Dairy Australia

# DAIRY FARM MONITOR PROJECT

## SOUTH AUSTRALIA ANNUAL REPORT 2018–19

# ACKNOWLEDGEMENTS

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The dilligent work of Dairy Australia's farm business analyst Jake Musson and 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 Lachie Hood, from Rural Business Support 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 2018–19 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 2017–18 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 2017–18 are in the 2018–19 report. This year, there are three new participating farms bringing the total number of participants to twenty (LY: 19). 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 2018–19?

The Dairy Farm Monitor Report for 2018–19 includes a number of changes since last year's report.

Fertiliser application rates are now reported on the milking area as compared with the usable area in previous years.

Regional land value averages were devised for farms located in the same area to enable a validation and standardising of land values. Participating farms were benchmarked against this average and if there was no reason for one property to be valued higher or lower than the average, its value was adjusted accordingly.

Average data do not include zero values for the indicators given below. A note to this effect is also given in the Appendix Tables.

- Silage, hay and other feed values ($/t)
- Land values
- Water asset values
- Equity values.

# SUMMARY

In 2018–19, the data from 20 participating dairy farms in South Australia demonstrated that despite tough seasonal conditions and significantly increased feed costs, positive returns were still achieved.

Despite being a high cost year, participants achieved an average EBIT of $243,984, which is 14% above the previous 7 year average, but lower than last year's $295,330. While average return on total assets declined to 3.5% for 2018–19 (LY: 4.3%) it remains above the seven year average of 3.3%.

Average return on equity also decreased to 2.1% compared to last year's 4.1%.

This is the seventh 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 496 million litres, of national milk output in Australia. State milk production for 2018–19 was slightly down on the 505 million litres produced in 2017–18

The 2018–19 year was largely impacted by dry seasonal conditions across much of South Eastern Australia. Rainfall in SA was below long term average annual rainfall in most areas. The warmer and drier conditions were conducive to good pasture growth in the South East, but other regions did not fare so well. As a result, the average price of purchased fodder was 47% higher than last year.

In 2018–19, many producers made changes to their operations in an attempt to minimize the impact of high purchased feed costs. Participants reduced the amount of fodder conserved from 1.3 t DM/ha to 0.9 t DM/ha. Participants also increased their reliance on home grown feed, representing 61% of metabolisable energy fed to cattle (2017–18: 54%). Some participants were also able to take advantage of market opportunities, resulting in a 4% increase to the average milk price.

Fertiliser use remained consistent with previous years, with an average of 171 kg/ha of nutrients being applied by participants, 59% of which was nitrogen.

The combination of a 4% rise in milk price, less a 6% increase in cost of production contributed to a drop in earnings (EBIT) and Net Farm Income (NFI). This year average EBIT of participating farms was $243,984 (2017–18: $295,330) and NFI $128,035 (LY: $174,651).

Returns on total assets managed for participating farms was 3.5% (2017–18: 4.3%) and return on equity reduced to 2.2% (2017–18: 4.1%).

A high level of expectation exists for better business returns in 2019–20 based on good price expectations, increased milk production and reduced costs for purchased feed.

Respondents indicated intentions to become more reliant on home grown feed, with expectations of higher labour costs a result.

The average level of emissions from participating farms continues to decline from 14.14 t $CO_2$-e/t MS in 2017–18 down 1% to 14.04t $CO_2$-e/t MS. Investment in solar power to reduce emissions and electricity costs has driven this change.

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.


# DAIRY FARM MONITOR PROJECT

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

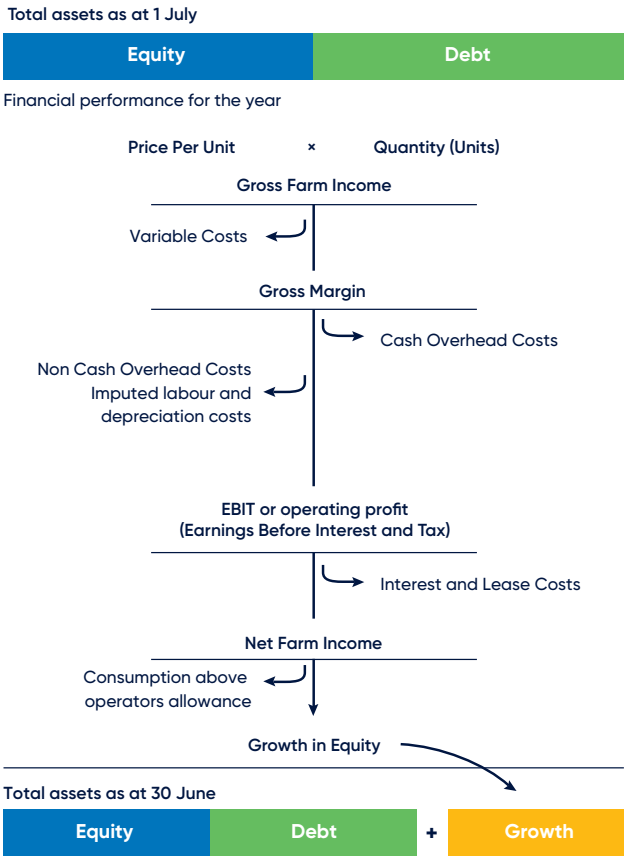
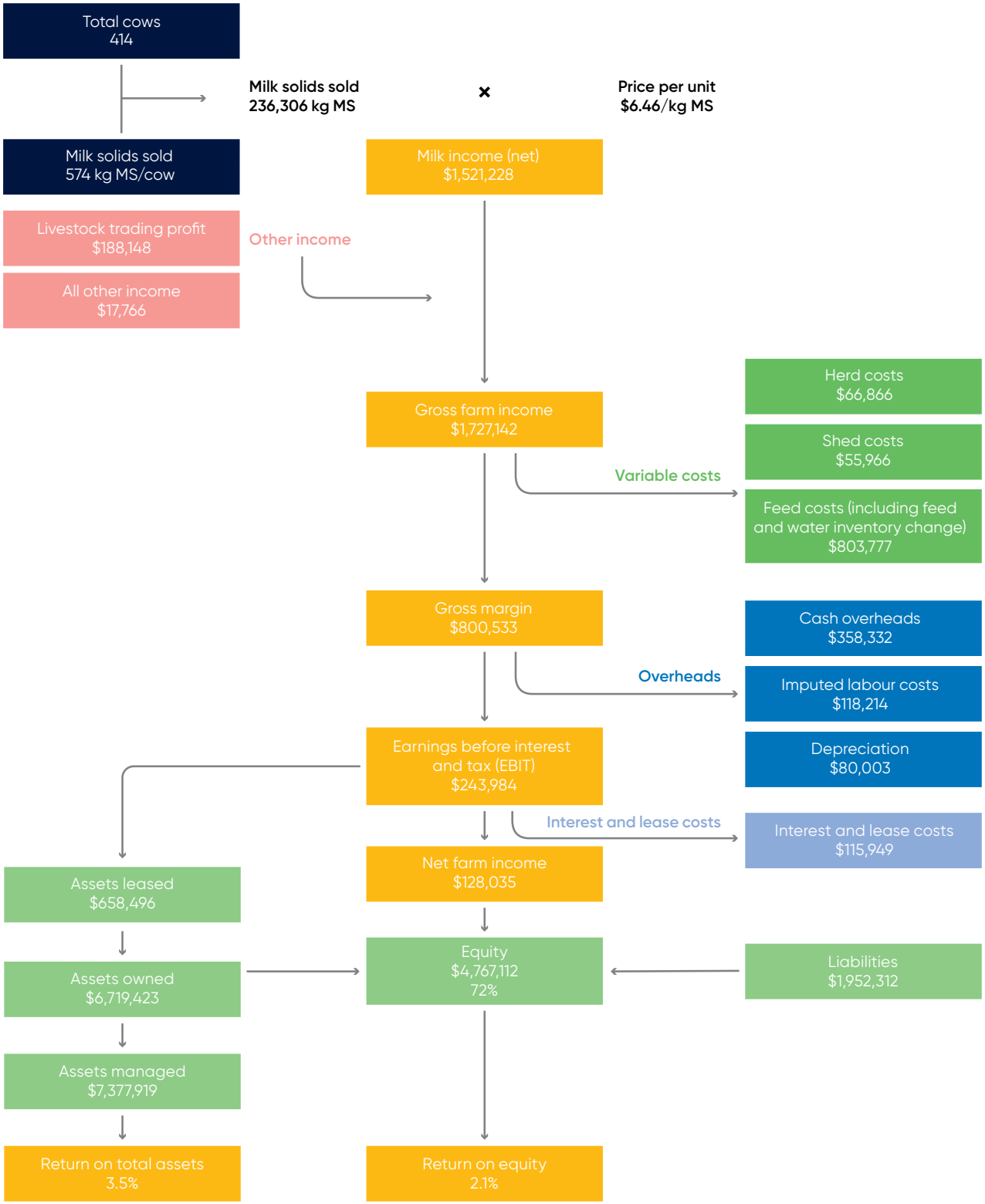


**Figure 2** Dairy Farm Monitor Project method profit map* – state average 2018–19 data




* 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 496 million litres, of the national milk output in the Australian dairy industry, down from 505 million litres in 2017–18[1].

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 orange) 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 3% of South Australia's production with 8% of the State's dairy farms located in this region.

The Central region (shaded blue) 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 51% 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.

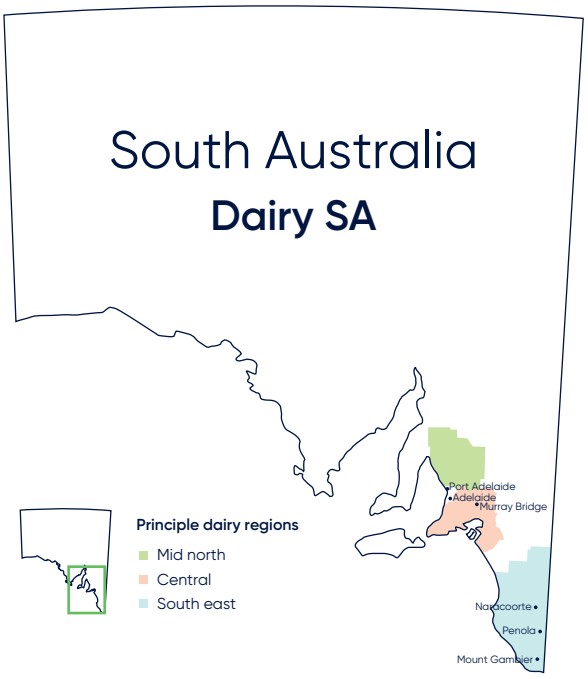
The River and Lakes have a history of being affected by severe water restrictions particularly during the 2000s and drought times. These farms are more dependent on irrigation and natural water flows for fodder production and livestock and domestic purposes than the Mid North, Fleurieu Peninsula and 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 green) 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 59% 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 rations' dairies rise in numbers. In the South East of South Australia, the best use of its regional strength – high quality underground water – sees predominantly irrigation 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




## Seasonal conditions

Rainfall during the 2018–19 year was below long term average annual rainfall in most areas. The warmer and drier conditions were conducive to good pasture growth in the South East, but other regions did not fare so well.

Dairy farmers continued to reduce the amount of conserved fodder due to the dry conditions averaging 0.9 t DM/ha in 2018–19 down from 1.3 t DM/ha in 2017–18. This, combined with drought conditions across Southern and Eastern states will continue placing pressure on purchased feed prices.

Seasonal conditions were below or near average across the dairy regions of South Australia during 2018–19 with all but two participant farms recording below average rainfall for the financial year (Figure 5).

A wet 2018 winter was followed by a dry spring, with the Bureau of Meteorology reporting the second driest September on record for the State. A dry start to 2019 persisted through to the end of April, before good season opening rains in May.

As a result, average total rainfall of 605mm for participants was 81mm less than long term average, a reduction of 12% on last year's rainfall. Rainfall received represented 88% of the long term average of all participants.

Most dairying regions of the State received below long term average rainfall over the financial year. However, good pasture growth was evident in the South East due to warmer and drier conditions.

In contrast, other agricultural regions of South Australia did not fare as well. Below average rainfall and warm conditions resulted in lower yielding pasture growth. This, along with demand for fodder from drought affected areas in other states has resulted in higher purchased feed prices during 2018–19.

Good opening rains in May 2019 has provided some expectation of high quality feed being available in the new financial year. The lower conserved fodder held over from June 2019 and ongoing drought conditions in eastern states will result in ongoing pressure on feed prices into the 2019–20 financial year, although likely not at the same high level of 2018–19.

**Figure 4** Monthly average rainfall (all farms)

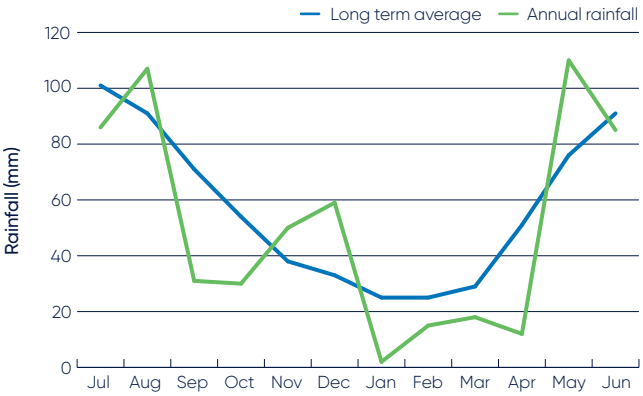
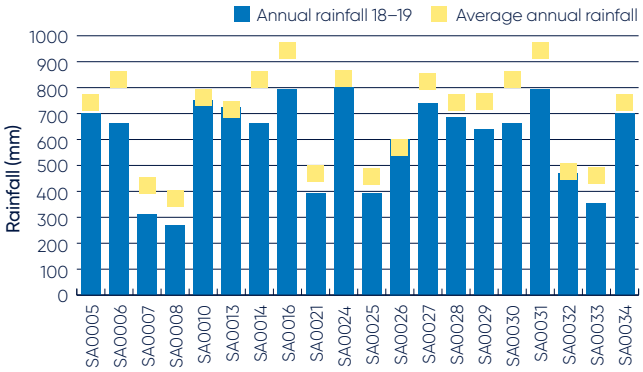



**Figure 5** 2018–19 annual rainfall and long term average rainfall of participant farms



# WHOLE FARM ANALYSIS

Gross farm income of participating farms increased 7% over 2017–18, primarily from increases to the average milk price received. Unfortunately, increased cost of production, largely from a 47% increase in the average price of purchased fodder and increased effort producing home grown feed, resulted in lower returns to participating dairy farmers.

Returns on total assets managed for participating farms was 3.5% (2017–18: 4.3%) and return on equity reduced to 2.2% (2017–18: 4.1%).

The average herd size of participating farms increased to 414 cows in 2018–19 (2017–18: 399) and usable area increased to 573 ha (2017–18: 527 ha). However, this had no impact on the average stocking rate of 1.1 milking cows per hectare (2017–18: 1.1 cows/ha).

The increase in usable area did however impact on the average of milk sold per hectare, reducing to 600 kg MS/ha, a 4% decrease (2017–18: 628 kg MS/ha).

Average milk sold per cow increased slightly to 574 kg MS/cow (2017–18: 569 kg MS/cow).

The average annual rainfall received by participants was 605mm which is 81mm below long term average rainfall.

Water use efficiency averaged 0.6 t DM/100mm/ha across participating farms (2017–18: 0.6 t DM/100mm/ha) with a Q1–Q3 range of between 0.5 and 0.8 t DM/100mm/ha – a slight improvement on last year. Participants with irrigation increased the average in water use efficiency capitalizing on pasture production in the drier months in summer and autumn.

Reliance on home grown feed increased in response to increased feed prices, providing 61% of metabolisable energy (ME), up from 54% in 2017–18. Home-grown feed as a proportion of ME consumed had a wide spread in the Q1 to Q3 range of 53% to 74% (2017–18: 43%-67%). The wide spread in home grown feed production is due to the variation of production systems in South Australia.

Previous year efficiencies in labour use were maintained in 2018–19 with the state average steady at 94 cows/FTE (2017–18: 94). The Q1 to Q3 range was 77 to 105 milking cows/FTE which represents the variation in the scale of farms and livestock management systems across the state.

Average labour efficiency in kilograms of milk solids per FTE however did increase very slightly to 52,922 kg MS/FTE (2017–18: 52,742). The Q1 to Q3 range was slightly more compressed compared to last year, being between 44,141 to 60,081 kg MS/FTE (2017–18: 39,144 to 61,384 kg MS/FTE). This change is likely due to a change in participating farms in the survey.

**Table 1** Farm physical data

| Farm physical parameters | State average | Q1 to Q3 range | Top 25% average |
|---|---|---|---|
| Annual rainfall 18–19 (mm) | 605 | 451–728 | 631 |
| Herd size | 414 | 299–556 | 420 |
| Total water use efficiency (t DM/100mm/ha) | 0.6 | 0.5–0.8 | 0.8 |
| Total usable area (ha) | 573 | 231–627 | 388 |
| Milking cows per usable hectares | 1.1 | 0.6–1.2 | 1.6 |
| Milk sold (kg MS/cow) | 574 | 523–604 | 531 |
| Milk sold (kg MS/ha) | 600 | 340–731 | 782 |
| Home grown feed as a % of ME consumed | 61 | 53–74 | 64 |
| Labour efficiency (cow/FTE) | 94 | 77–105 | 104 |
| Labour efficiency (kg MS/FTE) | 52,922 | 44,141–60,081 | 54,358 |

## Gross farm income

Gross farm income is inclusive of milk sales, livestock trading and income from other farm sources such as milk factory share dividends.

Gross farm income for participants in 2018–19 combined an average of 88% milk income and 12% from all other income (no change to last year).

Figure 6 displays the gross farm income for participant farms throughout the South Australian dairying areas. Gross farm income across participants averaged $6.46/kg MS. The top 25% of participants averaged $7.31/kg MS, a premium of 13% predominantly from livestock trading, sales of feed or other farm income.

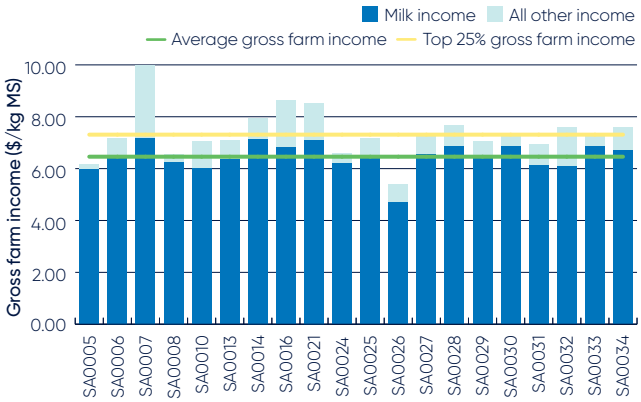
The average milk income received was $6.46/kg MS in 2018–19, an increase of 4% on last year's average $6.24/kg MS. This increase is on top of the 8% price increase reported in 2017–18.

The Q1 to Q3 range for milk income received was $6.18 to $6.85/kg MS, a difference of 67c between Q1 and Q3 (2017–18: $5.92 to $6.33/kg MS). This gap increased over last year, meaning there is a greater variation in price received by participants in the survey.

The increase to average milk income and increased range of income received could be reflective of participants able to take advantage of market opportunities at a higher price, particularly in spring.

Participant farmers also received an average of $0.79/kg MS from all other income, down from $0.84/kg MS. Income from livestock trading at $0.75/kg MS was consistent with last year's results (2017–18: $0.75/kg MS).

**Figure 6** Gross farm income of 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 rather than the quality of management.

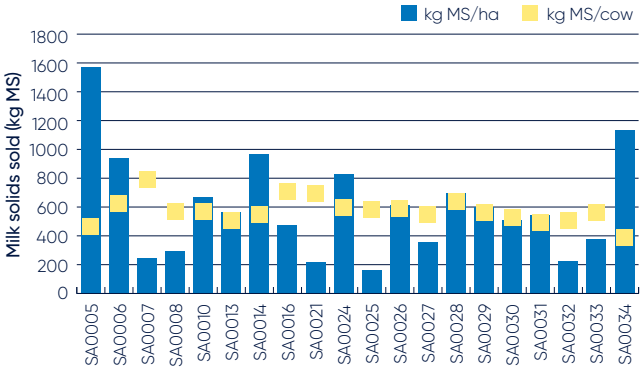
The quantity of milk solids sold in the Q1 to Q3 range is from 340 kg MS/ha to 731 kg MS/ha with an average of 600 kg MS/ha which is 4% lower than the 2017–18 average of 628 kg MS/ha.

The change in production per hectare is a result of increased land used in milk production, from 527 ha in 2017–18 to 573 ha in the current year. As there was also an increase in the number of cows milked by participants, there was no change to the figure of 1.1 milking cows per hectare.

While the variance is quite large in terms of milk solids per hectare, milk solids sold per cow is relatively even between participants, averaging 574 kg MS/cow and Q1 to Q3 varies between 523–604 kg MS/cow. The kg MS/cow results were very slightly higher than last year (2017–18: Average 569 kg MS/cow).

Such a wide variation in milk solids sold 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

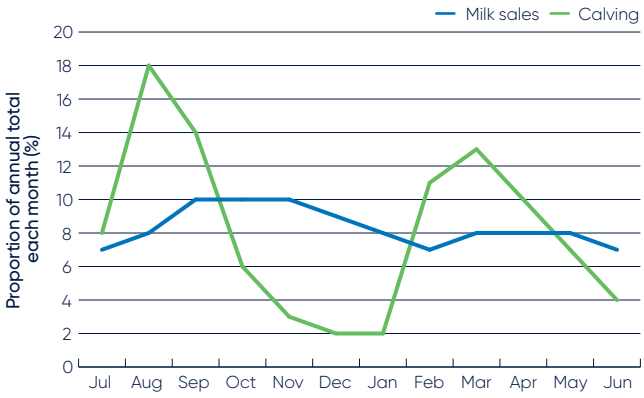
Figure 8 below shows average milk sales for all participant farms against the monthly distribution of cows calving. Year round calving is evident with peaks in spring and autumn.

Although there were peaks and troughs in calving, milk sales were relatively stable although a rise in spring milk sales is becoming more evident.

Milk sales recorded the lowest monthly figure amongst participants in July which reflects targeted calving to coincide with optimal spring pasture growth. Calving continues throughout spring. Milk sales dip again in February when autumn calving commences.

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 cost

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.

Historically, average variable costs in South Australia have been relatively stable between 2013 and 2016, ranging between $3.85/kg MS to $3.98/kg MS. More recently through focusing on reducing the cost of production, average variable costs in 2016–17 dropped to $3.23/ kg MS. However increased feed costs have seen average total variable costs return to $3.82/kg MS in 2018–19, up from $3.40/kg MS last year (a 13% increase).

There are distinct differences between the levels of variable costs between participants shown below (Figure 9). While herd and shed costs were relatively stable, levels of home-grown and purchased feed were often the difference.

In 2018–19, average herd and shed costs were $0.29/kg MS and $0.24/kg MS respectively. Herd and shed costs both reduced from last year, partly from reduced power costs from investment in solar.

Feed costs contribute significantly to the costs of participant farms being 86% of variable costs. Average home grown feed as a percentage of ME consumed for 2018–19 increased to 61% at an average price of $1.02/kg MS. This is an increase in cost of $0.11/kg MS from last year, but still below levels in prior years ($1.22/kg MS in 2016–17). Additional effort was expended to increase home grown feed in the current year.

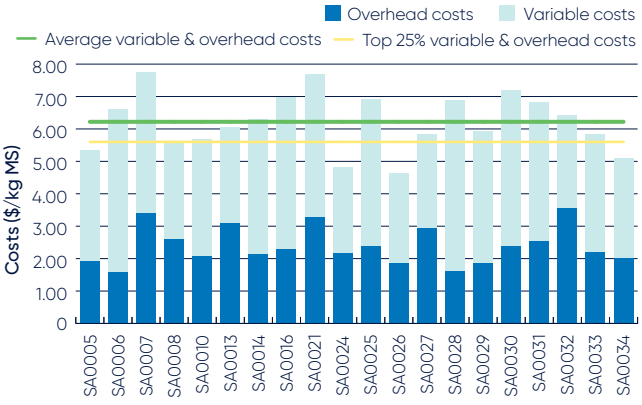
Purchased feed and agistment increased significantly in 2018–19 due to higher feed prices. Feed and agistment averaged $2.28/kg MS, a 27% increase on last year's figure of $1.80/kg MS.

Prices for purchased fodder were influenced by seasonal conditions, with increased competition nationally across intensive livestock industries pushing up prices. Average cost of purchased feed increased 47% over last year to $418/t DM (2017–18: $285/t DM).

The range of purchased feed and agistment costs between Q1 to Q3 data of $1.50/kg MS to $3.09/kg MS reflects the difference between dairy production systems in South Australia and greater availability of home grown feed in some regions.

The breakdown of variable costs can be found in Appendix Table A4 and Table A6.

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



## 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 by 4% to $2.40/kg MS for the survey down from $2.50/kg MS in 2017–18. Repairs and maintenance and depreciation remained at 2017–18 levels, but council rates (up 22%), farm insurance costs (up 7%) and imputed labour (up 2%) increased. Vehicle costs, employed labour and other overheads were lower than in 2017–18.

## 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 increase 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 $6.22/kg MS up from $5.90/kg MS last year.

Dairy participants increased livestock inventories over the year, resulting in an average write back of $0.09/kg MS.

The average increase in cost of production of $0.32/kg MS was partially offset by the $0.27/kg MS increase in average milk price received – however this largely contributed to the reduction in earnings before interest and tax (EBIT).

A breakdown of the overhead costs in $/kg MS is provided in Appendix Table A5.

**Table 2** Total variable and overhead costs

| Farm income and cost category | Average | Q1 to Q3 range | Top 25% average |
|---|---|---|---|
| **Income** | **$ kg/MS** | **$ kg/MS** | **$ kg/MS** |
| Milk income (net) | 6.46 | 6.18–6.85 | 6.66 |
| Livestock trading profit | 0.75 | 0.49–0.81 | 0.54 |
| Other farm income | 0.10 | 0–0.03 | 0.11 |
| Total income | 7.32 | 6.91–7.62 | 7.31 |
| **Variable costs** | | | |
| Herd cost | 0.29 | 0.21–0.36 | 0.31 |
| Shed cost | 0.24 | 0.18–0.3 | 0.21 |
| Home grown feed cost | 1.02 | 0.65–1.37 | 0.95 |
| Purchased feed and agistment | 2.28 | 1.50–3.09 | 2.14 |
| Feed inventory change | 0.00 | -0.09–0.09 | -0.06 |
| Water inventory change | 0.00 | 0–0 | -0.01 |
| Total feed costs | 3.30 | 2.55–3.87 | 3.02 |
| Total variable costs | 3.83 | 3.02–4.45 | 3.53 |
| **Gross margin** | **3.49** | **2.67–4.11** | **3.78** |
| **Overhead costs** | | | |
| Employed labour | 0.89 | 0.58–1.15 | 0.79 |
| Repairs and maintenance | 0.29 | 0.16–0.34 | 0.21 |
| All other overheads | 0.32 | 0.24–0.36 | 0.27 |
| Imputed labour | 0.55 | 0.30–0.91 | 0.54 |
| Depreciation | 0.35 | 0.23–0.48 | 0.26 |
| Total overhead costs | 2.40 | 1.99–2.68 | 2.07 |
| **Variable and overhead costs** | **6.22** | **5.68–6.89** | **5.60** |
| **Earnings before interest and tax** | **1.09** | **0.79–1.53** | **1.71** |

## 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.

In 2018–19 the EBIT for participating farms dropped to $1.09/kg MS compared to $1.18/kg MS in 2017–18.

The decrease in EBIT is largely explained by a 6% increase in cost of production only partially being offset by a 4% increase in milk price received.

All participants in 2018–19 had a positive EBIT result. The Q1 to Q3 EBIT range was $0.79 to $1.53/kg MS. The top quartile averaged EBIT of $1.71/kg MS, down from $1.97/kg MS in 2017–18.

## 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 2018–19 the RoTA achieved by participant farms was between 0.4% and 8.3%. With lower returns achieved, most participants (n=16; 80%) fell into the 0%-5% range, with the remaining 20% achieving RoTA of between 5 and 10 percent (figure 11).

The average RoTA for participants across South Australia for 2018–19 was 3.5%, down from 4.3% last year. The top 25% of participants achieved a 6.2% return on assets managed.

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 2018–19, 4 participant farms had a negative RoE, with the majority (n=12) achieving a RoE of between 0% and 5%. The remaining 4 participant farms achieved RoE of between 5% and 10%. (Figure 13).

The average RoE for participating farms this year was 2.1% (ranging from negative 11.2% to positive 9.4%), compared to 4.1% in 2017–18. The average decrease in RoE is partially influenced by the inclusion of 3 new farms in comparison with last year, but also reflects a lower average gross margin.

Farms with negative RoE include dairies with low levels of equity and high lease costs.

For more information, Appendix Table A1 presents the RoTA and RoE for all participant farms

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

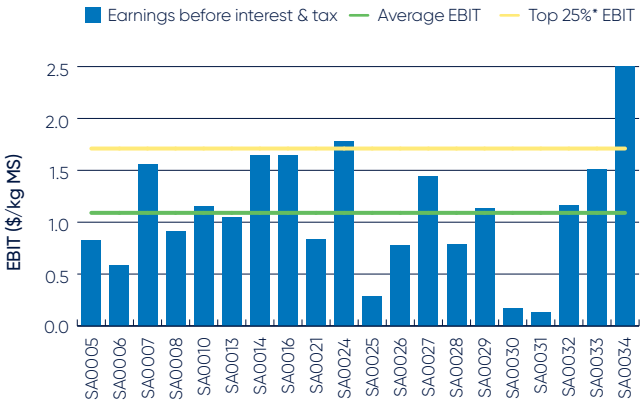



**Figure 11** Distribution of farms by return on total assets

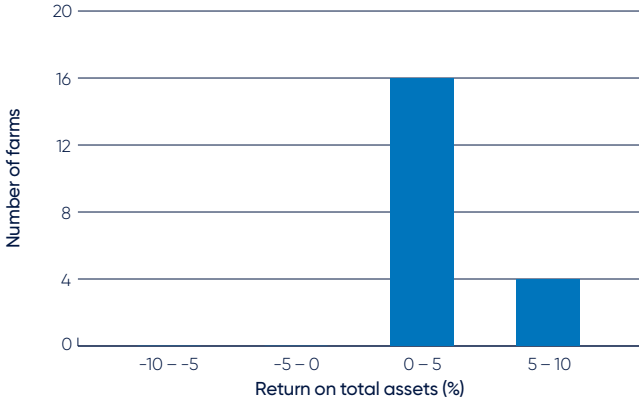



**Figure 12** Return on total assets

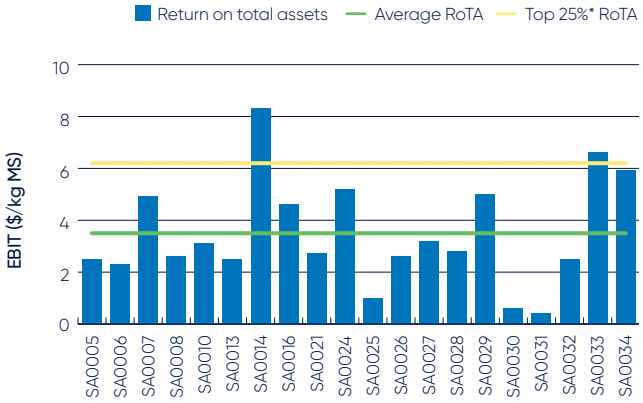


**Figure 13** Distribution of farms by return on equity

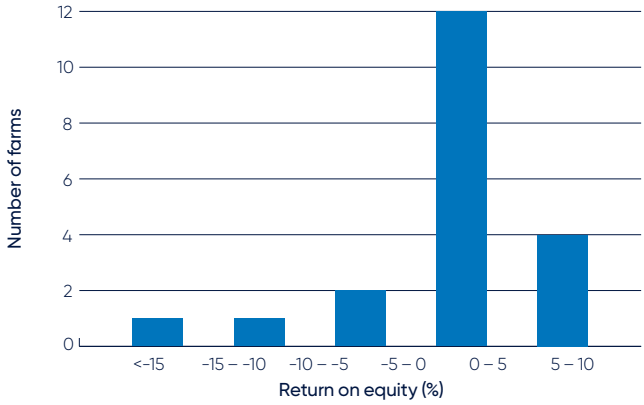
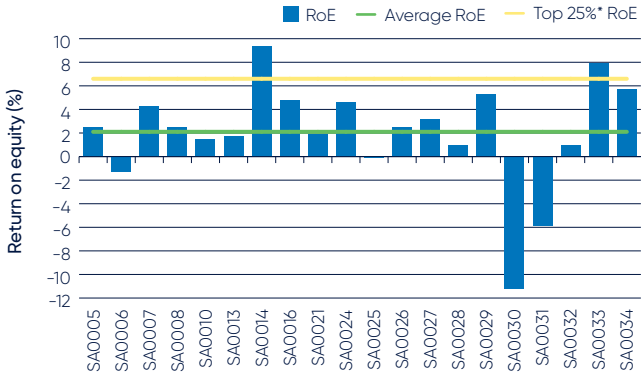



**Figure 14** Return on equity




## 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..."*[1]

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 Tables A1, A3 and 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. Further, the data in Appendix Tables A4 and A5 are in cost per kilogram of milk solids sold. This data set is best used as risk indicators, given it is measured against the product produced and sold currently and not the capital invested.

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, $0.61 was used to cover variable costs in 2018–19. However it is worth noting that cost structure varies between farms. One hundred minus this

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

percentage gives the proportion of total costs that are overhead costs.

The debt servicing ratio shows interest and lease costs, as a proportion of gross farm income. The ratio of 7% this year is the same as reported last year. It indicates that on average farms paid $0.07 from every dollar of gross farm income to their creditors.

Equity levels reported by participating farms remained consistent with last year, averaging 72% (2017–18: 71%). 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 2018–19, only five of the 20 (25%) participant farms received a RoE greater than their RoTA. This is a similar number to previous surveys.

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 decreased in 2018–19 to an average 39% which is lower than the average across the previous seven years. The 2017–18 season was an exception at 36% of ME sourced from imported feed as participants were able to rely more on home grown fodder. Previous to 2017–18 the average ranged from 43%-52%.

**Table 3** Risk indicators – statewide

| | Statewide |
|---|---|
| Cost structure (percentage of total costs as variable costs) | 61 |
| Debt service ratio (percentage of income as finance costs) | 7 |
| Debt per cow | $4,552 |
| Equity percentage (ownership of total assets managed) | 72 |
| Percentage of feed imported (as a percentage of total ME) | 39 |

# PHYSICAL MEASURES

South Australian participant farms exhibited a wide range of feeding systems, including naturally grazed, total mixed ration and feedlot / cut and carry dairies. Reliance on grazed pasture increased in an attempt to avoid the high cost of purchased feed, but concentrates also remained a significant source of metabolisable energy.

Fertilizer use remained consistent with previous years, with an average of 171 kg/ha of nutrients being applied by participants, 59% of which was nitrogen.

## 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 13 of 20 participants, compared with 11 of 19 in 2017–18. This is likely due to an increased number of participants trying to reduce reliance on purchased feed costs at high prices. Excluding three farms which would be considered TMR farms (total mixed ration), directly grazed pasture represented 48% on average of ME consumed (2017–18: 51%).

Concentrates were the second most utilised source of total ME fed to livestock with an average of 29% (2017–18: 34%) of total ME fed. The average price for concentrates increased 43% to $485/t DM in 2018–19 on top of the 12% increase in the previous year (2017–18: $340/t DM; 2016-17 $304/t DM).

Hay's contribution to ME decreased from 15% to 12% as a proportion of ME and silage represented 13% of ME (2017–18: 14%). Other feed contributed the remaining 4% of metabolisable energy, including the feedlot and cut and carry dairies.

Appendix Table A3 provides further information on purchased feed.

Figure 16 and Appendix Table A2 gives an estimate of the average quantity for home grown feed consumed per milking hectare for participant farms across the state. It accounts only for the consumption of pasture that occurred on the milking area whether by milking, dry or young stock.

**Figure 15** Sources of whole farm metabolisable energy

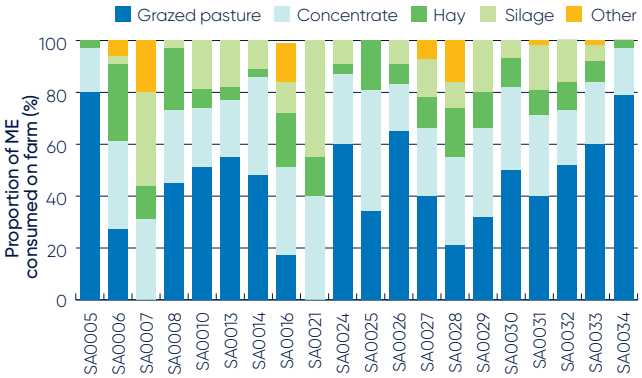
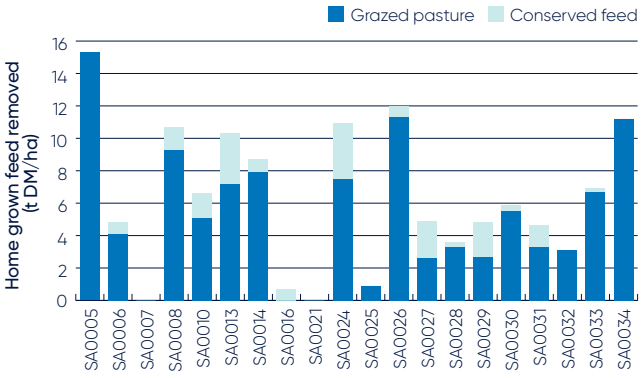



**Figure 16** Estimated tonnes of home grown feed removed per milking area hectare



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 estimated pasture consumed as grazed feed on the milking area increased to 5.3 t/ha (2017–18: 4.4 t DM/ ha) with an additional 0.9 t/ha (LY: 1.3 t DM/ha) consumed from conserved fodder. The higher pasture consumption reflected increased effort to produce home grown pasture to avoid high purchased feed prices.

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

This involves a calculation based on the total ME required on the farm, 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.

Farms SA0007 and SA0021 have minimal milking areas and could be considered feedlots or have cut and carry feeding system. This feeding system is reflected in both Figures 15 and 16 where there was minimal or no grazed pasture shown.

## Fertiliser application

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

Despite changes in farm participants this year, fertiliser use remains similar to that of 2017–18 and in line with historical averages.

Fertilisers used on dryland pastures were urea and diammonium phosphate (DAP) which are both leading sources of nitrogen. Irrigators who elected to apply fertiliser more frequently used custom fertilisers to optimise feed growth.

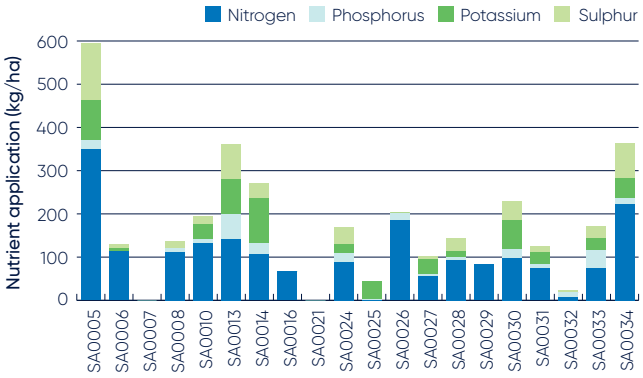
Figure 17 shows the range of application rates used on properties. There could be other factors beyond fertiliser application that influence the production of home grown feed including soil fertility, climate and management of pastures.

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 1 kg/ha to 349 kg/ha, with an average of 111 kg/ha. Distribution varies per farm but is used in higher quantities by irrigators.

Phosphorous use ranged from 0 kg/ha to 55 kg/ha at an average of 15 kg/ha. Potassium use ranged from 0 kg/ha to 104 kg/ha at an average of 33 kg/ha. Sulphur use ranged from 0 kg/ha to 132 kg/ha at an average of 30 kg/ha.

Further information on fertiliser application can be found in Appendix Table A2.

**Figure 17** Fertiliser application per useable hectare



# Business confidence survey

## Expectations and issues

A high level of expectation exists for better business returns in 2019–20 based on good price expectations, increased milk production and reduced costs for purchased feed.

Respondents indicated intentions to become more reliant on home grown feed, with expectations of higher labour costs a result.

## Expectations for business returns

Expectations for the 2019–20 year are positive with all but two respondents expecting an improvement to their returns. This is significantly higher than last year where only 41% of respondents expected improved returns.

The positive attitude is a result of expectations of reduced purchased feed costs and good pasture availability across the South East and Fleurieu at the time of the survey.

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 2019–20 milk price announcements which also provided some level of optimism.

## Price and production expectations – milk

On the basis that 2019–20 opening milk prices had been announced, all but one respondent expected their milk price to increase in the next 12 months (Figure 19).

Similarly, 65% of respondents expect milk production to increase (up from 47% last survey) while 30% expect milk production to remain stable. One respondent expects a reduction in their milk production for 2019–20.

## Production expectations – fodder

Despite drier than average conditions across the state, participants had reported average or above average pasture growth at the time of the survey. This was particularly true in the lower South East of SA and across the Fleurieu Peninsula which benefit from slightly drier than average conditions. The majority of respondents (65%) expect to increase fodder production in 2019–20, with only 1 respondent expecting a reduction in production (Figure 20).

**Figure 18** Expectation of business returns

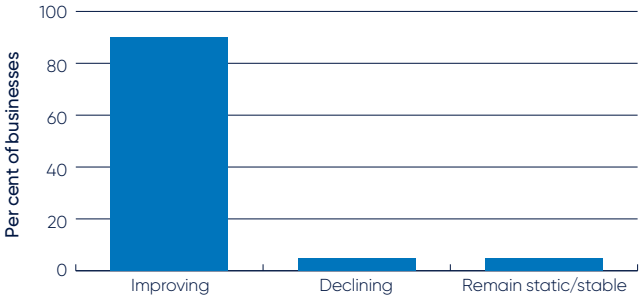



**Figure 19** Price and production expectations – milk

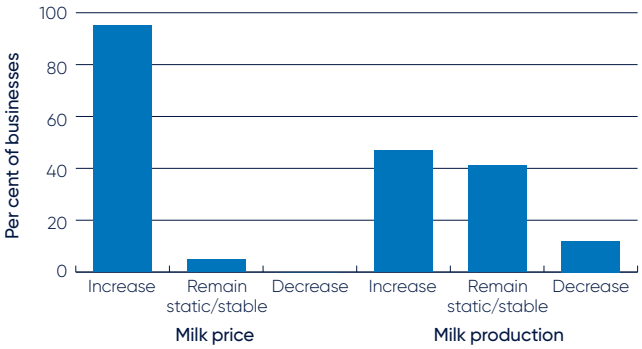
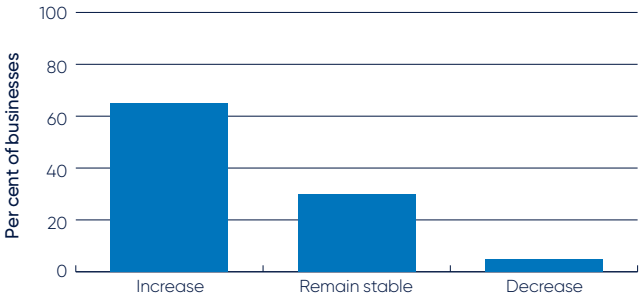



**Figure 20** Producer expectations – fodder



## Cost expectations

Data in Figure 21 represent the expectations with regard to costs in 2019–20 from South Australian participants. Survey responses were provided in late July and early August based on understanding of seasonal conditions known at the time.

The general expectation is that on average costs will largely remain the same as 2018–19 with the exception of a decrease in feed costs and an increase in labour costs.

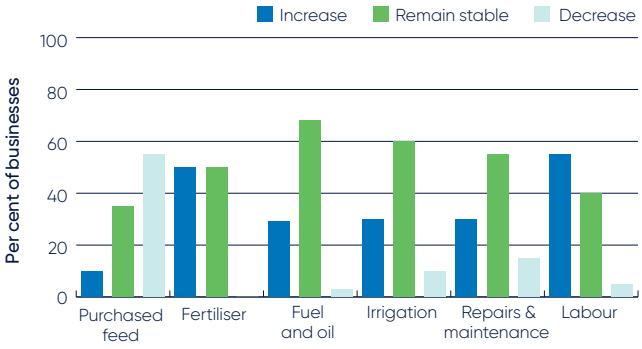
Just over half (55%) expect purchased feed costs to fall in 2019–20 from record high prices, while 10% expect feed costs to increase. The remaining 35% expect purchased feed prices to remain stable.

The majority of respondents are expecting fuel and oil, irrigation and repairs/maintenance costs to remain stable. However 40% of respondents have an expectation that fuel and oil costs will increase.

Respondents were divided in their expectations on fertilizer costs, with half expecting an increase and the other have expecting costs to remain the same.

Most respondents (55%) consider labour costs will increase in the 2019–20 year or remain stable (40%) based on their production programs. This may be a reflection of expected increased effort to produce home grown feed to attempt to reduce costs.

**Figure 21** Costs expectations




## Major issues in 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.

Other factors were considered significant for 23% of respondents.

Milk pricing remains at front of mind for many participants this year due to unpredictability of the milk market.

Electricity and input costs remain a cause for concern alongside pasture/fodder availability, which had such a significant impact on 2018–19 results.

Climate and seasonal conditions are also of some concern to 18% of respondents.

## Major issues in the dairy industry – the next 5 years

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

Milk price over the next 5 years is easily 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.

Other factors were of concern to 25% of respondents. This includes commentary from a respondent indicating concerns about the potential for government and regulatory changes to impact their business

**Figure 22** Major issues for individual businesses – 12 month outlook

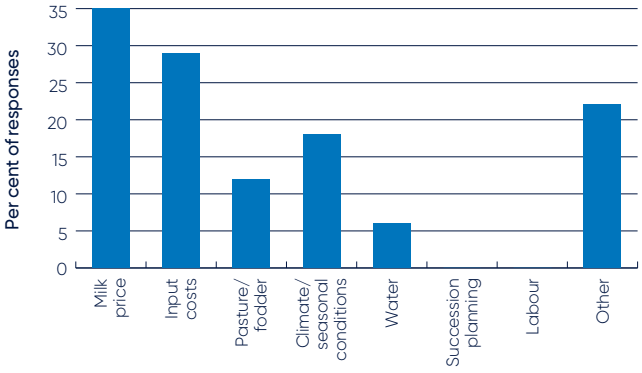
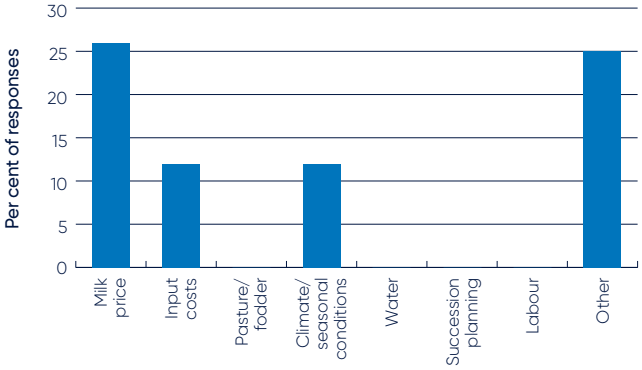



**Figure 23** Major issues for individual businesses – 5 year outlook



# Greenhouse gas emissions

The average level of emissions from participating farms continues to decline from 14.14 t $CO_2$-e/t MS in 2017–18 down 1% to 14.04t $CO_2$-e/t MS. Investment in solar power to reduce emissions and electricity costs has driven this change.

Carbon dioxide equivalents ($CO_2$-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 $CO_2$-e tonnes and expressed per tonne of milk solids sold ($CO_2$-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; $CO_2$: methane; $CH_4$: nitrous oxide; $N_2O$). This year the greenhouse emission was calculated through DairyBase using the Australian Dairy Carbon Calculator.

The distribution of different emissions for 2018–19 is shown in Figure 24. Greenhouse gas emissions per tonne of milk solids produced ranged from 12.15 t $CO_2$-e/t MS to 16.42 t $CO_2$-e/t MS with an average emission level of 14.04 t $CO_2$-e/t MS. This is a slight reduction from last year's average of 14.14 t $CO_2$-e/t MS.

The percentage breakdown for emissions in 2018–19 was 64% for $CH_4$, 25% for $CO_2$, and 11% for $N_2O$ emissions – no change to last year.

Methane was identified as the main greenhouse gas emitted from dairy farms, accounting for 64% of all greenhouse emissions. There are two main sources of $CH_4$ emissions on farm: ruminant digestion and anaerobic digestion in effluent management systems. Methane produced from ruminant digestion is known as enteric $CH_4$ and was the major source of emissions from all farms in this report, with an average of 55% of total emissions. Methane from effluent ponds accounted for 9% of total emissions on average across the state in 2018–19.

The second main greenhouse gas emission was $CO_2$ 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.

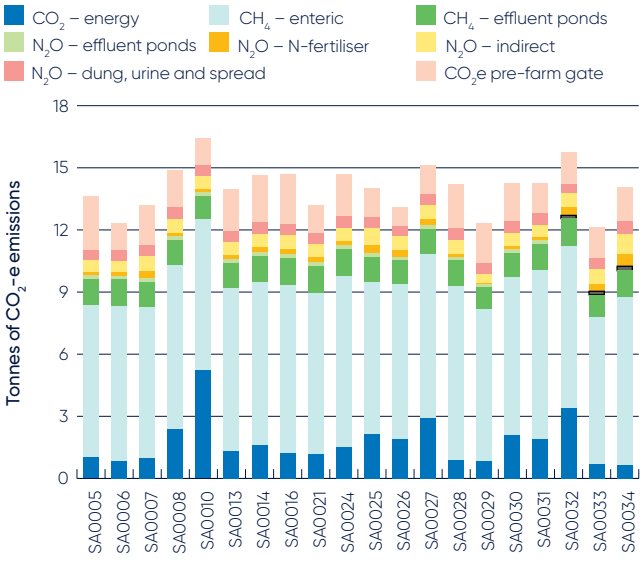
Carbon dioxide accounted for 25% of total emissions 12% from pre-farm gates sources and 12% from on-farm energy sources. Output levels were highly dependent on the source of electricity used with some farms using coal generated electricity and others using electricity sourced from renewable sources (e.g. solar). The average pre-farm gate $CO_2$ levels reported by participants decreased by 11% on last year's figures, however petrochemical use increased by 6%.

The third main greenhouse gas emission was nitrous oxide (N2O), accounting for 11% 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 $N_2O$. Strategic fertiliser management practices can reduce $N2_2O$ 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 **environment.gov.au/climate-change**.

**Figure 24** Greenhouse gas emissions per tonne of milk solids produced



# Historical analysis

Historical trends in average milk price continues to drive trends in financial performance of 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.

Despite being a high cost year, participants achieved an average EBIT of $243,984, which is 14% above the previous 7 year average. ROTA for 2018–19 3.5% remains above the seven year average of 3.3%.

In South Australia, 2018–19 milk prices were rising during a year where purchased fodder prices were at their highest deciles. The 47% increase in the price of purchased feed resulted in lower returns on total assets and return on equity across participant farms.

Set out in Figure 25 is the average EBIT and net farm income for the seven years of Dairy Farm Monitor Project in South Australia. Both EBIT and net farm income initially rose for all participant farms from 2012–13 to 2013–14 before beginning a downward trend from 2014–15 to 2015–16. Post 2015-16 EBIT and Net Farm Income have stabilised.

Historically, the low average EBIT of approximately negative $6,900 and net farm income negative $95,689 in 2012–13 was primarily due to low milk prices and high feed costs. In 2012–13, feed costs accounted for 83% of total variable costs.

In 2013–14, EBIT and net farm income rose to an average $345,843 and $230,761, respectively as a result of a good average milk prices of $7.29/kg MS (adjusted for inflation).

Average farm EBIT and net farm income in 2014–15 declined to approximately $229,029 and $93,574 respectively, as a result of lower average milk prices received. The average milk income of $6.68/kg MS in 2014–15 was 8% lower than the $7.29/kg MS received in 2013–14 (adjusted for inflation).

The downward trend continued for average farm EBIT and net farm income in 2015–16, declining further to approximately $170,889 and $39,858 respectively, with average milk prices of $6.40/kg MS (4% lower than 2014–15) being a major contributor.

In 2016-17 the average farm EBIT and net farm income increased to $205,279 and $103,487 respectively as a result of increased other farm income and improved seasonal conditions increasing the availability of home grown feed. This reduced the need for purchased feed at lower prices for concentrates and hay, if feed was purchased.

In 2017–18 average EBIT was $294,920 with net farm income of $174,240. This was the second best performance recorded since the high milk price year of 2013–14. The average milk price for the season was $6.24 kg MS which is of significance when compared to previous years' prices (adjusted for inflation) as it is actually the second lowest price in the past six years. The strong 'EBIT' and 'Net Farm Profit' results reported by participants are a reflection of businesses maintaining tight cost control methods (brought on in 2016–17 by low milk prices) into a period of improved prices.

This year, a combination of a 4% rise in milk price, less a 6% increase in cost of production resulted in a drop in EBIT and net farm income. Despite high feed costs, average EBIT of $243,984 was achieved by participant farms, 14% higher than the previous 7 year average of $214,696. Net farm income for the year was $128,035.

Average return on total assets for 2018–19 was 3.5%, a decrease on the previous year of 4.3% but above the seven year average of 3.3%. Figure 26 illustrates that although the last 3 years were challenging, participants have found a way to stabilise returns after the peaks and troughs 2012-13 through to 2015-16.

In all of the past six years, average return on equity has ranged from negative 4.9% (2012–13) to a high of 8.5% in 2013–14 before falling to negative 1.5% in 2015–16 from 3.6% in 2014–15. In 2018–19, average farm return on equity dropped to 2.1% down from last year's average of 4.1%.

The average return on equity reported for 2018–19 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 2018–19 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

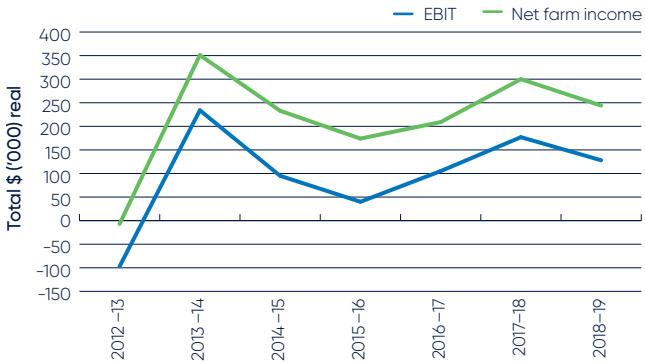
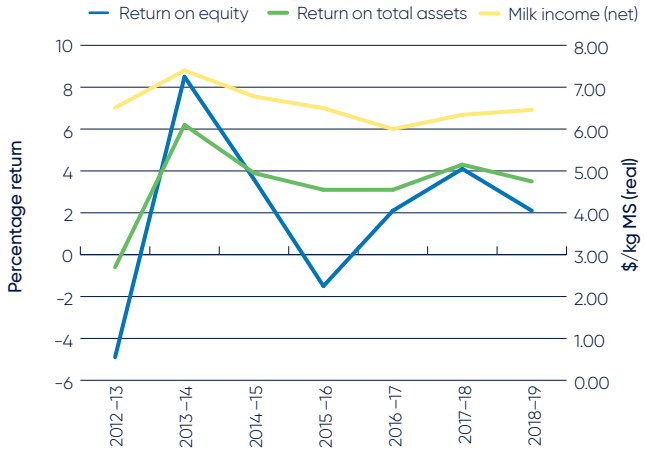



**Figure 26** Regional return on total assets (LHS), return on equity (LHS) and milk price (RHS)



# Appendices

# APPENDIX A

## SUMMARY TABLES

**Table A1** Main financial indicators

| Farm number | Milk income (net) | All other income | Gross farm income | Total variable costs | Total overhead costs | Cost structure (variable costs/total costs) | Earnings before interest and tax | Return on total assets (exc. capital apprec.) | Interest and lease charges | Debt servicing ratio | Net farm income | Return on equity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $ kg/ MS | $/kg MS | $ kg/ MS | $/kg MS | $/kg MS | % | $/kg MS | % | $/kg MS | % of income | $ kg/ MS | % |
| SA0005 | 5.96 | 0.20 | 6.16 | 3.40 | 1.94 | 64 | 0.82 | 2.5 | - | 0.0 | 0.82 | 2.5 |
| SA0006 | 6.52 | 0.66 | 7.18 | 5.01 | 1.60 | 76 | 0.58 | 2.3 | 0.70 | 9.8 | (0.13) | -1.3 |
| SA0007 | 7.18 | 2.14 | 9.32 | 4.34 | 3.42 | 56 | 1.56 | 4.9 | 0.68 | 7.3 | 0.89 | 4.3 |
| SA0008 | 6.26 | 0.29 | 6.55 | 3.05 | 2.59 | 54 | 0.91 | 2.6 | 0.09 | 1.4 | 0.81 | 2.5 |
| SA0010 | 6.01 | 0.83 | 6.84 | 3.60 | 2.09 | 63 | 1.15 | 3.1 | 0.83 | 12.2 | 0.32 | 1.5 |
| SA0013 | 6.36 | 0.74 | 7.10 | 2.95 | 3.10 | 49 | 1.05 | 2.5 | 0.48 | 6.8 | 0.57 | 1.7 |
| SA0014 | 7.14 | 0.81 | 7.95 | 4.18 | 2.13 | 66 | 1.64 | 8.3 | 0.19 | 2.4 | 1.45 | 9.4 |
| SA0016 | 6.82 | 1.81 | 8.63 | 4.71 | 2.28 | 67 | 1.64 | 4.6 | 0.61 | 7.1 | 1.03 | 4.8 |
| SA0021 | 7.10 | 1.42 | 8.52 | 4.42 | 3.27 | 58 | 0.83 | 2.7 | 0.51 | 6.0 | 0.32 | 1.9 |
| SA0024 | 6.20 | 0.39 | 6.60 | 2.65 | 2.17 | 55 | 1.78 | 5.2 | 0.93 | 14.1 | 0.85 | 4.6 |
| SA0025 | 6.42 | 0.77 | 7.19 | 4.52 | 2.39 | 65 | 0.28 | 1.0 | 0.30 | 4.2 | (0.02) | -0.1 |
| SA0026 | 4.70 | 0.71 | 5.42 | 2.78 | 1.86 | 60 | 0.78 | 2.6 | 0.16 | 3.0 | 0.62 | 2.5 |
| SA0027 | 6.54 | 0.74 | 7.27 | 2.88 | 2.95 | 49 | 1.44 | 3.2 | 0.02 | 0.2 | 1.43 | 3.2 |
| SA0028 | 6.86 | 0.81 | 7.67 | 5.26 | 1.63 | 76 | 0.79 | 2.8 | 0.71 | 9.2 | 0.08 | 1.0 |
| SA0029 | 6.43 | 0.63 | 7.06 | 4.08 | 1.85 | 69 | 1.13 | 5.0 | 0.05 | 0.8 | 1.08 | 5.3 |
| SA0030 | 6.86 | 0.49 | 7.35 | 4.80 | 2.38 | 67 | 0.17 | 0.6 | 0.56 | 7.7 | (0.39) | -11.2 |
| SA0031 | 6.13 | 0.80 | 6.93 | 4.27 | 2.54 | 63 | 0.13 | 0.4 | 0.88 | 12.7 | (0.75) | -5.9 |
| SA0032 | 6.09 | 1.51 | 7.60 | 2.89 | 3.55 | 45 | 1.16 | 2.5 | 0.83 | 10.9 | 0.33 | 1.0 |
| SA0033 | 6.85 | 0.52 | 7.37 | 3.66 | 2.19 | 63 | 1.51 | 6.6 | 0.50 | 6.8 | 1.02 | 7.9 |
| SA0034 | 6.70 | 0.90 | 7.60 | 3.10 | 2.01 | 61 | 2.50 | 5.9 | 0.85 | 11.2 | 1.65 | 5.7 |
| **Average** | **6.46** | **0.86** | **7.32** | **3.83** | **2.40** | **61** | **1.09** | **3.5** | **0.49** | **6.7** | **0.60** | **2.1** |
| **Top 25*** | **6.66** | **0.65** | **7.31** | **3.53** | **2.07** | **63** | **1.71** | **6.2** | **0.50** | **7.0** | **1.21** | **6.6** |

**Table A2** Physical information

| Farm number | Total usable area | Milking area | Total water use efficiency | Number of milking cows | Milking cows per usable area | Milk sold | Milk sold | Fat | Protein |
|---|---|---|---|---|---|---|---|---|---|
| | ha | ha | t DM/100mm/ha | hd | hd/ha | kg MS/cow | kg MS/ha | % | % |
| SA0005 | 176 | 173 | 1.2 | 595 | 3.4 | 464 | 1569 | 4.7 | 3.6 |
| SA0006 | 233 | 170 | 0.6 | 350 | 1.5 | 626 | 940 | 3.9 | 3.4 |
| SA0007 | 691 | 9 | 0.6 | 216 | 0.3 | 794 | 248 | 4.2 | 3.2 |
| SA0008 | 438 | 76 | 0.5 | 230 | 0.5 | 567 | 298 | 4.2 | 3.3 |
| SA0010 | 252 | 208 | 0.8 | 295 | 1.2 | 570 | 667 | 4.3 | 3.5 |
| SA0013 | 348 | 177 | 0.6 | 390 | 1.1 | 505 | 566 | 4.0 | 3.3 |
| SA0014 | 225 | 152 | 0.8 | 400 | 1.8 | 546 | 970 | 3.9 | 3.4 |
| SA0016 | 605 | 103 | 0.4 | 410 | 0.7 | 705 | 478 | 3.5 | 3.3 |
| SA0021 | 1,825 | 2 | 0.4 | 574 | 0.3 | 697 | 219 | 3.5 | 2.9 |
| SA0024 | 216 | 170 | 0.9 | 300 | 1.4 | 597 | 829 | 3.8 | 3.2 |
| SA0025 | 1,960 | 1,080 | 0.2 | 550 | 0.3 | 581 | 163 | 3.8 | 3.3 |
| SA0026 | 603 | 236 | 0.7 | 630 | 1.0 | 591 | 617 | 4.7 | 3.9 |
| SA0027 | 350 | 200 | 0.5 | 225 | 0.6 | 551 | 354 | 4.0 | 3.3 |
| SA0028 | 500 | 244 | 0.5 | 547 | 1.1 | 639 | 699 | 3.1 | 3.2 |
| SA0029 | 289 | 189 | 0.8 | 308 | 1.1 | 561 | 598 | 4.1 | 3.4 |
| SA0030 | 219 | 120 | 0.5 | 211 | 1.0 | 528 | 509 | 4.2 | 3.3 |
| SA0031 | 564 | 342 | 0.7 | 620 | 1.1 | 495 | 544 | 4.0 | 3.4 |
| SA0032 | 761 | 314 | 0.6 | 335 | 0.4 | 508 | 224 | 3.9 | 3.1 |
| SA0033 | 1,088 | 446 | 0.5 | 730 | 0.7 | 565 | 379 | 4.1 | 3.6 |
| SA0034 | 123 | 118 | 1.0 | 360 | 2.9 | 387 | 1136 | 4.5 | 3.6 |
| **Average** | **573** | **226** | **0.6** | **414** | **1.1** | **574** | **600** | **4.0** | **3.4** |
| **Top 25*** | **388** | **215** | **0.8** | **420** | **1.6** | **531** | **782** | **4.1** | **3.4** |

| Farm number | Estimated grazed pasture* | Estimated conserved feed* | Home grown feed as of ME consumed | Nitrogen application | Phosphorous application | Potassium application | Sulphur application | Labour efficiency | Labour efficiency |
|---|---|---|---|---|---|---|---|---|---|
| | t DM/ha | t DM/ha | % of ME | kg/ha | kg/ha | kg/ha | kg/ha | hd/FTE | kg MS/FTE |
| SA0005 | 15.3 | 0.0 | 81 | 342.7 | 20.9 | 92.2 | 129.4 | 149 | 69,036 |
| SA0006 | 4.1 | 0.7 | 30 | 85.4 | 0.1 | 5.9 | 6.8 | 95 | 59,501 |
| SA0007 | 0.0 | 0.0 | 67 | 42.8 | 13.9 | 0.0 | 1.3 | 58 | 46,354 |
| SA0008 | 9.3 | 1.4 | 72 | 26.4 | 6.2 | 0.0 | 6.0 | 108 | 61,354 |
| SA0010 | 5.1 | 1.5 | 63 | 133.1 | 7.6 | 36.5 | 18.5 | 101 | 57,294 |
| SA0013 | 7.2 | 3.1 | 79 | 76.0 | 29.9 | 44.4 | 43.1 | 69 | 34,934 |
| SA0014 | 7.9 | 0.8 | 54 | 82.1 | 21.2 | 82.4 | 26.7 | 90 | 49,260 |
| SA0016 | 0.0 | 0.7 | 40 | 44.1 | 4.6 | 7.5 | 3.1 | 69 | 48,386 |
| SA0021 | 0.0 | 0.0 | 69 | 45.3 | 18.1 | 16.8 | 0.7 | 53 | 36,881 |
| SA0024 | 7.5 | 3.4 | 73 | 70.2 | 15.0 | 16.7 | 30.9 | 100 | 59,657 |
| SA0025 | 0.9 | 0.0 | 43 | 1.2 | 2.2 | 42.1 | 0.4 | 107 | 62,343 |
| SA0026 | 11.3 | 0.7 | 75 | 120.4 | 21.0 | 0.0 | 1.7 | 139 | 81,853 |
| SA0027 | 2.6 | 2.3 | 62 | 41.4 | 5.4 | 27.3 | 6.7 | 70 | 38,808 |
| SA0028 | 3.3 | 0.3 | 31 | 95.9 | 3.5 | 10.0 | 29.5 | 99 | 63,295 |
| SA0029 | 2.7 | 2.1 | 52 | 70.0 | 0.0 | 0.0 | 0.0 | 105 | 58,760 |
| SA0030 | 5.5 | 0.4 | 55 | 60.0 | 14.3 | 39.9 | 28.9 | 85 | 44,724 |
| SA0031 | 3.3 | 1.3 | 60 | 59.3 | 14.3 | 18.5 | 17.1 | 80 | 39,494 |
| SA0032 | 3.1 | 0.0 | 74 | 14.3 | 7.8 | 0.0 | 4.6 | 83 | 42,391 |
| SA0033 | 6.7 | 0.2 | 61 | 34.5 | 22.7 | 10.7 | 13.7 | 91 | 51,287 |
| SA0034 | 11.2 | 0.0 | 79 | 353.4 | 20.2 | 73.9 | 129.0 | 136 | 52,825 |
| **Average** | **5.3** | **0.9** | **61** | **89.9** | **12.4** | **26.2** | **24.9** | **94** | **52,922** |
| **Top 25*** | **7.2** | **1.3** | **64** | **122.0** | **15.8** | **36.7** | **40.1** | **104** | **54,358** |

*on milking area

**Table A3** Purchased feed

| Farm number | Purchased feed per milker | Concentrate price | Silage price | Hay price | Other feed price | Average purchased feed price | of total energy imported |
|---|---|---|---|---|---|---|---|
| | t DM/hd | $/t DM | $/t DM | $/t DM | $/t DM | $/t DM | % of ME |
| SA0005 | 0.96 | $467 | $- | $224 | $- | $416 | 19 |
| SA0006 | 5.87 | $495 | $- | $360 | $231 | $407 | 70 |
| SA0007 | 3.72 | $680 | $- | $400 | $185 | $269 | 33 |
| SA0008 | 1.84 | $389 | $- | $- | $- | $389 | 28 |
| SA0010 | 2.63 | $455 | $333 | $319 | $831 | $388 | 37 |
| SA0013 | 1.13 | $472 | $- | $- | $- | $472 | 21 |
| SA0014 | 2.65 | $471 | $230 | $322 | $- | $414 | 46 |
| SA0016 | 5.79 | $457 | $- | $402 | $262 | $392 | 60 |
| SA0021 | 2.78 | $442 | $- | $- | $- | $442 | 31 |
| SA0024 | 1.79 | $480 | $- | $- | $- | $480 | 27 |
| SA0025 | 3.51 | $489 | $- | $383 | $- | $468 | 57 |
| SA0026 | 1.39 | $433 | $533 | $181 | $- | $338 | 25 |
| SA0027 | 2.62 | $486 | $- | $300 | $139 | $384 | 38 |
| SA0028 | 5.88 | $489 | $- | $358 | $272 | $395 | 69 |
| SA0029 | 3.68 | $539 | $- | $389 | $- | $483 | 48 |
| SA0030 | 2.92 | $542 | $170 | $330 | $- | $449 | 45 |
| SA0031 | 2.86 | $566 | $- | $417 | $165 | $511 | 40 |
| SA0032 | 1.95 | $433 | $471 | $128 | $- | $408 | 26 |
| SA0033 | 1.92 | $433 | $304 | $368 | $200 | $380 | 39 |
| SA0034 | 0.92 | $481 | $- | $- | $- | $481 | 21 |
| **Average** | **2.84** | **$485** | **$340** | **$325** | **$286** | **$418** | **39** |
| **Top 25*** | **2.19** | **$481** | **$267** | **$359** | **$200** | **$448** | **36** |

**Table A4** Variable costs

| Farm number | AI and herd test | Animal health | Calf rearing | Shed power | Dairy supplies | Total herd and shed costs | Fertiliser | Irrigation | Hay and silage making |
|---|---|---|---|---|---|---|---|---|---|
| | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS |
| SA0005 | 0.08 | 0.34 | - | 0.18 | 0.04 | 0.63 | 0.57 | - | - |
| SA0006 | 0.13 | 0.12 | 0.21 | 0.17 | 0.12 | 0.74 | 0.13 | 0.07 | 0.07 |
| SA0007 | 0.15 | 0.10 | - | 0.18 | 0.12 | 0.55 | 0.31 | 0.56 | 0.56 |
| SA0008 | 0.14 | 0.16 | 0.01 | 0.10 | 0.08 | 0.49 | 0.22 | 0.05 | 0.05 |
| SA0010 | 0.09 | 0.21 | - | 0.09 | 0.17 | 0.56 | 0.53 | 0.03 | 0.03 |
| SA0013 | 0.07 | 0.15 | - | 0.12 | 0.07 | 0.41 | 0.57 | 0.27 | 0.27 |
| SA0014 | 0.21 | 0.13 | 0.01 | 0.12 | 0.25 | 0.73 | 0.37 | 0.09 | 0.09 |
| SA0016 | 0.16 | 0.17 | 0.03 | 0.07 | 0.06 | 0.49 | 0.16 | 0.16 | 0.16 |
| SA0021 | 0.10 | 0.12 | 0.03 | 0.26 | 0.23 | 0.74 | 0.66 | 0.15 | 0.15 |
| SA0024 | 0.16 | 0.19 | - | 0.17 | 0.09 | 0.62 | 0.10 | 0.28 | 0.28 |
| SA0025 | 0.03 | 0.07 | - | 0.08 | 0.03 | 0.21 | 0.61 | 0.07 | 0.07 |
| SA0026 | 0.14 | 0.09 | 0.06 | 0.16 | 0.06 | 0.50 | 0.31 | 0.27 | 0.27 |
| SA0027 | 0.10 | 0.04 | 0.01 | 0.15 | 0.07 | 0.38 | 0.30 | 0.07 | 0.07 |
| SA0028 | 0.09 | 0.20 | 0.11 | 0.16 | 0.17 | 0.72 | 0.21 | 0.22 | 0.22 |
| SA0029 | 0.08 | 0.06 | - | 0.12 | 0.07 | 0.32 | 0.18 | 0.03 | 0.03 |
| SA0030 | 0.18 | 0.10 | 0.01 | 0.13 | 0.23 | 0.65 | 0.56 | 0.08 | 0.08 |
| SA0031 | 0.10 | 0.12 | 0.04 | 0.20 | 0.09 | 0.56 | 0.27 | 0.05 | 0.05 |
| SA0032 | 0.08 | 0.04 | - | 0.08 | 0.03 | 0.22 | 0.13 | 0.16 | 0.16 |
| SA0033 | 0.09 | 0.09 | - | 0.02 | 0.02 | 0.23 | 0.33 | 0.02 | 0.02 |
| SA0034 | 0.11 | 0.40 | - | 0.10 | 0.06 | 0.67 | 0.81 | - | - |
| **Average** | **0.11** | **0.15** | **0.03** | **0.13** | **0.10** | **0.52** | **0.37** | **0.13** | **0.13** |
| **Top 25*** | **0.13** | **0.18** | **0.00** | **0.11** | **0.10** | **0.51** | **0.36** | **0.08** | **0.08** |

| Farm number | Fuel and oil | Pasture improvement/ cropping | Other feed costs | Fodder purchases | Grain/ concentrates/ other | Agistment costs | Feed and water inventory change | Total feed costs | Total variable costs |
|---|---|---|---|---|---|---|---|---|---|
| | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS |
| SA0005 | 0.03 | 0.04 | - | 0.10 | 0.77 | 0.50 | - | 2.77 | 3.40 |
| SA0006 | 0.10 | 0.07 | - | 1.77 | 2.17 | - | (0.04) | 4.27 | 5.01 |
| SA0007 | 0.39 | 0.17 | 0.20 | 0.20 | 1.00 | - | 0.63 | 3.78 | 4.34 |
| SA0008 | 0.15 | 0.20 | - | - | 1.33 | - | 0.60 | 2.56 | 3.05 |
| SA0010 | 0.09 | 0.20 | - | 0.99 | 1.29 | - | (0.08) | 3.05 | 3.60 |
| SA0013 | 0.06 | 0.13 | - | - | 1.20 | - | (0.26) | 2.54 | 2.95 |
| SA0014 | 0.05 | 0.12 | - | 0.39 | 1.77 | 0.27 | 0.12 | 3.44 | 4.18 |
| SA0016 | 0.13 | 0.18 | 0.03 | 1.20 | 2.32 | - | 0.01 | 4.22 | 4.71 |
| SA0021 | 0.32 | 0.47 | - | - | 1.78 | - | (0.09) | 3.69 | 4.42 |
| SA0024 | 0.04 | 0.03 | 0.30 | - | 1.46 | - | (0.41) | 2.03 | 2.65 |
| SA0025 | 0.15 | 0.09 | 0.01 | 0.47 | 2.55 | 0.05 | 0.30 | 4.31 | 4.52 |
| SA0026 | 0.21 | 0.20 | - | 0.45 | 1.09 | - | (0.62) | 2.27 | 2.78 |
| SA0027 | 0.20 | 0.05 | - | 0.14 | 1.66 | - | 0.08 | 2.50 | 2.88 |
| SA0028 | 0.15 | 0.17 | - | 1.20 | 2.68 | - | (0.08) | 4.54 | 5.26 |
| SA0029 | 0.07 | 0.12 | - | 1.02 | 2.37 | - | (0.03) | 3.76 | 4.08 |
| SA0030 | 0.05 | 0.30 | - | 0.72 | 2.06 | 0.26 | (0.05) | 4.14 | 4.80 |
| SA0031 | 0.09 | 0.19 | - | 0.64 | 2.47 | - | - | 3.71 | 4.27 |
| SA0032 | 0.31 | 0.23 | 0.01 | 0.44 | 1.26 | - | (0.09) | 2.66 | 2.89 |
| SA0033 | 0.15 | 0.44 | - | 0.84 | 1.25 | - | (0.10) | 3.43 | 3.66 |
| SA0034 | 0.09 | 0.14 | - | - | 0.87 | 0.15 | 0.12 | 2.42 | 3.10 |
| **Average** | **0.14** | **0.18** | **0.03** | **0.53** | **1.67** | **0.06** | **0.00** | **3.30** | **3.83** |
| **Top 25*** | **0.08** | **0.17** | **0.06** | **0.45** | **1.55** | **0.08** | **(0.06)** | **3.02** | **3.53** |

**Table A5** Overhead costs

| Farm number | Rates | Farm insurance | Motor vehicle expenses | Repairs and maintenance | Other overheads | Employed labour | Total cash overheads | Depreciation | Imputed owner/ operator and family labour | Total overheads |
|---|---|---|---|---|---|---|---|---|---|---|
| | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS | $ kg/MS |
| SA0005 | 0.04 | 0.08 | 0.09 | 0.27 | 0.12 | 0.98 | 1.58 | 0.36 | - | 1.94 |
| SA0006 | 0.03 | 0.06 | 0.00 | 0.06 | 0.14 | 0.59 | 0.89 | 0.24 | 0.47 | 1.60 |
| SA0007 | 0.08 | 0.20 | 0.01 | 0.72 | 0.15 | 0.89 | 2.04 | 0.49 | 0.89 | 3.42 |
| SA0008 | 0.13 | 0.11 | 0.02 | 0.31 | 0.13 | 0.26 | 0.96 | 0.66 | 0.97 | 2.59 |
| SA0010 | 0.08 | 0.06 | 0.01 | 0.22 | 0.08 | 0.75 | 1.20 | 0.28 | 0.61 | 2.09 |
| SA0013 | 0.05 | 0.08 | 0.03 | 0.34 | 0.20 | 0.53 | 1.23 | 0.30 | 1.57 | 3.10 |
| SA0014 | 0.04 | 0.04 | 0.01 | 0.17 | 0.16 | 1.23 | 1.65 | 0.15 | 0.33 | 2.13 |
| SA0016 | 0.07 | 0.12 | 0.06 | 0.07 | 0.08 | 1.07 | 1.47 | 0.48 | 0.32 | 2.28 |
| SA0021 | 0.04 | 0.13 | 0.10 | 0.39 | 0.28 | 1.48 | 2.42 | 0.53 | 0.33 | 3.27 |
| SA0024 | 0.05 | 0.09 | 0.04 | 0.21 | 0.16 | 0.23 | 0.77 | 0.42 | 0.98 | 2.17 |
| SA0025 | 0.19 | 0.04 | 0.01 | 0.32 | 0.08 | 1.16 | 1.78 | 0.13 | 0.48 | 2.39 |
| SA0026 | 0.06 | 0.02 | - | 0.28 | 0.23 | 0.87 | 1.47 | 0.39 | - | 1.86 |
| SA0027 | 0.14 | 0.20 | 0.05 | 0.15 | 0.04 | 1.63 | 2.20 | 0.51 | 0.23 | 2.95 |
| SA0028 | 0.03 | 0.06 | 0.01 | 0.12 | 0.09 | 1.07 | 1.38 | 0.24 | - | 1.63 |
| SA0029 | 0.06 | 0.05 | 0.01 | 0.10 | 0.10 | 0.95 | 1.26 | 0.25 | 0.34 | 1.85 |
| SA0030 | - | 0.06 | 0.03 | 0.37 | 0.10 | 0.89 | 1.45 | 0.12 | 0.82 | 2.38 |
| SA0031 | 0.05 | 0.03 | 0.01 | 0.31 | 0.25 | 1.24 | 1.89 | 0.18 | 0.47 | 2.54 |
| SA0032 | 0.10 | 0.12 | 0.02 | 0.75 | 0.12 | 0.51 | 1.62 | 0.73 | 1.20 | 3.55 |
| SA0033 | 0.06 | 0.07 | 0.02 | 0.35 | 0.05 | 0.37 | 0.92 | 0.28 | 0.99 | 2.19 |
| SA0034 | 0.03 | 0.09 | 0.10 | 0.22 | 0.14 | 1.15 | 1.73 | 0.20 | 0.07 | 2.01 |
| **Average** | **0.07** | **0.09** | **0.03** | **0.29** | **0.14** | **0.89** | **1.50** | **0.35** | **0.55** | **2.40** |
| **Top 25*** | **0.05** | **0.07** | **0.03** | **0.21** | **0.12** | **0.79** | **1.27** | **0.26** | **0.54** | **2.07** |

**Table A6** Variable costs – percentage

| Farm number | AI and herd test | Animal health | Calf rearing | Shed power | Dairy supplies | Total herd & shed costs | Fertiliser | Irrigation | Hay and silage making |
|---|---|---|---|---|---|---|---|---|---|
| | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs |
| SA0005 | 1.4 | 6.4 | 0.0 | 3.3 | 0.7 | 11.8 | 10.6 | 0.0 | 0.0 |
| SA0006 | 1.9 | 1.8 | 3.2 | 2.5 | 1.8 | 11.2 | 2.0 | 1.0 | 1.0 |
| SA0007 | 2.0 | 1.3 | 0.0 | 2.3 | 1.5 | 7.1 | 3.9 | 7.2 | 7.2 |
| SA0008 | 2.4 | 2.9 | 0.1 | 1.8 | 1.5 | 8.7 | 3.9 | 0.8 | 0.8 |
| SA0010 | 1.5 | 3.7 | 0.0 | 1.6 | 2.9 | 9.8 | 9.3 | 0.6 | 0.6 |
| SA0013 | 1.2 | 2.4 | 0.0 | 2.0 | 1.2 | 6.7 | 9.5 | 4.5 | 4.5 |
| SA0014 | 3.3 | 2.1 | 0.2 | 2.0 | 4.0 | 11.6 | 5.9 | 1.4 | 1.4 |
| SA0016 | 2.3 | 2.5 | 0.4 | 1.0 | 0.9 | 7.1 | 2.3 | 2.3 | 2.3 |
| SA0021 | 1.3 | 1.6 | 0.4 | 3.4 | 2.9 | 9.6 | 8.6 | 2.0 | 2.0 |
| SA0024 | 3.4 | 3.9 | 0.0 | 3.5 | 2.0 | 12.8 | 2.1 | 5.8 | 5.8 |
| SA0025 | 0.4 | 1.0 | 0.0 | 1.2 | 0.4 | 3.0 | 8.8 | 1.0 | 1.0 |
| SA0026 | 3.0 | 1.9 | 1.3 | 3.5 | 1.2 | 10.9 | 6.6 | 5.8 | 5.8 |
| SA0027 | 1.8 | 0.7 | 0.3 | 2.6 | 1.3 | 6.5 | 5.1 | 1.2 | 1.2 |
| SA0028 | 1.3 | 2.9 | 1.6 | 2.3 | 2.4 | 10.4 | 3.1 | 3.1 | 3.1 |
| SA0029 | 1.3 | 1.0 | 0.0 | 2.0 | 1.1 | 5.4 | 3.1 | 0.4 | 0.4 |
| SA0030 | 2.5 | 1.4 | 0.2 | 1.8 | 3.2 | 9.1 | 7.8 | 1.2 | 1.2 |
| SA0031 | 1.5 | 1.7 | 0.6 | 3.0 | 1.4 | 8.2 | 4.0 | 0.7 | 0.7 |
| SA0032 | 1.3 | 0.6 | 0.0 | 1.2 | 0.5 | 3.5 | 2.0 | 2.5 | 2.5 |
| SA0033 | 1.6 | 1.6 | 0.0 | 0.4 | 0.4 | 4.0 | 5.7 | 0.3 | 0.3 |
| SA0034 | 2.2 | 7.9 | 0.0 | 1.9 | 1.2 | 13.2 | 15.8 | 0.0 | 0.0 |
| **Average** | **1.9** | **2.5** | **0.4** | **2.2** | **1.6** | **8.5** | **6.0** | **2.1** | **2.1** |
| **Top 25*** | **2.4** | **3.3** | **0.0** | **1.9** | **1.7** | **9.4** | **6.5** | **1.6** | **1.6** |

| Farm number | Fuel and oil | Pasture improvement/ cropping | Other feed costs | Fodder purchases | Grain/ concentrates/ other | Agistment costs | Feed and water inventory change | Total feed costs | Total variable costs |
|---|---|---|---|---|---|---|---|---|---|
| | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs |
| SA0005 | 0.6 | 0.8 | 0.0 | 1.8 | 14.3 | 9.4 | 0.0 | 51.8 | 63.7 |
| SA0006 | 1.5 | 1.1 | 0.0 | 26.8 | 32.9 | 0.0 | -0.6 | 64.7 | 75.8 |
| SA0007 | 5.1 | 2.2 | 2.5 | 2.6 | 12.8 | 0.0 | 8.2 | 48.8 | 55.9 |
| SA0008 | 2.6 | 3.6 | 0.0 | 0.0 | 23.5 | 0.0 | 10.6 | 45.3 | 54.0 |
| SA0010 | 1.5 | 3.5 | 0.0 | 17.3 | 22.7 | 0.0 | -1.4 | 53.5 | 63.3 |
| SA0013 | 1.0 | 2.2 | 0.0 | 0.0 | 19.8 | 0.0 | -4.2 | 42.0 | 48.7 |
| SA0014 | 0.9 | 1.9 | 0.0 | 6.2 | 28.1 | 4.3 | 2.0 | 54.6 | 66.2 |
| SA0016 | 1.9 | 2.6 | 0.5 | 17.2 | 33.2 | 0.0 | 0.1 | 60.3 | 67.4 |
| SA0021 | 4.2 | 6.2 | 0.0 | 0.0 | 23.1 | 0.0 | -1.1 | 47.9 | 57.5 |
| SA0024 | 0.9 | 0.7 | 6.2 | 0.0 | 30.3 | 0.0 | -8.5 | 42.2 | 55.0 |
| SA0025 | 2.2 | 1.3 | 0.2 | 6.8 | 36.9 | 0.7 | 4.3 | 62.4 | 65.4 |
| SA0026 | 4.6 | 4.3 | 0.0 | 9.7 | 23.5 | 0.0 | -13.4 | 49.0 | 59.9 |
| SA0027 | 3.4 | 0.9 | 0.0 | 2.4 | 28.4 | 0.0 | 1.4 | 42.9 | 49.4 |
| SA0028 | 2.1 | 2.4 | 0.0 | 17.5 | 38.9 | 0.0 | -1.1 | 66.0 | 76.4 |
| SA0029 | 1.2 | 2.1 | 0.0 | 17.2 | 40.0 | 0.0 | -0.4 | 63.5 | 68.9 |
| SA0030 | 0.8 | 4.1 | 0.0 | 10.0 | 28.7 | 3.6 | -0.7 | 57.7 | 66.8 |
| SA0031 | 1.3 | 2.8 | 0.0 | 9.4 | 36.3 | 0.0 | 0.0 | 54.5 | 62.7 |
| SA0032 | 4.9 | 3.5 | 0.1 | 6.8 | 19.6 | 0.0 | -1.5 | 41.4 | 44.9 |
| SA0033 | 2.6 | 7.5 | 0.0 | 14.4 | 21.4 | 0.0 | -1.7 | 58.6 | 62.6 |
| SA0034 | 1.7 | 2.7 | 0.0 | 0.0 | 17.1 | 2.9 | 2.3 | 47.5 | 60.7 |
| **Average** | **2.2** | **2.8** | **0.5** | **8.3** | **26.6** | **1.0** | **-0.3** | **52.7** | **61.3** |
| **Top 25*** | **1.4** | **3.0** | **1.2** | **7.6** | **27.4** | **1.4** | **-1.3** | **53.3** | **62.7** |

**Table A7** Overhead costs – percentage

| Farm number | Rates | Farm insurance | Motor vehicle expenses | Repairs and maintenance | Other | Employed labour | Total cash | Depreciation | Imputed owner/ operator and family labour | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs | % of costs |
| SA0005 | 2.2 | 18.3 | 29.6 | 6.8 | 0.0 | 36.3 | 25.9 | 4.7 | 16.6 | 47.2 |
| SA0006 | 2.2 | 8.9 | 13.5 | 3.6 | 7.0 | 24.2 | 34.3 | 2.4 | 11.3 | 48.1 |
| SA0007 | 1.9 | 11.4 | 26.3 | 6.3 | 11.5 | 44.1 | 27.7 | 3.7 | 10.4 | 41.8 |
| SA0008 | 2.3 | 4.6 | 17.1 | 11.7 | 17.2 | 46.0 | 18.6 | 3.4 | 14.4 | 36.5 |
| SA0010 | 1.5 | 13.1 | 21.1 | 4.9 | 10.7 | 36.7 | 30.6 | 3.1 | 0.0 | 33.7 |
| SA0013 | 3.2 | 8.8 | 20.4 | 5.0 | 25.9 | 51.3 | 19.0 | 6.3 | 17.0 | 42.2 |
| SA0014 | 2.5 | 19.6 | 26.1 | 2.4 | 5.3 | 33.8 | 18.1 | 8.1 | 16.1 | 42.3 |
| SA0016 | 1.2 | 15.4 | 21.1 | 6.9 | 4.6 | 32.6 | 22.8 | 3.5 | 26.4 | 52.6 |
| SA0021 | 3.7 | 19.3 | 31.4 | 6.8 | 4.3 | 42.5 | 27.1 | 3.2 | 9.9 | 40.2 |
| SA0024 | 3.3 | 4.7 | 16.0 | 8.7 | 20.3 | 45.0 | 26.0 | 7.4 | 9.5 | 42.9 |
| SA0025 | 1.1 | 16.7 | 25.8 | 1.8 | 7.0 | 34.6 | 22.2 | 3.6 | 9.5 | 35.4 |
| SA0026 | 5.0 | 18.8 | 31.6 | 8.5 | 0.0 | 40.1 | 16.4 | 3.4 | 11.5 | 31.3 |
| SA0027 | 0.7 | 28.0 | 37.8 | 8.7 | 4.0 | 50.6 | 28.6 | 5.9 | 16.7 | 51.2 |
| SA0028 | 1.3 | 15.6 | 20.1 | 3.5 | 0.0 | 23.6 | 16.5 | 4.6 | 12.2 | 33.2 |
| SA0029 | 1.6 | 16.0 | 21.3 | 4.2 | 5.7 | 31.1 | 34.4 | 2.5 | 3.0 | 40.0 |
| SA0030 | 1.5 | 12.4 | 20.2 | 1.6 | 11.4 | 33.2 | 29.4 | 5.0 | 2.4 | 36.7 |
| SA0031 | 3.7 | 18.3 | 27.7 | 2.6 | 7.0 | 37.3 | 22.0 | 7.4 | 12.8 | 42.2 |
| SA0032 | 1.8 | 7.9 | 25.1 | 11.4 | 1.8 | 7.9 | 25.1 | 11.4 | 18.6 | 55.1 |
| SA0033 | 0.8 | 6.3 | 15.7 | 4.8 | 0.8 | 6.3 | 15.7 | 4.8 | 16.9 | 37.4 |
| SA0034 | 2.8 | 22.5 | 33.9 | 4.0 | 2.8 | 22.5 | 33.9 | 4.0 | 1.4 | 39.3 |
| **Average** | **1.1** | **1.4** | **0.5** | **4.6** | **2.2** | **14.3** | **24.1** | **5.7** | **8.9** | **38.7** |
| **Top 25*** | **0.8** | **1.3** | **0.6** | **3.8** | **2.2** | **13.8** | **22.6** | **4.8** | **9.9** | **37.3** |

**Table A8** Capital structure

| Farm assets | | | | |
|---|---|---|---|---|
| | Land value | Land value | Permanent water value | Permanent water value |
| | $/ha | $/cow | $/ha | $/cow |
| Average | 11,010 | 10,982 | 4,450 | 3,409 |

| Other farm assets (per usable hectare) | | | | |
|---|---|---|---|---|
| Plant and equipment | Livestock | Hay and grain | Other assets | Total assets |
| $/ha | $/ha | $/ha | $/ha | $/ha |
| 1,094 | 2,543 | 130 | 173 | 16,870 |

| Liabilities | |
|---|---|
| Liabilities per usable hectare | Liabilities per milking cow |
| $/ha | $/cow |
| **4,408** | **5,058** |

| Equity | |
|---|---|
| Equity per usable hectare | Average equity |
| $/ha | % |
| **12,902** | **72** |

**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 ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) |
| 2012–13 | 5.83 | 6.51 | 6.40 | 7.14 | 0.32 | 0.36 | 0.28 | 0.31 | 2.96 | 3.30 | 3.56 | 3.97 |
| 2013–14 | 6.83 | 7.40 | 7.74 | 8.39 | 0.30 | 0.33 | 0.26 | 0.28 | 3.04 | 3.29 | 3.61 | 3.91 |
| 2014–15 | 6.35 | 6.78 | 7.03 | 7.51 | 0.29 | 0.31 | 0.22 | 0.23 | 3.28 | 3.50 | 3.79 | 4.05 |
| 2015–16 | 6.15 | 6.50 | 7.10 | 7.51 | 0.34 | 0.36 | 0.24 | 0.25 | 3.13 | 3.31 | 3.71 | 3.92 |
| 2016–17 | 5.78 | 6.00 | 6.75 | 7.00 | 0.40 | 0.41 | 0.27 | 0.28 | 2.49 | 2.58 | 3.16 | 3.28 |
| 2017–18 | 6.24 | 6.34 | 7.08 | 7.19 | 0.31 | 0.31 | 0.29 | 0.29 | 2.80 | 2.84 | 3.40 | 3.45 |
| 2018–19 | 6.46 | 6.46 | 7.32 | 7.32 | 0.29 | 0.29 | 0.24 | 0.24 | 3.30 | 3.30 | 3.83 | 3.83 |
| **Average** | | **6.57** | | **7.44** | | **0.34** | | **0.27** | | **3.16** | | **3.77** |

| | 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 ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Nominal ($ kg/MS) | Real ($ kg/MS) | Return on total assets % | Return on equity % |
| 2012–13 | 1.55 | 1.73 | 1.60 | 1.79 | 3.15 | 3.52 | (0.31) | (0.35) | 0.53 | 0.59 | (0.84) | (0.94) | -0.6 | -4.9 |
| 2013–14 | 1.54 | 1.67 | 1.31 | 1.42 | 2.85 | 3.09 | 1.27 | 1.38 | 0.52 | 0.56 | 0.75 | 0.81 | 6.2 | 8.5 |
| 2014–15 | 1.50 | 1.60 | 1.03 | 1.10 | 2.52 | 2.69 | 0.72 | 0.77 | 0.55 | 0.59 | 0.16 | 0.17 | 3.9 | 3.6 |
| 2015–16 | 1.60 | 1.69 | 1.00 | 1.06 | 2.60 | 2.75 | 0.79 | 0.84 | 0.57 | 0.60 | 0.22 | 0.23 | 3.1 | -1.5 |
| 2016–17 | 1.68 | 1.74 | 1.04 | 1.08 | 2.71 | 2.81 | 0.88 | 0.91 | 0.47 | 0.49 | 0.40 | 0.41 | 3.1 | 2.1 |
| 2017–18 | 1.61 | 1.64 | 0.89 | 0.90 | 2.50 | 2.54 | 1.18 | 1.20 | 0.54 | 0.55 | 0.65 | 0.66 | 4.3 | 4.1 |
| 2018–19 | 1.50 | 1.50 | 0.90 | 0.90 | 2.40 | 2.40 | 1.09 | 1.09 | 0.49 | 0.49 | 0.60 | 0.60 | 3.5 | 2.1 |
| Average | | **1.65** | | **1.18** | | **2.83** | | **0.83** | | **0.55** | | **0.28** | **3.4** | **2.0** |

Note: 'Real' dollar values are the nominal values converted to 2017–18 dollar equivalents by the consumer price index (CPI) to allow for inflation.
The gross income in 2017–18 did not include feed inventory changes and changes to the value of carry-over water. These were included in feed costs.

**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 | 339 |
| 2013–14 | 526 | 164 | 0.60 | 453 | 1.4 | 469 | 660 | 7.9 | 0.9 | 57 | 343 | 372 |
| 2014–15 | 529 | 159 | 0.70 | 362 | 1.3 | 581 | 738 | -11.5 | 4.1 | 44 | 364 | 389 |
| 2015–16 | 447 | 131 | 0.70 | 355 | 1.4 | 586 | 751 | 6.4 | 1.4 | 48 | 366 | 387 |
| 2016–17 | 565 | 200 | 0.60 | 394 | 1.3 | 539 | 630 | 5.7 | 1.9 | 64 | 304 | 315 |
| 2017–18 | 527 | 205 | 0.60 | 399 | 1.1 | 569 | 628 | 4.4 | 1.3 | 54 | 340 | 345 |
| 2018–19 | 573 | 226 | 0.63 | 414 | 1.1 | 574 | 600 | 5.3 | 0.9 | 61 | 485 | 485 |
| **Average** | **501** | **175** | **0.65** | **385** | **1.3** | **549** | **661** | **3.3** | **1.7** | **54** | | **376** |

*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 B** 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. |
| 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;<br>• Cash cost of production; variable costs plus cash overhead costs<br>• Cost of production excluding inventory changes; variable costs plus cash and non-cash overhead costs<br>• 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 equal 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 farm 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 | 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, 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 pasture | Calculated using the energetics method. Grazed pasture is calculated as the gap between total metabolisable energy required by livestock over the year and amount of metabolisable energy available from other sources (hay, silage, grain and concentrates).<br>Total metabolisable energy required by livestock is a factor of age, weight, growth rate, pregnancy and lactation requirements, distance to shed, terrain and number of animals.<br>Total metabolisable 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 net of levies and charges, livestock trading profit and other farm income, exclusive of GST. |
| 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 $30.33 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 solids sold. 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 | 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 rents 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 non-cash 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. |
| 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 | Home grown feed consumed or harvested per 100mm 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 changes). |
| Water inventory change | An estimate of the irrigation water on hand at the start and end of the financial year to capture water used in the production of pasture and crops. |

## 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 |
| Top 25 | The state average for the top 25 of farms ranked by return on total assets. |

## 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 | 1,200 |
| Calves | | 600 |
| Mature bulls | 2,400 | 2,400 |

## Imputed owner/operator and family labour

In 2018–19 the imputed owner/operator and family labour rate was $30.33/hr based on a full time equivalent (FTE) working 48 hours/week for 50 weeks of the year. The imputed labour rate was increased from $67,200/FTE in 2016–17 to $72,800/FTE in 2017–18.

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