Dairy Australia
Your Levy at Work

Dairy Farm Monitor Project

South Australia

Annual report 2016–17

Acknowledgements

The cooperation, patience and goodwill of the farmers who willingly supplied their farm information is gratefully acknowledged.

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The data in this report and the report itself have been produced by John Christensen and Lachie Hood, from Rural Business Support, in conjunction with Natalie Nelson from the Victorian Department of Economic Development, Jobs, Transport and Resources.

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Contents

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 2016–17 year. Data are 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 (25%) 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 2015–16 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 2015–16 are in the 2016–17 report. This year, there are three new participating farms. This is important to bear in mind when comparing data sets between years.

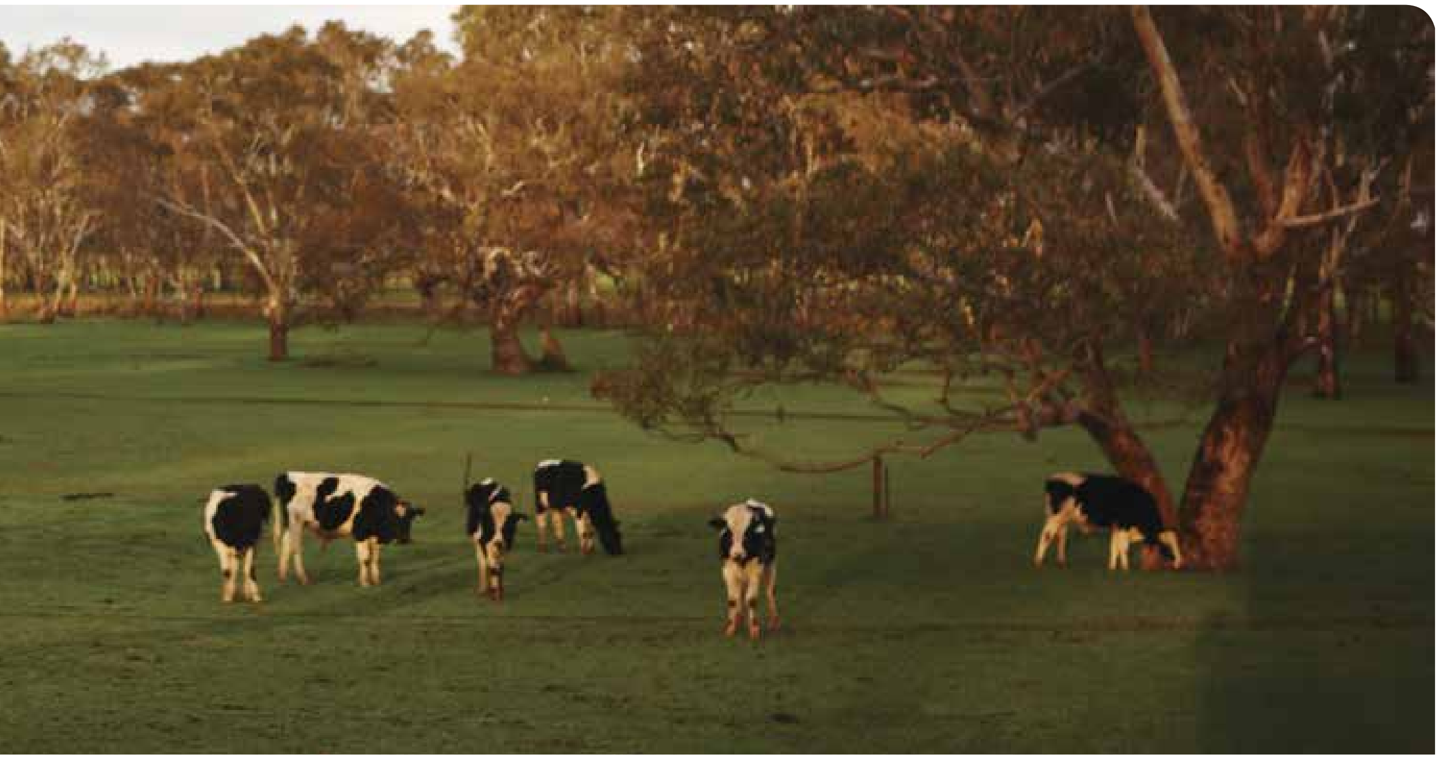
Please note that text explaining terms may be repeated within the different chapters.

What's new in 2016–17?

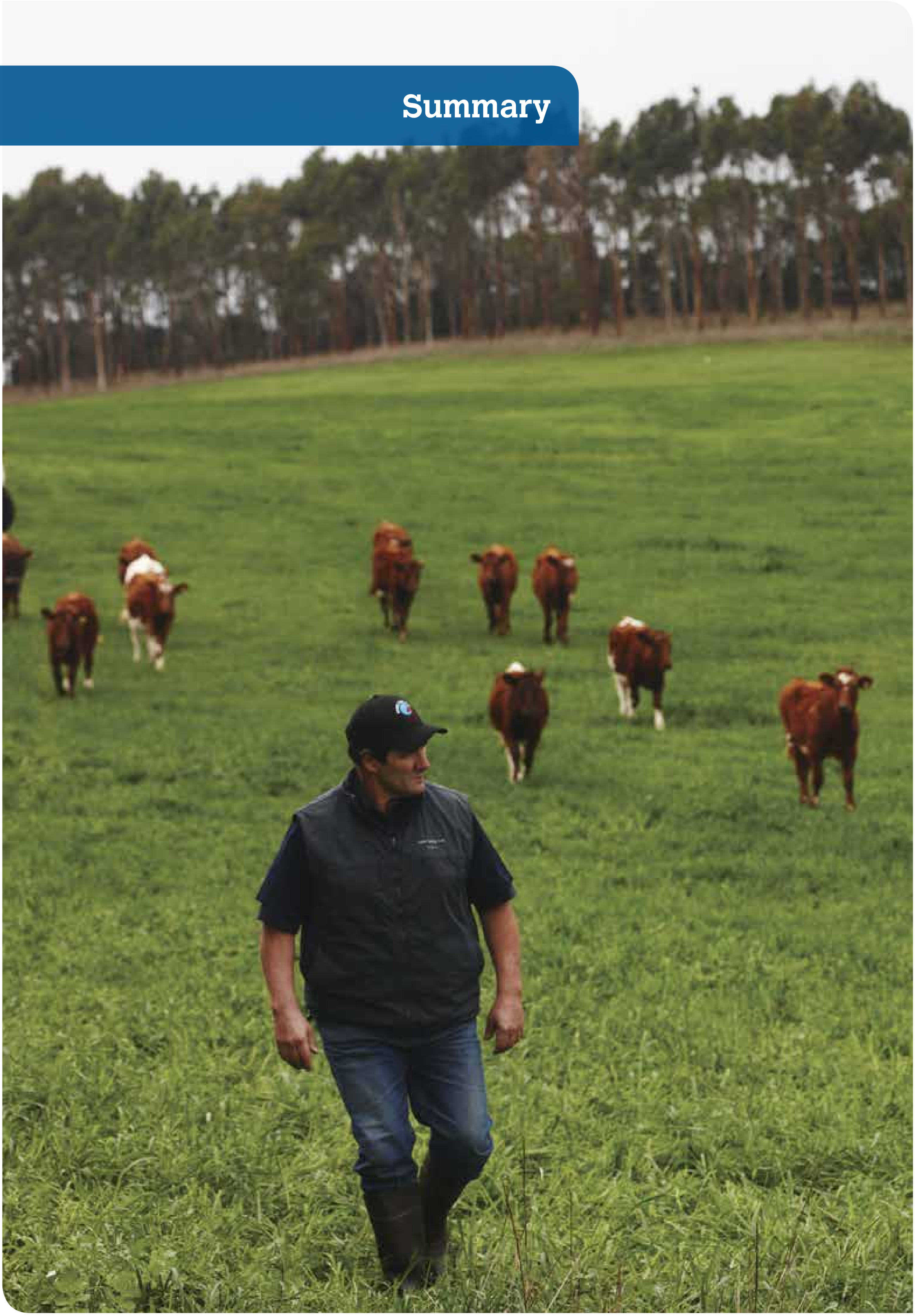
The Dairy Farm Monitor Report for 2016–17 includes very few changes since last year's report.

- All Dairy Farm Monitor Project data from Victoria, South Australia, New South Wales, Western Australia and Tasmania now provide the baseline data for comparative purposes in DairyBase, Dairy Australia's national dairy industry database for farm level data.
- The Pasture Calculator used in the production of this report this year is not the DEDJTR Pasture Consumption Calculator. In 2016–17, pasture consumption figures have been calculated within DairyBase, meaning results may not be directly comparable to previous years' reports.
- In 2016–17 gross farm income does not include feed inventory change, as it has in previous years. Feed inventory change and, if applicable, change in the value of carry-over water are included as feed costs.
- Performance measures for the top 25% South Australian participants will not be reported in 2016–17. The small sample size is not statistically adequate to represent the top 25% performers.
- Data in this report are produced used standard values, which have been outlined in Appendix B. These standard values for livestock and imputed labour have remained unchanged since last year. These standard values may vary from other organisation's standard values. Take care with directly comparing the results of multiple benchmarking studies without due diligence investigating the assumptions made in each data set.
- Australia's dairy industry greenhouse gas emissions estimator, the national greenhouse gas inventory (NGGI), was used in conjunction with the physical and financial data provided by participant farms which remains unchanged from last year but may differ to other Greenhouse Gas Emission calculator outputs.

Keep an eye on the project website for further reports and updates on the project at: agriculture.vic.gov.au/dairyfarmmonitor or dairyaustralia.com.au/dairyfarmmonitor



Summary



Summary

In 2016–17, the data from 15 participant farms in South Australia resulted in a rise in average whole farm earnings before interest and tax (EBIT) to $201,057, a 22% increase on 2015–16. Return on assets was stable at 3.1% with a net farm income of $101,358 resulting in a return on equity rising to 2.1% compared to last year's negative 1.5%.

This is the fifth 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 lower average milk price received was offset by above average seasonal conditions and reduced feed prices, resulted in higher profit performance compared to 2015–16.

Average milk income in 2016–17 was $5.78/kg MS, a 6% decrease on last year's milk income of $6.15/kg MS.

To compensate for a reduction in average milk income, participant farmers improved gross farm income with 'other income' (including livestock trading profit and other income). This rose 20% from $0.81/kg MS last year (adjusted to exclude change in feed inventory) to $0.97/kg MS this year.

This resulted in participating farmers having an average gross farm income of $6.75/kg MS this year down from $6.96/kg MS (adjusted to exclude change in feed inventory) last year.

This year all of the participating dairy farms recorded above average rainfall, and as a result irrigators used only part of their full water allocations to supplement pasture and fodder production.

The above average seasonal conditions, unlike the last two seasons, resulted in home grown pasture levels and conserved pasture levels increasing, with the average grazed feed to 7.2 t DM/ha and 1.9 t DM/ha of conserved fodder. The abundance of available pasture resulted in reduced need for supplementary feed which this year made up an average of 49% (63% in 2015–16) of total ME fed. However, concentrates fed increased from 30% in 2015–16 to 34% of total ME fed at an average price of $304/t DM, 17% lower than last year.

The average stocking rate in South Australia this year marginally fell to 1.3 cows/ha compared to 1.4 cows/ha in 2015–16.

Milk solids sold per cow and per hectare decreased from 2015–16 levels; milk solids per cow was 8% lower and 16% lower on per hectare basis.

The average farm EBIT was $201,057 or $0.88/kg MS which was higher than last year's $0.79/kg MS.

Average interest and lease costs fell 21% this year to $99,699.

This year net farm income rose to $101,358 from $38,310 last year.

Seasonal conditions resulting in above average pasture production, lower concentrate feeding levels and prices enabled participant farmers to focus on cost of production. Input costs continue to remain a concern for dairy farmers with the average South Australian participants' average cash cost of production at $6.13/kg MS ($6.31/kg MS in 2015–16).

Average overhead costs this year increased slightly (4%) to $2.71/kg MS. This was mainly due to a rise in labour costs. Employed labour cost rose from $0.80/kg in 2015–16 MS to $0.89/kg MS and imputed labour increased from $0.66/kg MS to $0.72/kg MS.

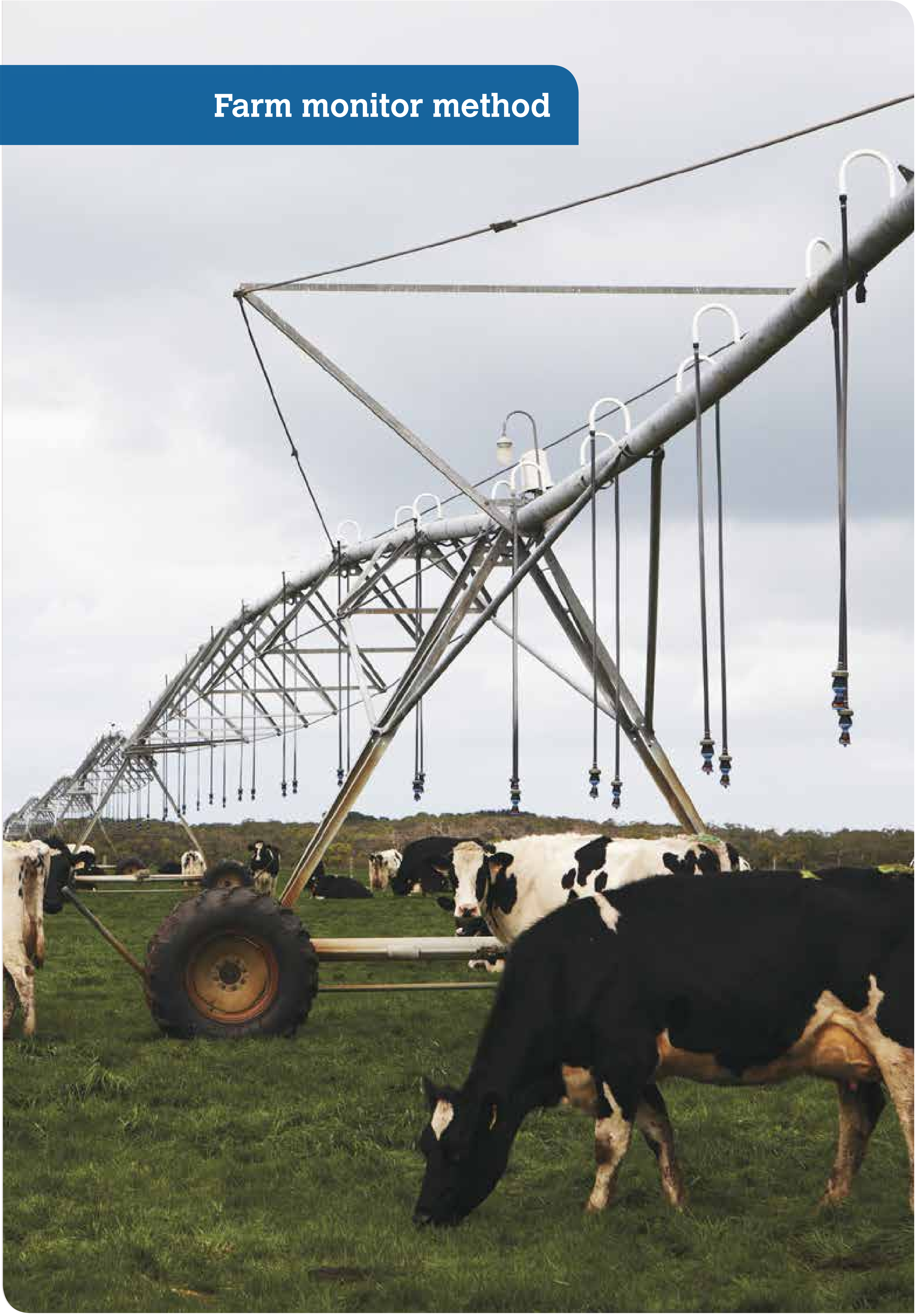
The average return on assets for the year remained stable at 3.1% while return on equity improved to 2.1% from negative 1.5% in 2015–16. This is due to a combination of improved operating conditions, a change in business operations of one farm and a change in the population sample.

Expectations for 2017–18 were positive, with 87% of producers expecting better returns, 80% expecting milk prices to increase and 73% planned to increase their production with the balance for farmers all of the previous categories expecting no change in circumstance. Majority of farmers either expected costs to increase or remain stable for the next 12 months.

Not surprisingly given the lower announced prices for the 2016–17 financial year, most dairy farmers were concerned about milk prices and effects on their cashflow and income.

Greenhouse gasses emitted by participant farms were 14.2 t CO_2-e/t MS produced with 68% being CH_4, 21% being CO_2, and 11% from N_2O emissions.

Farm monitor method



Farm monitor method

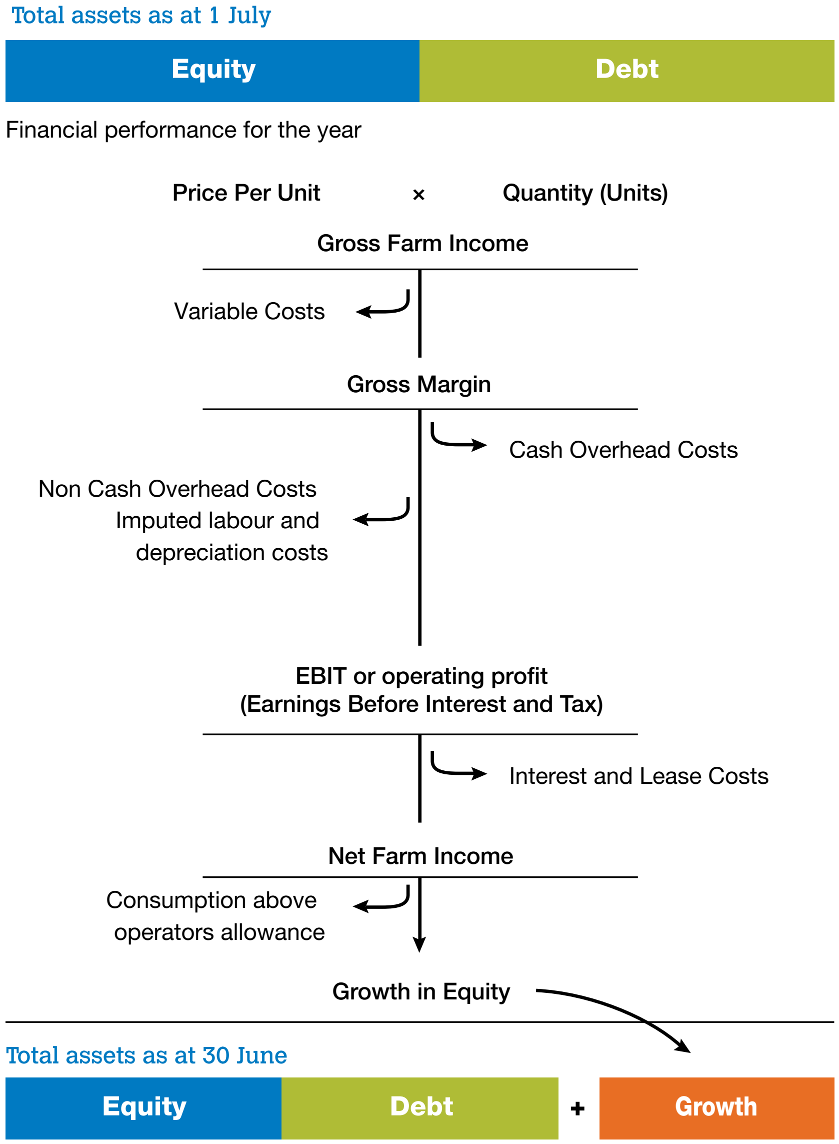
This chapter explains the method used in the Dairy Farm Monitor Project (DFMP) and defines the key terms used.

The method employed to generate the profitability and productivity data was adapted from that described in The Farming Game (Malcolm *et al*. 2005) and is consistent with previous Dairy Farm Monitor Project (DFMP) reports. Readers should be aware that not all benchmarking programs use the same method or terms for farm financial reporting. The allocation of items such as lease costs, overhead costs or imputed labour costs against the farm enterprises varies between financial benchmarking programs. Standard dollar values for items such as stock and feed on hand and imputed labour rates may also vary. For this reason, the results from different benchmarking programs should be compared with caution.

Figure 1 demonstrates how the different farm business economic terms fit together and are calculated. This has been adapted from an initial diagram developed by Bill Malcolm. The diagram shows the different profitability measures as costs are deducted from gross farm income. Growth is achieved by investing in assets which generate income. These assets can be owned with equity (one's own capital) or debt (borrowed capital). The amount of growth is dependent on the maximisation of income and minimisation of costs, or cost efficiency relative to income generation.

The performance of all participants in the project using this method is shown in Figure 2. Production and economic data are both displayed to indicate how the terms are calculated and how they in turn fit together.

Figure 1 Dairy farm monitor project method



Gross farm income

The farming business generates a gross farm income which is the sum of milk cash income (net), livestock trading profit, or other sources such as milk share dividends. The main source of income is from milk, which is calculated by multiplying price received per unit by the number of units. For example, dollars per kilogram milk solids multiplied by kilograms of milk solids sold. Subtracting certain costs from total income gives different profitability measures.

Variable costs

Variable costs are the costs specific to an enterprise, such as herd, shed and feed costs. These costs vary in relation to the size of the enterprise. Subtracting variable costs for the dairy enterprise only from gross farm income, gives the gross margin. Gross margins are a common method for comparing similar enterprises and are commonly used in broad acre cropping and livestock enterprises. Gross margins are not generally referred to in economic analysis of dairy farming businesses due to the specific infrastructure investment required to operate a dairy farm making it less desirable to switch enterprise.

Overhead costs

Overhead costs are costs not directly related to an enterprise as they are expenses incurred through the general operating of the business. The DFMP separates overheads into cash and non-cash overheads, to distinguish between different cash flows within the business. Cash overheads include rates, insurance, and repairs and maintenance. Non-cash overheads include costs that are not actual cash receipts or expenditure; for example the amount of depreciation on a piece of equipment. Imputed operators' allowance for labour and management is also a non-cash overhead that must be costed and deducted from income if a realistic estimate of costs, profit and the return on the capital of the business is to be obtained.

Earnings before interest and tax

Earnings before interest and tax (EBIT) are calculated by subtracting variable and overhead costs from gross farm income. Earnings before interest and tax is sometimes referred to as operating profit and is the return from all the capital used in the business.

Net farm income

Net farm income is EBIT minus interest and lease costs and is the reward to the farmer's own capital. Interest and lease costs are viewed as financing expenses, either for borrowed money or leased land that is being utilised.

Net farm income is then used to pay tax and what is remaining is net profit or surplus and therefore growth, which can be invested into the business to expand the equity base, either by direct reinvestment or the payment of debt.

Return on assets and return on equity

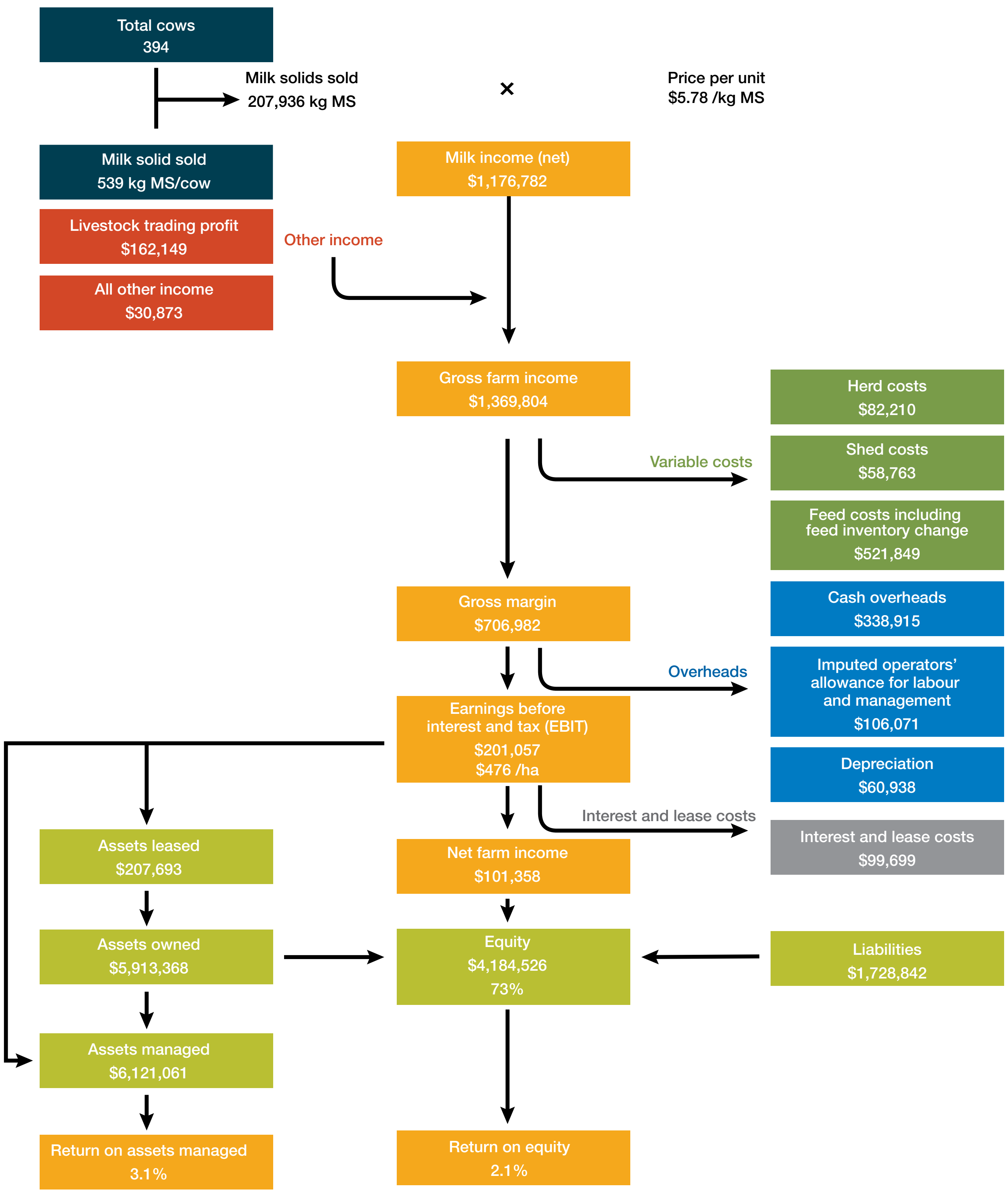
Two commonly used economic indicators of whole farm performance are return on assets (RoA) and return on equity (RoE). They measure the return to their respective capital base.

Return on assets indicates the overall earning of the total farm assets, irrespective of capital structure of the business. It is EBIT expressed as a percentage of the total assets under management in the farm business, including the value of leased assets. Return on assets is sometimes referred to as return on capital.

Earnings before interest and tax expressed as a return on total assets is the return from farming. There is also a further return to the asset from any increase in the value of the assets over the year, such as land value. If land value goes up 5% over the year, this is added to the return from farming to give total return to the investment. This return to total assets can be compared with the performance of alternative investments with similar risk in the economy. In Figure 1, total assets are visually represented by debt and equity. The debt: equity ratio or equity percent of total capital varies depending on the detail of individual farm business and the situation of the owners, including their attitude towards risk.

Return on equity measures the owner's rate of return on their own capital investment in the business. It is net farm income expressed as a percentage of total equity (one's own capital). The DFMP reports RoE without capital appreciation. The RoE is reported in Appendix Table A1.

Figure 2 Dairy farm monitor project method profit map – state average 2016–17 data[1]



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

South Australian overview

South Australian dairy industry

South Australia represents approximately 5.5%, or 487.5 million litres, of the national milk output in the Australian dairy industry, down from 516.5 million litres in 2015–16.

The State's milking herd also decreased by 6% during 2016–17 mainly as a result of dairy farmers adjusting production in response to poor opening milk prices and taking advantage of higher cattle meat prices.

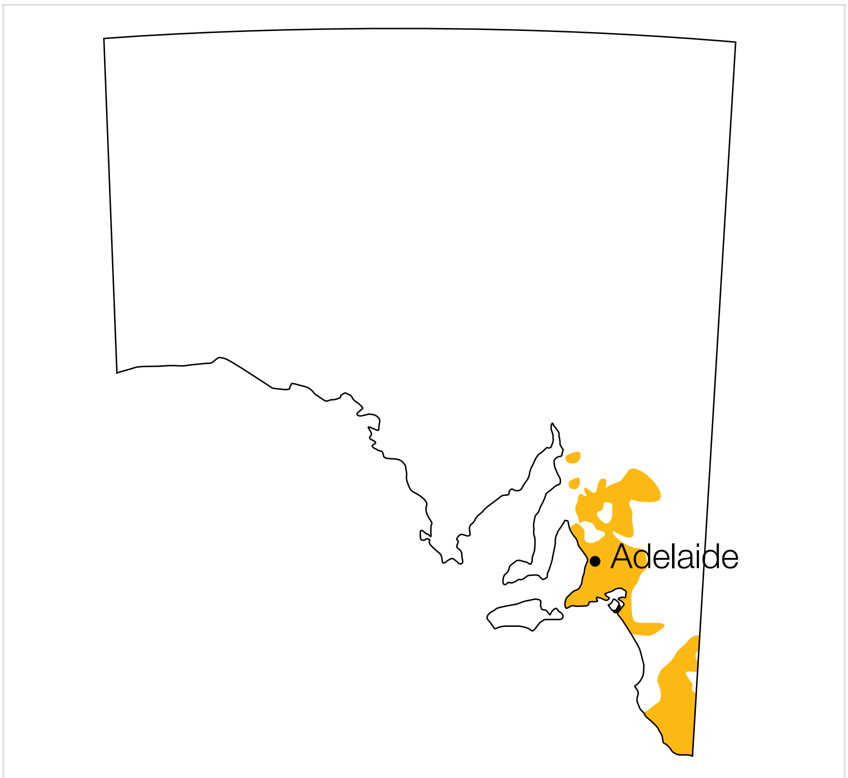
The state's industry has a long history of high productivity and quality dairy produce. South Australia's milk has a record of high component values in terms of butterfat and protein which adds to its value in terms of product shelf-life and versatility to a processor.

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

The Mid North including Barossa 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 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.

Figure 3 South Australian dairying regions



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 is regarded as an integral part of the future growth of the "South West Victorian" milk bowl. Its longer growing season (April to end of 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.

2016–17 Seasonal conditions

The 2016–17 year was characterised as one of the wettest on record, with above average spring and summer rainfall extending the growing period and reducing the need for irrigation. Dairy farmers capitalised on these positive seasonal conditions by increasing conserved fodder reserves (average 1.9 t DM/ha in 2016–17 from 1.4 t DM/ha in 2015–16) despite severe storms in late September impacting all regions. The seasonal conditions resulted in high yields and strong pasture growth, however cool and wet conditions compromised quality.

Seasonal conditions were more favourable across the dairy regions of South Australia during 2016–17 with all participant farms recording above average rainfall for the financial year (Figure 4). Total rainfall for South Australian participants was on average 780 mm or 22% above long term average.

The season started with a late break in April 2016 followed by a well above long term average rainfall in May 2016. Winter was heralded with a very wet June followed by an above average rainfall in July and near average rainfall in August (Figure 5) with temperatures being above average for this period. September and October were wet and cool with the state being affected by severe storms in late September causing a state wide black out for a number of days and damaging crops. Summer was characterised by above average rainfall which continued throughout the autumn months.

As seasonal conditions were favourable not only statewide but across large parts of Australia, they were considered the saving grace during a year of milk price uncertainty. Record grain yields nationally saw the price paid at the farm gate for concentrates decrease by 17% and hay prices also reduce considerably. The reduced purchased feed costs combined with an extended growing season and an increase in home-grown fodder, gave producers some much needed control over a significant area of cost to their business.

The average conserved fodder yields (on the milking area) were 1.9 t DM/ha (compared to 1.4 t DM/ha in 2015–16) with a range of 0 t DM/ha to 4.4 t DM/ha.

While irrigators had the full use of their water allocations in 2016–17, they did not need to use all of their allocation.

Figure 4 2016-17 annual rainfall and long term average rainfall of participant farms

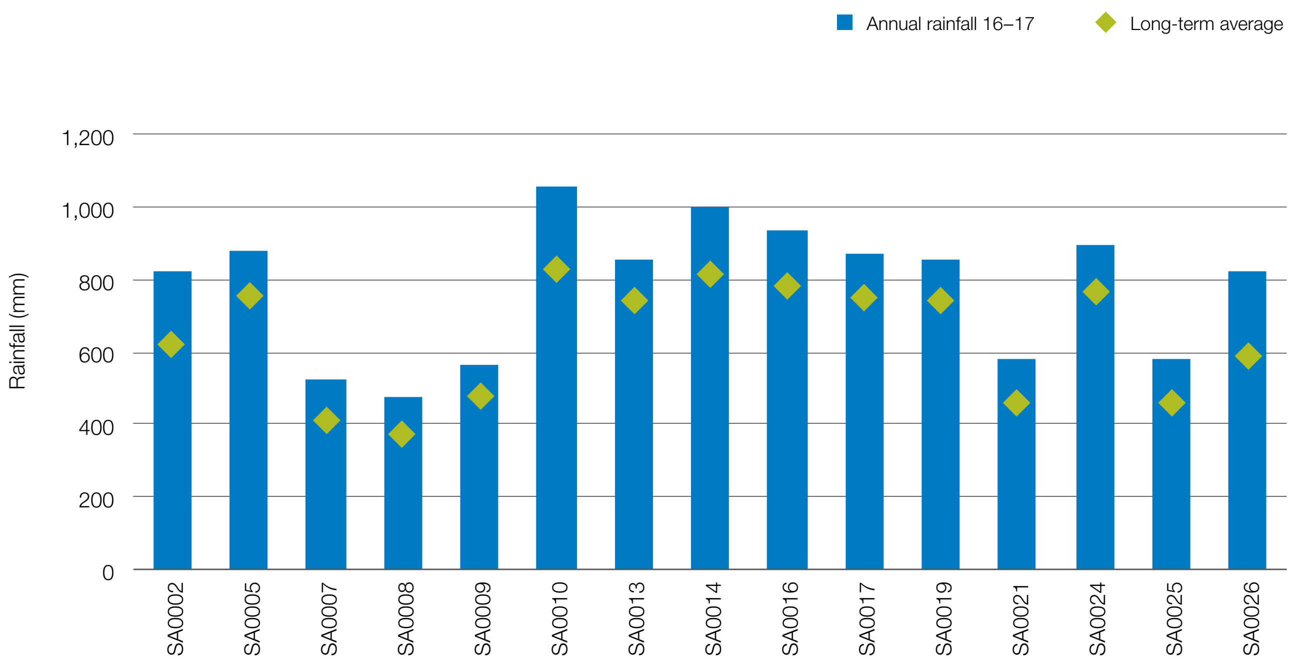
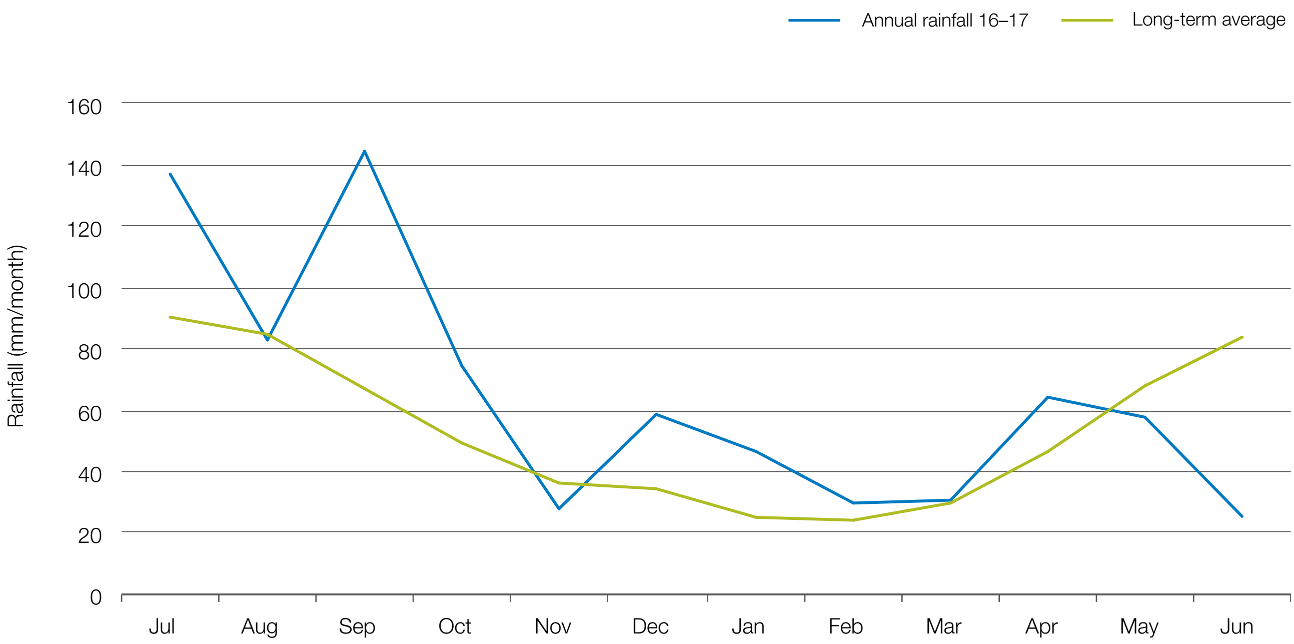


Figure 5 Monthly average rainfall (all farms)



Whole farm analysis

In 2016–17, South Australian participant farms had higher than average rainfall, were characterised by an average herd size of 394 cows and usable area of 565 ha. Average milk production was 539 kg MS/cow with home grown feed providing 64% of metabolisable energy (ME).

South Australian participant farmers for 2016–17 had an 11% higher average herd size of 394 cows/farm compared to 355 cows/farm the previous year. They carried an average stocking rate of 1.3 cows/ usable hectare with Q1–Q3 ranging from 0.5 to 1.6 cows/usable hectare (Table 1).

Participant farms sold an average of 539 kg milk solids sold in 2016/17, down 8% on the previous year's average of 586 kg MS/cow. This was due to changes in participating farms, a reduction of purchased feed due to increased availability of grazed pasture with the underlying drivers of milk price reductions and lower stocking rate (by 7%).

The average annual rainfall was 780 mm/ha or 35% greater than 2015–16 and 22% greater than long term historical average. Water used (rainfall plus irrigation) for 2016–17 was 1,143 mm/ha or 47% above the previous year which supported greater home grown feed production. This led to an average of 64% of home-grown feed utilised as a percentage of metabolisable energy (% ME) consumed, up from 48% in 2015–16. The home grown feed as ME consumed for Q1 to Q3 ranged from 55% to 72%, which illustrates the wide range of production systems in South Australia.

The average labour use was 90 cows per full time equivalent labour unit (cows/FTE) compared to 88 milking cows/FTE for the previous year. The Q1 to Q3 range was 69 to 112 milking cows/FTE which indicates that the Q3 farms were almost twice as labour efficient compared to Q1 on a per cow basis. The average labour efficiency was 47,861 kg MS/ FTE down from 50,701 kg MS/FTE when compared to the previous year. The Q1 to Q3 range was 41,768 kg MS/FTE to 55,341 kg MS/FTE indicating approximately 30% difference between these quartiles on a kg MS/FTE basis.

Table 1 Farm physical data

Farm physical parameters	Average	Q1 to Q3 range
Herd size (no. cows milked for at least 3 months)	394	285–547
Annual rainfall 2016–17	780	577–885
Water used (irrigation + rainfall) (mm/ha)	1,143	908–1,396
Total usable area (hectares)	565	225–604
Milking cows per usable hectare	1.3	0.5–1.6
Milk sold (kg MS /cow)	539	486–592
Milk sold (kg MS /ha)	630	298–830
Home grown feed as % of ME consumed	64%	55%–72%
Labour efficiency (milking cows / FTE)	90	69–112
Labour efficiency (kg MS / FTE)	47,861	41,768–55,341

Gross farm income

Gross farm income is inclusive of all farm incomes which includes milk sales, change in inventories of livestock, or cash income from livestock trading profit and milk factory share dividends (included as other income). In 2016–17, feed inventory change are included in feed costs.

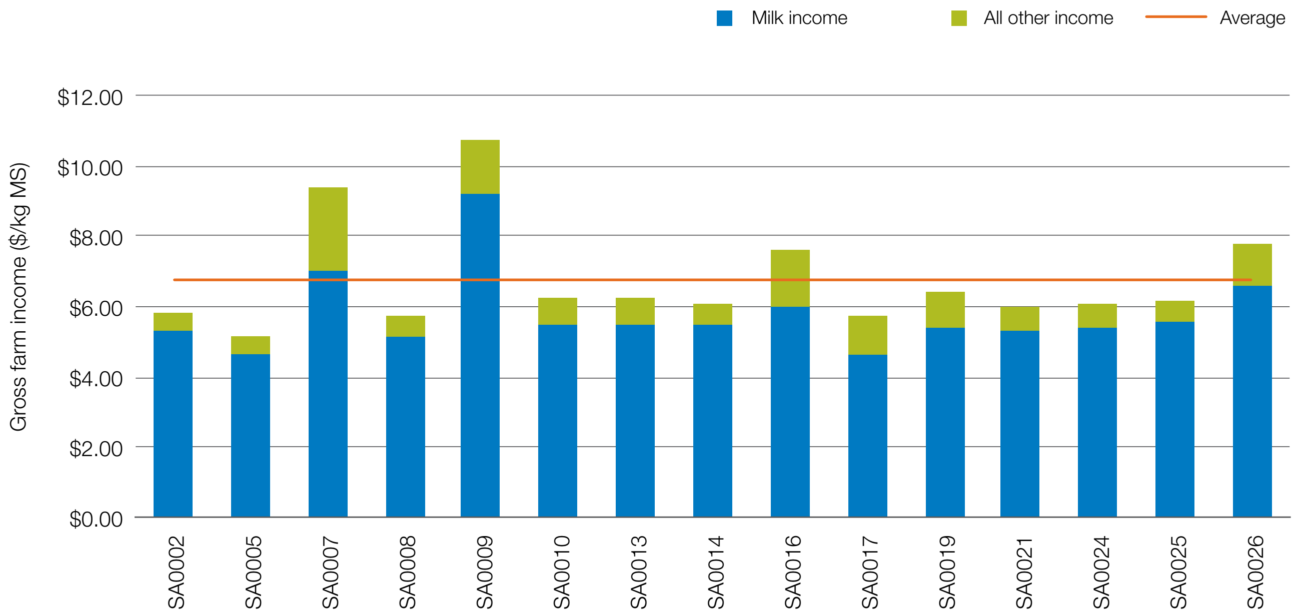
Income from sources other than milk accounted for 14% of gross farm income in 2016–17with a range of between 8% and 36%.

Figure 6 presents the gross farm income for participant farms throughout the South Australian dairying areas. The range of gross farm income received was between $5.13/kg MS and $10.79/kg MS with an average of $6.75/kg MS.

The average milk price received was $5.78/kg MS in 2016–17, a decrease of 6% on last year from $6.15/kg MS. South Australian participant farmers were exposed to lower milk prices offered by the major processors. Some producers in the mid-North and Fleurieu regions have taken advantage of higher milk prices offered by local niche processors, which has the effect of increasing average milk price per kg MS. There continues to be a negative trend for South Australian participant farmers in recent years with respect to milk prices achieved.

Participant farmers continued to supplement the lower milk income received through 'other income' predominantly from livestock sales, given the relatively better than average market prices for cull cows. For 2016–17, the average 'other income' of all participant farms was $0.97/kg MS with a range of $0.52/kg MS to $2.41/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 of the quantity of milk sold per hectare is a reflection of the diverse dairy farming systems throughout South Australia rather than the quality of management.

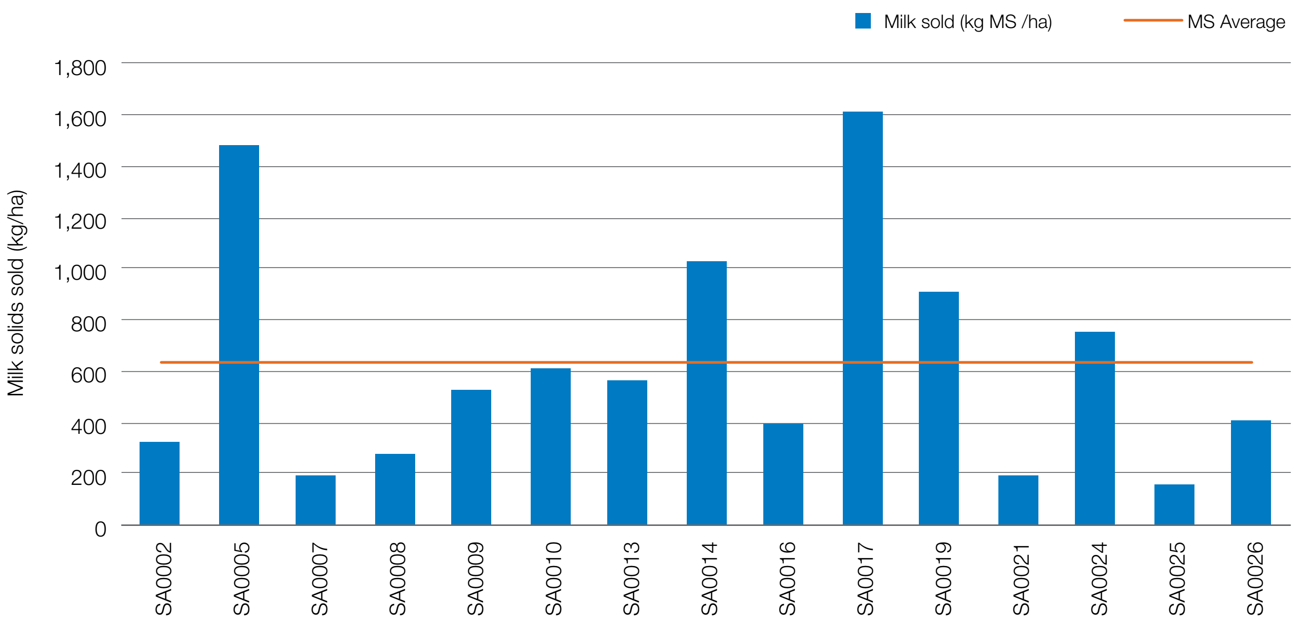
The quantity of milk solids sold ranged from 158 kg MS/ha to 1,616 kg MS/ha with an average of 630 kg MS/ha (14% lower than the average in 2015–16 of 751 kg MS/ha).

In 2016–17, the average number of cows milked was 394 cows/farm (on 565 hectares usable area) compared to 355 cows/farm in 2015–16 (on 447 hectares usable area). The lower average milk solids sold per hectare was due to a 26% increase in usable area which was partially offset by an 11% increase in the average number of cows milked and decreased cow productivity (8% decrease in average kg MS/cow produced (see Whole Farm Analysis section).

Five out of 15 farms this year sold more milk solids per hectare than the state participant average. A focus on grazing systems and irrigation allowed some of these farms to grow and utilise more pasture resulting in increased feed utilisation on a per hectare basis along with higher stocking rates.

Such a wide variation in milk solids sold in 2016–17 was due to the differences in rainfall, irrigation use, growing season, soil types and diverse farming systems in the dairying areas of South Australia.

Figure 7 Milk solids sold per hectare



Milk sales versus calving pattern

Figure 8 below shows the 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 with dairy farmers taking advantage of better out-of-season prices than is normally available in spring.

Milk sales recorded the lowest monthly figure amongst dairy farmers in July which reflects targeting calving to coincide with optimal spring pasture growth. Calvings continue 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.

Variable costs

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

Historically, average variable costs of participant farms have been relatively stable but in decreasing trend in the last three years. This year, average variable costs decreased from $3.71/kg MS in 2015–16 to $3.30/kg MS (excluding feed inventory to be comparable with previous years). Historical data are presented in Appendix Table A9.

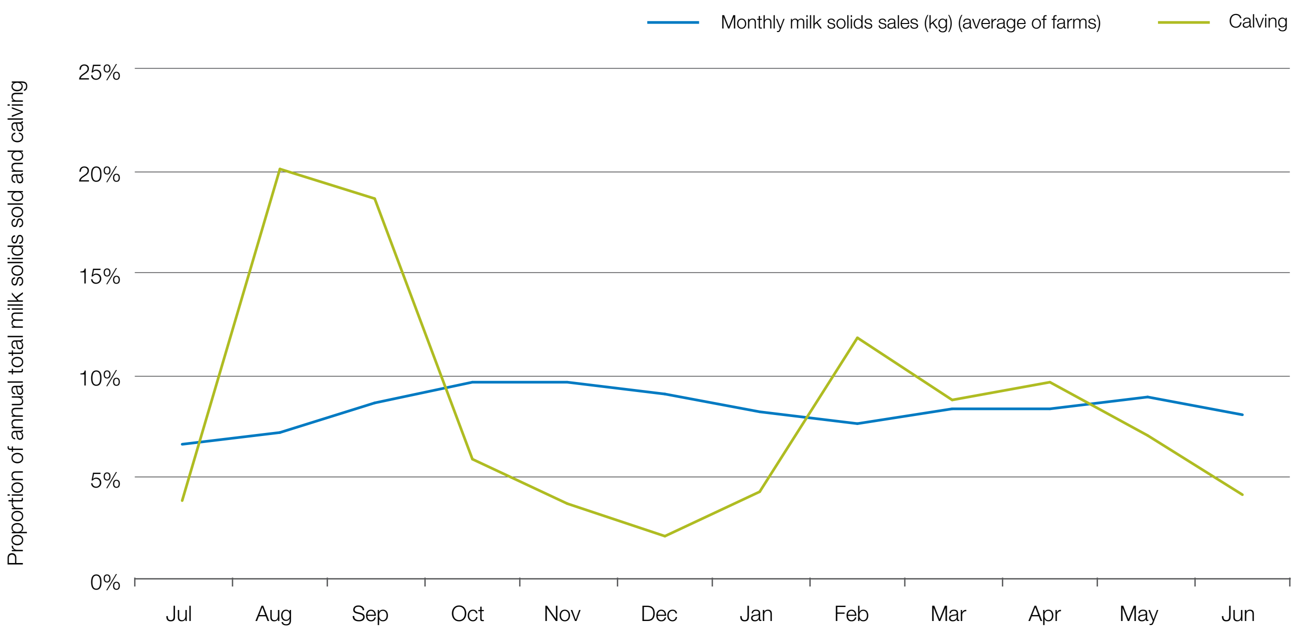
There is a considerable difference in variable costs for the survey farms ranging from $1.82/kg MS to $4.68/kg MS (shown as green bars in Figure 9) with an average of $3.16/kg MS, noting that in 2016–17 variable costs also include feed inventory change and if applicable carryover water inventory change.

In 2016–17, average herd and shed costs increased by $0.09/kg MS or 18% on last year reflecting increased costs associated with animal health, higher shed power costs and dairy supplies.

Feed costs were a major variable cost to participant farms (79% of total variable cost). Average costs of purchased feed and agistment decreased to $1.41/kg MS from $2.08/kg MS. This 32% decrease can be attributed to dairy farmers making purchase feed adjustments in response to lower milk prices, lower prices for concentrate and hay, as well as an increased home grown feed availability partly in relation to an extended growing season. Additionally, average costs increased for home grown feed to $1.22/kg MS from $1.05/kg MS reflecting an increase of home grown forage conserved (by 0.5 t DM/ha) from last year.

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

Figure 8 Milk sales vs calving pattern



Overhead costs

Overhead costs or 'fixed cost' are those that do not vary 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 increased to $2.71/kg MS for the survey farms with a range from $1.77/kg MS to $7.30/kg MS (shown as blue bars in Figure 9). Both cash and non cash overhead costs increased due to the increase in both employed (11%) and imputed labour (9%) costs, despite reductions in other cash overhead costs and depreciation.

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

Cost of production

Cost of production gives an indication of the average cost of producing a kilogram of milk solids. It is calculated as variable plus overhead costs and accounts for changes in fodder and livestock inventory. Including changes in fodder inventory is important to establish the true costs 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 net livestock depreciation or reduced stock numbers, or an increase due to natural increase rather than through purchases.

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

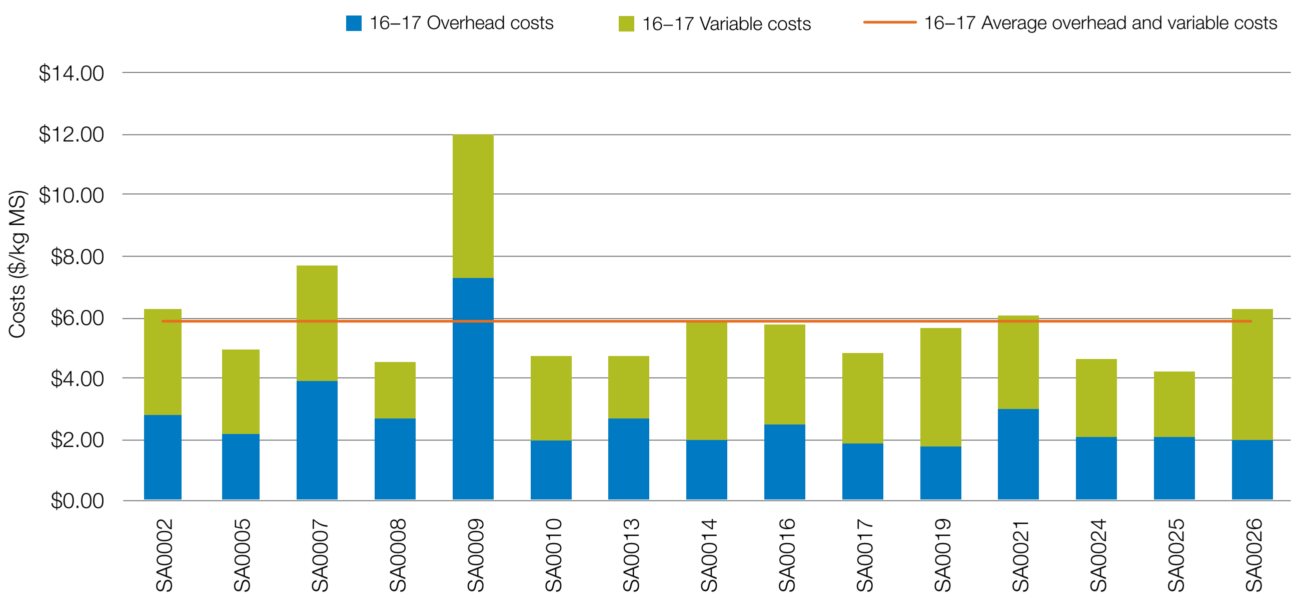


Table 2 shows that the average cost of production (including inventory change) was $6.03/kg MS, which was the same as last year. However, this year's Q1–Q3 range was lower but more varied, compared to last year's Q1–Q3 range of between $5.12/kg MS and $6.51/kg MS. This indicates that dairy farmers in these quartiles reduced their cost of production by between 2% and 10% compared to 2015–16.

Dairy farmers increased their feed inventories on average as shown by a negative $0.14/kg MS 'cost' but decreased livestock inventories by $0.04/kg MS average. Having a low cost of production (variable and cash and non cash overheads) was a key determinant of being profitable in 2016–17.

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 is a valuable measure of operating profit.

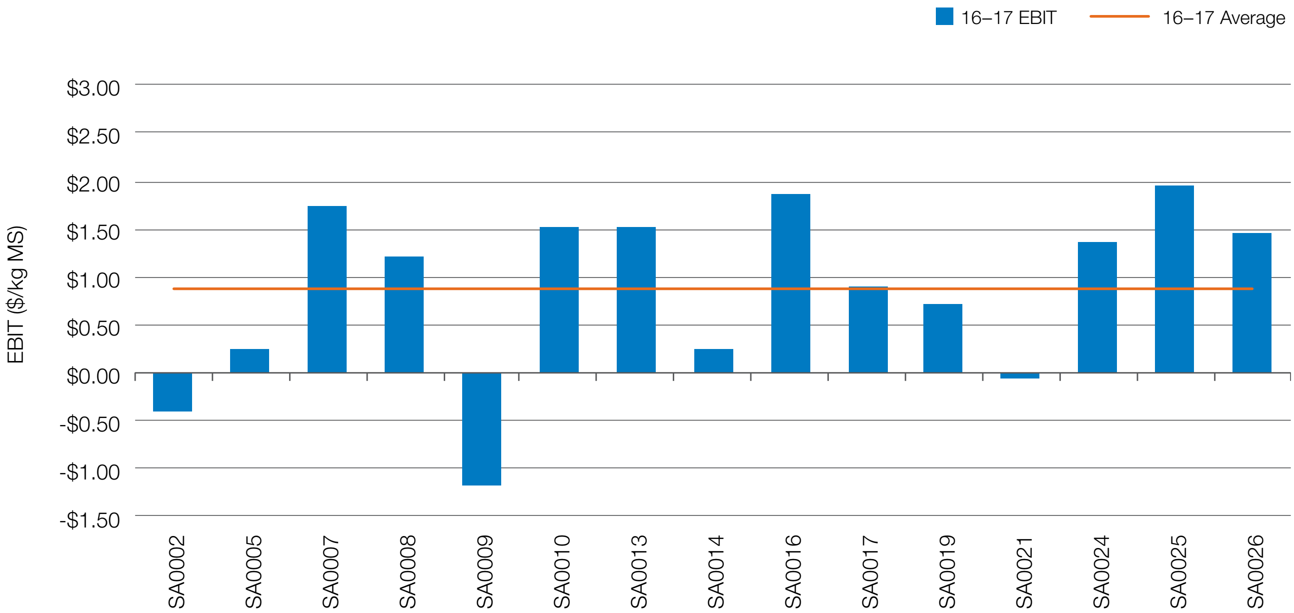
In 2016–17 the EBIT for the participant farms ranged from negative $1.18/kg MS to $1.95/kg MS with the average of $0.88/kg MS (Figure 10). This was 11% higher than 2015–16 ($0.79/kg MS) and 22% higher than 2014–15.

Table 2 Cost of production

Farm costs ($/kg MS)	Average	Q1 to Q3 range
Variable costs		
Herd costs	$0.40	$0.27–$0.47
Shed costs	$0.27	$0.19–$0.35
Purchased feed and agistment	$1.41	$1.00–$1.79
Home grown feed costs	$1.22	$0.84–$1.53
Total variable costs	**$3.30**	**$2.71–$4.01**
Overhead costs		
Employed labour cost	$0.89	$0.67–$1.11
Repairs and maintenance	$0.42	$0.22–$0.49
All other cash overheads	$0.36	$0.24–$0.45
Total cash overheads	**$1.68**	**$1.28–$1.93**
Cash cost of production	**$5.09**	**$4.04–$5.73**
Depreciation	$0.31	$0.17–$0.44
Imputed labour costs	$0.72	$0.34–$0.95
Non-cash overheads	**$1.04**	**$0.58–$1.24**
Cost of production without inventory changes	**$6.13**	**$4.82–$6.39**
Inventory changes		
+/- feed inventory change	-$0.14	-$0.29–$0.00
+/- livestock inventory change less purchases	$0.04	-$0.20–$0.10
Cost of production with inventory change	**$6.03**	**$4.60–$6.38**

Due to rounding, the adding of average cost categories may not equal to the total cost value, which is also rounded off to the nearest cent.

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



The rise in EBIT is largely explained by lower variable costs (11%) offsetting a 3% reduction in average gross income and 4% increase in overhead costs from previous year.

Twelve of the 15 farms (80%) recorded positive EBIT, compared to 88% (14 out of 16 farms) 2015–16 and 85% (17 out of 20 farms in 2014–15.

The management ability of farmers is also a crucial contributing factor to strong performance which is not presented in these financial data.

Return on assets and equity

Return on assets (RoA) 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. Figure 11 to Figure 14 were calculated excluding capital appreciation.

In 2016–17 the RoA achieved by participants farms lay between negative 5% and 10%; three farms recorded between negative 5% and 0%, nine farms achieved between 0% and 5% and three farms had RoA of between 5% and 10% (Figure 11).

The average RoA for participants across South Australia was 3.1% (ranging from negative 1.9% to 7.7%) RoA this year (Figure 12).

The 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.

In 2016–17, the RoE achieved by participant farms lay between negative 5% and 10%: where five farms recorded between negative 5% and 0%, six farms achieved between 0% and 5% and four farms had RoE of between 5% and 10% (Figure 13).

The average RoE this year was 2.1% (ranging from negative 3.3% to 8.3%), compared to negative 1.5% in 2015–16. Please note that the average return on equity this year may have been affected by one farm changing its business structure and a change in the sample participants.

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

Figure 11 Distribution of farms by return on assets

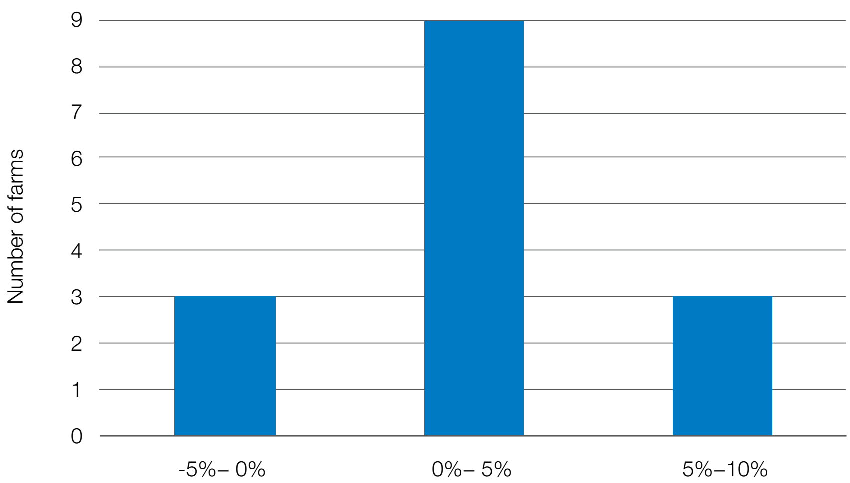


Figure 12 Return on assets

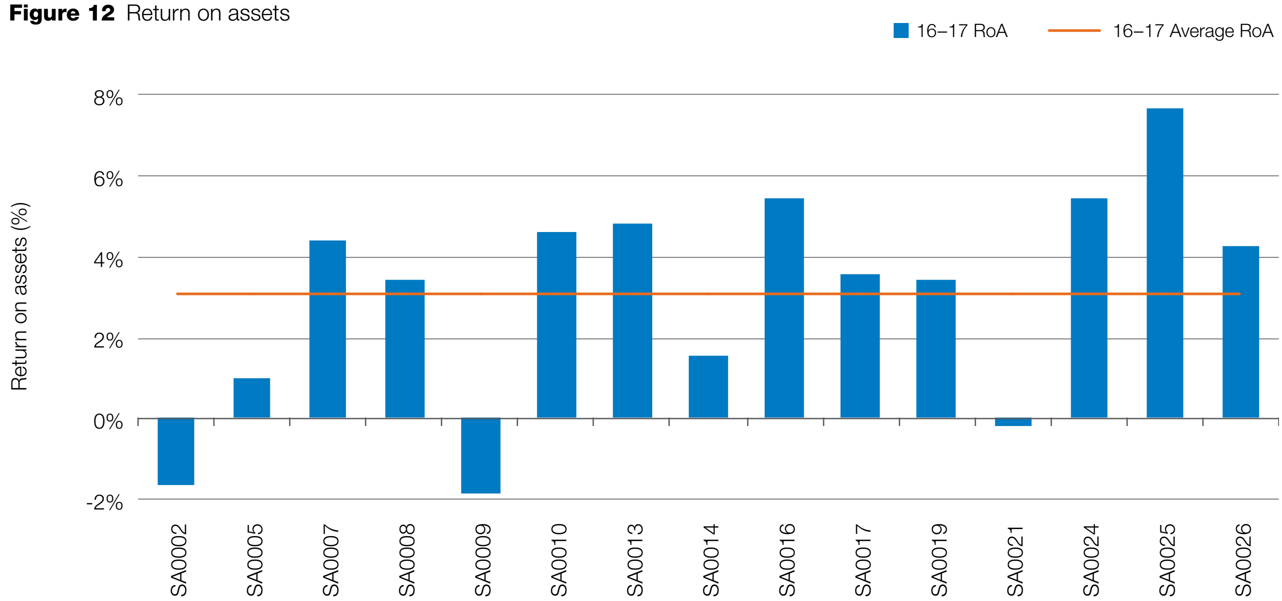


Figure 13 Distribution of farms by return on equity

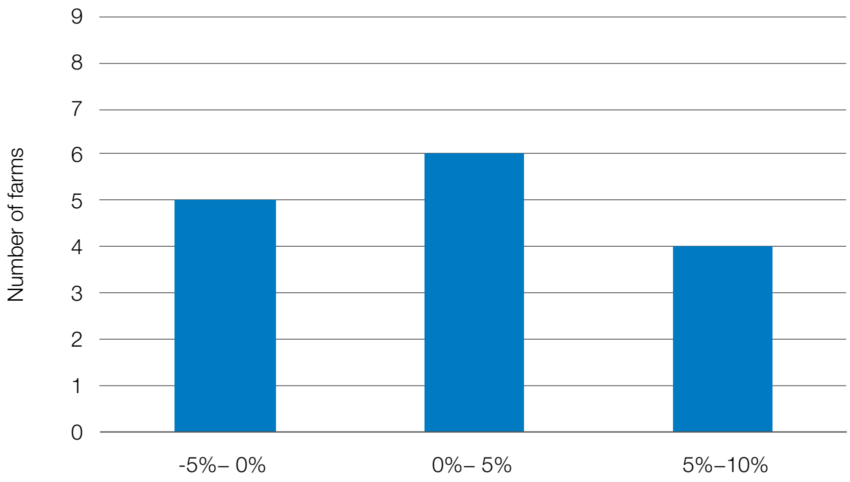
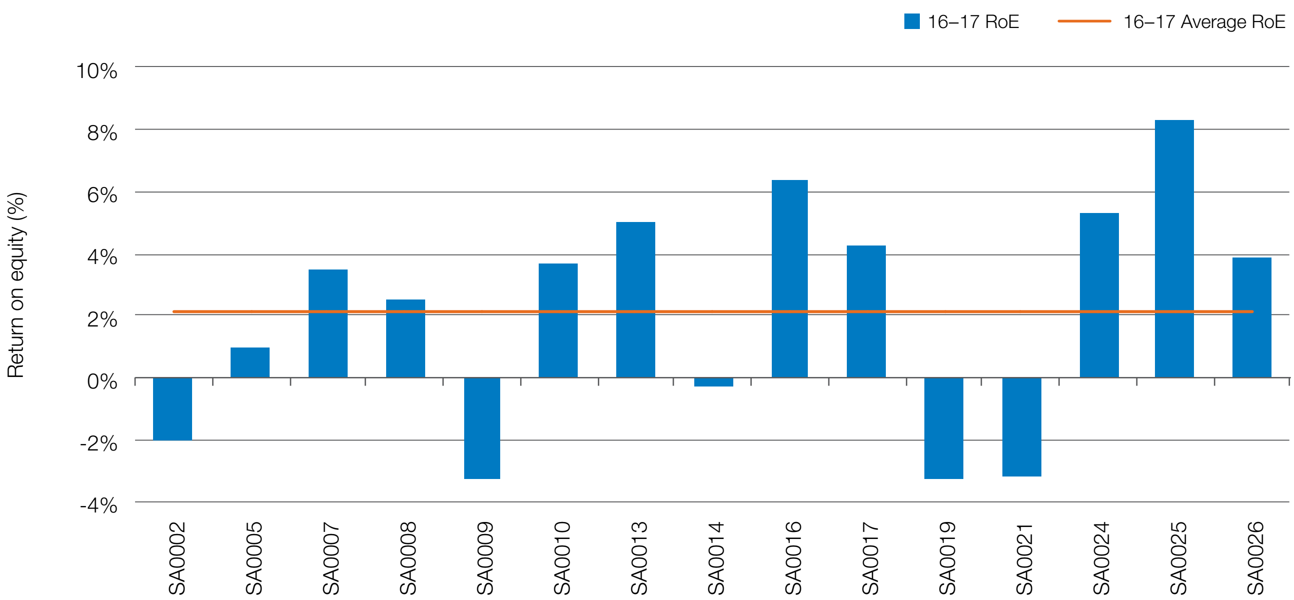


Figure 14 Return on equity



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…'[2]

Table 3 presents some key risk indicators. Refer to Appendix B 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 they 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 flexibility in the business. Table 3 shows that across the state for every $1.00 spent, $0.57 was used to cover variable costs in 2016–17. However it is worth noting that cost structure varies between farms. One hundred minus this percentage gives the proportion of total costs that are overhead costs.

The debt servicing ratio shows interest and lease costs, as a proportion of gross farm income. The ratio of 7% this year is similar to 8% recorded last year. It indicates that on average farms repaid $0.07 of every dollar of gross farm income to their creditors.

Equity levels across the state increased this year, with an average of 73% being reported compared to of 65% in 2015–16, 69% the previous two years (2013–14 and 2014–15), returning to 2012–13 levels. Caution should be exercised when comparing equity levels between years as the farms in the sample changes.

The benefit of taking risks and borrowing money can be seen when farm incomes yield a higher RoE than on their RoA. When the percentage of RoE increases compared to RoA, it is the result of a higher return from the additional assets than the interest or lease rate. In 2016–17, only four of the 15 (27%) participant farms received a RoE greater than their RoA compared to four of 16 and six of the 20 farms in the previous two years.

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 significantly in 2016–17 to an average 36% from an average of 52% and 51% in 2015–16 and 2014–15, respectively. This reflects the favourable growing conditions for pasture and fodder crops thus enabling farms on average to reduce their proportion of diet from imported feeds compared to previous years resulting in reduced purchased feed costs.

Table 3 Risk Indicators – statewide

	2012–13	2013–14	2014–15	2015–16	2016–17
Cost structure (proportion of total costs that are variable costs)	57%	57%	61%	59%	57%
Debt servicing ratio (percentage of income as finance costs)	8%	7%	8%	8%	7%
Debt per cow	$3,411	$3,439	$3,991	$4,803	$4,369
Equity percentage (ownership of total assets managed)	74%	69%	69%	65%	73%
Percentage of feed imported (as a % of total ME)	49%	43%	51%	52%	36%

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

Physical measures

South Australian participant farms exhibited a wide range of feeding systems. Directly grazed pasture was the dominant source of metabolisable energy supplying on average 51% of ME to livestock, up from last year's 37%. In 2016–17, farmers applied an average of 143 kg/ha of nutrients, 61% being 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) fed to livestock for 12 of 15 the farms accounting for an average of 51% of total ME as compared to 13 of 16 farms in 2015–16 (average for the 13 farms was 45%). Note the average this year does not include the three farms which would be considered partial mixed ration farms due to the small or non existent directly grazed pasture presented in their cows' diet.

Concentrates were the next most important source of total ME fed to livestock with an average of 34% (30% in 2015–16) of total ME fed.

The average price for concentrates was lower in 2016–17 ($304/t DM) than in 2015–16 ($366/t DM). Silage and hay were next, having an average of 14% and 11% of total contributed ME, respectively. Other feed was only a source of ME for the mixed ration 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.

The range of home grown feed consumed per milking hectare varied greatly among the participant producers as shown in Figure 16. The average estimated pasture consumed as grazed feed on the milking area was 7.2 t/ha (6.4 t DM/ha in 2015–16) plus an additional 1.9 t/ha (1.4 t DM/ha in 2015–16) harvested as conserved fodder. The higher pasture consumption in 2016–17 reflected the improvement in pasture growth and harvesting conditions experienced across the state.

Both Figures 15 and 16 were estimated using the pasture consumption calculator in DairyBase which is reasonably similar but not directly comparable to figures published in previous years using the DEDJTR Pasture Consumption Calculator.

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 in the produced on farm, divided into grazed and conserved feed depending on the quantity of fodder production recorded.

Farms SA0007 and SA0009 and SA0021 have minimal milking areas and have mixed ration or cut and carry feeding system. These feeding system are reflected in both Figures 15 and 16 where there was minimal or no grazed pasture shown.

Figure 15 Sources of whole farm metabolisable energy

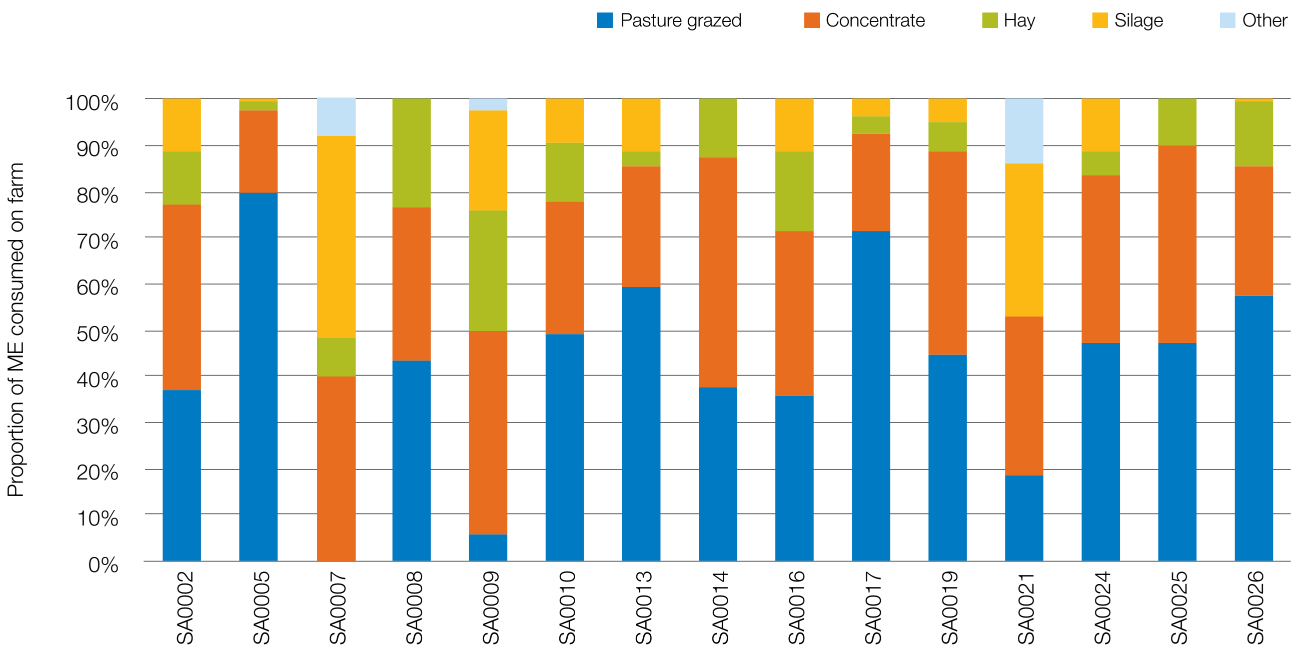
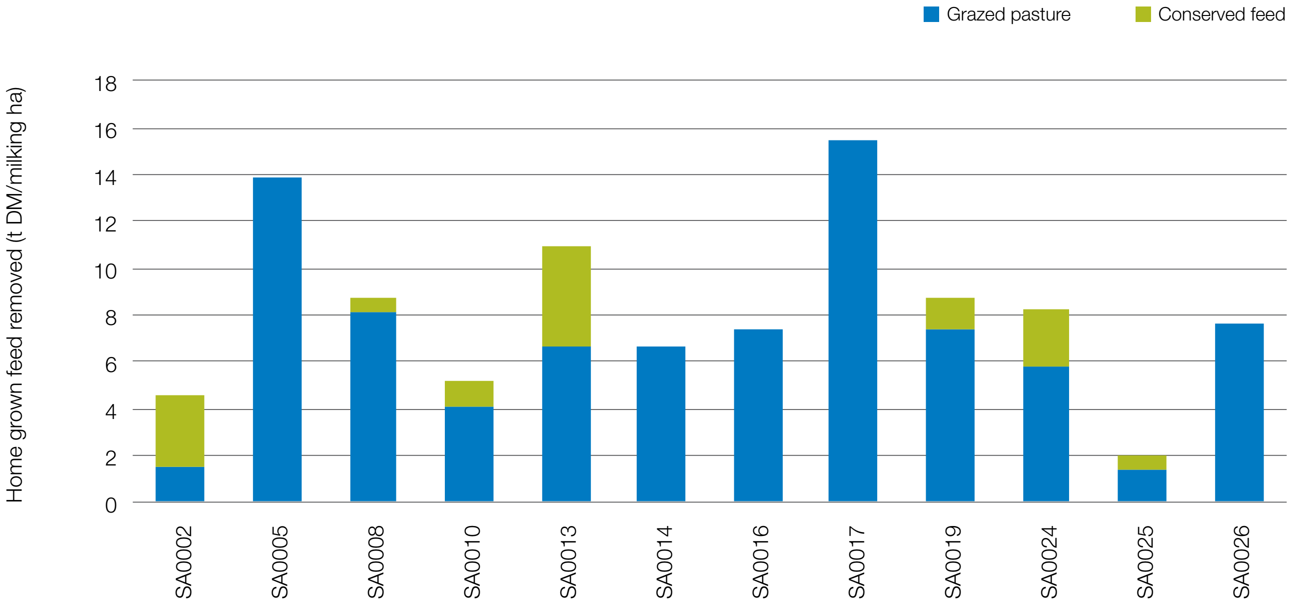


Figure 16 Estimated tonnes of home grown feed consumed per milking hectare



Fertiliser application

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

Table 4 shows that the application rates of phosphorous and potassium have been relatively consistent over the past five years of data collection.

There was a 26% decrease in total fertiliser application in 2016–17 down from 192 t/ha in 2015–16 to 143 t/ha. The significant decrease was due to reduced use of nitrogen and sulphur down 28% and 45% respectively, to an average of 88 t/ha and 16 t/ha in 2016–17. Current usage is more in line with the historical averages, particularly last year to take advantage of favoural rainfall to promote pasture production before the onset of winter 2016.

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

Table 4 Fertiliser use hectare

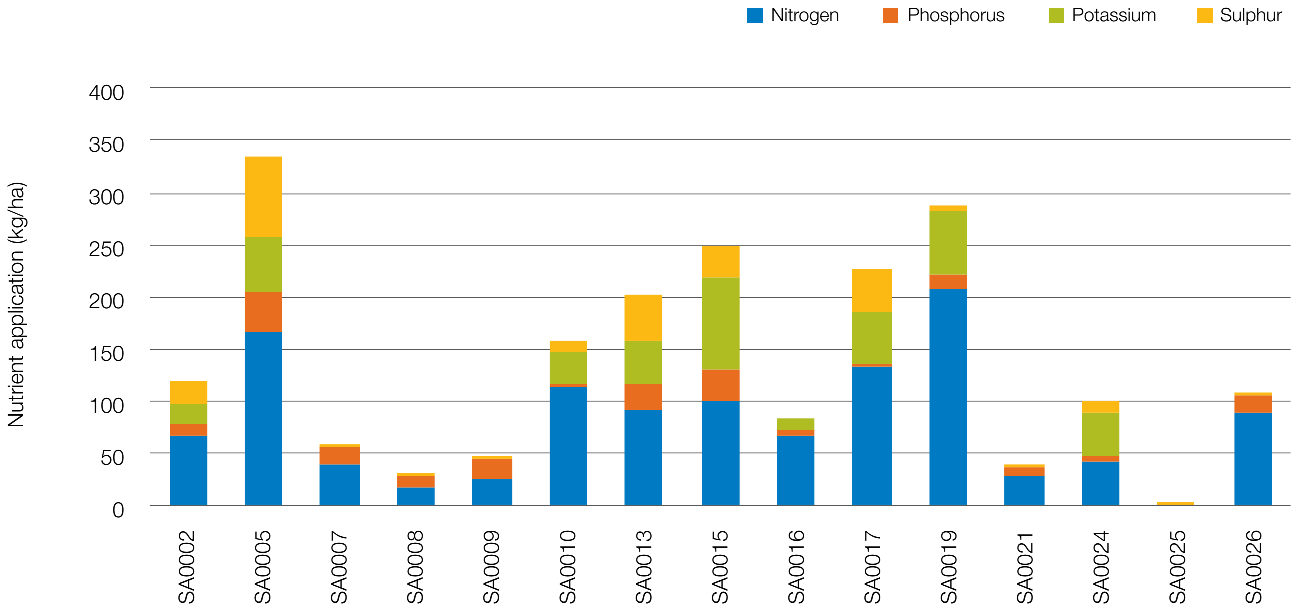
	2012–13	2013–14	2014–15	2015–16	2016–17
Nitrogen kg/ha	70	62	91	121	88
Phosphorus kg/ha	11	10	11	12	11
Potassium kg/ha	32	27	31	29	28
Sulphur kg/ha	15	18	20	30	16

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

2016–17 saw the prices paid by participant farmers were reduced by 3% from last year. Some participant farmers took advantage of these lower prices and seasonal conditions by increasing the application of fertiliser. Whilst others made management decisions to reduce their application rates to a maintenance level or not apply fertiliser at all as a cost saving measure due to the reduced milk prices.

The range in use of nitrogen was quite significant, ranging from 0 kg/ha to 287 kg/ha. Phosphorous usage ranged from 0 kg/ha to 29 kg/ha. Potassium use ranged from 0 kg/ha to 87 kg/ha. Sulphur use ranged from 0 kg/ha to 70 kg/ha. Further information on fertiliser application can be found in Appendix Table A2.

Figure 17 Fertiliser application (kg/ha)



Business confidence survey

Expectations and issues

Responses to this business confidence survey were made in July and August 2017 with regard to the 2017–18 financial year and the next five years to 2021–22.

Expectation for business returns

Following the 2016–17 year, expectations for the following financial year were positive with 87% of dairy farmers predicting an improvement in their business returns with 13% predicting no change as shown in Figure 18. This is notably different to last year's business expectations when more than 60% of dairy farmers predicted deterioration of business returns.

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

At the time of data collection, farmers had already received their 2017–18 milk price announcements which were higher than in 2016–17.

Price and production expectations – milk

On the basis that 2017–18 opening milk prices had been announced, 80% of dairy farmers expected their milk price to increase in the next 12 months (Figure 19) and 20% expecting milk prices to remain at similar levels to 2016–17.

Similarly, a high proportion of farmers (73%) expected to increase milk production in the next 12 months and the rest (27%) did not plan to change their milk production levels.

Figure 18 Expectation of business returns

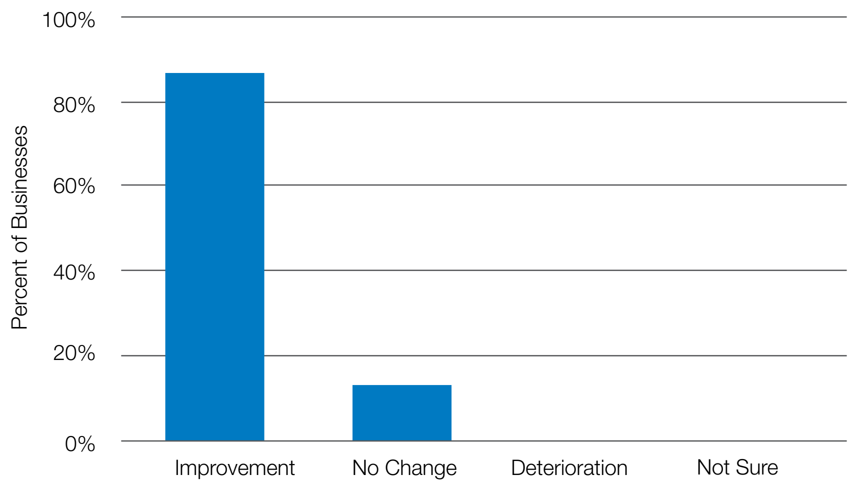
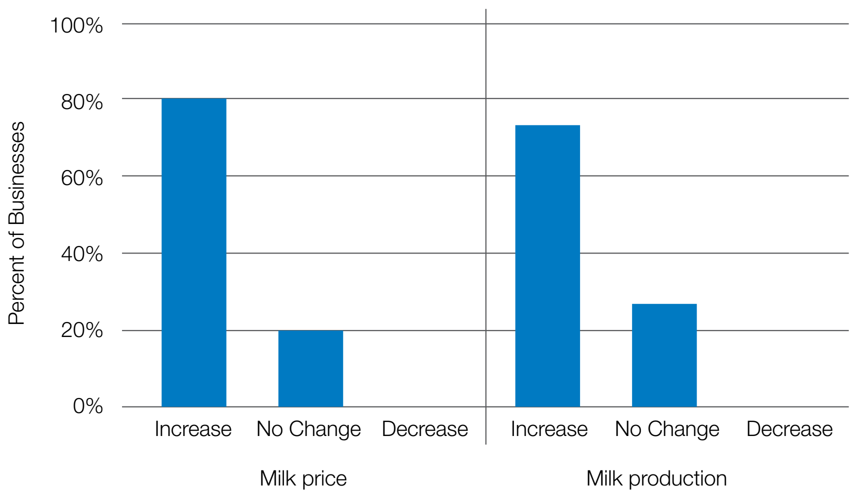


Figure 19 Price and production expectations – milk



Production expectations – Fodder

The question on farmers' expectations of fodder price was not asked in this year's survey.

Participants had experienced improved pasture growth conditions across the state in 2016–17, allowing for high levels of conserved feed. An equal proportion of participants planned to either increase or maintain fodder production for 2017–18 (Figure 20).

Cost expectations

Data in Figure 21 represent the expectations of costs for the dairy industry taken from the 15 participating South Australian dairy farms. The majority of dairy farmers expected costs to increase for purchased feed (67%), fertiliser (60%), labour (53%) and irrigation (63% of irrigators).

Only 47% of respondents expected costs associated with fuel and oil and repairs and maintenance to increase (50%) with 53% and 40% expecting no change, respectively.

Figure 20 Production expectations – fodder

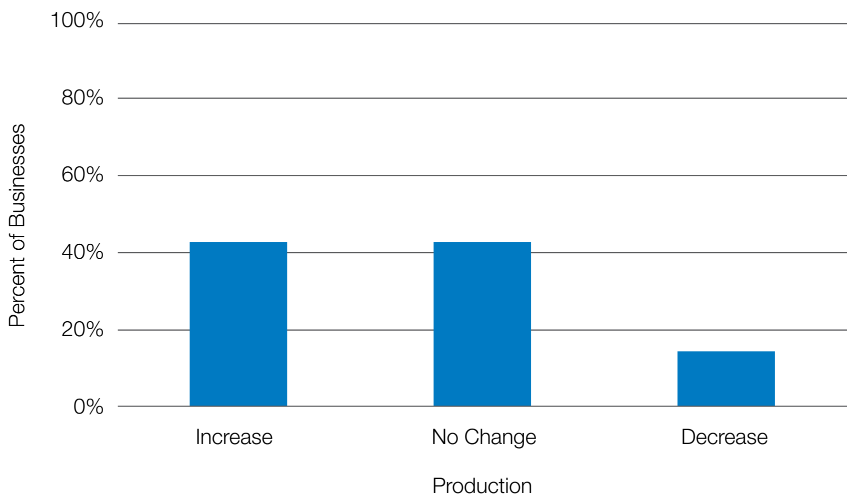
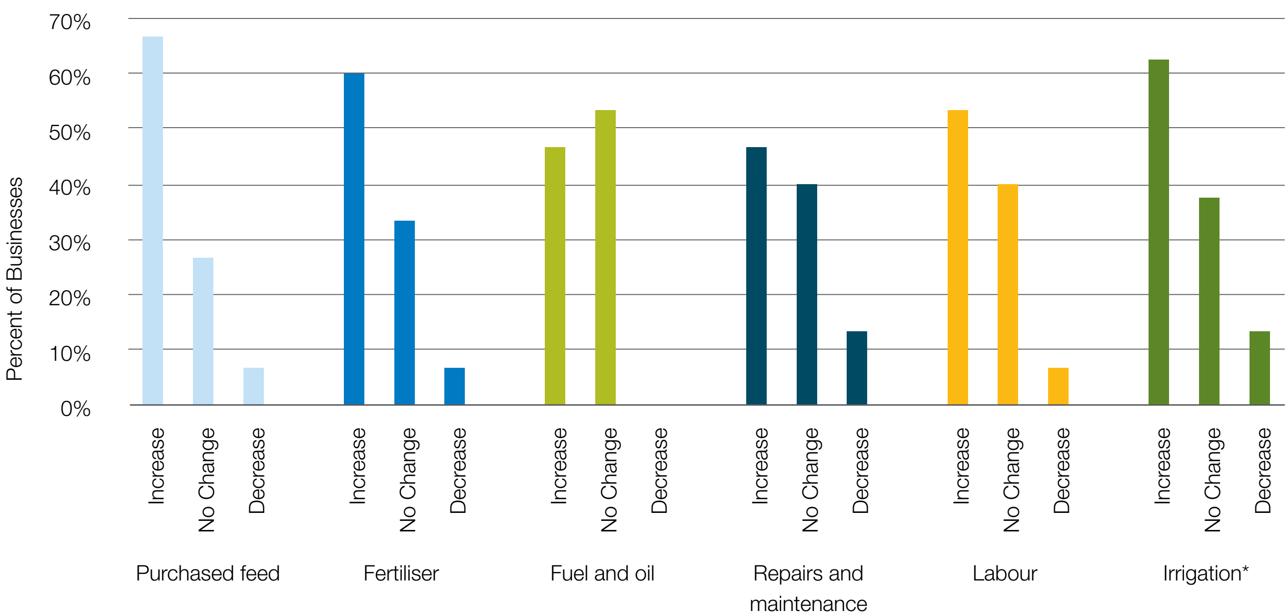


Figure 21 Cost expectations



* response from eight irrigators

Major issues facing the dairy industry – the next 12 months

The participants were asked if any of the seven issues was a major issue or not important in 2017–18. A summary of the major issues identified by participants is in Figure 22.

The three most important issues that farmers identified for the next 12 months were input costs, milk price and climate/seasonal conditions. These were then followed to a lesser extent by labour, with water and pasture/fodder issues receiving the same proportion of responses. Succession planning was the least major concern over the next 12 months.

Other issues raised were electricity costs and stability of supply (not surprisingly by seven farmers); costs rising faster than milk price; milk price stability and sustainability; government/industry regulation and compliance and policies including the Murray Darling Basin Plan; debt management, and renegotiation of milk supply contract. These other issues were also raised as concerns for the next five years.

Major issues facing the dairy industry – the next five years

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

The top three major concerns in the next five years were similar to those identified in the next 12 months. Milk price replaced input costs as the most important issue. These were followed by climate/seasonal conditions. Labour and water were identified as the next major issues by five and four farmers, respectively. The least major concerns over the next five years were pasture/fodder and succession planning which were ranked equally.

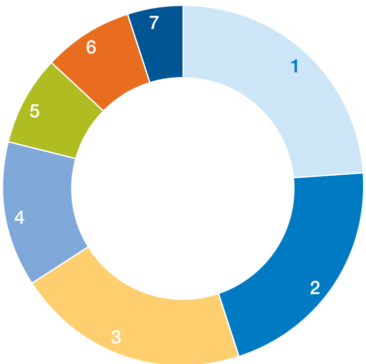


Figure 22 Major issues facing the dairy industry – the next 12 months

1 Input costs **24%**

2 Milk price **21%**

3 Climate/seasonal conditions **21%**

4 Labour **13%**

5 Pasture/fodder **8%**

6 Water **8%**

7 Succession planning **5%**

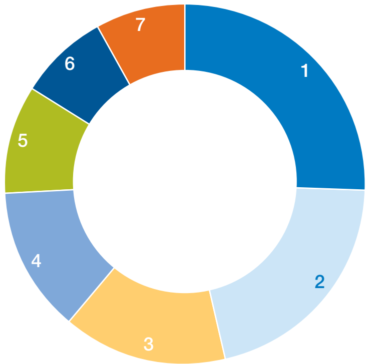


Figure 23 Major issues facing the dairy industry – the next five years

1 Milk price **26%**

2 Input costs **21%**

3 Climate/seasonal conditions **15%**

4 Labour **13%**

5 Water **10%**

6 Pasture/fodder **8%**

7 Succession planning **8%**

2016–17 Greenhouse gas emissions

2016–17 Greenhouse Gas Emissions

The average level of emission from participating farms was 14.2 t CO_2-e/t MS in 2016–17, slightly higher than last year's 14.1 t CO_2-e/t MS. This year there were changes in the method of estimating greenhouse gas emissions which increased total emissions and therefore emissions intensity.

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 of the data in this section is in CO_2-e tonnes and expressed per tonne of milk solids produced (CO_2-e/t MS).

In 2016 the method of estimating Australia's dairy industry greenhouse gas emissions was amended to reflect new research outcomes and align with international guidelines. The GWP for the three gases that are discussed in this report have altered to 1: 25: 298 (CO_2: CH_4: N_2O). Other changes have included a decrease in the proportion of waste (dung and urine) deposited onto pastures while the milking herd graze and changes to the emission factors for N_2O emissions from nitrogen fertiliser and animal waste.

In addition, the estimation of greenhouse gas emissions now include a pre-farm gate emission source. These are the greenhouse gases emitted with the manufacturing of fertilisers and the production of purchased fodder, grain and concentrates.

The distribution of different emissions for 2016–17 is shown in Figure 24. Greenhouse gas emissions per tonne of milk solids produced ranged from 11.6 t CO_2-e/t MS to 18.2 t CO_2-e/t MS with an average emission level of 14.2 t CO_2-e/t MS. The percentage breakdown for emissions in 2016–17 was 68% for CH_4, 21% for CO_2, and 11% for N_2O emissions.

Methane was identified as the main greenhouse gas emitted from dairy farms, accounting for 68%, or 9.7 t CO_2-e/t MS, 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 60% of total emissions. Methane from effluent ponds accounted for 8% of total emissions on average across the state in 2016–17.

The most efficient strategy to reduce enteric CH_4 production is manipulating the diet by increasing the feed quality through improved pastures or supplementation with particular concentrates. Adding fat supplements such as whole cotton seed, canola meal or linseed oil into the diet can also reduce CH_4 emissions. This is a simple and effective method, however it is recommended that fats should not constitute more than 6–7% of the dietary dry matter intake.

The second main greenhouse gas emission was CO_2 being produced primarily from fossil fuel consumption as either electricity or petrochemicals. The NGGI calculates carbon emissions from both pre-farm gates and on-farm sources. Carbon dioxide accounted for 21% of total emissions (2.9 t CO_2-e/t MS); 12% from pre-farm gates sources and 9% from on-farm energy sources. Output levels were highly dependent on the source of electricity used with farms using brown coal generated electricity and electricity sourced from renewable sources (e.g. solar).

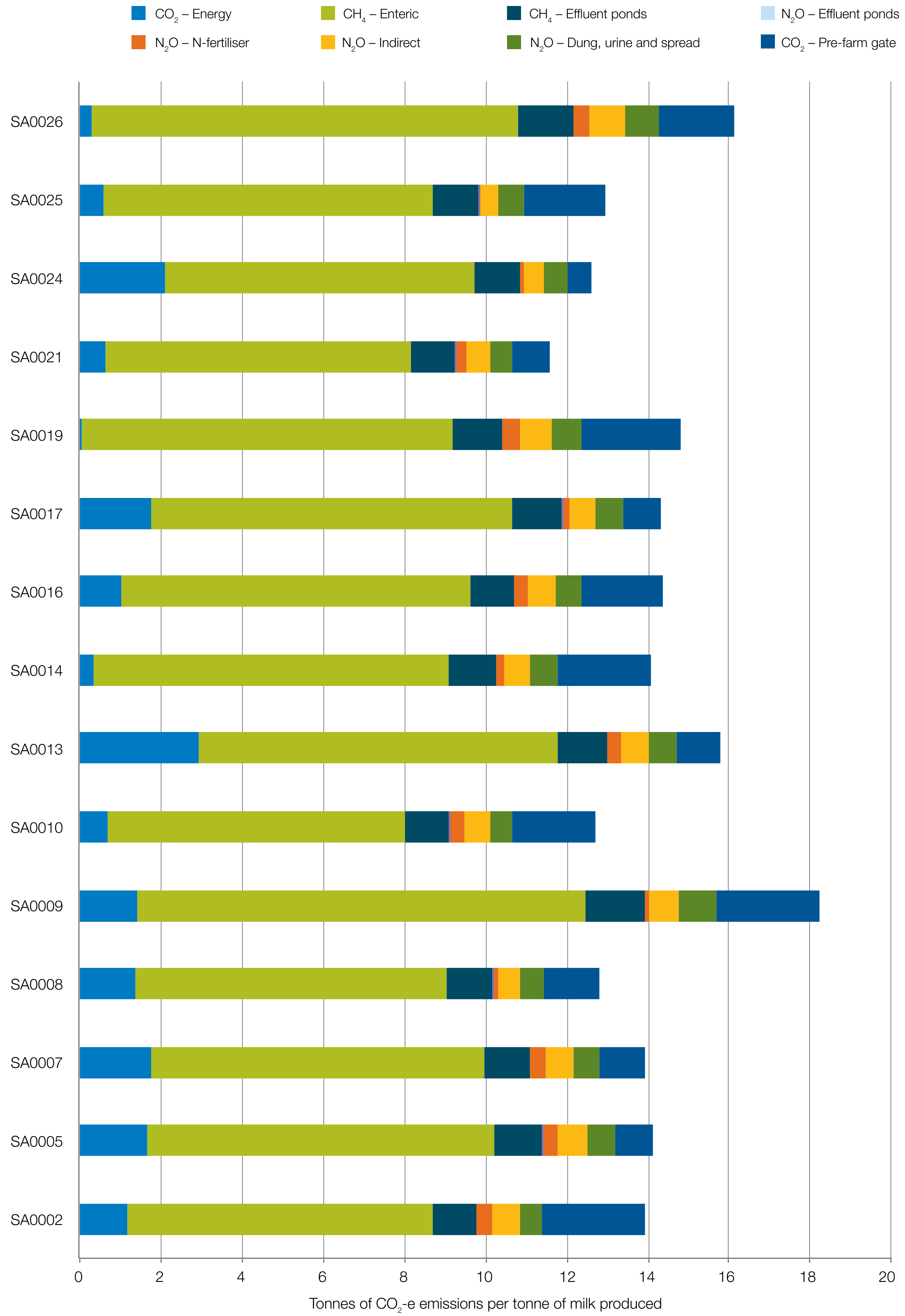
There are a number of technologies available to improve energy efficiency in the dairy while reducing electricity costs.

The third main greenhouse gas emission was nitrous oxide (N_2O), accounting for 11% of total emissions or 1.6 t CO_2-e/t MS. 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 0.2% and excreta accounted for 4.7%. Nitrous oxide from indirect emissions was 4.6%. 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 N_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 analysis

The dollar values are adjusted for inflation to allow comparison between years, however, the number of farms in the sample is not consistent and 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.

In South Australia, 2016–17 was characterised by record low average milk prices and above average rainfall. Return on assets was maintained and net farm income was higher than 2015–16 but remained below the 2013–14 results.

Set out in Figure 25 is the average EBIT and net farm income for the five 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 then rising again in 2016–17.

Historically, the low average EBIT of approximately negative $7,000 and net farm income negative $94,000 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 $338,730 and $226,015, respectively as a result of good average milk prices received $7.14/kg MS (adjusted for inflation).

Average farm EBIT and net farm income in 2014–15 declined to approximately $224,000 and $92,000 respectively, as a result of lower average milk prices received. The average milk price of $6.54/kg MS in 2014–15 was 8% lower than the $7.14/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 $167,000 and $39,000 respectively, with average milk prices of $6.26/kg MS (4% lower than 2014–15) being a major contributor.

In 2016–17, average farm EBIT and net farm income increased to approximately $201,000 and $101,000 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. The five year average for EBIT was approximately $139,000 with average net farm income of approximately $56,000.

Average return on assets for 2016–17 was 3.1%, same as the previous year, with 3.1% becoming the new five-year average (down from 3.2% as the average for 2012–13 to 2014–15). This followed a high of 6.2% return on assets in 2013–14 and a low of negative 0.6% in 2012–13 (Figure 26).

In the past five years of the project, average return on equity of participant farms has ranged from the lowest (negative 4.9% in 2012–13) to the highest (8.5% in 2013–14) within a year. In 2016–17, the average return on equity rose from negative 1.5% last year to 2.1%. Please note that the average return on equity this year may have been affected by one farm changing its business structure and a change to the farms participating in the project.

Figure 25 Historical EBIT and net farm income

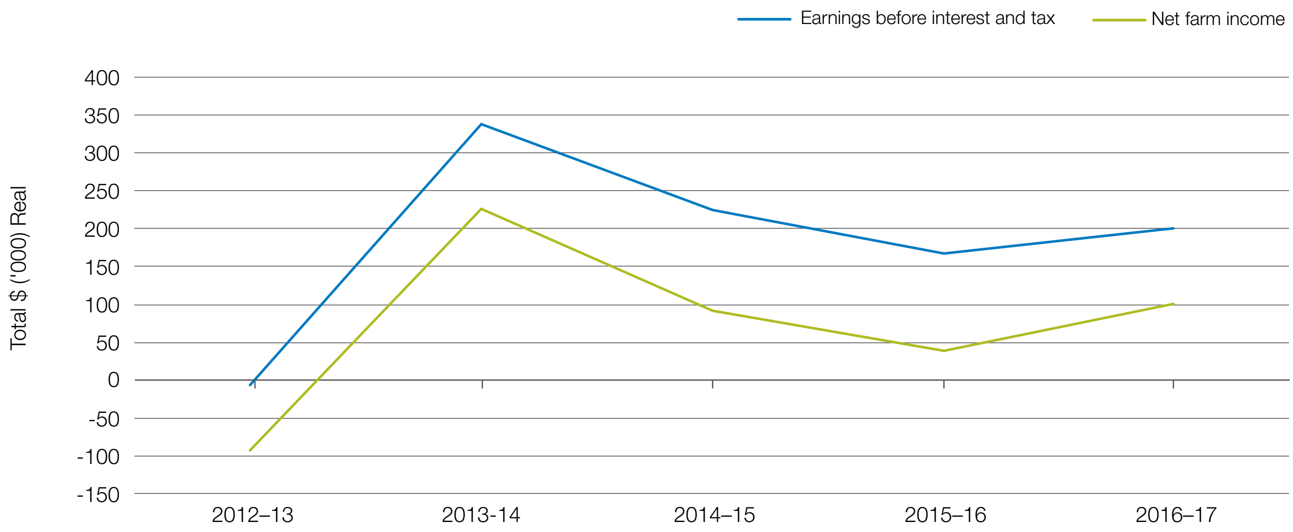
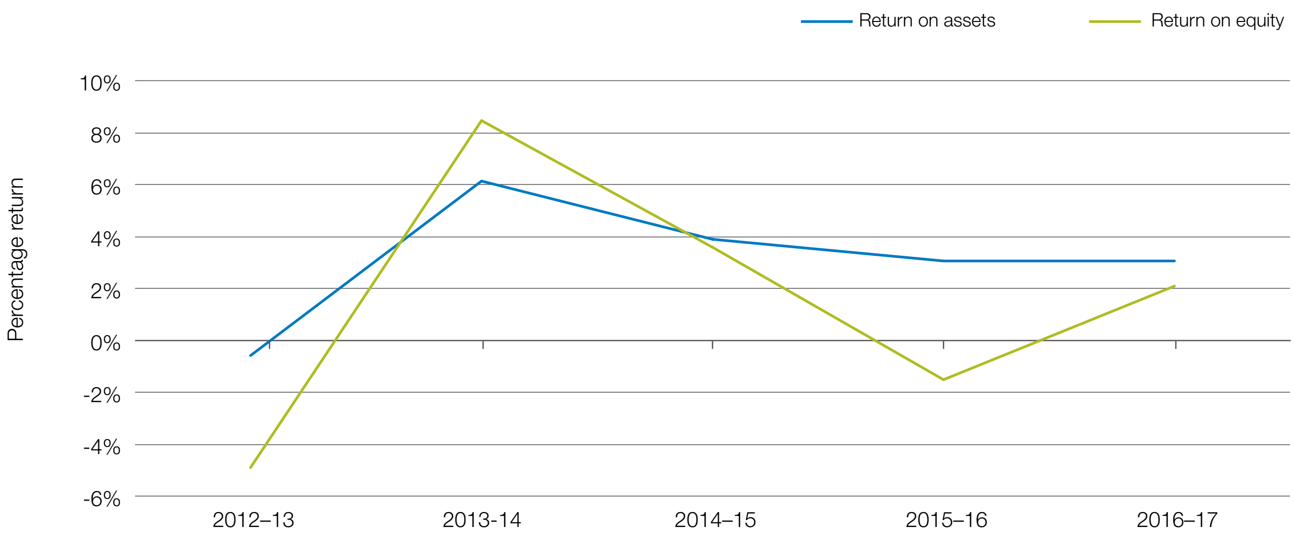


Figure 26 Historical return on assets and return on equity



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
DEDJTR	Department of Economic Development, Jobs, Transport and Resources, Victoria
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. 1 mm is equivalent to 4 points or 1/25th 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
RoA	Return on assets
RoE	Return on equity
t	Tonne = 1,000 kg

Standard values

Livestock values

The standard vales used to estimate the inventory values of livestock were:

Category	Opening value ($/hd)	Closing value ($/hd)
Mature cows	$1,500	$1,500
14–15 heifers	$1,050	$1,500
15–16 heifers	$450	$1,050
16–17 calves		$450
Mature bulls	$1,500	$1,500

Imputed owner/operator and family labour

In 2016–17 the imputed owner/operator and family labour rate was $28/hr based on a full time equivalent (FTE) working 48 hours/week for 50 weeks of the year.





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