Dairy Australia

DAIRY FARM MONITOR PROJECT

WESTERN AUSTRALIA ANNUAL REPORT 2018–19

ACKNOWLEDGEMENTS

This report was produced by Kirk Reynolds in conjunction with Dairy Australia.

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

The Dairy Farm Monitor Project (WA) is enabled by funding from Dairy Australia and the South West Development Commission.

We acknowledge the work of dairy consultants Kirk Reynolds, Colin Bosustow, Steve Hossen and Dan Parnell who collected farm data, provided feedback and data validation.

We also acknowledge the work of Dairy Australia's farm analysts Jake Musson and Fiona Smith, who conducted the data checking, validation and analysis.

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.

Farmer photographs contained within this report do not infer their participation in the DFMP. All photographs are selected from Dairy Australia's image library.

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GOVERNMENT OF WESTERN AUSTRALIA

SOUTH WEST DEVELOPMENT COMMISSION

Western DAIRY

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CONTENTS

LIST OF FIGURES AND TABLES

Figures

Tables

HOW TO READ THIS REPORT

This page explains the calculations used and the data presented throughout this report, as well as the purpose of the different sections.

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 2018–19 year. Data is presented for individual farms, as state averages and for the state top 25 per cent of farms ranked by return on total assets (ROTA). 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 per cent of farms are presented as lighter coloured bars in the state overview figures. Return on total assets is the determinate used to identify the top 25 per cent 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 per cent) 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 per cent) of data in that range is greater than the average. Therefore the middle 50 per cent 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) reflecting payment systems 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 per cent consists of seven farms located throughout the dairying areas of WA.

Any reference to 'last year' refers to the 2017–18 Dairy Farm Monitor Project report.

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

It should be noted that not all of the participants from 2017–18 are in the 2018–19 report. This year, there are three new participating farms. This is important to bear in mind when comparing data sets between years.

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

WHAT'S NEW IN 2018–19?

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

The most significant are:

- As per last year, to protect the anonymity of participants, farms have been allocated a different number each year. Therefore results for individual farms may not be directly compared to previous years.
- All assets values were critically reviewed in 2018–19 and readjusted if required, particularly in relation to land values. The last time this was critically reviewed was 2013–14.

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

SUMMARY

In 2018–19 the data from 27 farms in WA resulted in average whole farm earnings before interest and tax (EBIT) of $353,193, representing a 31 per cent decrease on the previous year's $511,339. On average, participants achieved return on total assets averaging 3.2 per cent, down from 4.3 per cent in 2017–18. The average milk price received was $7.07/kg MS (50.8 c/L), a 1 per cent increase from last year.

This is the sixth 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 physical and financial performance.

Twenty seven farms participated in the project in 2018–19, of which 13 have been involved since the project began. There were two new farms and one re-entry in this year's dataset. The WA DFMP participants generated an average earnings before interest and tax (EBIT) of $353,193 per farm or $1.16/kg MS (8.4 c/L), an 31 per cent decrease from 2017–18 and the lowest since the project's inception in 2013–14.

Once interest and lease costs were taken into account the resulting average net farm income was $184,035, a 48 per cent decrease. This equated to an average return on equity of 4.4 per cent, and again the lowest experienced since the DFMP began.

The average milk price of $7.07 /kg MS (50.8 c/L) was a 1 per cent increase on last year's price of $7.00 /kg MS (50.1 c/L). The milk price reflected the current "static nature" of WA's domestic milk supply. Livestock trading profit remained constant at $1.16/kg MS (8.3 c/L) which meant that the gross farm income was very similar at $8.25/kg MS (59.3 c/L)

The milk income again varied considerably from $6.20 to $7.99 kg/MS (43.9 – 59.8 c/L). The processor that was supplied had the greatest influence on the prices received and then the seasonality of when the milk was produced (with summer premiums significantly higher than spring payments). The processing sector is giving strong indications when it wants the milk, however the large variation in pricing is causing concern for the industry confidence.

Participants costs of production (inc inventory change) increased by 10 per cent. Both variable and overhead costs increased, with the main change in variable costs due to the higher feed costs. Variable costs rose from $4.05/kg MS last year to $4.40/kg MS (31.6 c/L), with average overhead costs rising from $2.57/kg MS to $2.69/kg MS (19.3 c/L). The main drivers of higher costs were total feed costs (up 9.3 per cent) and labour (up 8.1 per cent). Home grown feed as a source of metabolisable energy increased from 57 per cent to 60 per cent. There was a slight decrease in purchased feed, from 3.0 to 2.9 t DM/hd due to the known higher costs before summer feeding, however the average concentrate price increase of $59/t to $488/t DM drove the higher purchased feed costs. The late start to the season also meant more purchased feed was bought than was budgeted.

The static gross farm income, coupled with higher costs, in feed and labour, led to return on total assets (ROTA) lowering again from 4.3 per cent to 3.2 per cent. One participant recorded a negative ROTA with the spread being -0.5 per cent to 10.6 per cent. In contrast the number of participants with a negative ROE skyrocketed from three to nine with the spread being -6.9 per cent to 30.2 per cent.

The 2018–19 season was a very dry season with the annual rainfall 131mm short of the average. The dry September reduced the amount of pasture grown and the autumn proved to be one of the most difficult for most. The below rainfall for April, and then May being 86mm lower then average (only about 30 per cent of average rainfall) meant that farmers had to feed more imported feed than they had budgeted for. This was coupled with record feed prices which cripled margins. The entire dairy region was severely affected by the autumn and the feed prices. Due to the east coast experiencing a very poor start and the domestic sheep and beef markets being buoyant, fodder prices soared in late autumn/winter, again increasing the feed costs to those purchasing.

The top 25 per cent of farms achieved an average EBIT of $2.35/kg MS (17 c/L) and average return on total assets of 6.6 per cent. This large difference between the average

and top 25 per cent is mainly due to 4 per cent higher milk income, better labour efficiency (10 per cent), higher milk production per hectare (8 per cent), along with 8 per cent lower costs of production.

More than half of participating farmers expect no change in business returns for the 2018–19 period (54 per cent), while 27 per cent expect an improvement. Some fifty four per cent believe that the milk price will remain stable with the majority seeing milk production remaining stable or increasing.

The majority of respondents see a decrease in purchased feed prices (58 per cent) with fertiliser, fuel and oil, irrigation, repairs, maintenance and labour considered to largely remain stable.

Milk price, input costs, pasture/fodder and managing seasonal conditions were the major issues facing the participant farmers in both the short and long term. Less than 10 per cent of respondents see water, succession planning and labour as major issues facing their businesses.

FARM MONITOR METHOD

This chapter explains the method used in the 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 Dairy Farm Monitor Project method

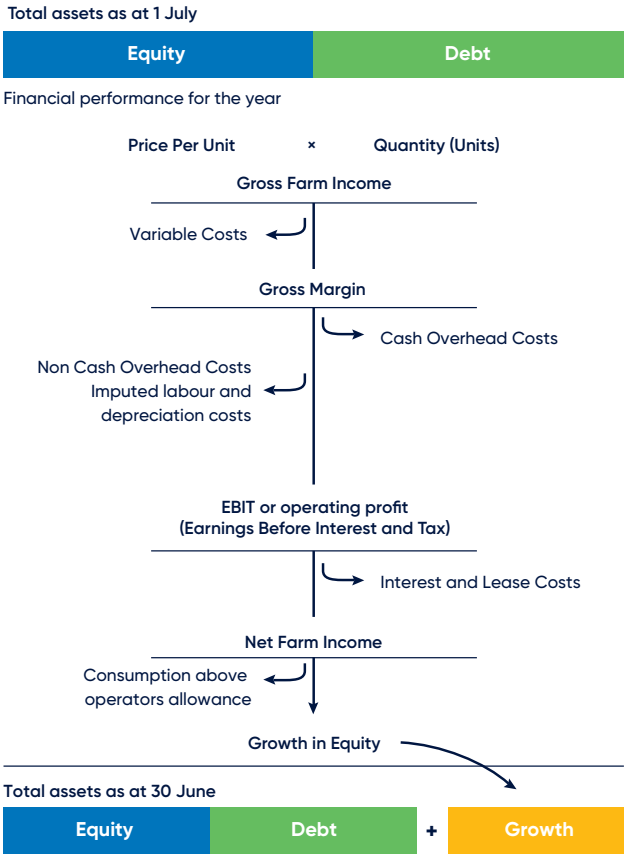


Figure 1 demonstrates how the different farm business economic terms fit together and are calculated. This has been adapted from an initial diagram developed by Bill Malcolm. The diagram shows the different profitability measures as costs are deducted from gross farm income. Growth is achieved by investing 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.

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 total assets and return on equity

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

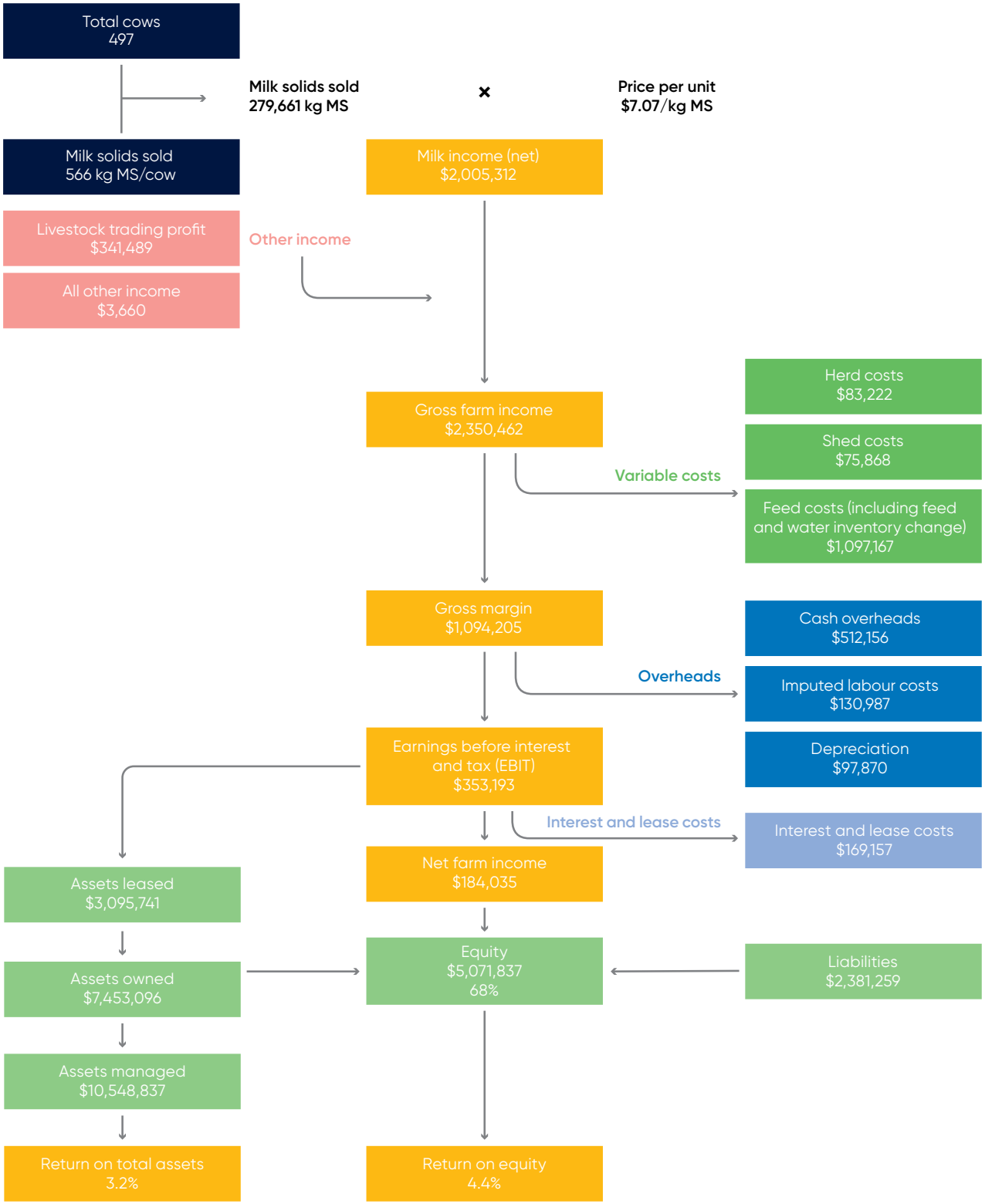
Return on total assets indicates the overall earning of the total farm assets, irrespective of capital structure of the business. It is EBIT expressed as a percentage of the total assets under management in the farm business, including the value of leased assets. Return on total assets is sometimes referred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

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

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

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

All 27 farms



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

Western Australia overview

Western Australia produced approximately 4.3 per cent, or 374 million litres, of the Australian milk production in 2018–19. Milk production in WA remained stable in 2018–19, reflecting constant domestic demand conditions, compared to the national decrease of 5.7 per cent.

During 2018–19 there remained a significant range in prices received for milk in the WA industry. Processor payments are now targeting summer milk with pricing incentives as well as some premium and penalties for components.

The WA dairy industry is located in the higher rainfall (> 750 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 tourism.

The WA dairy region has a Mediterranean climate with consistent winter rainfall and hot dry summers. WA has a ryegrass pasture-based production system based on rain-fed annuals 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.

WA milk continues to be recognised for its high quality, with five WA farms being in the top 100 nationally, based on bulk milk cell count, also consistent with the level of national milk supply produced by this state.

2018–19 seasonal conditions

Drier seasonal conditions prevailed throughout 2018–19, with below autumn rainfall across all WA dairy regions as well as below rainfall for September.

The total rainfall in 2018–19 was drier than the long term average for the majority of participants, with only three respondents receiving close to their average.

Participant farms received an average of 802 mm rainfall, 14 per cent less than the long-term average of 933 mm. However, some farms received 20 per cent less than their long-term average annual rainfall.

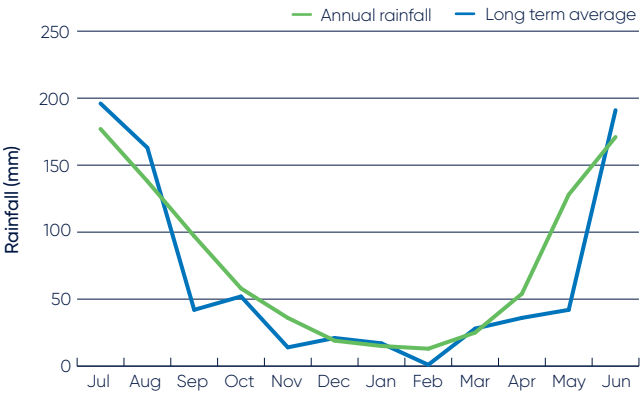
For most farms the month in which the rain fell is generally more important.

The September of 2018 was very dry with the majority of farmers very anxious until good October rains meant they were relatively happy with fodder production. The autumn of 2019 was very difficult for most, as can be seen with the lower rainfall amounts in April and May (Figure 3). For farms on the west coast there was a good opening rain in mid-April but then a long six to seven-week dry spell that reduced early pasture growth.

In general, summer conditions were mild with little rainfall activity in December/January providing little relief for irrigators.

The April, and particularly May deficits, with a quick wet June lead to most farmers exhausting all fodder supplies and having to buy in expensive fodder in late autumn/winter. The impact can also be seen with estimated grazed pasture only reaching 4.2 t DM/ha, remaining similar to the previous poor season the year before.

Figure 3 Monthly average rainfall (All farms)




838

WHOLE FARM ANALYSIS

The 2018–19 year has produced the poorest business performance since the inception of the project six years ago. With a only a small decrease in production (2.5 per cent), a similar milk price and a large increase (14 per cent) in the price of purchased feed, margins were eroded. The majority of on-farm fodder was largely consumed with the late break in 2019 with less than 350 kg/cow fodder on hand.

The 27 participant farms represent 19 per cent of the Western Australian dairy industry in terms of number of farms, however it represents 28 per cent of milk volume. However, there is a large range of farming systems, calving patterns and herd size across the participant farmers, so care is required when interpreting averages.

There were two 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 has emerged between the profitability of dryland and irrigated farms. In 2017–18 there was a similar trend in EBIT and ROTA between irrigated and dryland participant farms; with dryland farms having a higher RoTA and EBIT than irrigated farms. In 2018–19, irrigated farms had ROTA of 2.7 per cent compared with dryland systems at 3.6 per cent, and an EBIT of $1.07/ kg MS vs $1.23/kg MS.

However this year the dryland farms had a higher cost of production ($0.19/ kg MS) with a similar milk price, but a much higher livestock trading profit.

The average herd size of 497 cows was exactly the same as previous years, supporting the consistent participation of the similar size businesses as well as most businesses in a static production profile.

The average labour efficiency kg MS/FTE decreased by 8 per cent is most likely a function of a greater proportion of livestock trading in the WA dairy businesses. This is supported by the milk production per ha only dropping 2 per cent, hence businesses are gaining an increase in their labour unit efficiencies as there are less litres to divide per labour unit.

Table 1 presents a summary of the average physical parameters of the 27 participant farms. Further details can be found in Appendix Table 2 for individual farms.

While the average herd size (number of cows milked for at least three months) was 497 there was a wide range in herd size from 191 to 1,440 cows with two farms milking more than 1,000 cows.

The top 25 per cent of participants were, in general, characterised by a larger herd size, larger farm size, lower cost of production, higher milk solids per cow and per hectare and greater labour efficiency compared to the average. They also had a higher milk price and livestock trading profit which gave them a much greater net farm income (more than 8 per cent).

Table 1 Farm physical data

Farm physical parameters	State average	Q1 to Q3 range	Top 25 per cent average
Annual rainfall 18–19 (mm)	802	723–854	736
Herd size	497	293–610	631
Total water use efficiency (t DM/100mm/ha)	0.6	0.5–0.7	0.7
Total usable area (ha)	579	324–662	695
Milking cows per usable hectares	0.9	0.8–1.0	1.0
Milk sold (kg MS/cow)	566	513–588	589
Milk sold (kg MS/ha)	515	394–610	555
Home grown feed as a per cent of ME consumed	60	56–65	57
Labour efficiency (cow/FTE)	83	68–91	90
Labour efficiency (kg MS/FTE)	46,894	37,842–53,122	51,711

Gross farm income

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

Figure 4 shows the income generated this season. Milk is the dominant income stream providing 86 per cent of income, with the remainder coming from livestock trading profit. It is important to remember that this is the second season that livestock trading profit provides a "truer" picture than previously, whereby dairy steers that remained on property were sold out internally. Across the participating farms, income from sources other than milk accounted for 14 per cent of gross farm income, but ranged from 7 per cent to 26 per cent.

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 for export or replace an aging herd structure plus rearing steer calves to sell as part of their value-add enterprise.

The average milk income received this season was $7.07/kg MS (50.8 c/L) with a range of $6.20/kg MS and $7.99/kg MS (43.9 c/L to 59.8 c/L).

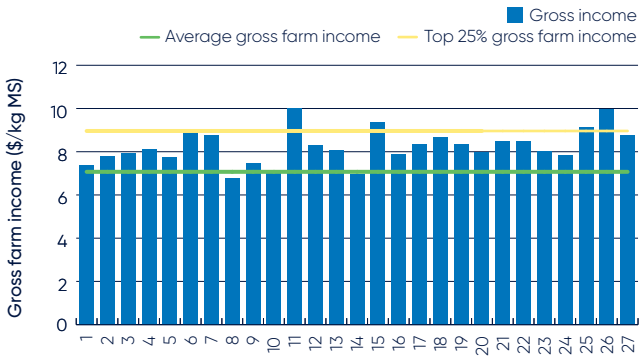
The top 25 per cent of performers received an average milk price of $7.31/kg MS (53.3 c/L) with 82 per cent of gross income coming from milk sales.

Average gross farm income in 2018–19 was $8.25/kg MS (59.3 c/L) and $8.96/kg MS (64.5 c/L) for the top 25 per cent.

The participants in 2017–18 in comparison had an average gross farm income of $8.16/kg MS (58.4 c/L) and $8.96 (64.5 c/L) for the top 25 per cent performers.

Due to confidentiality reasons the individual milk price is not presented in the appendix tables. However the average and top 25 per cent income metrics can be seen in greater detail in Table 2 and Appendix A1.

Figure 4 Gross farm income of per kilogram of milk solids



Variable costs

Variable costs (Figure 5) 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 $4.40/kg MS (31.6 c/L). The range was from $3.29/kg MS to $6.52/kg MS (23.3 c/L to 45.5 c/L). The average variable cost was higher compared to last year's average of $4.05/kg MS (29.0 c/L). The top 25 per cent had lower variable costs than the average of all participant farms at $4.19/kg MS (30.1 c/L).

Feed costs were the major variable cost accounting for 87 per cent of total variable costs and 54 per cent of total costs. The top 25 per cent of farms' feed costs were $3.71/kg MS (26.7 c/L), 4 per cent less than the average of $3.85/kg MS (27.7 c/L).

Imported feed decreased to 40 per cent of whole farm metabolisable energy (ME) fed, compared to 43 per cent last year. At the same time, concentrate costs increased by 14 per cent to an average of $488/t. The price of purchased concentrate ranged from $390/t DM to $632/t DM.The average home grown feed was $130/t DM with the range being $69/t DM to $207/t DM.

The top 25 per cent purchased concentrates on average for $480/t DM and it cost them $114/t DM for home grown feed.

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

Overhead costs

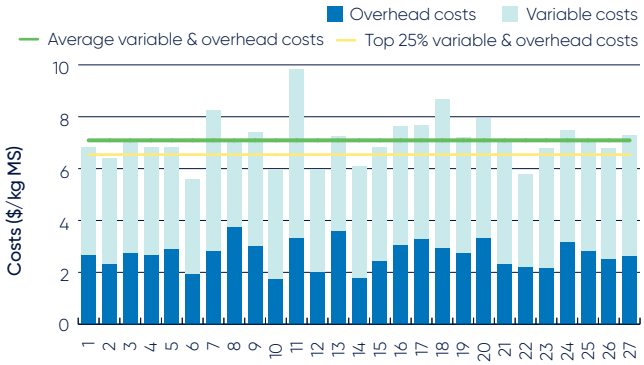
The calculation of overhead costs in the DFMP consists of cash and non-cash costs to the dairy business. Examples of cash overheads include rates, insurance and employed labour, and non-cash overheads include depreciation of plant and machinery and imputed owner/operator and family labour.

Figure 5 further highlights the variation in overhead costs between participant farms with values ranging from $1.72/kg MS to $3.72/kg MS (12.7 c/L to 26.3 c/L). The top 25 per cent recorded lower overhead costs at $2.42/kg MS (17.4 c/L) compared to the average of $2.69/kg MS (19.3 c/L).

Labour costs, including employed and imputed labour, were the major overhead cost, accounting for 60 per cent of total overhead costs and 23 per cent of total costs. Repairs and maintenance and depreciation increased 12 per cent from the previous year.

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.

Figure 5 Total operating costs - variable and overhead costs per kilogram of milk solids



Cost of production

Cost of production gives an indication of the average cost of producing a kilogram of milk solids. It is calculated as variable plus overhead costs and accounts for changes in fodder and livestock inventory. Including changes in fodder inventory is important to establish the true costs to the business. The changes in fodder inventory count for the net cost of feed from what was fed out, conserved, purchased and stored over the year. Livestock trading loss or increase is also considered in the cost of production. Where there is a decrease in the value of livestock due to reduced stock numbers, or value, then this represents a cost to the business. An increase and retention of young stock due to natural increase, rather than through purchases, will lead to a negative cost as there has been a growth in the assets and this change is captured as a negative cost.

Table 3 shows that the average cost of production (with inventory changes accounted for) was $7.18/kg MS (51.5 c/L) and the top 25 per cent was $6.58/kg MS (47.3 c/L).

The average cost of production of the top 25 per cent was 8 per cent lower than the average for participant farms with all costs (except purchased feed costs and agistment) being equal to or lower than the average. The top 25 per cent allocated less dollars to hay and silage making, fetiliser and pasture/cropping costs than the average (combined 1 c/L). The majority of costs were in line with last year, except for purchased feed and agistments (2.3 c/L) due to the increase in concentrate price. Having a low cost of production is one key determinant of being a top 25 per cent producer in 2018–19.

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 6 shows the EBIT per kg MS.

The average EBIT for 2018–19 was $353,193 per farm, down from $511,339 per farm in 2017–18, noting some participant changeover this year.

On average, EBIT per kg MS decreased more than 25 per cent to $1.16/kg MS (8.4 c/L) in 2018–19 from $1.54/kg MS (11.0 c/L). The decrease in EBIT is a reflection of the higher concentrate and forage price and the late break. The continued decline in EBIT is now 41 per cent down from 2016–17.

The top 25 per cent of performers did not escape the reduced margins with an average EBIT decreasing 23 per cent to $2.35/kg MS (17.0 c/L), although the margin is double that of the average. This meant they were able to retain 20 per cent of their gross farm income compared to only 6 per cent for the average.

Figure 6 Whole-farm earnings before interest and tax per kilogram of milk solids

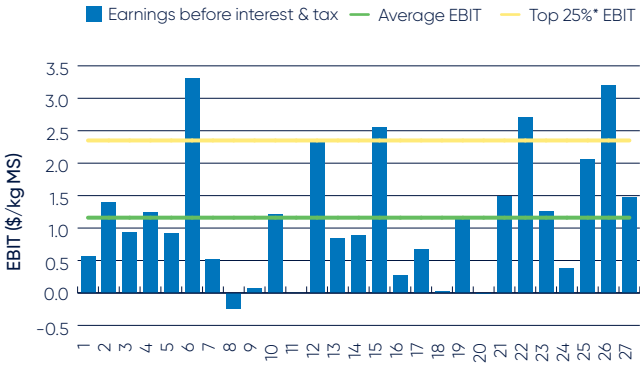


Table 2 Total variable and overhead costs

Farm income and cost category	Average	Q1 to Q3 range	Top 25 per cent average
Income	**$ kg/MS**	**$ kg/MS**	**$ kg/MS**
Milk income (net)	7.07	6.80–7.41	7.31
Livestock trading profit	1.16	0.74–1.35	1.65
Other farm income	0.01	0.00–0.02	0.00
Total income	8.25	7.83–8.73	8.96
Variable costs			
Herd cost	0.28	0.22–0.34	0.26
Shed cost	0.27	0.21–0.33	0.22
Home grown feed cost	1.28	1.02–1.54	1.13
Purchased feed and agistment	2.59	2.32–2.88	2.62
Feed inventory change	-0.03	-0.10–0.03	-0.04
Water inventory change	0.00	0.00–0 .00	0.00
Total feed costs	3.85	3.60–4.00	3.71
Total variable costs	4.40	4.14–4.60	4.19
Overhead costs			
Employed labour	0.98	0.73–1.22	0.99
Repairs and maintenance	0.42	0.26–0.58	0.40
All other overheads	0.31	0.25–0.36	0.28
Imputed labour	0.62	0.34–0.82	0.44
Depreciation	0.36	0.26–0.44	0.30
Total overhead costs	2.69	2.32–3.02	2.42
Total operating costs	$7.09	6.77–7.44	$6.61
Earnings before interest and tax	**1.16**	**0.44–1.48**	**2.35**

Table 3 Cost of production

Farm costs ($/kgMS)	Average	Q1 to Q3 range	Top 25 per cent average
Cash cost of production	6.14	5.61–6.47	5.91
Cost of production (excl inventory changes)	7.12	6.79–7.50	6.65
Inventory change			
+/- feed and water inventory changes	-0.03	-0.01–0.03	-0.04
+/- livestock inventory changes minus purchases	0.08	-0.04–0.34	-.0.03
Cost of production (incl inventory changes)	7.18	6.68–7.54	6.58

Return on total assets and equity

Return on total assets (ROTA) 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.

The average ROTA for participants was 3.2 per cent, down from last year's 4.3 per cent, ranging from negative 0.5 per cent to 10.6 per cent (Figure 9). Only 22 per cent of participants recorded a ROTA higher than 5 per cent, as opposed to 62 per cent two years ago. Only one farm achieved a ROTA greater than 10 per cent, compared to six in 2016–17.

Figures 7 to Figure 10 were calculated excluding capital appreciation.

Figure 7 Distribution of farms by return on total assets

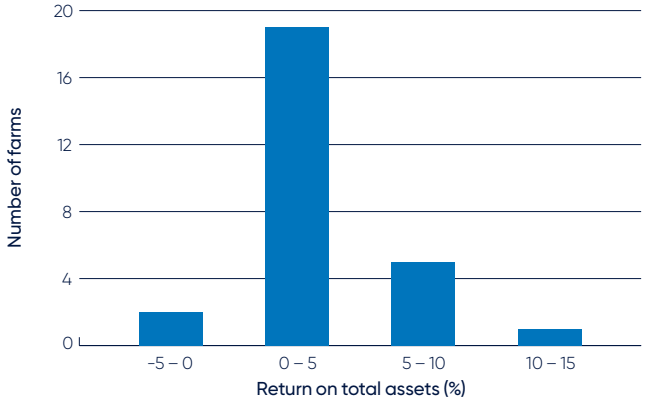
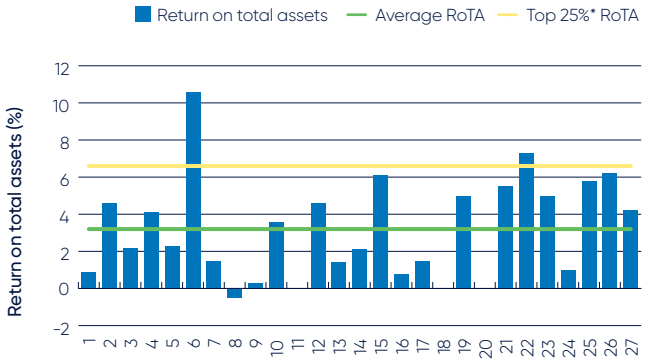


Figure 8 Return on total assets

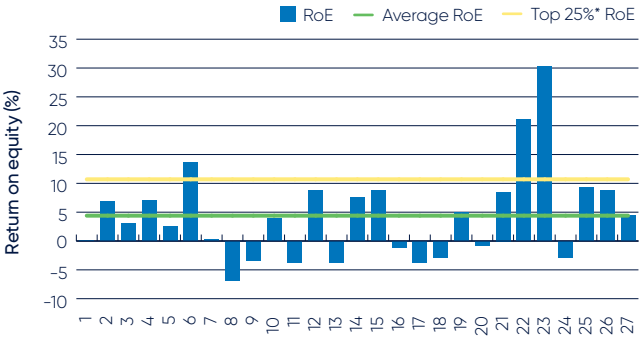


Return on equity is the net farm income expressed as a percentage of owner's equity. It is a measure of the owner's rate of return on their investment. The average return on equity (RoE) for the 27 farms was 4.4 per cent in contrast to 11.2 per cent two years ago. Return on equity ranged from -6.9 per cent to 30.2 per cent, with the top 25 per cent recording an RoE of 10.7 per cent. There were nine particpants (33 per cent) that recorded a negative RoE up from three last year and only one the year before.

Figure 9 and Figure 10. It is of interest to note that the two farms with largest RoE are heavily skewing the average. If these two were removed from the data set then the average would be a very sobering 2.8 per cent. This figure is indicative of the current mood in the industry and the lack of willingness to invest. Appendix Table A1 presents all the return on total assets and return on equity for the participating farms.

Figure 9 Distribution of farms by return on equity

Figure 10 Return on equity



Risk

"Risk is conventionally classified into two types: business risk and financial risk. Business risk is the risk any business faces regardless of how it is financed. It comes from production and price risk, uncertainty and variability. 'Business risk' refers to variable yields of crops, reproduction rates, disease outbreaks, climatic variability, unexpected changes in markets and prices, fluctuations in inflation and interest rates, and personal mishap. 'Financial risk' derives from the proportion of other people's money that is used in the business relative to the proportion of owner-operator's capital…""[1]

Table 3 presents some key risk indicators. Refer to Appendix E for the definition of terms used in Table 3. These indicators can also be found in Appendix Tables A1, A3 and A8.

As most farms use a mix of borrowed and owned capital, they are generally exposed to both business and financial risk. It is important to understand that risk drives return, and achieving the rate balance between risk and return can drive success.

Table 3 presents some key risk indicators. Refer to Appendix E for the definition of terms used in Table 3. These indicators can also be found in Appendix Tables A1, A3 and A8.

Only one farm in the project relied on <25 per cent of imported feed for the herd's feed requirement. With an average of 40 per cent 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 23 per cent to 68 per cent.

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 4 shows that across the state for every $1.00 spent, 62 cents was used to cover variable costs. This figure is very consistent across years.

The debt services ratio shows interest and lease costs, as a proportion of gross farm income. This year's ratio of 6 per cent indicates that on average farms repaid 6 cents of every dollar of gross farm income to their creditors.

Equity levels averaged 68 per cent down from 70 per cent last year. Debt per cow rose by more than $500/cow which means it has risen $1238/cow or 38 per cent in the last two seasons.

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 2018–19, 15 of the 27 of participant farms (56 per cent) received a return on equity greater than their return on assets, down from 71 per cent last season and 85 per cent the year before. When the percentage of RoE increases compared to ROTA, it is the result of a higher return from the additional assets than the interest or lease rate.

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

Table 4 Risk indicators – statewide

	Statewide
Cost structure (percentage of total costs as variable costs)	62
Debt service ratio (percentage of income as finance costs)	7
Debt per cow	$4,469
Equity percentage (ownership of total assets managed)	68
Percentage of feed imported (as a percentage of total ME)	40

PHYSICAL MEASURES

There are a wide range of farming systems that exist in the WA dairy industry. The average WA dairy produces milk from roughly equal portions of grass, fodder and grain with 62 per cent of the diet coming from home grown feed. However the systems vary in terms of cow type, feedbase, stocking rate and production levels and are underpinned by quite varying feed inputs. Participant farms sourced 41 per cent of their metabolisable energy (ME) from directly grazed pasture (range 14–64 per cent) and concentrates provided 35 per cent of ME (range 22–49 per cent). The other main supply of energy was from silage (15 per cent) and hay (8 per cent).

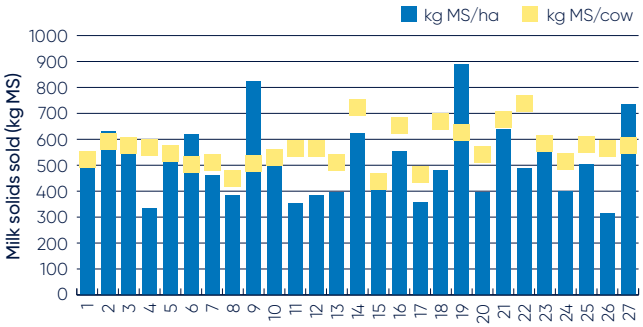
Milk solids sold

There was a large variation in the amount of milk solids sold per usable hectare with a range of 314 kg MS/ha to 888 kg MS/ha reported, with the average being 515 kg MS/ha (Figure 11).

The top 25 per cent of farms sold an average of 555 kg MS/ha 8 per cent more than the average of all WA participants. Previously this has been 26 per cent higher mainly driven by stocking rate (30 per cent higher). The marginal cost of production, as well as larger percentages of livestock trading could be reasons why this gap has closed. Both of these factors would dilute the milk solids/ha as the energy would be partitioned to meat production and less production per high cost unit of energy fed.

The average kilograms of milk solids sold per cow remained stable at 566 kg MS/cow (7,884 L/cow), and ranged between 438 kg MS/cow and 739 kg MS/cow (6,232–10,631 L/cow). The top 25 per cent had an average per cow production of 589 kg MS/cow in 2018–19.

Figure 11 Milk solid sold



Milk sales versus calving pattern

Figure 12 shows the average milk sales for all participanting 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.

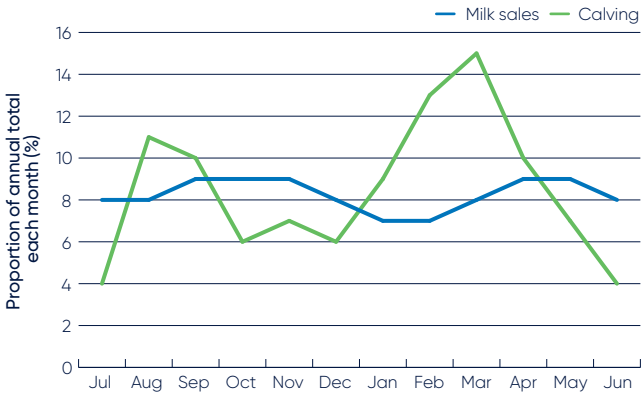
Peak milk production is in spring when pasture growth is greatest and conversely milk production is lowest in summer when reliance on supplements and irrigation is greatest. This is reflected in a peak to trough ratio of 1.37; with 9.3 per cent of annual milk produced in October compared to 6.8 per cent in February.

Most particpants in the DFMP have a split-calving pattern being spring and autumn. This can be seen in the shape of the curve with two distinct "bumps" in Aug/Sep and Feb/Mar. 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.

Interestingly the irrigation farms produce 23 per cent of their milk in summer with dryland farms similar at 21 per cent.

The 27 participant farms calved 27 per cent of their cows in August to October and another 37 per cent in February to April. There is a slight shift to more autumn calving which could be a result of the milk price signals for summer milk.

Figure 12 Milk sales vs calving pattern



Feed consumption

Pasture consumption is calculated as the gap 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.

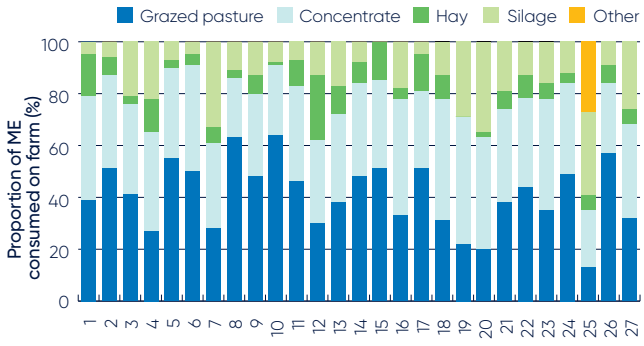
In 2018–19, 59 per cent of the diet ME is supplement based; with grazed pasture the major component of the cows' diet at 41 per cent (Figure 13).

Concentrates supply the greatest proportion of ME of all the supplements fed, accounting for 35 per cent of the diet, a similar figure to last year.

These ratios altered from last year where the diet consisted of 36 per cent grazed pasture, 37 per cent concentrate, 16 per cent silage and 10 per cent hay providing the energy.

Appendix Table A3 provides further information on purchased feed.

Figure 13 Sources of whole-farm metabolisable energy



Grazed pasture consumption was estimated by using a back calculation method embedded in DairyBase,

Home grown feed can be grazed pasture (shown as blue bars in Figure 14) and conserved pasture (shown as light blue bars).

The average total pasture harvested (grazed and conserved) from the milking area was 5.8 t DM/ha., similar to last year's 5.6 t DM/ha. The amount of pasture consumed as directly grazed feed on the milking area this year averaged 4.2 t DM/ha, ranging from 1.6 t DM/ha to 7.5 t DM/ha. This average was up slightly from last year by 0.4 t DM/ha which increased the amount of pasture in the diet.

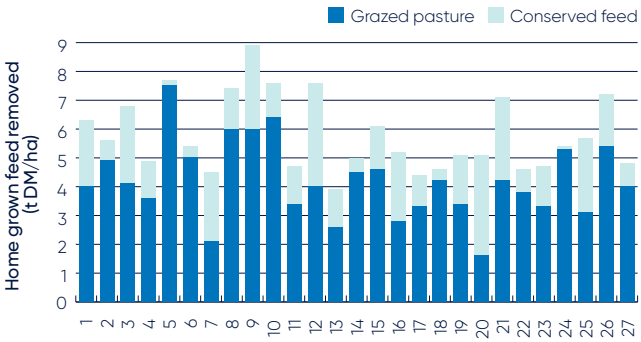
Pasture harvested on the usable area increased to 5.1 t DM/ha in 2018–19, from 4.7 t DM/ha last year and ranged from 3.5 t DM/ha to 8.3 t DM/ha.

The usual gap that exists with the top 25 per cent with high consumption across all the usable area, rather than just the milking platform was only very slight this year. Top businesses understand that the land is a resource, and managing all the pasture well, is essential to lower the cost of production. The short growing season makes it difficult for all operators to actively manage resources.

It should be noted that there can be a number of sources of error in this method including incorrect estimation of liveweight, 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. 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 Estimated tonnes of home grown feed consumed per milking area hectare



Fertiliser application

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

The total nutrient use was 199 kg/ha comprising of 115 kg/ha nitrogen, 15 kg/ha phosphorus, 40 kg/ha potassium and 29 kg/ha sulphur (Table 5).

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.

WA participating 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 15 kg N/ha up to 243 kg N/ha, with the group average at 115 kg N/ha (Figure 15). Farms in the top 25 per cent applied slightly more (8 per cent) fertiliser than the average but the variation was a lot smaller than in previous years. The only nutrient of significant variation was 10 per cent more nitrogen applied than the average usage.

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 15 can be found in Appendix Table A2.

Figure 15 Fertiliser application per useable hectare

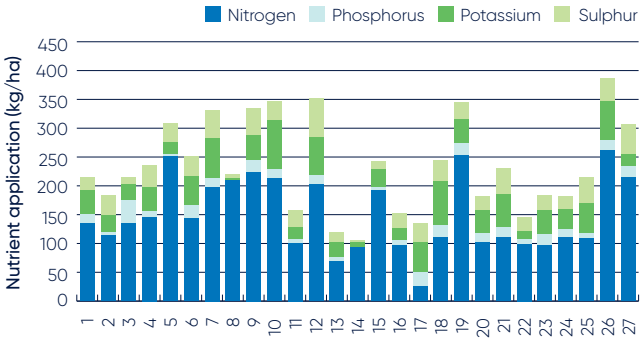


Table 5 Fertiliser application per hectare

Applied fertiliser	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19
Nitrogen	86	89	97	109	111	115
Phosphorus	12	14	16	14	19	15
Potassium	34	38	41	38	41	40
Sulphur	25	29	28	28	29	29

Business confidence survey

Expectations and issues

Responses to this business confidence survey were collected between July and September 2019 with regard to the 2018–19 financial year and the next five years.

Expectations for business returns

Following another difficult autumn for pasture growth, and with record grain and fodder prices for a consistent length of time, business confidence was seriously impacted during the completion of the survey. Terms of trade have decreased for the past 24 months which gives some context to the results. Expectations for the coming season remained more cautiously optimistic with only 27 per cent of farmers predicting an improvement in farm business returns compared to 17 per cent last year. The expectations of stability increased from 37 to 54 per cent and whilst the percentage of business expecting a further deterioration fell dramatically from 46 per cent to 15 per cent.

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 a similar or improved business return in 2019–20 were a lot higher than last year (Figure 16). This is primarily driven by the very high feed prices, the late seasons and the very low terms of trade. The comment "things can not get much worse" was consistently raised.

Price and production expectations – milk

The majority of respondents expected their price and production to remain stable. However there has been a major increase in the number of businesses who think their milk price will increase (from 9 to 42 per cent) This is a reflection of the higher cost of production, and the expectations that current demand will remain.

Whilst the expectations on production were more balanced, only 12 per cent were expecting to decrease their production. Some 54 per cent of respondents would maintain their production level with 35 per cent expecting an increase (Figure 17).

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.

Some 46 per cent of participating farmers expected no change or to increase their level of fodder production in 2019–20 (Figure 18).

Only 8 per cent indicated that they expected a decrease in their fodder production for the coming year, which is not surprising given the current high cost market conditions for fodder.

Figure 16 Expectation of business returns

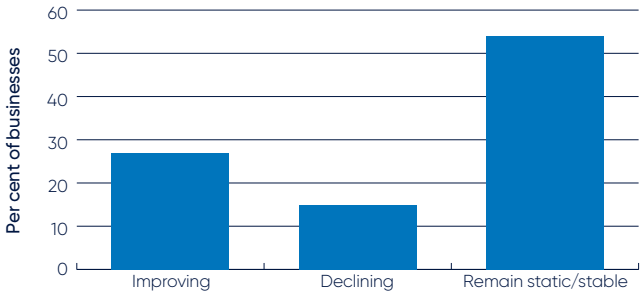


Figure 17 Price and production expectations – milk

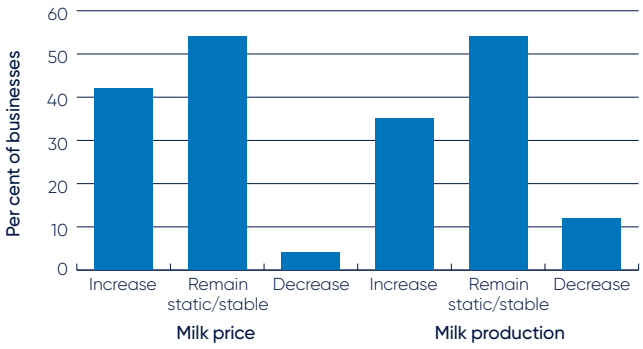
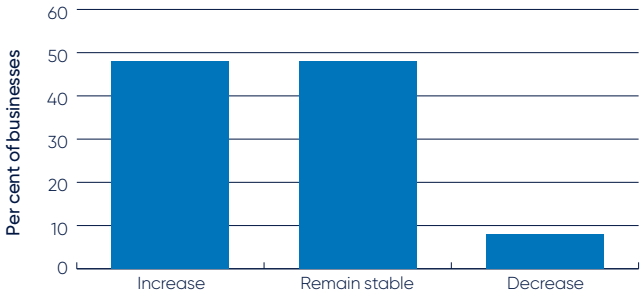


Figure 18 Producer expectations – fodder



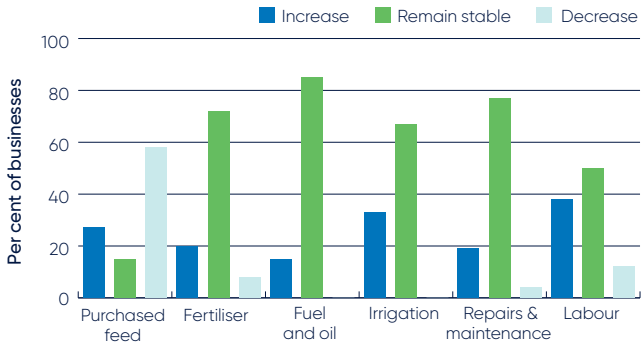
Cost expectations

In relation to costs there is little expectation of costs to decrease across the major cost categories, except feed. The majority (58 per cent) expected a decrease in purchased feed costs due to the record high grain prices. (Figure 19).

Some 85 per cent thought that the fuel and oil prices would remain stable and 72 per cent thought fertiliser would remain unchanged. This is not surprising as these commodities move in price when the grain market is moving. The expectation that grain price will retreat gives logic to the fertiliser and fuel remaining constant.

Among the irrigators, the majority of users (67 per cent) expected costs to remain similar to last year. Due to the high cost of grain there will be a greater focus on cost effectively utilising water this season. There has been a shift in the expectations around labour. Whilst the expectations around decreasing remains unchanged there are greater expectations of cost increasing rather than remaining stable from last season.

Figure 19 Cost expectations



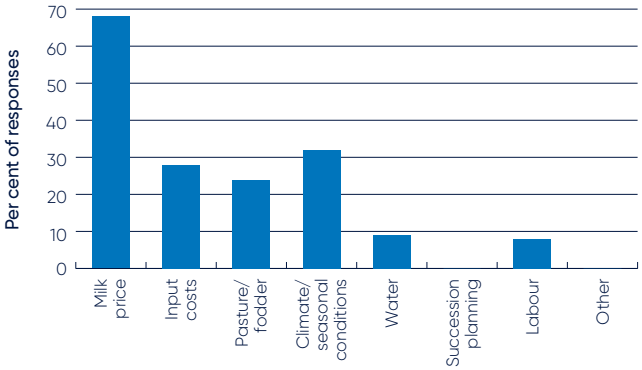
Major issues in the dairy industry – the next 12 months

The participants were asked to consider seven issues as identified in Figure 20, and to rank them based on the level of importance to their business for the upcoming year. They were asked to rank the issues from one to eight, with one being the most important, and eight being the least important. They were also given the opportunity to identify other issues of importance to their business.

Figure 20 shows that the great majority (68 per cent) of the respondents identified milk price as the most important issue they are facing in the short term (next 12 months). This is not surprising given the increase in cost of production and lower profit seen across the state over the past two years. With low rainfall in the past two autumns, and the forecast of continuing variable conditions, farmers commented that the impact of seasonality and growth of pasture and fodder, as the next issues that are all interlinked with input costs. Water, labour and succession planning were less important issues in the short term in this survey as seen in previous years.

There were numerous comments from farmers about the impact of the eastern states drought on business viability, and the concern about how much longer the high feed prices would continue. Some farmers revealed that the relentless high cost of production was affecting their morale and that of their families. Others said that a reliable autumn break in the season was crucial to the prospect of a reasonable year ahead.

Figure 20 Major issues for individual businesses – 12 month outlook



Greenhouse gas emissions

The average level of emission from participating farms was 14.8 t CO_2-e/t MS in 2018–19, which was very similar to last year's 14.6 t CO_2-e/t MS. While the changes for most were minimal, the CH_4 decreased 26 per cent and prefarm gate increased 30 per cent 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 per cent. This percentage increase will vary between farms in the state.

The distribution of different emissions for 2018–19 is shown in Figure 21. Greenhouse gas emissions per tonne of milk solids produced ranged from 12.2 CO_2-e/t MS to 18.2 t CO_2-e/t MS with an average emission level of 14.8 t CO_2-e/t MS. The percentage breakdown for emissions in 2018–19 was 63 per cent for CH_4, 23 per cent for CO_2, and 13 per cent for N_2O emissions.

Methane was identified as the main greenhouse gas emitted from dairy farms, accounting for 63 per cent, or 9.4 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 55 per cent of total emissions. Methane from effluent ponds accounted for 8 per cent of total emissions on average across the state in 2018–19.

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 per cent of the dietary dry matter intake.

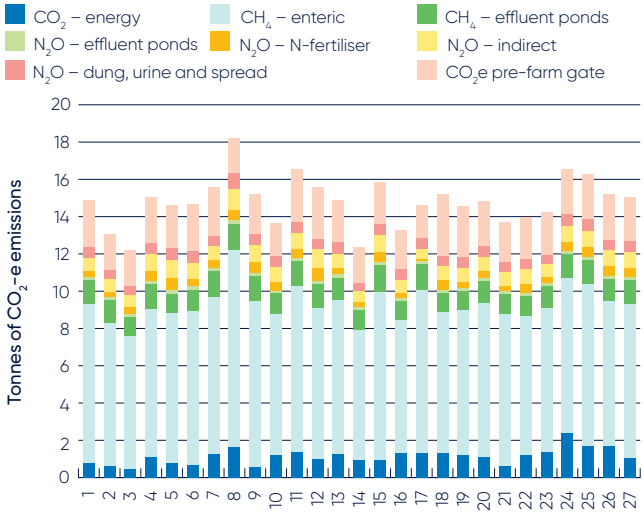
The second main greenhouse gas emission was pre-farm gate being produced primarily from fossil fuel consumption as either electricity or petrochemicals. The NGGI calculates carbon emissions from both pre-farm gates and on-farm sources. Carbon dioxide accounted for 24 per cent of total emissions (3.4 t CO_2-e/t MS); 16 per cent from pre-farm gates sources and 8 per cent from on-farm energy sources. Output levels were highly dependent on the source of electricity used with farms using brown coal generated electricity and electricity sourced from renewable sources (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 13 per cent of total emissions or 2.0 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.

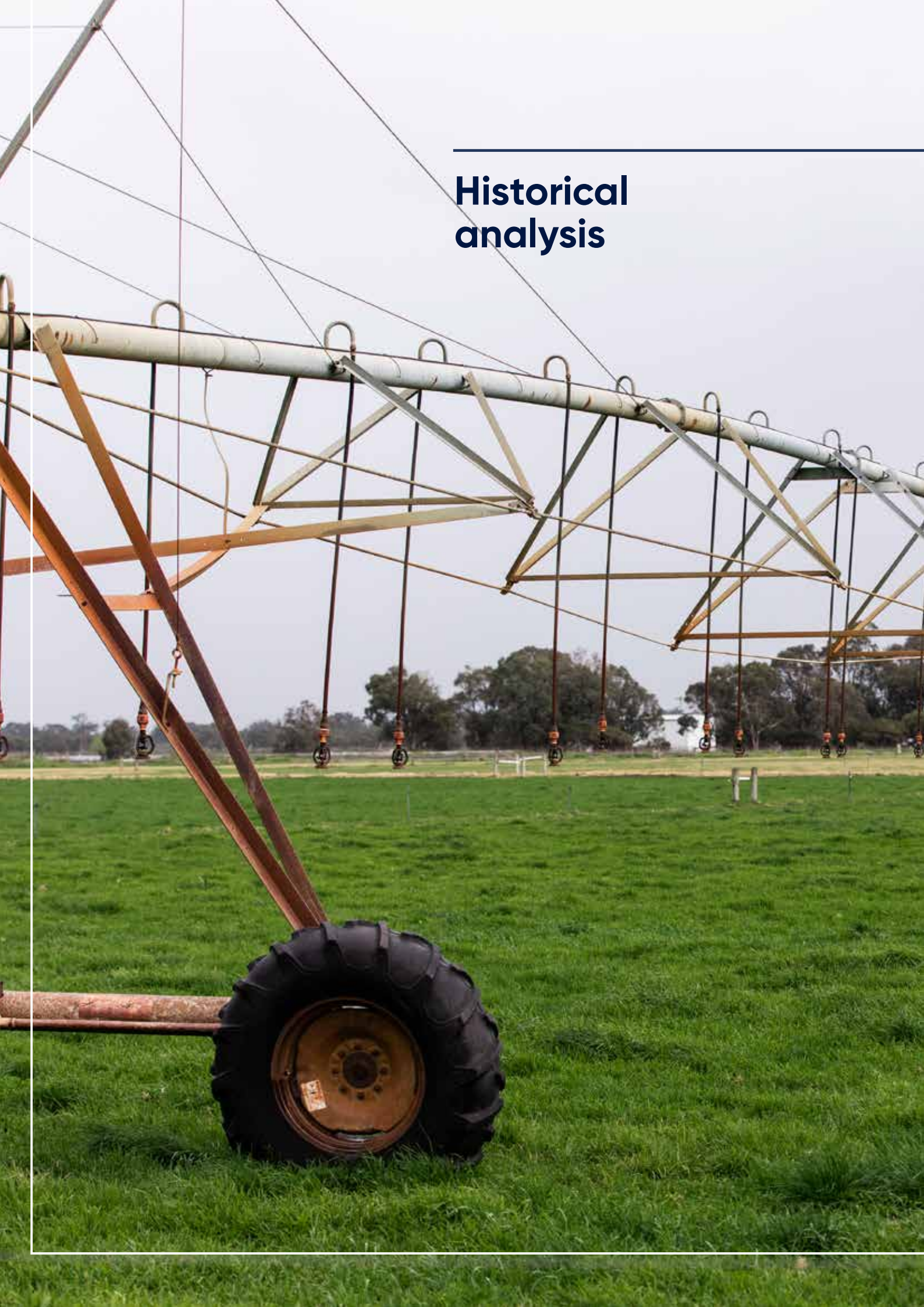
Nitrous oxide emissions from fertiliser accounted for 3 per cent of total emissions and excreta accounted for 4 per cent. Nitrous oxide from indirect emissions was 5 per cent. Nitrous oxide emissions are highest in warm, waterlogged soils with readily available nitrogen. Over application of nitrogen, 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.

It is increasingly important to understand and monitor greenhouse gas emissions. 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 website at **environment.gov.au/climate-change**.

Figure 21 Greenhouse gas emissions per tonne of milk solids produced



Historical analysis



The 2018–19 was a very tough year for the WA and national dairy industries. Continued high feed costs, poor seasons and a sharp rise in production costs has made this the worst financial performance in the past six years. In real terms, the EBIT and RoTA for 2018–19 is lower than any of the previous years. Net farm income and return of equity were also at their lowest points.

This section compares the performance of participant farms in the DFMP over the past six years. While figures are adjusted for inflation to allow comparison between years it should be noted that only 13 farms from the initial farms in 2013–14 have participated over all six seasons, with two new farms participating in 2018–19.

The average EBIT and net farm income (NFI) decreased for the fourth year in a row, to the lowest point recorded (Figure 22).

Earnings before interest and tax as well as net farm income declined significantly, 32 per cent and 48 per cent respectively in 2018–19, due to risng input costs, poorer physical performance and mainly the increase in purchased feed costs (adjusted for inflation). The current business performance is the worst in terms of ROTA, EBIT, NFI and RoE.

Return on total assets (ROTA) at 3.2 per cent in 2018–19 has dropped significantly in the past 12 months and has trended down for the past four years (Figure 23). This smaller proportion of farms' positive performance in 2018–19 was primarily due to the higher costs in purchased feeds and static milk income.

The average return on equity (RoE) decreased significantly from a very healthy 11.2 per cent in 2016–17, to 7.7 per cent last year and down to 4.4 per cent in 2018–19, whilst the top 25 per cent still remained at 10.7 per cent.

Figure 22 Historical EBIT and net farm income

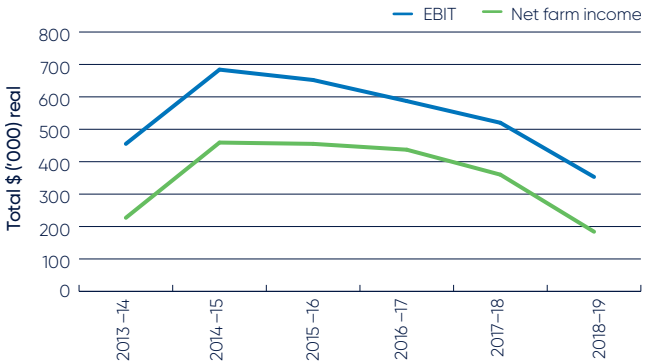
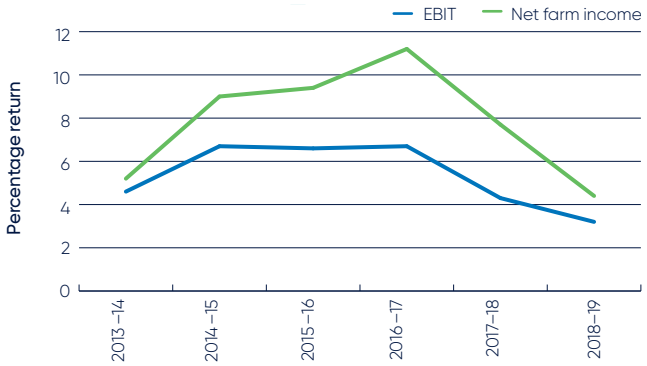


Figure 23 Regional return on total assets and return on equity



Appendices

APPENDIX A

SUMMARY TABLES

Table A1 Main financial indicators

Farm number	Milk income (net)	All other income	Gross farm income	Total variable costs	Total overhead costs	Cost structure (variable costs/total costs)	Earnings before interest and tax	Return on total assets (exc. capital apprec.)	Interest and lease charges	Debt servicing ratio	Net farm income	Return on equity
	$ kg/ MS	$/kg MS	$ kg/ MS	$/kg MS	$/kg MS	per cent	$/kg MS	per cent	$/kg MS	per cent of income	$ kg/ MS	per cent
1			7.38	4.18	2.65	61	0.56	0.9	0.50	6.8	0.06	0.1
2			7.81	4.11	2.31	64	1.39	4.6	0.16	2.0	1.24	6.8
3			7.94	4.25	2.75	61	0.94	2.2	0.20	2.5	0.74	3.0
4			8.07	4.20	2.64	61	1.24	4.1	0.64	7.9	0.60	7.1
5			7.77	3.97	2.88	58	0.92	2.3	0.27	3.4	0.65	2.6
6			**8.89**	**3.66**	**1.93**	**65**	**3.30**	**10.6**	**0.39**	**4.3**	**2.91**	**13.6**
7			8.77	5.43	2.83	66	0.51	1.5	0.45	5.1	0.06	0.3
8			6.77	3.29	3.72	47	-0.24	-0.5	0.96	14.1	-1.20	-6.9
9			7.49	4.42	2.99	60	0.07	0.3	0.38	5.1	-0.31	-3.3
10			7.13	4.21	1.72	71	1.21	3.6	0.86	12.0	0.35	3.9
11			9.84	6.52	3.32	66	0.00	0.0	1.04	10.5	-1.03	-3.7
12			8.31	3.98	1.99	67	2.34	4.6	0.79	9.6	1.55	8.7
13			8.08	3.66	3.58	51	0.84	1.4	1.31	16.2	-0.47	-3.7
14			6.97	4.31	1.79	71	0.88	2.1	0.41	5.9	0.47	7.5
15			**9.39**	**4.42**	**2.42**	**65**	**2.55**	**6.1**	**0.53**	**5.6**	**2.02**	**8.8**
16			7.91	4.59	3.05	60	0.27	0.8	0.51	6.4	-0.24	-1.2
17			8.35	4.39	3.29	57	0.67	1.5	1.28	15.3	-0.61	-3.7
18			8.69	5.76	2.92	66	0.02	0.0	0.58	6.7	-0.56	-2.9
19			**8.37**	**4.45**	**2.74**	**62**	**1.18**	**5.0**	**0.02**	**0.2**	**1.17**	**5.0**
20			7.96	4.65	3.31	58	-0.01	0.0	0.13	1.7	-0.14	-0.8
21			**8.49**	**4.68**	**2.32**	**67**	**1.48**	**5.5**	**0.65**	**7.7**	**0.83**	**8.5**
22			**8.51**	**3.62**	**2.18**	**62**	**2.71**	**7.3**	**0.93**	**10.9**	**1.78**	**21.0**
23			8.03	4.61	2.16	68	1.26	5.0	0.74	9.3	0.51	30.2
24			7.85	4.32	3.15	58	0.38	1.0	0.79	10.0	-0.41	-2.9
25			**9.13**	**4.27**	**2.80**	**60**	**2.06**	**5.8**	**0.60**	**6.6**	**1.46**	**9.3**
26			**9.97**	**4.25**	**2.52**	**63**	**3.20**	**6.2**	**0.48**	**4.9**	**2.71**	**8.7**
27			8.78	4.69	2.61	64	1.47	4.2	0.54	6.2	0.93	4.4
Average	**7.07**	**1.18**	**8.25**	**4.40**	**2.69**	**62**	**1.16**	**3.2**	**0.60**	**7.3**	**0.56**	**4.4**
Top 25*	**7.31**	**1.66**	**8.96**	**4.19**	**2.42**	**63**	**2.35**	**6.6**	**0.51**	**5.7**	**1.84**	**10.7**

Table A2 Physical information

Farm number	Milking cows per usable area	Milk sold	Milk sold	Fat	Protein
	hd/ha	kg MS/cow	kg MS/ha	per cent	per cent
1	1.0	524	509	3.8	3.2
2	1.1	591	630	3.8	3.3
3	1.0	575	564	4.2	3.5
4	0.6	568	333	4.2	3.2
5	0.9	547	512	4.1	3.2
6	**1.2**	**502**	**620**	**4.2**	**3.4**
7	0.9	511	459	4.0	3.2
8	0.9	447	382	3.9	3.2
9	1.6	507	825	3.8	3.1
10	1.0	528	537	4.3	3.7
11	0.6	565	353	3.8	3.2
12	0.7	565	383	3.8	3.3
13	0.8	509	394	4.0	3.2
14	0.9	721	621	3.9	3.2
15	**1.0**	**438**	**428**	**3.8**	**3.2**
16	0.9	652	555	3.9	3.2
17	0.8	466	356	4.1	3.3
18	0.7	667	479	3.8	3.2
19	**1.4**	**625**	**888**	**3.9**	**3.2**
20	0.7	543	394	4.0	3.1
21	**0.9**	**676**	**638**	**4.0**	**3.1**
22	**0.7**	**739**	**489**	**3.9**	**3.2**
23	1.0	585	600	3.9	3.3
24	0.8	514	399	3.6	3.2
25	**0.9**	**581**	**505**	**4.0**	**3.2**
26	**0.6**	**563**	**314**	**3.9**	**3.3**
27	1.3	578	734	3.9	3.2
Average	**0.9**	**566**	**515**	**3.9**	**3.2**
Top 25*	**1.0**	**589**	**555**	**4.0**	**3.2**

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	per cent of ME	kg/ha	kg/ha	kg/ha	kg/ha	hd/FTE	kg MS/FTE
1	4.0	2.3	53	84.5	14.7	34.7	19.6	84	44,173
2	4.9	0.7	61	99.1	10.7	32.4	36.0	97	57,520
3	4.1	2.7	62	102.3	35.4	34.3	13.5	76	43,601
4	3.6	1.3	60	94.6	5.2	43.6	27.7	65	37,133
5	7.5	0.2	64	166.4	14.4	41.3	34.8	93	50,760
6	**5.0**	**0.4**	**56**	**129.2**	**21.1**	**44.1**	**32.8**	**116**	**58,402**
7	2.1	2.4	51	97.5	12.0	34.0	31.6	86	43,835
8	6.0	1.4	77	108.9	10.7	36.2	19.9	64	28,560
9	6.0	2.9	65	242.8	16.9	43.9	46.5	63	32,211
10	6.4	1.2	70	131.0	10.1	52.0	19.4	140	73,702
11	3.4	1.3	60	90.4	8.9	37.7	24.6	54	30,521
12	4.0	3.6	67	147.3	10.3	52.6	51.2	127	71,744
13	2.6	1.3	60	69.7	7.4	25.2	17.3	64	32,558
14	4.5	0.5	56	94.6	0.0	14.2	5.2	68	49,037
15	**4.6**	**1.5**	**65**	**120.8**	**9.8**	**26.4**	**15.0**	**119**	**52,274**
16	2.8	2.4	51	75.7	19.8	39.5	36.5	80	51,925
17	3.3	1.1	70	15.4	19.6	38.5	26.9	69	32,002
18	4.2	0.4	46	130.6	21.2	81.0	35.4	71	47,442
19	**3.4**	**1.7**	**32**	**168.8**	**24.8**	**39.7**	**28.0**	**90**	**56,377**
20	1.6	3.5	57	77.8	9.4	31.9	18.0	71	38,551
21	**4.2**	**2.9**	**63**	**102.1**	**6.8**	**47.2**	**33.3**	**68**	**45,820**
22	**3.8**	**0.8**	**66**	**137.3**	**9.2**	**45.3**	**32.2**	**73**	**53,970**
23	3.3	1.4	55	107.1	19.7	46.0	28.2	99	58,119
24	5.3	0.1	61	97.0	10.2	25.0	16.6	67	34,404
25	**3.1**	**2.6**	**48**	**132.9**	**10.8**	**61.8**	**59.5**	**77**	**44,521**
26	**5.4**	**1.8**	**72**	**91.6**	**17.4**	**36.9**	**25.3**	**90**	**50,611**
27	4.0	0.8	58	189.2	21.9	45.0	55.5	80	46,377
Average	**4.2**	**1.6**	**60**	**115**	**14**	**40**	**29**	**83**	**46,894**
Top 25*	**4.2**	**1.7**	**57**	**126**	**14**	**43**	**32**	**90**	**51,711**

*on milking area

Table A3 Purchased feed

Farm number	Purchased feed per milker	Concentrate price	Silage price	Hay price	Other feed price	Average purchased feed price	of total energy imported
	t DM/hd	$/t DM	$/t DM	$/t DM	$/t DM	$/t DM	per cent of ME
1	3.0	511	-	321	-	463	47
2	2.4	541	-	297	-	521	39
3	2.3	547	-	289	-	477	38
4	2.7	418	270	-	-	397	40
5	2.3	440	-	224	-	436	36
6	**2.8**	**438**	**-**	**349**	**-**	**423**	**44**
7	3.9	473	245	229	-	386	49
8	1.6	390	-	-	-	390	23
9	2.4	547	-	-	-	547	35
10	2.1	504	559	316	-	489	30
11	3.8	578	-	341	-	559	40
12	2.2	393	-	305	-	390	33
13	2.2	434	-	247	-	393	40
14	3.8	609	-	268	-	502	44
15	**2.0**	**481**	**-**	**320**	**-**	**473**	**35**
16	3.2	435	-	380	-	429	49
17	1.9	591	-	-	-	591	30
18	4.6	496	-	242	-	424	54
19	**4.5**	**395**	**267**	**235**	**-**	**349**	**68**
20	2.9	546	364	211	-	537	43
21	**3.2**	**632**	**-**	**406**	**-**	**620**	**37**
22	**3.3**	**513**	**-**	**418**	**-**	**511**	**34**
23	3.1	477	-	353	-	468	45
24	2.7	432	-	293	-	405	39
25	**3.6**	**412**	**275**	**292**	**38**	**209**	**52**
26	**2.5**	**490**	**-**	**268**	**1,316**	**477**	**28**
27	2.7	456	-	269	-	417	42
Average	**2.9**	**488**	**330**	**299**	**677**	**455**	**40**
Top 25*	**3.1**	**480**	**271**	**327**	**677**	**438**	**43**

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	0.16	0.06	0.02	0.13	0.07	0.44	0.43	0.00	0.03
2	0.10	0.08	0.03	0.10	0.05	0.35	0.46	0.32	0.32
3	0.15	0.08	0.01	0.09	0.12	0.45	0.60	0.13	0.13
4	0.09	0.19	0.06	0.12	0.14	0.60	0.70	0.34	0.34
5	0.12	0.14	0.04	0.12	0.15	0.57	0.72	0.34	0.34
6	**0.12**	**0.12**	**0.00**	**0.07**	**0.13**	**0.44**	**0.48**	**0.04**	**0.04**
7	0.06	0.19	0.22	0.13	0.11	0.71	0.65	0.20	0.20
8	0.05	0.07	0.00	0.30	0.06	0.48	0.62	0.06	0.06
9	0.13	0.09	0.00	0.12	0.11	0.44	0.58	0.25	0.25
10	0.07	0.15	0.00	0.13	0.13	0.48	0.57	0.21	0.21
11	0.11	0.23	0.08	0.25	0.33	0.99	0.76	0.37	0.37
12	0.05	0.17	0.06	0.17	0.15	0.59	0.88	0.09	0.09
13	0.06	0.11	0.02	0.17	0.17	0.53	0.42	0.07	0.07
14	0.08	0.17	0.00	0.11	0.14	0.51	0.28	0.19	0.19
15	**0.08**	**0.17**	**0.04**	**0.15**	**0.09**	**0.53**	**0.44**	**0.09**	**0.09**
16	0.20	0.22	0.01	0.22	0.17	0.82	0.59	0.17	0.17
17	0.09	0.12	0.02	0.22	0.15	0.59	0.52	0.18	0.18
18	0.16	0.21	0.02	0.13	0.09	0.61	0.87	0.23	0.23
19	**0.09**	**0.09**	**0.00**	**0.16**	**0.14**	**0.49**	**0.44**	**0.24**	**0.24**
20	0.16	0.07	0.01	0.11	0.04	0.38	0.35	0.14	0.14
21	**0.13**	**0.27**	**0.00**	**0.13**	**0.09**	**0.62**	**0.35**	**0.03**	**0.03**
22	**0.09**	**0.09**	**0.00**	**0.13**	**0.09**	**0.40**	**0.44**	**0.02**	**0.02**
23	0.17	0.13	0.00	0.11	0.19	0.59	0.54	0.17	0.17
24	0.20	0.14	0.01	0.25	0.13	0.73	0.52	0.04	0.04
25	**0.10**	**0.24**	**0.00**	**0.10**	**0.11**	**0.55**	**0.65**	**0.20**	**0.20**
26	**0.09**	**0.09**	**0.01**	**0.08**	**0.08**	**0.35**	**0.87**	**0.24**	**0.24**
27	0.11	0.21	0.00	0.16	0.20	0.68	0.67	0.19	0.19
Average	**0.11**	**0.14**	**0.02**	**0.15**	**0.13**	**0.55**	**0.57**	**0.17**	**0.17**
Top 25*	**0.10**	**0.15**	**0.01**	**0.12**	**0.10**	**0.48**	**0.52**	**0.12**	**0.12**

Farm number	Fuel and oil	Pasture improvement/ cropping	Other feed costs	Fodder purchases	Grain/ concentrates/ other	Agistment costs	Feed and water inventory change	Total feed costs	Total variable costs
	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS
1	0.11	0.12	0.00	0.57	2.67	0.00	-0.21	3.74	4.18
2	0.04	0.33	0.01	0.11	2.27	0.03	0.05	3.76	4.11
3	0.07	0.18	0.00	0.41	2.09	0.00	-0.28	3.79	4.25
4	0.23	0.25	0.00	0.10	1.93	0.00	0.04	3.60	4.20
5	0.10	0.16	0.02	0.02	1.92	0.00	-0.06	3.40	3.97
6	**0.12**	**0.05**	**0.00**	**0.37**	**2.29**	**0.01**	**-0.14**	**3.22**	**3.66**
7	0.16	0.63	0.00	0.57	1.95	0.00	0.36	4.72	5.43
8	0.25	0.09	0.00	0.00	1.31	0.00	0.01	2.81	3.29
9	0.09	0.35	0.00	0.00	2.31	0.00	0.13	3.98	4.42
10	0.09	0.29	0.00	0.20	1.68	0.58	-0.01	3.73	4.21
11	0.16	0.41	0.00	0.18	3.62	0.00	0.03	5.53	6.52
12	0.18	0.18	0.13	0.04	1.83	0.24	-0.18	3.39	3.98
13	0.29	0.11	0.00	0.31	1.93	0.00	0.00	3.13	3.66
14	0.17	0.17	0.04	0.50	2.47	0.00	-0.16	3.81	4.31
15	**0.12**	**0.33**	**0.00**	**0.08**	**2.34**	**0.00**	**0.00**	**3.89**	**4.42**
16	0.21	0.34	0.13	0.23	1.99	0.00	0.11	3.77	4.59
17	0.15	0.11	0.01	0.00	2.56	0.00	0.05	3.80	4.39
18	0.32	0.20	0.00	0.58	3.00	0.00	-0.06	5.14	5.76
19	**0.31**	**0.09**	**0.00**	**0.80**	**2.17**	**0.15**	**-0.24**	**3.96**	**4.45**
20	0.28	0.17	0.00	0.08	3.05	0.17	0.02	4.27	4.65
21	**0.14**	**0.25**	**0.00**	**0.11**	**3.17**	**0.00**	**0.00**	**4.06**	**4.68**
22	**0.22**	**0.12**	**0.00**	**0.04**	**2.39**	**0.00**	**0.00**	**3.22**	**3.62**
23	0.25	0.34	0.00	0.16	2.58	0.00	-0.03	4.02	4.61
24	0.17	0.16	0.00	0.35	2.12	0.00	0.00	3.59	4.32
25	**0.40**	**0.29**	**0.02**	**0.31**	**1.57**	**0.20**	**0.08**	**3.72**	**4.27**
26	**0.11**	**0.11**	**0.00**	**0.08**	**2.24**	**0.01**	**-0.01**	**3.90**	**4.25**
27	0.14	0.49	0.00	0.29	1.86	0.44	-0.22	4.01	4.69
Average	**0.18**	**0.24**	**0.01**	**0.24**	**2.27**	**0.07**	**-0.03**	**3.85**	**4.40**
Top 25*	**0.20**	**0.18**	**0.00**	**0.26**	**2.31**	**0.05**	**-0.04**	**3.71**	**4.19**

Table A5 Overhead costs

Farm number	Rates	Farm insurance	Motor vehicle expenses	Repairs and maintenance	Other overheads	Employed labour	Total cash overheads	Depreciation	Imputed owner/ operator and family labour	Total overheads
	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS	$ kg/MS
1	0.10	0.07	0.04	0.32	0.13	1.04	1.70	0.42	0.53	2.65
2	0.05	0.07	0.03	0.38	0.22	0.36	1.12	0.32	0.87	2.31
3	0.06	0.06	0.01	0.27	0.48	0.44	1.34	0.31	1.10	2.75
4	0.01	0.07	0.02	0.46	0.10	1.21	1.87	0.22	0.54	2.64
5	0.09	0.08	0.01	0.58	0.10	1.12	1.99	0.48	0.42	2.88
6	**0.06**	**0.06**	**0.01**	**0.33**	**0.05**	**0.91**	**1.42**	**0.16**	**0.36**	**1.93**
7	0.07	0.04	0.01	0.62	0.17	0.97	1.88	0.42	0.52	2.83
8	0.24	0.15	0.03	0.17	0.11	0.95	1.65	0.48	1.59	3.72
9	0.12	0.09	0.05	0.22	0.10	0.63	1.21	0.18	1.61	2.99
10	0.04	0.03	0.01	0.17	0.09	1.09	1.42	0.29	0.00	1.72
11	0.10	0.12	0.06	0.22	0.16	0.74	1.39	0.44	1.48	3.32
12	0.05	0.10	0.06	0.24	0.12	0.86	1.43	0.35	0.21	1.99
13	0.10	0.15	0.11	0.46	0.13	1.87	2.81	0.44	0.33	3.58
14	0.05	0.05	0.01	0.15	0.05	0.64	0.95	0.19	0.64	1.79
15	**0.09**	**0.05**	**0.03**	**0.62**	**0.10**	**1.22**	**2.11**	**0.11**	**0.19**	**2.42**
16	0.02	0.13	0.04	0.73	0.14	0.50	1.57	0.57	0.91	3.05
17	0.06	0.01	0.03	0.64	0.11	1.21	2.06	0.46	0.77	3.29
18	0.04	0.06	0.02	0.64	0.15	1.37	2.29	0.41	0.22	2.92
19	**0.03**	**0.11**	**0.05**	**0.31**	**0.16**	**0.82**	**1.47**	**0.84**	**0.42**	**2.74**
20	0.04	0.06	0.06	0.63	0.20	0.46	1.47	0.48	1.37	3.31
21	**0.04**	**0.10**	**0.04**	**0.27**	**0.10**	**1.24**	**1.79**	**0.12**	**0.41**	**2.32**
22	**0.04**	**0.07**	**0.12**	**0.14**	**0.17**	**0.99**	**1.53**	**0.24**	**0.42**	**2.18**
23	0.02	0.02	0.00	0.45	0.08	1.22	1.78	0.28	0.10	2.16
24	0.04	0.07	0.03	0.49	0.17	1.57	2.36	0.43	0.36	3.15
25	**0.07**	**0.07**	**0.05**	**0.57**	**0.03**	**1.02**	**1.82**	**0.34**	**0.64**	**2.80**
26	**0.08**	**0.06**	**0.03**	**0.58**	**0.12**	**0.72**	**1.58**	**0.31**	**0.62**	**2.52**
27	0.03	0.07	0.05	0.56	0.16	1.23	2.11	0.29	0.22	2.61
Average	**0.06**	**0.08**	**0.04**	**0.42**	**0.14**	**0.98**	**1.71**	**0.36**	**0.62**	**2.69**
Top 25*	**0.06**	**0.07**	**0.05**	**0.40**	**0.10**	**0.99**	**1.68**	**0.30**	**0.44**	**2.42**

Table A6 Variable costs – percentage

Farm number	AI and herd test	Animal health	Calf rearing	Shed power	Dairy supplies	Total herd & shed costs	Fertiliser	Irrigation	Hay and silage making
	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs
1	2.4	0.8	0.2	2.0	1.0	6.4	6.3	0.0	0.5
2	1.5	1.2	0.4	1.5	0.8	5.4	7.2	5.0	5.0
3	2.1	1.2	0.2	1.3	1.7	6.5	8.6	1.8	1.8
4	1.3	2.8	0.8	1.7	2.0	8.7	10.3	4.9	4.9
5	1.8	2.0	0.6	1.7	2.1	8.3	10.5	5.0	5.0
6	**2.1**	**2.2**	**0.0**	**1.3**	**2.3**	**7.9**	**8.5**	**0.7**	**0.7**
7	0.7	2.3	2.7	1.6	1.3	8.6	7.9	2.4	2.4
8	0.7	1.0	0.0	4.3	0.8	6.9	8.9	0.8	0.8
9	1.8	1.2	0.0	1.6	1.4	6.0	7.9	3.3	3.3
10	1.2	2.5	0.0	2.1	2.1	8.1	9.6	3.5	3.5
11	1.1	2.3	0.8	2.5	3.3	10.0	7.7	3.8	3.8
12	0.8	2.8	1.0	2.8	2.6	9.9	14.7	1.5	1.5
13	0.9	1.5	0.3	2.4	2.3	7.4	5.8	1.0	1.0
14	1.3	2.9	0.0	1.8	2.4	8.3	4.5	3.2	3.2
15	**1.2**	**2.5**	**0.7**	**2.1**	**1.3**	**7.8**	**6.4**	**1.3**	**1.3**
16	2.6	2.8	0.1	2.9	2.2	10.7	7.7	2.2	2.2
17	1.2	1.5	0.2	2.8	1.9	7.7	6.7	2.4	2.4
18	1.9	2.4	0.3	1.5	1.0	7.1	10.1	2.7	2.7
19	**1.3**	**1.3**	**0.0**	**2.2**	**2.0**	**6.8**	**6.1**	**3.3**	**3.3**
20	2.0	0.8	0.2	1.3	0.4	4.8	4.4	1.8	1.8
21	**1.9**	**3.9**	**0.0**	**1.9**	**1.3**	**8.9**	**5.0**	**0.4**	**0.4**
22	**1.6**	**1.6**	**0.0**	**2.2**	**1.6**	**7.0**	**7.6**	**0.3**	**0.3**
23	2.5	1.9	0.0	1.6	2.8	8.7	8.0	2.5	2.5
24	2.6	1.9	0.1	3.4	1.7	9.7	6.9	0.5	0.5
25	**1.4**	**3.4**	**0.0**	**1.5**	**1.5**	**7.8**	**9.2**	**2.8**	**2.8**
26	**1.4**	**1.3**	**0.1**	**1.1**	**1.2**	**5.1**	**12.8**	**3.6**	**3.6**
27	1.5	2.9	0.0	2.2	2.7	9.2	9.2	2.6	2.6
Average	**1.6**	**2.0**	**0.3**	**2.0**	**1.8**	**7.8**	**8.1**	**2.3**	**2.4**
Top 25*	**1.6**	**2.3**	**0.1**	**1.8**	**1.6**	**7.3**	**7.9**	**1.8**	**1.8**

Farm number	Fuel and oil	Pasture improvement/ cropping	Other feed costs	Fodder purchases	Grain/ concentrates/ other	Agistment costs	Feed and water inventory change	Total feed costs	Total variable costs
	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs
1	1.6	1.8	0.0	8.4	39.2	0.0	-3.0	54.8	61.2
2	0.5	5.2	0.2	1.8	35.3	0.5	0.7	58.5	64.0
3	1.0	2.6	0.0	5.9	29.9	0.0	-4.0	54.2	60.7
4	3.4	3.7	0.0	1.5	28.3	0.0	0.6	52.7	61.4
5	1.4	2.3	0.3	0.3	28.0	0.0	-0.9	49.6	57.9
6	**2.1**	**0.9**	**0.0**	**6.6**	**41.0**	**0.1**	**-2.5**	**57.5**	**65.4**
7	2.0	7.7	0.0	6.9	23.5	0.0	4.4	57.1	65.7
8	3.6	1.3	0.0	0.0	18.7	0.0	0.2	40.1	47.0
9	1.2	4.8	0.0	0.0	31.2	0.0	1.8	53.6	59.6
10	1.5	4.8	0.0	3.4	28.4	9.8	-0.2	62.9	71.0
11	1.6	4.2	0.0	1.9	36.8	0.0	0.3	56.2	66.2
12	3.0	2.9	2.2	0.7	30.7	4.0	-3.0	56.7	66.7
13	4.0	1.5	0.0	4.3	26.6	0.0	-0.1	43.2	50.6
14	2.8	2.8	0.7	8.2	40.6	0.0	-2.6	62.4	70.7
15	**1.8**	**4.8**	**0.0**	**1.2**	**34.2**	**0.0**	**0.0**	**56.9**	**64.7**
16	2.7	4.5	1.7	3.0	26.1	0.0	1.5	49.4	60.1
17	2.0	1.4	0.1	0.0	33.3	0.0	0.7	49.4	57.1
18	3.7	2.3	0.1	6.7	34.5	0.0	-0.7	59.3	66.3
19	**4.4**	**1.3**	**0.0**	**11.1**	**30.3**	**2.0**	**-3.4**	**55.1**	**61.9**
20	3.5	2.2	0.0	1.0	38.3	2.2	0.3	53.6	58.4
21	**2.0**	**3.6**	**0.0**	**1.6**	**45.2**	**0.0**	**0.0**	**57.9**	**66.8**
22	**3.7**	**2.0**	**0.0**	**0.7**	**41.1**	**0.0**	**0.0**	**55.4**	**62.4**
23	3.7	5.1	0.0	2.3	38.1	0.0	-0.4	59.3	68.1
24	2.3	2.1	0.0	4.7	28.4	0.0	0.0	48.1	57.8
25	**5.6**	**4.2**	**0.3**	**4.3**	**22.2**	**2.8**	**1.2**	**52.6**	**60.4**
26	**1.6**	**1.7**	**0.0**	**1.1**	**33.1**	**0.1**	**-0.2**	**57.7**	**62.8**
27	1.9	6.8	0.0	4.0	25.5	6.1	-3.0	55.0	64.2
Average	**2.5**	**3.3**	**0.2**	**3.4**	**32.2**	**1.0**	**-0.5**	**54.4**	**62.2**
Top 25*	**3.0**	**2.6**	**0.0**	**3.8**	**35.3**	**0.7**	**-0.7**	**56.2**	**63.5**

Table A7 Overhead costs – percentage

Farm number	Rates	Farm insurance	Motor vehicle expenses	Repairs and maintenance	Other	Employed labour	Total cash	Depreciation	Imputed owner/ operator and family labour	Total
	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs	per cent of costs
1	1.5	1.1	0.6	4.7	1.9	15.2	24.9	6.1	7.8	38.8
2	0.7	1.1	0.5	6.0	3.5	5.7	17.4	5.0	13.6	36.0
3	0.9	0.9	0.2	3.9	6.9	6.3	19.1	4.5	15.8	39.3
4	0.2	1.0	0.4	6.8	1.4	17.7	27.4	3.2	7.9	38.6
5	1.3	1.2	0.2	8.5	1.5	16.3	29.0	7.0	6.1	42.1
6	**1.0**	**1.1**	**0.2**	**5.9**	**1.0**	**16.2**	**25.3**	**2.9**	**6.4**	**34.6**
7	0.8	0.5	0.1	7.5	2.0	11.8	22.8	5.1	6.4	34.3
8	3.4	2.2	0.5	2.5	1.5	13.5	23.6	6.9	22.6	53.0
9	1.6	1.2	0.7	3.0	1.3	8.5	16.3	2.4	21.7	40.4
10	0.7	0.4	0.1	2.9	1.6	18.4	24.1	4.9	0.0	29.0
11	1.0	1.3	0.6	2.2	1.6	7.5	14.2	4.5	15.1	33.8
12	0.8	1.7	1.0	4.0	2.0	14.3	23.9	5.9	3.6	33.3
13	1.3	2.0	1.5	6.3	1.9	25.8	38.8	6.1	4.6	49.4
14	0.8	0.9	0.2	2.5	0.8	10.5	15.6	3.1	10.5	29.3
15	**1.4**	**0.7**	**0.5**	**9.1**	**1.4**	**17.9**	**30.9**	**1.6**	**2.8**	**35.3**
16	0.3	1.8	0.5	9.5	1.9	6.6	20.5	7.4	11.9	39.9
17	0.8	0.1	0.3	8.3	1.4	15.8	26.8	6.0	10.1	42.9
18	0.4	0.7	0.2	7.4	1.7	15.8	26.4	4.7	2.5	33.7
19	**0.4**	**1.5**	**0.7**	**4.3**	**2.3**	**11.4**	**20.5**	**11.7**	**5.9**	**38.1**
20	0.6	0.8	0.8	8.0	2.5	5.8	18.4	6.0	17.2	41.6
21	**0.6**	**1.4**	**0.6**	**3.9**	**1.4**	**17.6**	**25.6**	**1.8**	**5.8**	**33.2**
22	**0.7**	**1.1**	**2.0**	**2.5**	**2.9**	**17.1**	**26.4**	**4.1**	**7.2**	**37.6**
23	0.3	0.3	0.0	6.6	1.2	18.0	26.3	4.1	1.5	31.9
24	0.5	0.9	0.3	6.6	2.3	21.0	31.6	5.8	4.8	42.2
25	**1.0**	**1.0**	**0.7**	**8.1**	**0.4**	**14.5**	**25.8**	**4.9**	**9.0**	**39.6**
26	**1.2**	**0.9**	**0.4**	**8.5**	**1.7**	**10.7**	**23.4**	**4.6**	**9.2**	**37.2**
27	0.5	0.9	0.7	7.7	2.2	16.8	28.8	4.0	3.0	35.8
Average	**0.9**	**1.1**	**0.5**	**5.8**	**1.9**	**14.0**	**24.2**	**5.0**	**8.6**	**37.8**
Top 25*	**0.9**	**1.1**	**0.7**	**6.0**	**1.6**	**15.1**	**25.4**	**4.5**	**6.6**	**36.5**

Table A8 Capital structure

Farm assets				
	Land value	Land value	Permanent water value	Permanent water value
	$/ha	$/cow	$/ha	$/cow
Average	8,849	9,978	868	862

Other farm assets (per usable hectare)				
Plant and equipment	Livestock	Hay and grain	Other assets	Total assets
$/ha	$/ha	$/ha	$/ha	$/ha
1,362	2,415	102	349	13,029

Liabilities	
Liabilities per usable hectare	Liabilities per milking cow
$/ha	$/cow
3,779	**4,469**

Equity	
Equity per usable hectare	Average equity
$/ha	per cent
9,250	**68**

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

	Income				Variable costs							
	Milk income (net)		Gross farm income		Herd costs		Shed costs		Feed costs		Total variable costs	
Year	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)
2013–14	6.62	7.17	7.75	8.40	0.24	0.26	0.26	0.28	3.29	3.57	3.79	4.11
2014–15	7.07	7.55	8.26	8.82	0.25	0.26	0.26	0.28	3.31	3.53	3.82	4.08
2015–16	7.22	7.63	8.29	8.76	0.26	0.27	0.24	0.26	3.45	3.64	3.95	4.17
2016–17	7.05	7.31	8.12	8.42	0.26	0.27	0.26	0.27	3.24	3.36	3.76	3.90
2017–18	7.00	7.11	8.16	8.29	0.26	0.26	0.27	0.27	3.52	3.58	4.05	4.11
2018–19	7.07	7.07	8.25	8.25	0.28	0.28	0.27	0.27	3.85	3.85	4.40	4.40
Average		**7.31**		**8.49**		**0.27**		**0.27**		**3.59**		**4.13**

	Overhead costs						Profit							
	Cash overhead costs		Non-cash overhead costs		Total overhead costs		Earnings before interest and tax		Interest and lease charges		Net farm income			
Year	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Nominal ($ kg/MS)	Real ($ kg/MS)	Return on total assets per cent	Return on equity per cent
2013–14	1.50	1.62	0.86	0.93	2.36	2.56	1.59	1.72	0.65	0.70	1.01	1.09	4.2	4.2
2014–15	1.47	1.57	0.8	0.85	2.26	2.41	2.17	2.32	0.59	0.63	1.66	1.77	6.3	8.2
2015–16	1.51	1.60	0.82	0.87	2.33	2.46	2.02	2.14	0.53	0.56	1.54	1.63	6.4	9.1
2016–17	1.56	1.62	0.83	0.86	2.39	2.48	1.98	2.05	0.53	0.55	1.48	1.54	6.5	18.3
2017–18	1.53	1.55	0.52	0.53	2.57	2.61	1.54	1.56	0.53	0.54	1.01	1.03	4.3	7.7
2018–19	1.71	1.71	0.98	0.98	2.69	2.69	1.16	1.16	0.60	0.60	0.56	0.56	3.2	4.4
Average		**1.61**		**0.84**		**2.54**		**1.82**		**0.60**		**1.27**	**5.1**	**8.7**

Note: 'Real' dollar values are the nominal values converted to 2018–19 dollar equivalents by the consumer price index (CPI) to allow for inflation.
The gross income in 2017–18 did not include feed inventory changes and changes to the value of carry-over water. These were included in feed costs.

Table A10 Historical data – average farm physical information

	Total usable area	Milking area	Total water use efficiency	Number of milking cows	Milking cows per useable area	Milk sold	Milk sold	Estimated grazed pasture*	Estimated conserved feed*	Home grown feed as of ME consumed	Concentrate price	
Year	ha	ha	t DM/ 100mm/ ha	hd	hd/ ha	kg MS/ cow	kg MS/ ha	t DM/ ha	t DM/ ha	of ME	Nominal ($/t DM)	Real ($/t DM)
2013–14	606	280	0.4	522	0.9	505	453	3.3	1.5	62	418	453
2014–15	625	296	0.6	543	0.9	535	486	3.6	1.7	63	421	449
2015–16	575	283	0.5	545	1.0	557	541	4.1	1.7	57	445	470
2016–17	499	268	0.6	498	1.0	558	570	5.1	1.3	61	404	419
2017–18	586	277	0.5	497	0.9	580	521	4.0	1.9	57	429	436
2018–19	579	286	0.6	497	0.9	566	515	4.2	1.6	60	488	488
Average	**579**	**282**	**0.5**	**517**	**0.9**	**550**	**514**	**4.0**	**1.6**	**50**		**453**

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


1924

Appendix B Glossary of terms, abbreviations and standard values

All other income	Income to the farm from all sources except milk. Includes livestock trading profit, dividends, interest payments received, and rent from farm cottages.
Appreciation	An increase in the value of an asset in the market place. Often only applicable to land value.
Asset	Anything managed by the farm, whether it is owned or not. Assets include owned land and buildings, leased land, plant and machinery, fixtures and fittings, trading stock, farm investments (i.e. Farm Management Deposits), debtors, and cash.
Cash overheads	All fixed costs that have a cash cost to the business. Includes all overhead costs except imputed labour costs and depreciation.
Cost of production	The cost of producing the main product of the business; milk. Usually expressed in terms of the main enterprise output i.e. dollars per kilogram of milk solids. It is reported at the following levels; • 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 equal variable costs plus overhead costs.
Debt servicing ratio	Interest and lease costs as a percentage of gross farm income.
Depreciation	Decrease in value over time of capital asset, usually as a result of using the asset. Depreciation is a non-cash cost of the business, but reduces the book value of the asset and is therefore a cost.
Earnings before interest and tax (EBIT)	Gross farm income minus total variable and total overhead costs.
Employed labour cost	Cash cost of any paid employee, including on-costs such as superannuation and WorkCover.
Equity	Total assets minus total liabilities. Equal to the total value of capital invested in the farm business by the owner/ operator(s).
Equity	Total equity as a percentage of the total assets owned. The proportion of the total assets owned by the business.
Feed costs	Cost of fertiliser, irrigation (including effluent), hay and silage making, fuel and oil, pasture improvement, fodder purchases, grain/ concentrates, agistment, lease costs associated with any of the above costs, and feed inventory change.
Feed inventory change	An estimate of the feed on hand at the start and end of the financial year to capture feed used in the production of milk and livestock.
Finance costs	See interest and lease costs.
Full time equivalent (FTE)	Standardised labour unit. Equal to 2,400 hours a year. Calculated as 48 hours a week for 50 weeks a year.
Grazed pasture	Calculated using the energetics method. Grazed pasture is calculated as the gap between total metabolisable energy required by livestock over the year and amount of metabolisable energy available from other sources (hay, silage, grain and concentrates). Total metabolisable energy required by livestock is a factor of age, weight, growth rate, pregnancy and lactation requirements, distance to shed, terrain and number of animals. Total metabolisable energy available is the sum of energy available from all feed sources except pasture, calculated as (weight (kg) x dry matter content (DM) x metabolisable energy (MJ/kg DM).
Gross farm income	Farm income including milk sales net of levies and charges, livestock trading profit and other farm income, exclusive of GST.
Gross margin	Gross farm income minus total variable costs.
Herd costs	Cost of artificial insemination (AI) and herd tests, animal health and calf rearing.
Imputed	An estimated amount, introduced into economic management analysis to allow reasonable comparisons between years and between other businesses.
Imputed labour cost	An allocated allowance for the cost of owner/ operator, family and sharefarmer time in the business, valued at $30.33 per hour.
Interest and lease costs	Total interest plus total lease costs paid.
Labour cost	Cost of the labour resource on farm. Includes both imputed and employed labour costs.
Labour efficiency	FTEs per cow and per kilogram of milk solids sold. Measures of productivity of the total labour resources in the business.
Labour resource	Any person who works in the business, be they the owner, family, sharefarmer or employed on a permanent, part time or contract basis.
Liability	Money owed to someone else, e.g. family or a financial institute such as a bank.
Livestock trading profit	An estimate of the annual contribution to gross farm income by accounting for the changes in the number and value of livestock during the year. It is calculated as the trading income from sales minus purchases, plus changes in the value and number of livestock on hand at the start and end of the year, and accounting for births and deaths. An increase in livestock trading indicates there was an appreciation of livestock or an increase in livestock numbers over the year.
Metabolisable energy	Energy available to livestock in feed, expressed in megajoules per kilogram of dry matter (MJ/ kg DM).
Milk income	Income through the sales of milk. This is net of compulsory levies and charges.
Milking area	Total usable area minus out-blocks or run-off areas.

Net farm income	Earnings before interest and tax (EBIT) minus interest and lease costs. The amount of profit available for capital investment, loan principal repayments and tax.
Nominal terms	Dollar values or interest rates that include an inflation component.
Number of milkers	Total number of cows milked for at least three months.
Other income	Income to the farm from other farm owned assets and farm business related external sources. Includes milk factory dividends, interest payments received, and rents from farm cottages.
Overhead costs	All fixed costs incurred by the farm business that do not vary with the level of production. These include cash overhead costs such as employed labour and non-cash costs such as imputed owner-operator labour, family labour and depreciation of plant and equipment. It excludes interest, lease costs, capital expenditure, principal repayments, drawings and tax.
Real terms	Dollar values or interest rates that have no inflation component.
Return on equity (RoE)	Net farm income divided by the value of total equity.
Return on total assets (RoTA)	Earnings before interest and tax divided by the value of total assets under management, including owned and leased land.
Shed costs	Cost of shed power and dairy supplies such as filter socks, rubberware, vacuum pump oil etc.
Total usable area	Total hectares managed minus the area of land which is of little or no value for livestock production e.g. house and shed area.
Total water use efficiency	Home grown feed consumed or harvested per 100mm water applied (rainfall and irrigation) to the usable hectares on the farm.
Variable costs	All costs that vary with the size of production in the enterprise e.g. herd, shed and feed costs (including feed and water inventory changes).
Water inventory change	An estimate of the irrigation water on hand at the start and end of the financial year to capture water used in the production of pasture and crops.

List of abbreviations

AI	Artificial insemination
CH_4	Methane gas
CO_2	Carbon dioxide gas
CO_2-e	Carbon dioxide equivalent
CoP	Cost of production
DFMP	Dairy Farm Monitor Project
DM	Dry matter of feed stuffs
EBIT	Earnings before interest and tax
FTE	Full time equivalent.
GWP	Global Warming Potential
ha	Hectare(s)
hd	Head of cattle
HRWS	High Reliability Water Shares
kg	Kilograms
LRWS	Low Reliability Water Shares.
ME	Metabolisable energy (MJ/kg)
MJ	Megajoules of energy
mm	Millimetres. 1mm is equivalent to 4 points or 1/25 of an inch of rainfall
MS	Milk solids (proteins and fats)
N_2O	Nitrous oxide gas
Q1	First quartile, i.e. the value of which one quarter, or 25, of data in that range is less than
Q3	Third quartile, i.e. the value of which one quarter, or 25, of data in that range is greater than
RoTA	Return on total assets
RoE	Return on equity
t	Tonne = 1,000kg
Top 25	The state average for the top 25 of farms ranked by return on total assets.

Livestock values

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

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

Imputed owner/operator and family labour

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

ISSN 2652-547X (Print) ISSN 2651-866X (online)

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1832 | Mar 2020