Dairy Australia

Dairy Farm Monitor Project

South Australia Annual Report 2022/23

Acknowledgements

Participants

To continuing and returning participants and those new to the project, thank you for your participation, including all your efforts in supplying data for the 2023 Dairy Farm Monitor Project.

Project participants were selected based on a distribution of farm size, feeding system, herd size and geographical location within each region and results should not be viewed as a representation of the entire South Australian dairy farm population.

Report

The report was prepared by Fiona Smith (F. Smith Agribusiness Consulting) in conjunction with Dairy Australia.

Contributors/data collectors

Greg Mitchell (FPAG), Chris Scheid (Moore Australia) and Fiona Smith (F. Smith Agribusiness Consulting).

These people collected farm data and provided feedback and validation to ensure the accuracy and integrity of the information.

The diligent work of Dairy Australia's consultant analysts Fiona Smith and Kerry Kempton, who conducted data checking, validation and analysis is much appreciated.

Appendix Tables

The appendices at the end of this report provide detailed metrics on the historical physical and financial performance and efficiency for the average of the South Australian project participants.

Further information

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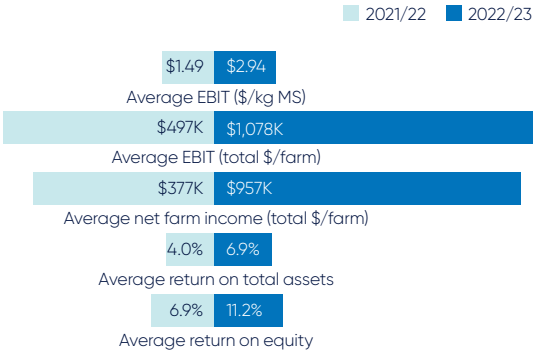
Executive summary

In 2022/23 the average South Australia Farm Monitor profitability increased on the previous year and was the highest in the 11 years of the project (accounting for inflation).

Average milk price increased to $9.90 per kilograms of milk solids ($/kg MS), with the increase being high enough to offset higher variable costs, resulting in strong margins in 2022/23.

Farms once again utilised the favourable cashflow position to invest in infrastructure and machinery and repay debt, resulting in an increase in average equity across participant farms.

South Australia



In 2022/23 farms in South Australia predominantly experienced positive seasonal conditions for dairying, with the highest levels of homegrown feed on milking platforms for the past five years. Whilst there was a decline in livestock trading conditions, record high milk prices resulted in the highest gross farm incomes in the 11 years of DFMP in SA with all participants recording a profit.

Whilst the majority of input costs continued to increase on last year, record high milk prices, provided strong cash flow for many participants. The majority of participants (93 per cent) maintained or increased their business equity across the year with continued investment on farm and focused debt reduction.

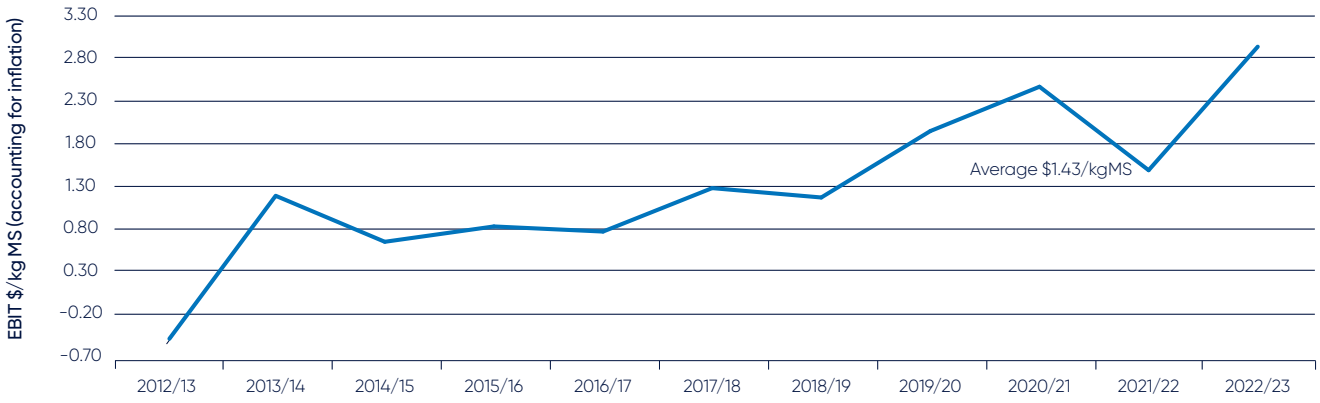
The above average rainfall throughout Spring resulted in above average pasture growth and fodder yields, although some farms experienced issues with fodder quality due to the wet Spring. The improved seasonal conditions resulted in higher spending on homegrown feed costs than last year with a rebound in fertiliser application on the back of softening prices, and increased hay and silage costs on the back of increased quantities of conserved feed.

Gross farm income and profitability (average EBIT per kilogram of milk solids) were the highest over the 11 years of the project (accounting for inflation).

Whilst variable costs were the highest seen so far in the project (accounting for inflation) overhead costs were the fourth highest in the 11 years demonstrating that participant farms are still focused on core cost control in their businesses.

How does 2022/23 compare?

Historical profitability



Average profit (per kg milk solids) in 2022/23 was above the long-term average for South Australia.

Strong profit results per farm (average $1,077,936) across the state, were well above the 11-year long term average of $417,755, and significantly higher than the average of $524,425 (adjusted for inflation) in 2021/22.

Milk price

Milk price increased 30 per cent on average in 2022/23. Milk income contributed on average, 89 per cent of gross farm income due to the increase in milk price across all participant farms.

South Australia ↑ 30% to $9.90/kg MS

Expectations for profit in 2023/24

The majority (53 per cent) of participant farms were expecting farm business returns to remain stable in the coming 12 months with 40 per cent of participants expecting better returns in 2022/23. Input costs were identified by participants as the greatest risk to their business for the coming 12 months with milk price remaining the most important factor over the next 5 years.

Greenhouse gas emissions

The median carbon footprint for South Australian dairy farm participants was 4,340 tonnes of carbon dioxide equivalents per farm in 2022/23. This year more specific questions were asked about the manure management on farms along with more accurate collection of on farm total fuel use with the results more accurately reflecting the on-farm emissions. The median emissions intensity increased due to more accurate capture of data in 2022/23 and a change in participant farms.

South Australia overview

State-wide, average profitability in South Australia increased by 97 per cent to $2.94/ kg MS.

The increase in average milk prices was the main driver with a decline in livestock trading conditions across Australia resulting in a decrease of 11 per cent on livestock trading profits.

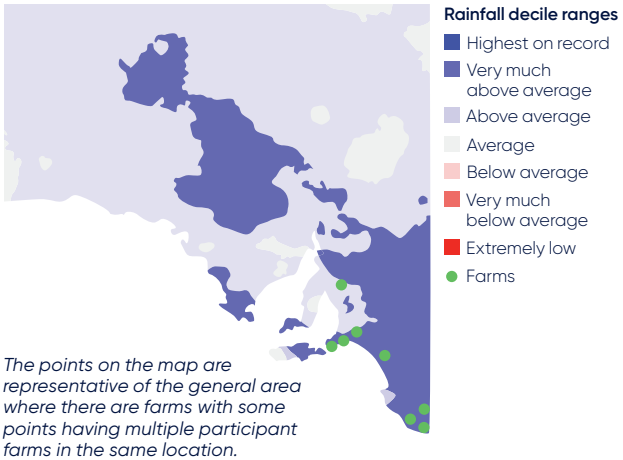
Profitability was assisted by positive seasonal conditions, particularly across Spring, enabling farmers to increase homegrown feed on their milking area with an overall increase in the proportion of homegrown feed in the diet.

There was a general increase across all variable cost categories with homegrown feed costs largely increasing on the back of higher overall costs for fertiliser and hay & silage making as participant farms strategically spent more in these areas to maximise homegrown feed. Total overhead costs increased by 3 per cent compared to 2021/22 with the biggest increase coming from higher employed labour costs both, as a result of increased paid labour units across participant farms but also increased wage rates.

Dairying in South Australia

There were approximately **182** dairy farm businesses in SA that produced 474 million litres or **5.8 per cent** of Australia's national milk production in 2022/23.

Dairy Farm Monitor Project farm locations and rainfall in 2022/23



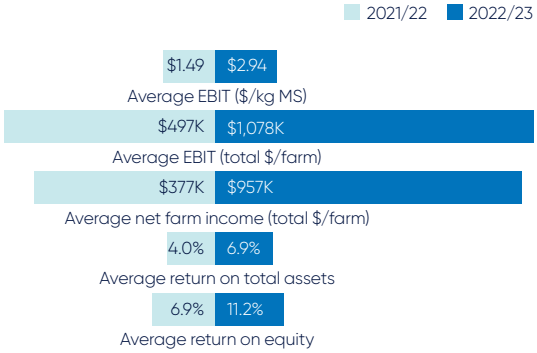
The points on the map are representative of the general area where there are farms with some points having multiple participant farms in the same location.

Physical farm characteristics

While the average herd size in South Australia once again increased to 613 cows, milk produced per cow declined from 580kgMS/cow to 553kgMS/cow. Farms grazed and conserved more feed on their milking areas this year on the back of above average rainfall on all participant farms combined with an increase in fertiliser applied compared to 2021-22 on the back of softening prices.

Average herd size	Milk solids sold	Homegrown feed
↑33%	↓5%	↑3%
613 cows	553 kg MS/cow	60% of metabolisable energy consumed

In 2022/23, all SA participants recorded a positive profit



Profitability

In 2022/23 farm profitability has been influenced by:

↑30%
in average milk price to **$9.90/kg MS**

↑19%
in herd costs to **$0.43/kg MS**

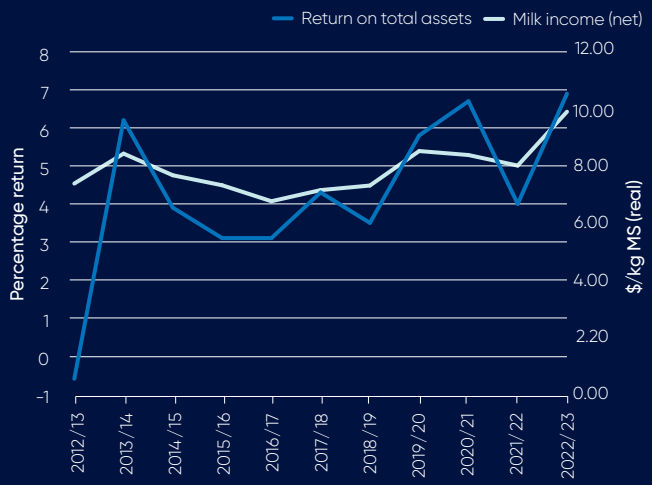
↑25%
In shed costs to **$0.30/kg MS**

↑13%
In total feed costs to **$4.15/kg MS**

↑3%
In overhead costs to **$3.26/kg MS**

Despite increased costs across most areas of the business, the average profit was the highest on record, accounting for inflation due to the strong milk prices received by participant farms.

Return on total assets and milk price



Physical parameters and seasonal conditions

All participant farms received above average rainfall in 2022/23, largely impacted by the spring rain, followed by above average rainfall throughout Autumn of 2023.

Seasonal conditions throughout the year resulted in an increase in homegrown feed on milking platforms, with softening fertiliser prices assisting through increased fertiliser use.

Farm systems have remained similar although the average herd size increased again in 2022/23 to the highest in the projects eleven-year history.

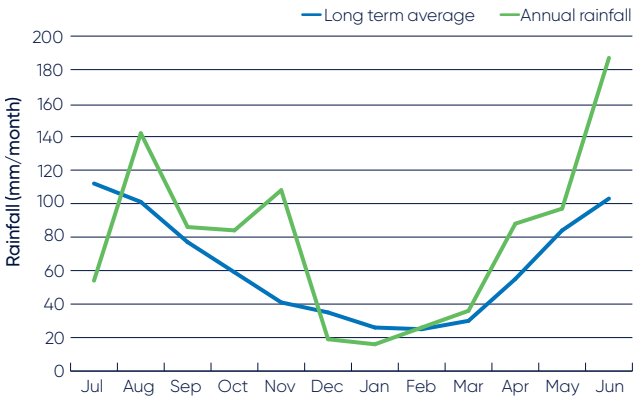
SA pasture based dairy production

Dairying in South Australia is predominantly pasture based, with 60 per cent of all consumed metabolisable energy home grown across participant farms. Spring and Autumn rainfall are important as is the availability of adequate water across irrigation areas.

Rainfall

Above average spring rainfall in 2022 was followed by above average rainfall across autumn in 2023 and these both assisted the physical and financial performance across South Australia. The preceding conditions as well as the conditions prevalent in a particular month influence feed availability and conditions to harvest pastures and crops as well as their timely renovation or sowing.

Figure 1 Monthly rainfall 2022/23

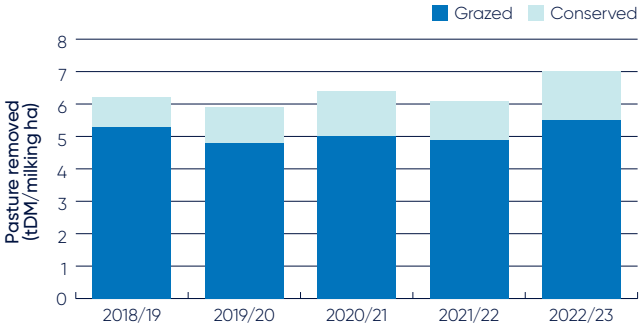


Above average rainfall throughout Spring (Figure 1) resulted in above average pasture growth and fodder yields, although fodder quality was compromised. The mild summer temperatures combined with good carryover soil moisture from Spring meant there was good pasture growth and reduced irrigation water usage into Summer along with a reduced reliance on fodder feeding. Above average rains in April produced an early opening to the 2023 growing season and reduced the requirement for supplementary fodder feeding on many farms. There was however an increased incidence of insect pests on farm that impacted new pasture and crops in Autumn.

Feed consumption and harvest

With higher homegrown feed availability across the state, the average tonnes of homegrown feed increased by 0.9 t DM/ha (Figure 2). Whilst the proportion of concentrates consumed in the diet remained stable there was a decline in fodder as a proportion of the diet, largely on the back of increased availability of grazed feed. The ability to grow and harvest feed was also impacted by higher fertiliser applications due to softening prices and the positive seasonal conditions experienced throughout spring and autumn.

Figure 2 Estimated tonnes of homegrown feed removed

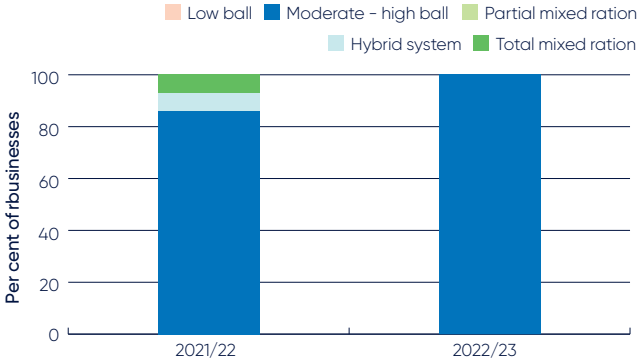


Feeding system

Moderate to high bail feeding systems were the only feeding systems utilised by participant farms in 2022/23 (Figure 3). The reduction in farms utilising a hybrid and total mixed ration system from 2021/22 is due to a combination of a change in participant farms and increased availability of pasture year round due to seasonal conditions, rather than showing a particular trend in the South Australian farming systems.

South Australia is predominantly reliant on perennial pasture species, comprising approximately 73 per cent of pastures on average, with the remaining portion made up of annuals.

Figure 3 Type of feeding systems



Information on feeding systems was first collected in 2020/21 to capture the transition of dairy feeding systems in South Australia over time, reflecting a longer-term decision made by the business operator to manage a certain type of feeding system, rather than a short term one to manage adverse seasonal conditions in a given year.

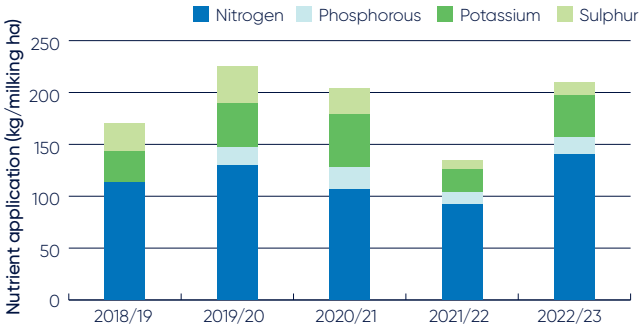
Fertiliser application

Total nutrient application on the milking area increased substantially in 2022/23 to the second highest in five years. The softening of fertiliser prices and positive growing conditions resulted in farmers applying higher quantities of fertiliser than last year.

In comparison to the previous year, (Figure 4) shows that in 2022/23:

- Nitrogen applied was 140 kg/ha, a 52 per cent increase.
- Phosphorous applied was 17 kg/ha, a 42 per cent increase.
- Potassium applied was 40 kg/ha, an 82 per cent increase.
- Sulphur applied was 13 kg/ha, a 44 per cent increase.

Figure 4 Nutrient application

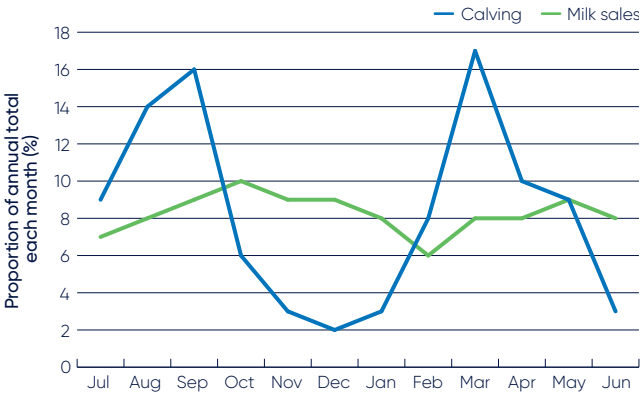


Milk solids sold

South Australian participant farms on average increased the level of total milk production on farm due to an increase in average herd size despite a decrease in milk production per cow.

Milk production reflects the seasonal nature of calving. Calving pattern determines milk production and subsequently the milk payment system available to participant farms (Figure 5).

Figure 5 Monthly distribution of milk sales and calving



Calving pattern

South Australia is characterised by split calving (spring and autumn) as shown in Figure 5. The calving pattern determines the feed requirements on farm with some farms electing to calve year-round. The lowest proportion of cows calving occurs across the hotter summer months.

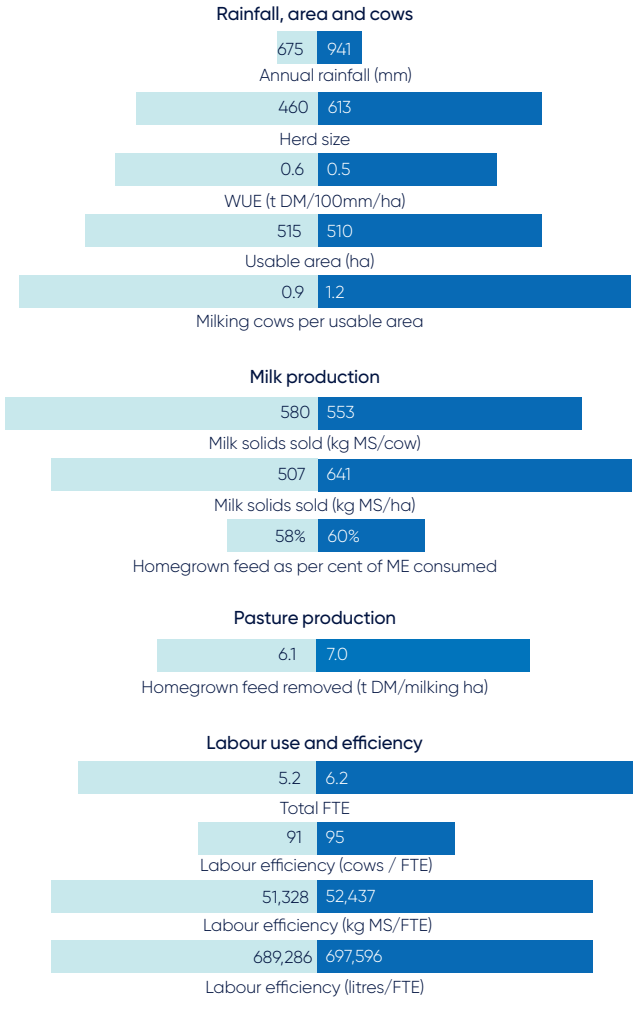
Whole farm analysis

On average, farm profitability increased in 2022/23 to the highest in the history of the project. Earnings before Interest and Tax (EBIT) was positive for all participating farms.

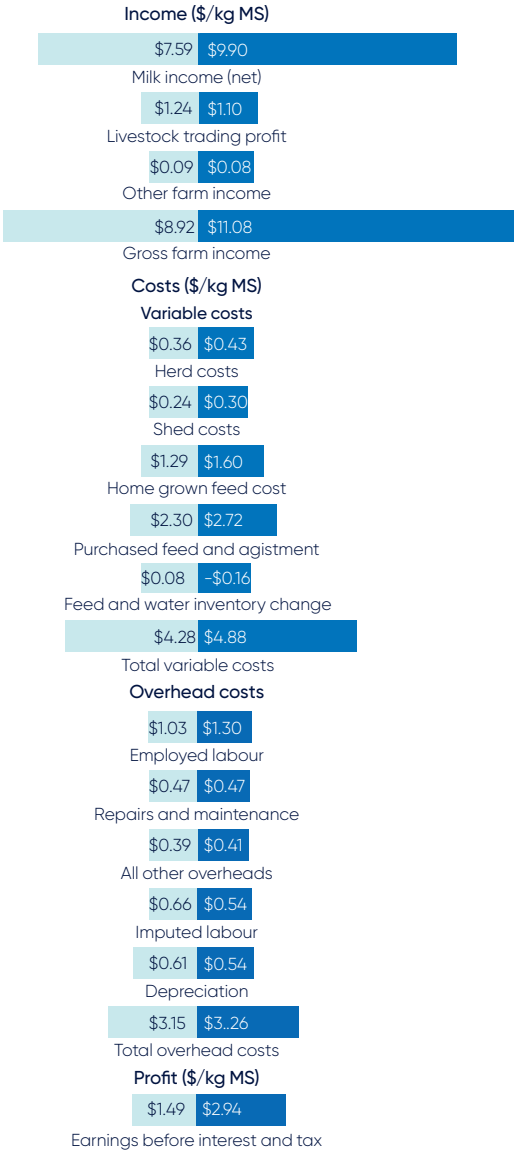
Milk price increased by 30 per cent to the highest on record at $9.90/kg MS on average. There was an 11 per cent reduction in livestock trading profit.

Variable costs increased by 14 per cent (primarily due to feed costs), with overhead costs increasing by 3 per cent, largely on the back of increased reliance on paid labour at higher wage rates.

Physical parameters



Financial parameters



Gross farm income

Gross farm income increased by 24 per cent to $11.08/kg MS, the highest for South Australia in the eleven-year history of DFMP (accounting for inflation). Record high milk prices were the main driver of the increased income.

Variable costs

Variable costs increased by $0.60/kg MS with higher purchased feed costs being the largest component followed by homegrown feed costs.

Homegrown feed costs increased by $0.31/kg MS with fertiliser contributing $0.16/kg MS, hay and silage up $0.12/kg MS, and fuel & oil and irrigation costs contributing a further $0.03/kg MS.

Purchased feed costs also increased, largely on the back of higher concentrate prices and an increased reliance on agistment on participant farms.

The improved growing conditions and increased conservation of fodder followed by positive seasonal conditions in autumn resulted in the majority of farms building feed inventory across the year, although there were some issues with fodder quality due to wet conditions during harvest in 2022.

Shed and herd costs both increased, largely on the back of increased use of sexed semen and genomic testing in herd costs and increasing prices for power and dairy supplies in shed costs.

Overhead costs

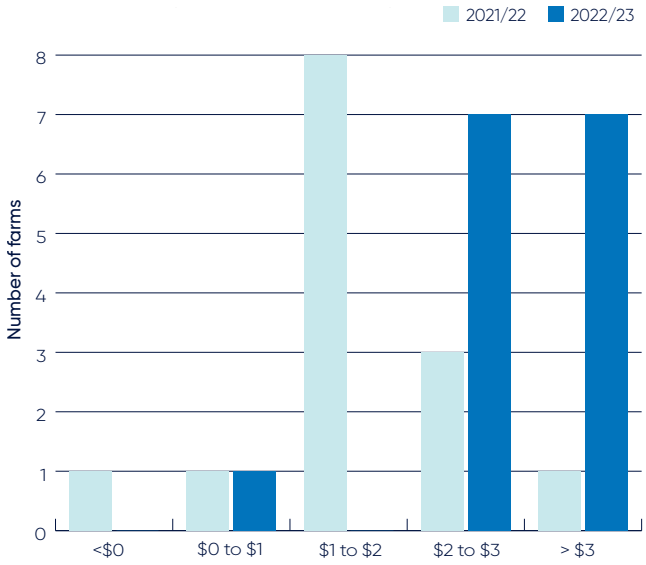
Total overhead costs increased on average by 3 per cent in 2022/23 despite a reduction in spending in most of the overhead cost categories. The increase was largely a result of increased reliance on employed labour compared to imputed and increased wage rates resulting in an increase of $0.27/kg MS for average employed labour costs.

Repairs and maintenance remained similar to last year with farmers expressing that strong milk prices had enabled them to continue to catch up and continue on farm repairs that had historically not been possible when milk prices were lower.

Earnings before interest and tax

In 2022/23 all participants had a positive EBIT (Figure 6). Average EBIT per farm (total dollars) was the highest in the 11 years of the DFMP, accounting for inflation. Average EBIT ($/kg MS) was higher year-on-year and again the highest on record, accounting for inflation.

Figure 6 Average EBIT per kg MS



Return on total assets and equity

A positive return on total assets (ROTA) was recorded for all participants (Figure 7). In 2022/23 average ROTA increased to 6.9 per cent compared to 4.0 per cent the previous year. The higher returns were a result of higher total EBIT across participant farms.

Average return on equity (ROE) in 2022/23 increased to 11.2 per cent relative to the previous year at 6.9 per cent. Equity levels increased on the majority of farms during the last 12 months.

With the cost of financing lower than the returns from accessing additional assets (e.g. land and infrastructure upgrades), 80 per cent of the participants recorded higher ROE than ROTA meaning they have been able to grow their business.

Figure 7 Average returns ROTA and ROE

** One farm operates with mainly leased assets and has a very high ROE of 57 per cent. Dot point manually adjusted to 25 per cent so it can be seen on the graph.*

Business confidence survey

Participant farmers predominantly expected stable business returns in the coming 12 months (2023/24).

The majority of participant farms expected milk price to remain stable with the majority of farms expecting milk production to increase or remain stable.

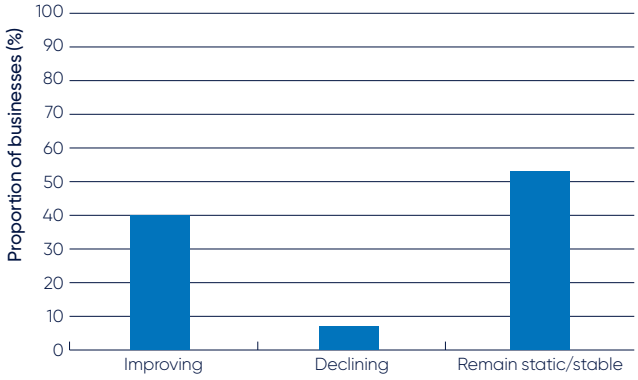
Input costs was the major issue listed for the coming 12 months with milk price being the most significant issue for the coming 5 years.

In 2023/24 costs were expected to increase across purchased feed, fuel and oil and labour whilst fertiliser, irrigation and repairs and maintenance costs are anticipated to remain stable.

Expectations for business profit 2023/24

The participant survey considers different aspects of farming, from climate outlook to expectations about market conditions for dairy products. Expectations for business profit in the coming year showed 53 per cent of farms are expecting returns to remain stable whilst a further 40 per cent are expecting an increase in returns (Figure 8).

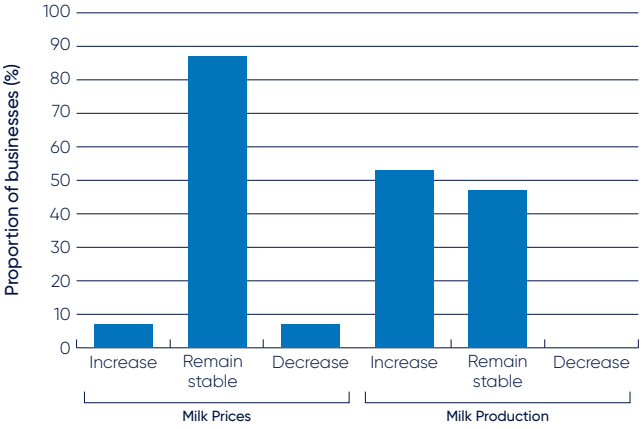
Figure 8 Expected change to farm business profit in 2023/24



Price and production expectations – milk

Participants were largely expecting milk prices to remain stable with 53 percent expecting to increase milk production and a further 47 per cent expecting to retain current milk production levels. This is mainly due to the timing of milk price announcements (1 June), with farmers having more informed choices on their milk factory at the time of the DFMP survey (August-October 2023). Only 7 per cent predicted milk price would decrease in 2023/24 with no farms planning to reduce production in 2023/24 (Figure 9).

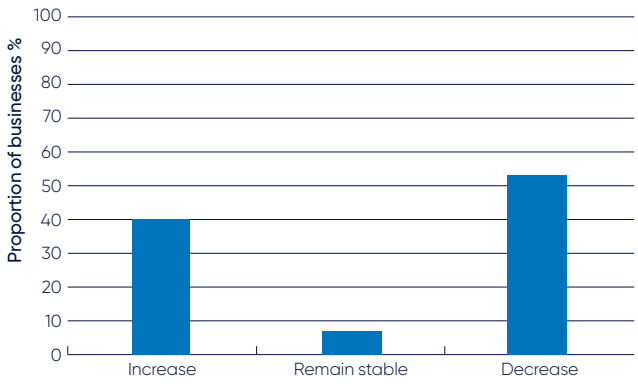
Figure 9 Producer expectations of milk prices and production in 2023/24



Production expectations – fodder

Fodder production in 2023/24 was expected to remain stable for 53 per cent of participant farms with 33 per cent expecting a decrease in fodder after positive seasonal conditions in 2022/23 resulted in an increase in fodder production on a number of farms (Figure 10).

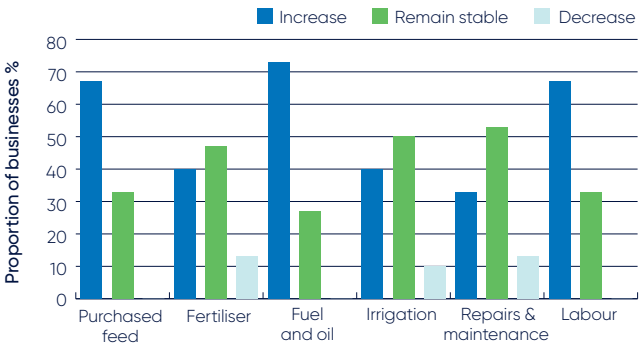
Figure 10 Producer expectations of fodder production in 2023/24



Cost expectations

The cost category that was expected to be the most likely to increase in 2022/23 was fuel and oil followed by purchased feed and labour costs which were both expected to increase by 67 per cent of participant farms (Figure 11). Fertiliser, irrigation costs and repairs and maintenance were expected to stay stable as in the previous year.

Figure 11 Producer Expectations of costs for the dairy industry in 2023/24



Comments from participants

Respondents indicated higher milk prices and the ability to lock strong prices in for multiple years was providing them with confidence to invest in their business whilst others indicated they would continue to explore options to diversify income streams through integrating beef and other livestock into their enterprise.

A number of participants remarked on the benefits of participating in DFMP and their ability to use the data to improve their business performance.

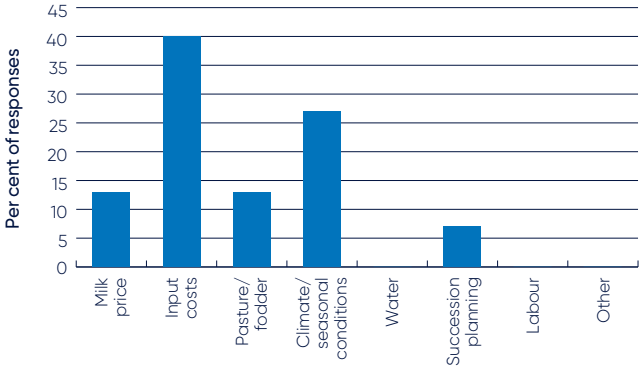
Issues of importance to dairy businesses

Participants were asked to rank issues based on the level of importance to their business – with a ranking of (1) being most important and (8) being least important. The results are shown in Figure 12 for the short-term issues and Figure 13 for medium term issues.

Short term issues – Next 12 months

The most important issue in the coming 12 months was input costs with 40 per cent of respondents ranking this as number 1 which was not surprising given increasing inflation and the predicted El Nino. Climate and seasonal conditions (ranked number 2 by 27 per cent of respondents) was then ahead of milk price and pasture and fodder production (at 13 per cent) as being a major issue.

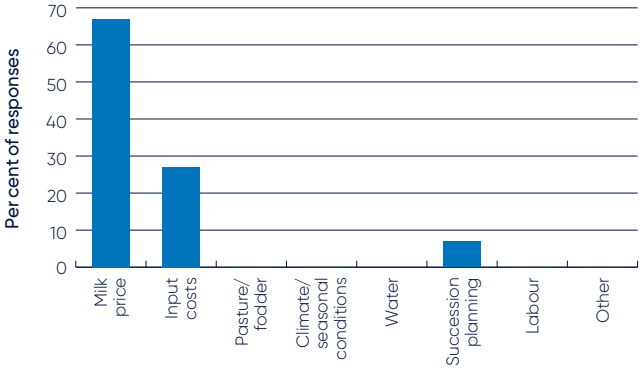
Figure 12 Major issues for individual businesses – 12 month outlook



Medium to long term issues – Next five years

Milk price remains the major consideration for participants farms with 67 per cent of respondents ranking it number 1 followed by input costs at 27 per cent. Succession planning was the only other issue that ranked as being the number one priority for the coming 5 years.

Figure 13 Major issues for individual businesses – 5 year outlook



2022/23 greenhouse gas emissions

The median carbon footprint for South Australian farm monitor farms was 4,340 tonnes of carbon dioxide equivalents (t CO^2-e) per farm in 2022/23.

Methane from cow rumination (enteric) accounted for 61 per cent of on-farm emissions (median).

Changes in the net farm emissions for SA dairy farms in 2022/23 can be attributed to changes in the data capture process, a change in participant farms and increases across all emissions sources on farm

Emissions intensity was 0.90 t CO^2-e/t FPCM, increasing on last year.

Total emissions

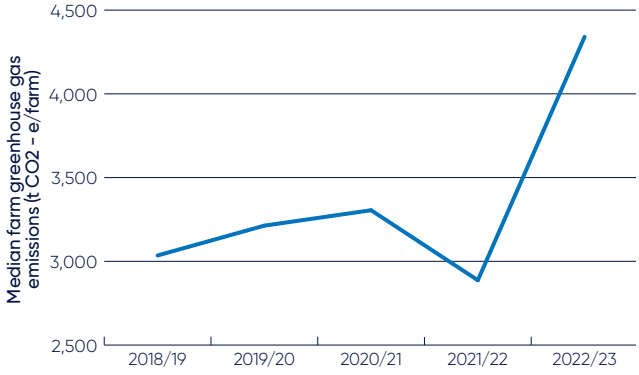
Net greenhouse gas (GHG) emissions (median) in 2022/23 were the highest in 5 years at 4,340 tonnes of carbon dioxide equivalent (Table 1 and Figure 14). Median milk production increased in 2022/23 and there was also a change in the way the data inputs were captured. User defined inputs for manure management were captured instead of the state defaults and fuel from contractors was estimated on all farms. Over the last 5 years, higher median GHG emissions were also associated with greater herd size and milk production per farm.

Methane from manure management contributed the largest increase to higher emissions in 2022/23 indicating that the previous reliance on state defined factors did not accurately reflect the emissions across all farms. Greater fuel and electricity use also increased carbon dioxide emissions as did the pre-farm emission from fertiliser manufacture which may also be attributed to a change in data capture, whereby the Urea component of blends was separated out in the 2022/23 year.

The softening of fertiliser prices and positive seasonal conditions resulted in an increase in fertiliser use compared to 2021/22 and back to the second highest in the past 5 years.

Enteric methane remained similar to the previous year accounting for 61 per cent of emissions and is sensitive to changes in livestock weights and numbers on individual farms.

Figure 14 Estimated median GHG emissions between 2018/19 and 2022/23 (CO^2 equivalent)

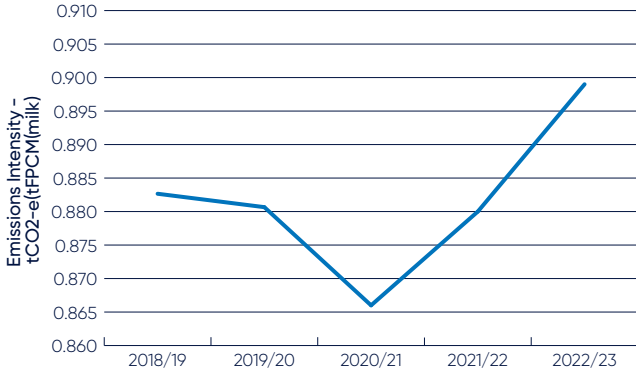


NOTE: Greenhouse gas emission estimates are calculated using the Australian Dairy Carbon Calculator embedded within DairyBase.

Emissions intensity

The emissions intensity allocated to milk production (once meat production is considered), increased to 0.99 t CO2-e/t FPCM and has fluctuated over the years (Figure 15 and Table 1). Emissions intensity is calculated by dividing total emissions by the amount of fat and protein corrected milk (FPCM); standard of 4.0 per cent fat and 3.3 per cent protein. Regional and farm variation was also observed over this period.

Figure 15 Estimated median emissions intensity between 2018/19 and 2022/23 (CO^2 equivalent)



The data

The median GHG emissions have been provided as the data is not symmetrically distributed. When the data are skewed, the median is more useful because the average will be distorted by outliers. These median values reflect the profiles of the participating farms in the project.

Changes to the emission accounting framework in 2021/22 included new factors for methane, nitrous oxide, fertiliser, purchased feeds, electricity and fuel. The scope considered other livestock on dairy farms (dairy beef) and the allocated proportion of GHG to meat production.

Carbon capture and storage from trees was recorded. Data from all five years was analysed using the 2021-22 accounting framework. In 2022/23 additional information was captured for manure management on all farms where previously state based defaults had been allocated to this area. Participant farms also needed to estimate the fuel usage by contractors on farm and had to separate out the Urea portion of any fertiliser blends.

NOTE: Greenhouse gas emission estimates are calculated using the Australian Dairy Carbon Calculator embedded within DairyBase.

Table 1 Estimated average GHG emissions and intensity between 2018/19 and 2022/23 (CO^2 equivalent)

Emission source	Units	18/19	19/20	20/21	21/21	22/23
Sample size		20	18	16	14	15
Methane	t CO^2-e/farm	2123	2285	2347	2113	2737
Pre-farm	t CO^2-e/farm	304	384	394	328	540
Nitrous oxide	t CO^2-e/farm	307	358	324	302	513
Carbon dioxide	t CO^2-e/farm	228	211	250	250	367
Tree carbon	t CO^2-e/farm	N/A	N/A	N/A	0	0
Net GHG emissions	t CO^2-e/farm	3,035	3,213	3,305	2,887	4,340
Emissions intensity	t CO^2-e/FPCM (milk)	0.88	0.88	0.87	0.88	0.90
Emissions intensity	t CO^2-e/t MS (milk)	12.4	12.4	12.1	12.3	12.6
Emissions intensity	t CO^2-e/kg lwt (meat)	4.0	4.1	4.0	4.1	4.3

How does 2022/23 compare?

Gross farm income increased by 24 per cent to $11.08/kg MS, the highest in the 11-year history of DFMP (accounting for inflation), driven by the record high milk price in 2022/23.

Strong profit results per farm (average $1,077,936) across the state, were well above the 11 year long term average of $417,755.

The increase in EBIT resulted in an increase in return on total assets to 6.9 per cent.

Farm profit (EBIT) in 2022/23 was the highest (accounting for inflation) since the start of the DFMP in 2012/13 (Figure 16). Average EBIT was $1,077,936 in 2022/23, compared to the long-term average of $417,755. Net farm income was $957,377 in 2022/23, compared to the long-term average of $287,647.

Average ROTA was 6.9 per cent in 2022/23, increasing from 4.0 per cent the previous year (Figure 17), which is the highest in the last 11 years. The average ROE increased to 11.2 per cent in 2022/23 from 6.9 per cent in 2021/22. This is compared to the long-term average of 4.6 per cent.

Figure 16 Farm profitability between 2012/13 and 2022/23

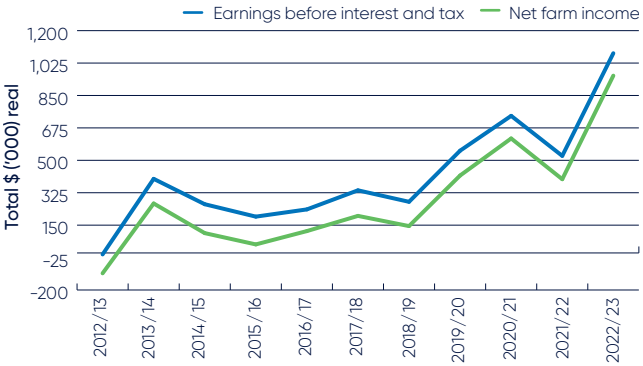
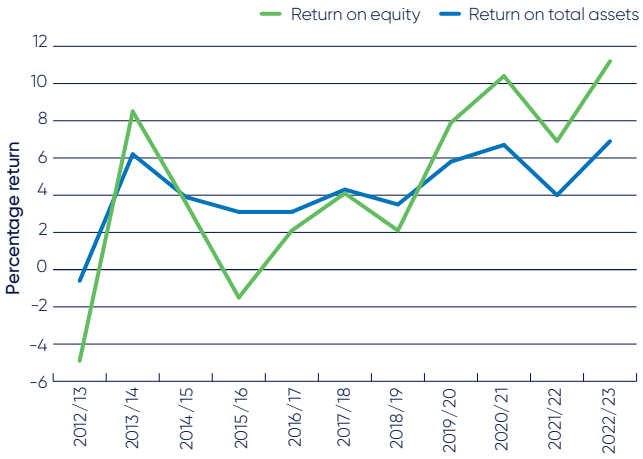


Figure 17 Whole farm performance between 2012/13 and 2022/23



Appendices

Table A8 Capital structure

Farm assets				
	Land value	Land value	Permanent water value	Permanent water value
	$/ha	$/cow	$/ha	$/cow
Average	19,199	19,210	2,203	1,652

Other farm assets (per usable hectare)				
Plant and equipment	Livestock	Hay and grain	Other assets	Total assets
$/ha	$/ha	$/ha	$/ha	$/ha
1,259	3,446	209	199	26,515

Liabilities		
	Liabilities per usable hectare	Liabilities per milking cow
	$/ha	$/cow
Average	3,727	3,639

Equity	
Equity per usable hectare	Average equity
$/ha	%
22,788	83

Table A9 Historical data – average farm income, costs and profit per kilogram of milk solids

	Income				Variable costs							
	Milk income (net)		Gross farm income		Herd costs		Shed costs		Feed costs		Total variable costs	
Year	Nominal ($/kgMS)	Real ($/kgMS)	Nominal ($/kgMS)	Real ($/kgMS)	Nominal ($/kgMS)	Real ($/kgMS)	Nominal ($/kgMS)	Real ($/kgMS)	Nominal ($/kgMS)	Real ($/kgMS)	Nominal ($/kgMS)	Real ($/kgMS)
2012/13	5.83	7.38	6.40	8.10	0.32	0.40	0.28	0.35	2.96	3.75	3.56	4.50
2013/14	6.83	8.43	7.74	9.55	0.30	0.37	0.26	0.32	3.04	3.75	3.61	4.46
2014/15	6.35	7.66	7.03	8.48	0.29	0.35	0.22	0.27	3.28	3.96	3.79	4.57
2015/16	6.15	7.33	7.10	8.46	0.34	0.41	0.24	0.29	3.13	3.73	3.71	4.42
2016/17	5.78	6.76	6.75	7.89	0.40	0.47	0.27	0.32	2.49	2.91	3.16	3.69
2017/18	6.24	7.16	7.08	8.12	0.31	0.36	0.29	0.33	2.80	3.21	3.40	3.90
2018/19	6.46	7.32	7.32	8.29	0.29	0.33	0.24	0.27	3.30	3.74	3.83	4.34
2019/20	7.62	8.52	8.64	9.66	0.36	0.41	0.26	0.29	3.53	3.94	4.14	4.63
2019/20	7.61	8.38	8.75	9.64	0.37	0.41	0.23	0.25	3.16	3.48	3.76	4.14
2021/22	7.59	8.01	8.92	9.41	0.36	0.38	0.24	0.25	3.67	3.87	4.28	4.52
2022/23	9.90	9.90	11.08	11.08	0.43	0.43	0.30	0.30	4.15	4.15	4.88	4.88
Average		**7.89**		**8.97**		**0.39**		**0.29**		**3.68**		**4.37**

Note: 'Real' dollar values are the nominal values converted to 2022/23 dollar equivalents by the consumer price index (CPI) to allow for inflation.
From 2016/17 gross farm income does not include feed inventory changes and changes to the value of carry-over water. These are included in feed costs.

Table A9 Historical data – average farm income, costs and profit per kilogram of milk solids (continued)

	Overhead costs						Profit							
	Cash overhead costs		Non-cash overhead costs		Total overhead costs		Earnings before interest and tax		Interest and lease charges		Net farm income			
Year	Nominal ($/kgMS)	Real ($/kg MS)	Nominal ($/kgMS)	Real ($/kg MS)	Nominal ($/kgMS)	Real ($/kg MS)	Nominal ($/kgMS)	Real ($/kg MS)	Nominal ($/kgMS)	Real ($/kg MS)	Nominal ($/kgMS)	Real ($/kg MS)	Return on total assets %	Return on equity %
2012/13	1.55	1.96	1.60	2.02	3.15	3.99	-0.31	-0.39	0.53	0.67	-0.84	-1.06	-0.6	-4.9
2013/14	1.54	1.90	1.31	1.62	2.85	3.52	1.27	1.57	0.52	0.64	0.75	0.93	6.2	8.5
2014/15	1.50	1.81	1.03	1.24	2.52	3.04	0.72	0.87	0.55	0.66	0.16	0.19	3.9	3.6
2015/16	1.60	1.91	1.00	1.19	2.60	3.10	0.79	0.94	0.57	0.68	0.22	0.26	3.1	-1.5
2016/17	1.68	1.96	1.04	1.22	2.71	3.17	0.88	1.03	0.47	0.55	0.40	0.47	3.1	2.1
2017/18	1.61	1.85	0.89	1.02	2.50	2.87	1.18	1.35	0.54	0.62	0.65	0.75	4.3	4.1
2018/19	1.50	1.70	0.90	1.02	2.40	2.72	1.09	1.23	0.49	0.55	0.60	0.68	3.5	2.1
2019/20	1.70	1.90	0.95	1.07	2.66	2.97	1.84	2.06	0.46	0.51	1.39	1.55	5.8	7.9
2020/21	1.62	1.78	1.00	1.10	2.62	2.89	2.37	2.61	0.41	0.45	1.96	2.16	6.7	10.4
2021/22	1.88	1.98	1.27	1.34	3.15	3.32	1.49	1.57	0.42	0.44	1.07	1.13	4.0	6.9
2022/23	2.18	2.18	1.08	1.08	3.26	3.26	2.94	2.94	0.43	0.43	2.51	2.51	6.9	11.2
Average		**1.90**		**1.27**		**3.17**		**1.43**		**0.56**		**0.87**	**4.3**	**4.6**

Note: 'Real' dollar values are the nominal values converted to 2022/23 dollar equivalents by the consumer price index (CPI) to allow for inflation.

Table A10 Historical data – average farm physical information

	Total usable area	Milking area	Total water use efficiency	Number of milking cows	Milking cows per usable area	Milk sold	Milk sold	Estimated grazed pasture*	Estimated conserved feed*	Home grown feed as % of ME consumed	Concentrate price	
Year	ha	ha	t DM/ 100mm/ ha	hd	hd/ ha	kg MS/ cow	kg MS/ ha	t DM/ ha	t DM/ ha	of ME	Nominal ($/t DM)	Real ($/t DM)
2012/13	340	141	0.70	320	1.2	527	622	4.8	1.2	51	304	385
2013/14	526	164	0.60	453	1.4	469	660	7.9	0.9	57	343	423
2014/15	529	159	0.70	362	1.3	581	738	-11.5	4.1	44	364	439
2015/16	447	131	0.70	355	1.4	586	751	6.4	1.4	48	366	436
2016/17	565	200	0.60	394	1.3	539	630	5.7	1.9	64	304	355
2017/18	527	205	0.60	399	1.1	569	628	4.4	1.3	54	340	390
2018/19	573	226	0.63	414	1.1	574	600	5.3	0.9	61	485	549
2019/20	592	238	0.61	446	1.0	577	579	4.8	1.1	57	505	565
2020/21	562	256	0.6	449	0.9	618	559	5.0	1.4	55	412	454
2021/22	515	225	0.6	460	0.9	580	507	4.9	1.2	58	455	480
2022/23	510	293	0.5	613	1.2	553	641	5.5	1.5	60	555	555
Average	**517**	**203**	**0.6**	**424**	**1.2**	**561**	**629**	**3.9**	**1.5**	**55**		**457**

*From 2006/07 to 2010/11 estimated grazed pasture and conserved feed was calculated per usable hectare.
From 2011/12 estimated grazed pasture and conserved feed was calculated per hectare of milking area.

Appendix E Glossary of terms, abbreviations and standard values

All other farm income	Income to the farm from all sources except milk. Includes livestock trading profit, dividends, interest payments received, and rent from farm houses.
Allocation	Water that is actually available to use or trade in any given year, including new allocations and carryover. Previously known as temporary water. Full allocation means irrigators receive 100 per cent of their HRWS.
Allocation trade	The transfer of a volume of allocation water between a seller and buyer. Water is traded within a current irrigation season. Previously this was known as trading of temporary water entitlement and some irrigators still use this term.
Appreciation	An increase in the value of an asset in the market, often only applicable to land value.
Asset	Anything managed by the farm, whether it is owned or not. Assets include owned land and buildings, leased land, plant and machinery, fixtures and fittings, trading stock, farm investments (i.e., Farm Management Deposits), debtors, and cash.
Cash overheads	All fixed costs that have a cash cost to the business. Includes all overhead costs except imputed labour costs and depreciation.
Cost structure	Variable costs as a percentage of total costs, where total costs equal variable costs plus overhead costs.
Concentrates	Refers to feeds with a concentrated source of energy such as grains, pellets and other grain mixes.
Debt servicing ratio	Interest and lease costs as a percentage of gross farm income.
Depreciation	Decrease in value over time of capital asset, usually as a result of using the asset. Depreciation is a non-cash cost of the business but reduces the book value of the asset and is therefore a cost.
Earnings before interest and tax (EBIT)	Gross income minus total variable and total overhead costs.
Employed labour cost	Cash cost of any paid employee, including on-costs such as superannuation and Workcover.
Equity	Total assets minus total liabilities. Equal to the total value of capital invested in the farm business by the owner/ operator(s).
Equity per cent	Total equity as a percentage of the total assets owned. The proportion of the total assets owned by the business.
Feed costs	Cost of fertiliser, irrigation (including effluent), hay and silage making, fuel and oil, pasture improvement, fodder purchases, grain/ concentrates, agistment and lease costs associated with any of the above costs, and feed inventory change.
Feed inventory change	An estimate of the feed on hand at the start and end of the financial year to capture feed used in the production of milk and livestock.
Feeding systems	**Low bail:** Low bail is defined by the one-tonne annual cap of grain or concentrates fed in the dairy bail – i.e. cows are fed up to one tonne of grain and concentrate in the dairy at milking time throughout lactation and livestock graze pasture all year round. **Moderate - high bail:** The level of grain or concentrate fed in the bail is more significant than one tonne per annum, and livestock graze pasture all year round. **Partial mixed ration:** In the partial mixed ration (PMR) system, livestock animals graze on pasture for most of the year, if not all of the year, while being fed a PMR on a feed pad. **Hybrid system:** Hybrid systems are classified as grazing pasture for fewer than nine months of the year while feeding a partial mixed ration on a feed pad with grain or concentrates. **Total mixed ration:** A total mixed ration or TMR is classified by zero-grazing, where cows are contained and fed a TMR throughout the year.
Finance costs	See interest and lease costs.
Full time equivalent (FTE)	Standardised labour unit. Equal to 2,400 hours a year. Calculated as 48 hours a week for 50 weeks a year.
Grazed pasture	Calculated using the back-calculation approach. Grazed pasture is calculated as the difference between total metabolisable energy required by livestock over the year and amount of metabolisable energy available from other sources (hay, silage, grain, and concentrates). Total metabolisable energy required by livestock is a factor of age, weight, growth rate, pregnancy, and lactation requirements, walking distance to shed, terrain and number of animals. Total metabolisable energy available is the sum of metabolisable energy from all feed sources except pasture, calculated as (weight (kg) x dry matter content (DM per cent) x metabolisable energy (MJ/ kg DM).
Gross farm income	Farm income including milk sales, livestock trading and other income such as income from grants and rebates.
Gross margin	Gross farm income minus total variable costs.
Herd costs	Cost of artificial insemination (AI) and herd tests, animal health and calf rearing.
Imputed	An estimated amount introduced into economic management analysis to allow reasonable comparisons between years and between other businesses.
Imputed labour cost	An allocated allowance for the cost of owner/ operator, family, and sharefarmer time in the business.
Liability	Money owed to someone else, e.g., family or a financial institute such as a bank.

Interest and lease costs	Total interest plus total lease costs paid.
Labour cost	Cost of the labour resource on farm. Includes both imputed and employed labour costs.
Labour efficiency	FTEs per cow and per kg MS. Measures productivity of the total labour resources in the business.
Livestock trading profit	An estimate of the annual contribution to gross farm income by accounting for the changes in the number and value of livestock during the year. It is calculated as the trading income from sales minus purchases, plus changes in the value and number of livestock on hand at the start and end of the year, and accounting for births and deaths.
Milk income	Income from the sale of milk. This is net of compulsory levies and charges.
Milking area	The area of land grazed by milking cows to produce milk.
Net farm income	Earnings before interest and tax (EBIT) minus interest and lease costs. The amount of profit available for capital investment, loan principal repayments and tax.
Nominal terms	Dollar values or interest rates that include an inflation component.
Number of milkers	Total number of cows milked for at least three months.
Other income	Income to the farm from other farm owned assets and farm business related external sources. Includes milk factory dividends, interest payments received, and rent from farm cottages.
Overhead costs	All fixed costs incurred by the farm business that do not vary with the level of production. These include cash overhead costs such as employed labour and noncash costs such as imputed owner-operator labour, family labour and depreciation of plant and equipment. It excludes interest, lease costs, capital expenditure, principal repayments, drawings, and tax.
Real terms	Dollar values or interest rates that have no inflation component.
Return on equity (ROE)	Net farm income divided by the value of total equity.
Return on total assets (ROTA)	Earnings before interest and tax divided by the value of total assets under management, including owned and leased land.
Shed costs	Cost of shed power and dairy supplies such as filter socks, rubberware, vacuum pump oil etc.
Top 25%	Regional or State average for the Top 25 per cent of participant farms ranked by return on total assets; can also be referred to as the top group, top performers within a region or the state.
Total income	See gross farm income.
Total usable area	Total hectares managed minus the area of land which is of little or no value for livestock production e.g., house and shed area.
Total water use efficiency	Homegrown feed consumed or harvested per 100 mm water 'applied' (rainfall and irrigation) to the usable hectares on the farm.
Variable costs	All costs that vary with the size of production in the enterprise e.g., herd, shed and feed costs (including feed and water inventory change).

List of abbreviations

AI	Artificial insemination
CH_4	Methane
CO^2	Carbon dioxide
CO^2-e	Carbon dioxide equivalent
CoP	Cost of production
DFMP	Dairy Farm Monitor Project
DM	Dry matter of feed stuffs
DJPR	Department of Jobs, Precincts and Resources, Victoria
EBIT	Earnings before interest and tax
FPCM	Fat and protein corrected milk
FTE	Full time equivalent
ha	Hectare(s)
hd	Head
HRWS	High Reliability Water Shares
kg	Kilograms
LRWS	Low Reliability Water Shares.
ME	Metabolisable energy (MJ/kg DM)
MJ	Megajoules of energy
ML	Megalitres
mm	Millimetres. 1 mm is equivalent to 4 points or 1/25th of an inch of rainfall
MS	Milk solids (protein and fat)
N_2O	Nitrous oxide
Q1	First quartile, i.e., the value of which one quarter, or 25 per cent, of data in that range is less than the average
Q3	Third quartile, i.e., the value of which one quarter, or 25 per cent, of data in that range is greater than the average
ROTA	Return on total assets
ROE	Return on equity
t	Tonne = 1,000 kg

Standard values

Pasture consumption

The pasture consumption calculation assumes 11 ME for homegrown feed.

Livestock values

The standard vales used to estimate the inventory values of livestock were determined by breed and liveweight. Example values for Friesians were:

Category	Opening value ($/hd)	Closing value ($/hd)
Mature cows (550kg)	$2,200	$2,200
2-year-old heifers	$1,650	$2,200
1-year old heifers	$825	$1,650
21/22 calves		$825
Mature bulls	$3,300	$3,300

Imputed owner/operator and family labour

In 2022/23, the imputed owner/operator and family labour rate was $36/hr based on a full time equivalent (FTE) working 48 hours/week for 50 weeks of the year.

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