Dairy Australia

DAIRY FARM MONITOR PROJECT

SOUTH AUSTRALIA ANNUAL REPORT 2020/21

ACKNOWLEDGEMENTS

The cooperation, patience and goodwill of the farmers who willingly supplied their farm information is gratefully acknowledged. The project was made possible this year through the guidance and contributions of Melissa Hunter and Rebecca Burgess from DairySA, and Helen Quinn from Dairy Australia.

The dilligent work of consultant Fiona Smith, who conducted the data checking, validation and analysis, is much appreciated.

The data collected for this report and the report itself have been produced by Greg Mitchell and Fiona Smith, in conjunction with Dairy Australia.

This document is also available in PDF format on the internet at **dairyaustralia.com.au/dairyfarmmonitor**.

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HOW TO READ THIS REPORT

This section explains the calculations used and the data presented throughout this report. The purpose of the different sections of the report is also discussed.

This report is presented in the following sections;

- Summary
- Farm monitor method
- South Australia overview
- Business confidence survey
- Greenhouse gas emissions report
- Historical analysis
- Appendices

Participants were selected for the project in order to represent a distribution of farm sizes, herd sizes and geographical locations within South Australia. The results presented in this report do not represent population averages as the participant farms were not selected using random population sampling.

The report presents visual descriptions of the data for the 2020/21 year. Data is presented for individual farms and as state averages. The presented averages should not be considered averages for the population of farms in the state due to the small sample size and these farms not being randomly selected.

The Q1–Q3 data range for key indicators are also presented to provide an indication of the variation in the data. The Q1 value is the quartile 1 value, that is, the value of which one quarter (25%) of data in that range is less than the average. The Q3 value is the quartile 3 value that is the value of which one quarter (75%) of data in that range is greater than the average. Therefore the middle 50% of data resides between the Q1–Q3 data range.

The appendices include detailed data tables, a list of abbreviations, a glossary of terms and a list of standard values used.

Milk production data are presented in kilograms of milk solids (fat + protein) as farmers are paid based on milk solids production.

The report focuses on measures on a per kilogram of milk solids basis, with occasional reference to measures on a per hectare or per cow basis. The appendix tables contain the majority of financial information on a per kilogram of milk solids basis.

Percentage differences are calculated as [(new value – original value)/original value]. For example 'costs went from $80/ha to $120/ha, a 50% increase'; [{(120–80)/80} x (100/1)] = [(40/80) x 100] = 0.5 x 100 = 50%, unless otherwise stated.

Any reference to 'last year' refers to the 2019/20 Dairy Farm Monitor Project report.

Price and cost comparisons between years are nominal unless otherwise stated.

It should be noted that not all of the participants from 2019/20 are in the 2020/21 report. This year, there is one new participating farm, and three farms that have not returned, bringing the total number of participants to sixteen (LY:18). This is important to bear in mind when comparing data sets between years.

Please note that text explaining terms may be repeated within the different chapters.

WHAT'S NEW IN 2020/21?

The Dairy Farm Monitor Report for 2020/21 includes some minor changes in data collection since last year's report.

- More information was recorded on the feedbase and feeding system in 2021. The pasture base (percentage of perennial and annual pastures) and the type of feeding system (based on proportion of diet sourced from grazed pasture and where supplements were fed) were included this year.
- Groundwater licences were entered separately in the Dairy Farm Monitor spreadsheet to enable accurate recording of this asset.

SUMMARY

In 2020/21, the data from 16 participating dairy farms in South Australia demonstrated that improved livestock trading conditions and a stable milk price combined with reduced variable costs resulted in a further increase in overall profitability for participant farms.

An increase in livestock trading by 16% combined with a stable milk price and a drop in variable costs by 9% saw participants achieve an average EBIT of $672,207, the highest in the nine years of the project. Average return on total assets improved to 6.7% for 2020/21, an increase of 15.5% compared to last year at 5.8%.

Average return on equity also increased to 10.4% compared to last year's 7.9%.

This is the ninth year of the Dairy Farm Monitor Project in South Australia. The project aims to provide the South Australian dairy industry with valuable farm level data relating to profitability and production.

The SA dairy industry represents approximately 5.6%, or 499 million litres, of national milk output in Australia. State milk production for 2020/21 was 2.2% up on the 489 million litres produced in 2019/20.

The conditions coming out of winter 2020 were quite favourable for pasture and crop growth across South Australia. Above average rains in spring resulted in extended green pasture growth and above average silage and hay yields across parts of the state, although the quality of conserved fodder was affected by continuing spring rains. These conditions also led to good supplies of purchased hay from adjacent broadacre cropping regions and at reasonable prices. Cereal grain could also be purchased at reasonable prices for most of the year. Normal weather conditions prevailed through the summer, however autumn rains were late, and particularly late across the southern Fleurieu Peninsula. Consequently, early pasture supply was tight on dryland farms in May–June 2021. Early over-sowings of annual ryegrass were disappointing on many farms.

In 2020/21, producers managed to leverage the stable milk price and increased livestock trading position against reduced purchased feed costs to maximise their returns.

Whilst the proportion of homegrown feed in the diet dropped to 55% of metabolisable energy the overall homegrown feed on milking area increased in 2020/21.

Fertiliser use dropped to an average of 204kg/ha of nutrients being applied by participants, 52% of which was nitrogen. The drop was largely a result of the late Autumn break with possible flow on effects to be seen in the 2021/22 homegrown feed results.

The stable milk price and 12% increase in other farm income, combined with the 7% drop in cost of production, resulted in a further increase to earnings (EBIT) and Net Farm Income (NFI). This year average EBIT of participating farms was $672,207 (LY: $493,700) and NFI $560,873 (LY: $373,866).

Returns on total assets managed for participating farms increased to 6.7% (LY: 5.8%) and return on equity increased to 10.4% (LY: 7.9%).

The majority of respondents are expecting stable business returns for the year ahead based on stable milk production and milk prices although there is considerable concern around the impacts of increasing fertiliser costs and ongoing issues with sourcing labour and the related costs.

The average level of emissions from participating farms dropped to 13.60 t CO2-e/t MS, down from 14.25t CO2-e/t MS last year. The most significant source of on-farm emissions was methane from ruminant digestion.

Historical trends in average milk price continues to drive financial performance reported by participating farms. While comparisons between years need to be made with care, there is an apparent correlation between milk price and the returns of participating farms.

FARM MONITOR METHOD

This chapter explains the method used in the Dairy Farm Monitor Project (DFMP) and defines the key terms used.

Figure 1 Dairy farm monitor project method

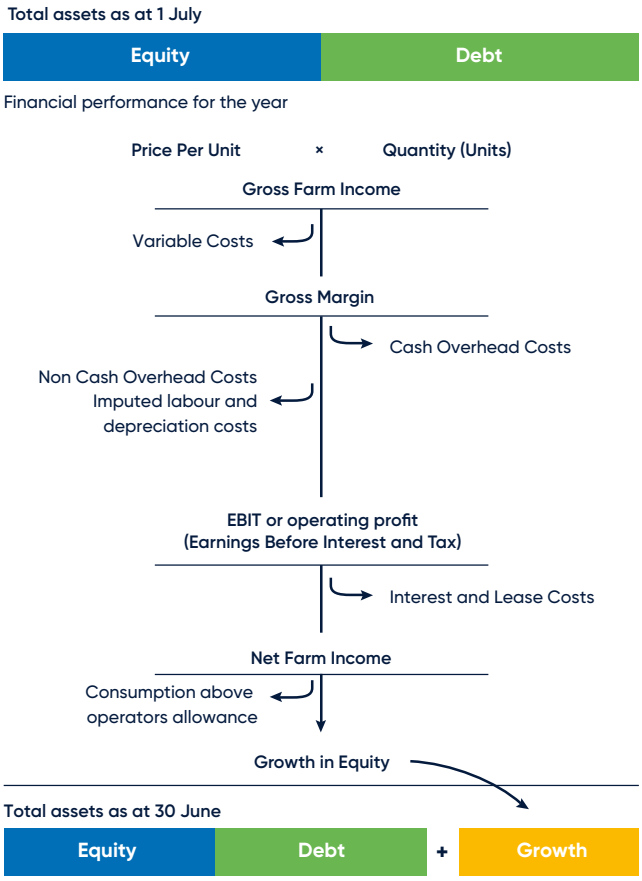
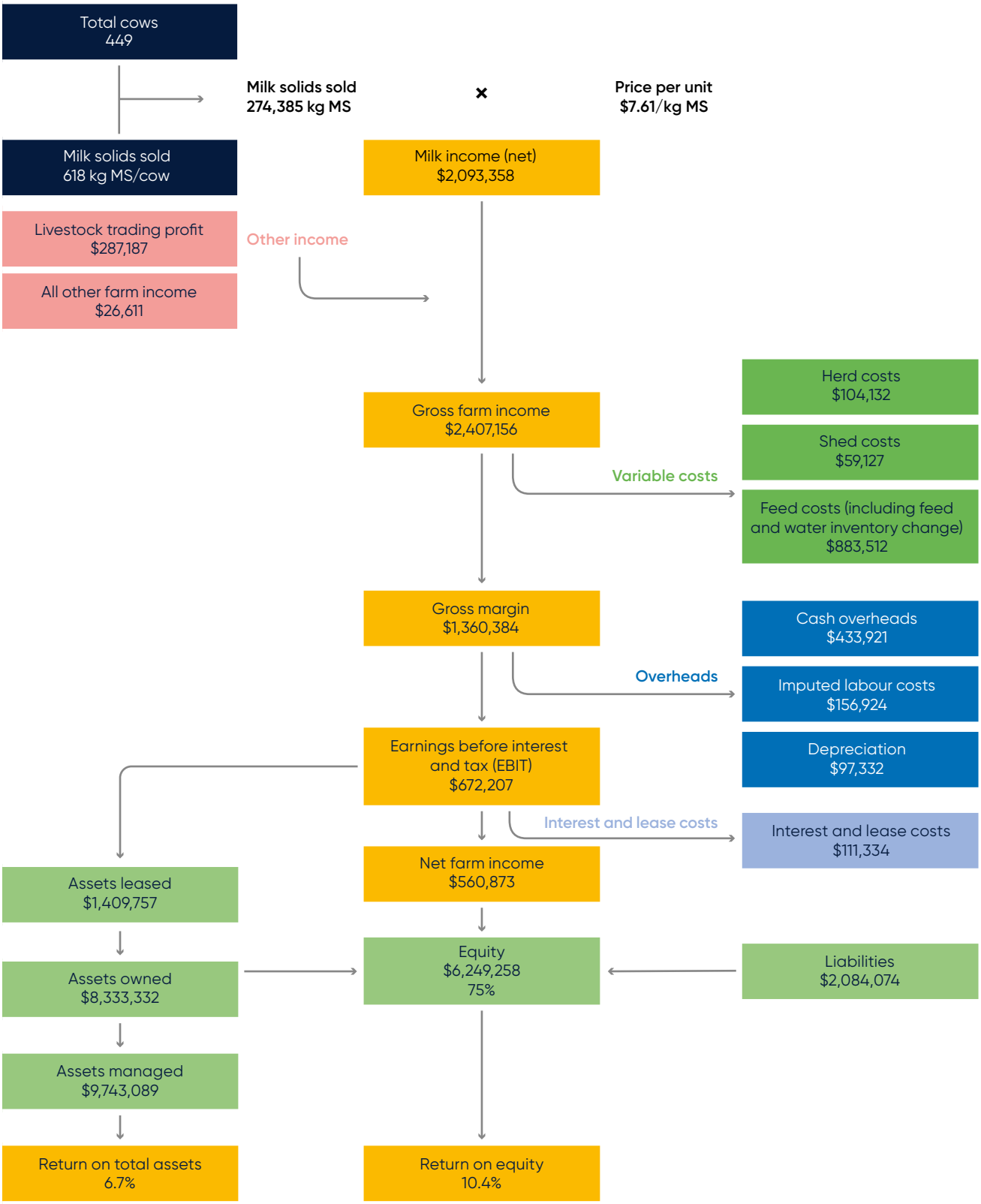


Figure 2 Dairy Farm Monitor Project method profit map* – state average 2020/21 data

All 16 farms



*Profit map adapted from Queensland Dairy Accounting Scheme – 2010 with permission from Ray Murphy, Department of Agriculture, Fisheries and Forestry, Queensland

South Australia overview

South Australian dairy industry

South Australia represents approximately 5.6%, or 499 million litres, of the national milk output in the Australian dairy industry, up from 489 million litres in 2019/20.[2]

The State's industry has a long history of high productivity and quality dairy produce. South Australia's milk has a record of high component values in terms of butterfat and protein which adds to its value in terms of product shelf-life and versatility to a processor.

There are three main dairying regions in South Australia. These are the Mid North, Central and South East as shown in Figure 3.

The Mid North including Barossa (shaded green) is perhaps better known for its wine and crop production. There is, however, a thriving dairy industry in the region based on dryland systems supported by locally grown grain and hay. Milk production in this region contributes 2% of South Australia's production with 10% of the State's dairy farms located in this region.

The Central region (shaded red) has three subregions – the Fleurieu Peninsula, River and Lakes and the Adelaide Hills. The Fleurieu Peninsula and Adelaide Hills traditionally have high average annual rainfalls and higher land values. They are predominantly dryland dairy farming areas. The number of farms in this region is contracting but it still accounts for 49% of State's dairy farms.

These well-known and productive dairy regions are under increasing threat from urban sprawl and other competing land uses, making it difficult to achieve an acceptable return on total assets. However, the farmers in these regions remain committed to high quality milk and have productive herds.

The River and Lakes have a history of being affected by severe water restrictions particularly during the 2000s and drought times. These farms are more dependent on irrigation and natural water flows for fodder production and livestock and domestic purposes than the Mid North, Fleurieu Peninsula and Adelaide Hills. The irregularity of Murray River flows during the 2000s has reduced the number of dairy farms in the region but numbers have now stabilised. Dairy farmers from the Rivers and Lakes are resilient and have had to develop more flexible dairy farming models to remain profitable.

The South East of South Australia (shaded blue) is regarded as an integral part of the future growth of the 'South West Victorian' milk bowl. Its longer growing season (April to end November, or longer) and ready access to high quality underground water enables irrigation to extend the growing season and makes this region a premium dairying area in South Australia.

This region has 41% of South Australia's dairy farms located in it and produces approximately 58% of South Australia's milk production.

There are a number of different dairying systems in South Australia. These have been developed by dairy farmers to take advantage of regional strengths. For example in the Mid North and River and Lakes regions of South Australia, the close proximity to South Australia's cereal zone has seen 'total (and 'partial') mixed ration' dairies rise in numbers. In the South East of South Australia, the regional strength of high quality underground water sees predominantly irrigated and (mainly) grass based dairies, although concentrates still form an integral part of a cow's diet.

It is important to recognise, that this report contains data from all the representative types of dairying systems available in South Australia and not one particular type.

Figure 3 South Australia dairying regions

2 In Focus 2021, Dairy Australia, November 2021

Seasonal conditions

Above average rainfall in early spring following favourable conditions in the 2020 winter resulted in extended green pasture growth and an increase in conserved feed across the year but the late autumn break resulted in all farms receiving below long term average rainfall for the year.

The extended spring led to higher grazed feed per hectare (5.0t DM/ha) than last year (4.8t DM/ha), and participant farms managed to increase the amount of conserved fodder from 1.1 t DM/ha in 2019/20 to 1.4t DM/ha in 2020/21. The improved seasonal conditions across Australia also resulted in lower prices on purchased feeds.

Seasonal conditions were again below average across the dairy regions of South Australia during 2020/21 with all participant farms recording below average rainfall for the financial year (Figure 5).

Average total rainfall of 635mm for participants was 41mm less than long term average. Whilst this was a drop on the 2019/20 year the extended spring ensured farms were able to build inventory stores across the year. The main impact was from a late Autumn break but with seasonal conditions looking promising in the 2021/22 year participants are still optimistic about fodder production for the year ahead.

In 2020/21 the improved seasonal conditions across Australia resulted in a significant drop in feed prices with a flow on effect to lower overall purchased feed costs and a subsequent drop in cost of production for participant farms.

The strong spring conditions at the time of data collection has provided expectations of stable homegrown feed for the coming year and whilst there is expectation of some increase in purchased feed costs the main concern is around fertiliser prices and the flow on effect on home grown feed.

Figure 4 Monthly average rainfall (all farms)

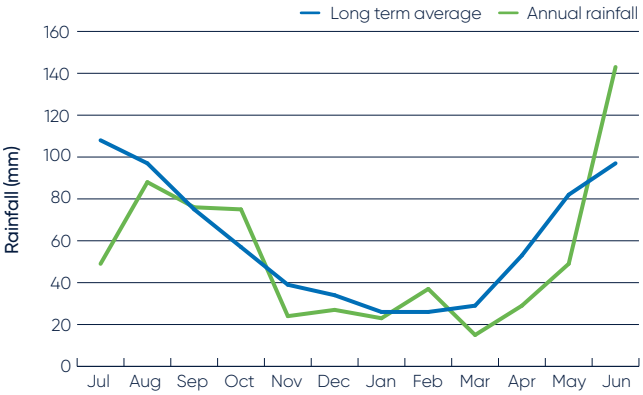
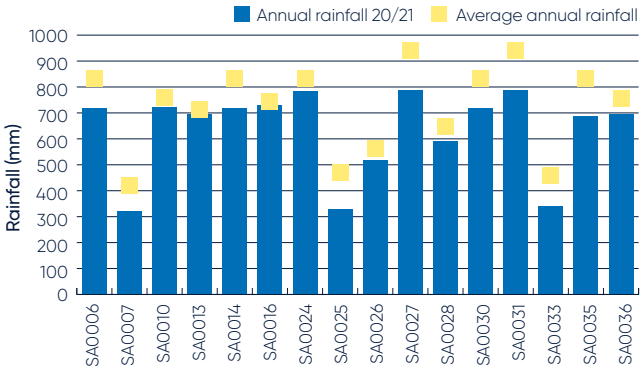


Figure 5 2020/21 annual rainfall and long term average rainfall of participant farms



WHOLE FARM ANALYSIS

The 2020/21 year produced the best performance, since the inception of the project nine years ago, with return on total assets managed for participating farms being 6.7% compared with 5.8% last year. This year saw the highest historical earnings before interest and tax at $2.37 per kg milksolids on the back of above average milk price and below average variable costs.

The average herd size of participating farms remained stable at 449 cows in 2020/21 (LY: 446) with a range in herd size from 237 to 888 cows. Usable area decreased to 562 ha from an average of 592 ha last year.

Average milk sold per cow increased by 7% to 618 kg MS/cow (LY: 577 kg MS/cow). The average milk sold per hectare dropped from 579 kg MS/ha to 559 kg MS/ha

Water use efficiency averaged 0.6 t DM/100mm/ha across participating farms in line with last year. This was on the back of lower average rainfall but higher average megalitres of irrigation water applied across participant farms compared to 2019/20. Participants with irrigation increased the average in water use efficiency capitalising on pasture production in the drier months in summer and autumn.

The proportion of home grown feed in the diet decreased further from 57% of metabolisable energy (ME) last year to 55%. The spread of home-grown feed as a proportion of ME consumed has reduced but is still quite varied from 37% to 75% (LY: 23%–84%). This spread is due to the variation of production systems in South Australia. This includes a variation across farms in the pasture base with some farms being 100% perennial and some having only 30% of their feed base as perennial pastures.

Whilst labour efficiency declined marginally on a per cow basis to 85 milking cows/FTE from 87 last year there was a 3.8% increase in milksolids per FTE from 49,515 last year to 51,393 in 2020/21. The Q1 to Q3 range was 72 to 95 milking cows/FTE which represents the variation in the scale of farms and livestock management systems across the state. The Q1 to Q3 range on milksolids per FTE reduced compared to last year, being between 41,472 to 58,159 kg MS/FTE (LY: 39,646 to 60,851 kg MS/FTE).

Table 1 Farm physical data

Farm physical parameters	State average	Q1 to Q3 range	Top 25% average
Annual Rainfall 20/21	635	573–725	526
Herd size	449	282–581	486
Total water use efficiency	0.6	0.5–0.8	0.7
Total usable area (hectares)	562	335–628	589
Milking cows per usable hectares	0.9	0.8–1.2	0.9
Milk sold (kg MS/cow)	618	567–623	663
Milk sold (kg MS/ha)	559	551–657	548
Home grown feed as % of ME consumed	55%	48%–62%	54%
Labour efficiency (cows/FTE)	85	72–95	84
Labour efficiency (kg MS/FTE)	51,393	41,472–58,159	54,021

Gross farm income

Gross farm income is inclusive of milk sales, livestock trading and income from other farm sources such as rental from houses.

Gross farm income for participants in 2020/21 combined an average of 87% milk income and 13% other income, which is similar to the past three years with livestock trading profit contributing a higher proportion of the overall gross farm income than last year.

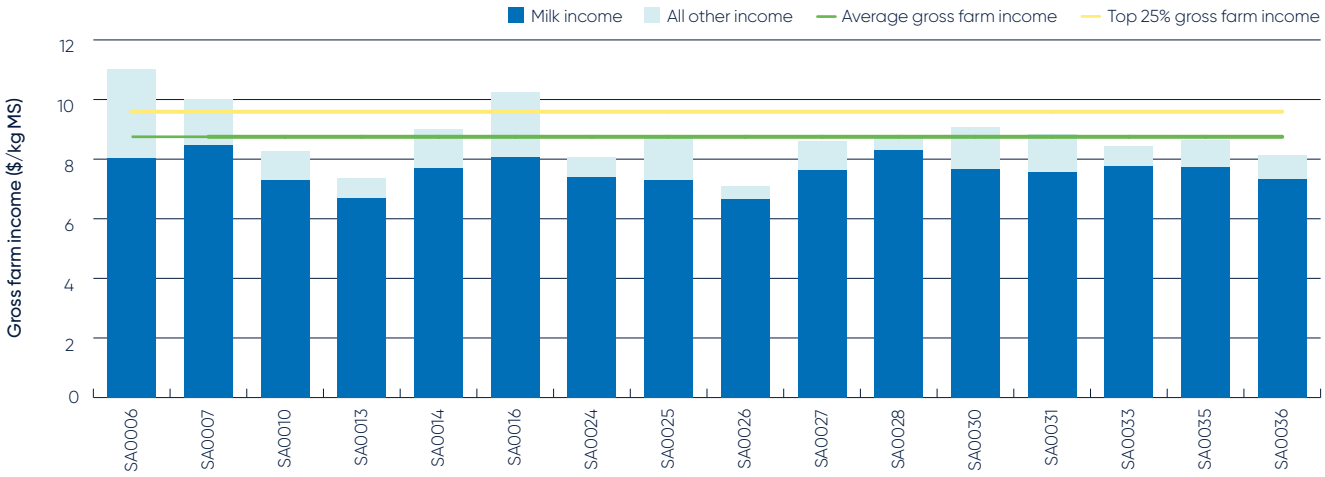
Figure 6 displays the gross farm income for participant farms throughout the South Australian dairying areas. Gross farm income across participants averaged $8.75/kg MS with the top 25% of participants receiving a significantly higher average gross farm income at $9.59/kg MS.

The average milk income received was stable at $7.61/kg MS in 2020/21, compared to last year's average $7.62/kg MS.

The Q1 to Q3 range for milk income received was $7.32 to $7.84/kg MS, compared to $7.39 to $7.87/kg MS last year. This gap widened compared to last year, meaning there was more variation in price received by participants in the survey.

Participant farmers also received an average of $1.14/kg MS from all other income, up from $1.03/kg MS. Income from livestock trading increased to $1.03/kg MS from $0.89/kg MS last year on the back of strong export heifer sales and increased livestock prices across Australia. Other Farm Income dropped from $0.12/kg MS to $0.09/kg MS with a number of farms still receiving COVID related payments throughout the year.

Figure 6 Gross farm income per kilogram of milk solids



Milk solids sold

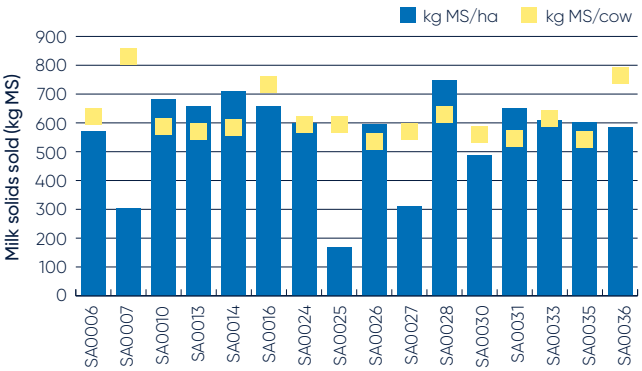
Figure 7 shows the quantity of milk solids sold per usable hectare. The wide range in quantity of milk sold per hectare is a reflection of the diversity of dairy farming systems throughout South Australia.

The average quantity of milk solids sold decreased again by the same margin of 3.5% to 559 kg MS/ha (LY: 579 kg MS/ha) with participant farms ranging from 170 kg MS/ha to 748 kg MS/ha.

The milk solids sold per cow increased 7% from 577 kg MS/cow to 618 kg MS/cow, with a Q1 to Q3 variance between 551–657 kg MS/cow.

Such a wide variation in milk solids sold per cow and per hectare is due to differences in rainfall, irrigation use, growing season length, soil types reflecting the diverse production systems in dairying regions of South Australia.

Figure 7 Milk solids sold



Milk sales versus calving pattern

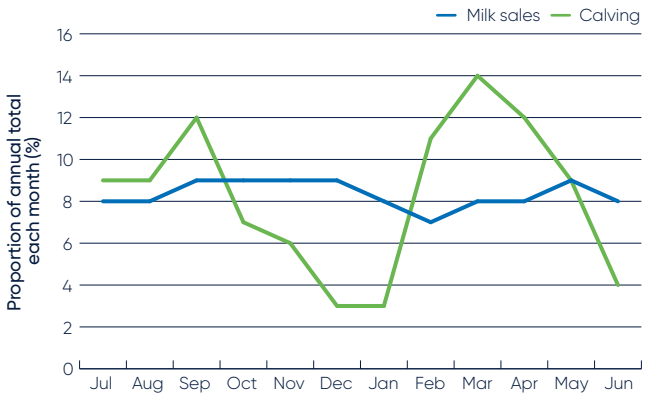
Figure 8 below shows average milk sales for all participant farms against the monthly distribution of cows calving. Whilst year round calving is evident, split calving is still the predominant pattern, with defined peaks in spring and autumn.

Whilst there were peaks and troughs in calving, milk sales were relatively stable, although there were relative peaks that corresponded with the calving pattern.

Milk sales recorded the lowest monthly figure amongst participants in February, when Autumn calving commences and grazed feed is in limited supply. A similar dip is evident in July which reflects targeted calving to coincide with optimal spring pasture growth.

This indicates that seasonal, split calving and year round calving patterns are present in South Australia. This has been a relatively stable pattern since the South Australian Dairy Monitor Project commenced in 2012–13.

Figure 8 Milk sales vs calving pattern



Variable Costs

Figure 9 shows a breakdown of whole farm costs distinguishing between variable and overhead costs per kilogram of milk solids. Variable costs are those that vary proportionally to the amount of output and include herd, shed, feed costs as well as feed inventory change.

The average variable cost of all participant farms was $3.76/kgMS which was a 9.2% decrease on last year at $4.41/kgMS, with a drop in overall purchased feed costs contributing the most to the decrease. The range was $2.64/kgMS to $4.94/kgMS with the Top 25% averaging $3.86/kgMS.

There are distinct differences between the levels of variable costs between participants shown below (Figure 9). There is significant variation across all cost categories for the participant farms.

In 2020/21, average herd costs increased marginally to $0.37/kg MS (LY $0.36/kg MS). Shed costs, however, decreased from $0.26/kg MS to $0.23/kg MS mainly due to lower spending on dairy shed power as more farms move towards solar and implementing new technologies to improve energy efficiency.

Feed costs contribute significantly to the costs of participant farms being 84% of variable costs. Average home grown feed as a percentage of ME consumed for 2020/21 decreased to 55% at an average price of $1.00/kg MS. This is a decrease in cost of $0.08/kg MS from last year, with this decrease spread evenly across all homegrown feed categories.

The trend in purchased feed costs finally reversed in 2020/21 with a decrease of 13% to $2.16/kg MS (LY: $2.47/kg MS) on the back of lower concentrate and fodder prices.

The average cost of concentrates was $412/t DM ($371/t as fed), down from $505/t DM ($455/t as fed) last year. The cost of concentrates includes the cost of additives and minerals. Participant farmers fed an average of 2.3t DM/head concentrates to the milkers, up marginally from the 2.1t DM/head last year, although this figure includes concentrates fed to young stock on the milking area.

The price of purchased hay dropped from $325/tDM to $278/tDM with a corresponding drop in purchased silage prices. When combined with a decrease of purchased fodder in the diet from 1.1t DM/head to 0.8t DM/head there was a resultant decrease in overall purchased fodder costs from $0.63/kgMS to $0.47/kgMS. This was the flow on effect of improved seasonal conditions throughout Australia causing an increase in overall fodder supplies.

The Q1 to Q3 range of purchased feed and agistment costs between $1.86/kg MS to $2.63/kg MS reflects the difference between dairy production systems in South Australia and greater availability of home grown feed in some regions although the range was smaller this year on the back of the lower overall feed prices.

Overhead costs

Overhead costs are those that do not vary significantly with the level of production.

The Dairy Farm Monitor Project includes cash overheads such as repairs and maintenance, paid labour, rates and insurance as well as non-cash costs such as imputed labour and depreciation of plant and equipment. Imputed labour cost is an estimate of the cost of the time spent in the business by people with a share in the business such as the owner, the owner's family or a share farmer who owns assets of the business. Further information on imputed labour can be found in Appendix B.

Average overhead costs (cash and non-cash) for this year decreased marginally to $2.62/kg MS down from $2.66/kg MS in 2019/20.

Repairs and maintenance increased again from $0.36/kgMS to $0.42/kgMS as participants continued to catch up on repairs that were delayed in years of lower profits. This increase was offset by a drop in total labour costs (paid and imputed) from $1.59/kgMS to $1.52/kgMS. The ongoing labour shortage in the industry has driven an increase in imputed labour costs and a drop in paid labour as participant farms increased their workload to cover the shortfall in available paid labour.

The overhead costs this year ranged from $1.87/kg MS to $3.53/kg MS. Farms that regularly perform well, do so by keeping overhead costs per kg MS low and managing variable costs according to the season.

Cost of production

Cost of production gives an indication of the average cost of producing a kilogram of milk solids. It is calculated from the total of variable and overhead costs and accounts for changes in fodder and livestock inventory. Including changes in fodder inventory is important to establish the complete cost to the business. The changes in fodder inventory account for the net cost of feed from what was fed out, conserved, purchased and stored over the year. Livestock trading loss or profit is also considered in the cost of production where there is a decrease in the value of livestock due to reduced stock numbers, or an increase due to natural increase rather than through purchases.

Table 2 shows that the total variable and overhead costs (including feed inventory change) was $6.38/kg MS down from $6.80/kg MS last year.

Dairy participants increased livestock inventories over the year, resulting in an average write back of $0.17/kg MS and they were able to build feed inventory across the year.

The average decrease in cost of production (including inventory changes) of $0.47/kg MS, to $6.21/kg MS was strengthened by an increase in gross farm income of $0.11/kgMS, which contributed to the increase in earnings before interest and tax (EBIT).

Figure 9 Whole farm variable and overhead costs per kilogram of milk solids

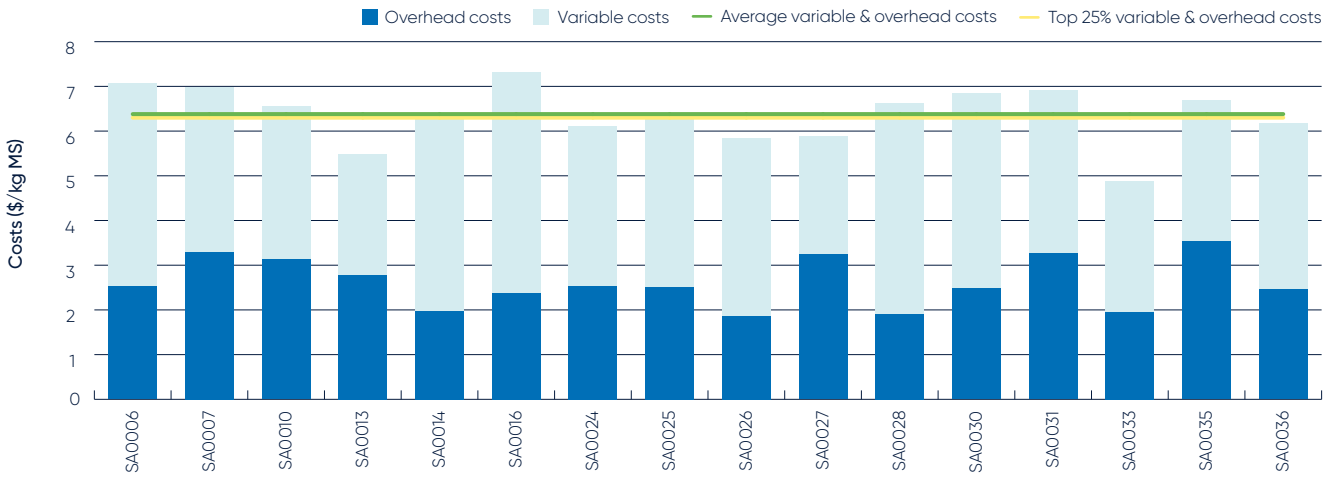


Table 2 Average farm financial performance

Farm costs	Average	Q1 to Q3 range	Top 25% average
Income	**$ kg/MS**	**$ kg/MS**	**$ kg/MS**
Milk income (net)	7.61	7.32–7.84	8.00
Livestock trading profit	1.03	0.62–1.4	1.42
Other farm income	0.11	0.01–0.19	0.17
Total income	8.75	8.22–9.03	9.59
Variable costs			
Herd cost	0.37	0.27–0.48	0.43
Shed cost	0.23	0.17–0.28	0.24
Home-grown feed cost	1.00	0.77–1.15	1.05
Purchased feed and agistment	2.20	1.86–2.63	2.07
Feed inventory change	-0.02	-0.14–0.06	0.06
Water inventory change	-0.01	0.00–0.00	0.01
Total feed costs	3.16	2.69–3.55	3.19
Total variable costs	3.76	3.37–4.30	3.86
Gross margin			
Per kilogram of milk solids	4.99	4.63–5.45	5.72
Overhead costs			
Employed labour	0.89	0.54–1.14	0.75
Repairs and maintenance	0.42	0.31–0.48	0.41
All other overheads	0.30	0.25–0.40	0.28
Imputed labour	0.63	0.31–0.98	0.67
Depreciation	0.37	0.26–0.48	0.33
Total overhead costs	2.62	2.28–3.16	2.44
Variable and overhead costs	**6.38**	**6.05–6.87**	**6.30**
Earnings before interest and tax			
Per kilogram of milk solids	**2.37**	**1.93–2.78**	**3.28**

Table 3 Cost of production

Farm costs ($/kg MS)	Average	Q1 to Q3 range	Top 25% average
Cash cost of production	5.41	4.94–6.03	5.23
Cost of production (excl. inventory changes)	6.41	6.1–6.86	6.23
Inventory change			
+/- feed and water inventory changes	-0.04	-0.17–0.06	0.07
+/- livestock inventory changes minus purchases	-0.17	-0.27–0.06	-0.36
Cost of production (incl. inventory changes)	6.21	5.95–6.64	5.94

Earnings before interest and tax

Earnings before interest and tax (EBIT) is the gross farm income less variable and overhead costs. As EBIT excludes interest and lease costs, it provides a comparable measure of participant's operating performance.

The average EBIT for participating farms in 2020/21 increased to $2.37/kg MS compared to $1.84/kg MS last year. This was due to the combined impact of an increase in gross farm income and overall drop in costs.

All participants had a positive EBIT result with a range of $1.25 to $3.82/kg MS. The top quartile averaged EBIT of $3.28/kg MS, up from $2.62/kg MS in 2019/20.

Return on total assets and equity

Return on total assets (RoTA) is the EBIT expressed as a percentage of total assets under management. It is therefore an indicator of the overall earning power of total assets, irrespective of capital structure. Figures 11 to 14 were calculated excluding capital appreciation.

In 2020/21 the RoTA achieved by participant farms was between 3.9% and 14.6%. With higher returns achieved, seven of the participants fell into the 0%–5% range, eight in the 5%–10% range and one farm achieving a RoTA of more than 10 percent (figure 11).

The average RoTA for participants across South Australia for 2020/21 was 6.7%, up from 5.8% last year. The top 25% of participants achieved a 10.6% return on total assets managed. It is worth noting that on top of the revaluations completed by a portion of the participants last year a number of participant farms revalued their farms at the beginning of the 2020/21 year on the back of both bank revaluations and land sales in their area, indicating a long term increase in land values for their respective regions. This will have once again impacted the RoTA results.

Figure 10 Whole farm earnings before interest and tax per kilogram of milk solids

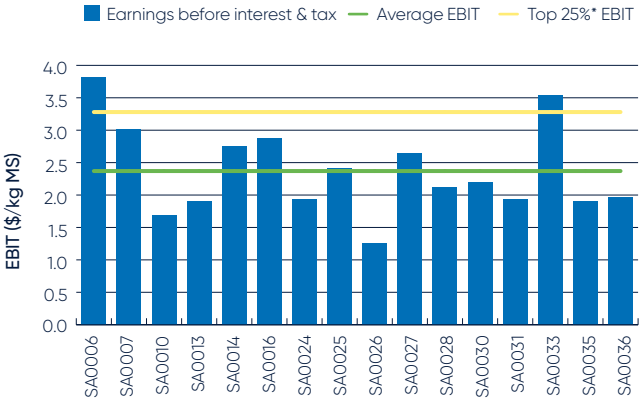


Figure 11 Distribution of farms by return on total assets

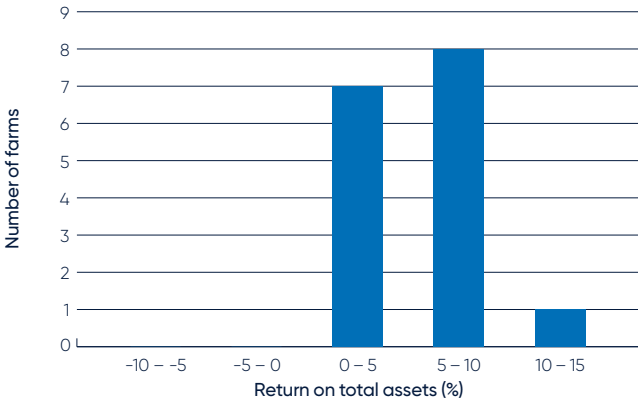
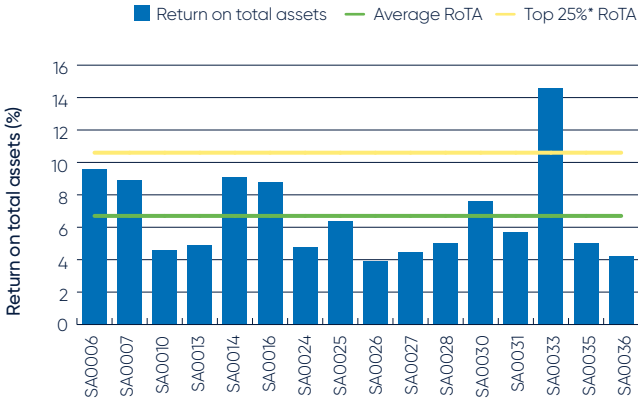


Figure 12 Return on total assets



Return on equity (RoE) is the net farm income expressed as a percentage of owners' equity. It is a measure of the owners' rate of return on their investment after allowing for interest and lease costs.

In 2020/21, all participant farms had a positive RoE. The average RoE for participating farms this year was 10.4% (ranging from 3.7% to 29.7%), up from 7.9% in 2019–20.

Figure 13 Distribution of farms by return on equity

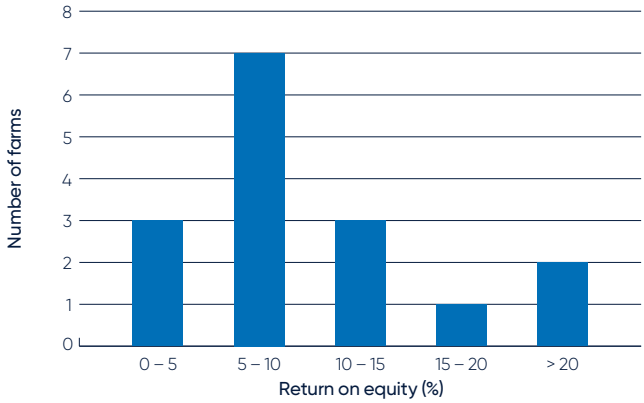
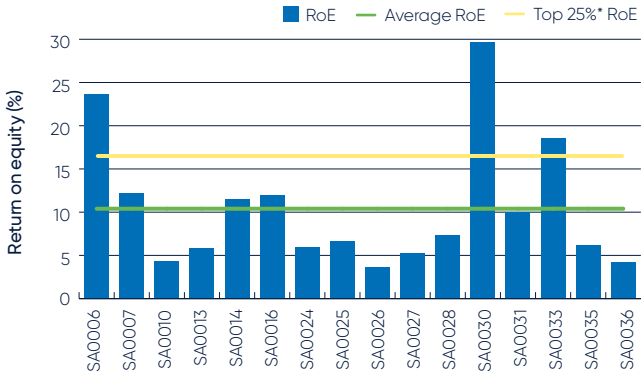


Figure 14 Return on equity



Risk

"Risk is conventionally classified into two types: business risk and financial risk. Business risk is the risk any business faces regardless of how it is financed. It comes from production and price risk, uncertainty and variability. 'Business risk' refers to variable yields of crops, reproduction rates, disease outbreaks, climatic variability, unexpected changes in markets and prices, fluctuations in inflation and interest rates, and personal mishap. 'Financial risk' derives from the proportion of other people's money that is used in the business relative to the proportion of owner-operator's capital…"[2]

Table 3 presents some key risk indicators. Refer to Appendix E for the definition of terms used in Table 3. These indicators can also be found in Appendix A8.

All farms are exposed to business and financial risk which is unavoidable. It is through managing risk that greater profits can be made. It is also the case that by accepting a level of risk in one area of business, a greater risk in another area can be avoided. Using the example of feed sources, dairy farmers are generally better at dairy farming than they are at grain production. Thus by allowing someone who is experienced in producing grain to supply them, they lessen the production and other business risks as well as the financial risks dairy farmers would have exposed themselves to by including extensive cropping in their own business. The trade-off is that they are in turn exposed to price and supply risks.

The trade-off between perceived risk and expected profitability will dictate the level of risk a given individual is willing to take. It then holds that in regions where risk is higher, less risk is taken. While in good times this will result in lower returns, in more challenging times it will lessen the losses.

The higher the risk indicator (or lower equity %) in Table 3, the greater the exposure to the risk of a shock in those areas of the business.

The cost structure ratio provides variable costs as a proportion of total costs. A lower ratio implies that overhead costs comprised a greater proportion of total costs which in turn indicates less ability to quickly reduce costs in response to changes in the operating environment. Table 3 shows that across the state for every $1.00 of cost, $0.59 was used to cover variable costs in 2020/21. However, it is worth noting that cost structure varies between farms. One hundred minus this percentage gives the proportion of total costs that are overhead costs.

2 Malcolm, L.R., Makeham, J.P. and Wright, V. (2005), The Farming Game, Agricultural Management and Marketing, Cambridge University Press, New York. p180

The debt servicing ratio shows interest and lease costs, as a proportion of gross farm income. The ratio of 5% this year is the same as last year. It indicates that on average farms paid $0.05 from every dollar of gross farm income to their creditors.

Equity levels reported by participating farms increased marginally from 73% to an average of 75%. Caution should be exercised when comparing equity levels between years as the participating farms in the survey sample changes from year to year.

The benefit of taking risks and borrowing money can be seen when farm incomes yield a higher RoE than on their RoTA. When the percentage of RoE increases compared to RoTA, it is the result of a higher return from the additional assets than the interest or lease rate. In 2020/21, 13 of the 16 (81%) participant farms received a RoE greater than their RoTA, up from 78% last year.

This year, all farms in the DFMP sourced at least some of their metabolisable energy (ME) from imported feeds and are therefore somewhat exposed to fluctuations in prices and supply in the market for feed. The proportion of imported feed increased in 2020/21 to an average 45% (LY: 43%) which is in line with the long term average over the nine years of the project.

Table 4 Risk indicators – Statewide

	Statewide
Cost structure (percentage of total costs as variable costs)	59%
Debt service ratio (percentage of income as finance costs)	5%
Debt per cow	$4,574
Equity percentage (ownership of total assets managed)	75%
Percentage of feed imported (as a % of total ME)	45%

PHYSICAL MEASURES

There are a wide range of farming systems that exist in the South Australian dairy industry, including naturally grazed, total mixed ration and feedlot/cut and carry dairies. The average South Australian dairy produces milk from roughly equal portions of grass, fodder and grain with 55% of the diet coming from home-grown feed.

Nitrogen fertiliser use decreased on last year, with an average of 108kg/milking ha being applied by participants, down 11% on last year, largely due to the late Autumn break in 2021.

Feed consumption

The contribution of different feed sources to the total ME consumed on the farm is presented in Figure 15. This includes feed consumed by dry cows and young stock.

A cow's diet can consist of grazed pasture, harvested forage, crops, concentrates and other imported feeds.

Pasture grazed was the main source of metabolisable energy (ME) consumed by livestock for 10 of 16 participants (63%), compared with 12 of 18 (67%) in 2019/20. This is indicative that participants are trying to reduce reliance on purchased feed costs and utilise homegrown feed where possible. With one participant farm considered as a TMR farm (total mixed ration), directly grazed pasture represented 38% on average of ME consumed (2019/20: 40%).

Concentrates were the second most utilised source of total ME fed to livestock with an average of 34% (LY: 32%) of total ME fed. The average price for concentrates decreased 18% to $412/t DM in 2020/21 which is a return to close to the average of the history of the project in South Australia. The drop in concentrate and fodder prices combined with a late autumn break resulted in farms increasing the concentrate fed per cow where grazed feed was not available late in the year.

Hay's contribution to ME decreased from 13% to 11% as a proportion of ME and silage once again represented 13% of ME. Other feed contributed the remaining 4% of metabolisable energy.

Figure 16 gives an estimate of the average quantity for home grown feed consumed per milking hectare for participant farms across the state. It accounts for the consumption of pasture that occurred only on the milking area whether by milking, dry or young stock.

Figure 15 Sources of whole farm metabolisable energy

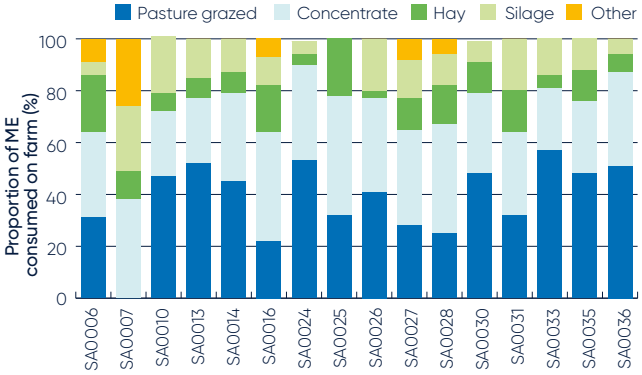
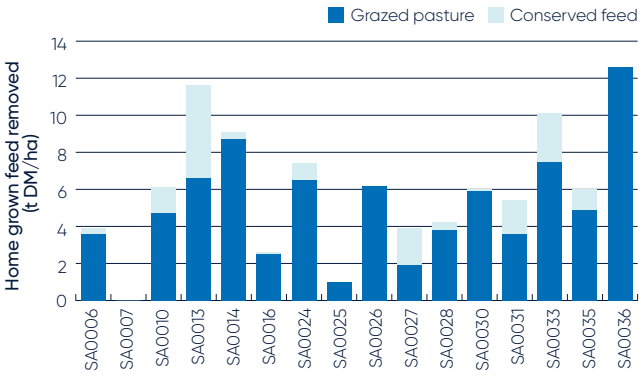


Figure 16 Estimated tonnes of home grown feed removed per milking area hectare



The range of home grown feed consumed per milking hectare varied greatly among the participant producers as shown in Figure 16 depending on the dairy systems employed.

The average total homegrown feed harvested (grazed and conserved) from the milking area was 6.4t DM/ha, down from last year's 5.9t DM/ha. The estimated pasture consumed as grazed feed on the milking area increased to 5.0 t/ha (LY: 4.8 t DM/ha), whilst conserved feed increased to 1.4 t/ha (LY: 1.1 t DM/ha) coming from conserved fodder.

Several of the farms in the project grew fodder crops for silage or grain on the non-milking area. These tonnages were calculated as part of the total feed produced on the farm usable area, but may not be captured as home grown feed consumed on the milking area. So some farms may appear as low consumers of pasture by direct grazing, but may actually grow and consume large tonnages of fodder over the whole farm usable area.

Both Figures 15 and 16 were estimated using the pasture consumption calculator in DairyBase.

This involves a calculation of the total ME required on the farm, based on live weight, average distance stock walk to and from the dairy and milk production. Metabolised energy imported from other feed sources is subtracted from the total farm ME requirements over the year to estimate the total produced on farm, divided into grazed and conserved feed depending on the quantity of fodder production recorded.

Potential sources of error in the method used to calculate home grown pasture consumed may come from the incorrect estimation of liveweight, amounts of fodder and concentrates fed, ME concentration of fodder, concentrate and pasture, wastage of feed and associative effects between feeds when they are digested by the animal. Comparing pasture consumption estimated using the back-calculation method between farms can lead to incorrect conclusions and a more useful approach is to compare pasture consumption on the same farm over time using the same method of estimation.

Fertiliser application

Participant dairy farms across South Australia used a wide variety of fertilisers and application rates.

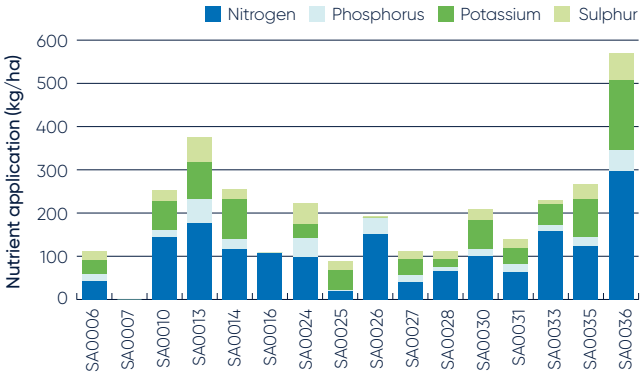
Fertiliser use decreased in 2020/21 compared to last year, which was largely due to reduced applications as a result of the late Autumn break.

Figure 17 shows the range of application rates used on properties. It should be noted that seasonal variation, water availability, pasture species, soil type and fertility along with pasture management all influence pasture growth and fertiliser application strategies.

The use of nitrogen on farm varies greatly between participants. Of those farms who rely on grazed pasture (i.e. excluding feedlot/cut and carry) nitrogen use ranged from almost 19kg/ha to 297kg/ha, with an average of 108kg/ha. Distribution varies per farm but is used in higher quantities by irrigators.

Phosphorous use ranged from 0 to 60kg/ha at an average of 21kg/ha. Potassium use ranged from 0 to 161kg/ha at an average of 51kg/ha. Sulphur use ranged from 0 to 62kg/ha at an average of 25kg/ha.

Figure 17 Fertiliser application per milking hectare



Business confidence survey

Responses to this business confidence survey were made at the time of data collection from July to November 2021 with regard to the 2021/22 financial year and the next five years.

Expectations and issues

Following higher average profits in the 2020/21 year and expected increases in fertiliser and labour costs participants had a high level of expectation for stable or marginally improved business returns for 2021/22. This was based on the majority of participant farms expecting milk prices to remain stable with milk production expected to remain stable or increase on most farms and fodder production to remain similar to the 2020/21 year.

Expectation for business returns

Expectations for the 2021/22 year are positive with all but two respondents expecting their returns to remain stable or improve as was the case last year.

The majority of respondents (56%) expect business returns to remain stable for the 2021/22 year with a further 31% expecting improved returns. This is primarily driven by the expectation that most elements of the participant businesses will remain stable for the year ahead with 44% of participants expecting to increase milk production over the coming year. Participants were positive about the expectation around sustained livestock trading but this was offset by concern around increased fertiliser and labour costs.

Responses to the survey took into consideration all aspects of farming including climate and market conditions for all products bought and sold that were known at the time.

At the time of data collection, farmers had received their 2021/22 milk price announcements which also provided some level of optimism.

Price and production expectations – milk

With the 2021/22 opening milk prices already announced at the time of the survey, four respondents expected their milk price to increase in the next 12 months with 10 expecting milk prices to remain stable (Figure 19).

Milk production was expected to remain stable on 50% of the farms with 44% stating they would look to increase production for the 2021/22 year.

Production expectations – fodder

Whilst the autumn break was late in 2021/22 the majority of participant farms expected fodder production to remain stable with a number of farms already having undertaken silage harvest by the time data collection was complete. Only one farm was expecting a decline in fodder production for the coming year. (Figure 20).

Figure 18 Expectation of business returns

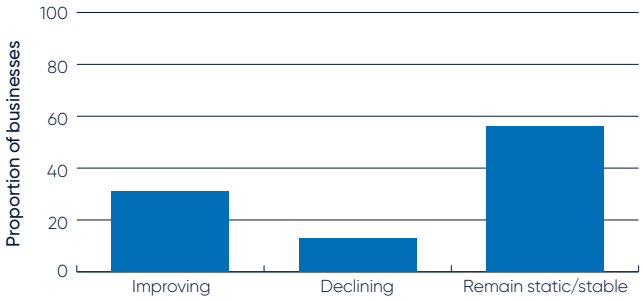


Figure 19 Price and production expectations – milk

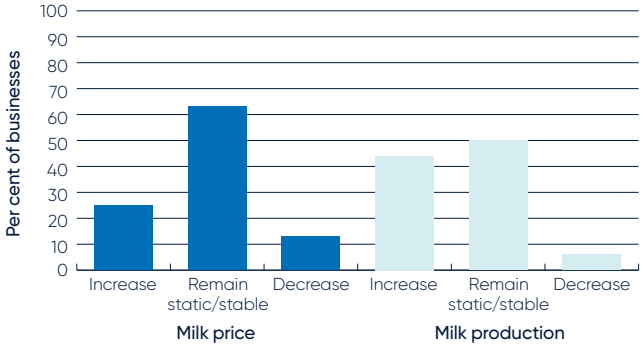
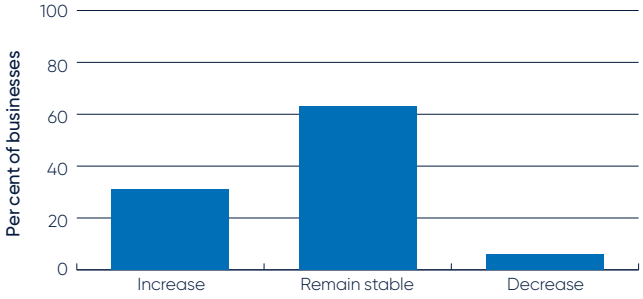


Figure 20 Producer expectations – fodder



Cost expectations

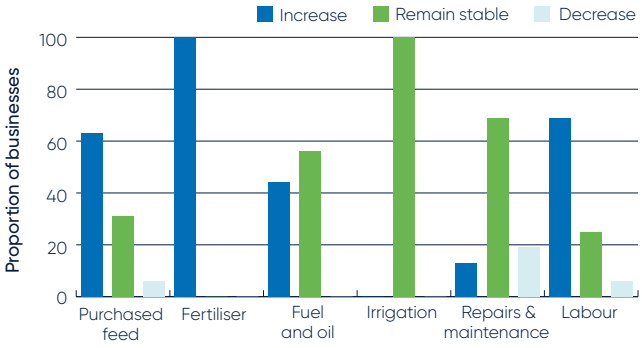
Data in Figure 21 represent the expectations with regard to costs in 2021/22 from South Australian participants. The question refers to total costs to the business for each category, not the unit price for inputs, such as of grain or fertiliser.

The general expectation is that on average, costs will largely increase or remain stable in 2021/22 with little expectation costs will decrease over the coming 12 months. All participants are expecting an increase in fertiliser costs for the year which is reflective of the price increases already seen for urea due to global fertiliser markets. Urea prices surged 19% in June (Source: Dairy Australia) with further price increases experienced by participant farms in the early start to 2021/22.

The majority (63%) of respondents expect an increase in purchased feed costs with 69% also expecting an increase in labour costs for the year ahead. This is up on the 33% last year that believed labour costs would increase in the current year.

The majority of respondents expect fuel and oil, repairs and maintenance and irrigation costs to remain stable for the 2021/22 year.

Figure 21 Costs expectations



Major issues facing the dairy industry – the next 12 months

Survey participants were asked to rate the significance of seven issues for the dairy industry over the coming 12 months. A summary of the major issues identified by participants is in Figure 22.

The two most significant issues identified by respondents for the next 12 months in order of importance were milk price and input costs. Respondents placed more significance on input costs this year largely on the back of concerns around increasing fertiliser prices.

Milk pricing remains front of mind for many participants this year due to the overall impact it has on profitability.

Water and succession planning were less important issues in the short term as seen in previous years.

Major issues facing the dairy industry – the next five years

Figure 23 shows the key issues identified by participants over the next five years.

Milk price over the next 5 years continues to be of greatest concern to respondents of the survey. Many consider milk price to be the primary driver of profit for their business. As such it is always front of mind for producers.

As with the 12 month outlook input costs will continue to remain important given the impacts they also have on cost of production and overall profitability in dairy farm businesses.

Figure 22 Major issues for individual businesses – 12 month outlook

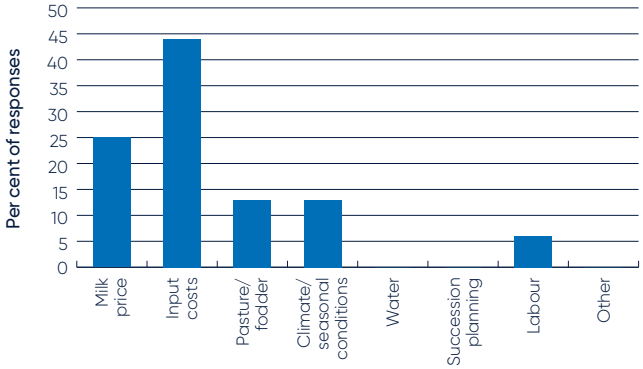
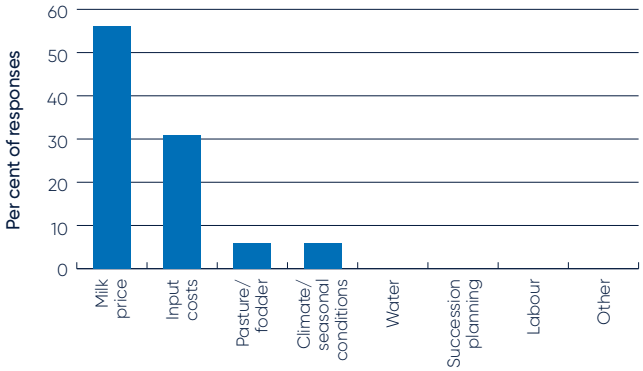


Figure 23 Major issues for individual businesses – 5 year outlook



Greenhouse gas emissions

The average level of emissions from participating farms decreased from 14.25 t CO2-e/t MS in 2019/20 to 13.60 t CO2-e/t MS. The most significant source of on-farm emissions was methane from ruminant digestion contributing 54% of total farm emissions.

Carbon dioxide equivalents (CO2-e) are used to standardise the greenhouse potentials from different gases. The Global Warming Potential (GWP) is the index used to convert relevant non-carbon dioxide gases to a carbon dioxide equivalent. This is calculated by multiplying the quantity of each gas by its GWP. All the data in this section is in CO2-e tonnes and expressed per tonne of milk solids sold (CO2-e/t MS).

The method of estimating Australia's dairy industry greenhouse gas emissions reflects the latest research outcomes and aligns with international guidelines. The GWP for the three gases discussed in this report is 1: 25: 298 (carbon dioxide; CO2: methane; CH4: nitrous oxide; N2O). This year the greenhouse emission was calculated through DairyBase using the Australian Dairy Carbon Calculator.

The distribution of different emissions for 2020/21 is shown in Figure 24. Greenhouse gas emissions per tonne of milk solids produced ranged from 12.64 t CO2-e/t MS to 14.80 t CO2-e/t MS with an average emission level of 13.60 t CO2-e/t MS. This is a 5% decrease from last year's average of 14.25 t CO2-e/t MS.

The percentage breakdown for emissions in 2020/21 was 62% for CH4, 26% for CO2, and 12% for N2O emissions – which is the same split as last year.

Methane was identified as the main greenhouse gas emitted from dairy farms, accounting for 62% of all greenhouse emissions. There are two main sources of CH4 emissions on farm: ruminant digestion and anaerobic digestion in effluent management systems. Methane produced from ruminant digestion is known as enteric CH4 and was the major source of emissions from all farms in this report, with an average of 54% of total emissions. Methane from effluent ponds accounted for 8% of total emissions on average across the state in 2020/21.

The second main greenhouse gas emission was CO2 being produced primarily from fossil fuel consumption as either electricity or petrochemicals. The estimation of greenhouse gas emissions includes a pre-farm gate emission source. These are the greenhouse gases emitted during the manufacturing of fertilisers and the production of purchased fodder, grain and concentrates.

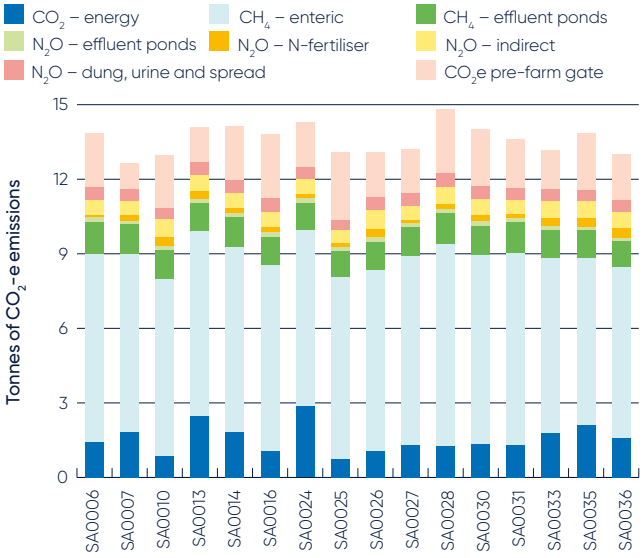
Carbon dioxide accounted for 26% of total emissions, 15% from pre-farm gates sources and 11% from on-farm energy sources. Output levels were highly dependent on the source of electricity used with some farms using coal generated electricity and others using electricity sourced from renewable sources (e.g. solar).

The third main greenhouse gas emission was nitrous oxide (N2O), accounting for 12% of total emissions. Nitrous oxide emissions on dairy farms are primarily derived from direct emissions, including nitrogen fertiliser application, effluent management systems and animal excreta (dung and urine), as well as indirect emissions such as from ammonia and nitrate loss in soils.

Nitrous oxide emissions from fertiliser accounted for 2% of total emissions, effluent ponds accounted for 1% and excreta accounted for 4%. Nitrous oxide from indirect emissions was 5%. Nitrous oxide emissions are highest in warm, waterlogged soils with readily available nitrogen. Over application of nitrogen, high stocking intensity and flood irrigation are all potential causes of increased nitrogen loss as N2O. Strategic fertiliser management practices can reduce N2O emissions and improve nitrogen efficiency.

There is a growing importance to understand and monitor greenhouse gas emissions, and these are likely to become more important into the future. To find detailed information on the Australian National Greenhouse Gas Inventory, strategies for reducing greenhouse gasses and more details on sources of greenhouse gases on dairy farms visit the Australian Department of the Environment's website at **www.environment.gov.au/climate-change**.

Figure 24 Greenhouse gas emissions per tonne of milk solids produced



Historical analysis

The 2020/21 year saw a further improvement in business performance with participant farms achieving the highest RoTA and RoE in real terms in the history of the project. EBIT and net farm income were at the highest level seen in the nine years on the back of the third highest real milk price combined with below average variable and overhead costs.

This section compares the performance of participant farms in the Dairy Farm Monitor Project over the past nine years. While figures are adjusted for inflation to allow comparison between years it should be noted that the same farms do not participate each year and care needs to be taken when comparing the performance across years.

Set out in Figure 25 is the average EBIT and net farm income for the nine years of Dairy Farm Monitor Project in South Australia. Whilst EBIT and net farm income initially rose, the high in 2013–14 was followed by a decline and volatility with 2020/21 producing the best result across both EBIT and Net Farm Income since the projects inception.

EBIT and net farm income both improved further in 2020/21 compared to last year on the back of an above average milk price of $7.61/kg MS, compared to the nine year average of $6.99/kg MS.

In 2020/21 the average EBIT per farm was $672,207 and net farm income was $560,873, with both well above their long term averages of $302,238 and $182,650 respectively.

This year's RoTA of 6.7% is the highest seen since the inception of the project and is well above the nine year average of 4.6%

The average RoE improved from 7.9% to 10.4% in 2020/21 which is significantly higher than the nine year average of 4.7%

The 2020/21 year saw milk price drop below the high of 2019/20 in real terms but when combined with a drop in variable and overhead costs compared to last year and below the long term average, this resulted in higher profit margins for participant farms.

The average returns reported for 2020/21 may also have been influenced by a change to the farms participating in the project having different financing arrangements.

The dollar values included in this historical analysis are adjusted to 2020/21 equivalent values (allowing for CPI inflation) to allow comparison between years, however, the number of farms in the sample is not consistent. As some farms do not participate each year and new farms are added to the sample, care needs to be taken when comparing performance across years.

Figure 25 Historical EBIT and net farm income

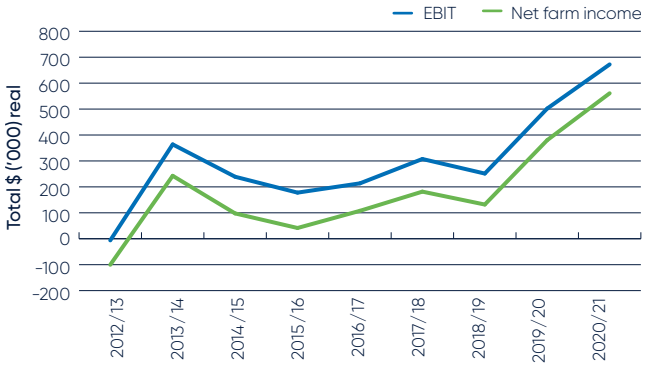
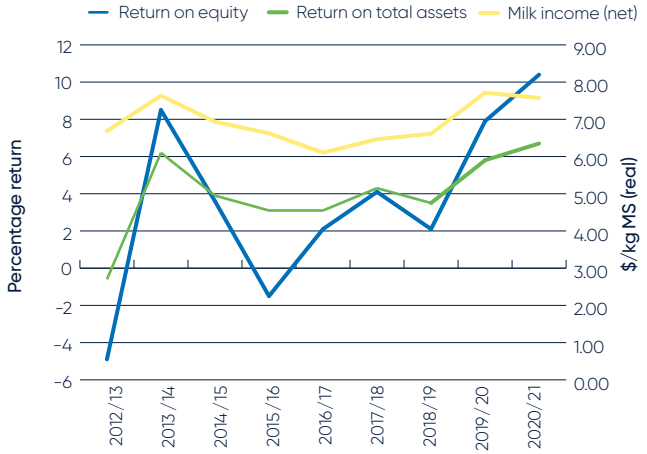


Figure 26 Historical return on total assets (LHS), return on equity (LHS) and milk price (RHS)



Appendix

Table A8 Capital structure

Farm assets				
	Land value	Land value	Permanent water value	Permanent water value
	$/ha	$/cow	$/ha	$/cow
Average	11,537	13,569	1,167	1,063
Top 25%	8,331	11,371	1,534	1,400

Other farm assets (per usable hectare)				
Plant and equipment	Livestock	Hay and grain	Other assets	Total assets
$/ha	$/ha	$/ha	$/ha	$/ha
1,304	2,598	214	228	17,048
1,320	2,537	209	189	14,120

Liabilities		
	Liabilities per usable hectare	Liabilities per milking cow
	$/ha	$/cow
Average	4,410	4,574
Top 25%	3,945	5,178

Equity	
Equity per usable hectare	Average equity
$/ha	%
12,637	75.1
10,175	71.6

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	6.72	6.40	7.37	0.32	0.37	0.28	0.32	2.96	3.41	3.56	4.10
2013/14	6.83	7.66	7.74	8.68	0.30	0.34	0.26	0.29	3.04	3.41	3.61	4.05
2014/15	6.35	6.96	7.03	7.71	0.29	0.32	0.22	0.24	3.28	3.60	3.79	4.16
2015/16	6.15	6.66	7.10	7.69	0.34	0.37	0.24	0.26	3.13	3.39	3.71	4.02
2016/17	5.78	6.14	6.75	7.17	0.40	0.42	0.27	0.29	2.49	2.65	3.16	3.36
2017/18	6.24	6.51	7.08	7.38	0.31	0.32	0.29	0.30	2.80	2.92	3.40	3.54
2018/19	6.46	6.66	7.32	7.54	0.29	0.30	0.24	0.25	3.30	3.40	3.83	3.95
2019/20	7.62	7.75	8.64	8.79	0.36	0.37	0.26	0.26	3.53	3.59	4.14	4.22
2019/20	7.61	7.61	8.75	8.75	0.37	0.37	0.23	0.23	3.16	3.16	3.76	3.76
Average		**6.99**		**7.96**		**0.35**		**0.26**		**3.26**		**3.88**

Note: 'Real' dollar values are the nominal values converted to 2020/21 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	1.79	1.60	1.84	3.15	3.63	(0.31)	(0.36)	0.53	0.61	(0.84)	(0.97)	-0.6	-4.9
2013/14	1.54	1.73	1.31	1.47	2.85	3.20	1.27	1.42	0.52	0.58	0.75	0.84	6.2	8.5
2014/15	1.50	1.65	1.03	1.13	2.52	2.76	0.72	0.79	0.55	0.60	0.16	0.18	3.9	3.6
2015/16	1.60	1.73	1.00	1.08	2.60	2.81	0.79	0.86	0.57	0.62	0.22	0.24	3.1	-1.5
2016/17	1.68	1.78	1.04	1.10	2.71	2.88	0.88	0.93	0.47	0.50	0.40	0.42	3.1	2.1
2017/18	1.61	1.68	0.89	0.93	2.50	2.61	1.18	1.23	0.54	0.56	0.65	0.68	4.3	4.1
2018/19	1.50	1.55	0.90	0.93	2.40	2.47	1.09	1.12	0.49	0.50	0.60	0.62	3.5	2.1
2019/20	1.70	1.73	0.95	0.97	2.66	2.70	1.84	1.88	0.46	0.46	1.39	1.41	5.8	7.9
2020/21	1.62	1.62	1.00	1.00	2.62	2.62	2.37	2.37	0.41	0.41	1.96	1.96	6.7	10.4
Average		**1.68**		**1.08**		**2.76**		**1.14**		**0.53**		**0.79**	**4.6**	**4.7**

Note: 'Real' dollar values are the nominal values converted to 2020/21 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 useable 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	350
2013/14	526	164	0.60	453	1.4	469	660	7.9	0.9	57	343	385
2014/15	529	159	0.70	362	1.3	581	738	-11.5	4.1	44	364	399
2015/16	447	131	0.70	355	1.4	586	751	6.4	1.4	48	366	396
2016/17	565	200	0.60	394	1.3	539	630	5.7	1.9	64	304	323
2017/18	527	205	0.60	399	1.1	569	628	4.4	1.3	54	340	354
2018/19	573	226	0.63	414	1.1	574	600	5.3	0.9	61	485	500
2019/20	592	238	0.61	446	1.0	577	579	4.8	1.1	57	505	514
2020/21	562	256	0.6	449	0.9	618	559	5.0	1.4	61	412	412
Average	**540**	**197**	**0.6**	**409**	**1.2**	**564**	**643**	**3.5**	**1.6**	**55**		**410**

*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 A Glossary of terms, abbreviations and standard values

All other income	Income to the farm from all sources except milk. Includes livestock trading profit, dividends, interest payments received, and rent from farm cottages.
Annual hours	Total hours worked by a person during the given twelve month period.
Appreciation	An increase in the value of an asset in the market place. 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 of production	The cost of producing the main product of the business; milk. Usually expressed in terms of the main enterprise output i.e. dollars per kilogram of milk solids. It is reported at the following levels; • cash cost of production; variable costs plus cash overhead costs • cost of production excluding inventory changes; variable costs plus cash and non-cash overhead costs • cost of production including inventory changes; variable costs plus cash and non-cash overhead costs, accounting for feed inventory change and livestock inventory change minus livestock purchases.
Cost structure	Variable costs as a percentage of total costs, where total costs equals variable costs plus overhead costs.
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.
EBIT%	The ratio of EBIT compared to gross income. Indicates the percentage of each dollar of gross income that is retained as EBIT.
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 %	Total equity as a percentage of the total assets owned. The proportion of the total assets owned by the business.
Farm income	See gross farm income.
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.
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 area	Total usable area minus any area used only for fodder production during the year.
Grazed pasture	Calculated using the energetics method. Grazed pasture is calculated as the gap between total energy required by livestock over the year and amount of energy available from other sources (hay, silage, grain and concentrates). Total energy required by livestock is a factor of age, weight, growth rate, pregnancy and lactation requirements, distance to shed, terrain and number of animals. Total energy available is the sum of energy available from all feed sources except pasture, calculated as (weight [kg] x dry matter content (DM %) 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, valued at $30 per hour.
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 kilogram of milk solid. Measures of productivity of the total labour resources in the business.
Labour resource	Any person who works in the business, be they the owner, family, sharefarmer or employed on a permanent, part time or contract basis.
Liability	Money owed to someone else, e.g. family or a financial institute such as a bank.

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. An increase in livestock trading indicates there was an appreciation of livestock or an increase in livestock numbers over the year.
Metabolisable energy	Energy available to livestock in feed, expressed in megajoules per kilogram of dry matter (MJ/kg DM).
Milk income	Income through the sales of milk. This is net of compulsory levies and charges.
Milking area	Total usable area minus out-blocks or run-off areas.
Net farm income	*Previously reported as business profit.* 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 external sources. Includes dividends, interest payments received, and rents from farm cottages.
Overhead costs	All fixed costs incurred by the farm business e.g. rates, administration, depreciation, insurance and imputed labour. Interest, leases, capital expenditure, principal repayments and tax are not included.
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.
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 used	Total rainfall plus average irrigation water used expressed as millimetres per hectare, where irrigation water is calculated as; (total megalitres of water used/total usable area) x 100.
Variable costs	All costs that vary with the size of production in the enterprise e.g. herd, shed and feed costs (including feed inventory change).

List of abbreviations

AI	artificial insemination
CH_4	methane gas
CO_2	carbon dioxide gas
CO_2-e	carbon dioxide equivalent
CoP	cost of production
DFMP	Dairy Farm Monitor Project
DM	dry matter of feed stuffs
EBIT	earnings before interest and tax
FTE	full time equivalent.
GWP	global warming potential
ha	hectare(s)
hd	head of cattle
HRWS	high reliability water shares
kg	kilograms
LRWS	low reliability water shares
ME	metabolisable energy (MJ/kg)
MJ	megajoules of energy
mm	millimetres: 1mm is equivalent to 4 points or $^1/_{25}$ of an inch of rainfall
MS	milk solids (proteins and fats)
N_2O	nitrous oxide gas
Q1	first quartile, i.e. the value of which one quarter, or 25, of data in that range is less than
Q3	third quartile, i.e. the value of which one quarter, or 25, of data in that range is greater than
RoTA	return on total assets
RoE	return on equity
t	tonne = 1,000kg

Standard values

Livestock values

The standard vales used to estimate the inventory values of livestock were as below.

Category	Opening value ($/hd)	Closing value ($/hd)
Mature cows	1,600	1,600
Rising 2 year heifers	1,200	1,600
Rising 1 year heifers	600	600
Bulls	2,400	2,400

Imputed owner/operator and family labour

In 2020/21 the imputed owner/operator and family labour rate was $32/hr based on a full time equivalent (FTE) working 48 hours/week for 50 weeks of the year.

ISBN 978-1-922529-48-0 (Print)
ISBN 978-1-922529-47-3 (PDF)

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