Dairy Australia

DAIRY FARM MONITOR PROJECT

WESTERN AUSTRALIA ANNUAL REPORT 2020/21

ACKNOWLEDGEMENTS

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) was enabled through funding from Dairy Australia and the South West Development Commission.

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

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

This report was produced by Sarah Lang in conjunction with Dairy Australia.

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

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Western DAIRY

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HOW TO READ THIS REPORT

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

This report is presented in the following sections:

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

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

The report presents visual descriptions of the data for the 2020/21 year. Data is presented for individual farms, as state averages and for the state top 25% 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% 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% of producers as it provides an assessment of the performance of the whole farm irrespective of differences in location and production system.

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

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

Milk production data is presented in kilograms of milk solids (fat + protein) 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% consists of five farms located throughout the dairying areas of Western Australia.

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

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

It should be noted that not all of the participants from 2019/20 are in the 2020/21 report. This year, there is one returning farm and five farms that participated last year but did not participate this year.

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

PREFACE

The Dairy Farm Monitor Report for 2020-21 includes some minor changes in data collection since last year's report. As per previous years, 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. Eg you can't compare farm number 3 to farm number 3 between years.

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

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

SUMMARY

In 2020/21 the data from 21 farms in WA resulted in average whole farm earnings before interest and tax (EBIT) of $663,698 a 52% increase on the previous year's $437,466. On average, participants achieved return on total assets averaging 5.5%, up from last year's 3.9%. The average milk price received was $7.30 /kg MS (53.1 c/L), a 1% decrease from last year.

This is the eighth 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 physical and financial performance.

Twenty one farms participated in the project in 2020/21, of which nine have been involved since the project began. There was one returning farm in this year's dataset. The WA DFMP participants generated an average earnings before interest and tax (EBIT) of $663,698 per farm or $2.24/kg MS (16.4 c/L), a 52% increase from 2019/20.

Once interest and lease costs were taken into account the resulting average net farm income was $501,977, a 75% increase. This equated to an average return on equity of 10.8%, which is the second highest average achieved since the DFMP began.

The average milk price of $7.30 /kg MS (53.1 c/L) was a 1% decrease from last year's price of $7.35 /kg MS (52.3 c/L). The milk price reflected the current "static nature" of Western Australia's domestic milk supply, with lower feed costs. Livestock trading profit improved 31% to $1.75/kg MS (12.7 c/L) in light of the strong beef prices and increased heifer export values. This meant that the gross farm income increased 5% to $9.17/kg MS (66.7 c/L).

The milk income again varied considerably from $6.69 to $8.03 kg/MS (48.4–59.0 c/L), however the variation was reduced from $1.48 to $1.34 kg/MS. 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 continues to cause concern for industry confidence.

Participants costs of production (inc inventory change) decreased by 6%. Variable costs reduced by 11% while overhead costs increased by 4%. Variable costs were $3.93/kg MS (28.5 c/L), with average overhead costs rising again from $2.89/kg MS to $3.00/kg MS (21.8 c/L). The main drivers of higher overhead costs were repairs and maintenance (up 10%). An increase in employed labour (20%) offset a reduction in imputed labour down 23%. Home grown feed as a source of metabolisable energy rose by 6% to 67%. There was a decrease in purchased feed, from 2.6 to 2.1 t DM/hd due to a favourable winter and spring allowing for greater than average fodder conservation. The average concentrate price decreased from $507/t DM to $494/t DM.

The improved gross farm income, coupled with lower variable costs, lead to return on total assets (RoTA) improving from 3.9% to 5.5%. All participants recorded a positive RoTA with the spread being 1.7% to 12.5%. All participants recorded a positive RoE with the spread being 1.7% to 34.2%. This is an improved result from last year where two participants recorded negative RoE.

The 2020-21 season was favourable with the annual rainfall 40mm above average (3% above average). A wet early Autumn start enabled seeding and cows to start grazing earlier, further strengthening on farm reserves. A wet November and February was the main contributor to participants achieving above average rainfall.

The top 25% farms achieved an average EBIT of $3.53/kg MS (25.9 c/L) and average return on total assets of 9.4%. The large difference between the average and top 25% is mainly due to 10% higher livestock trading profit, 23% lower purchased feed and agistment costs, 15% lower overhead costs (mainly labour and depreciation), better labour efficiency (12%), along with 12% lower costs of production.

Expectations for the coming season were less optimistic with only 30% of participants predicting an improvement in farm business returns compared to 72% last year. Whilst 80% of participants expected milk prices to increase this was offset by 90% of businesses expecting an increase in fertiliser costs. The expectations of production stability decreased from 64% to 60%.

The majority of respondents see an increase in labour costs (70%) and fuel and oil prices (55%) with irrigation and repairs and maintenance expected to largely remain stable.

Milk price was by far the major issue facing the Western Australian participant farmers in both the short and long term. Input costs was seen as the next major concern with less than 5% of respondents seeing pasture/fodder as a major issue facing their business

FARM MONITOR METHOD

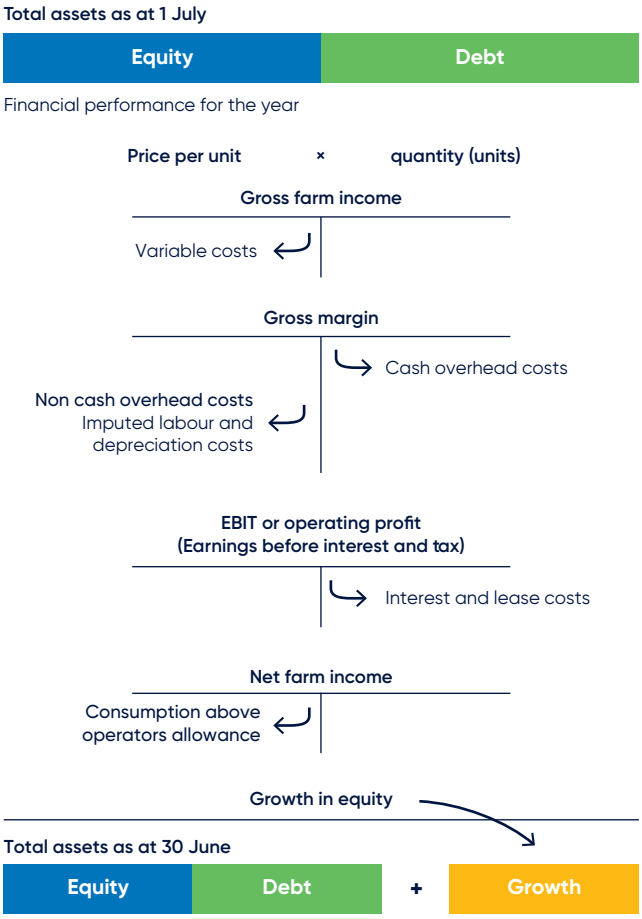
This chapter explains the method used in the DFMP and defines the key terms used.

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

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

Figure 1 Dairy Farm Monitor Project method



Gross farm income

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

Variable costs

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

Overhead costs

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

Earnings before interest and tax

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

Net farm income

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

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

Return on 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.

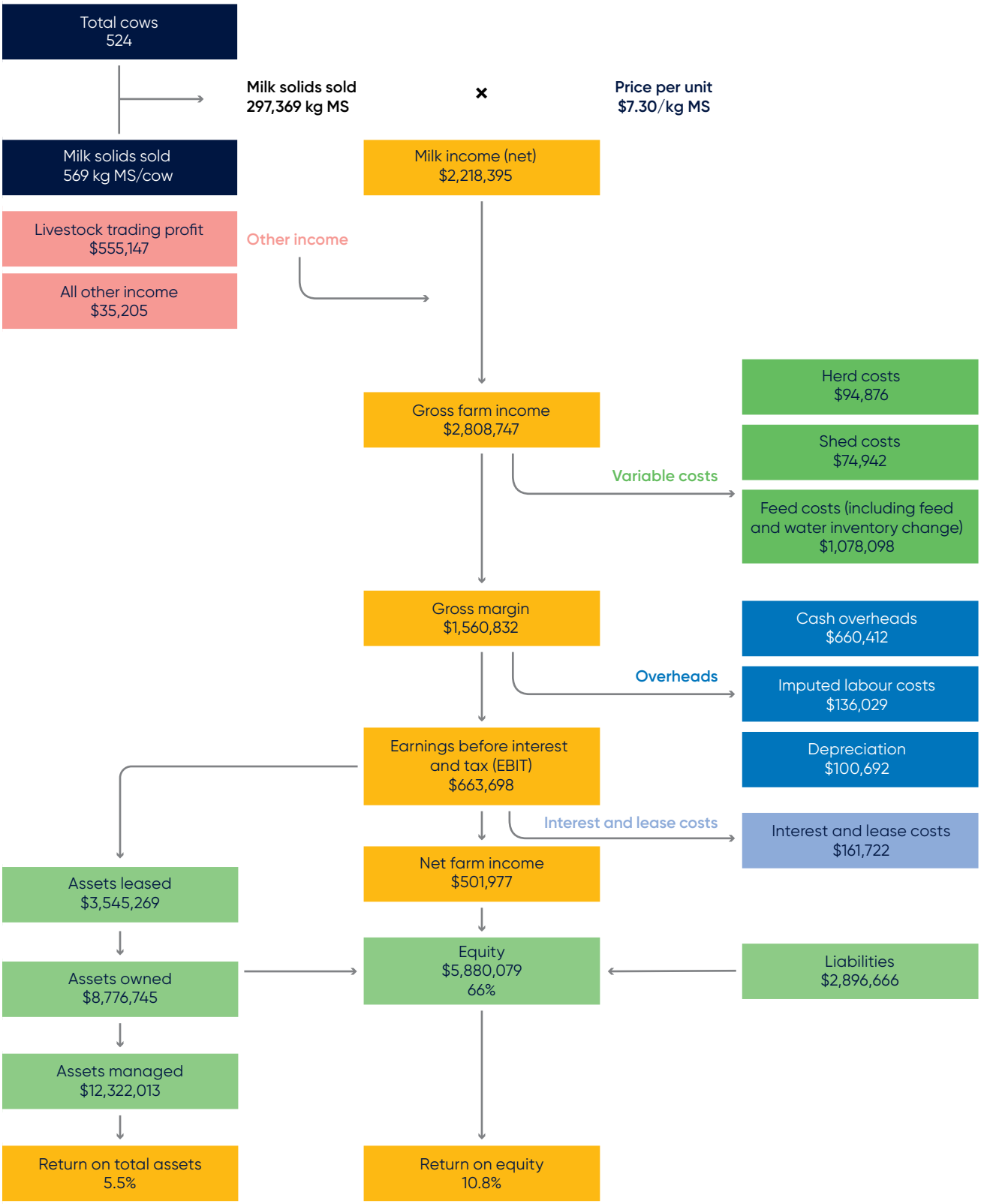
Return on total assets indicates the overall earning of the total farm assets, irrespective of capital structure of the business. It is EBIT expressed as a percentage of the total assets under management in the farm business, including the value of leased assets. Return on total assets is sometimes referred 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% 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 2020/21 data*

All 21 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 4.1%, or 362 million litres, of the Australian milk production in 2020/21. Milk production in Western Australia remained stable in 2020/21, reflecting constant domestic demand conditions. The national milk production remained stable at 8.8B litres.

During 2020/21 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. As a result the level of production across the season is very consistent with a peak:trough ratio of 1.3

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 lifestyle pursuits.

The WA dairy region has a Mediterranean climate with consistent winter rainfall and hot dry summers. Western Australia has a ryegrass pasture-based production system based on rain-fed 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 Harvey in the North through to Denmark/Albany in the south with a good distribution of dryland and irrigation systems and varying herd size.

Western Australian milk continues to be recognised for its high quality, with five WA farms being in the top 5% nationally, based on bulk milk cell count, also consistent with the level of national milk supply produced by this state.

2020/21 seasonal conditions

Favourable winter and spring conditions occurred in 2020, with a wet early Autumn in 2021 recording above average rainfall across all WA dairy regions. It was a dry June recording only 82% of average rainfall.

The total rainfall in 2020/21 was wetter than the long term average for 48% of participants.

Participant farms received an average of 965 mm rainfall, 3% higher than the long term average of 940 mm. However, two farms only received 87% of their long-term average annual rainfall.

Figure 4 shows the average monthly rainfall pattern compared to the long term annual average.

Above average rainfall in winter and early spring allowed for greater than average fodder conservation. Parts of south west WA have recorded their wettest ever winter which left small windows for spraying and fertilising, affecting the quality of fodder crops.

A wet autumn enabled seeding and cows to start grazing earlier, further strengthening on farm reserves.

In general, a wet November helped ease the mild early summer conditions with little rainfall activity during December and January.

Above average rainfall in autumn meant pastures established well and grazing was able to take place earlier than in past years.

Figure 3 2020/21 annual rainfall

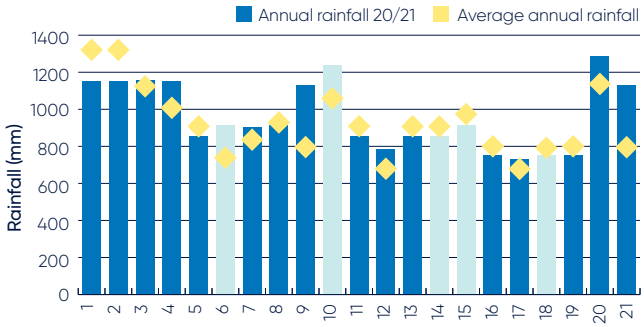
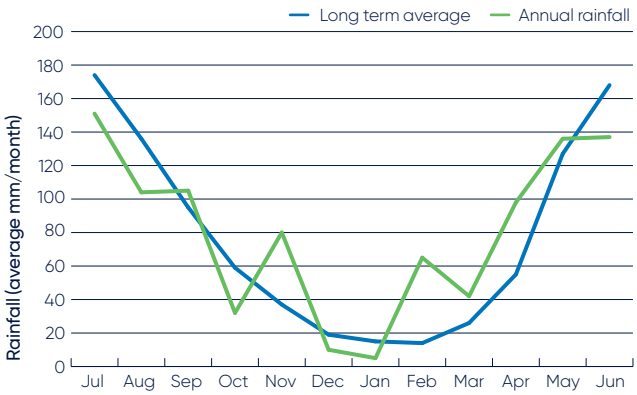


Figure 4 Monthly average rainfall (all farms)



WHOLE FARM ANALYSIS

The 2020/21 year has produced above average business performance since the inception of the project eight years ago, and an improvement on last year. A 10% increase in milk production, with a similar milk price (1%) combined with a 30% increase in livestock trading and an 11% drop in variable costs drove improved margins. All farming businesses returned a positive EBIT and consequent positive RoA.

The 21 participant farms represented 15% of the Western Australian dairy industry in terms of number of farms, however it represents 24% of milk volume. There are a large range of farming systems, calving patterns and herd size across the participant farmers, so care is required when interpreting averages.

There was one new entrant, and five non-participants from last year into the project so conclusions cannot be drawn from changes in averages, particularly when trying to determine whole farm analysis.

Again, an interesting feature of this year's data is the difference that has emerged between the profitability of dryland and irrigated farms. This year the dryland farms had a very similar cost of production and EBIT with a lower milk price (24c/kg MS), but a higher livestock trading profit (34 c/kg MS). Interestingly two of the farms in the top 25% were not irrigated.

The average herd size of 524 is a 9% increase on last year supporting the consistent participation of the similar size businesses as well as most businesses in a static production profile.

The average labour efficiency continued to be around 46, 000 kg MS/FTE. This figure is generally less than most other dairy regions, particularly the exporting ones. This is a function of a greater proportion of livestock trading in the WA dairy businesses and less access to contractors so each business does a lot more operational tasks "in house" (eg seeding, spraying, fodder making etc).

Table 1 presents a summary of the average physical parameters of the 21 participant farms.

While the average herd size (number of cows milked for at least three months) was 524 there was a wide range in herd size from 218 to 1,310 cows with two farms milking more than 1,000 cows.

The top 25% participants were, in general, characterised by a larger herd size, larger farm size, lower cost of production, higher milk solids 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 gross farm income (5%).

Table 1 Farm physical data

Farm physical parameters	State average	Q1 to Q3 range	Top 25% average
Annual rainfall 2020/21 (mm)	965	856–1,155	934
Herd size	524	300–620	597
Total water use efficiency (t DM/100mm/ha)	0.6	0.4–0.7	0.7
Total usable area (ha)	678	335–926	772
Milking cows per usable hectares	0.8	0.7–1.0	0.9
Milk sold (kg MS/cow)	569	536–617	565
Milk sold (kg MS/ha)	471	368–539	475
Home-grown feed as a per cent of ME consumed	67%	58%–73%	73%
Labour efficiency (cow/FTE)	82	67–92	92
Labour efficiency (kg MS/FTE)	46,263	38,869–52,382	51,000

Financial measures

Gross farm income

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

Figure 5 shows the income generated this season. Milk is the dominant income stream providing 80% of income, with the remainder coming from livestock trading profit (19%) and other income (1%). It is important to remember that this is the fourth 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 20% of gross farm income, but ranged from 11% to 28%.

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 $7.30/kg MS (53.1 c/L) with a range from $6.69 to $8.03 kg/MS (49.6 – 59.0 c/L) This variation, whilst still large, was reduced from $1.48 to $1.34 kg/MS compared to the previous year.

The top 25% performers received an average milk price of $7.55/kg MS (55.6 c/L) with 79% of gross income coming from milk sales.

Average gross farm income in 2020-21 was $9.17/kg MS (66.7 c/L) and $9.63/kg MS (70.8 c/L) for the top 25%.

By comparison, the participants in 2019-20 had an average gross farm income of $8.74/kg MS (52.2 c/L) and $9.08/kg MS (64.9 c/L) for the top 25% performers.

Due to confidentiality reasons the milk income is not differentiated from overall income in Figure 5. However the average and top 25% income metrics can be seen in greater detail in Table 2.

Variable costs

Variable costs (Figure 6) are those that change directly according to the amount of output and are measured in cost per kilogram of milk solids. Variable costs include herd, shed and feed costs.

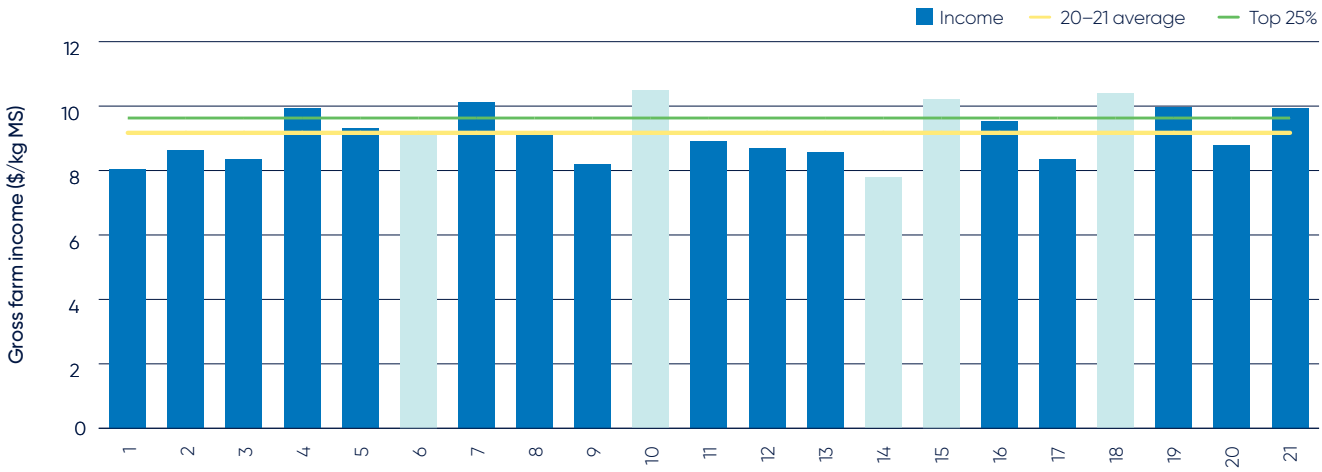
The average variable cost of all participant farms was $3.93/kg MS (28.5 c/L). The range was from $3.10/kg MS to $5.48/kg MS (20.9 c/L to 38.2 c/L). The average variable cost was lower than last year's average of $4.41/kg MS (31.4 c/L). The top 25% had lower variable costs than the average of all participant farms at $3.57/kg MS (26.3 c/L).

Feed costs were the major variable cost accounting for 86% of total variable costs and 49% of total costs. The top 25% of farms' feed costs were $3.07/kg MS (26.3 c/L), 9% less than the average of $3.38/kg MS (28.5 c/L).

Imported feed decreased to 33% of whole farm metabolisable energy (ME) fed, compared to 39% last year. At the same time, concentrate costs reduced by 3% to an average of $494/t. The price of purchased concentrate ranged from $342/t DM to $730/t DM. The average home grown feed was $114/t DM with the range being $62/t DM to $192/t DM.

The top 25% purchased concentrates on average for $444/t DM and it cost them $112/t DM for home grown feed.

Figure 5 Gross farm income ($/kg MS)



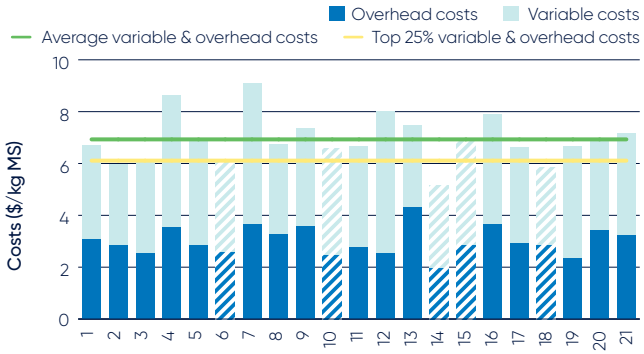
Overhead costs

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

Figure 6 further highlights the variation in overhead costs between participant farms with values ranging from $1.96/kg MS to $4.29/kg MS (15.6 c/L to 30.2 c/L). The top 25% recorded lower overhead costs at $2.54/kg MS (18.6 c/L) compared to the average of $3.00/kg MS (21.7 c/L).

Labour costs, including employed and imputed labour, were the major overhead cost, accounting for 58% of total overhead costs and 25% of total costs. Repairs and maintenance and depreciation increased another 3% from the previous year.

Figure 6 Whole farm variable and overhead costs



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 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 in value or retention of more 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 2 shows that the average cost of production (with inventory changes accounted for) was $6.90/kg MS (50.1 c/L) and the top 25% was $6.10/kg MS (44.9 c/L).

The average cost of production of the top 25% was 12% lower than the average for participant farms with all costs (except homegrown feed cost) being equal to or lower than the average. The top 25% allocated less dollars to hay and silage making, concentrate, other overheads and depreciation costs than the average. Having a low cost of production is one key determinant of being a top 25% producer in most cases.

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 7 shows the EBIT per kg MS.

The average EBIT for 2020-21 was $663,698 per farm, up from $437,466 per farm in 2019-20, noting some participant changeover this year.

On average, EBIT per kg MS increased 56% to $2.24/kg MS (16.3 c/L) in 2019-20 from $1.44/kg MS (10.3 c/L). The increase in EBIT is a reflection of the increase in livestock trading profit and the favourable winter and spring resulting in reduced feed costs and greater than average fodder conservation. The average EBIT recorded during the project is the highest level recorded in the past 8 years (Figure 25).

The top 25% performers also improved profitability with EBIT increasing 37% to $3.53/kg MS (25.6 c/L), which is 58% higher than the average. This meant they were able to retain 37% of their gross farm income compared to only 24% for the average.

Figure 7 Whole farm EBIT ($/kg MS)

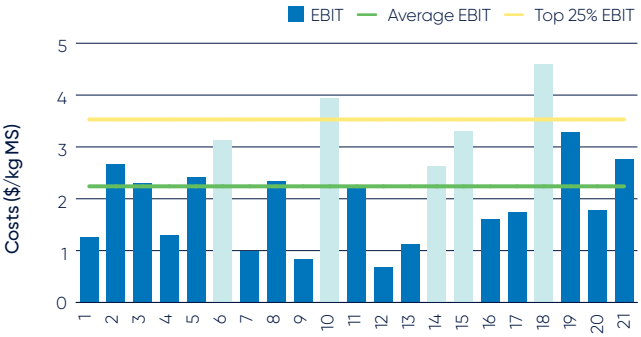


Table 2 Average farm financial performance

Farm costs	Average	Q1 to Q3 range	Top 25% average
Income	**$/kgMS**	**$/kgMS**	**$/kgMS**
Milk income (net)	7.30	7.03–7.53	7.55
Livestock trading profit	1.75	1.33–2.15	1.93
Other farm income	0.12	0.06–0.15	0.15
Total income	9.17	8.57–9.94	9.63
Variable costs			
Herd cost	0.29	0.22–0.35	0.27
Shed cost	0.25	0.20–0.27	0.23
Home-grown feed cost	1.37	1.13–1.64	1.52
Purchased feed and agistment	2.17	1.80–2.65	1.68
Feed inventory change	-0.17	-0.22–-0.02	-0.13
Water inventory change	0.00	0.00–0.00	0.00
Total feed costs	3.38	2.93–3.65	3.07
Total variable costs	3.93	3.50–4.09	3.57
Gross margin			
Per kilogram of milk solids	5.24	4.64–5.62	6.06
Overhead costs			
Employed labour	1.19	1.02–1.30	1.11
Repairs and maintenance	0.56	0.42–0.67	0.52
All other overheads	0.37	0.29–0.41	0.31
Imputed labour	0.55	0.34–0.65	0.38
Depreciation	0.33	0.24–0.42	0.22
Total overhead costs	3.00	2.58–3.41	2.54
Variable and overhead costs	6.93	6.55–7.36	6.11
Earnings before interest and tax	**2.24**	**1.31–2.77**	**3.53**

Table 3 Cost of production

Farm costs ($/kg MS)	Average	Q1 to Q3 range	Top 25% average
Cash cost of production	6.21	5.61–6.51	5.64
Cost of production (excl. inventory changes)	7.09	6.58–7.59	6.24
Inventory change			
+/- feed and water inventory changes	-0.17	-0.22–-0.02	-0.13
+/- livestock inventory changes minus purchases	-0.03	-0.26–0.16	-0.01
Cost of production (incl. inventory changes)	6.90	6.30–7.32	6.10

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 5.5%, up from last year's 3.9% ranging from 1.7% to 12.5% (Figure 8). 52% of participants recorded a RoTA higher than 5%, compared to 36% last year and 22% two years ago. Two farms achieved a RoTA greater than 10%, compared to one farm in 2019/20.

Figure 8 to Figure 11 were calculated excluding capital appreciation.

Return on equity is the net farm income expressed as a percentage of owners equity. It is a measure of the owner's rate of return on their investment. The average return on equity (RoE) for the 21 farms was 10.8% in contrast to 8.1% last year. Return on equity ranged from 1.7% to 34.2%, with the top 25% recording an average RoE of 19.7%. There were no participants that recorded a negative RoE this year down from 2 last year and 9 in 2018/19.

Figure 10 and Figure 11 - It is of interest to note that the three farms with largest RoE are heavily skewing the average. If these three were removed from the data set then the average would be almost halved to 5.5%. This figure, whilst improved, 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 participant farms.

Figure 8 Distribution of farms by return on total assets (%)

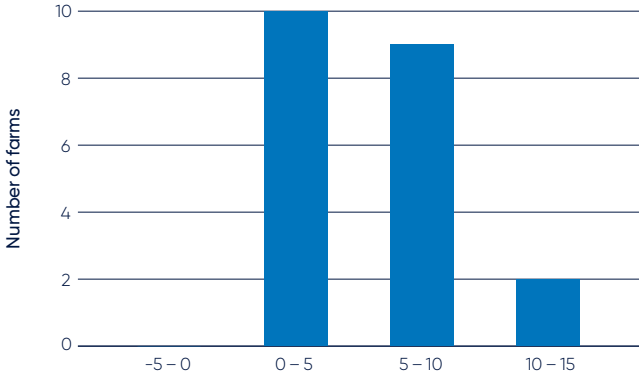


Figure 9 Return on total assets (excl. capital appreciation)

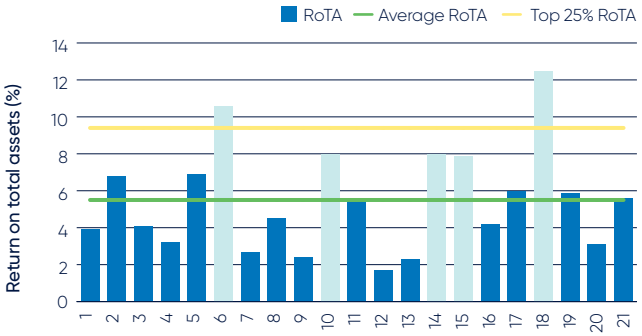


Figure 10 Distribution of farms by return on equity

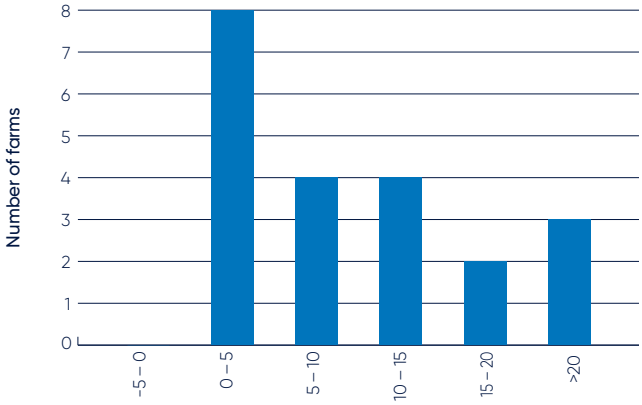
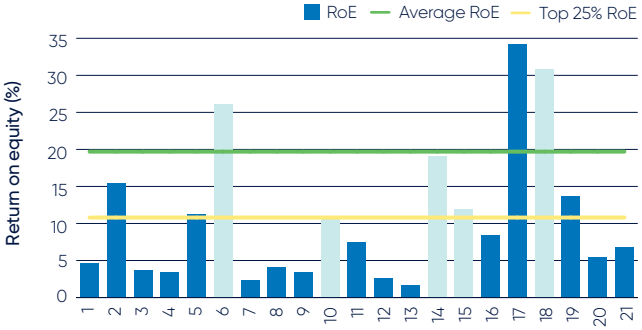


Figure 11 Return on equity



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]

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 4 presents some key risk indicators. Refer to Appendix E for the definition of terms used in Table 4. These indicators can also be found in Appendix Tables A8.

Eleven farms (52%) in the project relied on <30% of imported feed for the herd's feed requirement. With an average of 33% 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 19% to 47%.

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, 57 cents was used to cover variable costs. This figure is very consistent across years however down from last year of 61 cents.

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

Equity levels averaged 66% down from 69% last year. Debt per cow rose by $582/cow which means it has risen $1,876/cow or 58% in the last four 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 2020/21, 17 of the 21 participant farms (81%) received a return on equity greater than their return on assets, up from 64% last season. 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.

Table 4 Risk indicators – state-wide

Cost structure	57%
Debt service ratio (% of income as finance costs)	6%
Debt per cow	$5,107
Equity percentage (ownership of total assets managed)	66%
Percentage of feed imported (as % of total ME)	33%

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

PHYSICAL MEASURES

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 67% of the diet coming from home grown feed.

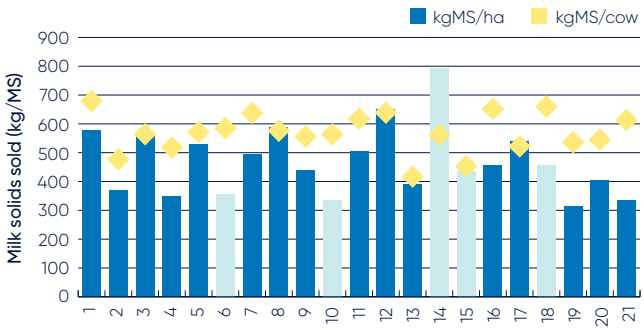
However, the systems vary in terms of cow type, feedbase, stocking rate and production levels and are underpinned by quite varying feed inputs. Participant farms sourced 47% of their metabolisable energy (ME) from directly grazed pasture (range 26-65%) and concentrates provided 31% of ME (range 12-43%). The other main supply of energy was from silage (15%) and hay (6%).

Milk solids sold

There was a large variation in the milk solids sold per usable hectare with a range of 315kg MS/ha to 793 kg MS/ha reported, with the average being 471 kg MS/ha (Figure 12).

The average kilograms of milk solids sold per cow remained stable at 569 kg MS/cow (7,816 L/cow), and ranged between 417 kg MS/cow and 679 kg MS/cow (5,922 – 9,388 L/cow). The top 25% had an average per cow production of 565 kg MS/cow in 2020/21.

Figure 12 Milk solids sold



Milk sales versus calving pattern

Figure 13 shows the average milk sales for all participant farms against the monthly distribution of calves born.

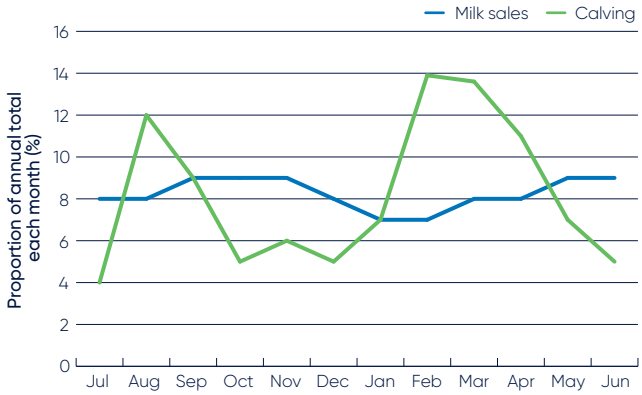
Average monthly distribution of milk production in WA reflects the cost of producing milk in a Mediterranean climate (hot dry summers and mild wet winters) together with processors' requirement for a flatter milk supply for the liquid milk market.

Peak milk production is in spring when pasture growth is greatest and conversely milk production is lowest in summer when reliance on supplements and irrigation is greatest. This is reflected in a peak to trough ratio of 1.3 with 9% of annual milk produced in October compared to 7% 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. Another small increase of calving can be seen in November where some attempt to capture the summer premiums. Many factors influence choice of calving pattern on individual farms, including matching feed supply with animal demand, receiving seasonal milk price, rainfall and irrigation, ease of management and herd fertility management.

The 21 participant farms calved 26% of their cows in August to October and another 39% 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 13 Monthly milk production and calving



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 2020/21 grazed pasture was the major component of the cows' diet at 47% (Figure 14).

Concentrates supply the greatest proportion of ME of all the supplements fed, accounting for 31% of the diet, a 4% reduction on last year.

These ratios varied from last year where the diet consisted of 40% grazed pasture, 35% concentrate, 16% silage and 8% hay providing the energy.

Appendix Table A3 provides further information on purchased feed.

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 15) and conserved pasture (shown as light blue bars).

The average total pasture harvested (grazed and conserved) from the milking area was 6.5t DM/ha, an increase on last year's 5.6 t DM/ha. The amount of pasture consumed as directly grazed feed on the milking area this year averaged 4.6 t DM/ha, ranging from 1.4 t DM/ha to 7.1 t DM/ha. This average was a 10% increase on last year.

The usual gap exists with the top 25% having higher grass consumption across all the usable area (0.8t DM/ha), as well as the milking platform (1.8t DM/ha). Top businesses understand that the land is a resource, and managing all the pasture well, is essential to lower the cost of production. The longer grazing season in 2020-21 enabled an increase in homegrown feed production across participant farms.

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 and it is best to compare pasture consumption on the same farm over time using the same method of estimation.

Figure 15 Estimated tonnes of home-grown feed per milking ha (t DM/ha)

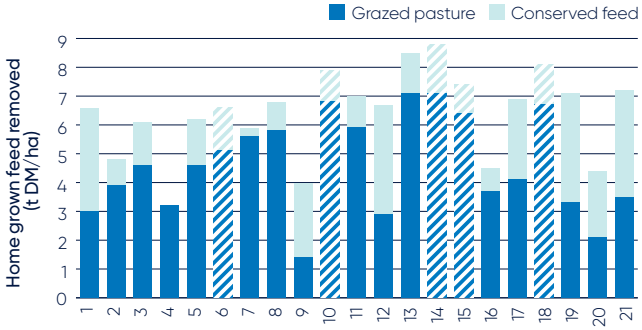
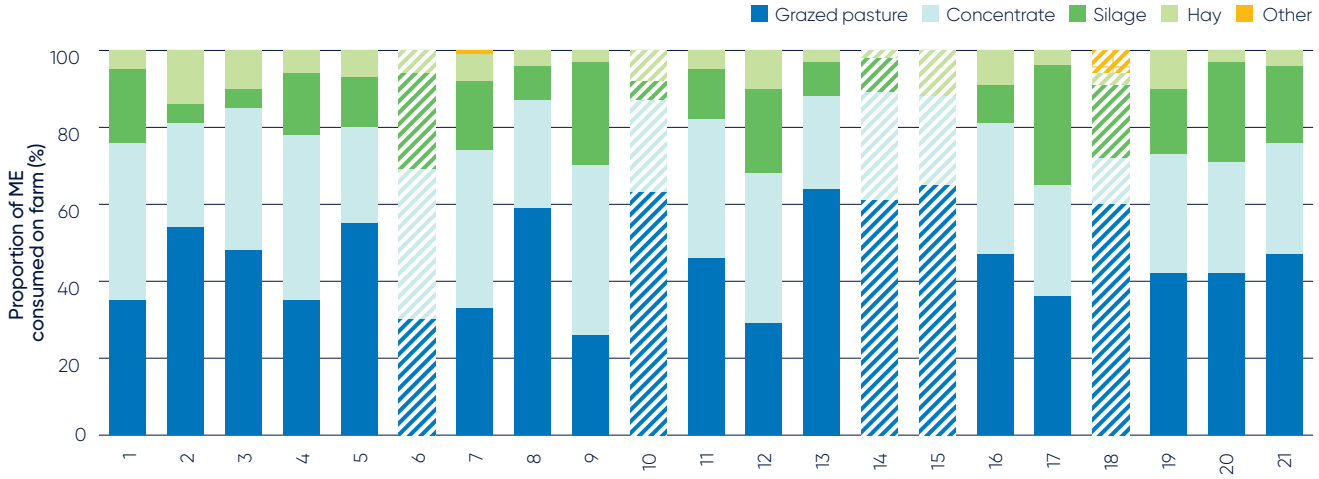


Figure 14 Sources of whole farm ME



Fertiliser application

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

The total nutrient use on milking area was 261 kg/ha, comprising of 157 kg/ha nitrogen, 17 kg/ha phosphorus, 52 kg/ha potassium and 35 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.

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

Nitrogen applied varied from 59 kg N/ha up to 316 kg N/ha, with the group average at 157 kg N/ha (Figure 16). Farms in the top 25% applied 23% more fertiliser than the average. The main nutrients of significant variation was 31% more nitrogen applied than the average user.

The extended growing season provided increased opportunity for fertiliser applications resulting in an increse in both grazed and conserved feed with farms also able to increase feed inventories at year end.

It should also be recognised that grazing strategies and timing of rainfall and irrigation scheduling would also impact upon pasture growth and consumption.

Figure 16 Fertiliser application per milking ha

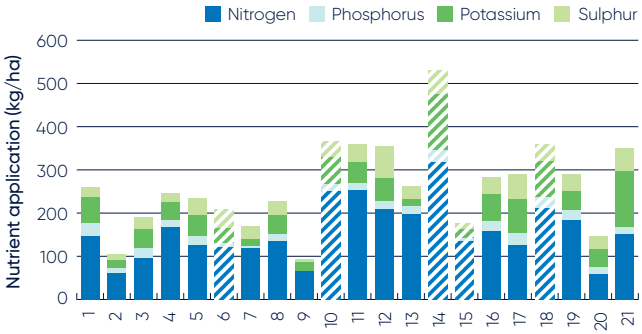


Table 5 Fertiliser application per hectare (kg/ha)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Nitrogen	97	109	111	115	124	157
Phosphorus	16	14	19	15	17	17
Potassium	41	38	41	40	44	52
Sulphur	28	28	29	29	28	35

Business confidence survey

Expectations and issues

Responses to this business confidence survey were made from July to September 2021 with regard to the 2021/22 financial year and the next five years.

Expectations for business returns

Improved milk and livestock prices was are predicted to be offset by lack of labour supply and an increase in fertiliser costs. This resulted in reduced business confidence for the year ahead. The majority of participants expect business returns to remain stable for the coming season. The expectations of production stability decreased from 64% to 60% whilst 90% of businesses expect an increase in fertiliser costs. 70% expect an increase in labour costs due to lack of labour supply.

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

The majority of respondents (65%) expect buisness returns to remain stable for the 2021/22 year with the remaining participants expecting improved returns. This is primarily driven by predicted increases in milk and livestock prices, resulting in improved income levels. Noting that increases to costs will partially offset increases in milk and livestock prices. Cautious optimism, with a desire to remain stable rather than progess, was a common theme.

Price and production expectations – milk

The majority of respondents expected their price to increase and production to remain stable. The continued higher cost of production, and the expectations that current supply and demand will remain stable is the reasoning.

Whilst the expectations on production were more balanced only 15% were expecting to decrease their production. 60% of respondents would maintain their production level with 25% expecting a increase (Figure 18).

Production expectations – fodder

Twenty five per cent of participating farmers expected to increase their level of fodder production in 2021/22 (Figure 19) and the same percentage of participating farmers are expecting a decrease in their level of fodder production.

Half of the participating farmers were expecting fodder production to remain stable which is not surprising given the favourable winter and spring last year expected to continue again in 2021/22.

Figure 17 Expectation of business returns

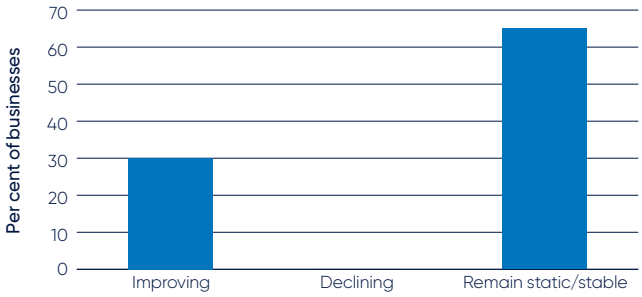


Figure 18 Price and production expectations – milk

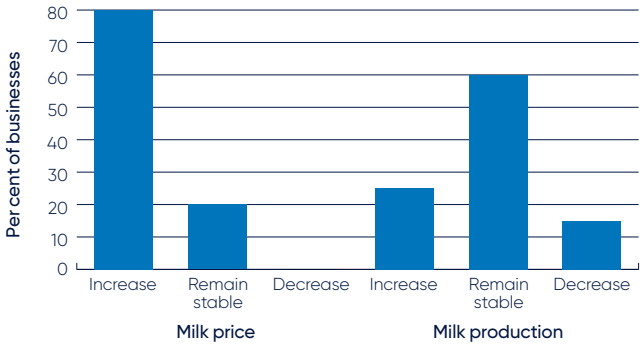
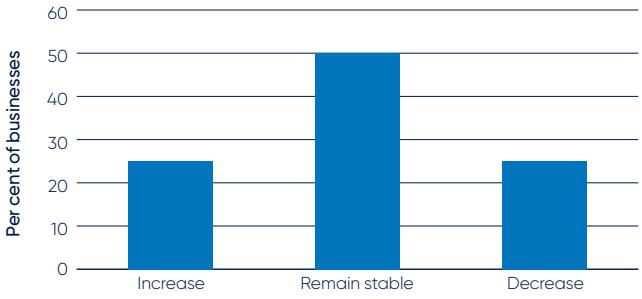


Figure 19 Producer expectations – fodder



Cost expectations

In relation to costs there is little expectation of costs to decrease across the major cost categories (Figure 20), except irrigation costs. Eighty six per cent of particpating farmers expect irrigation costs to remain stable with none expecting an increase. Ninety five per cent of participating farmers expect purchased feed prices to increase or remain stable due to the current high grain prices.

Ninety percent thought that the fertiliser prices will increase and 70% thought that labour costs would increase. This is not surprising given the current labour shortage. Fuel and oil prices are expected to increase reported 55% of participating farmers.

Nitrogen and urea prices remain a concern to farmers with supply issues driving prices to record highs.

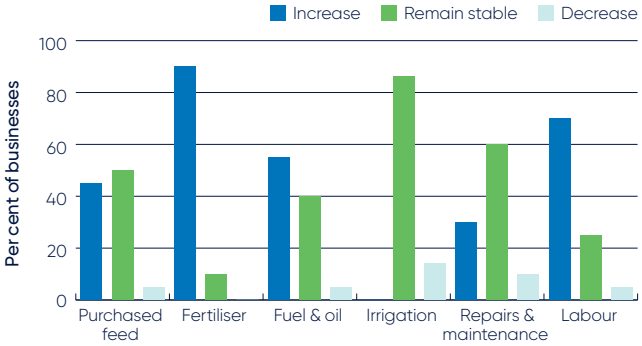
Major issues in the dairy industry – the next 12 months

The participants were asked to consider seven issues as identified in Figure 21, 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 1 to 7, with 1 being the most important, and 7 being the least important. They were also given the opportunity to identify other issues of importance to their business.

Figure 21 and 22 highlight that the trends for the next 12 months are perceived to be similar for the next 5 years. Thirty five percent of the respondents identified milk price as the most important issue they are facing in the short term (next 12 months) and long term (30%). This is not surprising given the increase in cost of production and costs seen across the state in recent years. With above average rainfall in the previous winter and autum, and a solid spring, farmers commented that the impact of seasonality and growth of pasture and fodder, as the next issues that are all interlinked with input costs. Pasture/fodder and water were less important issues in the short term in this survey.

There were numerous comments from farmers about the positive impact of complimenting the milking operation with a beef herd to increase profitbility. Farmers are confident land prices will continue to increase and are seeing better prices for their milk. Above average rainfall has contributed to strong on farm feed reserves.

Figure 20 Cost expectations



*Dataset includes 12 farms with irrigation

Figure 21 Major issues facing the dairy industry – 12-month outlook

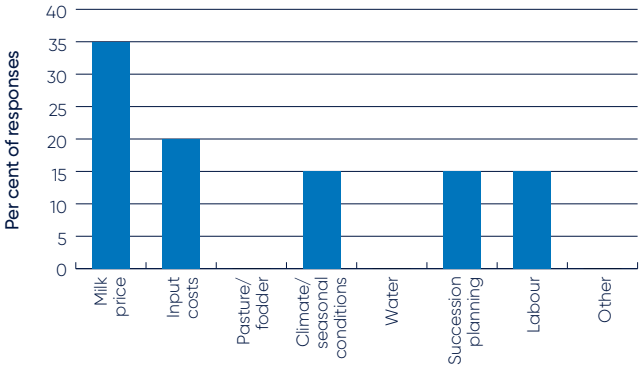
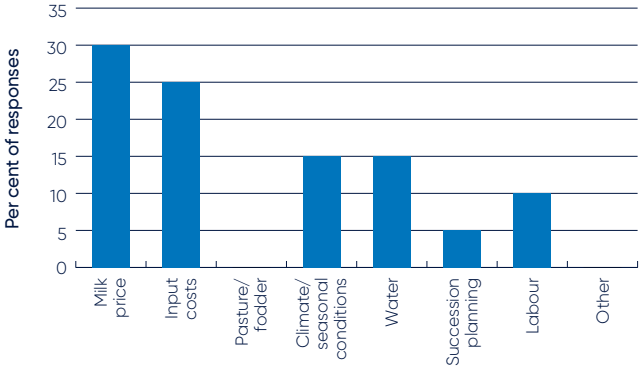


Figure 22 Major issues facing the dairy industry – 5-year outlook



Greenhouse gas emissions

The average level of emission from participating farms was 14.5 t CO_2-e/t MS in 2020/21, a slight reduction to last year's 15.0 t CO_2-e/t MS. Each of the three main gases responsible for emissions, methane, carbon dioxide and nitrous oxide were calculated for each farming participant.

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 (CH4) and 3.4 kg of nitrous oxide (N_2O). Other changes have included a decrease in the proportion of waste (dung and urine) deposited onto pastures while the milking herd graze, resulting in an increase in waste CH_4 and N_2O emissions along with some changes to the emission factors for N_2O emissions from nitrogen fertiliser and animal waste.

In addition, the estimation of greenhouse gas emissions now include a pre-farm gate emission source. This is the greenhouse gases emitted with the manufacturing of fertilisers and the production of purchased fodder, grain and concentrates. The result of these changes with the NGGI method and inclusion of pre-farm gate emissions will be an increase in emissions intensity of around 30%. This percentage increase will vary between farms in the state.

The distribution of different emissions for 2020/21 is shown in Figure 23. Greenhouse gas emissions per tonne of milk solids produced ranged from 12.1 CO_2-e/t MS to 18.1 t CO_2-e/t MS with an average emission level of 14.5 t CO_2-e/t MS. The percentage breakdown for emissions in 2020/21 was 63% for CH_4, 23% for CO_2, and 14% for N_2O emissions.

Methane was identified as the main greenhouse gas emitted from dairy farms, accounting for 63%, or 9.1 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 54% of total emissions. Methane from effluent ponds accounted for 8% of total emissions on average across the state in 2020/21.

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

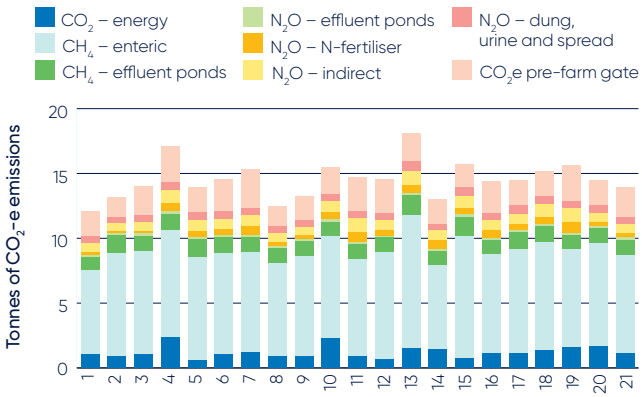
The second main greenhouse gas emission was pre-farm gate being produced primarily from fossil fuel consumption as either electricity or petrochemicals. The NGGI calculates carbon emissions from both pre-farm gates and on-farm sources. Carbon dioxide accounted for 23% of total emissions (3.4 t CO_2-e/t MS); 15% from pre-farm gates sources and 8% 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 14% 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% of total emissions and excreta accounted for 4%. Nitrous oxide from indirect emissions was 6%. Nitrous oxide emissions are highest in warm, waterlogged soils with readily available nitrogen. Over application of nitrogen, high stocking intensity and flood irrigation are all potential causes of increased nitrogen loss as N_2O. Strategic fertiliser management practices can reduce N_2O emissions and improve nitrogen efficiency.

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

Figure 23 Greenhouse gas emissions per tonne of milk solids produced



Historical analysis

The 2020/21 was an improved year for the WA dairy industry as well as nationally. Continued high feed costs didn't help, however an improved winter and spring and improved livestock prices has led to improved business performance. In real terms, the EBIT for 2020/21 is the second highest in the projects eight year history. Net farm income and return on equity were also above the average figures for the past seven years.

This section compares the performance of participant farms in the Dairy Farm Monitor Project over the past eight years. While figures are adjusted for inflation to allow comparison between years it should be noted that only nine farms from the initial farms in 2013/14 have participated over all eight seasons with one returning farm participating in 2020/21.

The average EBIT and net farm income (NFI) improved on last year and is above average for the period 2014–2021 (Figure 24).

Earnings before interest and tax as well as net farm income improved significantly, 52% and 75% respectively in 2020/21 due to a favourable winter and spring and strong beef prices. The current business performance is above average in terms of RoTA, EBIT, NFI and RoE.

Return on total assets (RoTA) at 5.5% in 2020-21 has improved in the past twelve months and is above the long term average of 4.9% (Figure 25). The positive performance in 2020-21 was primarily due to improved livestock income and reduced feed costs.

The average return on equity (RoE) improved from 8.1% to 10.8% in 2020-21, whilst the top 25% was a very healthy 19.7%. The top 25% of figures as well as the average was distorted by two participants who had an RoE in excess of 30%.

Figure 24 Historical EBIT and net farm income

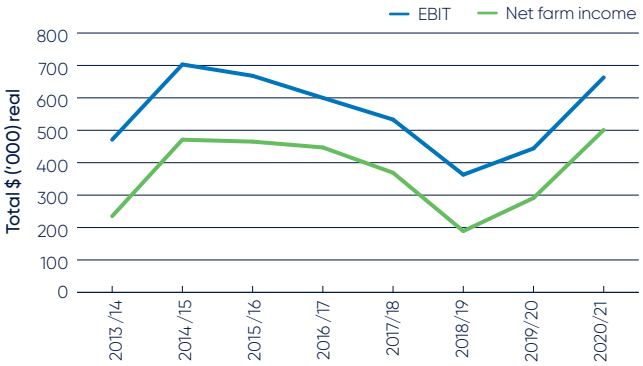
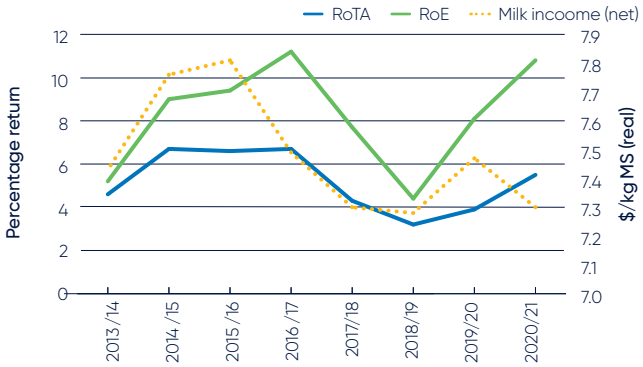


Figure 25 Historical return on total assets, return on equity and real milk income



Appendix

Table A8 Capital structure

Farm assets				
	Land value	Land value	Permanent water value	Permanent water value
	$/ha	$/cow	$/ha	$/cow
Average	9,770	11,974	318	310
Top 25%	9,086	10,600	507	444

Other farm assets (per usable hectare)				
Plant and equipment	Livestock	Hay and grain	Other assets	Total assets
$/ha	$/ha	$/ha	$/ha	$/ha
1,173	2,265	126	214	13,866
656	2,442	131	162	12,984

Liabilities	
Liabilities per usable hectare	Liabilities per milking cow
$/ha	$/cow
4,002	5,107
4,983	5,488

Equity	
Equity per usable hectare	Average equity
$/ha	%
9,865	66.4
8,001	64.3

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

	Income				Variable costs							
	Milk income net		Gross farm income		Herd costs		Shed costs		Feed costs		Total variable costs	
Year	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS
2013/14	6.62	7.43	7.75	8.69	0.24	0.27	0.26	0.29	3.29	3.70	3.79	4.26
2014/15	7.07	7.75	8.26	9.06	0.25	0.27	0.26	0.29	3.31	3.63	3.82	4.19
2015/16	7.22	7.82	8.29	8.97	0.26	0.28	0.24	0.26	3.45	3.73	3.95	4.27
2016/17	7.05	7.49	8.12	8.63	0.26	0.27	0.26	0.28	3.24	3.44	3.76	3.99
2017/18	7.00	7.30	8.16	8.51	0.26	0.27	0.27	0.28	3.52	3.67	4.05	4.22
2018/19	7.07	7.28	8.25	8.49	0.28	0.29	0.27	0.28	3.85	3.97	4.40	4.54
2019/20	7.35	7.47	8.74	8.89	0.27	0.28	0.28	0.28	3.86	3.93	4.41	4.49
2020/21	7.30	7.30	9.17	9.17	0.29	0.29	0.25	0.25	3.38	3.38	3.93	3.93
Average		**7.48**		**8.80**		**0.28**		**0.28**		**3.68**		**4.24**

	Overhead costs						Profit							
	Cash overhead costs		Non-cash overhead costs		Total overhead costs		Earnings before interest & tax		Interest & lease charges		Net farm income			
Year	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	Nominal $/kgMS	Real $/kgMS	RoTA %	RoE %
2013/14	1.50	1.68	0.86	0.96	2.36	2.65	1.59	1.78	0.65	0.73	1.01	1.13	4.2	4.2
2014/15	1.47	1.61	0.8	0.88	2.26	2.48	2.17	2.38	0.59	0.65	1.66	1.82	6.3	8.2
2015/16	1.51	1.64	0.82	0.89	2.33	2.52	2.02	2.19	0.53	0.58	1.54	1.67	6.4	9.1
2016/17	1.56	1.66	0.83	0.88	2.39	2.54	1.98	2.10	0.53	0.56	1.48	1.57	6.5	18.3
2017/18	1.53	1.59	0.52	0.54	2.57	2.68	1.54	1.61	0.53	0.55	1.01	1.05	4.3	7.7
2018/19	1.71	1.76	0.98	1.01	2.69	2.77	1.16	1.19	0.60	0.61	0.56	0.58	3.2	4.4
2019/20	1.84	1.87	1.05	1.07	2.89	2.94	1.44	1.46	0.56	0.57	0.88	0.90	3.2	4.4
2020/21	2.12	2.12	0.88	0.88	3.00	3.00	2.24	2.24	0.52	0.52	1.72	1.72	5.5	10.8
Average		**1.74**		**0.89**		**2.70**		**1.87**		**0.60**		**1.30**	**4.9**	**8.4**

Note: 'Real' dollar values are the nominal values converted to 2020/21 dollar equivalents by the consumer price index (CPI) to allow for inflation. From 2016/17 Gross farm income does not include feed inventory changes and changes to the value of carry-over water. These are included in feed costs.

Table A10 Historical data – average farm physical information

	Total usable area	Milking area	Total water use efficiency	Number of milking cows	Milking cows	Milk sold	Milk sold	Estimated grazed pasture*	Estimated conserved feed*	Home-grown feed	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	469
2014/15	625	296	0.6	543	0.9	535	486	3.6	1.7	63	421	462
2015/16	575	283	0.5	545	1.0	557	541	4.1	1.7	57	445	482
2016/17	499	268	0.6	498	1.0	558	570	5.1	1.3	61	404	429
2017/18	586	277	0.5	497	0.9	580	521	4.0	1.9	57	429	447
2018/19	579	286	0.6	497	0.9	566	515	4.2	1.6	60	488	503
2019/20	582	273	0.7	481	0.9	561	507	4.2	1.6	61	507	515
2020/21	678	312	0.6	524	0.8	569	471	4.6	1.9	61	494	494
Average	**591**	**285**	**0.6**	**513**	**0.9**	**554**	**508**	**4.1**	**1.6**	**60**	**451**	**475**

* Milking area

Appendix A Glossary of terms, abbreviations and standard values

All other income	Income to the farm from all sources except milk. Includes livestock trading profit, dividends, interest payments received, and rent from farm cottages.
Annual hours	Total hours worked by a person during the given twelve month period.
Appreciation	An increase in the value of an asset in the market place. Often only applicable to land value.
Asset	Anything managed by the farm, whether it is owned or not. Assets include owned land and buildings, leased land, plant and machinery, fixtures and fittings, trading stock, farm investments (i.e. Farm Management Deposits), debtors, and cash.
Cash overheads	All fixed costs that have a cash cost to the business. Includes all overhead costs except imputed labour costs and depreciation.
Cost of production	The cost of producing the main product of the business; milk. Usually expressed in terms of the main enterprise output i.e. dollars per kilogram of milk solids. It is reported at the following levels; • cash cost of production; variable costs plus cash overhead costs • cost of production excluding inventory changes; variable costs plus cash and non-cash overhead costs • cost of production including inventory changes; variable costs plus cash and non-cash overhead costs, accounting for feed inventory change and livestock inventory change minus livestock purchases.
Cost structure	Variable costs as a percentage of total costs, where total costs equals variable costs plus overhead costs.
Debt servicing ratio	Interest and lease costs as a percentage of gross farm income.
Depreciation	Decrease in value over time of capital asset, usually as a result of using the asset. Depreciation is a non-cash cost of the business, but reduces the book value of the asset and is therefore a cost.
Earnings before interest and tax (EBIT)	Gross income minus total variable and total overhead costs.
EBIT%	The ratio of EBIT compared to gross income. Indicates the percentage of each dollar of gross income that is retained as EBIT.
Employed labour cost	Cash cost of any paid employee, including on-costs such as superannuation and WorkCover.
Equity	Total assets minus total liabilities. Equal to the total value of capital invested in the farm business by the owner/operator(s).
Equity %	Total equity as a percentage of the total assets owned. The proportion of the total assets owned by the business.
Farm income	See gross farm income.
Feed costs	Cost of fertiliser, irrigation (including effluent), hay and silage making, fuel and oil, pasture improvement, fodder purchases, grain/ concentrates, agistment and lease costs associated with any of the above costs, and feed inventory change.
Feed inventory change	An estimate of the feed on hand at the start and end of the financial year to capture feed used in the production of milk and livestock.
Finance costs	See interest and lease costs.
Full time equivalent (FTE)	Standardised labour unit. Equal to 2,400 hours a year. Calculated as 48 hours a week for 50 weeks a year.
Grazed area	Total usable area minus any area used only for fodder production during the year.
Grazed pasture	Calculated using the energetics method. Grazed pasture is calculated as the gap between total energy required by livestock over the year and amount of energy available from other sources (hay, silage, grain and concentrates). Total energy required by livestock is a factor of age, weight, growth rate, pregnancy and lactation requirements, distance to shed, terrain and number of animals. Total energy available is the sum of energy available from all feed sources except pasture, calculated as (weight [kg] x dry matter content (DM %) x metabolisable energy (MJ/kg DM)).
Gross farm income	Farm income including milk sales, livestock trading and other income such as income from grants and rebates.
Gross margin	Gross farm income minus total variable costs.
Herd costs	Cost of artificial insemination (AI) and herd tests, animal health and calf rearing.
Imputed	An estimated amount, introduced into economic management analysis to allow reasonable comparisons between years and between other businesses.
Imputed labour cost	An allocated allowance for the cost of owner/ operator, family and sharefarmer time in the business, valued at $32 per hour.
Interest and lease costs	Total interest plus total lease costs paid.
Labour cost	Cost of the labour resource on farm. Includes both imputed and employed labour costs.
Labour efficiency	FTEs per cow and per kilogram of milk solid. Measures of productivity of the total labour resources in the business.
Labour resource	Any person who works in the business, be they the owner, family, sharefarmer or employed on a permanent, part time or contract basis.
Liability	Money owed to someone else, e.g. family or a financial institute such as a bank.

Livestock trading profit	An estimate of the annual contribution to gross farm income by accounting for the changes in the number and value of livestock during the year. It is calculated as the trading income from sales minus purchases, plus changes in the value and number of livestock on hand at the start and end of the year, and accounting for births and deaths. An increase in livestock trading indicates there was an appreciation of livestock or an increase in livestock numbers over the year.
Metabolisable energy	Energy available to livestock in feed, expressed in megajoules per kilogram of dry matter (MJ/kg DM).
Milk income	Income through the sales of milk. This is net of compulsory levies and charges.
Milking area	Total usable area minus out-blocks or run-off areas.
Net farm income	*Previously reported as business profit.* Earnings before interest and tax (EBIT) minus interest and lease costs. The amount of profit available for capital investment, loan principal repayments and tax.
Nominal terms	Dollar values or interest rates that include an inflation component.
Number of milkers	Total number of cows milked for at least three months.
Other income	Income to the farm from other farm owned assets and external sources. Includes dividends, interest payments received, and rents from farm cottages.
Overhead costs	All fixed costs incurred by the farm business e.g. rates, administration, depreciation, insurance and imputed labour. Interest, leases, capital expenditure, principal repayments and tax are not included.
Real terms	Dollar values or interest rates that have no inflation component.
Return on equity (RoE)	Net farm income divided by the value of total equity.
Return on total assets (RoTA)	Earnings before interest and tax divided by the value of total assets under management, including owned and leased land.
Shed costs	Cost of shed power and dairy supplies such as filter socks, rubberware, vacuum pump oil etc.
Total income	See gross farm income.
Total usable area	Total hectares managed minus the area of land which is of little or no value for livestock production e.g. house and shed area.
Total water used	Total rainfall plus average irrigation water used expressed as millimetres per hectare, where irrigation water is calculated as; (total megalitres of water used/total usable area) x 100.
Variable costs	All costs that vary with the size of production in the enterprise e.g. herd, shed and feed costs (including feed inventory change).

List of abbreviations

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

Standard values

Livestock values

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

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

Imputed owner/operator and family labour

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

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