Dairy Australia
Your Levy at Work

Dairy Farm Monitor Project

Western Australia
annual report 2016–17

Acknowledgements

Western Dairy would like to gratefully acknowledge the cooperation, patience and goodwill of the farmers who willingly supplied their farm information.

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This report was produced by Kirk Reynolds, in conjunction with Natalie Nelson - DEDJTR, and Dairy Australia.

The project plays a critical role in identifying areas for farm performance improvement, as well as providing vital benchmark information for Dairy Australia's DairyBase tool. It is linked to our aims of growing the agricultural sector in order to grow jobs and investment in the region.

Further information regarding the Dairy Farm Monitor Project may be obtained from:

Esther Jones
Executive Officer
Western Dairy
PO Box 668
Denmark, WA 6333
Telephone: 0418 931 938
esther@westerndairy.com.au

Natalie Nelson
Farm Business Economist
Department of Economic Development, Jobs, Transport and Resources
1301 Hazeldean Road
Ellinbank, Victoria, 3821
Telephone: 03 5624 2235
natalie.nelson@ecodev.vic.gov.au

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Your Levy at Work

AGRICULTURE VICTORIA

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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
- Western 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 Western 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 is presented for individual farms, as state averages and for the state top 25% of farms ranked by return on assets (RoA). 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 top 25% of farms are presented as cross hatched bars in the state overview figures. Return on assets is the determinate used to identify the top 25% of producers as it provides an assessment of the performance of the whole farm irrespective of differences in location and production system.

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 is presented in kilograms of milk solids (fat + protein) and where possible production data is also presented in litres.

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.

The top 25% consists of seven farms located throughout the dairying areas of Western Australia.

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 eight 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 a number of changes since last year's report. The most significant are:

- 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 used in previous reports. 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.
- 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 when 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.
- This year in Western Australia only, to protect the anonymity of participants, farms have been allocated a new number rather than an identification code. Therefore results for individual farms may not be directly compared to previous years.

Keep an eye on the project website for further reports and updates on the project at dairyaustralia.com.au/dairyfarmmonitor

Summary

Summary

In 2016–17 the data from 26 farms in WA resulted in average whole farm earnings before interest and tax (EBIT) of $565,416, an 8% decrease on the previous year's $617,059. Participants achieved positive return on assets averaging 6.7%, similar to last year. The average milk price received was $7.05/kg MS (51.4 c/l), a 2% decrease from last year.

This is the fourth year of the Dairy Farm Monitor Project (DFMP) in Western Australia with support and funding from Dairy Australia. The project aims to provide the WA dairy industry with valuable farm level data relating to profitability and production.

Twenty six farms participated in the project in 2016–17, of which 16 were involved since the project started in 2013–14. There were eight new farms in this year's dataset. The WA DFMP participants generated an average earnings before interest and tax (EBIT) of $565,416 per farm or $1.98/kg MS (14.5 c/l), an 8% decrease from 2015–16.

Once interest and lease costs were taken into account the resulting average net farm income was $421,195. This equated to an average return on equity of 11.2%.

The average milk price of $7.05/kg MS (51.4 c/l) was a 2% decrease from last year's price of $7.22/kg MS (52.2 c/l). The milk price reflected the continued strong competition for domestic milk supply resulting in high milk price contracts, plus summer growth milk premiums offered by some processors. High milk price contributed to all participant farms, except one, achieving a positive return on assets, averaging 6.7%, similar to the 6.6% average in 2015–16.

The milk price varied from $6.09/kg MS to $8.11/kg MS (44.6 c/l to 58.7 c/l). The seasonal nature of supply appears to bear little influence over prices received for milk, whereas components (proportion of fat and protein per litre) and individual agreements with processors had the greatest influence on the prices received.

Participants generally managed to reduce their costs of production with a 5% decrease in average variable costs from $3.95/kg MS last year to $3.77/kg MS this year, however average overhead costs remained constant. The main driver of lower variable costs were in feed. Home grown feed as a source of metabolisable energy increased from 57% to 61% while lowering of the amount of purchased feeds and lower concentrate price also assisted.

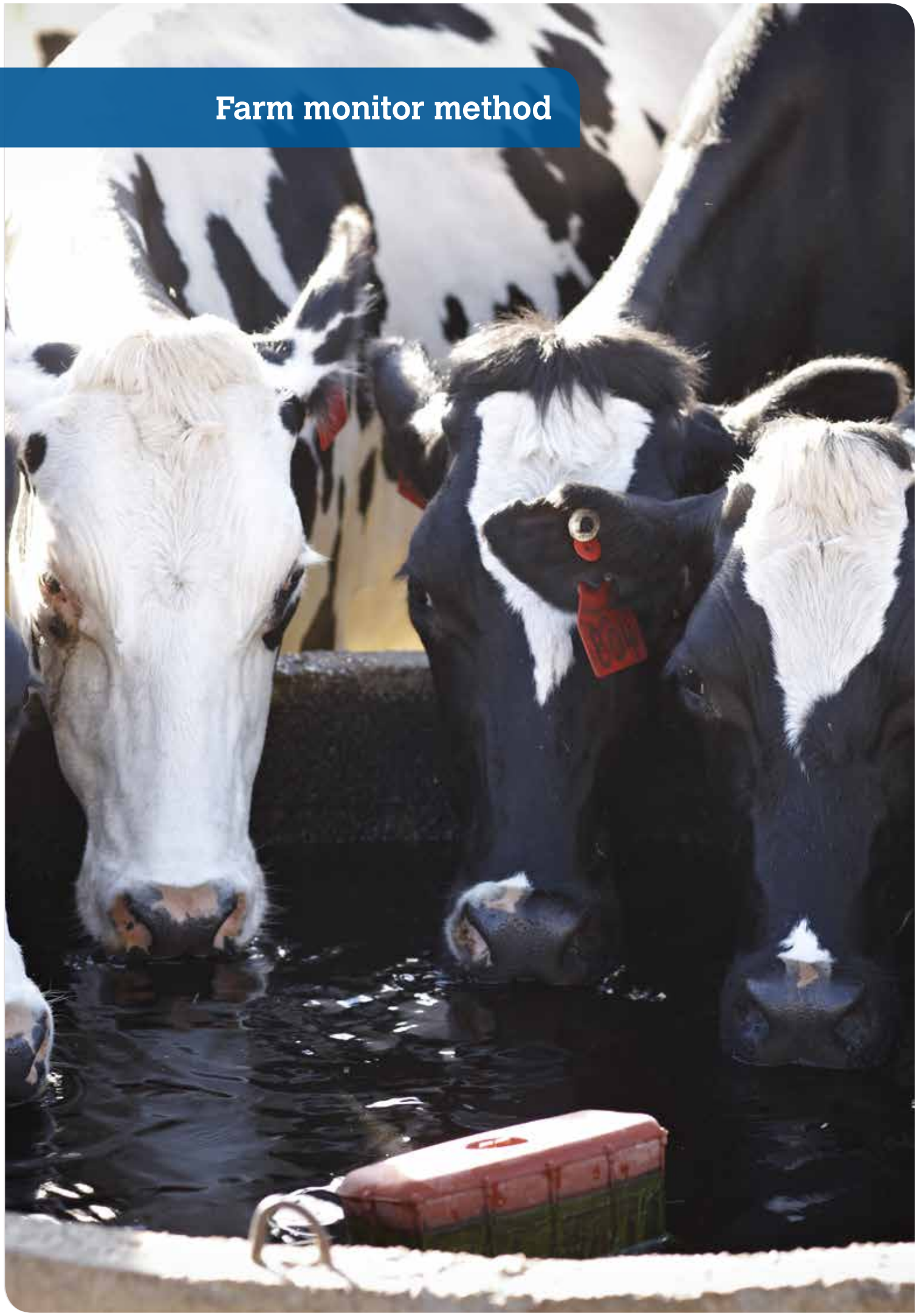
The 2016–17 season was a considerably drier year with farms receiving 17% less rainfall compared to the long term average. The 2016–17 season started well for most WA dairy regions on the back of an ideal autumn break and finish to 2015–16. Favourable conditions continued into the spring across the majority of the South West region resulting in well above average pasture growth rates in the dairying regions and higher crop fodder and grain yields across the cropping zones. Higher grain and fodder yields, and lower demand, were reflected in lower prices, but difficult harvest conditions saw some lower quality conserved fodder. Seasonal conditions towards the end of 2016–17 were less favourable with most regions experiencing a late autumn break and cooler conditions through early winter.

The top 25% farms achieved an average EBIT of $976,616 and average return on assets of 12.4%. This large difference between the average and top 25% is mainly due to higher milk income, higher stocking rates, better labour efficiency, higher milk production per cow and per hectare along with lower costs of production.

Expectations for the 2017–18 season were evenly split across increased business returns, no change or a decrease, with more than half predicting a decrease in milk price. There was no indication of decreasing production with a balance between constant production and increasing production.

Managing seasonal conditions and pasture/fodder supplies are the main issues of concern over the next year. Milk price, input costs and managing seasonal conditions were the major long term issues facing the Western Australian participant farmers.

Farm monitor method



Farm monitor method

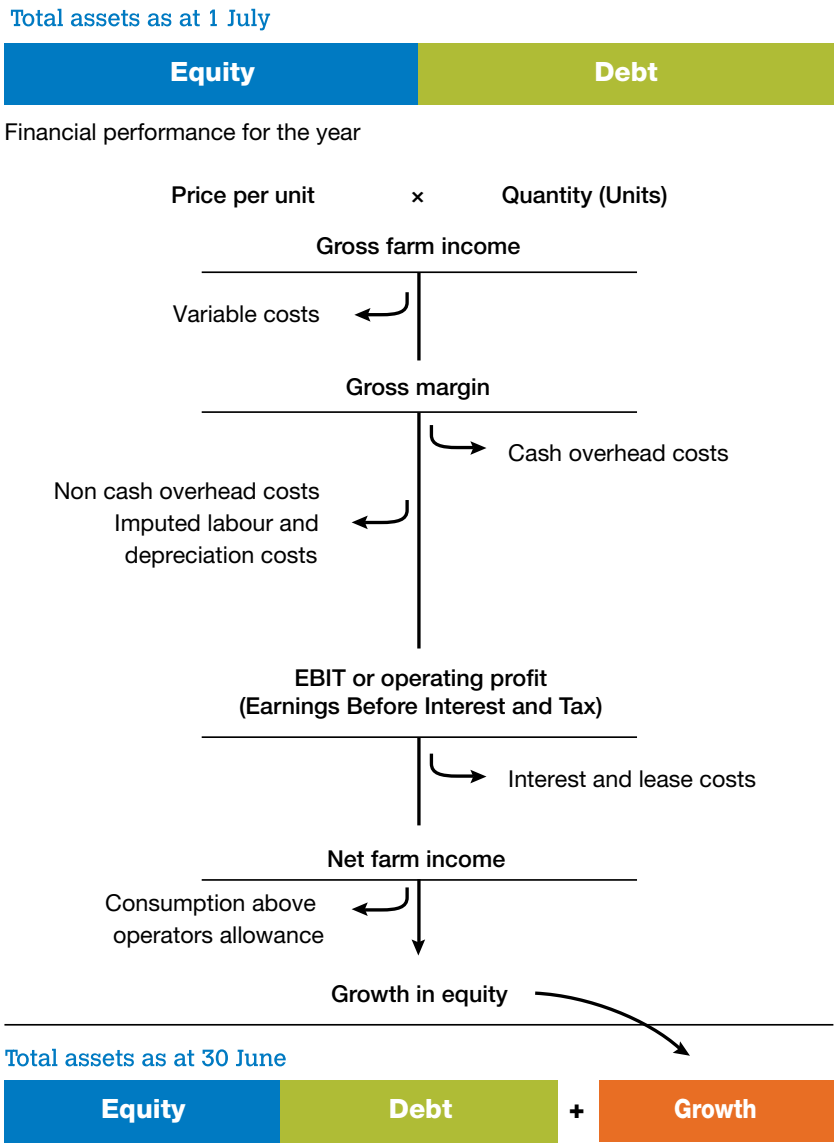
This chapter explains the method used in the Dairy Farm Monitor Project (DFMP) and defines the key terms used.

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 produced. 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 between 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.

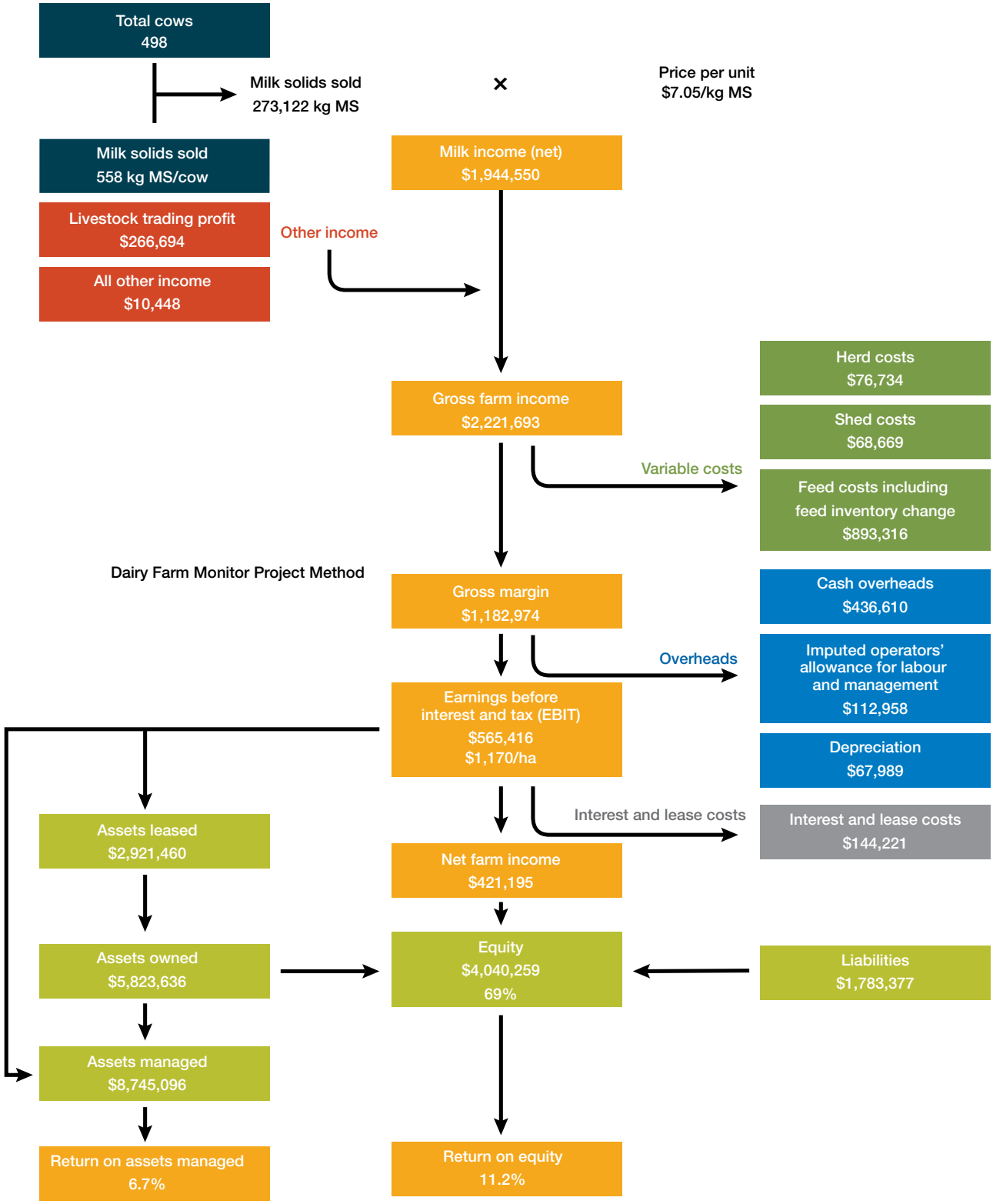
Return on assets indicates the overall earning of the total farm assets, irrespective of capital structure of the business. It is EBIT expressed as a percentage of the total assets under management in the farm business, including the value of leased assets. Return on assets is sometimes referred to as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

Earnings before interest and tax expressed as a return on total assets is the return from farming. 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]

All farms 26



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

Western Australian overview

Western Australian overview

Western Australia produced approximately 4.2%, or 380 million litres, of the Australian milk production in 2016–17. Milk production in Western Australia remained stable in 2016–17, reflecting constant domestic demand conditions, compared to the national decrease of 5.5%.

Following a number of years of industry contraction in Western Australia, the number of milking herds have stabilised at 150, reflecting cautious optimism within the industry.

During 2016–17 there was a significant range in prices received for milk in the WA industry, with the three major processors delivering stark differences to their suppliers. While some farms enjoyed a positive supply relationship, there were instances where supply contracts were not renewed and growth incentives were removed from the market place as processors tried to balance local supply.

The WA dairy industry is located in the higher rainfall (> 900 mm) coastal region of the South West and South Coast of the state.

Land values in the South West are generally higher than the South Coast reflecting greater land use competition from industries such as viticulture and lifestyle pursuits.

The WA dairy region has a Mediterranean climate with consistent winter rainfall and hot dry summers. Western Australia has a ryegrass pasture-based production system based on rain-fed annual pastures on dryland farms and irrigated perennial pastures or summer crops on farms with irrigation. These pasture based systems are supplemented with a range of feeds including concentrates, silage and hay at levels ranging from low input to high input farms.

The farms participating in this project were located from Waroona in the North through to Denmark/ Albany in the south with a good distribution of dryland and irrigation systems and varying herd size.

Western Australian milk continues to be recognised for its high quality, with four WA farms being in the top 100 nationally, based on bulk milk cell count.

2016–17 Seasonal conditions

Drier seasonal conditions prevailed throughout 2016–17, with below average rainfall across most WA dairy regions.

The rainfall in 2016–17 was 17% lower than the average rainfall (Figure 3). Participant farms received an average of 787 mm rainfall, 17% less than the long term average of 947 mm. However, some farms received 25% less than their long-term average annual rainfall.

While Figure 3 shows the individual farm rainfall on an annual basis most participant farms received below long term annual rainfall. For most farms the month in which the rain fell is equally important. Figure 4 shows the average monthly rainfall pattern compared to the long term annual average.

The 2017 season started with a relatively early break in March, providing a good start to the growing season. For farms south of Busselton the break was followed up with reasonable rains providing good quality pasture heading back into winter. However, farms north of Busselton experienced a relatively dry winter which was a cause of poor pasture establishment.

In general, spring conditions were positive with good silage and hay yields. Overall summer conditions were mild.

The April, May and June rainfall deficits led to most farmers feeding out a lot of the surplus spring fodder they created at the end of 2016.

Top 25%* – *The top 25% are shown as the striped bars in all graphs as ranked by return on assets.*

Figure 3 2016–17 Annual rainfall and long term average rainfall of participant farms

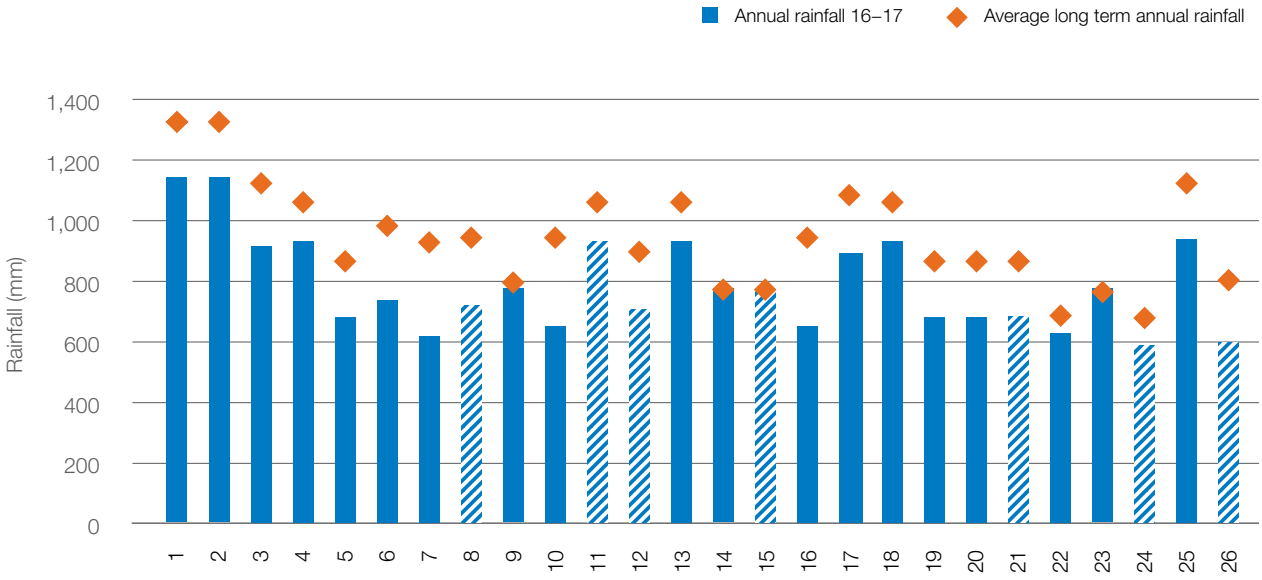
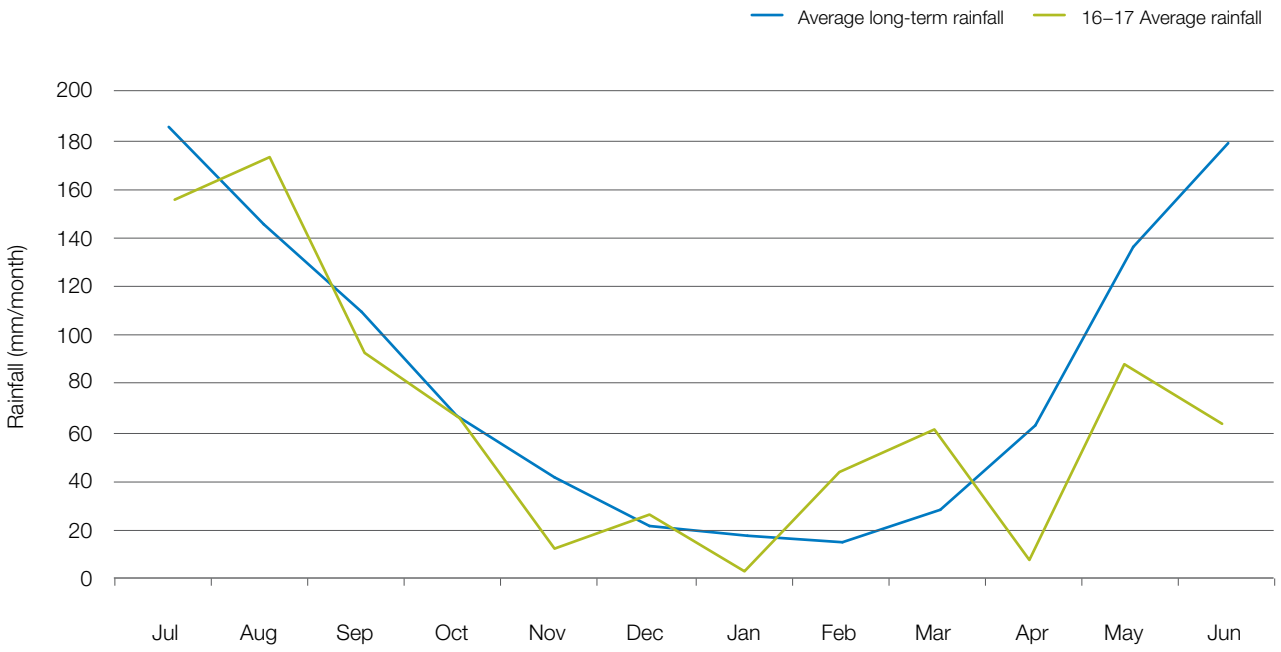


Figure 4 Monthly average rainfall (All farms)



Whole farm analysis

The surplus fodder created in spring 2016, was largely consumed with the late break in 2017. With a relatively constant production profile, a decline in milk price and a decline in the grain price the 2016–17 year can best be described as a "financial image" of the previous year.

The 26 participant farms represented 17% of the Western Australian dairy industry in terms of number of farms, however it represents 26% of milk volume. However, there is a large range of farm and herd size and dairy systems across the participant farmers, so care is required when interpreting averages.

There were eight new entrants into the project so conclusions cannot be drawn from changes in averages, particularly when trying to determine whole farm analysis.

An interesting feature of this year's data is the difference that emerged between the profitability of dryland and irrigated farms. In 2015–16 there was little difference in EBIT and RoA between irrigated and dryland participant farms; with irrigated farms having a higher cost of production (CoP) which was offset by a higher milk price. In 2016–17, dryland systems had RoA of 7.8% compared with 5.9% for irrigated farms, and an EBIT of $2.13/kg MS (15.5 c/l) vs $1.86/kg MS (13.7 c/l). Irrigated farms again had a higher cost of production (1.1 c/l) however their milk price was only 0.2 c/l higher.

A decrease in average herd size of 9% was mainly driven by the substitution of smaller businesses into the project as replacements to larger businesses from 2015–16.

The average labour efficiency kg MS/FTE increased by 6%.

Table 1 presents a summary of the average physical parameters of the 26 participant farms. Further details can be found in the Appendix Table A2 for individual farms.

While the average herd size (number of cows milked for at least three months) was 498, there was a wide range in herd size from 170 to 1,575 cows with two farms milking more than 1,000 cows.

The top 25% participants were, in general, characterised by a larger herd size, higher stocking rate, smaller farm size, higher milk solids per hectare and greater labour efficiency compared to the average.

Table 1 Farm physical data – state overview

Farm physical parameters	Average	Q1 to Q3 range	Top 25% average
Herd size (no. cows milked for at least 3 months)	498	250–643	542
Annual Rainfall 2016–17	787	678–928	713
Water used (irrigation + rainfall) (mm/ha)	1,270	805–1,735	972
Total usable area (hectares)	499	286–626	429
Milking cows per usable hectare	1.0	0.8–1.2	1.3
Milk sold (kg MS/cow)	558	529–583	575
Milk sold (kg MS/ha)	570	443–641	721
Home grown feed as % of ME consumed	61%	54%–66%	60%
Labour efficiency (milking cows/FTE)	96	76–104	112
Labour efficiency (kg MS/FTE)	53,259	40,380–58,957	63,913

Gross farm income

Gross farm income includes all farm income from milk sales, livestock trading profit and other farm income.

While Figure 5 shows how much milk income dominates gross income, other sources are still important to the farm business. Across the participating farms, income from sources other than milk accounted for 13% of gross farm income, but ranged from 6% to 20%.

The majority of the income from other sources is derived from higher livestock trading profit on many WA dairy farms compared to other dairy states. This is a combination of many farms choosing to rear extra heifers to replace an aging herd structure plus rearing steer calves to sell into their beef enterprise.

In 2016–17 the gross farm income of businesses was predominantly from milk sales (87%) supplemented by livestock trading profit (12%) and other farm income (1%).

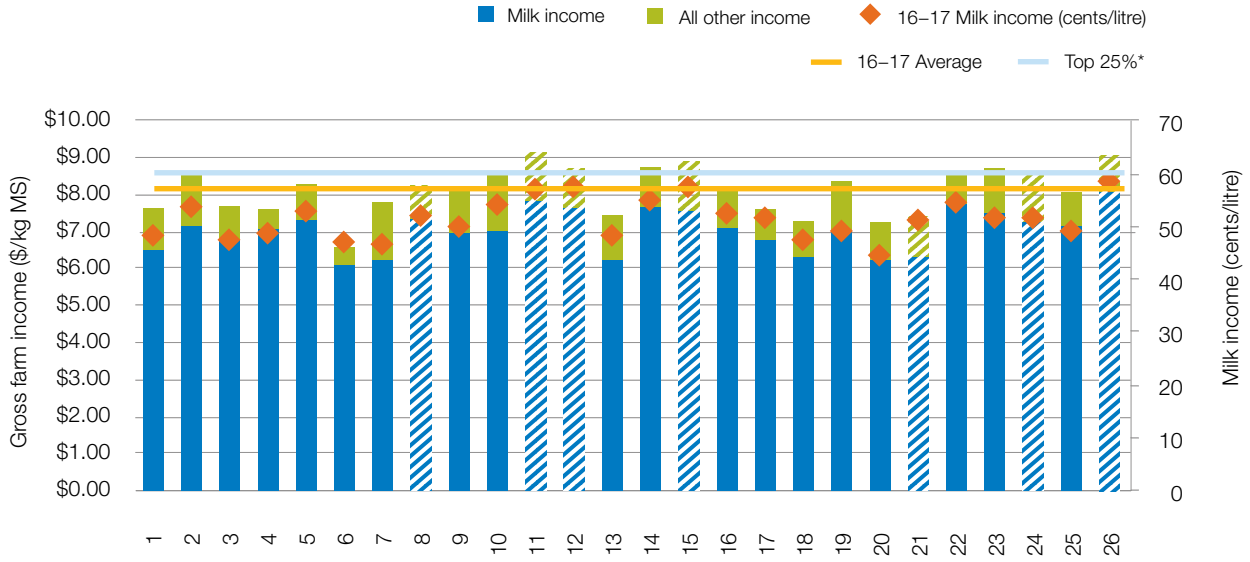
The average milk price received this season was $7.05/kg MS (51.4 c/l) with a range of $6.09/kg MS and $8.11/kg MS (44.6 c/l to 58.7 c/l).

The top 25% performers received an average milk price of $7.45/kg MS (55 c/l) with 87% of gross income coming from milk sales and 12.6% from livestock trading profit with the remaining 0.3% from other farm income.

Average gross farm income in 2016–17 was $8.12/kg MS (59.2 c/l) and $8.56/kg MS (63.2 c/l) for the top 25% performers.

The participants in 2015–16 in comparison had an average gross farm income of $8.30/kg MS (60 c/l) and the top 25% had $8.91/kg MS (63.8 c/l) of gross farm income.

Figure 5 Average farm financial performance per kilogram of milk solids



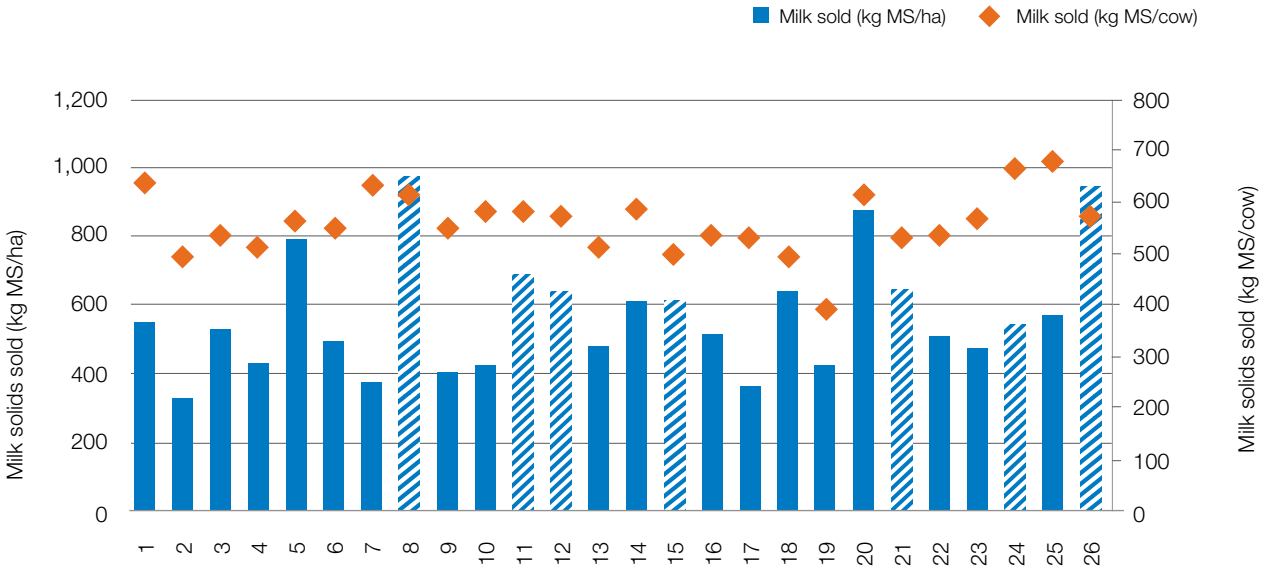
Milk solids sold

There was a large variation in the amount of milk solids sold per usable hectare with a range of 329 kg MS/ha to 970 kg MS/ha reported (Figure 6), with the average being 570 kg MS/ha.

The top 25% of farms sold an average of 721 kg MS/ha which was 26% more than the average of all WA participants mainly driven by stocking rate (30% higher).

The average kilograms of milk solids sold per cow remained stable at 558 kg MS/cow, and ranged between 390 kg MS/cow and 679 kg MS/cow. The top 25% had an average per cow production of 575 kg MS/cow in 2016–17.

Figure 6 Milk solids sold per hectare and per cow



Milk sales versus calving pattern

Figure 7 shows the average milk sales for all participant farms against the monthly distribution of calves born.

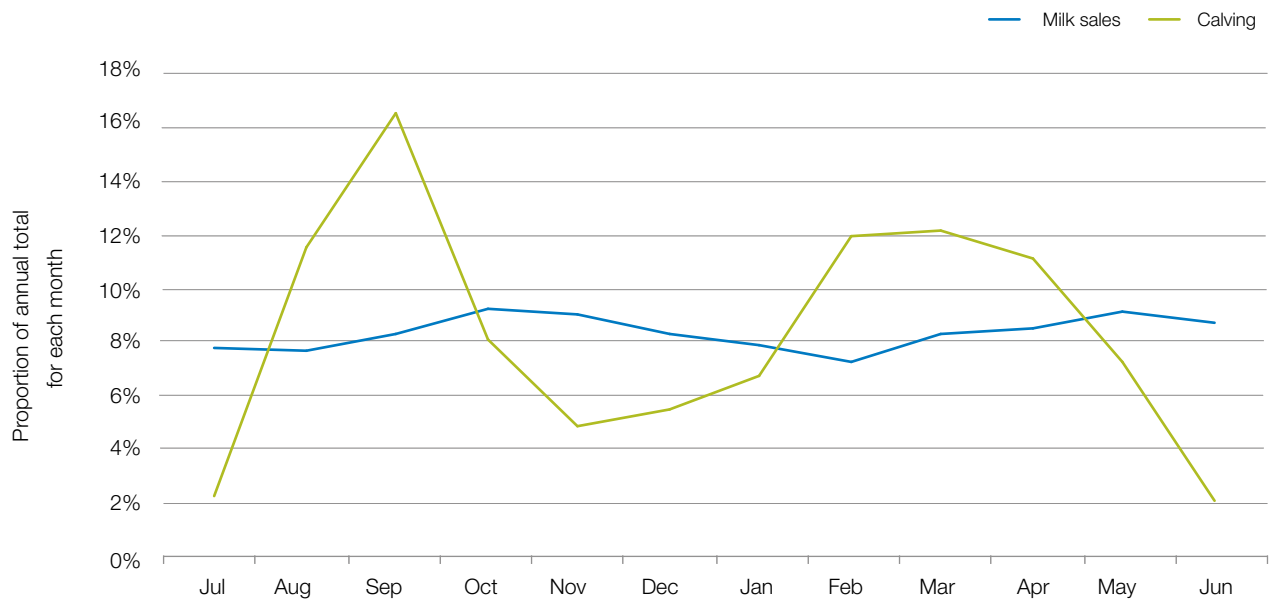
Average monthly distribution of milk production in WA reflects the cost of producing milk in a Mediterranean climate (hot dry summers and mild wet winters) together with processors' requirement for a flatter milk supply for the liquid milk market.

Peak milk production is in spring when pasture growth is greatest and conversely milk production is lowest in summer when reliance on supplements and irrigation is greatest. Reflective of the relatively flat milk supply required to satisfy the WA domestic milk market, participants supplied 9% of annual milk production in October compared to 7% in February. The September spike in calving percentage is being skewed by three farms who calve more than 40% of their calves in spring due to their irrigated systems and wet soils.

Most participants have a split calving pattern being spring and autumn. Many factors influence choice of calving pattern on individual farms including matching feed supply with animal demand, receiving seasonal milk price, rainfall and irrigation, ease of management and herd fertility management.

The 26 participant farms calved 36% of their cows in August to October and another 35% in February to April. However within this sample, irrigation farms would typically calve up to 66% of their cows in spring and 33% in autumn. Dryland farms would typically calve up to 33% of their cows in spring and 66% in autumn.

Figure 7 Milk sales vs calving pattern



Variable costs

Variable costs (Figure 8) are those that change directly according to the amount of output and are measured in cost per kilogram of milk solids. Variable costs include herd, shed and feed costs.

The average variable cost of all participant farms was $3.77/kg MS (27.4 c/l). The range was from $2.60/kg MS to $5.31/kg MS (16.5 c/l to 36.0 c/l). The variable costs average was lower compared to last year's average of $3.95/kg MS excluding feed inventory change. The top 25% had lower variable costs at $3.38/kg MS (24.9 c/l) than the average of all participant farms.

Feed costs were the major variable cost accounting for 86% of total variable costs and 53% of total costs. The top 25% of farms' feed costs were $2.94/kg MS (21.7 c/l), 10% less than the average of $3.25/kg MS (23.6 c/l), excluding feed inventory change, which was minimal this season.

Imported feed decreased to 38% of whole farm metabolisable energy (ME) fed, compared to 43% last year. At the same time, concentrate costs decreased by 10% to an average of $404/t DM. The price of purchased concentrate ranged from $304/t DM to $518/t DM.

The average home grown feed was $136/t DM with the range being $73/t DM to $238/t DM.

The top 25% purchased concentrates on average for $374/t DM and it cost them $138/t DM for home grown feed.

The percentage breakdown of the variable costs can be found in Appendix Table A6.

Overhead costs

The calculation of overhead costs in the Dairy Farm Monitor project consists of cash and non-cash costs to the dairy business. Examples of cash overheads include rates, insurance and employed labour, and non-cash overheads include depreciation of plant and machinery and imputed owner/operator and family labour.

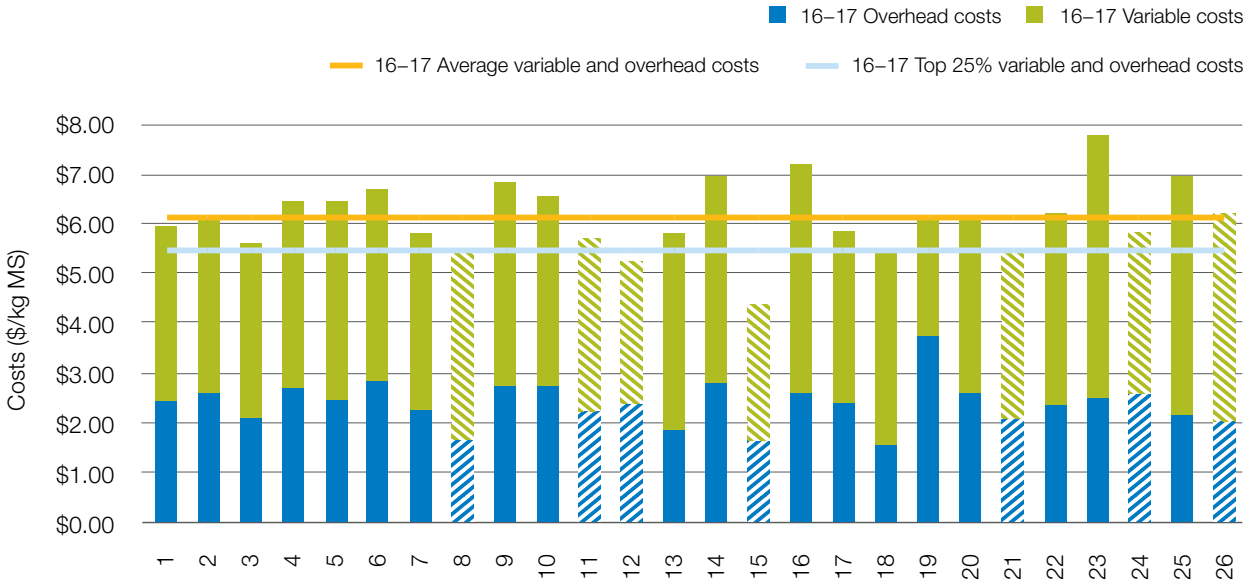
Figure 8 further highlights the variation in overhead costs between participant farms with values ranging from $1.56/kg MS to $3.74/kg MS (11.6 c/l to 26.1 c/l). The top 25% recorded lower overhead costs at $2.09/kg MS (15.4 c/l) compared to the average of $2.39/kg MS (17.4 c/l).

Labour costs, including employed and imputed labour, were the major overhead cost, accounting for 57% of total overhead costs and 22% of total costs.

The breakdown of overheads cost as expressed in $/kg MS and as a percentage of total costs for individual farms can be found in Appendix Tables A5 and A7, respectively.

Repairs and maintenance and depreciation are the other two major overhead cost categories. Spending on repairs and maintenance increased from 8% in 2015–16 to 12% of costs in 2016–17.

Figure 8 Whole farm variable and overhead costs per kilogram of milk solids



Cost of production

Cost of production gives an indication of the cost of producing a kilogram of milk solids. It is calculated as variable costs plus overhead costs and accounts for changes in fodder and livestock inventory.

Table 2 shows that the average cost of production (with inventory changes accounted for) was $6.09/kg MS (44.3 c/l) and the top 25% was $5.38/kg MS (39.6 c/l).

The average cost of production of the top 25% was 12% lower than the average for participant farms with all costs (except employed labour) being equal to or lower than the average. The variable costs were lower than last year primarily due to the reduction in concentrate price and the amount used. Having a low cost of production is one key determinant of being a top 25% producer in 2016–17.

Table 2 Cost of production

Farm Costs	Average		Q1 to Q3 range	Top 25% average	
	$/kg MS	c/l	$/kg MS	$/kg MS	c/l
Variable costs					
Herd costs	$0.26	1.9	$0.18 - $0.32	$0.23	1.7
Shed costs	$0.26	1.9	$0.19 - $0.28	$0.21	1.5
Purchased feed and agistment	$2.04	14.8	$1.53 - $2.26	$1.84	13.6
Home grown feed costs	$1.21	8.8	$0.89 - $1.35	$1.10	8.1
Total variable costs	**$3.77**	**27.4**	**$3.49 - $3.91**	**$3.38**	**24.9**
Overhead costs					
Employed labour	$0.78	5.7	$0.49 - $0.94	$0.82	6.1
Repairs and maintenance	$0.48	3.5	$0.28 - $0.62	$0.39	2.9
All other cash overheads	$0.30	2.2	$0.22 - $0.34	$0.26	1.9
Total cash overheads	**$1.56**	**11.4**	**$1.30 - $1.71**	**$1.48**	**10.9**
Cash cost of production	$5.33	38.8	$4.80 - $5.70	$4.85	35.8
Depreciation	$0.26	1.9	$0.17 - $0.30	$0.27	2.0
Imputed labour	$0.57	4.1	$0.28 - $0.80	$0.34	2.5
Non-cash overheads	$0.83	6.0	$0.51 - $1.06	$0.61	4.5
Cost of production without inventory change	**$6.16**	**44.9**	**$5.63 - $6.53**	**$5.47**	**40.3**
+/- feed invertory changes	-$0.01	-0.1	-$0.07 - $0.01	$0.00	0.0
+/- livestock invertory changes - purchases	-$0.06	-0.5	-$0.40 - $0.12	-$0.09	-0.8
Cost of production with inventory change	**$6.09**	**44.3**	**$5.57 - $6.56**	**$5.38**	**39.6**

Earnings before interest and tax

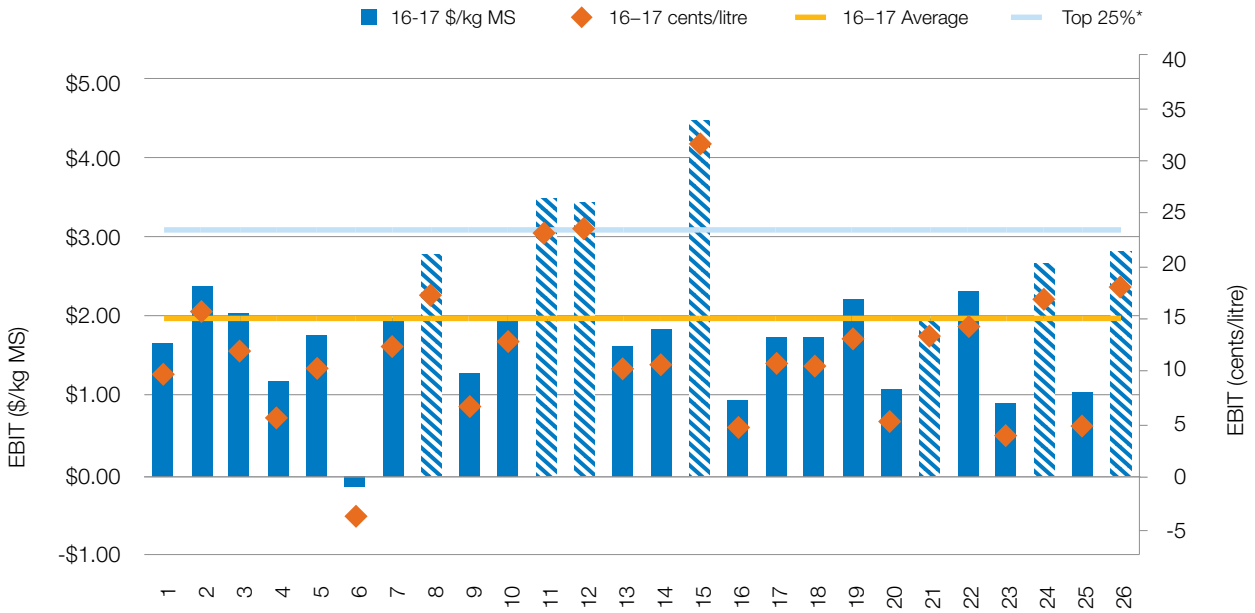
Earnings before interest and tax (EBIT) is the gross farm income less variable and overhead costs. As EBIT excludes interest and lease costs, it is a valuable measure of operating profit. Figure 9 shows the EBIT per kg MS.

The average EBIT for 2016–17 was $565,416 per farm, down from $617,059 per farm in 2015–16, noting participant changeover this year.

On average, EBIT per kg MS decreased marginally to $1.98/kg MS (14.5 c/l) in 2016–17 from $2.02/kg MS (14.6 c/l). The relatively stable EBIT is a reflection of the lower milk price being offset by the lower concentrate price.

The strength of the top 25% performers was highlighted with an average EBIT of $3.10/kg MS (22.9 c/l) meaning they were able to retain 36% of their gross farm income compared to 24% for the average.

Figure 9 Whole farm earnings before interest and tax per kilogram of milk solids



Return on assets and equity

Return on assets (RoA) is EBIT expressed as a percentage of total assets under management. It is an indicator of the overall earning power of total assets, irrespective of capital structure. Figure 10 to Figure 13 were calculated excluding capital appreciation.

The average RoA for participants was 6.7%, up from last year's 6.6%, ranging from negative 0.3% to 15.2% (Figure 11). Sixty two per cent of participants recorded a RoA greater than 5% and six farms (23%) achieved a RoA greater than 10%.

The market value of land varied widely across the 26 farms, depending on location and land capability. While the average land value was $17,839/ha across all farms (range $10,271/ha to $27,803/ha) there were seven farms with land values greater than $20,000/ha. As a result, this wide variation of land asset value has a significant impact on return on assets.

Figure 10 Distribution of farms by return on assets

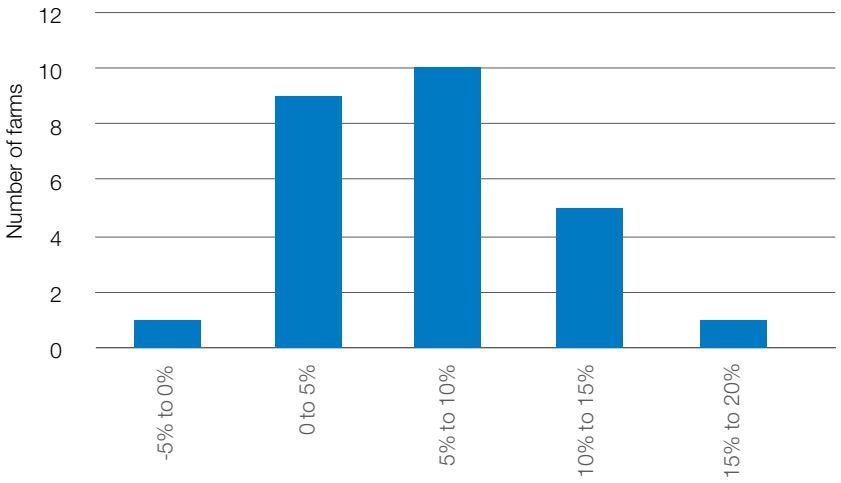
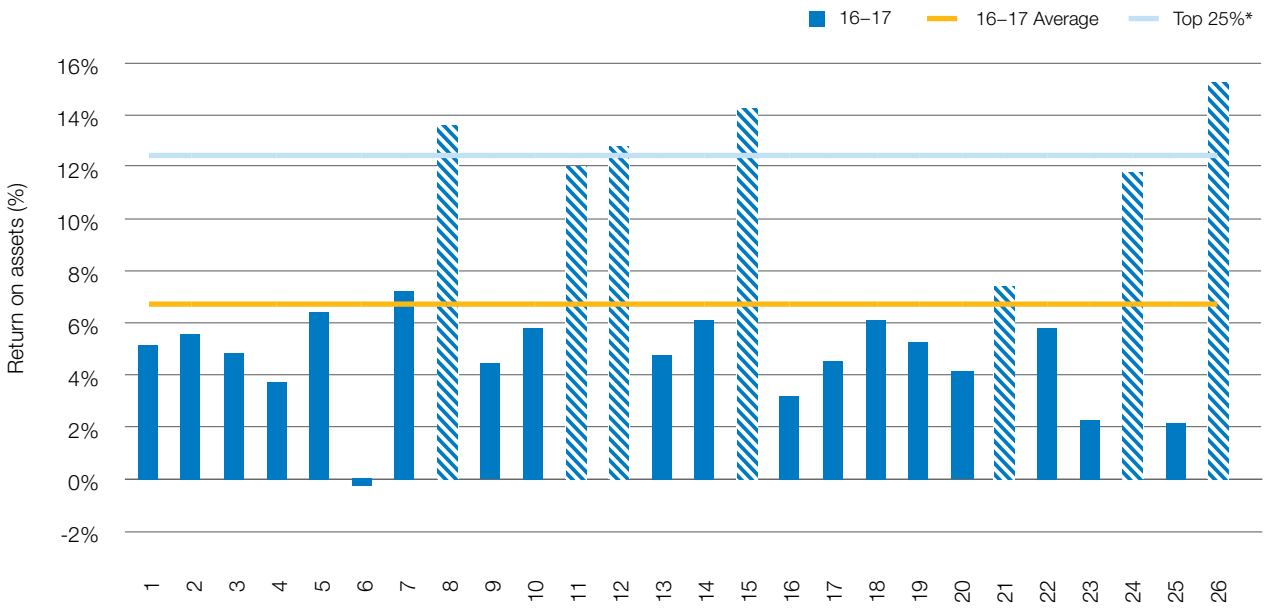


Figure 11 Return on assets



Return on equity is the net farm income expressed as a percentage of owners equity. It is a measure of the owner's rate of return on their investment.

The average return on equity (RoE) for the 25 farms was 11.2% in contrast to 9.4% last year. This figure is an average of 25 farms as there was an outlier RoE that exceeded 200%, due to the way the business is structured. Return on equity ranged from negative 2.2% to 212.3% with the second highest being 40.3%. The majority (42%) of farms recorded a RoE between 5% and 10%. (Figure 12 and Figure 13). Further discussion of return on assets and return on equity occur in the risk section below. Appendix Table A1 presents all the return on assets and return on equity for the participant farms.

Figure 12 Distribution of farms by return on equity

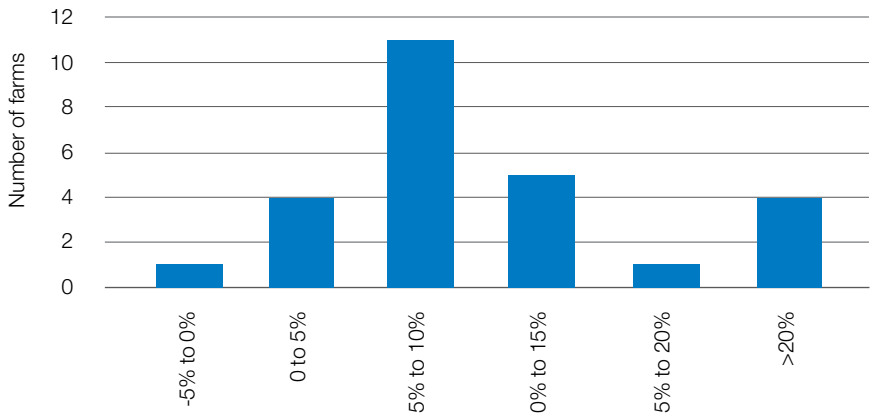
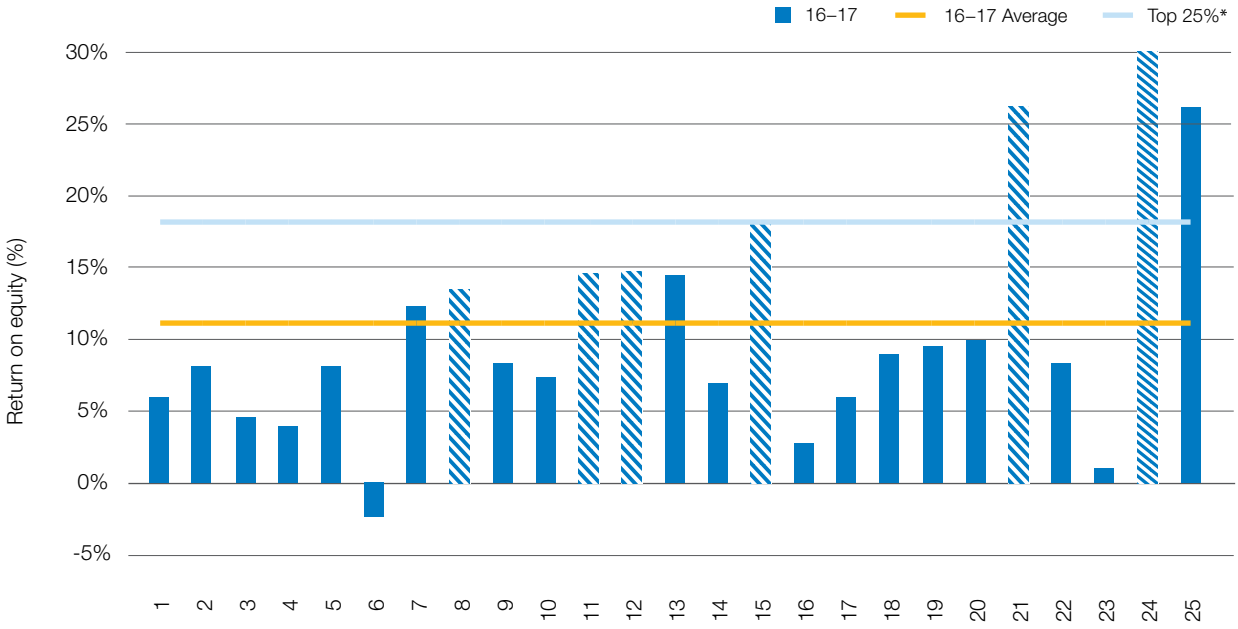


Figure 13 Return on equity



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.

Exposure to risk in business is entirely rational if not unavoidable. It is through managing risk that greater profits can be made. 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 then 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 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.

All but two farms in the project rely on imported feed for at least 25% of the herd's feed requirement. With an average of 39% of feed imported, WA dairy farms are exposed to fluctuations in prices and supply in the feed market. The percentage of imported feed ranged from 17% to 55%.

Equity levels averaged 69% and was the first time it has dropped below 70% in the past four years. Again this is more likely due to the changeover in participants as the original 16 farms still have an average equity of 76%.

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, $0.61 was used to cover variable costs. One hundred minus this percentage gives the proportion of total costs that are overhead costs.

The debt services ratio shows interest and lease costs, as a proportion of gross farm income. This year's ratio of 7% indicates that on average farms repaid $0.07 of every dollar of gross farm income to their creditors.

The benefit of taking risks and borrowing money can be seen when farm incomes yield a higher return on equity than on their return on assets. In 2016–17, 22 of the 26 of participant farms (85%) received a return on equity greater than their return on assets. 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.

The higher the risk indicator (or lower with equity %) in Table 3, the greater the exposure to the risk of a shock in those areas of the business. Appendix Tables A4 and A5 show the variable and overhead costs incurred by individual farms expressed in $/kg MS sold.

Table 3 Risk indicators – statewide

	2013–14	2014–15	2015–16	2016–17
Cost structure (proportion of total costs that are variable costs)	62%	63%	63%	61%
Debt servicing ratio (percentage of income as finance costs)	8%	7%	6%	7%
Debt per cow	$2,972	$2,798	$3,138	$3,231
Equity percentage (ownership of total assets managed)	76%	78%	76%	69%
Percentage of feed imported (as a % of total ME)	38%	37%	43%	39%

[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

Participant farms sourced 44% of their metabolisable energy (ME) from directly grazed pasture and 12% of their metabolisable energy came from silage. Concentrates provided 37% of metabolisable energy.

Feed consumption

Pasture consumption is calculated to be the difference between the total energy required on farm for all livestock classes and the energy provided from concentrates, silage, hay and other sources. A further description of the Energetics method used to calculate energy sources and feed consumption can be found in the Appendix B.

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

In 2016–17, 63% of the diet metabolisable energy (ME) was forage based; with grazed pasture the major component of the cows' diet at 44% (Figure 14).

Concentrates supply the greatest proportion of ME of all the supplements fed, accounting for 37% of the diet.

The remainder of the diet ME was supplied by silage (12%) and hay (8%).

Appendix Table A3 provides further information on purchased feed.

Grazed pasture consumption was estimated by using a back calculation method embedded in DairyBase, rather than the previously used DEDJTR pasture calculator, therefore despite similar methodology the results may not be directly comparable with previous years.

Home grown feed can be grazed pasture (shown as blue bars in Figure 15) and conserved pasture (shown as green bars).

The average total pasture harvested (grazed and conserved) from the milking area was 6.3 t DM/ha, increasing from 5.8 t DM/ha last year.

The amount of pasture consumed as directly grazed feed on the milking area this year averaged 5.1 t DM/ha, ranging from 1.1 t DM/ha to 10.8 t DM/ha.

Total pasture harvested (by direct grazing or conservation) on the usable area increased to 5.1 t DM/ha in 2016–17, from 4.6 t DM/ha last year and ranged from 3.2 t DM/ha to 7.9 t DM/ha.

There is a strong indication that the top 25% performers manage the pasture base better than the average with high consumption across all the usable area, rather than just the milking area. This infers the top 25% businesses understand that the land is a resource, and managing all the pasture well, is essential in lowering the cost of production.

It should be noted that there can be a number of sources of error in this method including incorrect estimation of live-weight, amounts of fodder and concentrates fed, ME concentration of fodder and concentrate, ME concentration of pasture, wastage of feed and associative effects between feeds when they are digested by the animal. Comparing pasture consumption estimated using the back calculation method between farms can lead to incorrect conclusions due to errors in each farm's estimate and it is best to compare pasture consumption on the same farm over time using the same method of estimation.

More details on how pasture consumption was calculated can be found in Appendix B.

Figure 14 Sources of whole farm metabolisable energy

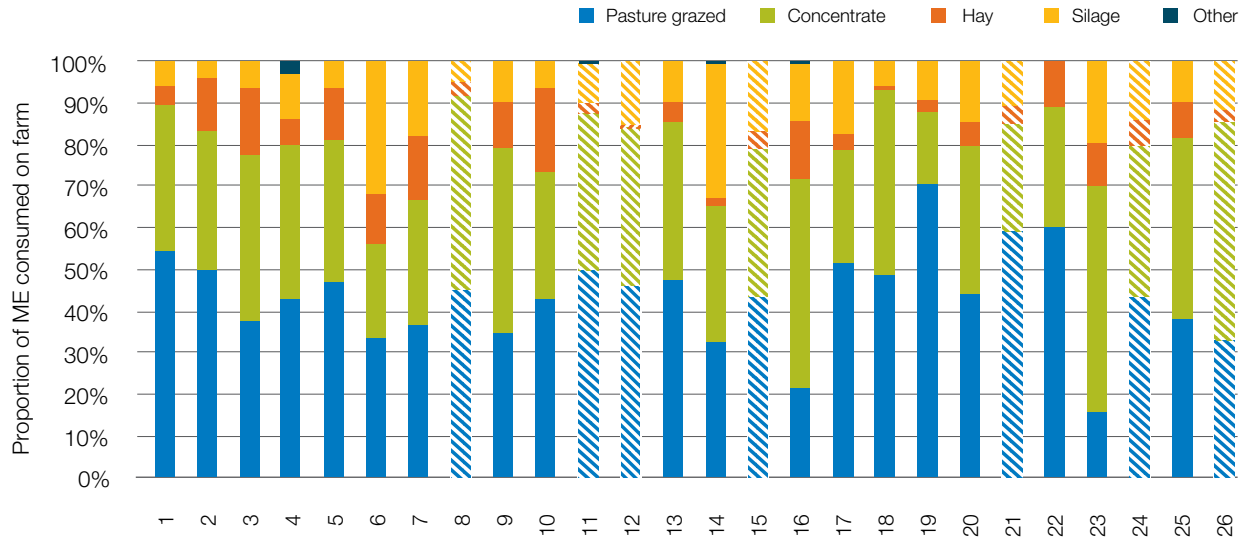


Figure 15 Estimated tonnes of home grown feed consumed per milking hectare

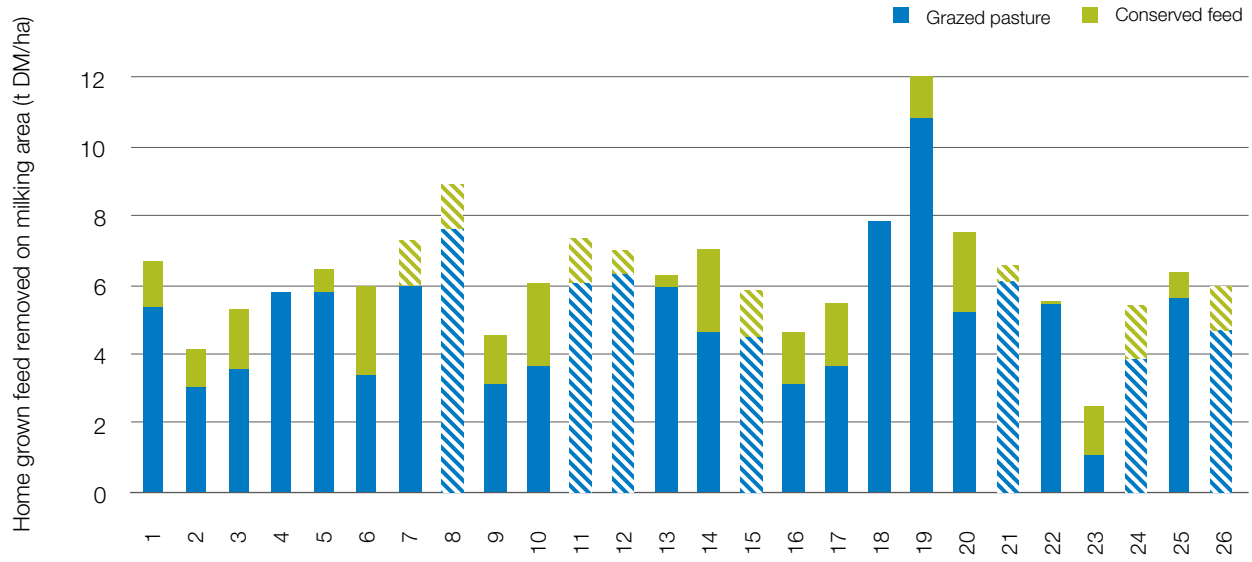
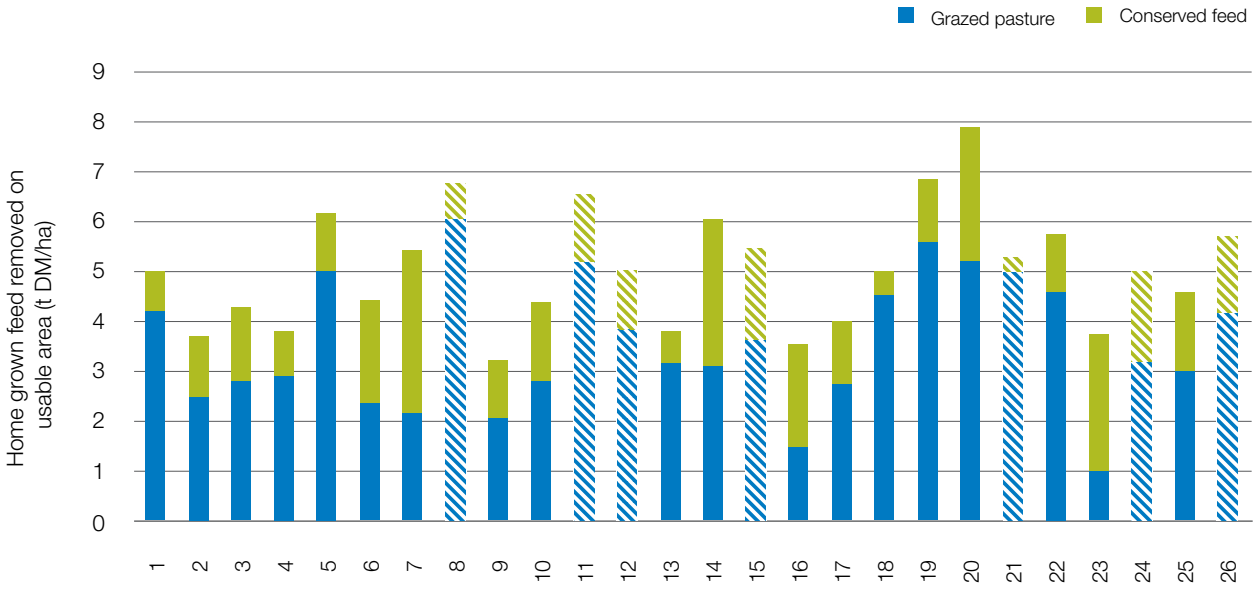


Figure 16 Estimated tonnes of home grown feed consumed per usable hectare



Fertiliser application

Application of total nutrients between participant farms have steadily increased since the start of the project in 2013–14, but driven mainly by increases in nitrogen application.

The average total nutrient use was 189 kg/ha comprising of 109 kg/ha nitrogen, 14 kg/ha phosphorus, 38 kg/ha potassium and 28 kg/ha sulphur (Table 4).

It should be noted that water availability, pasture species, soil type, pasture management, seasonal variation in response rates to fertilisers, variations in long-term fertiliser strategies plus other factors will all influence pasture growth and fertiliser application strategies. These particular strategies are not captured as part of this project.

Western Australian participant farms used a wide range of fertilisers and fertiliser application rates, both between farms and with the mix of key macronutrients on individual farms.

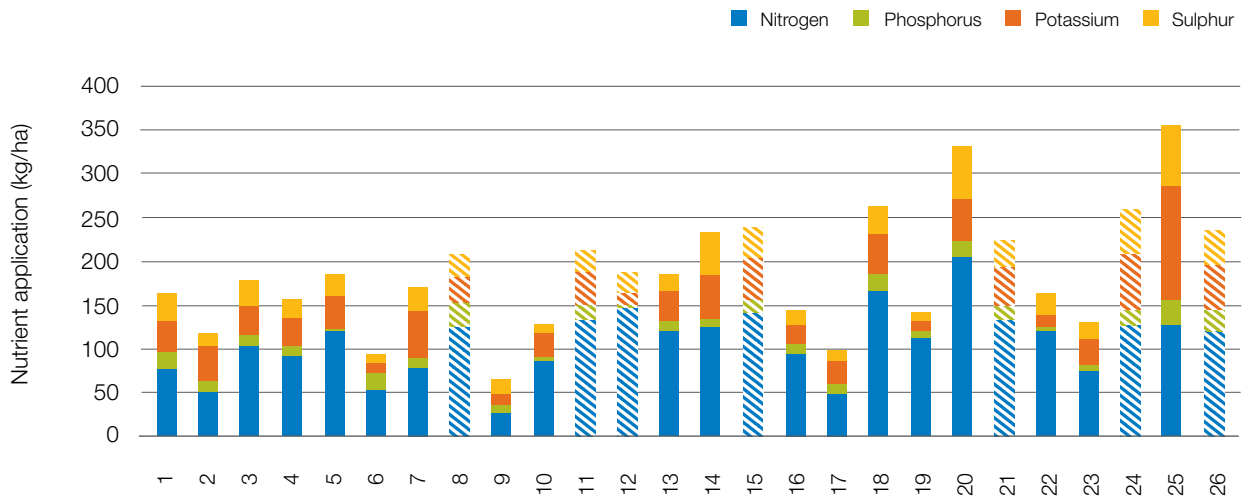
Nitrogen applied varied from 28 kg N/ha up to 206 kg N/ha, with the group average at 109 kg N/ha (Figure 17). Farms in the top 25% applied 22% more nitrogen than the average at 133 kg/ha; 25% more phosphorus at 18 kg/ha compared to the average of 14 kg/ha; and 8% more potassium at 41 kg/ha compared to the average of 38 kg/ha.

It should also be recognised that grazing strategies and timing of rainfall and irrigation scheduling would also impact upon pasture growth and consumption. The values for Figure 17 can be found in Appendix Table A2

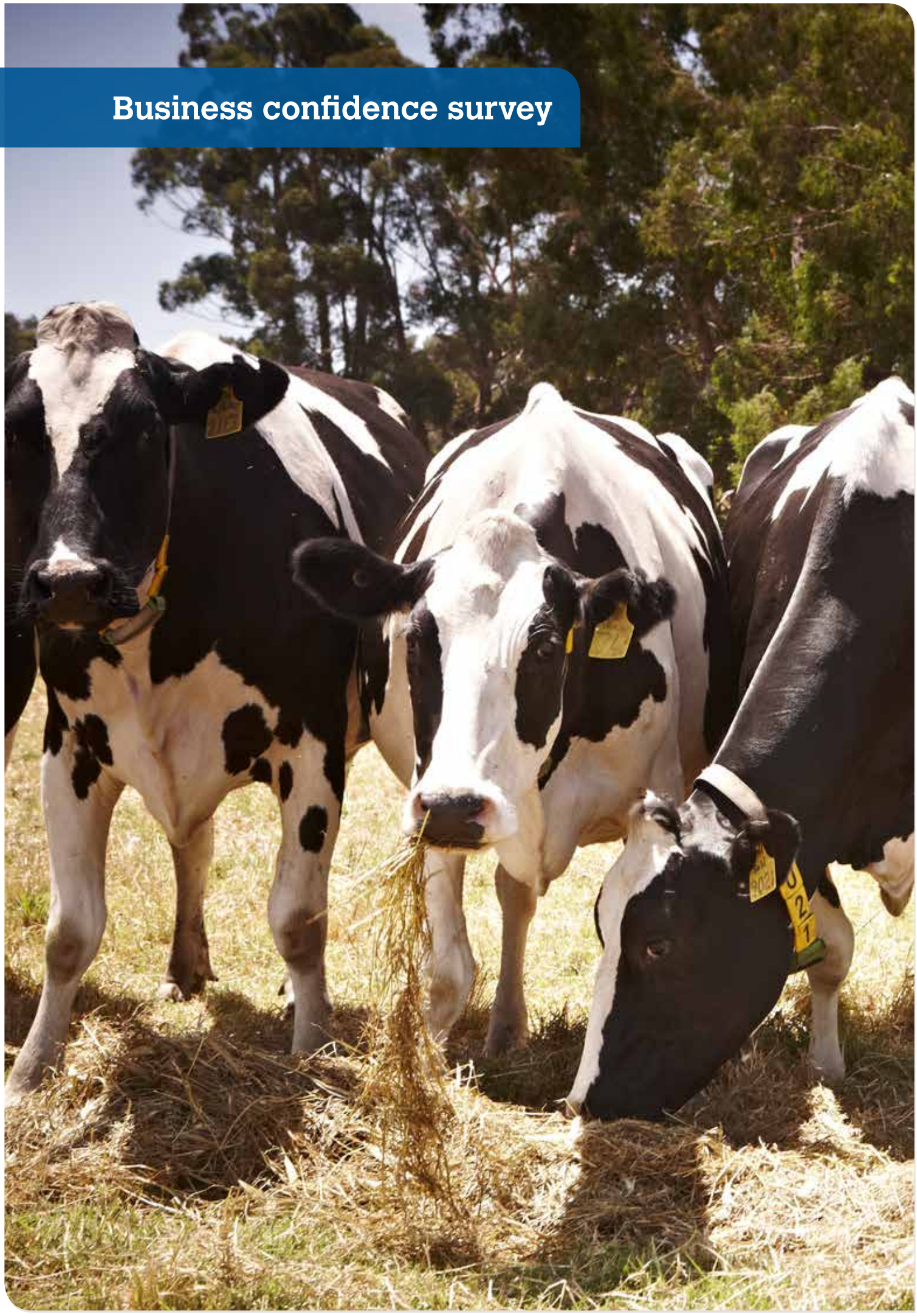
Table 4 Fertiliser use

	2013–14	2014–15	2015–16	2016–17
Nitrogen kg/ha	86	89	97	109
Phosphorus kg/ha	12	14	16	14
Potassium kg/ha	34	38	41	38
Sulphur kg/ha	25	29	28	28

Figure 17 Fertiliser application (kg/ha)



Business confidence survey



Expectations and issues

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

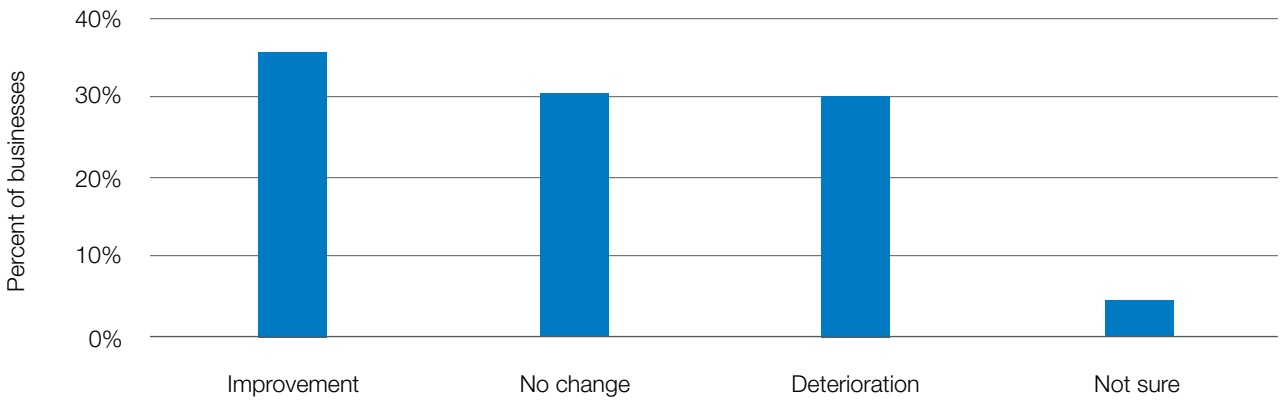
Expectation for business returns

Following a reasonable year in 2016–17, the uncertainty of future milk supply contracts seriously impacted on industry confidence. Expectations for the coming season remained more cautious with 35% of farmers predicting an improvement in farm business returns compared to 32% last year. The expectations of stability or deterioration were similar at 31%. Only 4% were not sure what would happen to their business returns in 2017–18.

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

The respondents expectations for farm business returns for 2017–18 were split evenly across improvement, no change and deterioration (Figure 18). This balanced view is largely driven by the businesses with a low milk price stating “it has to get better” and the businesses with a high milk price stating “I don’t think this will last”.

Figure 18 Expectation of business returns



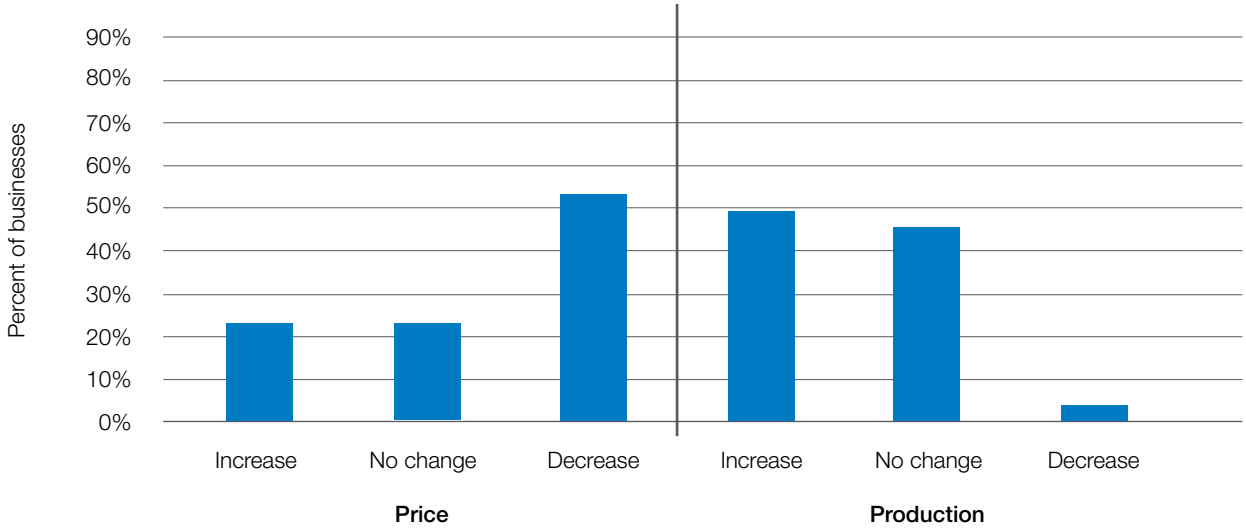
Price and production expectations – Milk

An equal number of participating farmers expected their milk price either to increase or remain unchanged in 2017–18. A large number of respondants (54%) expected their milk price to decrease in 2017–18 (Figure 19).

Last year, none of the participants expected an increase in milk price.

Half of the participants expected to increase production while 46% would maintain their production level and one participant expecting to decrease. The previous year there were two businesses expecting to decrease their milk production.

Figure 19 Prices and production expectations – Milk



Price and production expectations – Fodder

The question on farmers' expectations of fodder price was not asked in this year's survey, however expectations for fodder production were captured.

Forty two per cent of participating farmers expected no change in fodder production in 2017–18 (Figure 20).

Most farmers (50%) indicated that they expected an increase in their fodder production in 2017–18, however, a great majority (96%) predicted an increase in purchased feed. (Figure 21).

Cost expectations

The majority of farmers expected input costs to remain unchanged or increase in all categories except purchased feed (Figure 21). The majority of farm businesses were not expecting changes to fertiliser, fuel and oil and repairs and maintenance costs.

Twenty-seven per cent of participants thought fertiliser costs would increase, with 31% expecting rises in labour costs.

Among the irrigators, 46% predicted an increase in irrigation costs to their business, which is resulting in some irrigators choosing to reduce irrigation over the summer months.

Figure 20 Production expectations – Fodder

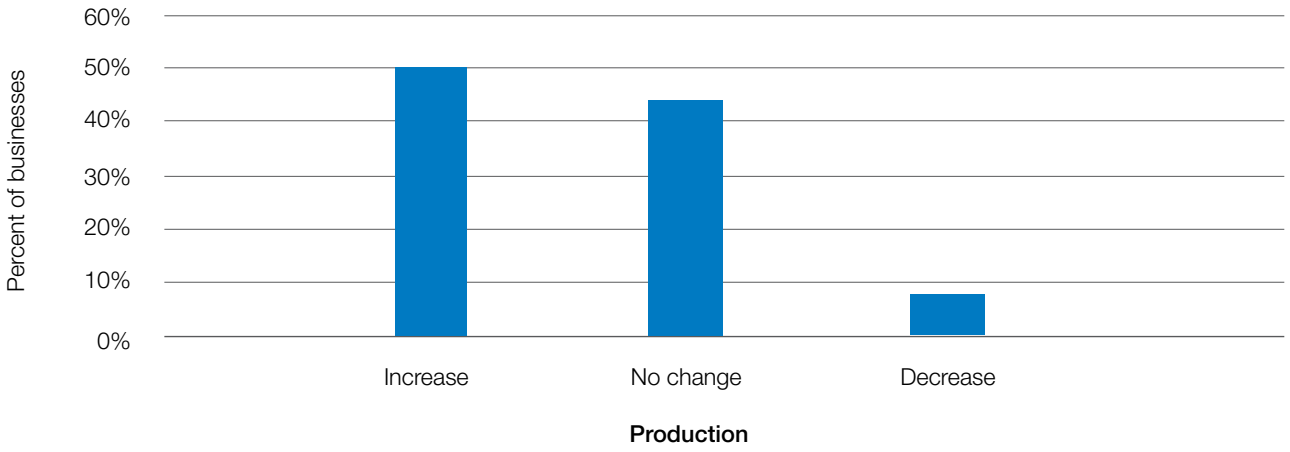
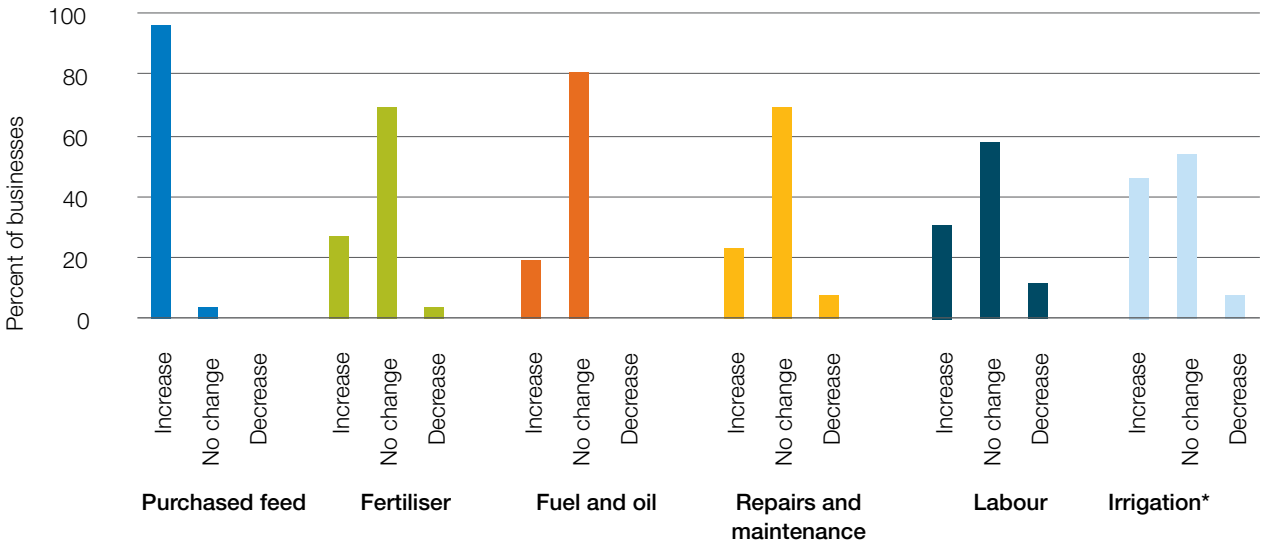


Figure 21 Cost expectations



only includes responses from 10 farms with irrigation

Major issues facing the dairy industry – the next 12 months

Figure 22 provides a summary of the key issues identified by participants for the coming 12 months.

Of the issues considered a major concern managing climate and seasonal conditions (24%) was the most common facing participants. This is not surprising after a late autumn break.

The production of pasture and fodder, associated with seasonal conditions, was the second major issue followed closely by milk price and input costs.

Succession planning, labour and water remained less important concern for 2017–18.

Major issues facing the dairy industry – the next five years

Participants were asked to respond to seven key issues for their business over the next five years to 2021-22 (Figure 23).

Milk price (20%), input costs and seasonal conditions were ranked equally important at around 19% each, with pasture/fodder at 16%. Succession planning (11%) and water (4%) were seen as the least concern to effect WA farms, which is a function of a high proportion of dryland farms.

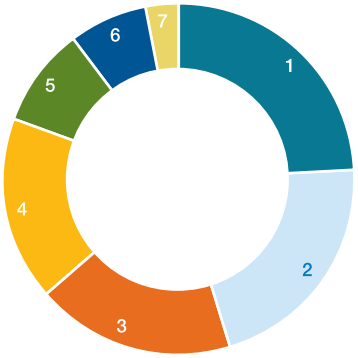


Figure 22 Major issues facing the dairy industry – the next 12 months

1 Climate/seasonal conditioins **24%**

2 Pasture/fodder **21%**

3 Milk price **18%**

4 Input costs **17%**

5 Succession planning **9%**

6 Labour **7%**

7 Water **3%**

Figure 23 Major issues facing the dairy industry – the next 5 years

1 Milk price **20%**

2 Input costs **19%**

3 Climate/seasonal conditioins **19%**

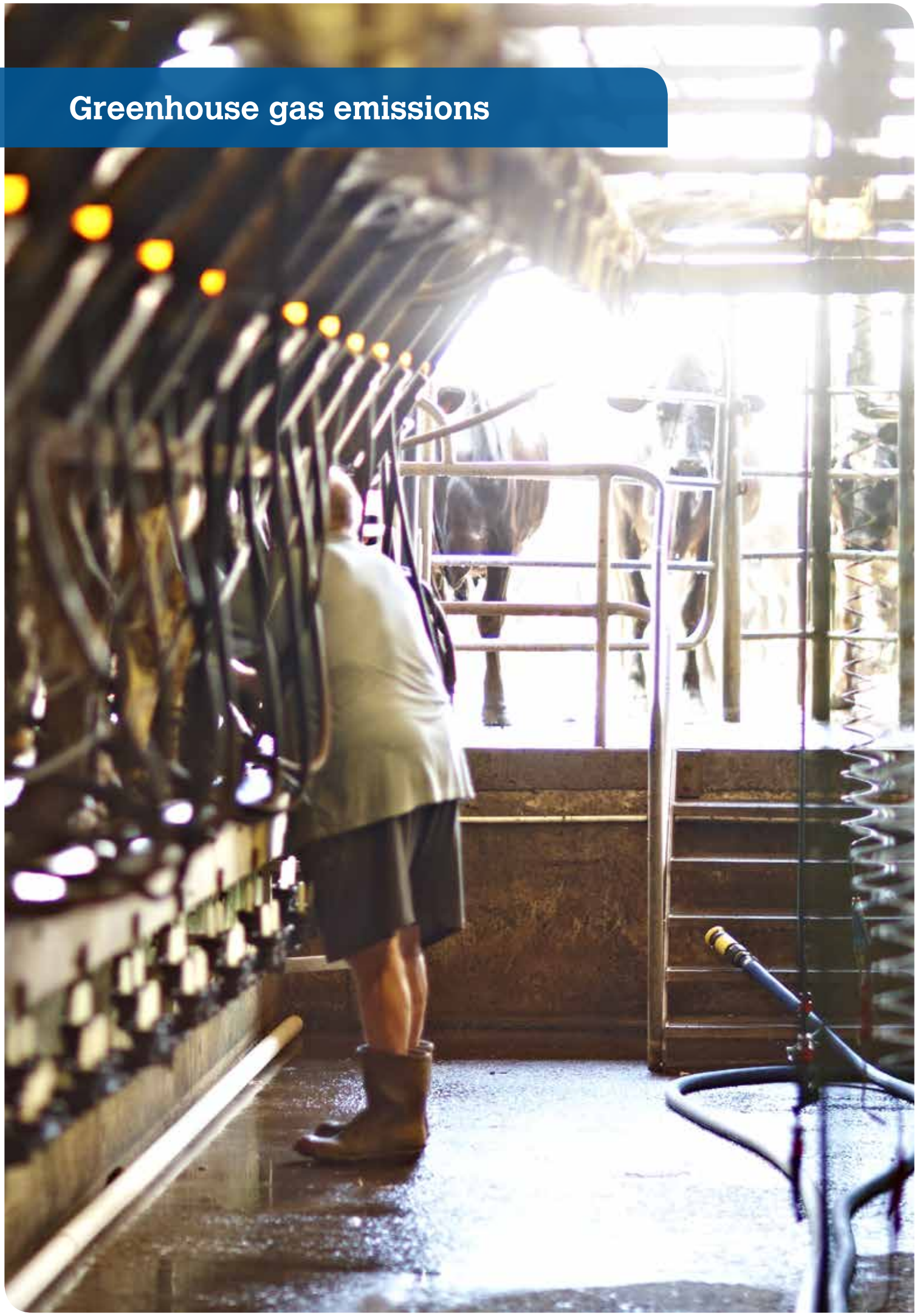
4 Pasture/fodder **16%**

5 Labour **11%**

6 Succession planning **11%**

7 Water **4%**

Greenhouse gas emissions



2016–17 Greenhouse gas emissions

The average level of emission from participating farms was 18.1 t CO_2-e/t MS in 2016–17, 30% higher than last year's 13.9 t CO_2-e/t MS. While the changes for CO_2 were minimal (4%), both the CH_4 (39%) and N_2O (30%) increased significantly.

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 (NGGI) altered 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). This means that one CO_2-e tonne equates to 40 kg of methane (CH_4) and 3.4 kg of nitrous oxide (N_2O). Other changes have included a decrease in the proportion of waste (dung and urine) deposited onto pastures while the milking herd graze, resulting in an increase in waste CH_4 and N_2O emissions along with some 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. This is the greenhouse gases emitted with the manufacturing of fertilisers and the production of purchased fodder, grain and concentrates. The result of these changes with the NGGI method and inclusion of pre-farm gate emissions will be an increase in emissions intensity of around 30%. This percentage increase will vary between farms in the state.

The distribution of different emissions for 2016–17 is shown in Figure 24. Greenhouse gas emissions per tonne of milk solids produced ranged from 12.7 CO_2-e/t MS to 24.5 t CO_2-e/t MS with an average emission level of 18.1 t CO_2-e/t MS. The percentage breakdown for emissions in 2016–17 was 70% for CH_4, 18% for CO_2, and 12% for N_2O emissions.

Methane was identified as the main greenhouse gas emitted from dairy farms, accounting for 70%, or 12.7 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 61% of total emissions. Methane from effluent ponds accounted for 9% 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.

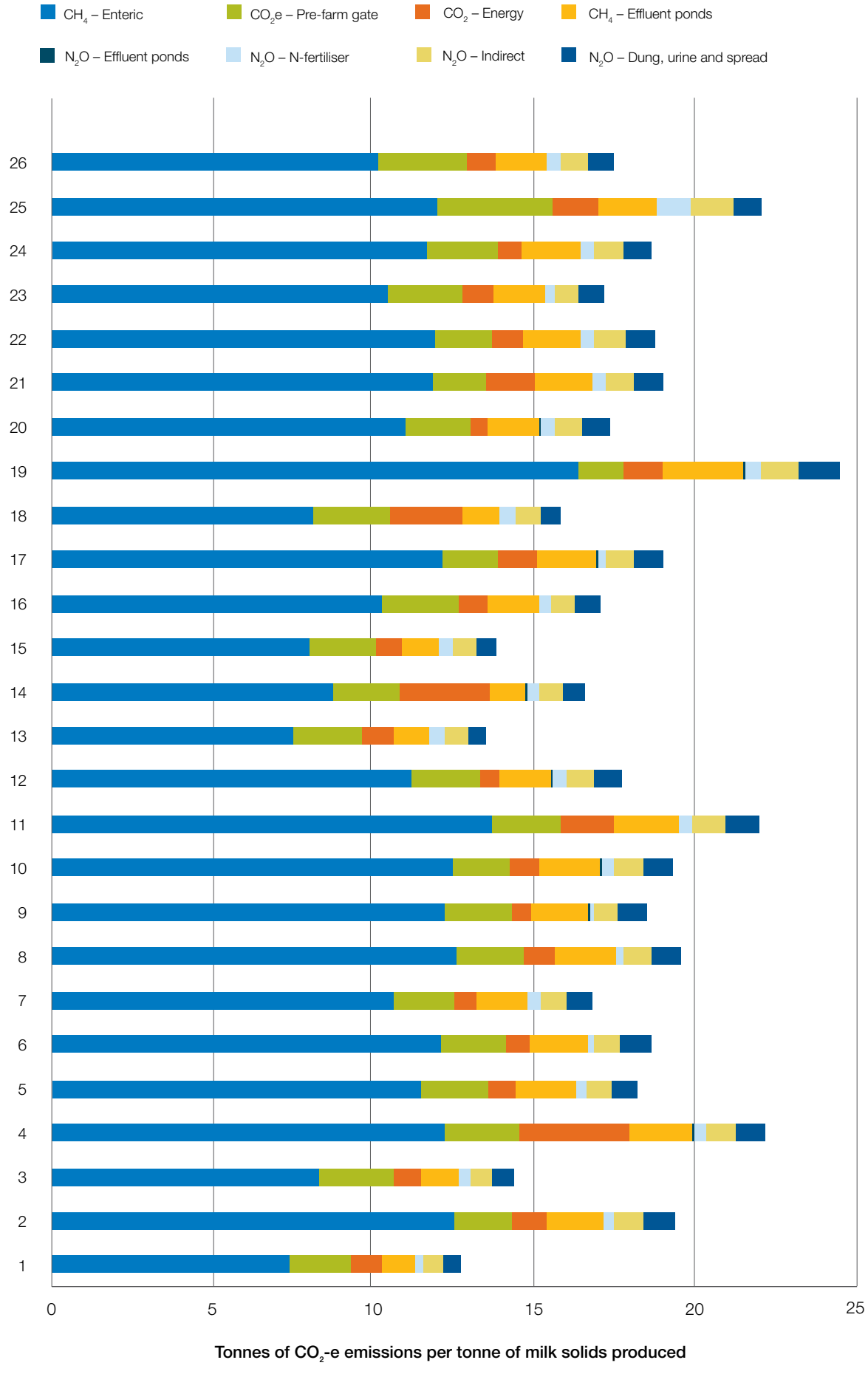
The second main greenhouse gas emission was CO_2 being produced primarily from fossil fuel consumption as either electricity or petrochemicals. The NGGI calculates carbon emissions from both pre-farm gates and on-farm sources. Carbon dioxide accounted for 18% of total emissions (3.3 t CO_2-e/t MS); 12% from pre-farm gates sources and 6% from on-farm energy sources. Output levels were highly dependent on the source of electricity. Farms were more likely to use brown coal generated electricity than electricity sourced from renewable sources (eg 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, accounting for 12% of total emissions or 2.1 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 and excreta accounted for 5%. 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 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

In real terms, the EBIT for 2016–17 is lower than the previous two years for the DFMP participants, however the average RoA is very similar at 6.7%. In the four years the project has run in WA, the majority of costs, both variable and overhead have remained largely the same in real terms. Real farm incomes were down from the past two years, due to milk price decreases, and were similiar to 2013–14.

This section compares the performance of participant farms in the Dairy Farm Monitor Project over the past four years. While figures are adjusted for inflation to allow comparison between years it should be noted that only 16 farms from the initial 30 farms in 2013–14 have participated over all four seasons of the project with eight new farms participating in 2016–17.

The average EBIT and net farm income decreased for the second year in a row, however they were higher than at the start of the project in 2013–14 (Figure 29).

Earnings before interest and tax as well as net farm income declined slightly in 2016–17 due to the average milk price decreasing by $0.31/kg MS to $7.05/kg MS (adjusted for inflation). The 34% increase in EBIT in 2014–15 from 2013–14 was primarily due to a 5% higher milk price received (average of $7.28/kg MS in 2014–15 compared to $6.92/kg MS in 2013–14 (both values adjusted for inflation) coupled with good seasonal conditions.

Return on assets (RoA) at 6.7% in 2016–17 has remained relatively stable over the last three years after increasing significantly from 4.6% RoA in 2013–14 (Figure 26).

In all of the past three years, all participating farms have achieved a positive RoA, except one in 2016–17. In the last three years more than 60% of farms achieved a RoA greater than 5% compared to only 37% of farms in 2013–14. The smaller proportion of farms' positive performance in 2013–14 was due to a lower milk price and higher feed costs.

The average return on equity (RoE) increased significantly from 5.2% in 2013–14 to 9.0% in 2014–15, 9.4% 2015–16 and a very healthy 11.2% in 2016–17.

Figure 25 Historical EBIT and net farm income

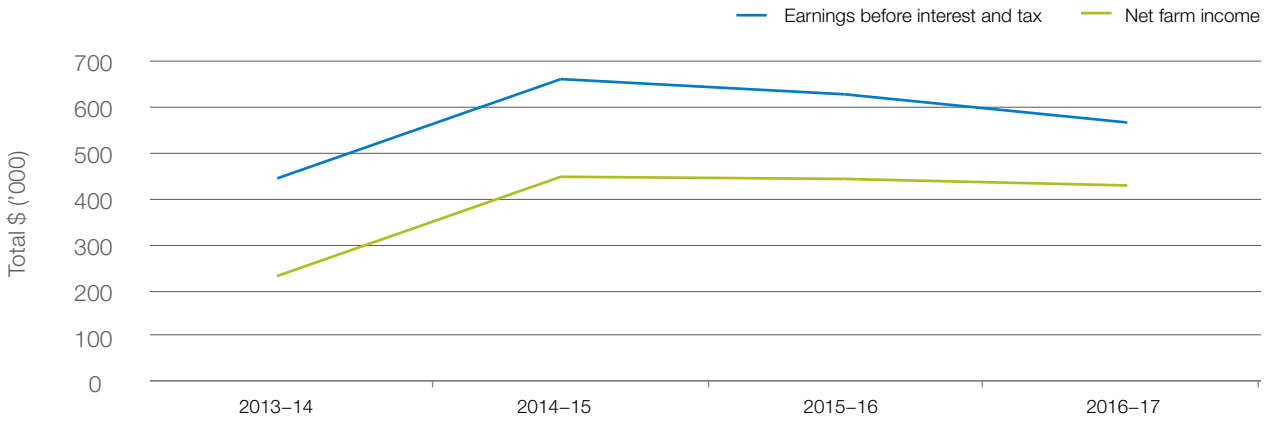
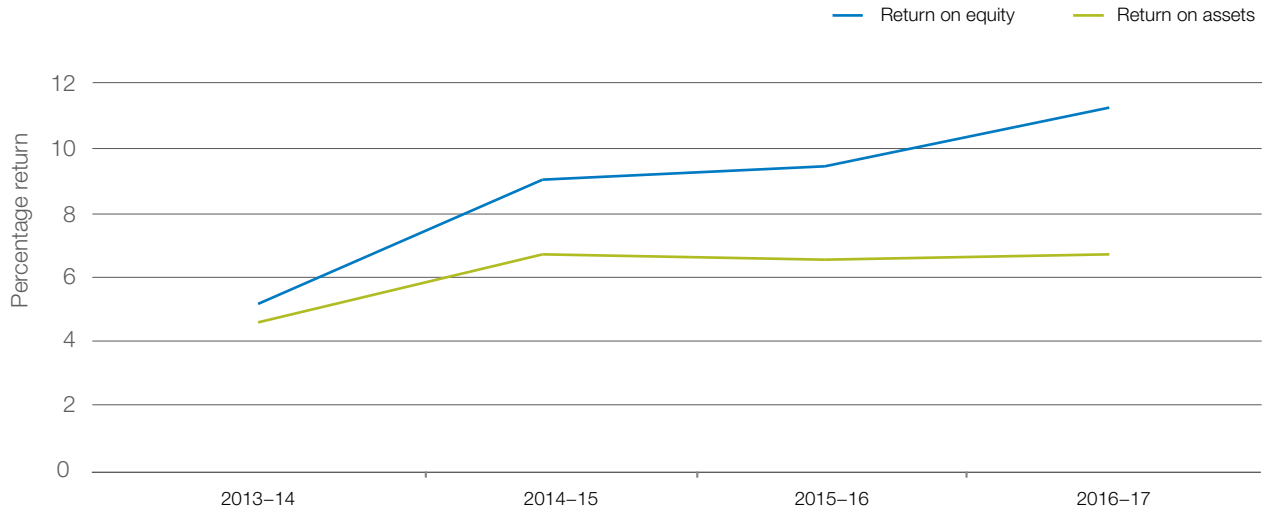


Figure 26 Historical return on assets and return on equity



Appendices

Appendix A: Western Australia 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 assets (excl. 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	%
1	$6.52	$1.13	$7.65	$3.53	$2.46	59%	$1.66	5.1%	$0.49	6.4%	$1.17	6.0%
2	$7.15	$1.38	$8.53	$3.52	$2.61	58%	$2.41	5.5%	$0.77	9.0%	$1.64	8.3%
3	$6.77	$0.90	$7.67	$3.53	$2.10	63%	$2.04	4.9%	$0.54	7.1%	$1.49	4.6%
4	$7.10	$0.56	$7.65	$3.77	$2.70	57%	$1.19	3.8%	$0.68	8.9%	$0.51	4.0%
5	$7.32	$0.93	$8.26	$4.06	$2.43	63%	$1.77	6.4%	$0.33	4.0%	$1.44	8.2%
6	$6.09	$0.48	$6.57	$3.86	$2.87	57%	-$0.15	-0.3%	$0.23	3.5%	-$0.38	-2.2%
7	$6.24	$1.59	$7.83	$3.58	$2.27	62%	$1.98	7.2%	$0.65	8.3%	$1.32	12.3%
8	***$7.36***	***$0.87***	***$8.23***	***$3.79***	***$1.65***	***70%***	***$2.78***	***13.6%***	***$0.00***	***0.0%***	***$2.78***	***13.6%***
9	$6.97	$1.17	$8.14	$4.09	$2.77	60%	$1.28	4.4%	$0.60	7.4%	$0.68	8.4%
10	$7.03	$1.55	$8.58	$3.84	$2.74	58%	$2.00	5.7%	$0.68	7.9%	$1.32	7.5%
11	***$7.86***	***$1.35***	***$9.21***	***$3.48***	***$2.23***	***61%***	***$3.50***	***12.0%***	***$0.22***	***2.4%***	***$3.27***	***14.6%***
12	***$7.65***	***$1.05***	***$8.69***	***$2.86***	***$2.39***	***56%***	***$3.44***	***12.8%***	***$0.25***	***2.9%***	***$3.19***	***14.8%***
13	$6.26	$1.19	$7.45	$3.98	$1.84	67%	$1.64	4.8%	$0.73	9.9%	$0.90	14.7%
14	$7.69	$1.09	$8.78	$4.17	$2.78	58%	$1.83	6.1%	$0.57	6.5%	$1.26	6.9%
15	***$7.58***	***$1.27***	***$8.86***	***$2.74***	***$1.64***	***63%***	***$4.48***	***14.2%***	***$0.38***	***4.3%***	***$4.09***	***18.1%***
16	$7.12	$1.07	$8.18	$4.65	$2.58	65%	$0.96	3.2%	$0.47	5.7%	$0.49	3.0%
17	$6.80	$0.85	$7.65	$3.48	$2.42	60%	$1.75	4.6%	$0.76	9.9%	$0.99	6.1%
18	$6.34	$0.94	$7.28	$3.98	$1.56	71%	$1.73	6.1%	$0.54	7.4%	$1.20	9.0%
19	$7.05	$1.29	$8.34	$2.37	$3.74	41%	$2.23	5.3%	$0.64	7.7%	$1.59	9.6%
20	$6.26	$1.00	$7.26	$3.57	$2.62	58%	$1.07	4.2%	$0.36	5.0%	$0.71	9.9%
21	***$6.35***	***$1.04***	***$7.40***	***$3.33***	***$2.09***	***60%***	***$1.98***	***7.4%***	***$0.82***	***11.1%***	***$1.16***	***26.3%***
22	$7.74	$0.84	$8.58	$3.91	$2.33	63%	$2.34	5.8%	$0.58	6.7%	$1.76	8.5%
23	$7.54	$1.18	$8.72	$5.28	$2.52	68%	$0.92	2.2%	$0.63	7.2%	$0.29	1.1%
24	***$7.25***	***$1.28***	***$8.53***	***$3.25***	***$2.59***	***56%***	***$2.68***	***11.8%***	***$0.69***	***8.1%***	***$1.99***	***40.3%***
25	$7.17	$0.86	$8.03	$4.84	$2.13	70%	$1.05	2.2%	$0.50	6.2%	$0.55	26.2%
26	***$8.11***	***$0.94***	***$9.05***	***$4.19***	***$2.03***	***67%***	***$2.83***	***15.2%***	***$0.56***	***6.1%***	***$2.27***	
Average	$7.05	$1.07	$8.12	$3.76	$2.39	61%	$1.98	6.7%	$0.53	6.5%	$1.45	11.2%
Top 25%*	$7.45	$1.12	$8.56	$3.38	$2.09	62%	$3.10	12.4%	$0.42	5.0%	$2.68	18.2%

** The top 25% are bold and italicised*

Table A2 Physical information

Farm number	Water used	Milking cows per usable area	Milk sold	Milk sold	Fat	Protein
	mm/ha	hd/ha	kg MS/ cow	kg MS/ha	%	%
1	1,145	0.9	637	547	4.1%	3.3%
2	1,845	0.7	492	329	4.1%	3.4%
3	919	1.0	536	527	3.8%	3.2%
4	1,756	0.8	510	433	3.7%	3.2%
5	1,588	1.4	564	790	3.9%	3.3%
6	2,053	0.9	549	495	4.3%	3.4%
7	615	0.6	631	375	4.2%	3.3%
8	***723***	***1.6***	***612***	***970***	***3.9%***	***3.2%***
9	775	0.7	549	404	4.0%	3.2%
10	1,937	0.7	581	428	4.2%	3.5%
11	***1,426***	***1.2***	***580***	***689***	***3.9%***	***3.3%***
12	***1,671***	***1.1***	***571***	***640***	***4.2%***	***3.3%***
13	1,575	0.9	513	482	4.1%	3.6%
14	1,560	1.0	584	610	3.9%	3.3%
15	***771***	***1.2***	***496***	***613***	***4.2%***	***3.4%***
16	1,052	1.0	534	515	4.1%	3.2%
17	891	0.7	531	359	4.3%	3.3%
18	1,325	1.3	494	641	3.9%	3.5%
19	1,832	1.1	390	426	3.8%	3.2%
20	1,778	1.4	613	873	3.9%	3.3%
21	***1,028***	***1.2***	***528***	***645***	***4.4%***	***3.6%***
22	1,864	0.9	535	505	3.8%	3.3%
23	776	0.8	568	474	3.7%	3.2%
24	***587***	***0.8***	***663***	***541***	***3.9%***	***3.2%***
25	939	0.8	679	573	3.7%	3.1%
26	***598***	***1.7***	***570***	***946***	***3.9%***	***3.3%***
Average	1,270	1.0	558	570	4.0%	3.3%
Top 25%*	972	1.3	575	721	4.1%	3.3%

** The top 25% are bold and italicised*

Table A2 Physical information (continued)

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
1	5.4	1.3	64%	78.2	18.2	36.5	31.9	93.3	59,473
2	3.1	1.0	66%	52.1	12.3	40.5	14.5	73.6	36,207
3	3.5	1.7	56%	105.0	11.5	32.5	28.7	96.8	51,943
4	5.8	0.0	54%	91.3	12.9	31.6	20.8	76.3	38,947
5	5.8	0.6	58%	120.0	2.4	39.6	24.3	97.2	54,856
6	3.4	2.6	62%	54.1	18.1	13.8	9.0	76.7	42,048
7	6.0	1.3	76%	78.0	12.5	53.2	27.3	59.3	37,409
8	***7.6***	***1.3***	***52%***	***125.9***	***27.8***	***29.7***	***25.1***	***154.0***	***94,210***
9	3.2	1.3	52%	27.9	9.1	12.9	14.6	71.8	39,467
10	3.6	2.5	66%	86.9	6.2	26.0	9.3	68.5	39,824
11	***6.1***	***1.3***	***62%***	***134.2***	***16.7***	***37.8***	***24.6***	***91.4***	***53,056***
12	***6.3***	***0.7***	***60%***	***147.8***	***3.7***	***13.9***	***22.0***	***96.2***	***54,989***
13	5.9	0.4	58%	121.6	10.6	35.7	17.6	125.3	64,352
14	4.7	2.4	70%	126.8	8.2	51.4	48.7	83.9	49,013
15	***4.5***	***1.3***	***66%***	***141.9***	***15.6***	***47.7***	***33.9***	***134.2***	***66,594***
16	3.1	1.5	46%	95.3	12.4	21.2	17.4	106.0	56,635
17	3.6	1.8	69%	49.2	10.4	28.0	12.2	98.4	52,252
18	7.9	0.0	55%	167.3	18.8	46.6	30.3	167.4	82,722
19	10.8	1.2	83%	112.7	8.3	13.2	8.9	74.5	29,064
20	5.2	2.4	64%	206.3	19.5	46.4	59.9	57.5	35,270
21	***6.1***	***0.5***	***71%***	***134.2***	***16.1***	***44.8***	***30.0***	***132.8***	***70,156***
22	5.5	0.1	71%	121.2	4.7	13.6	25.9	113.0	60,423
23	1.1	1.4	46%	75.7	5.9	30.7	18.3	88.1	50,026
24	***3.9***	***1.5***	***64%***	***127.6***	***17.7***	***64.1***	***50.8***	***79.0***	***52,368***
25	5.6	0.8	53%	128.9	29.1	128.6	71.5	84.6	57,409
26	***4.7***	***1.3***	***45%***	***120.6***	***25.0***	***51.0***	***39.3***	***98.2***	***56,021***
Average	5.1	1.3	61%	108.9	13.6	38.1	27.6	96	53,259
Top 25%*	5.6	1.1	60%	133.2	17.5	41.3	32.3	112	63,913

** The top 25% are bold and italicised*
*** on milking area*

Table A3 Purchased feed

Farm number	Purchased feed per milker	Concentrate price	Other feed price	Percent of total energy imported
	t DM/hd	$/t DM	$/t DM	% of ME
1	2.8	$381		36%
2	2.2	$509		34%
3	3.0	$427		44%
4	3.2	$330	$1,041	46%
5	3.0	$480		42%
6	3.0	$491		38%
7	2.2	$306		24%
8	***3.5***	***$338***		***48%***
9	3.6	$454		48%
10	2.7	$448		34%
11	***2.9***	***$383***	***$2,028***	***38%***
12	***2.4***	***$311***		***40%***
13	2.8	$401		42%
14	2.5	$346	$52	30%
15	***1.9***	***$326***		***34%***
16	3.1	$415	$2,226	54%
17	2.2	$518		31%
18	2.9	$373		45%
19	1.0	$304		17%
20	2.6	$468		36%
21	***1.8***	***$467***		***29%***
22	2.1	$396		29%
23	3.7	$489		54%
24	***3.0***	***$342***		***36%***
25	4.4	$346		47%
26	***3.7***	***$453***		***55%***
Average	2.8	$404	$1,337	39%
Top 25%*	2.7	$374	$2,028	40%

** The top 25% are bold and italicised*

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
1	$0.20	$0.12	$0.06	$0.11	$0.18	$0.67	$0.63	$0.00	$0.06
2	$0.10	$0.08	$0.01	$0.17	$0.08	$0.43	$0.42	$0.00	$0.14
3	$0.09	$0.06	$0.01	$0.13	$0.08	$0.37	$0.43	$0.00	$0.03
4	$0.14	$0.18	$0.00	$0.23	$0.14	$0.69	$0.39	$0.14	$0.05
5	$0.15	$0.06	$0.01	$0.08	$0.10	$0.41	$0.31	$0.13	$0.30
6	$0.11	$0.09	$0.00	$0.10	$0.13	$0.44	$0.18	$0.32	$0.60
7	$0.09	$0.20	$0.00	$0.11	$0.08	$0.48	$0.86	$0.00	$0.44
8	***$0.02***	***$0.14***	***$0.00***	***$0.15***	***$0.10***	***$0.42***	***$0.69***	***$0.00***	***$0.23***
9	$0.10	$0.09	$0.03	$0.12	$0.04	$0.37	$0.14	$0.00	$0.14
10	$0.03	$0.06	$0.01	$0.12	$0.15	$0.37	$0.36	$0.44	$0.12
11	***$0.09***	***$0.09***	***$0.02***	***$0.09***	***$0.09***	***$0.37***	***$0.49***	***$0.21***	***$0.18***
12	***$0.10***	***$0.15***	***$0.00***	***$0.14***	***$0.07***	***$0.45***	***$0.37***	***$0.17***	***$0.32***
13	$0.04	$0.22	$0.14	$0.08	$0.07	$0.55	$0.34	$0.04	$0.20
14	$0.11	$0.16	$0.16	$0.13	$0.21	$0.77	$0.67	$0.16	$0.16
15	***$0.13***	***$0.11***	***$0.00***	***$0.10***	***$0.10***	***$0.44***	***$0.46***	***$0.00***	***$0.04***
16	$0.06	$0.21	$0.12	$0.12	$0.08	$0.59	$0.45	$0.17	$0.32
17	$0.05	$0.06	$0.06	$0.21	$0.43	$0.82	$0.29	$0.00	$0.08
18	$0.06	$0.09	$0.16	$0.12	$0.04	$0.47	$0.53	$0.20	$0.09
19	$0.06	$0.03	$0.00	$0.19	$0.13	$0.41	$0.47	$0.48	$0.04
20	$0.10	$0.07	$0.00	$0.09	$0.10	$0.37	$0.46	$0.18	$0.26
21	$0.06	$0.13	$0.05	$0.10	$0.07	$0.42	$0.48	$0.13	$0.06
22	$0.09	$0.15	$0.00	$0.14	$0.09	$0.48	$0.39	$0.49	$0.32
23	$0.08	$0.22	$0.10	$0.16	$0.38	$0.93	$0.38	$0.00	$0.38
24	***$0.17***	***$0.10***	***$0.00***	***$0.13***	***$0.09***	***$0.49***	***$0.66***	***$0.00***	***$0.07***
25	$0.16	$0.08	$0.15	$0.16	$0.18	$0.74	$0.79	$0.00	$0.11
26	***$0.11***	***$0.12***	***$0.00***	***$0.10***	***$0.13***	***$0.47***	***$0.27***	***$0.00***	***$0.17***
Average	$0.10	$0.12	$0.04	$0.13	$0.13	$0.52	$0.46	$0.13	$0.19
Top 25%*	$0.10	$0.12	$0.01	$0.11	$0.09	$0.44	$0.49	$0.07	$0.15

** The top 25% are bold and italicised*

Table A4 Variable costs (continued)

Farm number	Fuel and oil	Pasture improvement/ cropping	Other feed costs	Fodder purchases	Grain/ concentrates/ other	Agistment costs	Feed 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
1	$0.14	$0.26	$0.07	$0.17	$1.53	$0.00	*$0.01*	$2.86	$3.53
2	$0.21	$0.13	$0.01	$0.03	$2.21	$0.00	*-$0.05*	$3.09	$3.52
3	$0.09	$0.12	$0.02	$0.34	$2.05	$0.06	*$0.03*	$3.16	$3.53
4	$0.16	$0.14	$0.00	$0.39	$1.57	$0.00	*$0.00*	$3.08	$3.77
5	$0.07	$0.42	$0.00	$0.50	$1.94	$0.05	*-$0.08*	$3.65	$4.06
6	$0.08	$0.20	$0.00	$0.58	$1.44	$0.05	*-$0.01*	$3.42	$3.86
7	$0.16	$0.24	$0.00	$0.07	$1.20	$0.00	*-$0.08*	$3.10	$3.58
8	***$0.20***	***$0.21***	***$0.10***	***$0.12***	***$1.81***	***$0.00***	***$0.02***	***$3.38***	***$3.79***
9	$0.26	$0.14	$0.00	$0.28	$2.62	$0.13	*$0.01*	$3.72	$4.09
10	$0.20	$0.10	$0.10	$0.24	$1.80	$0.00	*$0.09*	$3.47	$3.84
11	***$0.08***	***$0.11***	***$0.10***	***$0.06***	***$1.86***	***$0.00***	***$0.01***	***$3.11***	***$3.48***
12	***$0.04***	***$0.20***	***$0.00***	***$0.12***	***$1.37***	***$0.01***	***-$0.20***	***$2.40***	***$2.86***
13	$0.11	$0.07	$0.53	$0.10	$1.86	$0.00	*$0.16*	$3.42	$3.98
14	$0.12	$0.38	$0.07	$0.17	$1.35	$0.00	$0.30	$3.39	$4.17
15	***$0.07***	***$0.10***	***$0.04***	***$0.10***	***$1.39***	***$0.05***	***$0.00***	***$2.30***	***$2.74***
16	$0.11	$0.39	$0.00	$0.41	$2.31	$0.02	*-$0.24*	$4.06	$4.65
17	$0.17	$0.07	$0.20	$0.18	$1.81	$0.00	-$0.15	$2.66	$3.48
18	$0.04	$0.15	$0.32	$0.05	$2.07	$0.00	*$0.07*	$3.51	$3.98
19	$0.16	$0.09	$0.00	$0.00	$0.96	$0.00	-$0.23	$1.97	$2.37
20	$0.05	$0.28	$0.00	$0.00	$1.98	$0.00	$0.00	$3.20	$3.57
21	***$0.05***	***$0.16***	***$0.30***	***$0.15***	***$1.37***	***$0.00***	***$0.19***	***$2.91***	***$3.33***
22	$0.10	$0.24	$0.37	$0.00	$1.53	$0.00	$0.00	$3.43	$3.91
23	$0.11	$0.29	$0.00	$0.00	$3.21	$0.00	-$0.04	$4.34	$5.28
24	***$0.21***	***$0.17***	***$0.13***	***$0.00***	***$1.53***	***$0.00***	***$0.00***	***$2.76***	***$3.25***
25	$0.23	$0.30	$0.50	$0.15	$2.12	$0.00	-$0.09	$4.10	$4.84
26	***$0.17***	***$0.21***	***$0.02***	***$0.17***	***$2.73***	***$0.00***	***-$0.02***	***$3.72***	***$4.19***
Average	$0.13	$0.20	$0.11	$0.17	$1.83	$0.01	-$0.01	$3.24	$3.76
Top 25%*	$0.12	$0.17	$0.10	$0.10	$1.72	$0.01	$0.00	$2.94	$3.38

** The top 25% are bold and italicised*

Table A5 Overhead costs

Farm number	Rates	Registration and insurance	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
1	$0.02	$0.12	$0.49	$0.08	$0.34	$1.05	$0.61	$0.80	$2.46
2	$0.06	$0.04	$0.57	$0.23	$0.76	$1.67	$0.20	$0.74	$2.61
3	$0.08	$0.07	$0.42	$0.07	$0.90	$1.54	$0.16	$0.39	$2.10
4	$0.03	$0.14	$0.26	$0.14	$1.47	$2.04	$0.35	$0.30	$2.70
5	$0.05	$0.13	$0.75	$0.14	$0.39	$1.45	$0.20	$0.78	$2.43
6	$0.08	$0.10	$0.48	$0.16	$0.86	$1.69	$0.20	$0.97	$2.87
7	$0.01	$0.08	$0.50	$0.08	$1.00	$1.67	$0.07	$0.53	$2.27
8	***$0.02***	***$0.12***	***$0.29***	***$0.06***	***$0.43***	***$0.91***	***$0.46***	***$0.28***	***$1.65***
9	$0.05	$0.20	$0.63	$0.08	$0.73	$1.69	$0.27	$0.81	$2.77
10	$0.05	$0.14	$0.83	$0.14	$0.54	$1.71	$0.10	$0.93	$2.74
11	***$0.04***	***$0.07***	***$0.32***	***$0.27***	***$0.70***	***$1.40***	***$0.25***	***$0.58***	***$2.23***
12	***$0.06***	***$0.11***	***$0.72***	***$0.17***	***$0.74***	***$1.80***	***$0.20***	***$0.39***	***$2.39***
13	$0.00	$0.03	$0.20	$0.28	$0.95	$1.46	$0.17	$0.21	$1.84
14	$0.02	$0.08	$0.78	$0.16	$1.30	$2.35	$0.23	$0.20	$2.78
15	***$0.05***	***$0.06***	***$0.26***	***$0.02***	***$0.85***	***$1.24***	***$0.12***	***$0.28***	***$1.64***
16	$0.03	$0.11	$0.80	$0.19	$0.69	$1.82	$0.26	$0.51	$2.58
17	$0.03	$0.24	$0.42	$0.14	$0.44	$1.27	$0.32	$0.83	$2.42
18	$0.01	$0.02	$0.21	$0.15	$0.93	$1.33	$0.21	$0.03	$1.56
19	$0.14	$0.16	$0.31	$0.16	$0.92	$1.71	$0.57	$1.46	$3.74
20	$0.16	$0.11	$0.21	$0.07	$0.43	$0.98	$0.19	$1.45	$2.62
21	***$0.03***	***$0.01***	***$0.28***	***$0.16***	***$1.13***	***$1.62***	***$0.45***	***$0.03***	***$2.09***
22	$0.08	$0.05	$0.63	$0.31	$0.95	$2.02	$0.11	$0.20	$2.33
23	$0.07	$0.03	$0.56	$0.25	$0.35	$1.24	$0.39	$0.89	$2.52
24	***$0.05***	***$0.09***	***$0.38***	***$0.22***	***$1.22***	***$1.95***	***$0.24***	***$0.40***	***$2.59***
25	$0.00	$0.16	$0.62	$0.06	$0.70	$1.53	$0.22	$0.38	$2.13
26	***$0.01***	***$0.11***	***$0.52***	***$0.10***	***$0.67***	***$1.42***	***$0.15***	***$0.46***	***$2.03***
Average	$0.05	$0.10	$0.48	$0.15	$0.78	$1.56	$0.26	$0.57	$2.39
Top 25%*	$0.04	$0.08	$0.39	$0.14	$0.82	$1.48	$0.27	$0.34	$2.09

** The top 25% are bold and italicised*

Table A6 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
	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs
1	3.3%	2.0%	0.9%	1.9%	3.0%	11.2%	10.4%	0.0%	1.1%
2	1.7%	1.2%	0.1%	2.8%	1.2%	7.1%	6.9%	0.0%	2.2%
3	1.6%	1.1%	0.1%	2.2%	1.5%	6.6%	7.6%	0.0%	0.5%
4	2.2%	2.8%	0.0%	3.6%	2.1%	10.6%	6.2%	2.2%	0.7%
5	2.3%	1.0%	0.2%	1.3%	1.6%	6.3%	4.7%	2.0%	4.7%
6	1.6%	1.4%	0.0%	1.6%	1.9%	6.5%	2.6%	4.7%	8.9%
7	1.5%	3.5%	0.0%	1.8%	1.4%	8.2%	15.3%	0.0%	7.5%
8	***0.5%***	***2.5%***	***0.0%***	***2.8%***	***1.9%***	***7.6%***	***12.6%***	***0.0%***	***4.3%***
9	1.4%	1.4%	0.4%	1.8%	0.6%	5.5%	2.1%	0.0%	2.1%
10	0.5%	1.0%	0.1%	1.9%	2.2%	5.6%	5.5%	6.7%	1.8%
11	***1.5%***	***1.6%***	***0.3%***	***1.5%***	***1.6%***	***6.5%***	***8.6%***	***3.6%***	***3.2%***
12	***1.9%***	***2.8%***	***0.0%***	***2.6%***	***1.4%***	***8.6%***	***7.0%***	***3.3%***	***6.0%***
13	0.6%	3.9%	2.5%	1.3%	1.2%	9.5%	5.9%	0.7%	3.4%
14	1.6%	2.3%	2.4%	1.9%	3.0%	11.1%	9.6%	2.4%	2.4%
15	***2.9%***	***2.6%***	***0.0%***	***2.3%***	***2.2%***	***10.1%***	***10.6%***	***0.0%***	***0.8%***
16	0.9%	2.9%	1.6%	1.7%	1.0%	8.1%	6.2%	2.4%	4.4%
17	0.9%	1.0%	1.1%	3.6%	7.3%	13.9%	5.0%	0.0%	1.4%
18	1.1%	1.7%	2.9%	2.1%	0.7%	8.5%	9.6%	3.5%	1.7%
19	0.9%	0.5%	0.0%	3.0%	2.2%	6.6%	7.8%	7.8%	0.6%
20	1.6%	1.2%	0.0%	1.4%	1.7%	5.9%	7.4%	2.8%	4.2%
21	***1.1%***	***2.4%***	***1.0%***	***1.8%***	***1.4%***	***7.7%***	***9.0%***	***2.5%***	***1.1%***
22	1.5%	2.4%	0.1%	2.2%	1.5%	7.7%	6.2%	7.9%	5.1%
23	1.0%	2.8%	1.2%	2.0%	4.9%	12.0%	4.9%	0.0%	4.8%
24	***3.0%***	***1.6%***	***0.0%***	***2.3%***	***1.6%***	***8.5%***	***11.2%***	***0.0%***	***1.1%***
25	2.4%	1.1%	2.2%	2.3%	2.5%	10.5%	11.3%	0.0%	1.5%
26	***1.8%***	***2.0%***	***0.1%***	***1.5%***	***2.1%***	***7.5%***	***4.3%***	***0.0%***	***2.7%***
Average	1.6%	1.9%	0.7%	2.1%	2.1%	8.4%	7.6%	2.0%	3.0%
Top 25%*	1.8%	2.2%	0.2%	2.1%	1.7%	8.1%	9.0%	1.3%	2.8%

** The top 25% are bold and italicised*

Table A6 Variable costs (continued)

Farm number	Fuel and oil	Pasture improvement/ cropping	Other feed costs	Fodder purchases	Grain/ concentrates/ other	Agistment costs	Feed 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
1	2.4%	4.3%	1.1%	2.8%	25.5%	0.0%	*0.1%*	47.8%	58.9%
2	3.4%	2.1%	0.1%	0.4%	36.1%	0.0%	*-0.9%*	50.4%	57.5%
3	1.6%	2.1%	0.4%	6.0%	36.5%	1.1%	*0.5%*	56.2%	62.8%
4	2.5%	2.2%	0.0%	6.0%	28.1%	0.0%	*0.0%*	47.6%	58.3%
5	1.1%	6.5%	0.0%	7.7%	30.0%	0.8%	*-1.2%*	56.2%	62.5%
6	1.2%	2.9%	0.0%	8.6%	21.4%	0.8%	*-0.1%*	50.9%	57.4%
7	2.8%	4.2%	0.0%	1.3%	23.9%	0.0%	*-1.4%*	53.0%	61.2%
8	***3.7%***	***3.9%***	***1.8%***	***2.3%***	***33.2%***	***0.0%***	***0.3%***	***62.0%***	***69.7%***
9	3.7%	2.1%	0.0%	4.1%	38.2%	1.8%	*0.1%*	54.2%	59.6%
10	3.1%	1.6%	1.6%	3.6%	27.4%	0.0%	*1.3%*	52.7%	58.3%
11	***1.3%***	***2.0%***	***1.8%***	***1.1%***	***32.7%***	***0.0%***	***0.1%***	***54.4%***	***60.9%***
12	***0.9%***	***3.8%***	***0.0%***	***2.2%***	***26.2%***	***0.1%***	***-3.7%***	***45.8%***	***54.4%***
13	1.9%	1.2%	9.1%	1.8%	32.0%	0.0%	*2.7%*	58.8%	68.3%
14	1.7%	5.4%	1.0%	2.5%	19.6%	0.0%	4.3%	48.9%	60.0%
15	***1.6%***	***2.3%***	***0.9%***	***2.2%***	***33.1%***	***1.1%***	***-0.1%***	***52.5%***	***62.6%***
16	1.5%	5.5%	0.0%	5.6%	33.6%	0.3%	*-3.3%*	56.1%	64.3%
17	2.9%	1.2%	3.4%	3.1%	30.8%	0.0%	-2.6%	45.2%	59.0%
18	0.6%	2.7%	5.8%	0.8%	37.3%	0.0%	*1.2%*	63.3%	71.8%
19	2.6%	1.4%	0.0%	0.0%	15.7%	0.0%	-3.8%	32.2%	38.8%
20	0.8%	4.5%	0.0%	0.0%	31.9%	0.0%	*0.1%*	51.7%	57.7%
21	***1.0%***	***3.0%***	***5.6%***	***2.8%***	***25.2%***	***0.0%***	***3.6%***	***53.8%***	***61.5%***
22	1.6%	3.9%	5.8%	0.0%	24.5%	0.0%	0.0%	55.0%	62.6%
23	1.4%	3.7%	0.0%	0.0%	41.2%	0.0%	-0.5%	55.7%	67.6%
24	***3.6%***	***2.8%***	***2.2%***	***0.0%***	***26.2%***	***0.0%***	***0.0%***	***47.2%***	***55.6%***
25	3.2%	4.3%	7.2%	2.2%	30.4%	0.0%	-1.2%	58.8%	69.4%
26	***2.7%***	***3.3%***	***0.4%***	***2.8%***	***43.8%***	***0.0%***	***-0.3%***	***59.8%***	***67.3%***
Average	2.1%	3.2%	1.9%	2.7%	30.2%	0.2%	**-0.2%**	52.7%	61.1%
Top 25%*	2.1%	3.0%	1.8%	1.9%	31.5%	0.2%	**0.0%**	53.6%	61.7%

** The top 25% are bold and italicised*

Table A7 Overhead costs

Farm number	Rates	Registration and insurance	Repairs and maintenance	Other overheads	Employed labour	Total cash overheads	Depreciation	Imputed owner/ operator and family labour	Total overheads
	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs	% of costs
1	0.4%	2.0%	8.2%	1.4%	5.6%	17.6%	10.2%	13.3%	41.1%
2	1.0%	0.7%	9.3%	3.8%	12.4%	27.2%	3.2%	12.1%	42.5%
3	1.3%	1.3%	7.5%	1.3%	16.0%	27.4%	2.9%	7.0%	37.2%
4	0.4%	2.2%	4.0%	2.1%	22.8%	31.5%	5.5%	4.7%	41.7%
5	0.7%	2.0%	11.5%	2.1%	5.9%	22.3%	3.1%	12.1%	37.5%
6	1.2%	1.5%	7.2%	2.4%	12.8%	25.1%	3.0%	14.5%	42.6%
7	0.2%	1.3%	8.6%	1.3%	17.1%	28.5%	1.2%	9.1%	38.8%
8	***0.4%***	***2.2%***	***5.3%***	***1.0%***	***7.9%***	***16.8%***	***8.5%***	***5.1%***	***30.3%***
9	0.7%	2.9%	9.2%	1.2%	10.6%	24.7%	3.9%	11.8%	40.4%
10	0.8%	2.1%	12.7%	2.1%	8.3%	25.9%	1.5%	14.2%	41.7%
11	***0.7%***	***1.3%***	***5.6%***	***4.8%***	***12.2%***	***24.6%***	***4.3%***	***10.2%***	***39.1%***
12	***1.2%***	***2.1%***	***13.7%***	***3.3%***	***14.0%***	***34.4%***	***3.8%***	***7.4%***	***45.6%***
13	0.1%	0.4%	3.4%	4.8%	16.3%	25.1%	3.0%	3.6%	31.7%
14	0.3%	1.2%	11.3%	2.3%	18.7%	33.9%	3.3%	2.8%	40.0%
15	***1.2%***	***1.4%***	***5.9%***	***0.5%***	***19.3%***	***28.3%***	***2.7%***	***6.4%***	***37.4%***
16	0.4%	1.5%	11.0%	2.6%	9.6%	25.1%	3.6%	7.0%	35.7%
17	0.5%	4.0%	7.1%	2.4%	7.4%	21.5%	5.5%	14.0%	41.0%
18	0.2%	0.4%	3.9%	2.6%	16.8%	24.0%	3.8%	0.5%	28.2%
19	2.3%	2.7%	5.1%	2.7%	15.1%	27.9%	9.4%	23.9%	61.2%
20	2.6%	1.8%	3.4%	1.1%	6.9%	15.7%	3.1%	23.5%	42.3%
21	***0.6%***	***0.3%***	***5.1%***	***2.9%***	***20.9%***	***29.9%***	***8.2%***	***0.5%***	***38.5%***
22	1.3%	0.8%	10.1%	4.9%	15.1%	32.3%	1.8%	3.2%	37.4%
23	0.8%	0.3%	7.1%	3.2%	4.4%	16.0%	5.0%	11.4%	32.4%
24	***0.8%***	***1.5%***	***6.5%***	***3.7%***	***20.9%***	***33.4%***	***4.2%***	***6.8%***	***44.4%***
25	0.0%	2.3%	8.8%	0.8%	10.1%	22.0%	3.1%	5.5%	30.6%
26	***0.2%***	***1.8%***	***8.4%***	***1.6%***	***10.8%***	***22.8%***	***2.5%***	***7.5%***	***32.7%***
Average	0.8%	1.6%	7.7%	2.4%	13.0%	25.5%	4.3%	9.1%	38.9%
Top 25%*	0.7%	1.5%	7.2%	2.6%	15.2%	27.1%	4.9%	6.3%	38.3%

** The Top 25% are bold and italicised*

Table A8 Capital structure

	FARM ASSETS				OTHER FARM ASSETS (PER USABLE HECTARE)				TOTAL ASSETS
	Land value	Land value	Permanent water value	Permanent water value	Plant and equipment	Livestock	Hay and grain	Other assets	
	$/ha	$/cow	$/ha	$/cow	$/ha	$/ha	$/ha	$/ha	$/ha
Average	$8,420	$8,477	$536	$655	$1,561	$2,057	$87	$565	$11,637
Top 25%*	$10,067	$8,205	$0	$0	$2,100	$2,376	$92	$893	$13,566

	LIABILITIES		EQUITY	
	Liabilities per usable hectare	Liabilities per milking cow	Equity per usable hectare	Average equity
	$/ha	$/cow	$/ha	%
Average	$3,404	$3,501	$8,495	69%
Top 25%*	$4,236	$3,586	$9,935	64%

Table A9 Historical data – Western Australia.
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)
2013–14	$6.62	$6.92	$7.75	$8.09	$0.24	$0.25	$0.26	$0.27	$3.29	$3.44	$3.79	$3.96
2014–15	$7.07	$7.28	$8.26	$8.50	$0.25	$0.25	$0.26	$0.27	$3.31	$3.41	$3.82	$3.93
2015–16	$7.22	$7.36	$8.29	$8.45	$0.26	$0.26	$0.24	$0.25	$3.45	$3.51	$3.95	$4.02
2016–17	$7.05	$7.05	$8.12	$8.12	$0.26	$0.26	$0.26	$0.26	$3.24	$3.24	$3.76	$3.76
Average		**$7.15**		**$8.29**		**$0.26**		**$0.26**		**$3.40**		**$3.92**

Note: 'Real' dollar values are the nominal values converted to 2016–17 dollar equivalents by the consumer price index (CPI) to allow for inflation

	OVERHEAD COSTS					
	Cash overhead costs		Non-cash overhead costs		Total overhead costs	
Year	Nominal ($/kg MS)	Real ($/kg MS)	Nominal ($/kg MS)	Real ($/kg MS)	Nominal ($/kg MS)	Real ($/kg MS)
2013–14	$1.50	$1.56	$0.86	$0.90	$2.36	$2.46
2014–15	$1.47	$1.51	$0.80	$0.82	$2.26	$2.33
2015–16	$1.51	$1.54	$0.82	$0.83	$2.33	$2.37
2016–17	$1.56	$1.56	$0.83	$0.83	$2.39	$2.39
Average		**$1.54**		**$0.85**		**$2.39**

Note: 'Real' dollar values are the nominal values converted to 2016–17 dollar equivalents by the consumer price index (CPI) to allow for inflation

Table A9 Historical data – Western Australia.
Average farm income, costs and profit per kilogram of milk solids (continued)

	PROFIT							
	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)	Return on assets	Return on equity
2013–14	$1.59	$1.66	$0.65	$0.68	$0.95	$0.99	4.6%	5.2%
2014–15	$2.17	$2.24	$0.59	$0.61	$1.58	$1.63	6.7%	9.0%
2015–16	$2.02	$2.06	$0.53	$0.54	$1.48	$1.51	6.6%	9.4%
2016–17	$1.98	$1.98	$0.53	$0.53	$1.45	$1.45	6.7%	11.2%
Average		**$1.98**		**$0.59**		**$1.39**	**6.1%**	**8.7%**

Note: 'Real' dollar values are the nominal values converted to 2016–17 dollar equivalents by the consumer price index (CPI) to allow for inflation

Table A10 Historical data – Western Australia.
Average farm physical information

	Total usable area	Milking area	Water used	Number of milking cows	Milking cows per usable area	Milk sold	Milk sold	Estimated grazed pasture*	Estimated conserved feed*	Home grown feed as % of ME consumed	Concentrate price	
Year	ha	ha	mm/ha	hd	hd/ha	kg MS/ cow	kg MS/ ha	t DM/ ha	t DM/ ha	% of ME	Nominal ($/T DM)	Real ($/T DM)
2013–14	606	280	1081	522	0.9	505	453	3.3	1.5	62%	$418	$437
2014–15	625	296	930	543	0.9	535	486	3.6	1.7	63%	$421	$433
2015–16	575	283	964	545	1.0	557	541	4.1	1.7	57%	$445	$453
2016–17	499	268	1270	498	1.0	558	570	5.1	1.3	61%	$404	$404
Average	**576**	**282**	**1061**	**527**	**1.0**	**539**	**513**	**4.0**	**1.6**	**61%**		**$432**

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.

Annual hours

Total hours worked by a person during the given twelve month period.

Appreciation

An increase in the value of an asset in the market place. Often only applicable to land value.

Asset

Anything managed by the farm, whether it is owned or not. Assets include owned land and buildings, leased land, plant and machinery, fixtures and fittings, trading stock, farm investments (ie 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 ie dollars per kilogram of milk solids. It is reported at the following levels;

- Cash cost of production; variable costs plus cash overhead costs
- Cost of production excluding inventory changes; variable costs plus cash and non-cash overhead costs
- Cost of production including inventory changes; variable costs plus cash and non-cash overhead costs, accounting for feed inventory change and livestock inventory change minus livestock purchases.

Cost structure

Variable costs as a percentage of total costs, where total costs equals variable costs plus overhead costs.

Debt servicing ratio

Interest and lease costs as a percentage of gross farm income.

Depreciation

Decrease in value over time of capital asset, usually as a result of using the asset. Depreciation is a non-cash cost of the business, but reduces the book value of the asset and is therefore a cost.

Earnings before interest & tax (EBIT)

Gross income minus total variable and total overhead costs.

EBIT %

The ratio of EBIT compared to gross income. Indicates the percentage of each dollar of gross income that is retained as EBIT.

Employed labour cost

Cash cost of any paid employee, including on-costs such as superannuation and Workcover.

Equity

Total assets minus total liabilities. Equal to the total value of capital invested in the farm business by the owner/ operator(s).

Equity %

Total equity as a percentage of the total assets owned. The proportion of the total assets owned by the business.

Farm income

See gross farm income.

Feed costs

Cost of fertiliser, irrigation (including effluent), hay and silage making, fuel and oil, pasture improvement, fodder purchases, grain/concentrates, agistment and lease costs associated with any of the above costs, and feed inventory change.

Feed inventory change

An estimate of the feed on hand at the start and end of the financial year to capture feed used in the production of milk and livestock.

Full time equivalent (FTE)

Standardised labour unit. Equal to 2,400 hours a year. Calculated as 48 hours a week for 50 weeks a year.

Grazed area

Total usable area minus any area used only for fodder production during the year.

Grazed pasture

Calculated using the energetics method. Grazed pasture is calculated as the gap between total energy required by livestock over the year and amount of energy available from other sources (hay, silage, grain and concentrates).

Total energy required by livestock is a factor of age, weight, growth rate, pregnancy and lactation requirements, distance to shed, terrain and number of animals.

Total energy available is the sum of energy available from all feed sources except pasture, calculated as (weight (kg) x dry matter content (DM %) x metabolisable energy (MJ/kg DM)).

Gross farm income

Farm income including milk sales, livestock trading and other income such as income from grants and rebates.

Gross margin

Gross farm income minus total variable costs.

Herd costs

Cost of artificial insemination (AI) and herd tests, animal health and calf rearing.

Imputed

An estimated amount, introduced into economic management analysis to allow reasonable comparisons between years and between other businesses.

Imputed labour cost

An allocated allowance for the cost of owner/operator, family and sharefarmer time in the business, valued at $28 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

Cow and per kilogram of milk solid. Measures of productivity of the total labour resources in the business.

Labour resource

Any person who works in the business, be they the owner, family, sharefarmer or employed on a permanent, part time or contract basis.

Liability

Money owed to someone else, e.g. family or a financial institute such as a bank.

Livestock trading profit

An estimate of the annual contribution to gross farm income by accounting for the changes in the number and value of livestock during the year. It is calculated as the trading income from sales minus purchases, plus changes in the value and number of livestock on hand at the start and end of the year, and accounting for births and deaths. An increase in livestock trading indicates there was an appreciation of livestock or an increase in livestock numbers over the year.

Metabolisable energy

Energy available to livestock in feed, expressed in megajoules per kilogram of dry matter (MJ/kg DM).

Milk income

Income through the sales of milk. This is net of compulsory levies and charges.

Milking area

Total usable area minus out-blocks or run-off areas.

Net farm income

Previously reported as business profit.

Earnings before interest and tax (EBIT) minus interest and lease costs. The amount of profit available for capital investment, loan principal repayments and tax.

Nominal terms

Dollar values or interest rates that include an inflation component.

Number of milkers

Total number of cows milked for at least three months.

Other income

Income to the farm from other farm owned assets and external sources. Includes milk share dividends, interest payments received, and rents from farm cottages.

Overhead costs

All fixed costs incurred by the farm business e.g. rates, administration, depreciation, insurance and imputed labour. Interest, leases, capital expenditure, principal repayments and tax are not included.

Real terms

Dollar values or interest rates that have no inflation component.

Return on assets (RoA)

Earnings before interest and tax divided by the value of total assets under management, including owned and leased land.

Return on equity (RoE)

Net farm income divided by the value of total equity.

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 eg house and shed area.

Total water used

Total rainfall plus average irrigation water used expressed as millimetres per hectare, where irrigation water is calculated as;

(total megalitres of water used/total usable area) x 100.

Variable costs

All costs that vary with the size of production in the enterprise e.g. herd, shed and feed costs (including feed inventory change).

List of abbreviations

AI	Artificial insemination
CH_4	Methane gas
CO_2	Carbon dioxide gas
CO_2-e	Carbon dioxide equivalent
CoP	Cost of production
DEDJTR	Department of Economics Development, Jobs, Transport and Resources, Victoria
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. 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 the average
Q3	Third quartile, i.e. the value of which one quarter, or 25%, of data in that range is greater than the average
RoA	Return on assets
RoE	Return on equity
t	Tonne = 1,000 kg
WA	Western Australia

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.





Dairy Australia
Your Levy at Work

Dairy Australia Limited ABN 60 105 227 987
Level 3, HWT Tower
40 City Road, Southbank VIC 3006 Australia
T + 61 3 96943777 F + 61 3 9694 3701
E enquiries@dairyaustralia.com.au
dairyaustralia.com.au

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