



How does the dairy sector share its growth?

An analysis of the flow-on benefits of dairy's revenue
generation

NZIER final report to Dairy Companies Association of New Zealand
October 2018

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NZIER was established in 1958.

Authorship

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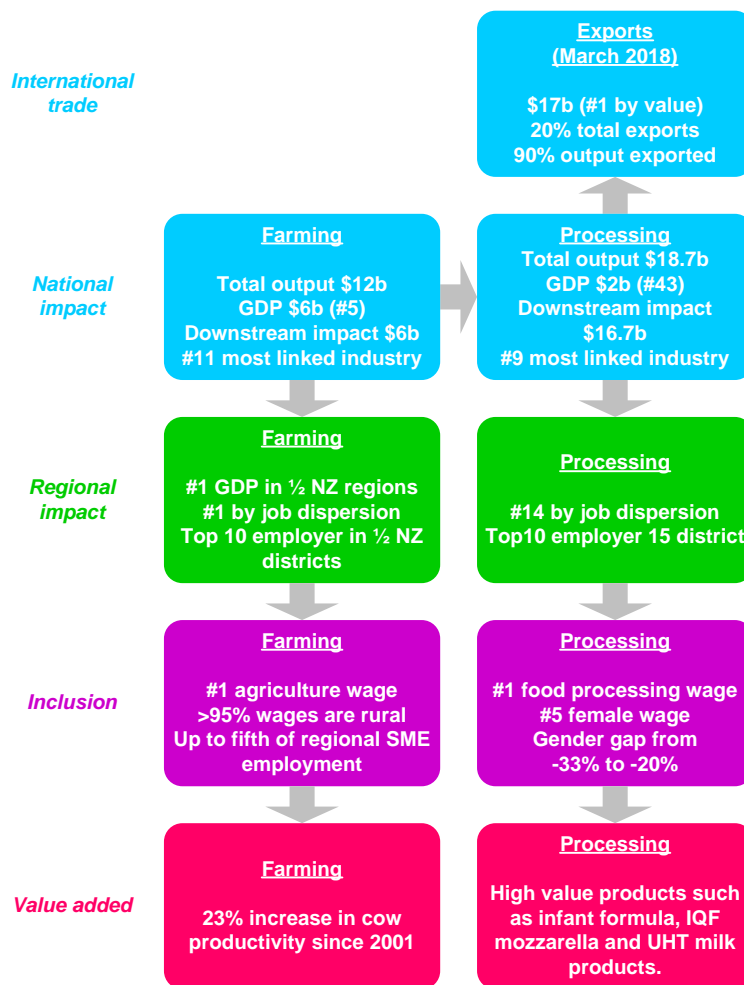
Key points

DCANZ asked NZIER to look beyond dairy's high-level impact on the New Zealand economy and delve into how income from dairy is distributed across New Zealand regions, other businesses, and incomes.

The dairy sector is a major contributor to NZ's living standards

Figure 1 Dairy value chain impact on NZ regional economies

All statistics for March Year End 2017 except exports



Source: NZIER

Dairy plays a crucial role in supporting regional economic development

- Dairy provides economic opportunities in many regional economies where there are few alternatives sources of jobs and income.
- Dairy farming is the top income generator in Waikato, West Coast and Southland. The dairy sector accounts for 14.8% of Southland's economy,

13.4% of the West Coast economy, 11.2% of the Waikato economy, 11.1% of Taranaki's economy and 6.0% of Northland's economy.

Dairy helps the New Zealand economy benefit from global economic development

- New Zealand's export profile is dominated by processed food and beverage (F&B) products, of which dairy is a significant contributor.
- The dairy sector accounts for 20% of total exports (goods and services).
- The strong growth of dairy export prices, driven by robust demand from emerging markets, has improved New Zealand's terms of trade dramatically since the early 2000s. This has improved Kiwi households' and firms' purchasing power.

Dairy's impacts flow well beyond the farm gate and processing plant

- Dairy farming is the largest purchaser in the economy of: agriculture, forestry, and fishing support services; building cleaning, pest control, and other support services; basic material wholesaling; veterinary and other professional services.
- Dairy processing is the largest purchaser in the economy of: polymer product and rubber product manufacturing; and rail transport.

Dairy shares its growth inclusively throughout the supply chain

- The dairy sector delivered \$2.6 billion in wages to dairy farmers and processing workers in 2017. About 80% of all dairy wages are earned in rural areas.
- Dairy farming has the highest average salary in the farming sector (\$48,700 compared to the average agriculture salary of \$45,800)
- Dairy processing has the highest average food and beverage processing sector wage (\$74,900 compared to the average of \$59,600).
- The average female dairy processing wage at \$72,710 is the fifth highest compared to all other sectors in the NZ economy.
- The gender wage gap in the dairy sector has been reducing over the last 15 years. It has fallen from -41% to -35% between the average male and female wage in dairy farming and from -33% to -20% in dairy processing.
- Dairy processing has the 20th lowest wage gap in the economy out of 139 sectors. New Zealand's major dairy companies are committed to increasing the diversity of their workforces.

Innovation

- We estimate total dairy plant investment at \$3.1 billion since 2013. The growth in infant formula exports (now above \$1billion), cheese and curd (almost \$2 billion) and UHT exports over the last three years is the result of plant investments across New Zealand in those specific product categories in response to shifting global demand.

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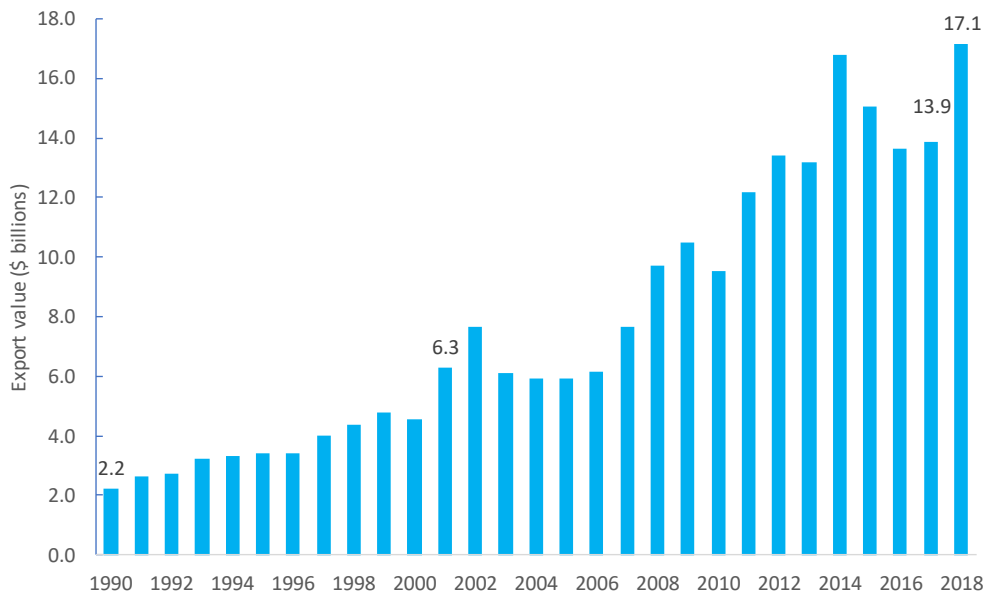
1. Introduction

1.1. Scope

The value of dairy exports has risen by nearly three times from \$6.3 billion in 2001 to \$17.1 billion in 2018. Since 1990, dairy export value has increased nearly eight-fold.

Figure 2 Value of dairy exports

Values in \$ billions



Source: NZIER, DairyNZ

This has clearly been beneficial for the dairy sector, but it is also useful to explore how dairy's growth has delivered wider economic and social benefits for New Zealand.

1.2. Report structure

Using the framework in Figure 3, we present quantitative analyses coupled with key points from some case studies where applicable to provide more context around the numbers. on the following areas:

- Export overview
- National impact
- Regional impact
- Inclusiveness
- Value addition

Figure 3 Overall framework to understand the dairy sector's impact



Source: NZIER

2. Export

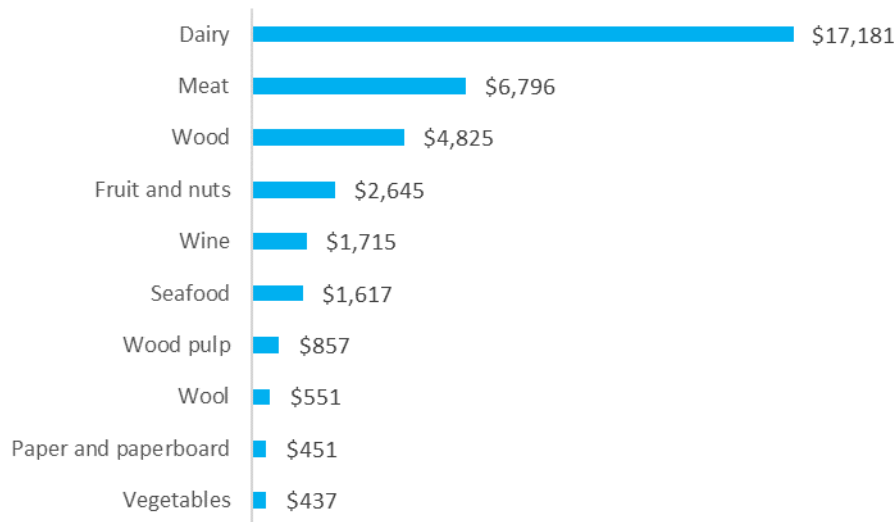
2.1. Dairy export review

The dairy sector remains New Zealand's largest goods export sector by some margin. At \$17.2 billion in the year to March 2018, it generates more than two and a half times as much as the meat sector, more than three times as much as the wood sector and ten times as much as the wine sector.

Dairy accounts for nearly 20% of total New Zealand goods and services trade.

Figure 4 Dairy is our biggest goods export by far

Merchandise Trade; March 2018; \$ millions



Source: NZIER, Statistics New Zealand

The key products exported by the dairy sector in the year to March 2017 include concentrated milk and cream (skimmed and whole milk powder) (\$7 billion), butter and spreads (\$3.5 billion), cheese and curds (\$2 billion), casein and caseinates (\$904 million), infant formula (\$1.1 billion) and whey (\$607 million).

If considered as standalone sectors, butter and spreads would be larger than fruit and nuts, and cheese would be larger than either wine or seafood.

Niche but rapidly-growing dairy export segments include hydrosalates (\$75 million), ice cream (\$40 million), ethanol (used for alcoholic beverages, \$38 million).

Table 1 Composition of dairy exports

\$ millions; March 2018 Year End

Dairy exports	Value	%
Milk & cream (concentrated)	\$7,254	42.2%
Butter & spreads	\$3,520	20.5%
Cheese & curd	\$1,925	11.2%
Infant formula	\$1,094	6.4%
Casein and caseinates	\$904	5.3%
Food preparations; n.e.c. in item no. 2106.90	\$856	5.0%
Milk & cream (unconcentrated)	\$713	4.1%
Whey	\$607	3.5%
Buttermilk, curdled milk & cream, yoghurt, kephir, fermented or acidified milk or cream	\$154	0.9%
Hydrosalates	\$75	0.4%
Ice cream	\$40	0.2%
Ethanol	\$38	0.2%
Total	\$17,181	100%

Source: NZIER, Statistics New Zealand

The growth production capacity of infant formula (now just above \$1 billion), cheese and curd (nearing \$2 billion) and UHT exports over the last three years is the result of plant investments across New Zealand in those specific product categories.

Table 2 Summary of plant investment by broad product

2014-2017

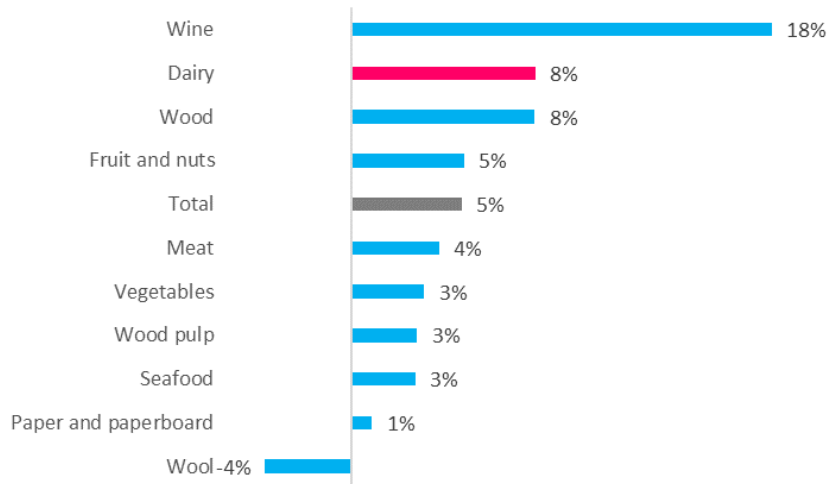
Broad product	Sum of Investment (\$m)
Powder	\$1,198
Mix (UHT milk, infant formula canning, lactoferrin, cream)	\$700
Infant formula	\$459
Cheese	\$396
UHT	\$187
Protein, cream	\$168
Total	\$3,108

Source: NZIER, Statistics New Zealand

Dairy export values have grown by an average of 8% per year since 1990, making it the fastest-growing primary industry exporter aside from the wine sector (18% annual growth, albeit from a low base of \$17 million in 1990).

Figure 5 Dairy exports have grown 8% per year since 1990, faster than most other exports

CAGR; 1990-2018; March Year End



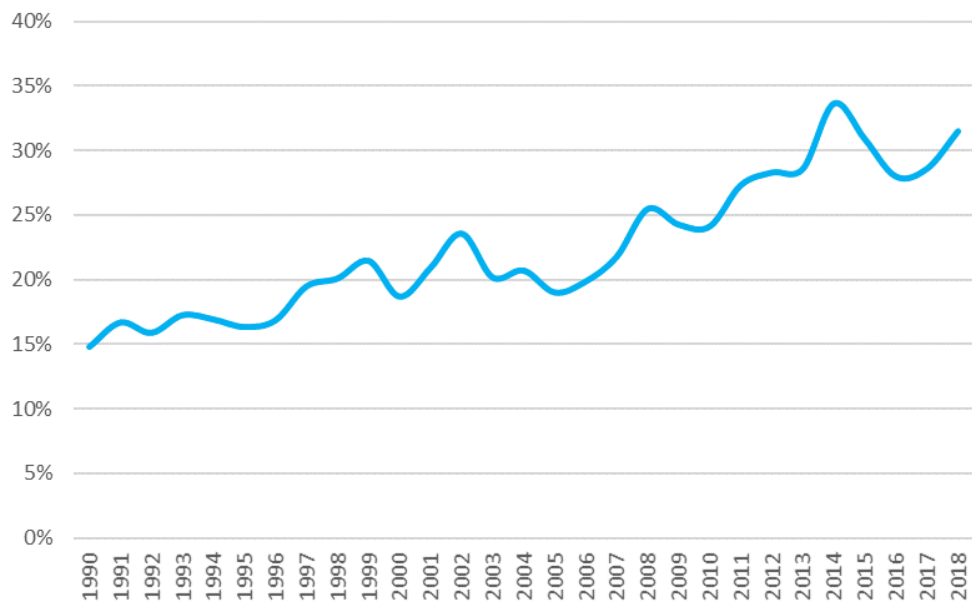
Source: NZIER, Statistics New Zealand

2.2. Dairy is the most internationally connected sector in the economy

Dairy’s share of New Zealand’s total goods exports has increased from 15% in 1990 to 31% in 2018, after peaking at 34% in 2014 when commodity prices soared.

Figure 6 Dairy accounts for an increasing share of goods exported

March Year End; Dairy exports as % of total goods (merchandise) exports

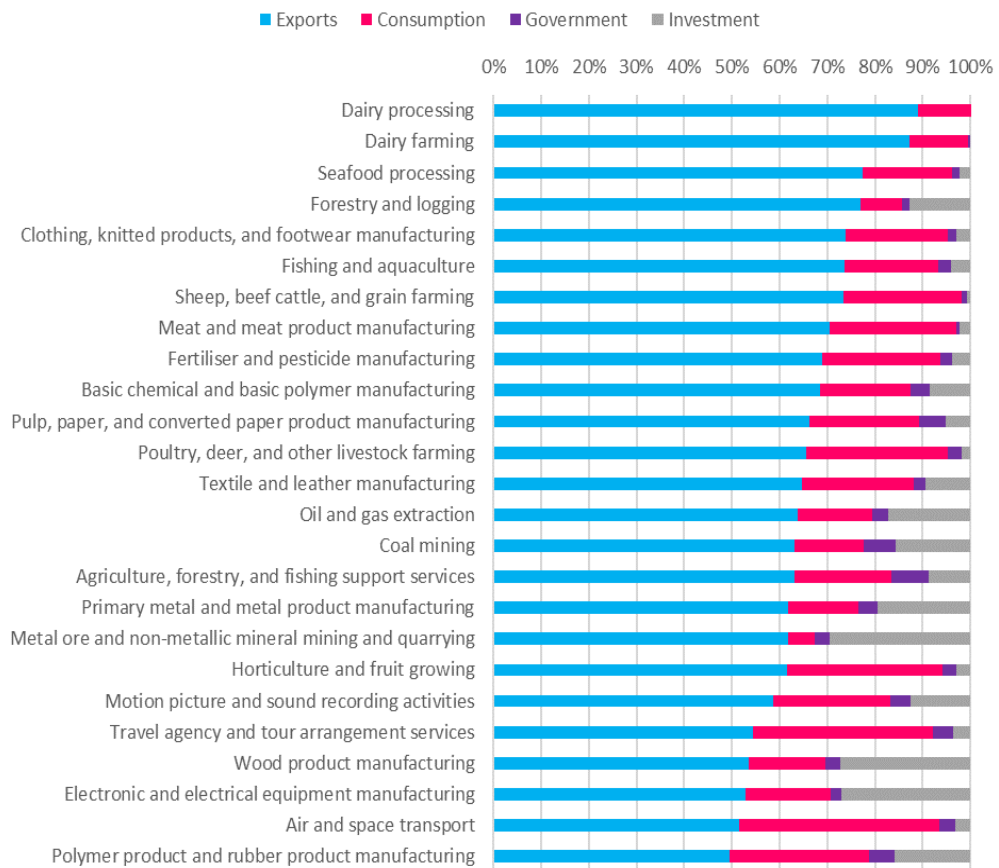


Source: NZIER, Statistics New Zealand

Dairy is the most internationally connected industry in the economy, with almost 90% of its output by value ultimately exported, the remaining 10% being domestically consumed.

Figure 7 Dairy is the most internationally connected sector in the economy

2017; Ultimate disposition ranked by export share; Top 20 industries; Ultimate disposition is an estimate of the final use of all goods and services produced, i.e. the ultimate disposition of Dairy farming is the final use (export or domestic consumption) of the milk originally produced (either in the form of powder, butter, etc)



Source: NZIER, Statistics New Zealand

The international connectedness of dairy extends beyond exports. New Zealand dairy companies offshore investments (in markets as diverse as Chile, the UK, Netherlands, Lithuania, and China) contribute additional revenue into the New Zealand economy via dividends paid to New Zealand shareholders.

Supplying goods to the dairy sector has also been launching pad for a number of agricultural support industries which now have growing exports. For example:

- Gallagher’s has become a major global agritech and security company after having started life as a supplier of electric fences to New Zealand dairy farms.

- Waikato Milk systems – located in the Waikato region, Waikato Milk Systems has moved from being a trusted brand within the New Zealand dairy industry to now having an expanding presence across 30 countries with sales and operations based in Europe, the Americas, Asia and Africa.

2.3. Terms of trade benefits

Dairy export revenue per kg has increased by 43% since 1990. The average dairy export value per kg increased from an average of \$3.40¹ between 1990 and 2007 to \$4.80 since 2008.

This growth can be attributable to a number of factors, including:

- rapid Chinese economic growth and demand for dairy which raised export prices
- innovation and value addition to dairy product exports by New Zealand firms.

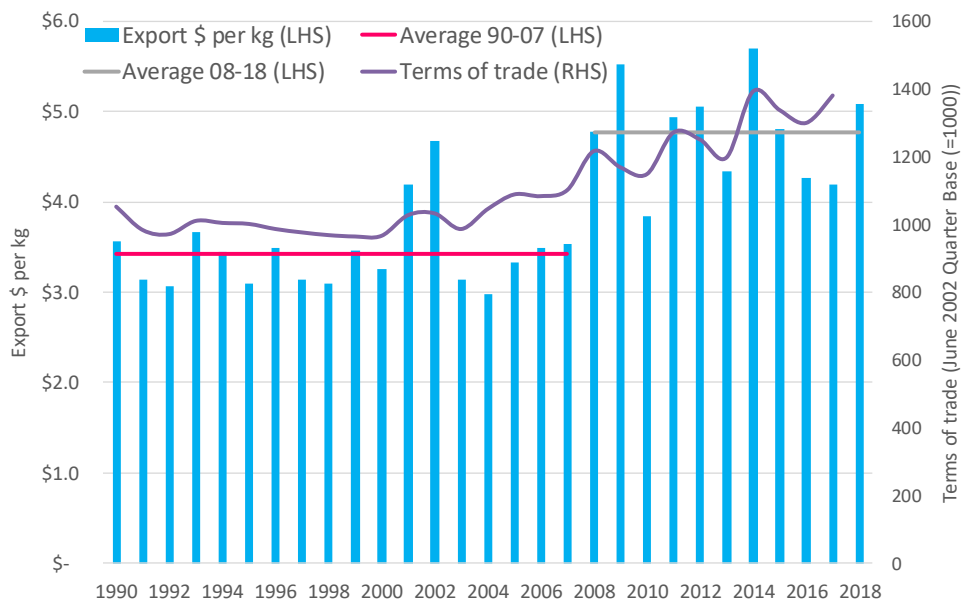
The growth of export prices is particularly visible in New Zealand’s terms of trade.

The terms of trade is the ratio of export prices to import prices. When the terms of trade improve, i.e. the ratio increases, New Zealanders see their purchasing power expand as a given amount of export revenue can purchase a larger bundle of imported items.

New Zealand’s terms of trade has improved strongly (40%) since the early 2000s.

Figure 8 Total dairy export revenue per kg

March Year End



Source: NZIER, Statistics New Zealand

¹ Nominal value.

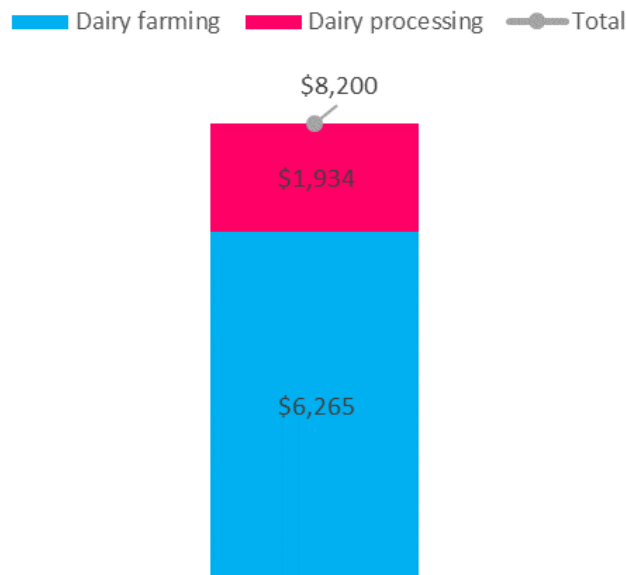
3. National economic impact

3.1. GDP – salaries and profits

The dairy sector accounts for \$8.2 billion (3.1%) of New Zealand’s total GDP (March 2017). This is shared between dairy farming (\$6.3 billion) and dairy processing (\$1.9 billion).

Figure 9 Dairy contributes \$8.2 billion to the New Zealand economy

March Year End 2017; GDP; \$ millions; Nominal



Source: NZIER

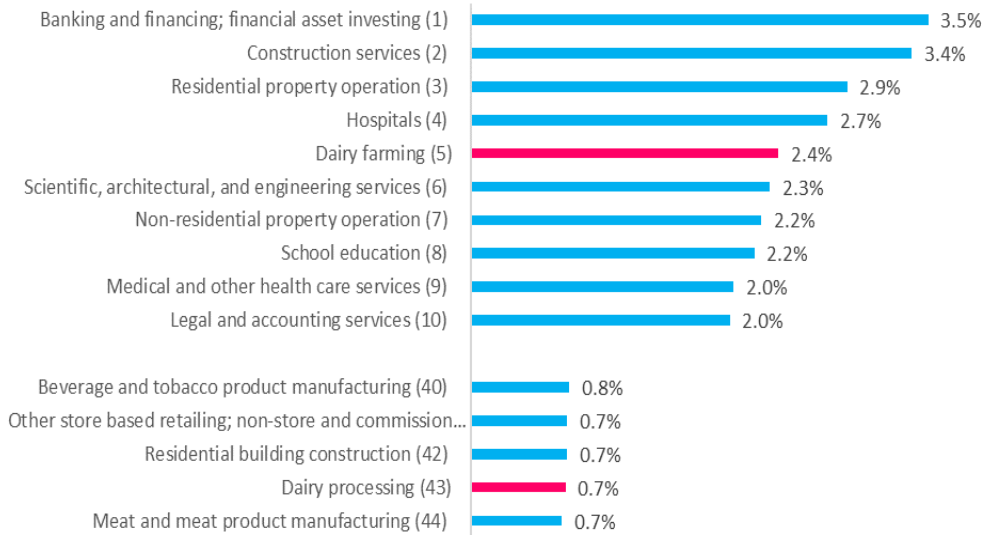
Dairy farming is the fifth largest industry in New Zealand behind finance, construction, real estate and health. Dairy processing’s contribution to economic activity is smaller than dairy farming’s and ranks 43rd, similar to meat processing.

In addition, the dairy sector contributes to the activity of those larger industries, particularly construction (largely dairy processing as a result of plant investments) and finance (total loans to dairy farmers were \$40.5 billion in March 2017²).

² <https://www.rbnz.govt.nz/statistics/s31-banks-assets-loans-by-purpose>

Figure 10 Dairy farming is the 5th largest industry in New Zealand

2017; Share of total GDP; Nominal; excludes Owner-Occupied Dwellings



Source: NZIER, Statistics New Zealand

3.2. Dairy is uniquely important to NZ amongst developed nations

Amongst OECD nations, New Zealand is in the top five agriculture and food processing countries, with these sectors both contributing around 5% of GDP respectively.

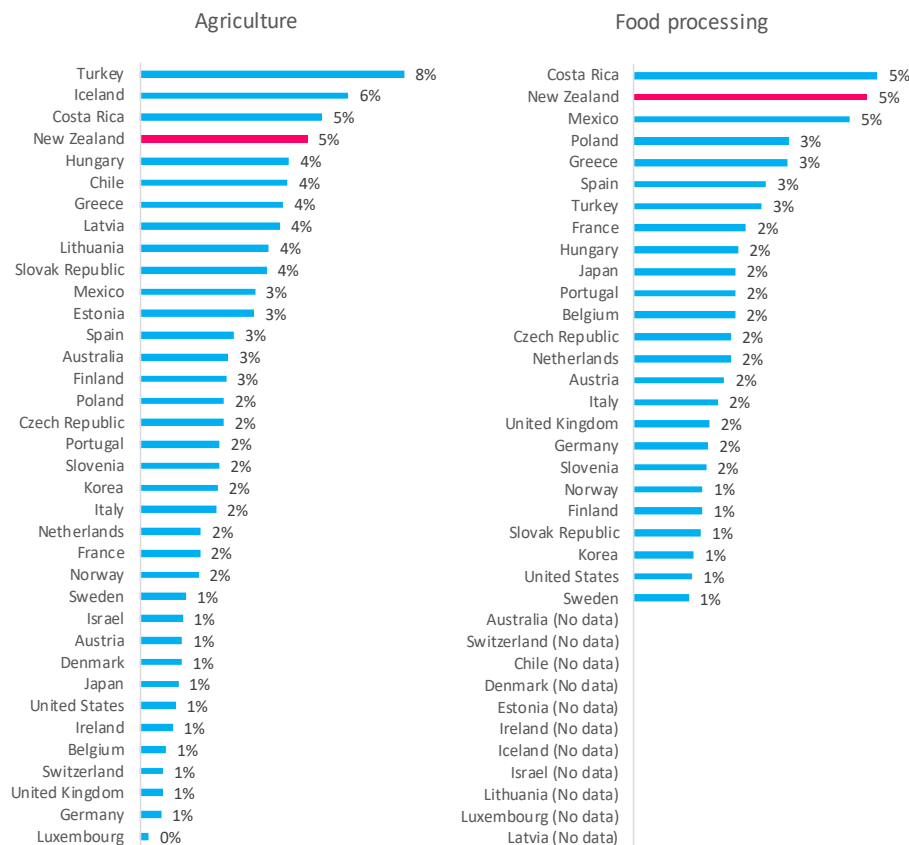
Recall that dairy alone accounts for 3.1% of New Zealand’s GDP. Few economies in the OECD earn above 3% of their total income from a single agricultural activity.

Even in countries such as the US and France, which have large agriculture and food processing industries by international standards, their dairy industries only contribute 1-2% of GDP.

This is in part a reflection of New Zealand’s comparative advantage and resource endowments. Our temperate climate and ample supply of productive land provide ideal conditions for dairy production. Our long history of primary production has also led to best-practice farming techniques that have boosted productivity.

Figure 11 New Zealand economy is heavily dependent on agriculture and food processing compared to other OECD countries

Share of national GDP; 2015



Source: OECD

3.3. Employment

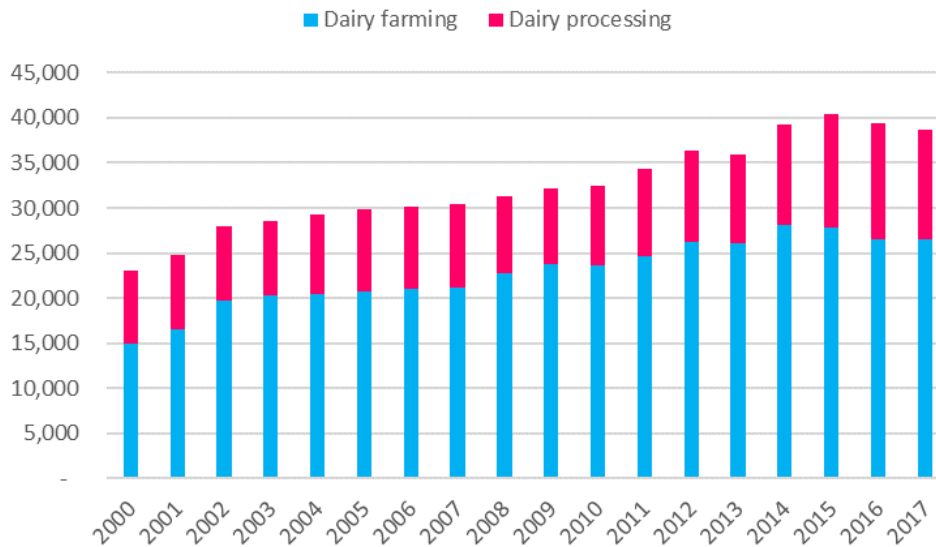
Dairy employment was 38,700 in February 2017, with 26,500 employed on farms and a further 12,200 employed in dairy processing. Additionally, dairy supports jobs in other sectors of the economy such as:

- Agriculture, forestry, and fishing support services (0.7% of GDP, 4675 jobs)
- Building cleaning, pest control, and other support services (0.7% of GDP, 2327 jobs)
- Basic material wholesaling (0.8% of GDP, 756 jobs)
- Veterinary and other professional services (0.2% of GDP, 259 jobs)
- Polymer product and rubber product manufacturing (0.6% of GDP, 1124 jobs)
- Rail transport (0.1% of GDP, 143 jobs).

Dairy employment has been relatively stable since 2014, despite milk price volatility. This indicates that dairy farming jobs are ‘sticky’ – farms tend to hold onto workers through price cycles.

Figure 12 Dairy sector employs 38,700 workers directly

Head count; February Year End 2017



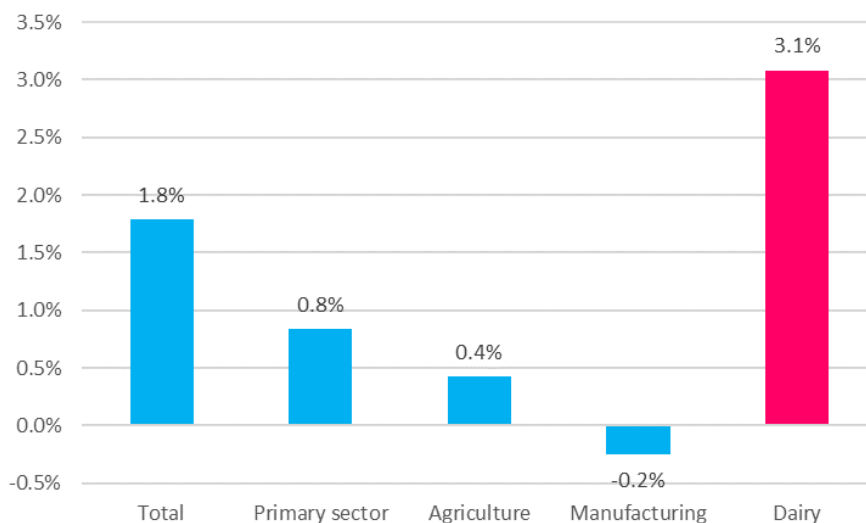
Source: NZIER, Statistics New Zealand

The dairy sector's contribution to national employment has steadily increased over time. Figure 13 shows that since 2000, dairy sector employment has grown by an average of 3.1% per year, compared to 1.8% for total employment.

Dairy sector employment has also been growing faster than other parts of the land-based economy. Total agricultural sector employment has grown at 0.4% per year since 2000.

Figure 13 Dairy employment has grown faster than national and primary sector employment since 2000

Employment (head count) CAGR



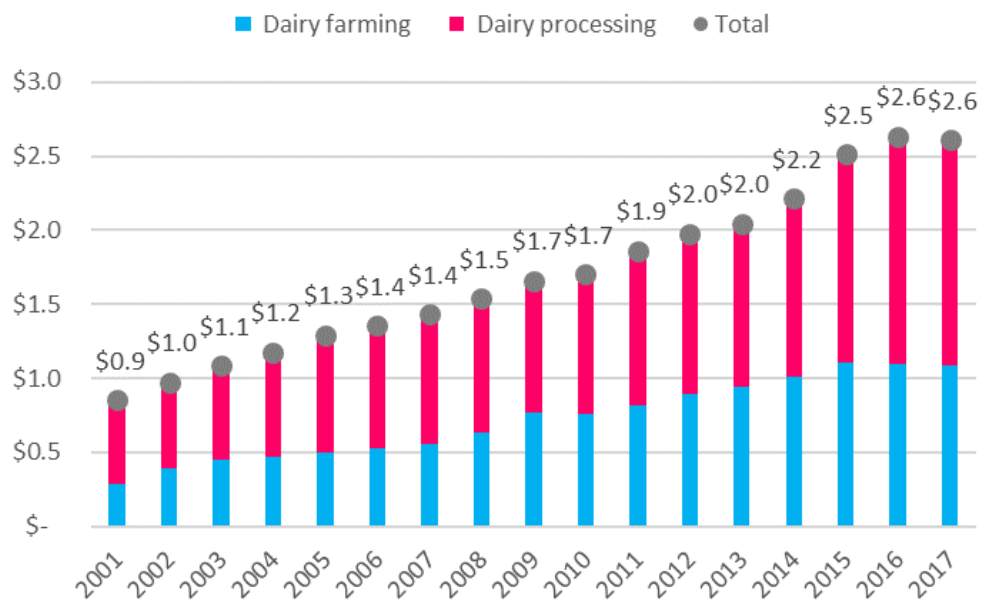
Source: NZIER, Statistics New Zealand

3.4. Wages

The dairy sector delivered \$2.6 billion in wages to dairy farmers and processing workers in 2017. Dairy sector wages almost tripled between 2001 and 2017.

Figure 14 Dairy sector total wage earnings

\$billions; March Year End



Source: NZIER, Statistics New Zealand

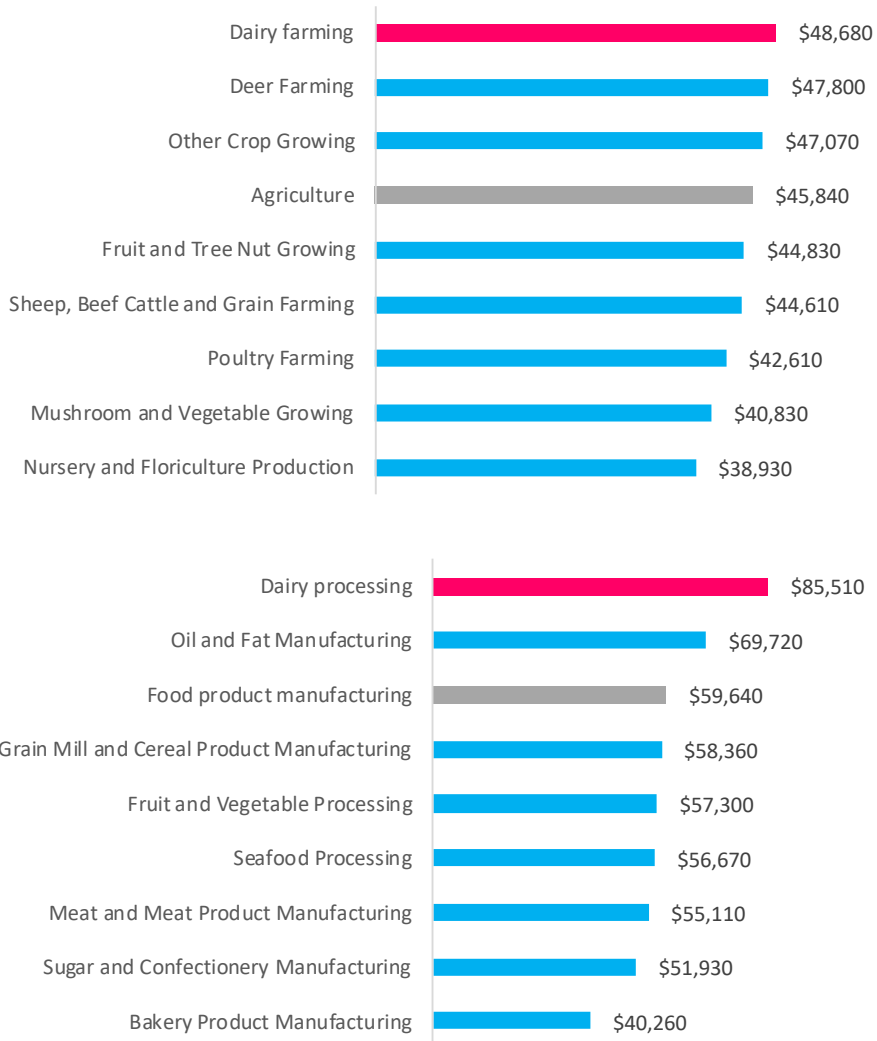
Dairy farming and dairy processing's average wages are high compared to other farming and food processing wages:

- The dairy farming sector has the highest average wage (\$48,700) in the wider farming sector. The average agriculture wage is \$45,840.
- The average dairy processing wage is \$85,510, well above all other forms of food product manufacturing. The average food manufacturing wage is \$59,640.

Dairy employment has increased faster than national job creation, meanwhile dairy wages are above other agricultural and food processing sectors, which provides greater spending power (at the condition that dairy sector activity and jobs would be replaced by other agricultural and food processing sectors if it did not exist).

Figure 15 Dairy wages are above comparable industries

Annual average earnings; March 2017 Year End

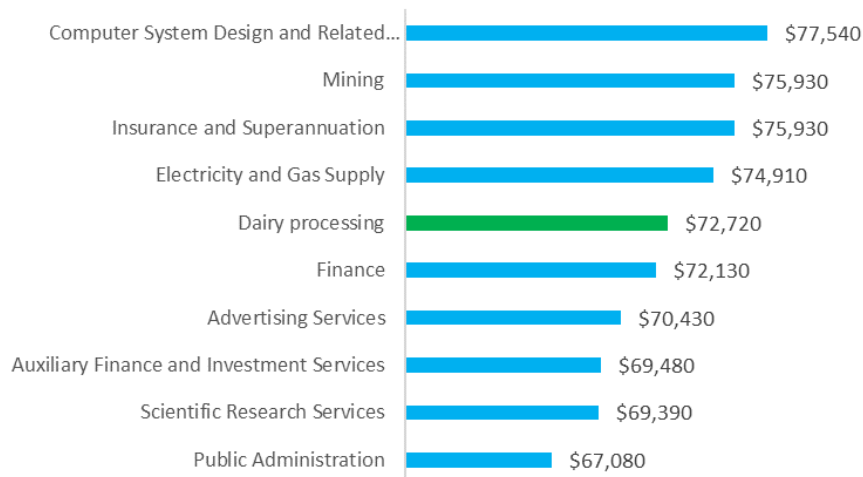


Source: NZIER, Statistics New Zealand

3.5. Diversity

Figure 16 Top 10 average female wage

2017; March Year End



Source: NZIER, Statistics New Zealand

Female wages in dairy have been growing faster than male wages. The gender wage gap in the dairy sector has been reducing over the last 15 years, falling from -41% to -35% between the average male and female wage in dairy farming; and from -33% to -20% in dairy processing.

Table 3 Trends in dairy wages by gender

March Year End; Nominal

Industry	Gender	2003	2017	CAGR
Dairy farming	Male	\$24,800	\$53,510	4.6%
	Female	\$14,570	\$34,980	5.3%
	Gap	-41%	-35%	
Dairy processing	Male	\$48,040	\$91,470	3.9%
	Female	\$32,410	\$72,720	4.9%
	Gap	-33%	-20%	

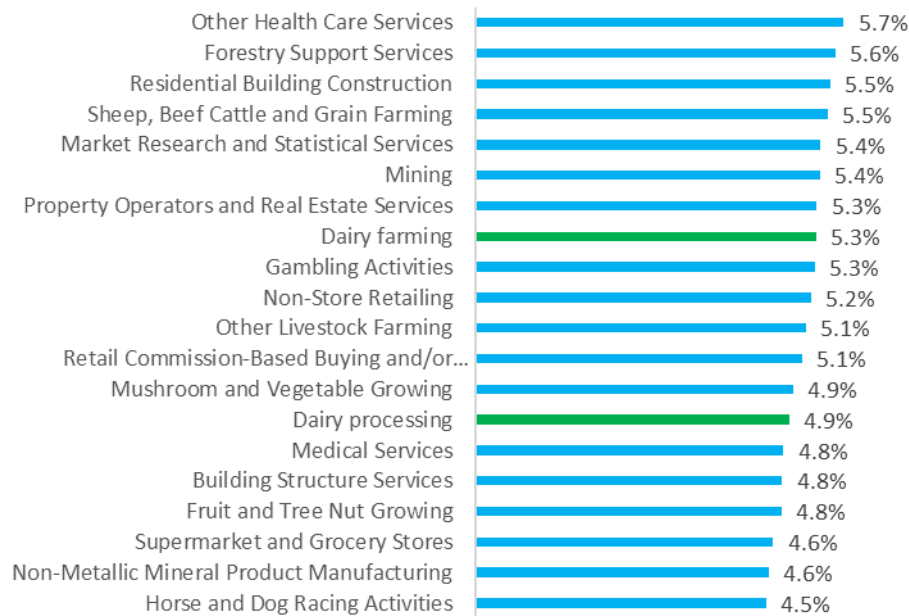
Source: NZIER, Statistics New Zealand

Dairy farming and processing have grown fast over the past 15 years, respectively 5.3% and 4.9% p.a. (in nominal terms), which are the 8th and 14th highest annual wage growth rate since 2000 compared to other sectors.

Sheep, beef and grain farming female wages have grown faster but they are still below average female dairy wages (\$28,210 compared to \$34,980 for Dairy farming).

Figure 17 Average annual growth rate female average wage by sector

2003-2017; March Year End; Nominal



Source: NZIER, Statistics New Zealand

Dairy processing at -20% has the 20th lowest wage gap (out of 139 sectors).

The dairy farming wage gap at -35% is higher (ranking at 113) but covers both full time and part time female workers (such as spouses working on the farm) which is likely to distort the average female wage in dairy farming down (and increase the gap).

In general, gender and cultural diversity can be seen across all levels of the dairy industry including:

- Female leadership of dairy organisations and dairy processors. The position of President of Federated Farmers, CEO of Westland Dairy Company, and Executive Director of the Dairy Companies Association of New Zealand are currently held by females.
- An increasing participation of women in a range of roles across the industry, including 15% of tanker drivers at Oceania Dairy being female and 35% of female participation across the total Oceania workforce.
- Fonterra has targets in place to ensure a 50/50 gender balance and 20% ethnic diversity targets at leadership levels, as well as its graduate and intern programmes, and a number of initiatives across its global business to ensure those targets are met.
- The Dairy Women's Network is actively supporting skills and leadership development for women within the dairy farming sector and is one of the four organisations partnering in the Dairy Tomorrow strategy.³

³ <https://www.dairytomorrow.co.nz/wp-content/uploads/2017/12/dairy-strategy-2017-A4-booklet-Part3.pdf>

- Cultural diversity highlighted by 45 nationalities with the workforce at Fonterra’s Research centre.
- Fonterra’s ‘Disrupt’ programme which brings diverse teams of employees together to create change ideas. This helped the co-op win the Deloitte Top 200 Diversity and Inclusion Leadership Award in 2017.

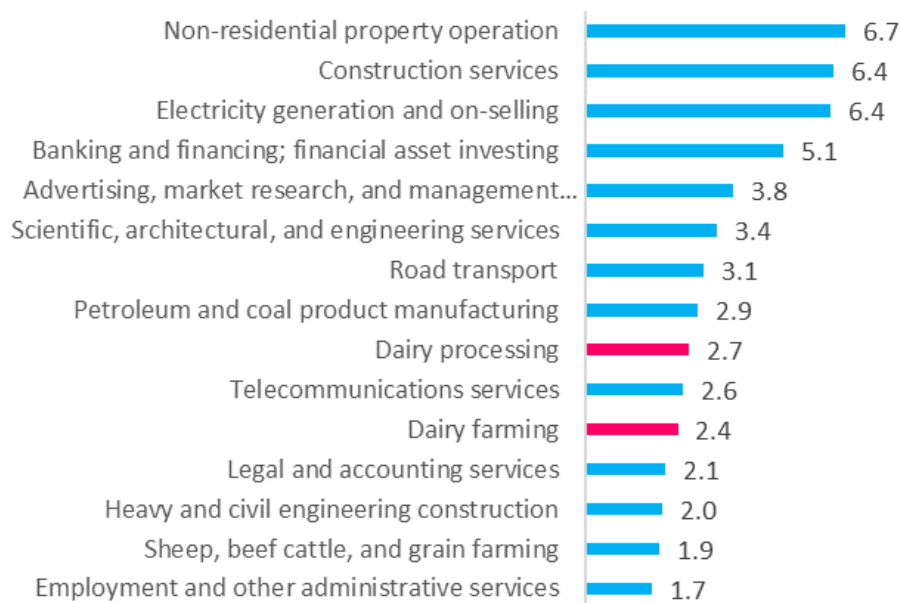
3.6. Downstream impact on other industries

The size of the dairy industry also has a significant impact on downstream activities in other parts of the New Zealand economy.

Industry entropy is an indicator of the size and spread of an industry’s linkages with the rest of the economy, i.e. how much and from how many industries does it use inputs from for its own production?

Using this measure, dairy is one of the most linked industries in the economy, with processing and farming ranking 9 and 11 respectively on the entropy index. In other words, many other industries rely on dairy for their own demand.

Figure 18 Industry entropy index, Top 15
2017



Source: NZIER, Statistics New Zealand

Dairy farming is the largest purchaser in the economy of:

- Agriculture, forestry, and fishing support services (0.7% of GDP, 4675 jobs)
- Building cleaning, pest control, and other support services (0.7% of GDP, 2327 jobs)
- Basic material wholesaling (0.8% of GDP, 756 jobs)

- Veterinary and other professional services (0.2% of GDP, 259 jobs).

Dairy processing is the largest purchaser in the economy of:

- Polymer product & rubber product manufacturing (0.6% of GDP, 1124 jobs)
- Rail transport (0.1% of GDP, 143 jobs).

Dairy farming and dairy processing are the largest purchasers of output from seven and six industries respectively in the New Zealand economy.

Dairy farming is amongst the top 10 purchasers of 40 industries' output; and processing amongst the top 10 purchasers of 33 industries' output.

This means the wider dairy sector is vitally important as a purchaser of goods and services from around a third of all industries in the New Zealand economy (40 industries for Dairy farming accounting for 41% of GDP and 33 industries for Dairy processing accounting for 29% of GDP).

Table 4 Dairy sector purchases of other industries' output, 2017

Industry	Industries where dairy is top output purchaser	Share of industries	Count Top 10 output purchaser	Share of industries
Dairy farming	7	7%	40	38%
Dairy processing	6	6%	33	31%
Dairy as key purchaser of other industry outputs				
Industry	Dairy farming - ranking (share output, jobs)	Industry	Dairy processing – ranking (share output, jobs)	
Agriculture, forestry, and fishing support services	1 (19%, 4675)	Polymer product & rubber product manufacturing	1 (9%, 1124)	
Building cleaning, pest control, and other support services	1 (6%, 2327)	Rail transport	1 (10%, 143)	
Basic material wholesaling	1 (3%, 756)	Road transport	2 (6%, 2503)	
Veterinary and other professional services	1 (6%, 259)	Warehousing & storage services	2 (8%, 119)	
Pharmaceutical, cleaning, and other chemical manufacturing	1 (5%, 110)	Water supply	4 (7%, 73)	
Motor vehicle and motor vehicle parts wholesaling	2 (2%, 171)	Electricity generation & on-selling	7 (1%, 137)	
Fertiliser and pesticide manufacturing	2 (21%, 595)	Electricity transmission & distribution	7 (1%, 49)	
Machinery manufacturing	2 (2%, 287)			

Source: NZIER, Statistics New Zealand

Figure 19 shows the purchases made by dairy farmers to support their production. Farmers spent \$820 million on agri-chemicals, \$414 million on forage crops and over \$220 million on agricultural equipment.

Farmers also spent a huge amount on services to support their operations: \$933 million on agricultural services, \$434 million on financial services and \$200 million on accounting and tax services.

Figure 19 Dairy farms draw on inputs from a wide range of supporting industries

2017; \$m of expenditure



Source: NZIER, Statistics New Zealand

Figure 20 shows the inputs used in the dairy processing sector. Clearly milk is the key input, but the processing sector also spends significant amounts on packaging (\$336 million in 2017), hired equipment (\$202 million) and plastics (\$201 million) and various other products and services.

Figure 20 Dairy processing uses more than just raw milk

2017; \$m of expenditure



Source: NZIER, Statistics New Zealand

3.7. Links to the Māori economy

Dairy plays a significant role in the Māori economy. Māori own 10% of all assets in the dairy industry. This linkage supports the Māori economy to benefit from dairy's international linkages and growth.

Miraka, the Māori-owned dairy exporting business located in Taupo currently has 40% of its employees who are Māori. Miraka also works to provide pathways for students right out of school, creating opportunities in the dairy industry for youth in Taupo. Nearly half (46%) of Taupo's youth population is Māori.⁴

The presence of Māori shareholders has allowed dairy cooperatives to leverage cultural identity to provide employment and business opportunities.⁵ Additionally, it has allowed Māori to become more experienced and involved in the whole value chain.⁶

Fonterra has approximately 213 Māori-owned or operated supplier farms, supported by dedicated Māori Relationship Managers. Fonterra is also working with organisations like Tupu Toa to support the development of Māori and Pasifika business leaders.

⁴ Population 19 years or under living in the Taupo district. Source: Statistics New Zealand.

⁵ <https://poutama.co.nz/projects/poutama-dairy/>

⁶ https://www.nzherald.co.nz/the-country/news/article.cfm?c_id=16&objectid=11989561

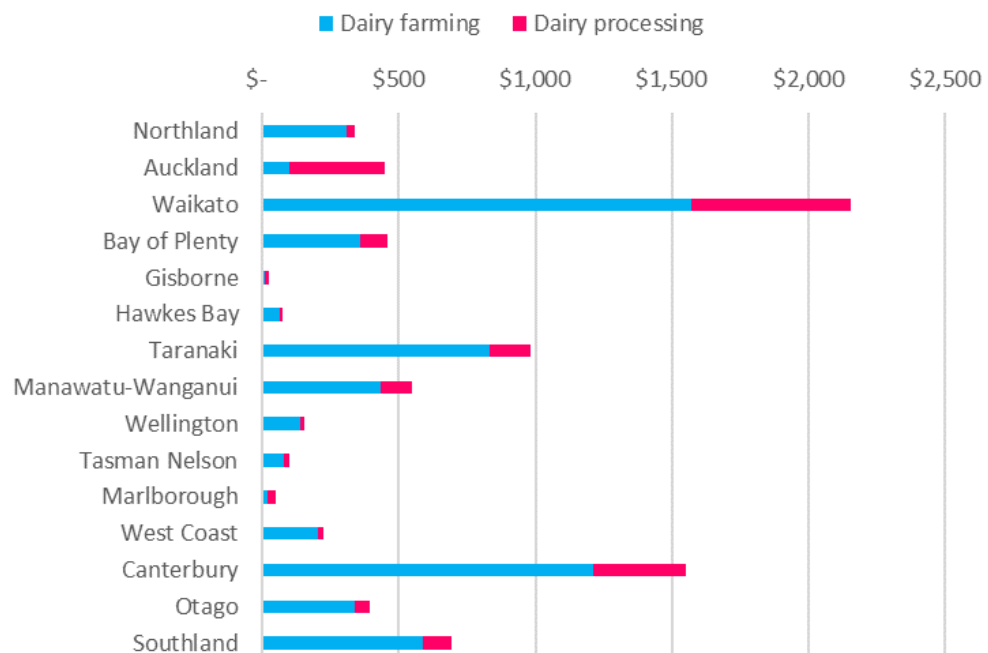
4. Dairy's regional impacts

4.1. Dairy farming and processing's GDP contribution at the regional council level

The dairy sector contributes to incomes across many regions in New Zealand, particularly its farming activities. Dairy processing is more concentrated in Auckland, Waikato and Canterbury.

Figure 21 Dairy's contribution to regional GDP

2017; \$ millions



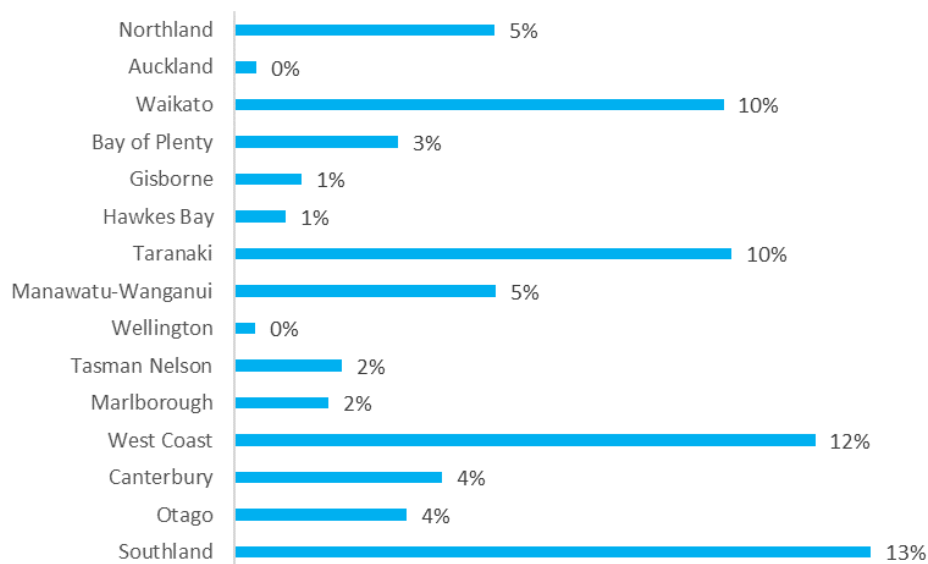
Source: NZIER, Statistics New Zealand

Dairy's income impact on the regions is significant. Waikato, Taranaki, West Coast and Southland all receive more than 10% of their GDP from dairy farming and dairy processing combined.

Another four (Northland, Manawatu-Wanganui, Canterbury and Otago) regions receive around 5% of their income from the dairy sector.

Figure 22 Dairy's contribution to the regions is significant

2017; Dairy farming and processing combined; % of regional GDP



Source: NZIER, Statistics New Zealand

As Table 5 shows, dairy farming is the top income generator in Waikato, Taranaki, West Coast and Southland.

Table 5 Ranking of GDP contribution by industry

March Year End; 2017

Region	Dairy farming	Dairy processing	Total Dairy
Northland	2	50	2
Auckland	94	69	57
Waikato	1	6	1
Bay of Plenty	7	43	3
Gisborne	49	27	18
Hawkes Bay	30	86	29
Taranaki	2	18	1
Manawatu-Wanganui	2	25	2
Wellington	59	103	54
Tasman Nelson	16	57	12
Marlborough	36	28	11
West Coast	1	29	1
Canterbury	3	35	3
Otago	7	52	4
Southland	1	13	1

Source: NZIER, Statistics New Zealand

At the regional level, dairy farming accounts for almost all use of agricultural equipment output in most regions and to a lesser degree forage products and animal and vegetable oils.

Table 6 Share of output purchased by dairy farming by region

2017

Region	Agricultural and forestry equipment	Forage products, fibres, sugar crops	Animal and vegetable oils and fats	Fertilisers and pesticides	Support services to agriculture
Northland	95%	83%	81%	47%	40%
Auckland	28%	23%	4%	2%	4%
Waikato	95%	86%	74%	52%	49%
Bay of Plenty	81%	68%	54%	34%	23%
Gisborne	34%	8%	17%	2%	1%
Hawkes Bay	59%	24%	16%	6%	3%
Taranaki	96%	93%	82%	73%	64%
Manawatu-Wanganui	92%	71%	66%	29%	28%
Wellington	76%	52%	22%	10%	12%
Tasman Nelson	85%	56%	44%	21%	11%
Marlborough	51%	15%	16%	9%	4%
West Coast	98%	95%	88%	80%	72%
Canterbury	90%	81%	55%	34%	37%
Otago	90%	66%	56%	27%	20%
Southland	96%	84%	84%	50%	42%

Source: NZIER, Statistics New Zealand

Table 7 Jobs supported by dairy farming in other sectors by region

2017

Region	Agricultural and forestry equipment	Forage products, fibres, sugar crops	Animal and vegetable oils and fats	Fertilisers and pesticides	Support services to agriculture
Northland	40	55	18	29	209
Auckland	13	18	6	10	69
Waikato	200	278	91	148	1065
Bay of Plenty	46	64	21	34	245
Gisborne	1	2	1	1	5
Hawkes Bay	9	12	4	7	46
Taranaki	107	148	49	79	566
Manawatu-Wanganui	56	77	26	42	296
Wellington	19	25	9	14	97
Tasman Nelson	11	15	5	8	55

Region	Agricultural and forestry equipment	Forage products, fibres, sugar crops	Animal and vegetable oils and fats	Fertilisers and pesticides	Support services to agriculture
Marlborough	3	4	2	3	15
West Coast	27	37	12	20	140
Canterbury	154	214	70	114	820
Otago	44	60	20	32	230
Southland	75	104	34	56	400
Total	805	1,113	368	597	4,258

Source: NZIER, Statistics New Zealand

Table 8 Share of output purchased by dairy processing by region

2017

Region	Starches	Railway transport freight services	Research and development	Semi-manufactures of plastics	Storage and warehousing services
Northland	70%	13%	12%	13%	12%
Auckland	42%	9%	5%	8%	7%
Waikato	89%	41%	33%	39%	41%
Bay of Plenty	60%	15%	14%	14%	13%
Gisborne	76%	17%	16%	23%	19%
Hawkes Bay	12%	3%	4%	3%	2%
Taranaki	88%	17%	18%	27%	22%
Manawatu-Wanganui	75%	26%	27%	21%	18%
Wellington	11%	1%	1%	1%	1%
Tasman Nelson	50%	11%	9%	12%	6%
Marlborough	48%	26%	36%	27%	16%
West Coast	77%	20%	21%	20%	19%
Canterbury	69%	23%	10%	14%	17%
Otago	53%	15%	9%	11%	10%
Southland	91%	33%	51%	31%	24%

Source: NZIER, Statistics New Zealand

Table 9 Jobs supported by dairy processing in other sectors by region

2017

Region	Starches	Railway transport freight services	Research and development	Semi-manufactures of plastics	Storage and warehousing services
Northland	4	5	2	12	3
Auckland	35	21	12	123	20
Waikato	58	33	19	207	34
Bay of Plenty	10	9	4	35	7
Gisborne	2	5	1	7	2
Hawkes Bay	1	5	1	4	1
Taranaki	15	9	5	53	9
Manawatu-Wanganui	12	9	4	40	7
Wellington	2	5	1	5	1
Tasman Nelson	3	5	1	8	2
Marlborough	3	5	1	11	2
West Coast	2	5	1	7	2
Canterbury	34	21	12	121	20
Otago	6	5	2	21	4
Southland	11	9	4	38	7
Total	198	151	70	692	121

Source: NZIER, Statistics New Zealand

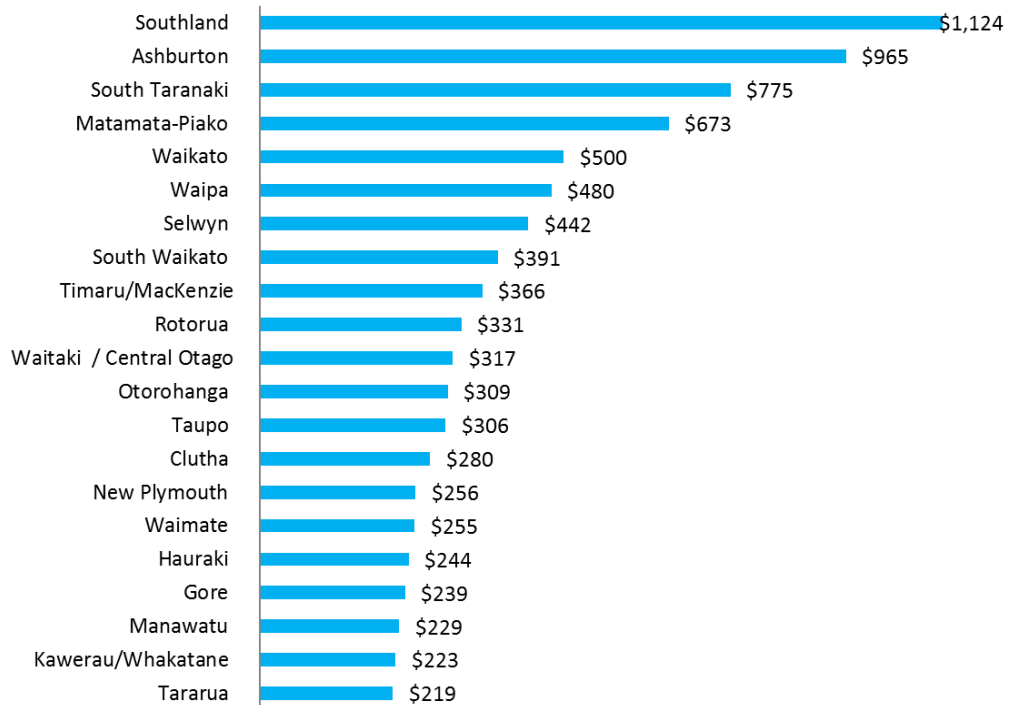
4.2. Dairy industry impact at the territorial authority level

The top 20 territorial authorities (TAs) by value of dairy production contributed three-quarters of the total value of dairy production in 2016/17.

Southland, Ashburton and South Taranaki's (the top three producers) combined production was valued at \$2.9 billion in 2016/17, a quarter of the national value.

Figure 23 Dairy production value by territorial authority 2016/2017

\$ millions



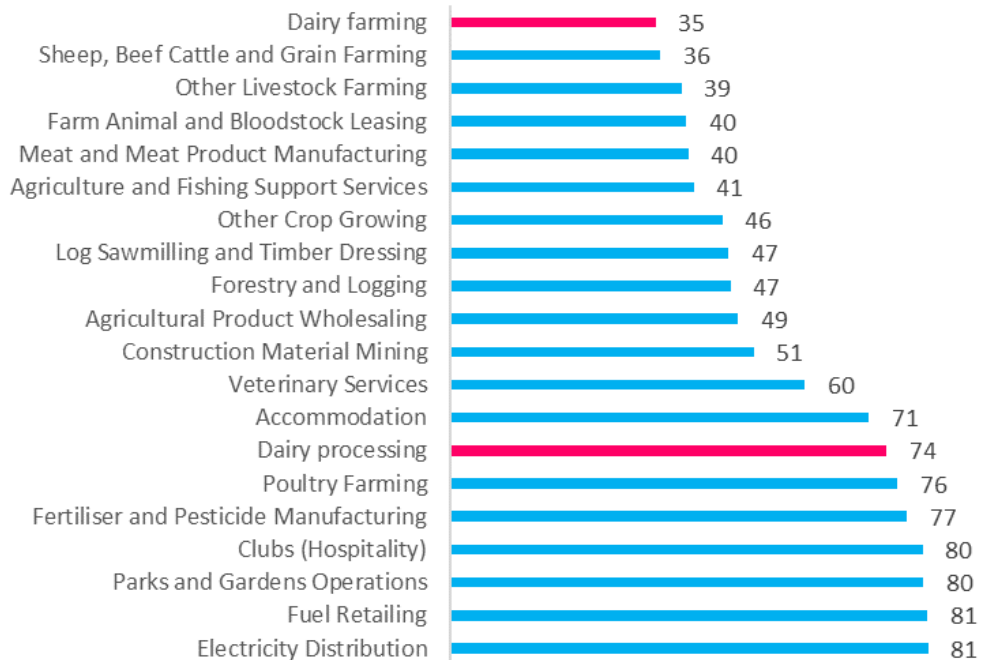
Source: NZIER, DairyNZ

Dairy provides job opportunities throughout New Zealand. Dairy farming is the least geographically concentrated industry in New Zealand i.e. dairy farming jobs are more prevalent in all New Zealand TAs than any other sector.

Dairy processing, while slightly more concentrated regionally, still figures amongst the 20 most dispersed industries by employment across the country.

Figure 24 Most dispersed employment across NZ districts by sector

February Year End; 2017; Herfindahl-Hirschman Index (HHI)⁷



Source: NZIER, Statistics New Zealand

The dairy industry is simultaneously one of the most dispersed industries in the economy but also amongst the top 10 employers in more than half of New Zealand TAs.

Dairy farming is the top employer in nine districts and amongst the top 10 employers in 36, half of all districts across New Zealand.

Dairy processing is amongst the top 10 employers in 10 districts (Table 10 overleaf).

⁷ HHI measures employment concentration across TAs. The greater the HHI score the more geographically concentrated employment is that sector across New Zealand.

Table 10 Dairy is a big employer in many districts

Employment count; 2017

Industry	Number of TAs where top employer	Share of all TA	Number of TAs where amongst top 10 employer	Share of all TAs
Dairy farming	9	13%	36	53%
Dairy processing	1	1%	10	15%
TAs in which dairy is amongst top 10 employer				
District	Dairy farming (employer ranking)		Dairy processing (employer ranking)	
South Waikato District	1		8	
Waimate District	1		3	
Southland District	1		8	
Matamata-Piako District	2		3	
Waipa District	2		6	
South Taranaki District	2		1	
Selwyn District	2		7	
Tararua District	3		7	
Clutha District	3		9	
Westland District	4		2	
Timaru District	8		9	

Source: NZIER, Statistics New Zealand

Looking at employment growth since 2000, dairy farming was the top job contributor in 14 districts (a fifth of all districts in New Zealand) and in the top contributor in 28 (41%).

Dairy processing was the top contributor in two and in the top 10 in 10 districts.

Table 11 Count dairy largest employment growth contributor since 2000

Employment count; Change 2000-2017

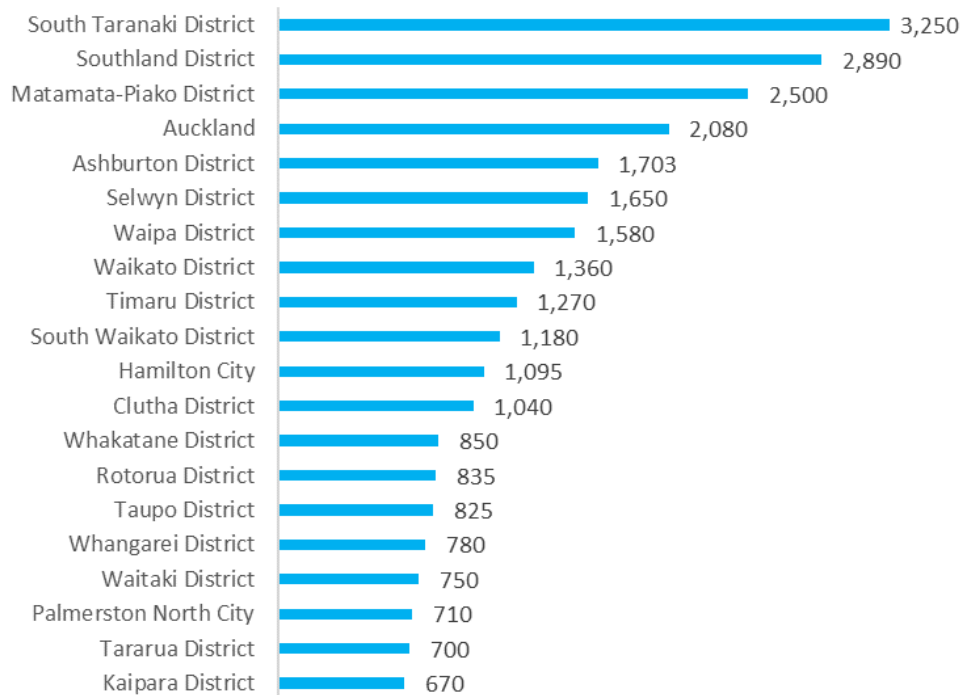
Industry	Number of TAs where dairy was the top contributor to employment growth	Share of TAs	Number of TAs where dairy was in the top 10 contributors to employment growth	Share of TAs
Dairy farming	14	21%	28	41%
Dairy processing	2	3%	10	15%

Source: NZIER, Statistics New Zealand

At a more detailed level (territorial authority), the dairy sector is vital to many territorial authority economies. Figure 25 shows the top 20 territorial authorities where dairy provides the most jobs.

Figure 25 Largest dairy employment by territorial authority

Head count



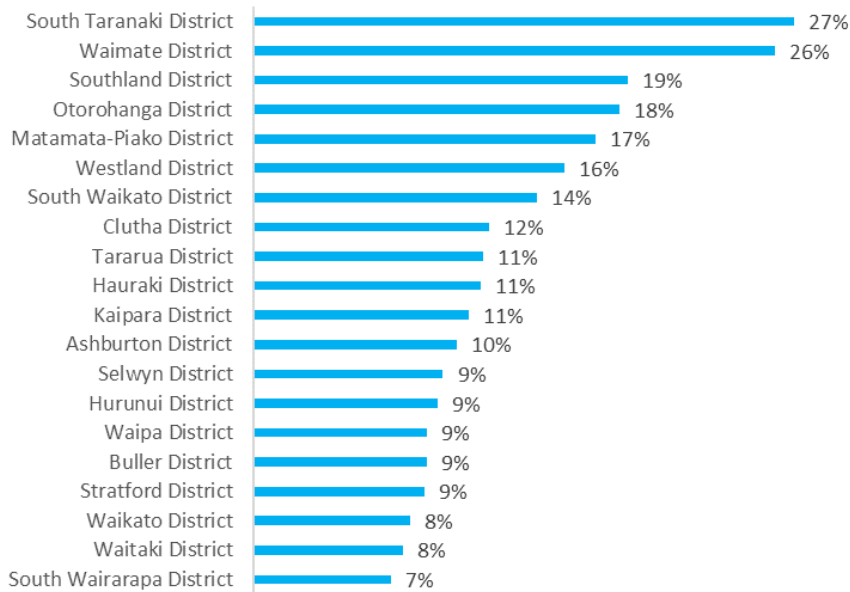
Source: NZIER, Statistics New Zealand

Figure 26 shows that dairy provides over one in four jobs in the South Taranaki and Waimate Districts; and over one in six in Southland, Otorohanga, Matamata-Piako. It provides over one in ten jobs in a further seven districts (Westland, South Waikato, Clutha, Taranua, Hauraki, Kaipara, Ashburton).

Figure 27 shows that growth in dairy sector jobs has been very strong in local economies such as Selwyn (11% average annual growth since 2000), Hastings (10%), Waimate (10%), Waitaki (8%) and Ashburton (8%).

Figure 26 Dairy is an important employer for many TAs

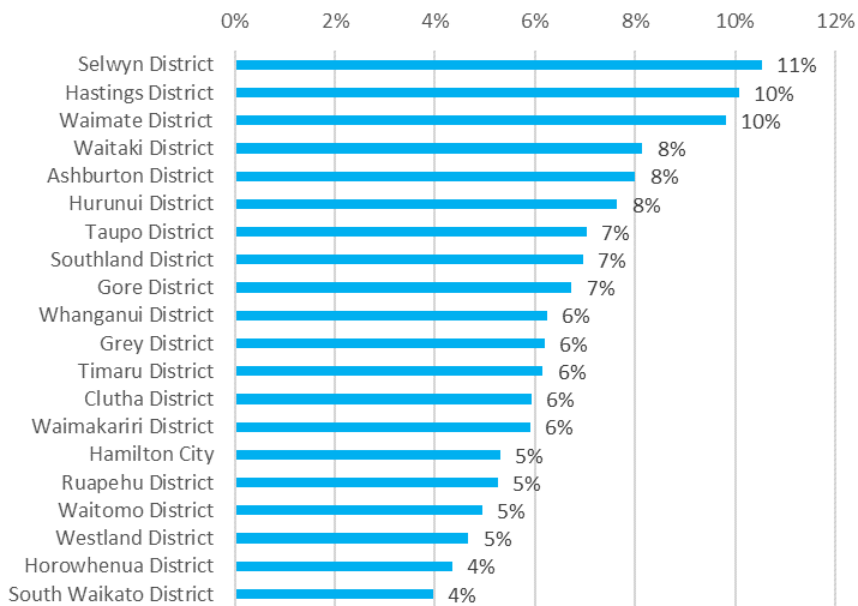
Dairy as a proportion of total jobs; Top 20



Source: NZIER, Statistics New Zealand

Figure 27 Dairy employment is growing rapidly in many parts of the country

CAGR; Dairy farming and processing; 2000-2017; Excludes Mackenzie as its growth rate (22%) is high starting from a very low base

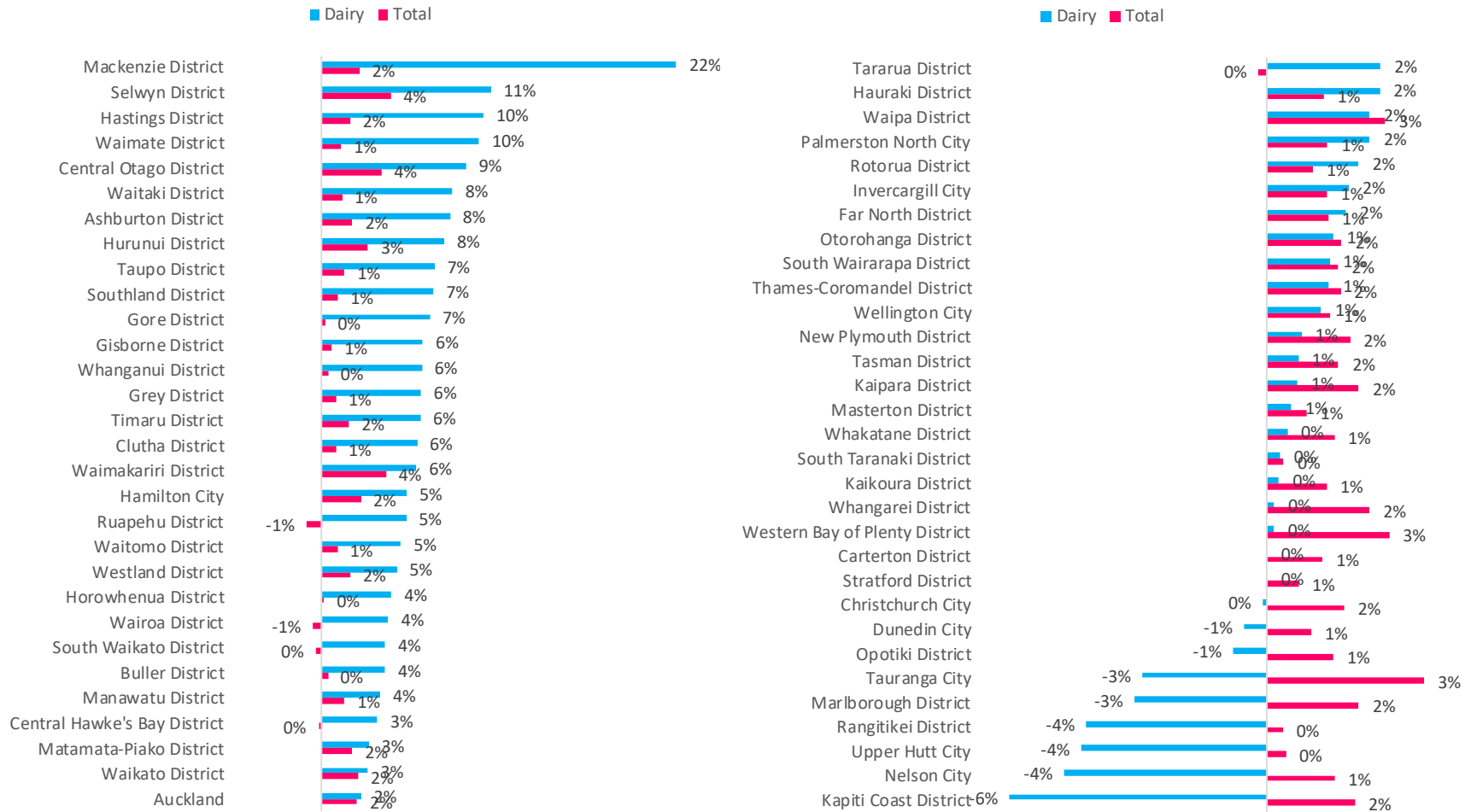


Source: NZIER, Statistics New Zealand

Since 2000, job growth has been stronger in the dairy sector than the economy as a whole in the majority of territorial authorities.

Figure 28 Dairy employment growth outstrips total employment in most areas

CAGR; 2000-2017



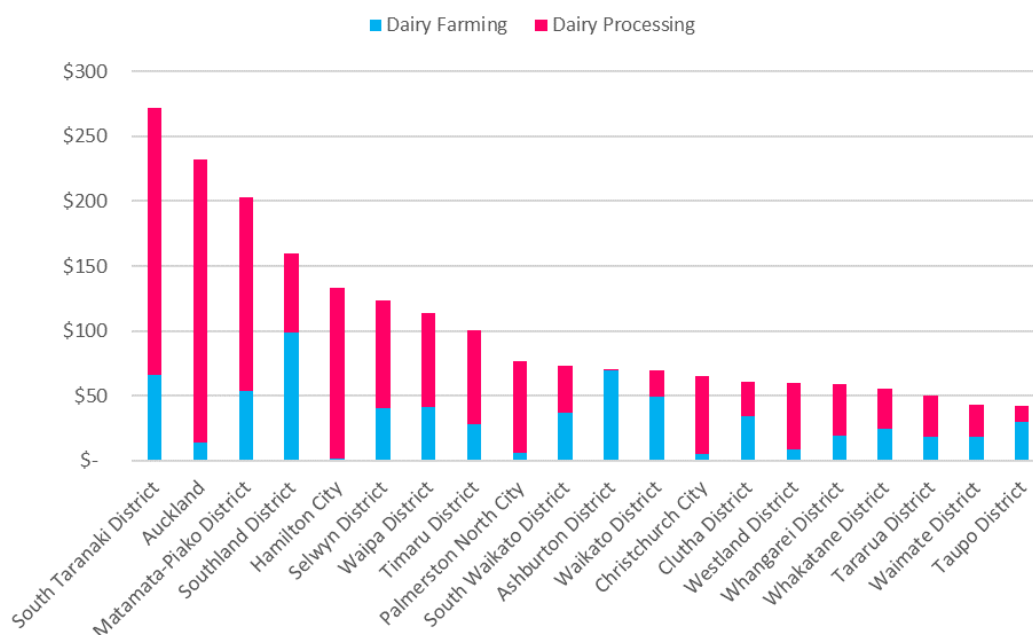
Source: NZIER, Statistics New Zealand

4.3. Wage contribution at a regional level

Dairy farming wages are more dispersed across New Zealand than dairy processing wages. The top dairy farming districts by wages make up half (48%) of total wages; the top 10 dairy processing districts make up three quarters (74%) and are more urban (Auckland and Hamilton especially).

Figure 29 Dairy sector injects \$2.6 billion in wages

March 2017 Year End; \$ millions; Top 20



Source: NZIER, Statistics New Zealand

About 80% of all dairy wages (\$2.1 billion) are earned in rural areas. Unsurprisingly, almost all dairy farming activity is rural, while a third of dairy processing wages are earned in urban areas.⁸

Table 12 Rural-Urban dairy wages distribution

2017; \$ millions

Industry	Rural	Urban	% rural
Dairy farming	\$1,045	\$43	96%
Dairy processing	\$1,014	\$504	67%
Total	\$2,060	\$547	79%

Source: NZIER, Statistics New Zealand

⁸ Urban areas are defined as City districts, rural areas are all other districts.

4.4. Dairy investment

Table 13 summarises dairy plant investments in New Zealand since 2013. We estimate total dairy plant investment at \$3.1 billion since 2013.

We provide a broad categorisation of the expect dairy products to be produced for each plant investment. The key dairy products groups invested into are UHT, infant formula, powders and to a lesser extent cheese (mozzarella) and protein (mostly lactoferrin).

Table 13 Summary of New Zealand dairy plant investments since 2014

Company	Investment type	Location	Product group	Investment (\$m)	Year
Fonterra	UHT plant	Waitoa-Waikato	UHT	\$120	2013
Fonterra	Mozzarella	Clandeboye-Canterbury	Cheese	\$240	2016
Fonterra	Mozzarella	Clandeboye-Canterbury	Cheese	\$72	2013
Fonterra	Protein, reverse osmosis, AMP plant	Edendale-Otago	Protein, cream	\$157	2015
Fonterra	Lactoferrin	Hautapu-Waikato	Protein	\$11	2015
Fonterra	Plant upgrade	Pahiatua-Manawatu	Powder	\$235	2013
Fonterra	New powder dryer	Lichfield-Waikato	Powder	\$398	2014
Fonterra	Reverse osmosis	Longburn-Manawatu	Powder	\$14	2014
Fonterra	Reverse osmosis	Darfield-Canterbury	Powder	\$150	2017
Fonterra	Plant upgrade (cheese slides)	Eltham-Taranaki	Cheese	\$32	2014
Fonterra	Cream cheese	Te Rapa	Cheese	\$32	2017
Fonterra	Cream cheese	Te Rapa	Cheese	\$20	2017
Open country	Expanded processing capability, milkpowder and cheese processing	Waikato	Powder	\$100	2017
Oceania	UHT milk, infant formula canning, lactoferrin	Glenavy-Canterbury	Mix	\$400	2018
Oceania	Powder processing plant	Glenavy-Canterbury	Powder	\$236	2014
Synlait	Expanded plant, consumer packaging, infant formula, cream	Canterbury	Mix	\$300	2015
Westland	UHT processing	Rolleston-Canterbury	UHT	\$40	2016

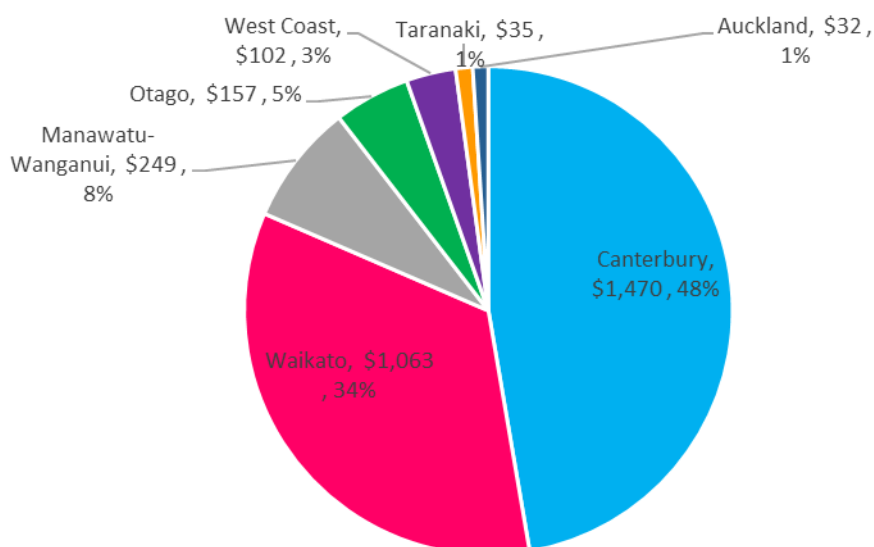
Company	Investment type	Location	Product group	Investment (\$m)	Year
Westland	Blending and canning, infant formula	Canterbury	Infant formula	\$32	2016
Westland	Infant formula	Hokitika-West Coast	Infant formula	\$102	2017
Miraka	UHT plant	Taupo-Waikato	UHT	\$27	2014
Yashilli	Infant formula	Pokeno-Waikato	Infant formula	\$220	2015
NIG Nutritionals	New goat spray dryer	Auckland	Infant formula	\$10	2015
Danone	New blending and canning line / early life nutrition plant	Airport Oaks-Auckland	Infant formula	\$25	2016
Dairy Goat Co-op	Milk powder dryer	Waikato	Infant formula	\$70	2014
Tatua	Specialist powder dryer	Morrinsville-Waikato	Powder	\$65	2014
Total				\$3,108	

Source: DCANZ members, Coriolis (2017), various sources

Canterbury and Waikato accounted for 79% of total plant investment. Manawatu-Wanganui, Otago and West Coast accounted for an additional 18%.

Figure 30 Summary of plant investment by region

2013-2017; \$m



Source: NZIER, Statistics New Zealand

This investment is having positive flow on benefits to other aspects of the dairy industries economic contribution. For example:

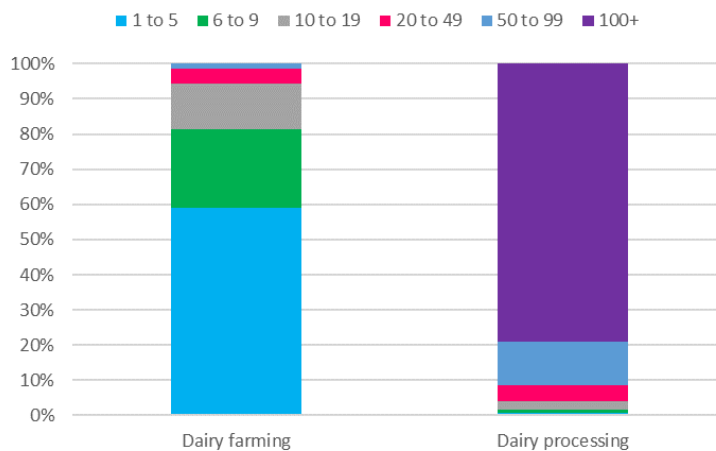
- Oceania Dairy’s investment in dairy processing has contributed to employment growth in Oamaru, Timaru and Waimate. With 270 staff it is a major employer in the region;
- The Fonterra Clandyboye plant build provided employment for up to 200 contractors on site during the peak of construction and has created a number of new jobs.
- The new investments are supporting a diversification of products within the industry. Infant formula has grown to account for nearly \$1 billion in exports, and mozzarella plants are supporting the industry to gain the benefits of growing demand for dairy products from food service businesses.

4.5. Dairy contribution to the SME economy

Dairy farming is largely made of small and medium enterprises⁹ (SMEs): 94% of dairy farming employment is in SMEs. In contrast, 79% of dairy processing employment is in firms with 100+ employees.

Figure 31 Dairy sector business size composition

February Year End 2017



Source: Statistics New Zealand, NZIER

Dairy farming accounts for 3% of total SME employment but in important dairy regions it accounts for much more e.g. a fifth of SME employment in Taranaki and Southland.

⁹ Defined as businesses with less than 20 employees.

Table 14 Dairy farming's share of SME employment by region

February Year End 2017

Region	1 to 5	6 to 9	10 to 19	20 to 49	50 to 99	100+	SME	Total
Northland	10%	4%	1%	0%	0%	0%	5%	2%
Auckland	0%	0%	0%	0%	0%	0%	0%	0%
Waikato	16%	7%	2%	1%	1%	0%	8%	4%
Bay of Plenty	6%	2%	1%	0%	0%	0%	3%	1%
Gisborne	0%	0%	0%	0%	0%	0%	0%	0%
Hawke's Bay	1%	1%	1%	0%	0%	0%	1%	0%
Taranaki	22%	6%	3%	0%	0%	0%	11%	5%
Manawatu-Wanganui	8%	4%	2%	1%	0%	0%	5%	2%
Wellington	1%	1%	0%	0%	0%	0%	1%	0%
Tasman	6%	2%	0%	0%	0%	0%	3%	2%
Nelson	0%	0%	0%	0%	0%	0%	0%	0%
Marlborough	2%	1%	0%	0%	0%	0%	1%	0%
West Coast	17%	10%	4%	0%	0%	0%	11%	5%
Canterbury	6%	5%	2%	0%	0%	0%	4%	2%
Otago	6%	3%	0%	0%	0%	0%	3%	1%
Southland	20%	12%	5%	1%	0%	0%	13%	6%
Total	6%	3%	1%	0%	0%	0%	3%	1%

Source: NZIER, Statistics New Zealand

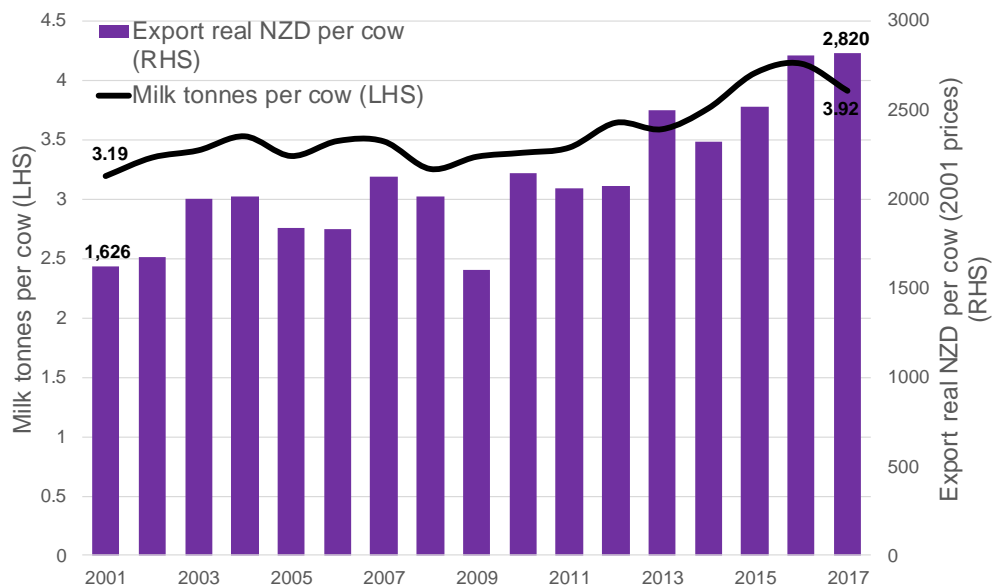
5. Value added

5.1. Dairy farming

Innovation in farming practices have increased on farm productivity. Since 2001, there has been 23% more milk per cow produced and 73% more revenue per cow generated.

Figure 32 23% increase in cow productivity and 73% more revenue per cow since 2001

Inflation adjusted prices



Source: NZIER, Statistics New Zealand, Dairy NZ, DCANZ

5.2. Dairy processing

The industry's investment in innovation and new processing technology is diversifying the product mix beyond standard ingredient products. For example:

- The investment in Infant Formula plants and canning lines by a number of companies including Westland, Fonterra, Oceania, Synlait, and Yashili has extended the processing of New Zealand milk from the milk powder stage to a consumer format stage and grown exports of this added value product to nearly \$1 billion. Infant formula has from 5% of Westland's business to 20% today.
- Miraka has innovated to add value beyond milk powder with a new smoothie milk product which brings together New Zealand milk with fruit and vegetables, and is marketed to consumers in New Zealand and export markets under the Whaiora brand.

- Open Country Dairy has actively increased its specification of its production across its manufacturing plants to move 70% of its annual production to being specialised ingredients.
- Fonterra's food services business is growing at 3 times the global rate, with over 50% of the 300 million pizzas sold in China topped with Fonterra's cheese each year.