

Dairy in Northern Victoria

Prepared for the Independent Murray-Darling Basin Social and Economic Assessment Panel

A Marsden Jacob Report

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Key points

This Marsden Jacob case study discussion paper focuses on dairy in the northern Victoria region of the Murray-Darling Basin. We use publicly available data, key stakeholder interviews and modelling to assess how rice activity levels could change subject to changing water availability in the future.

- Over the last decade, the pool of water available to dairy farmers has fallen considerably and competition for it has increased. Additionally, over this period, milk production has fallen and milk prices have been volatile. There have been generally poor conditions across the Victoria, New South Wales and Queensland sectors.
- Northern Victorian milk prices had been relatively poor for an extended period before the 2019-20 season. They recovered through 2019-20 significantly, in part reflecting the scarcity of supply. The number of dairy farmers and the level of milk production in northern Victoria has decreased more than other major dairy regions in the State.
- Milk processors have been rationalising capacity and upgrading key sites in response to changing market conditions and transport processing efficiencies. Many of the older, smaller, plants in northern Victoria have been closed and mothballed. This has consolidated processing capacity in the Goulburn Murray Irrigation District (GMID), particularly by large processors operating multiple plants. Smaller niche processors, producing high value-added drinking and 'wet' products (e.g. yoghurts, desserts and ice-cream) have also opened new facilities.
- Reflecting even more challenging operating conditions in some parts of New South Wales and Queensland, milk production from the GMID is increasingly being used to meet domestic consumption demands rather than being exported. This is leading to milk being transported up the eastern seaboard for processing into domestic drinking milk markets.

- These new processing opportunities are increasing competition for the available milk pool. Some processors are offering supply contracts that offer premium returns and reduce price volatility. These premiums and stable contract prices increase the opportunities for some dairy farmers to develop more intensive annual based feed systems that incorporate mixed cropping and the ability to build significant feed buffers to reduce the risks of low water availability.
- These opportunities will not exist for all dairy farmers in the GMID. Nor will all existing dairy farmers have the skills and capacity to manage these more complex farm systems. Many dairy farmers in northern Victoria will continue to face highly volatile commodity prices. In more traditional farm systems, where low prices also correspond with low water availability, the scope that farm systems can be sustained will depend on the length and depth of future milk price falls and the scarcity of water.
- The combined impact of falling milk prices and increasing competition for water has most affected dairy farmers that had previously sold water to water recovery programs and now rely on purchasing water on the temporary market.
- Increasing horticulture demand is significantly impacting on the available pool of water for which GMID dairy farmers compete. After annual cropping, dairy is the next semi-interruptible use that competes for high security water. The northern Victoria dairy sector is currently a pressure point, in part, because of historical profitability trends and the increasing competition from perennial horticulture development.
- The extent to which the northern Victoria dairy sector will be viable in the future depends on the cycle of milk prices relative to water availability, and the scope of dairy farmers to build buffer stocks of fodder in good times. Substantial risks for the sector include longer and deeper periods of reduced water availability and the corresponding periods of weak milk prices.
- Larger dairy farms with high security entitlements and access to domestic market contracts that operate new sustainable systems will be significantly more viable than smaller farmers operating less sophisticated feed systems and who are more vulnerable to international commodity price volatility.
- The dairy processing sector in northern Victoria will continue to adjust. Large manufacturers with plants in multiple regions will manage plant capacity within a whole of company focus rather than northern Victoria only. Improvements

in transport technology and investments in new plant technology mean that larger processors are moving milk into and out of the region for processing. This export and import of milk to the region can be expected to increase under reduced water availability scenarios.

- Impacts of horticulture development will be seen clearly by dairy farmers on the Murray River below the Choke. Areas of significant pressure at present are those in the Murray Valley including Cohuna, Leitchville and Kerang. Trade factors mean these dairy farmers will face the greatest competition for water.
- More impact areas exist for those dairy farmers with reduced ability to adopt sophisticated fodder systems and attract contracts for domestic milk supply and high-end products. These dairy farmers are likely to be smaller dairy farmers with tighter historical development footprints. They have less capacity to take on complex managerial and technical farm requirements. They face higher development costs and have reduced capacity to adjust to sustainable feed systems.

1. Introduction

At the request of the former Minister for Water, The Hon David Littleproud, the MDBA has convened an Independent Panel ('the Panel') to assess economic and social conditions in the Murray-Darling Basin. The Panel's assessment is a critical opportunity to shape understanding of current economic and social conditions in the Basin, and future Basin policy.

Marsden Jacob is supporting the Panel by delivering case studies of Basin industries with high water consumption dependency. Our case studies complement the regional impact modelling and trends and drivers analyses Marsden Jacob is completing for the Panel in parallel, through more detailed examination and ground-truthing, and a tighter regional focus.

The Panel asked that our reports look at each sectors current situation and their outlook. We were asked to be concise in our evaluations, and take into account how water reform, weather and climate, technology, prices, structural, demographic and preference change and other factors known to impact on industries in the Basin might impact in the future. The Panel will use the evidence from these case studies to support key findings and recommendations in the Panel's [draft report](#). The Panel encourages all readers of this case study to read the Panel draft report.

1.1 This discussion paper

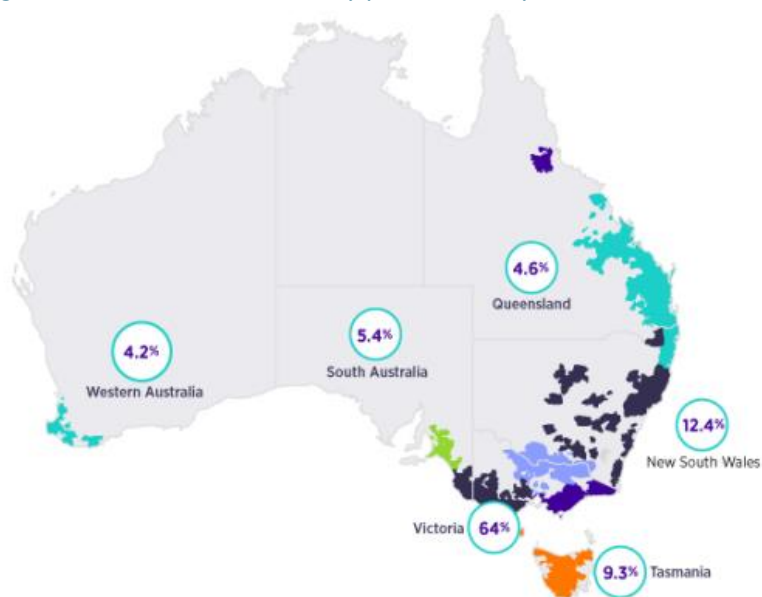
This Marsden Jacob discussion paper focuses on dairy in northern Victoria. The Panel has made this document publicly available as part of its commitment to transparency. The views in this report do not necessarily represent the views of the Panel.

2. Understanding the broader industry context

The dairy industry in northern Victoria has and is facing a challenging operating environment.

The recent decade has been characterised by market volatility and declining production and profitability. These trends are more pronounced in northern Victorian than in other major dairy regions in Victoria.

Figure 1: Share of national dairy production by State



Source: Dairy Australia (2019a)

2.1 Milk production and key industry features

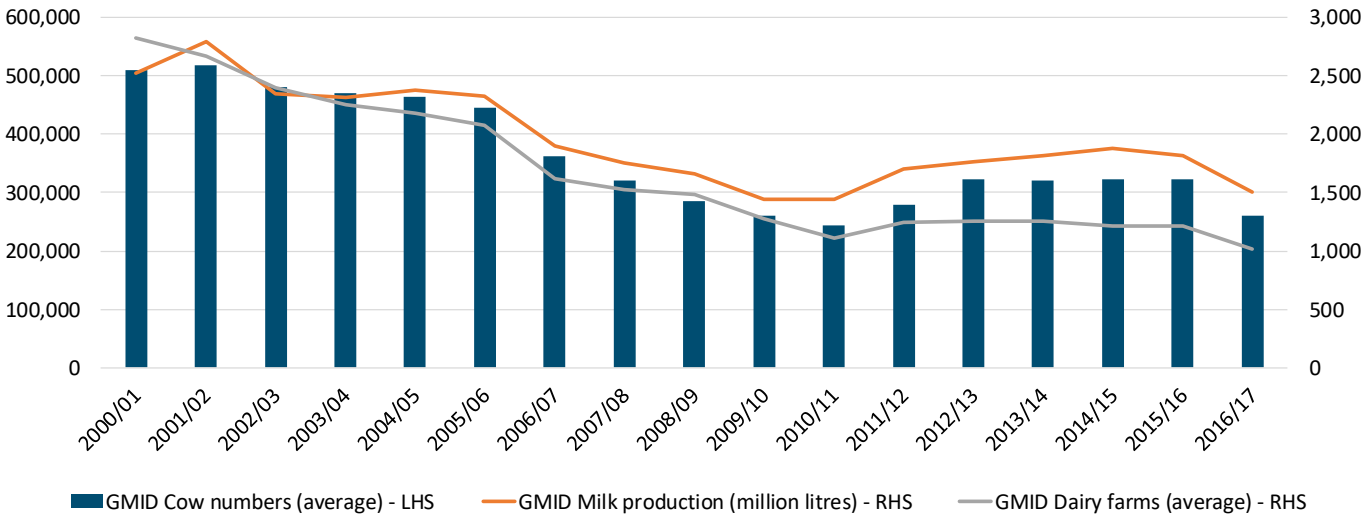
Dairy farming is carried out in most Australian States and most production (64 per cent of farmgate) occurs in Victoria (Figure 1)**Error! Reference source not found..**

Northern Victorian irrigation dairy farming is one of the largest milk production regions in Australia and typically produces between 20 and 25 per cent of Australia's total milk production. In recent years, dairy in this region has faced several challenges including increased climate variability, relatively high cost of irrigation water and competition from alternative agricultural production to dairy.

Since the year 2000, total milk production in the Goulburn Murray Irrigation District (GMID) as fallen by around 40 per cent. This has been driven by falling herd numbers, which has been offset somewhat by on-farm productivity improvements.

The number of dairy farms in the Goulburn Murray Irrigation has fallen by more than 60 per cent since the year 2000 (Figure 2). However, the remaining dairy farms have become larger in size and more efficient. Farm milk production and the number of dairy farms has stabilised somewhat over the last five years.

Figure 2: Milk production and key industry features in the Goulburn Murray Irrigation District (GMID)



Source: Dairy Australia (2019c)

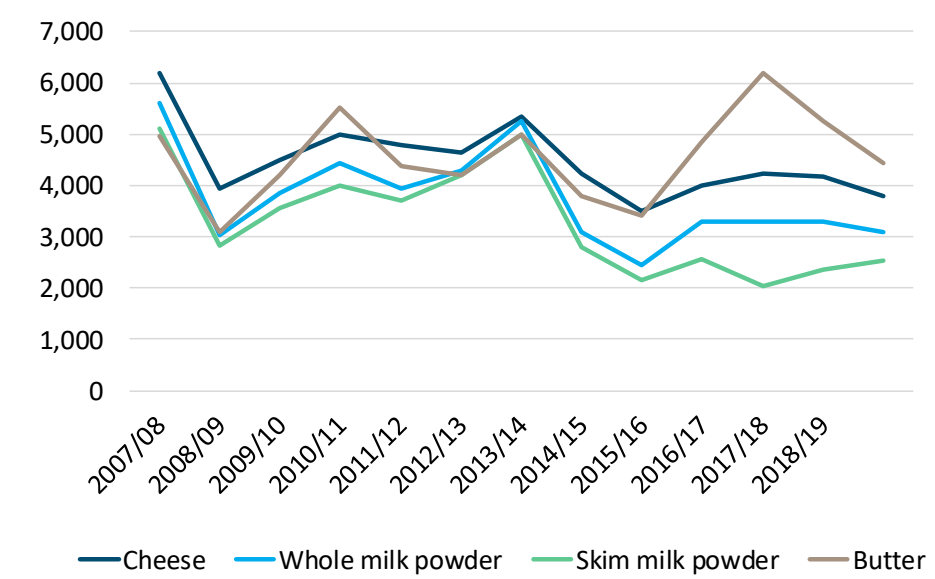
2.2 Dairy prices

Dairy commodity prices are volatile (Figure 3**Error! Reference source not found.**) and are susceptible to international market. Australian farmers are more vulnerable to market volatility than most of their international competitors because they operate in an open market, deregulated almost 20 years ago. Australian milk producers experience milk price volatility as a result (Figure 4**Error! Reference source not found.**), noting that prices received by farmers are an average of prices for different commodities i.e. butter, cheese and milk powders.

Some key recent market shocks include:

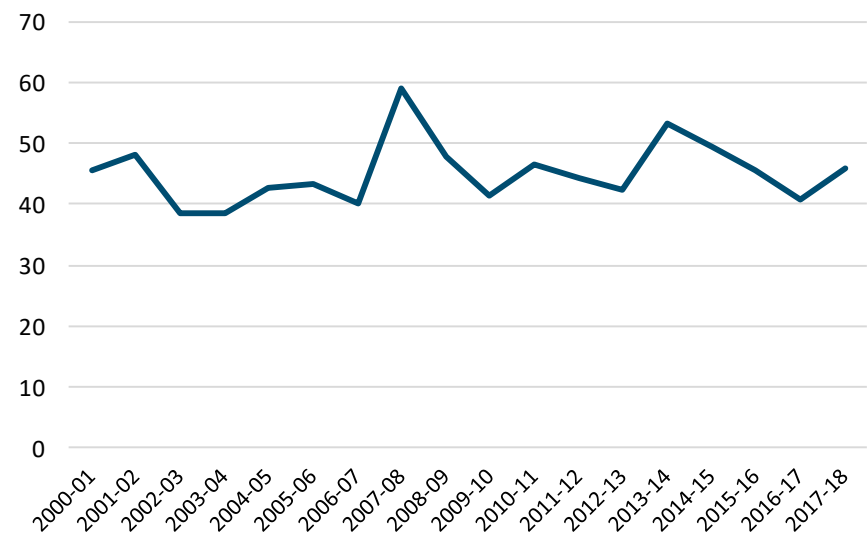
- the Global Financial Crisis in 2008 which led to sharp price falls in 2008/09
- the Russian ban on food imports (including dairy product) from countries including Australia which began in 2014 and is still in place. This provided downward pressure on dairy commodity prices
- the stockpiling of skim milk powder by the European Union since 2015, in response to the Russian ban and the end of production quotas
- the commencement of processes by Murray Goulburn and Fonterra in 2016 to recover milk payments from farmers.
- the collapse of Murray Goulburn.

Figure 3: World dairy prices, 2007-08 to 2019-20 (US\$/tonne)



Source: ABARES (2019)

Figure 4: Australian producer milk prices, 2001 to 2018 (\$/kg)



Note: 2017/18 dollars

Source: MJA analysis of ABARES (2019)

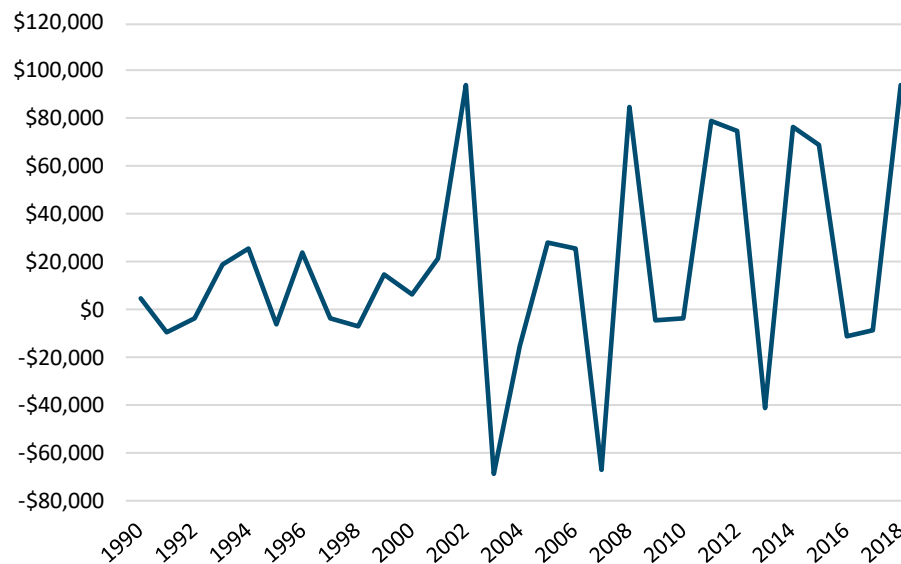
2.3 Farm profitability and productivity

Profit volatility for Australian dairy farm businesses in the dairy sector has increased since the year 2000 (Figure 5Error! Reference source not found.).

In the Victorian Northern zone, return on total assets for those farms measured by Dairy Australia's Dairy Farm Monitor Project have fallen to relatively low levels since 2015/16 (Figure 6Error! Reference source not found.).

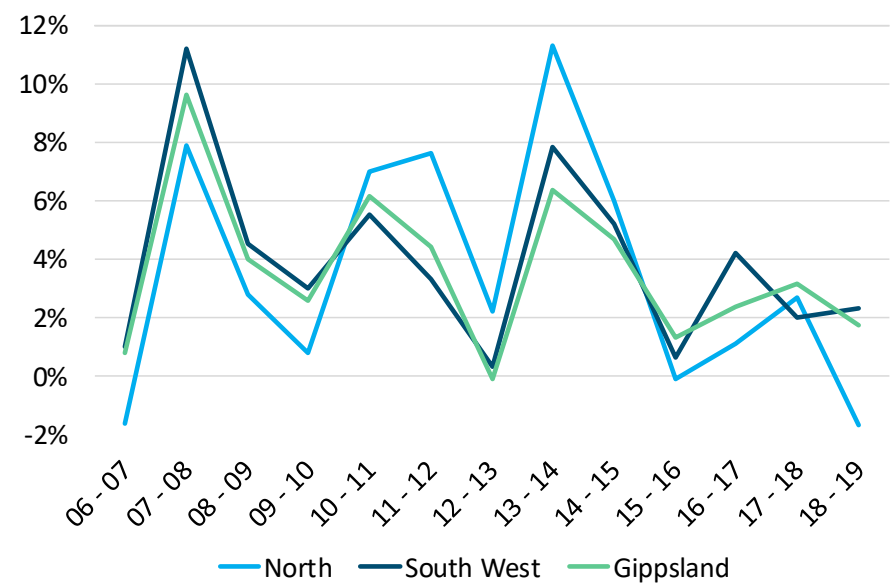
While market prices play a significant role in farm profitability, farm productivity also contributes to the ability of the sector to grow profits. While farm productivity grew in the 1990s, much slower growth and even stagnation has occurred since 2000 (Figure 7Error! Reference source not found.) constraining the ability of farms to improve profitability.

Figure 5: Farm business profit (\$) – average per dairy farm



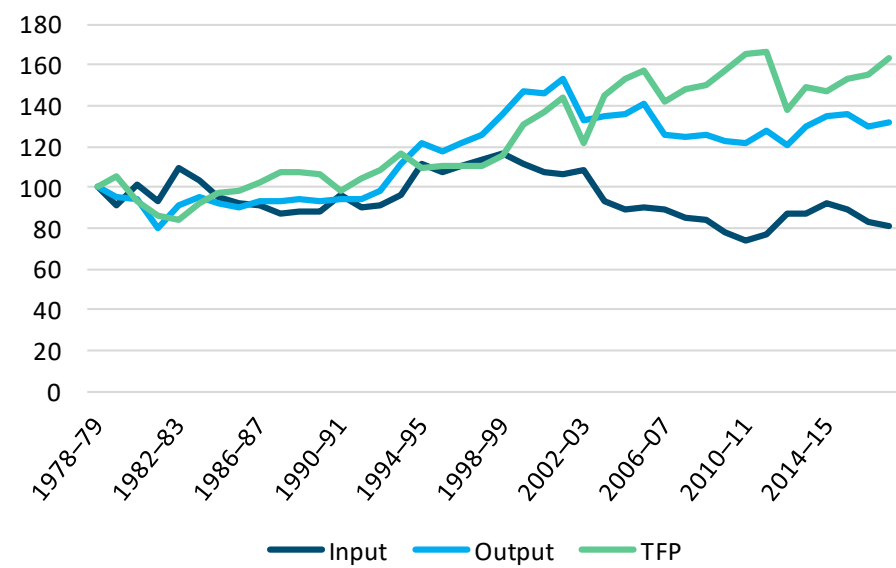
Source: Australian Government (2019)

Figure 6: Return on assets – Victorian Dairy Regions



Source: Dairy Australia (2019b)

Figure 7: Australian dairy productivity



*Index base 100

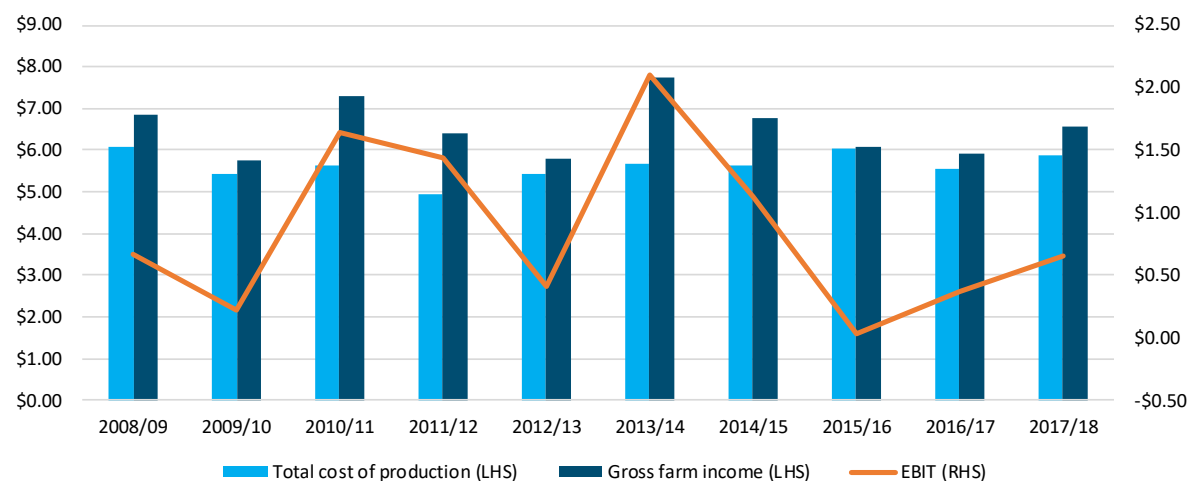
Source: ABARES (2019)

2.4 Challenging conditions in northern Victoria

A sequence of challenging conditions have impacted Northern Victoria milk prices over the last decade. MH17 incited trade disputes and retaliation that depressed prices. This was followed by Murray Goulburn significantly lowering the prices it paid to farmers in 2016 in response to financial difficulties in the company. Fonterra, and other processors to a lesser extent, followed Murray Goulburn's lead. Both Murray Goulburn and Fonterra also sought to recoup payment from the relatively high milk prices they had been paying suppliers. These farm gate price shocks increased pressure on farm profitability.

Milk prices have recovered somewhat in the last two years (2018 to 2019) and farm profitability has improved (Figure 8). However, some farmers have been impacted by the Murray Goulburn price shock more than others. Many small Murray Goulburn suppliers have struggled to recover financially. At the same time, newer plants have been established to target changing consumer preferences.

Figure 8: Average earnings before interest and tax (EBIT), income and costs for Northern Victoria dairy farmers \$/kg MS



Source: MJA analysis of Dairy Australia (2019b)

Dairy Australia attributes much of the decline in milk production and farm numbers within the northern Victorian region to consistent profitability challenges and minimal capital growth in areas other than water assets. The Murray Region Future Focus Strategy explains the situation in this region at length (Dairy Australia 2019c).

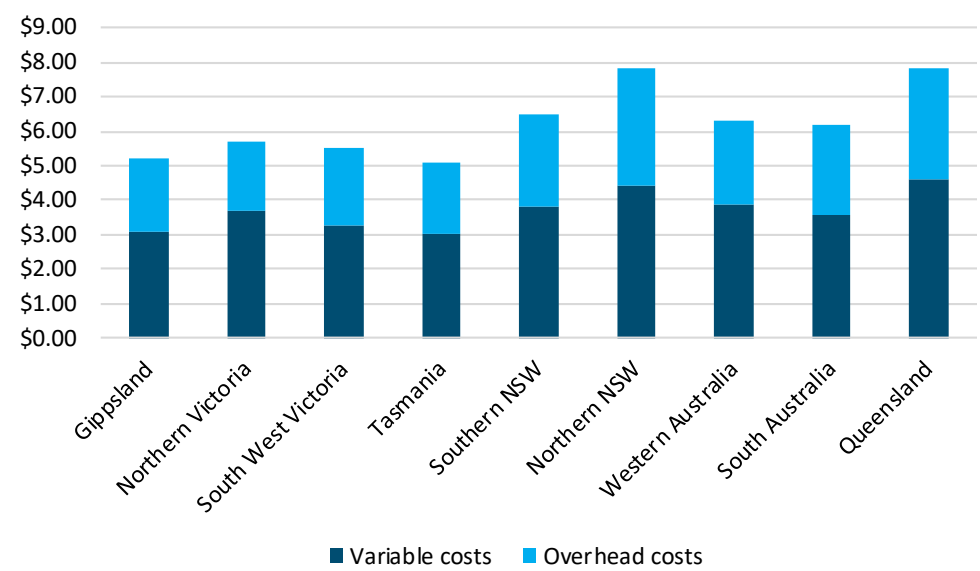
Imported and homegrown feed represents a higher proportion of Northern Victorian farm system costs than in other regions. This reflects the price of water and the smaller share of perennial pasture, relative to total feed, that Northern Victoria has compared to other areas of Victoria.

Costs of production in northern Victoria are low relative to other states such as New South Wales, Queensland, Western Australia and South Australia (Figure 9**Error! Reference source not found.**). However, they're slightly higher than other Victorian regions (i.e. South West and Gippsland).

More than 75 per cent of the costs of production in northern Victoria is made up of three components: feed, labour and energy costs (Figure 10**Error! Reference source not found.**). Feed costs are more than half the costs of production.

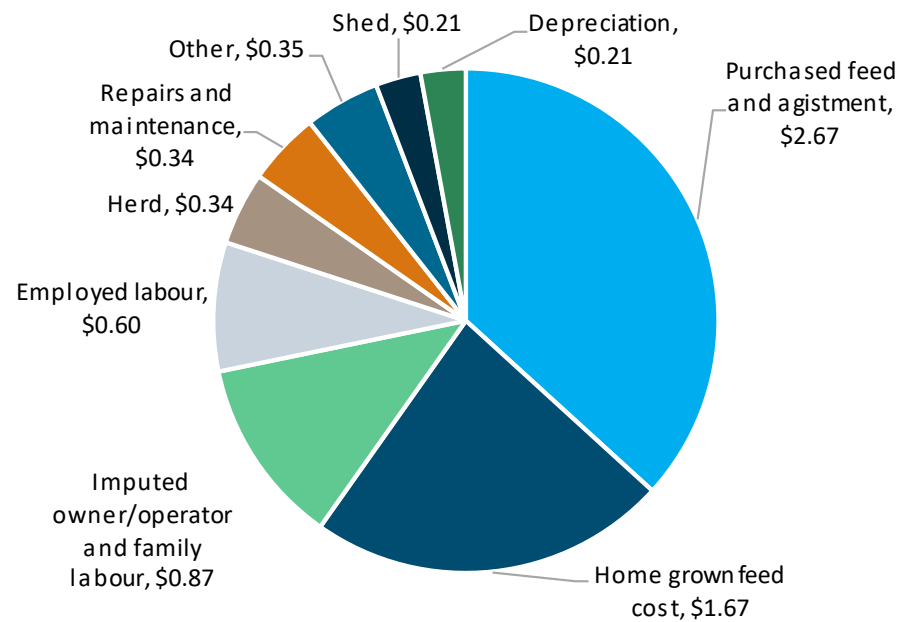
In recent years (2013/14 to 2017/18), gross farm income in northern Victoria has been above costs of production (Figure 11**Error! Reference source not found.**), although only marginally in 2015/16.

Figure 9: Variable and fixed costs of production (five year average) \$/kg MS



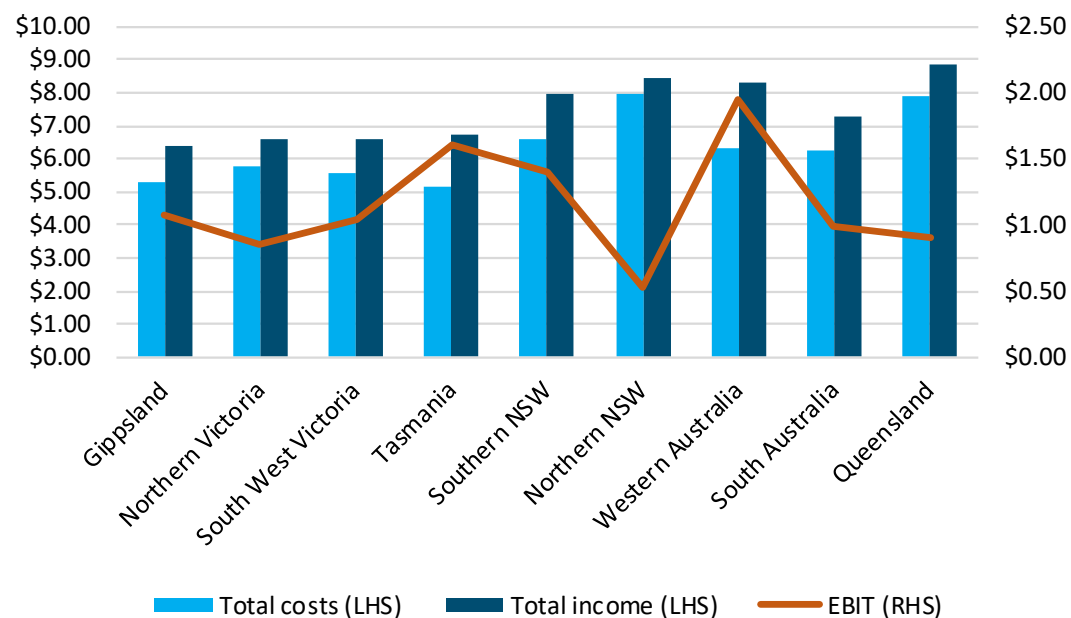
Source: MJA analysis of Dairy Australia (2019b)

Figure 10: Northern Victoria composition of average dairy farm costs \$/kg MS



Source: MJA analysis of Dairy Australia (2019b)

Figure 11: EBIT, income and costs (five year average) \$/kg MS



Note: Five year average 2013/14 to 2017/18; Western Australia is based on a four year average (it excludes 2013/14) as is Queensland (it excludes 2014/15).

Source: MJA analysis of Dairy Australia (2019b)

2.5 Farm investment

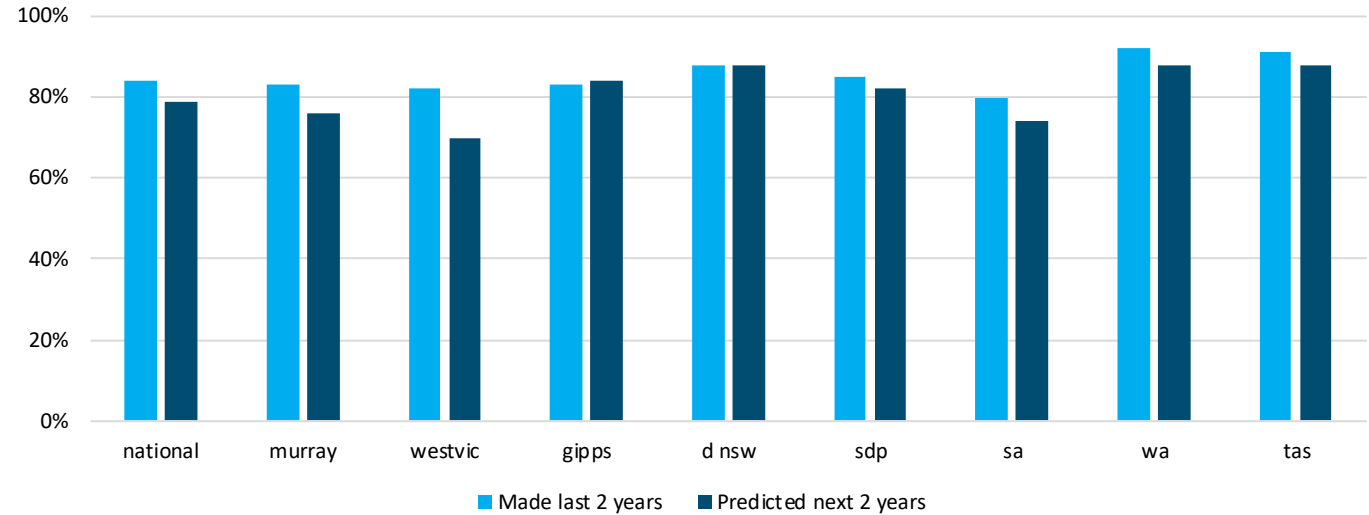
According to the National Dairy Farmer Survey (NDFS), over the two years prior to 2019, the vast majority of farmers in northern Victoria ('Murray' in Figure 12 **Error! Reference source not found.**) made on-farm capital investments (83%).

However, this is predicted to fall to 76 per cent in the next two years. This result is relatively close to the national average.

However, the survey also shows that, at a national level, only 8 per cent of those surveyed indicated that predicted investment will be in the ‘major category’. The most common mentioned areas for investment planned over the next two years are machinery (34 per cent), dairy plant (22 per cent) and irrigation plant (21 per cent).

The survey showed that only 34 per cent of farmers nationally feel positive about the future of the dairy industry, which is the sixth consecutive year of declining sentiment. However, the current low confidence levels of farmers may impact whether the predicted investment does occur.

Figure 12: On farm capital investment



Source: Dairy Australia (2019a, p. 44)

2.6 General trends in the national milk processing sector

Dairy manufacturers and processors have invested heavily in upgrades and new plants in recent years. With milk production falling in some regions (such as Northern Victoria), this has led to increased competition for milk from farmers across the State. Milk is moving longer distances from farm to manufacturers and processors as companies compete for milk and consolidate plants.

There have also been substantial increases in milk transport productivity with the introduction of Super B and AB Double tanker configurations and an increase in the access of these configurations to the local road network.

Substantial volumes of milk are now moving up the eastern seaboard to meet the needs of manufacturers and processors. In part, this reflects the relative competitiveness and productivity of Victorian, New South Wales and Queensland farm systems and the lower cost of year-round production systems in northern Victorian farms. This can be expected to continue.

3. Changing composition of the industry in northern Victoria

The dairy industry in the GMID contracted substantially over the last decade in response to lower water availability and weak milk prices.

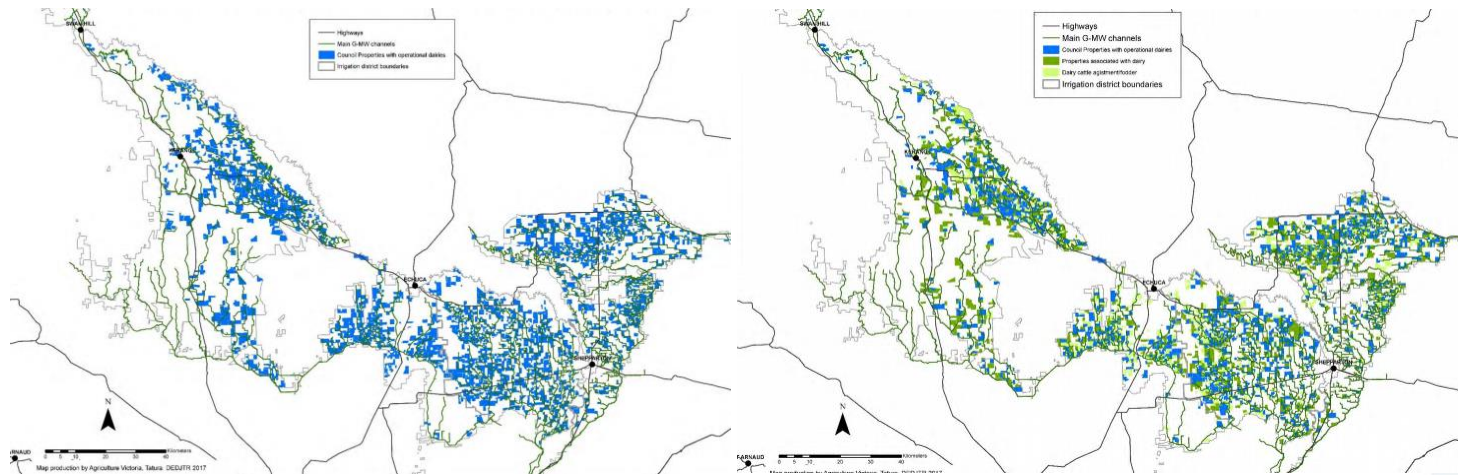
Various stages of the industry supply chain are in a state of flux, but opportunities are emerging as New South Wales and Queensland dairy farmers undergo even more substantial adjustments.

3.1 Change in the number and distribution of farms

Historically, the Northern Victorian dairy region used a perennial pasture-based system based on relatively cheap inputs of water and land. However, the 2006-07 drought had a significant adverse impact on farm profitability and also increased farm debt levels. The drought also sped up the rate of farm consolidation and reduced milk production. This has continued at a slower pace over the recent decade.

In 2004 there were 2,721 properties each with a functioning dairy shed and by 2015 this figure had fallen to 1,142. However, by 2015 an additional 765 more properties had dairy-associated land use and a further 759 properties were identified as dairy agistment/fodder but not considered a functioning dairy. This is illustrated in Figure 13.

Figure 13: Adjustment of dairy farms in Northern Victoria 2004-2015



Source: Murray Dairy and Dairy Australia, 2017

Note: The graph on the left is 2004 and the one on the right is 2015. The blue shading are properties with operating dairies, the dark green shading are properties associated with dairy and the light green are dairy cattle adjustment /fodder.

Dairy farming exit was wide-spread but led to a thinning out of the intensity of dairying particularly in the Murray Valley, Kyabram, and surrounding the Shepparton and Katamatite areas.

3.2 Reduction in high reliability water shares

Many dairy farmers responded to the drought by selling their High Security Water Entitlements (HSWE). Many did so to maintain cash flow and to pay down debt associated with high feed costs.

There has been a substantial reduction in the volume of high reliability water shares (HRWS) held by irrigators in GMID irrigation districts (Table 1). Indeed, GMID dairy farmers as a whole now own 57 per cent less water in HRWS than in 2000, and in recent years have used between 43 and 59 per cent more water than they owned (Dairy Australia, 2019c, p. 33).

Table 1: Comparison of high reliability water share ownership between 2001 and 2018

User group	Location	High reliability water share volume		% increase	
		30 June 2001	30 June 2018		
Irrigator	LMW diverters	203	209	3%	
	LMW districts	189	111	-41%	
	GMW diverters	243	159	-35%	
		Torrumbarry	378	209	-45%
		Loddon Valley	230	118	-49%
		Rochester/Campaspe	208	103	-50%
	GMW districts	Central Goulburn	391	213	-46%
		Shepparton	181	106	-41%
		Murray Valley	259	138	-47%
		Subtotal	1,648	887	-46%
	Not tied to land	0	298	N/A	
Water corporation	Not tied to land	0	63	N/A	
Environment	Not tied to land	0	661	N/A	
Total		2,283	2,388	5%	

Source: Victorian Government (2019)

Additionally, the result of the drought was to shift more farms to annual systems and cut and carry and partial mixed rations – this has resulted in higher cost operations than in other regions of Victoria. There has been substantial on-farm investment in plant and equipment as farmers have developed their farm systems in response to lower water availability.

Furthermore, because many sold their HSWE, many farmers are vulnerable to the price fluctuations in the temporary water market. Reflecting higher costs of production and lower milk returns, a survey of farmers found 26 percent said that water prices over \$150 were not viable for their business and 56 percent said prices over \$200 were not viable.

The current drought in Northern Victoria has resulted in relatively higher water prices and higher feed costs. For some farmers, this has resulted in total operational costs greater than income from milk sales. Higher feed costs in northern Victoria have also resulted from higher transport and fodder subsidies in NSW, which is driving up relative costs.

3.3 Evolution of northern Victorian dairy farms

Dairy farms in northern Victoria are continually evolving in different ways. Some, for example, prefer to evolve to the semi feedlot approach while others wish to remain primarily pasture based. These changes are leading to a region with an evolving mix of low and high cost farm systems, with different associated risk profiles.

Due to a range of pressures and opportunities, dairy farm amalgamations have continued throughout the last 20 years, increasing the average size of farms. The ad-hoc geographic nature of farm exit has created opportunities for relatively cheap land, while farm grants have funded a range of on-farm improvements.

3.3.1 Irrigation systems

Unpublished ABARES data used by the Independent Panel found that farmers reported more irrigation use after upgrades in order to get most of the productivity benefit. They also found the productivity benefit was smaller for dairy farmers than broad acre cropping. There are likely to be a variety of reasons for this:

- Milking systems and herd management complexities create greater limits to farm economies of scale than irrigation labour saving technologies
- Greater scope for farm consolidation and labour saving in broadacre than dairy farms because:

- There is generally a tighter pattern of settlement and more topographical features that create more complex farm layouts and consequently greater reconfiguration and amalgamation costs.
- Some new irrigation layouts that suit broadacre cropping don't suit dairy farms. For example, borderless check systems enable larger, more flexible, machinery to be used for broadacre cropping but are not suited to dairy farms which need to drain relatively quickly in winter to avoid bogging if herds are placed on them.

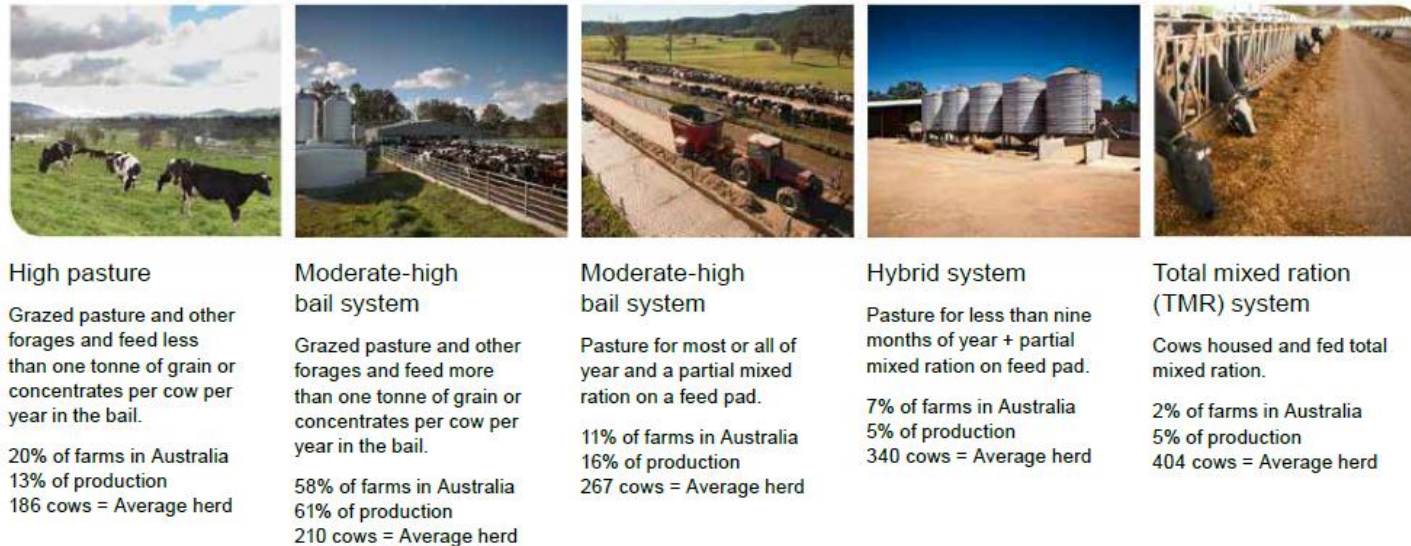
Farmers are also faced with emerging issues which could impact their businesses. For example, the capital value of water has increased substantially, which creates opportunities and incentives for those wishing to exit. It also increases the costs of those wishing to expand. Additionally, a range of planning and right to farm issues could emerge as houses and surrounding paddocks are excised as lifestyle blocks from remainder of farm.

3.3.2 Farm system design

Many dairy farmers are adjusting the relative balance of their feed systems in response to changing seasonal outlooks and they are searching for new resilient farm systems. Underlying perennial farm systems have been substantially modified with the wide-spread adoption of annual fodder cropping. As a result, dairy farm systems are becoming more complex and requiring substantially higher technical and managerial expertise. They are increasingly taking on the features of dairy farm systems of southern NSW that traditionally have less reliable water availability, operate mixed cropping enterprises as a complementary and supplementary co-farm systems and use ration feeding technologies. These higher input cost farm systems rely on market milk premiums and supply contracts to ensure suitable rates of return.

The current state of farm systems in northern Victoria is in flux. There is a wide mix of feeding systems (Figure 14) – there is no 'one' dominant system – as farmers take positions on existing farm systems or explore the production and risk boundaries of new ones. Individual farms are exploring the scope of their own evolving farm system, such as a greater use of forage crops.

Figure 14: Farm systems



Source: Dairy Australia (2019a, p. 36)

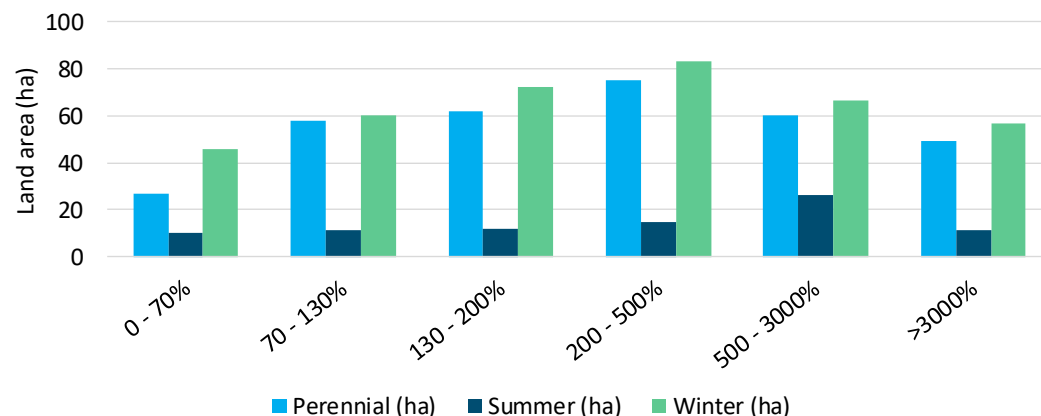
Feed base species are changing, and the mix varies considerably year to year depending on outlook. There is an increasing reliance on season shoulder irrigation as those growing annual crops avoid peak summer temperatures. Farmers are also continuing to adopt and fine tune annual systems – but in more reliable years some shift back to perennials.

Though no two farms are the same, the GMID is increasingly looking like the dairying areas in the Riverina area of New South Wales – large farms with dairy and mixed cropping systems using a mix of perennial and annual forages – but variations in the scope of annual cropping and the system of feeding the herd. Anecdotally, farmers and farm advisors talk of ‘the race to find the new sustainable farm system’.

Water security has had a significant impact on the type of systems implemented on individual farms. 2017/18 was a year of full allocation and low temporary water prices. Dairy Australia and Murray Dairy found that Northern Victorian dairy farmers that had high water security (used a high proportion of the water they owned) in 2017/18 had smaller than

average farms and proportionally more of their farm system under perennial pasture (Figure 15). And those with less water security generally had less perennial pasture and more opportunistic summer cropping.

Figure 15: Impact of water security on feed base (mean dairy activity (Ha) by use to HRWS%)



Note: The horizontal axis relates to water use as a % of HRWS that farmers own.

Source: Dairy Australia (2019c, p.24)

3.4 Processing plant consolidation

Since the 2006-7 drought, there has been substantial consolidation of major processing capacity in northern Victoria.

Major dairy processors have consolidated their processing footprint. This has generally been characterised by larger processors consolidating operations from small older plants to larger more modernised ones. Most processors typically do not rapidly sell mothballed plants to avoid the risks of smaller new entrants competing for nearby suppliers.

Nonetheless, several new niche producers have established new processing facilities and these are placing pressures on the major processors to optimise their remaining processing capacity:

- Murray Goulburn (now owned by Saputo) – closed Leitchville (reported 80 jobs) and Rochester (reported 100 jobs) and

consolidated operations to Cobram and opened new drinking milk processing plants at Erskine Park Sydney and Laverton Melbourne. Note the Leitchville site has recently been purchased by a private investment group who intend to convert the site to a cheese and pork products processing plant. The Rochester site remains unutilised.

- Fonterra (formerly Bonlac) – closed the Girgarre plant (reported 80 jobs) and consolidated operations to Stanhope where new cheese processing capacity has been installed. Land adjoining next to Girgarre site has recently been developed by ACM and now employs a reported 80 people.
- Nestle has announced its Tongala (reported 106 jobs) condensed milk processing plant will close in 2020
- Bega purchased Tatura milk and sold one drier to Mead Johnson that they will continue to contract operate.

The region has also seen a range of new investments by smaller processors in specialist wet products and nutritionals including:

- Kyvalley Dairies located in Kyabram
- Pactum Dairies/Freedom Foods located in Shepparton
- ACM located at Girgarre.

We estimate there is currently approximately 2 billion litres in processing capacity in northern Victoria. Increasingly, major processors are transporting milk from other regions to increase throughput in some larger plants and mothballing smaller plants in other regions. A recent example is Fonterra closing the Dennington plant outside Warrnambool and shifting more milk to its Cobden plant in the Western District and Stanhope in northern Victoria.

Arguably, the deterioration of dairy operating conditions in the GMID has been eclipsed in NSW and Queensland. Challenging conditions in these areas has resulted in a substantial increase in the 'leap frogging' of milk transport up the eastern seaboard to meet the drinking milk needs of major population centres. Hunter and North Coast production is being used to meet south east Queensland milk needs and GMID milk to meet Sydney market needs.

4. Current pressure points

The length and depth of the current drought is a critical issue that will determine the longer term make-up of the industry in northern Victoria.

Drought has driven up water prices in northern Victoria and is affecting the operations and viability of farms more exposed to the water market than others. However, it is important to note that the drought up the east coast of Australia has had arguably more severe consequences for the dairy industry in New South Wales and Queensland. In some of these areas, such as Darling Downs and the Lachlan and Murray valleys, the drought combined with other factors (milk prices and input costs) has resulted in a significantly higher share of farm exits in those regions than in northern Victoria over the same period. And as such, the drought has provided some competitive opportunities for the northern Victorian region going forward.

Nonetheless, a longer and deeper drought will lead to greater exposure of dairy farms that are:

- more reliant on purchasing temporary water and feed. Farmers with low permanent water holdings and high debt will be most exposed. The least exposed will be those with larger water entitlements and the capacity to borrow.
- on Murray River allocations below the Barmah Choke. These farms are facing greater competitive pressures (other things equal) for water compared to dairy farmers above the Choke and those in the Goulburn system. This will be because of the increased competition for available water below the Choke by horticulture enterprises which is driving the price of water up in those areas compared to others
- in tightly held areas with tighter settlement patterns. These farms will face greater costs and challenges in adjusting farm systems to remain competitive. This is because farm amalgamation is likely to become more complex. Farms may become a patch work of unconnected or partially connected blocks. An upside of the swiss cheese effect of past

adjustment is that there are relatively cheap expansion options near many farms – where opportunistic cropping can be developed for cut and carry fodder.

- closely situated to farms more suitable to conversion to other farm system uses.

4.1 Finding the ‘new norm’ for dairy farm businesses

As individual dairy farmers continue the search-test-evolve process to find new sustainable farm systems that work for their circumstance, Dairy Australia and Murray Dairy have undertaken scenario planning approaches to consider opportunities for the real application of dairy farm systems in the Murray Dairy region to 2040 (Cullen, Armstrong and Smith 2020).

The research was a reference group of farmers that considered and assessed farm adaptation possibilities — providing a base case for comparison and enabling the practicalities and implications of decision making to be considered. Three farm systems were assessed:

- Feedlot option – maximise yield per ML of irrigation water with no grazing by milking cows. This feed base relies on a maize-wheat double crop, lucerne and cereal silage and a year-round calving pattern.
- High grazing option – attempt to keep the proportion of grazed pasture high throughout the year. The feed base incorporates more perennial forages – lucerne and perennial ryegrass. In this option, cows are milked with a 60/40 spring/autumn split.
- Low irrigation option – managing with less irrigation water, mainly reliant on rainfall with some irrigation of annual pastures and cereals. The feed base is annual pasture (irrigated and dryland) and lucerne that is only irrigated in spring, with 75% of cows calving in autumn.

The case-study focussed on a relatively large farm system — comprising 28 hectares of irrigation lucerne, 200 hectares of irrigated annual pasture and 620 hectares of non-milking area sown to annual pastures or cereal crops.

The research did not find a clear 'winner' in the form of the most resilient farming system for the future. All of the development options explored had positive and negative aspects. However, in general, all of the options had less home grown feed and an increase in irrigation requirements in 2040, particularly in the high change scenario.

In terms of financial performance, there is no clear evidence that any of the farm system options are superior to others in a changing climate (Table 2) – noting that some options offered some potential for adaption to climate change. For example, under the High climate scenario ('2040 High'):

- All options provide for similar financial returns in good operating or 'wet' conditions
- The High Grazing option was most profitable during periods of 'wet' conditions, with the biggest drop in profitability in periods of 'dry' conditions of all the options.
- The Low irrigation option was the least profitable during periods of 'wet' conditions, with the lowest drop in profitability in periods of 'dry' conditions of all the options.

Table 2: Impact of alternative farm systems, climate change and milk prices on farm profitability (internal rate of return)

Milk price Average	Base- Historical	Base-2040 High	Feedlot - Historical	Feedlot - 2040 high	High Graze - Historical	High Graze - 2040 high	Low Irr- Historical	Low irr - 2040 High
Wet 10 - year period (similar to 1986/87 to 1995/96)								
\$7/kg MS	9.9	8.3	8.3	7.9	10.1	8.6	8.9	7.5
\$6.50/kg MS	8.4	6.9	5.8	5	8.7	7.1	7.4	6
\$6/kg MS	6.9	5.4	3.2	2.8	7.2	5.7	5.9	4.6
Dry 10 year period (similar to 200/01 to 2009/10)								
\$7/kg MS	7.5	3.3	5.5	3.9	7.4	2.8	8.6	4.7
\$6.50/kg MS	6	1.8	3	1.4	5.9	1.3	7.1	3.2
\$6/kg MS	4.6	0.4	0.5	-1.2	4.5	-0.1	5.7	1.7

Source: Cullen, Armstrong and Smith (2019)

4.2 Resilient farm and processing systems

If the consumptive pool of water continues to shrink in response to further water recovery and climate change, resilient dairy farm systems in the GMID will increasingly require the capacity to be able to produce a buffer of up to two seasons of fodder stocks. This is because periods of low water availability will become longer and more frequent.

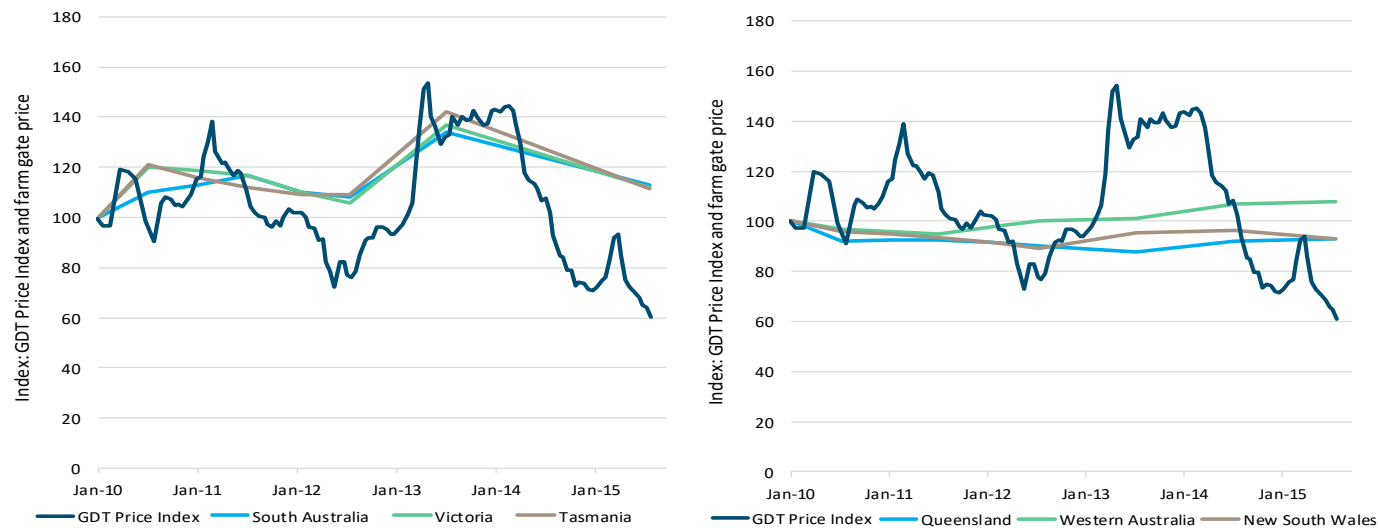
These farms will rely on complementary irrigation and dryland cropping enterprises that optimise the production of low costs pasture and crop reliably high energy fodder at the cheapest price. These systems will be more complex and costly to operate and to be profitable will require contracted premium milk prices.

Our estimate is that these farm systems will depend on consistently receiving milk prices in excess of \$6.50 -7 kg milk fat – in part to ensure consistent production across seasons within individual year but also across years as well. These systems will come under pressure when international milk prices decline and domestic prices commensurately fall and other

regions of Victoria are used to shore up supplies. However, historically milk prices paid for drinking milk markets in Queensland and New South Wales are less responsive to international milk price trends (Figure 16).

The challenge is not all of the milk production in the GMID will be required to absorb the gaps in supply created by the deterioration of industry conditions in NSW and Queensland.

Figure 16 Variability of average milk prices to the global trade index price



Source: ACCC (2018)

Smaller farms with perennial system at scales prevalent in other regions of Victoria are likely to come under increasing pressure as the consumptive pool of water shrinks. These farms are unlikely to achieve the returns necessary nor be able to set aside the feed supply hedge required for the risks for extended dry periods and reduced water availability.

We see a continued weakening of small and predominantly pasture based systems where there is are extended periods of low water availability. This will impact most on 'traditional milk processors' engaged in the processing of bulk cheese butter and milk powders. Our view is these will struggle to survive another period of extended dry period that also corresponds

with a period of relatively weak world prices. These traditional milk processors will continue to shore up their northern plants with supplies from Gippsland and the Western District subject to seasonal conditions in those areas.

4.3 Likely implications for processors

The dairy processing sector has undergone significant change over the last two decades. What was once dominated by locally owned firms (six out of the eight which were farmer-owned co-operatives) is now dominated by factory operations which are controlled by global players such as Fonterra, Lactalis, Saputo and Kirin Breweries. In addition, the sector has undergone significant factory rationalisation as processors act to become more efficient and respond to the competitive environment.

The dominance of multinational processors in the Australian dairy market adds complexity to what is traditionally a country of origin market. These multinational processors can source customers from multiple countries and are accountable to foreign shareholders and overseas parent companies.

If national milk production growth continues to stagnate or even decline, there will be increased competition from processors for the same or smaller pool of milk. Moreover, as the domestic population grows and the volume of milk produced in NSW and Queensland continues to fall, there will be increased competition from drinking milk and specialist wet processors for milk from Northern Victoria.

Traditional larger manufacturers in the region will compete for a smaller milk pool. As a result, competition for milk will likely result in an increasing reliance on alternative pricing arrangements – such as contract and incentive payments to maintain supply within and across years.

There is evidence of some specialist vertically integrated farm and drinking and wet product producers moving into northern Victoria, reflecting increasing risks to farm systems in southern NSW Murray and Lachlan valley. While the conditions are considered generally difficult by those already within the region, they are none the less considered more favourably by those in NSW Murray and some NSW valleys in the Northern Basin.

Large existing dairy processors will continue to consolidate plants to address overcapacity issues. This will include moving milk into and out of Northern Victoria from other plants. It will also mean more secondary processing of milk products in

and outside of Northern Victoria. Processors will do this to address the longer-term localised supply risks of more variable northern Victoria production and the increasing competition for drinking milk supplies

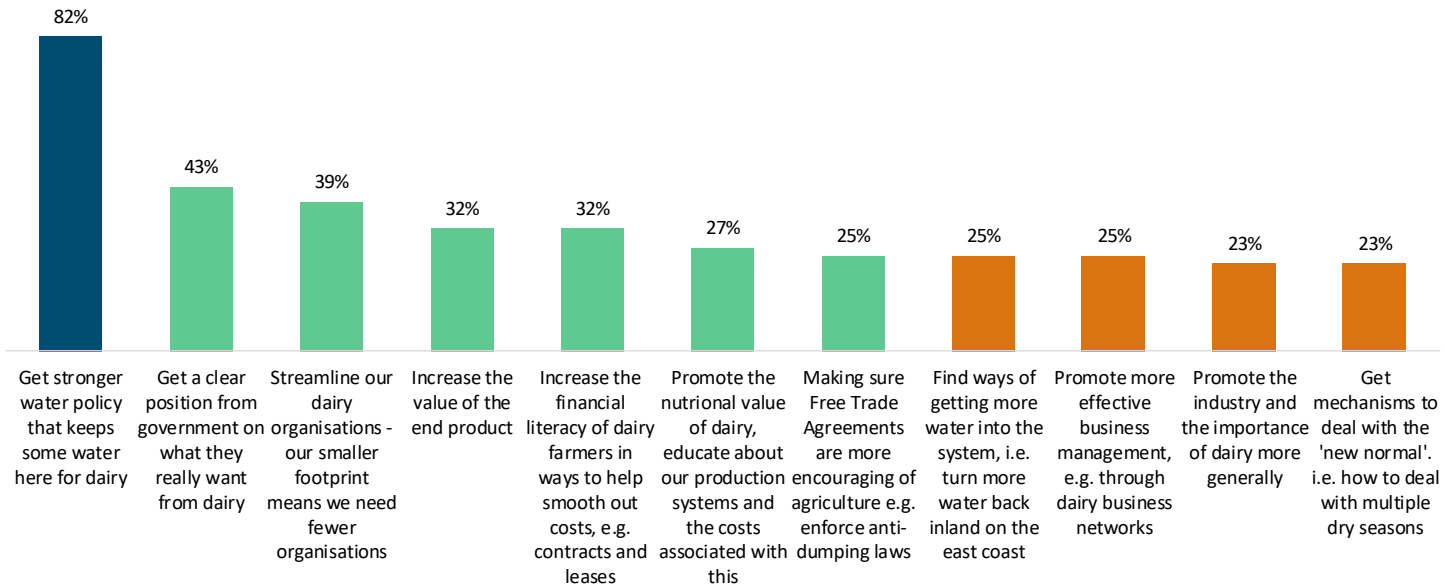
This will see an increase in the premium offered to large Northern Victoria suppliers as they can supply milk all year round. This will be required by these farmers to offset the higher costs of production under Northern Victoria conditions. Farmers will seek longer term contracts to hedge against price risk and to provide greater planning certainty for feed management strategies

The integration of mixed cropping systems along-side a dairy system creates a complexity of what should be the objective of the cropping enterprise. For example, should the farmer specialise in forage or cash cropping. Farmers will need to carefully manage the complexity and risk that comes with managing cropping systems while also ensuring the profitability of the dairy part of the business.

4.4 Farmers views on what needs to happen

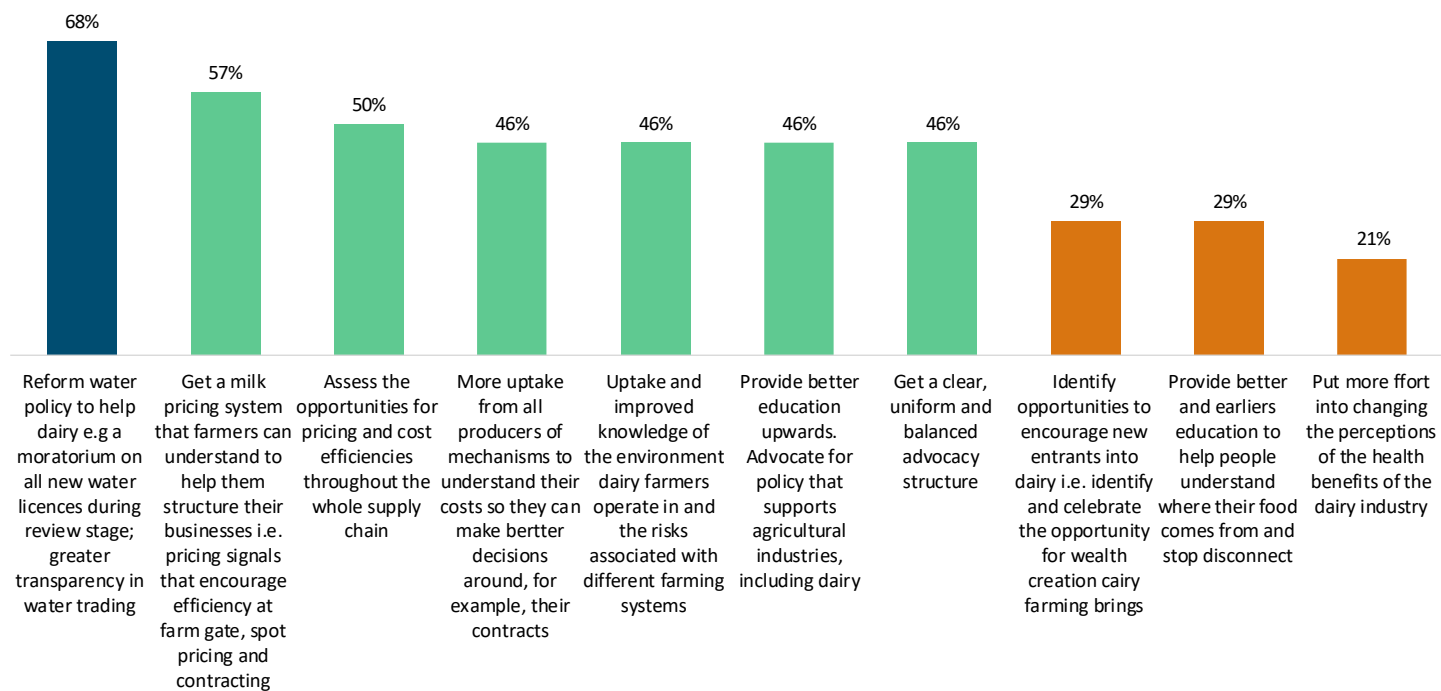
As part of the development of the recent National Dairy Plan, regional workshops were held in 2019 with farmers and some processors and service providers. Key results are shown in Figure 17 and Figure 18. The top issue in both the Cohuna and Tatura workshops (both towns within Northern Victoria) relates to reforms to water policy that assist the dairy sector.

Figure 17: Tatura workshop: Participants voted on “where should we be focusing our efforts and energy to get the change we want?”



Source: Australia Dairy Plan (2019)

Figure 18: Cohuna workshop



Source: Australia Dairy Plan (2019)

5. Key factors affecting forward outlook

Financial returns from new farming systems in the GMID will depend on a range of internal and external factors to the regions. Some will enhance opportunities for the industry while others will be countervailing – the relative balance of which will depend primarily on the pattern of future water availability, external commodity and specialist markets, the performance of NSW and Queensland producers, technology and practice change, and regulatory responses.

5.1 Key internal factors

Key internal factors include:

- **Expected availability of water and the pattern of availability over time** – as evidenced in the farm system modelling reported above, dairy farming returns are sensitive to the availability of water and the cost of maintaining feed sources for the herd for extended periods. Under future scenario modelling dairy farms will need to be able to profitably produce and store up to two seasons of herd fodder as a risk buffer in order to be sufficiently resilient to water availability shocks. Farms that have previously sold off water and rely on the temporary market will be highly vulnerable to extended dry periods and the costs of importing supplementary feed will not be sustainable over the longer term unless they are able to establish substantial price premiums for milk.
- **Skills of farmers and the ability to manage risk** – As evidenced by existing practice change challenges and the complexity of the scenarios of considered under the new systems research, the evolution of new resilient dairy farming systems will require more complex managerial and technical farming skills. These will not suit all existing farmers wishing to transition to them.

- **Ability to achieve further productivity gains** will continue to be hampered by natural constraints with dairy farming systems in the region (for example milk harvesting technologies and tight pattern of settlement) that make increasing economies of scale and scope complex and risky.
- **Closer pattern of settlement creates higher costs of dairy farm amalgamation** than the Murray Irrigation dairy region – some areas have more significant issues than others
- **An emerging fodder market** – as farm systems evolve and mixed cropping enterprises become more common, there is likely to be an evolution of fodder croppers that contract crops for dairy farms to build buffer stockpiles. This market will largely be driven by reduced and more variable water supplies.
- **Smaller farms holding onto allocation will use the water as a superannuation package.** Trading water back into the temporary market and realising assets over time on permanent market.

5.2 Key external factors

Key external factors include:

- **Price of water** – horticulture demands will increase the demand for water as plantings mature over time. High prices and difficulty accessing water will temper investment in dairy – except where water recovery mechanism target these farms and this leads to an increase in consumption of water.
- **Commodity prices for dairy and ability and willingness of processors to offer higher prices to the region** – Australian milk prices generally, and those particularly in Northern Victorian, are driven by world prices. Australia is largely a price taker on world markets. There have been efforts by processors to value add in an attempt to develop more specialised markets and higher returns. This strategy has had mixed results with vertically integrated approaches increasing costs and complexity and also increasing the risk of more transitory markets – examples include Murray Goulburn and Fonterra having unsuccessful vertically integrated ventures. Historically, milk prices in NSW and Queensland have been higher than Northern Victoria and processors have been willing to offer special contracts to suppliers to secure drinking milk supplies. The scope for northern Victorian dairy to be resilient will depend on the willingness of processors to offer similar inducements in the region.
- **Increasing transport efficiency of milk and semi processed products is seeing milk being shipped much larger distances more cheaply.** A-B doubles and Super B-doubles have significantly larger access to the road network due to road reclassification and upgrades than previously. Northern Victoria dairy has, generally speaking, a lower cost base

and more efficient farmers than those in New South Wales and Queensland. After the deregulation of the dairy industry there has been an increasing trend of leap frogging of milk up the east coast of Australia as the commercial position of northern Queensland and NSW farmers deteriorates. Hunter and North Coast is now supplying Brisbane as southern Queensland milk production shrinks and northern Victorian milk is going into Sydney and Canberra markets as NSW farmers reduce in number and less NSW new farmers enters these markets.

- **Relative price of land** – prices will be determined by the expected returns from suitable enterprises. The relative competitiveness of other dairy regions and the whole of supply chain of individual processors will also be a major driver of the longer term fortunes of the Northern Victoria region. There is likely to be an increasing competition for farmland by cash croppers and new horticulture ventures wanting to avoid river constraints. This is likely to result in larger scale horticulture and dairy operations (wishing to lower costs of aggregation and minimise right to farm issues) competing first for land on the outskirts of the GMID footprint.
- **Costs of energy.** The cost of electricity and fuel to power milk plants and machinery and pressurised irrigation systems will be a key factor affecting the relative competitiveness of dairy going forward as these costs rise relative to other dairying areas in Victoria.
- **Social licence to operate.** Animal welfare and nutrient management of intensive systems will be pressure points for dairy farmers more generally, and larger dairy farmers in particular, as social norms and values evolve and there is increased excision of lifestyle blocks off dewatered and amalgamated farms. Similarly, the right to farm will be an issue for where intensification of dairy farming occurs alongside other land uses.

5.3 Key needs going forward

The dairy industry faces significant challenges but also opportunities. The National Dairy Plan has identified a range of industry needs going forward. We complement this with the following:

- Continued consolidation of processing capacity that can manage under a future of reduced water.
- Investment in the consolidation of farms to enable stable flexible systems to succeed.
- Research and innovation on new resilient farm systems including – farm system design, genetic improvement, feed and crop varieties, milk harvesting technologies and fodder conservation strategies.
- Investment in skills and training to address labour and skill gaps required for these complex new systems.
- Refinement of planning regulations to address right to farm issues.

- Continued reform of road access and heavy vehicle charging to enable more efficient transport of milk and processed dairy goods long distances.

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