

## Measurement of profitability on Australian dairy farms (Option B)

### Historical trends and future targets

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#### Context

The Australian Dairy Plan (ADP) published a paper with the same title as this paper as Appendix F to the ADP in February 2020. There appear to be several significant weaknesses in the ADP paper including:

1. The ADP paper proposes to measure profitability but does not select the ratio that defines profit to undertake this. 'Return on Capital' (otherwise described as 'Return on Total Assets') is the measure of profitability.
2. The paper selects a single ratio, namely 'EBIT per kg MS' (otherwise described as 'Profit per kg MS') as a single measure to monitor profitability when referencing a number of ratios would provide a more effective methodology for farmers and extension services.
3. The paper selects a ratio (EBIT per kg MS) that delivers quite different levels of profitability (defined as Return on Capital) depending on the state and region as well as the choice of farm production system.
4. The paper selects a ratio (EBIT per kg MS) that is particularly variable with changes in milk price, making it difficult to monitor changes in industry or farm performance year-on-year in an effective way.

The combination of these apparent weaknesses means that if the recommendations in the ADP measuring profitability paper were adopted by the Australian dairy industry then, firstly, this would **not** result in profit being monitored, and secondly, individual farmers would in all probability be provided targets that will **not** produce the profit that was assumed. This paper is intended to address these weaknesses and provide an alternative that could be adopted.

#### Executive Summary

The national milk production in Australia has been in steady decline for almost two decades (since 2002). The international dairy market has been expanding over this period and Australia's major competitors have been increasing their milk production. Australian dairy farmers have been progressively becoming less profitable compared to these competitor countries, and if this situation cannot be reversed then Australia's national milk production is likely to continue to decline.

Establishing a profit target for the Australian dairy industry would provide a focus for all industry organisations so that funds might be appropriately allocated towards this target. This profit target would also provide farmers a common focus for their discussions on farm business performance as well as for feedback to their industry organisations.

Return on Capital (ROC), otherwise described as 'Return on Total Assets', is the ratio that defines profit as the return on the value of all assets employed in the business. In this paper ***I propose an industry target for profitability of a 5% operating ROC***. This is similar to the average level of profitability in Australia in the period 2000-2006 when the industry was competitive with most other countries, despite drought in some regions. This target would convert to a 7%-8% total ROC if an annual 2%-3% increase in the value of farm assets (capital gain) was added. However, the profit target could arguably be set somewhat higher or lower than this proposed level, and consultation with farmers would be recommended prior to a target being adopted by the industry.

All ratios that include total revenue will exhibit significant variability year-on-year due to the impact of changes in milk price. This would result in inconsistent annual results that would not be possible to monitor effectively. ***I propose a four-year rolling average of a 5% operating ROC as the industry target for profitability.***

Once a profit target is adopted, it could be devolved into a number of other profit-related ratios. This would provide a more developed description of business performance for farmers to monitor, as well as assisting extension and consultancy services. A suite of other ratios is included in Table 1 (grey shaded) based on recent benchmark data for each state and the three main dairy regions in Victoria.

The profit-related ratios include profit per cow, profit per hectare, profit per kg MS or per litre, cost of production and operating profit margin. All these ratios vary significantly at a consistent profit target depending on the state or region

and/or the farm production system implemented. However, all these profit-related ratios can be readily calculated for any state, region, production system or individual farm based on an agreed profit (ROC) target.

In the last 3-4 years, the average level of profit in Australia has been around 2% operating ROC. To lift this to around 5% will require significant reductions in cost of production, which will in turn require some significant changes in strategy by most participants in the Australian dairy industry.

**Table 1. Example ratios for states and regions based on 5% Return on Capital**

PROFITABILITY STATES and REGIONS	Tasmania	Victoria	Gippsland	South West Victoria	Northern Victoria	New South Wales	Queensland	South Australia	Western Australia
Return on capital	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Profit per cow	\$600	\$600	\$690	\$625	\$500	\$940	\$895	\$835	\$995
Profit per hectare	\$1,668	\$1,500	\$1,829	\$1,250	\$1,450	\$2,585	\$1,566	\$1,754	\$1,791
Production per cow (kg milksolids)	430	440	430	443	446	475	345	480	440
Production per cow (litres ECM)	5,796	5,979	5,825	6,022	6,077	6,523	4,724	6,595	6,061
Milk price per kgMS	\$6.20	\$6.20	\$6.20	\$6.20	\$6.20	\$7.75	\$8.50	\$6.40	\$7.50
Milk price per litre (ECM)	46.0	45.6	45.8	45.6	45.5	56.4	62.1	46.6	54.4
Cost of production per kgMS	\$4.80	\$4.84	\$4.60	\$4.79	\$5.08	\$5.77	\$5.91	\$4.66	\$5.24
Cost of production per litre (ECM)	35.6	35.6	33.9	35.2	37.3	42.0	43.1	33.9	38.0
Profit (EBIT) per kgMS	\$1.40	\$1.36	\$1.60	\$1.41	\$1.12	\$1.98	\$2.59	\$1.74	\$2.26
Profit (EBIT) per litre (ECM)	10.4	10.0	11.8	10.4	8.2	14.4	18.9	12.7	16.4
Operating profit margin	22.5%	22.0%	25.9%	22.8%	18.1%	25.5%	30.5%	27.2%	30.2%

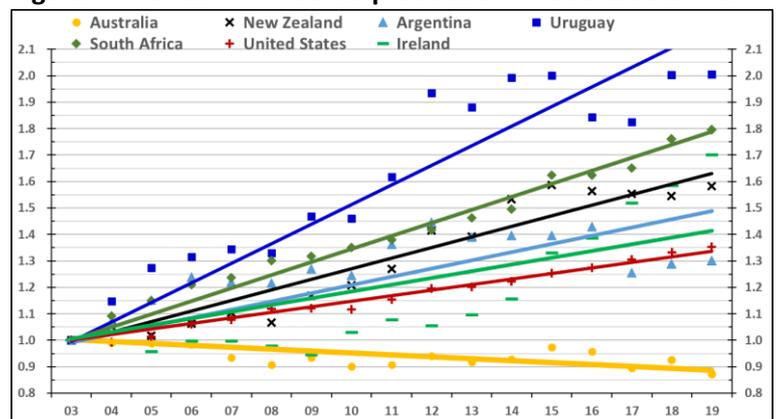
ECM = 'Energy Corrected Milk' corrected to 4.0% milkfat and 3.3% protein

**Introduction**

The trajectory of the Australian dairy industry that includes declining levels of milk production and lower levels of profitability has been a factor for two decades. To arrest a decline of this length will require a different strategy and focus to the existing one, or it would be reasonable to expect little change in outcome. The ADP "Measurement of profitability on Australian dairy farms" paper (Appendix F in the Australian Dairy Plan) references some trends in the Australian dairy industry. These trends are outlined in more detail, covering a longer period and a wider range of ratios, by Beca (2020) in the paper titled "Evaluating the Loss of Profitability and Declining Milk Production in the Australian Dairy Industry".

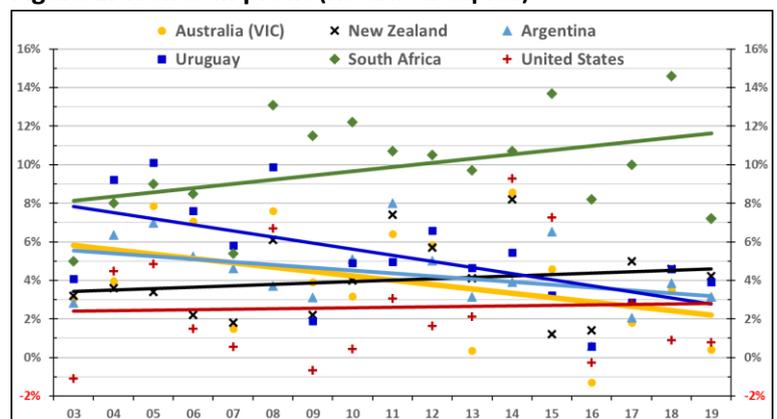
Some of the major trends can be summarised in the following graphs. Figure 1 highlights Australia's uncommon position of consistently declining milk production over the period from 2003-2019. This is compared with 6 other significant milk producing countries that are a mix of export and domestic focused dairy industries.

**Figure 1. Trends in milksolids production – 2003 base of 1.0**



Source: Dairy Australia, DairyNZ, MAGYP, INALE, MPO, USDA, CSO

**Figure 2. Trends in profit (Return on Capital)**



Source: Red Sky, Dairy Farm Monitor Project, DairyBase, AACREA, FUCREA, USDA, Genske Mulder

Figure 2 compares trends in profit across six countries based on ‘operating’ return on capital. Changes in asset values, including appreciation of land values (capital gain), are not included in this calculation of return on capital and would be additional to the returns outlined. Over this period, Australian profitability (represented by Victoria) has both progressively reduced in absolute terms and compared to the other countries. Over this 17-year period milk prices in Australia have been competitive with the other countries, and all countries have experienced significant climatic challenges at times.

Figure 3 compares trends in profit across the same six countries based on profit per cow in USD. Again, profit per cow for many Australian (Victorian) dairy farmers has progressively fallen behind other countries, with many recent years producing near zero or below zero profitability. Australian dairy farmers carry higher levels of debt per cow than the other countries listed with the exception of New Zealand farmers, so when financing costs are included, a majority of Australian dairy farmers have struggled to break even in recent years and have at times suffered significant losses.

Figure 4 compares trends in profit per cow across all states in Australia as well as across the three main dairy regions in Victoria. It confirms that all states and regions have had similar trends to Victoria including low levels of profit, except for Tasmania and Western Australia.

Figure 5 compares trends in ‘accounting’ cost of production across the six countries. ‘Accounting’ cost of production does not include an opportunity cost of capital attributable to the value of assets employed. The cost of production is reported in cents per litre of Energy Corrected Milk (ECM) with this corrected to 4.0% fat and 3.3% protein.

Over this period, the accounting cost of production for milk in Australia has increased rapidly, with this rate of increase being much higher than in a number of other countries including New Zealand, United States and South Africa. Argentina and Uruguay also have high rates of increase in cost of production, although they do start from a significantly lower base.

Figure 3. Trends in profit per cow (USD/cow)

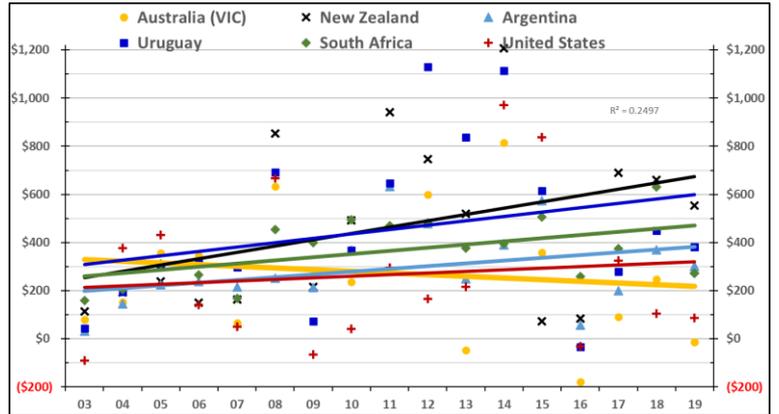


Figure 4. Trends in profit per cow (USD/cow)

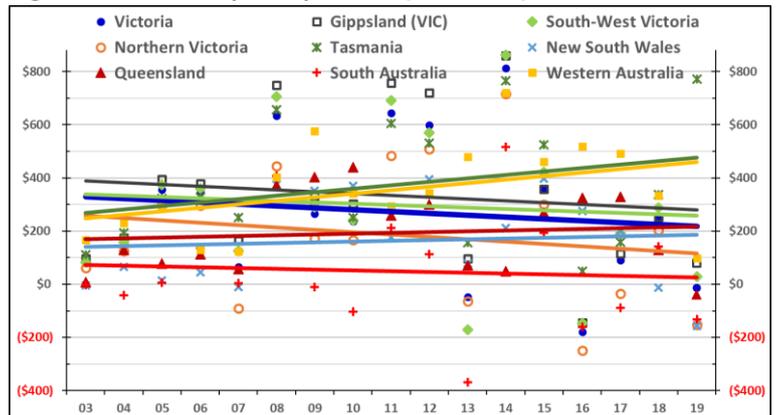


Figure 5. Trends in cost of production (USD c/litre ECM)

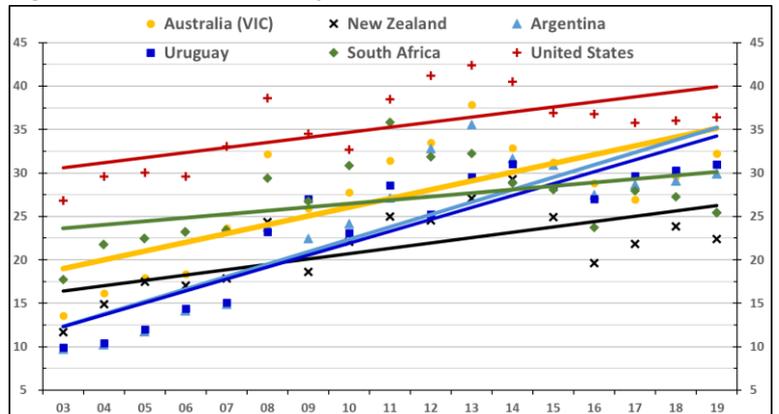
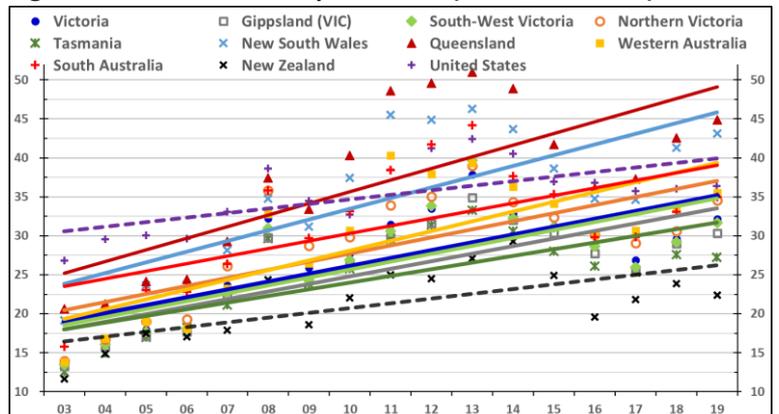


Figure 6. Trends in cost of production (USD c/litre ECM)



Sources: Red Sky, Dairy Farm Monitor Project, QDAS, DairyBase, AACREA, FUCREA, USDA, Genske Mulder

Figure 6 compares trends in accounting cost of production across all states and regions of Australia, as well as New Zealand and United States with dashed lines. This outlines how higher increases in cost of production have occurred across all states and regions in Australia compared to these international competitors and highlights the primary basis for the loss in profitability across Australia over the last two decades.

### Measuring profitability

Profit is defined as the return on the value of all assets employed in a business. Return on Capital (ROC), otherwise described as 'Return on Total Assets', is the ratio that measures profit. The application of agricultural economics and the methodologies for analysing business performance are described by Malcolm et al. (2005). There is not a sound alternative to utilising ROC as the measure for setting profitability targets and then monitoring dairy industry performance.

There are two components to 'total' ROC, the 'operating' return on capital and the change in value of the total assets over time. Both components are important, and both would be recommended for monitoring. However, it is the operating return on capital that can be significantly influenced by farm management, as well as by the unit value of inputs and outputs, so it is this component that would be recommended as the primary measure. It is calculated from operating profit (or EBIT) divided by the total value of all assets employed in the business.

There are several other ratios commonly used by farmers that are a proxy for profit e.g. profit per cow and profit per hectare. There are also several commonly used ratios that are profit-related though describe the cost structure or profit margin e.g. cost of production, profit per kg milksolid or litre, and operating profit margin. The application of these ratios and their correlation with profit are described by Beca (2020 #2).

**Table 2. Example ratios for changes in asset values, production system and milk price based on 5% Return on Capital**

PROFITABILITY PLANNING	Change in Value of Assets			Change in Production per Cow			Change in Milk Price		
	--	Base	++	--	Base	++	--	Base	++
Return on capital	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Investment per cow	\$9,000	\$12,000	\$15,000	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000
Profit per cow	\$450	\$600	\$750	\$600	\$600	\$600	\$600	\$600	\$600
Stocking rate	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Profit per hectare	\$1,125	\$1,500	\$1,875	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Production per cow (kg milksolids)	475	475	475	375	475	575	475	475	475
Production per cow (litres)	6,643	6,643	6,643	5,245	6,643	8,042	6,643	6,643	6,643
Production per cow (litres ECM)	6,536	6,536	6,536	5,160	6,536	7,912	6,536	6,536	6,536
Milksolids %	7.15%	7.15%	7.15%	7.15%	7.15%	7.15%	7.15%	7.15%	7.15%
Milkfat %	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%
Protein %	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%
Milk price per kgMS	\$6.25	\$6.25	\$6.25	\$6.25	\$6.25	\$6.25	\$5.25	\$6.25	\$7.25
Milk price per litre	44.7	44.7	44.7	44.7	44.7	44.7	37.5	44.7	51.8
Milk price per litre (ECM)	45.4	45.4	45.4	45.4	45.4	45.4	38.2	45.4	52.7
Cost of production per kgMS	\$5.30	\$4.99	\$4.67	\$4.65	\$4.99	\$5.21	\$3.99	\$4.99	\$5.99
Cost of production per litre	37.9	35.7	33.4	33.2	35.7	37.2	28.5	35.7	42.8
Cost of production per litre (ECM)	38.5	36.2	33.9	33.8	36.2	37.8	29.0	36.2	43.5
Profit (EBIT) per kgMS	\$0.95	\$1.26	\$1.58	\$1.60	\$1.26	\$1.04	\$1.26	\$1.26	\$1.26
Profit (EBIT) per litre	6.8	9.0	11.3	11.4	9.0	7.5	9.0	9.0	9.0
Profit (EBIT) per litre (ECM)	6.9	9.2	11.5	11.6	9.2	7.6	9.2	9.2	9.2
Operating profit margin	15.2%	20.2%	25.3%	25.6%	20.2%	16.7%	24.1%	20.2%	17.4%

ECM = 'Energy Corrected Milk' corrected to 4.0% milkfat and 3.3% protein

Utilising any of these profit 'proxies' or profit-related ratios to measure profit will provide inconsistent and erroneous results as highlighted in Table 2. The three sections of this table show the impact of 1) changes in asset values, 2)

changes in milk production per cow, and 3) changes in milk price, on these ratios at a consistent level of profit (namely 5% ROC). The changed values that cause the variations in these ratios are highlighted in blue. All five of these profit 'proxies' or profit-related ratios vary considerably when asset values, milk production per cow and milk price varies, as they do with changes in farm production system. Profit (EBIT) per kgMS or per litre and Operating profit margin are particularly unsound to use as proxies for profit as these 'margin' ratios can often increase and result in profit decreasing, just as they can often decrease and result in profit increasing.

However, regardless of what level of profit (ROC) was selected by the dairy industry, it can readily be converted into

a wider group of ratios for state or regional comparison, as well as for individual farmer application independently of whichever farm production system the farmer has chosen to implement. Table 3 highlights how straightforward this exercise would be. The inputs shaded green in the table need to be entered and from these all the balance of the ratios can be calculated.

### Determining a target level of profitability for the dairy industry

The proposed industry target for profit is a 5% operating ROC. This level of profit should be a realistic target as it is similar to the level of profit in Victoria and Tasmania in the period 2000-2006 when the industry was competitive with most other countries. This should also be a level that if maintained on average over time would provide sufficient return for farmers to reinvest in their businesses and provide regular increases in national milk production. This target presupposes inflation is no more than say 2%, which could suggest that a target would be better expressed as a margin above the inflation rate.

The suggested range of potential average profit targets for the dairy industry would be between 4% and 6% ROC. An average level lower than 4% would be unlikely to result in most farmers maintaining sufficient reinvestment in their businesses for national milk production to be sustained, while an average level over 6% may well result in asset values being bid up (capital gain) with one outcome being a reduction in the operating ROC.

This target for operating ROC would most probably convert into a total ROC approximately 2%-3% higher than this once an increase in the value of farm assets was added. So a 5% operating ROC would most probably convert into a 7%-8% total ROC over time, accepting that increases in land values (capital gain) have not historically been linear but often include periods of little change in values followed by shorter periods of more significant change.

A further way to describe an average 5% operating ROC would be through an estimate of the average ROC for the four quartiles of performance. An estimate of this could include the top quartile averaging 8% ROC, the second quartile

**Table 3. Example table for calculating profit-related ratios for extension**

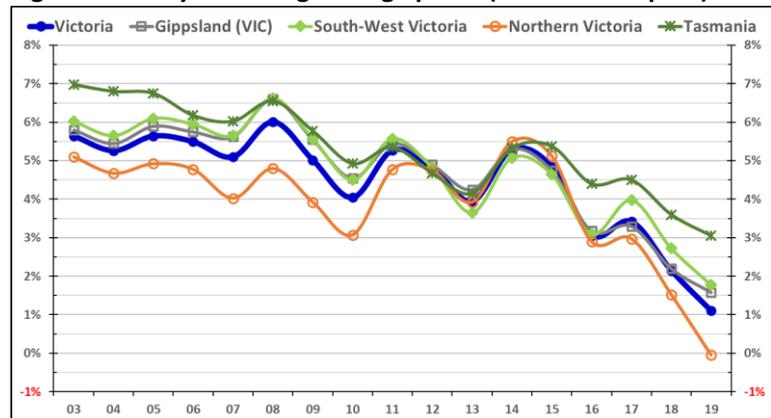
PROFITABILITY OPTIONS	Scenario # 1	Scenario # 2	Scenario # 3	Adjust * Scenario 1	Adjust * Scenario 2	Adjust * Scenario 3
<b>Return on capital</b>	4.0%	5.0%	6.0%	4.0%	5.0%	6.0%
Investment per cow	\$9,000	\$10,000	\$11,000	\$9,000	\$10,000	\$11,000
<b>Profit per cow</b>	\$360	\$500	\$660			
Stocking rate	2.00	2.50	3.00	2.00	2.50	3.00
<b>Profit per hectare</b>	\$720	\$1,250	\$1,980			
Production per cow (kg milksolids)	400	475	550	400	475	550
Production per cow (litres)	5,229	6,507	7,914			
Production per cow (litres ECM)	5,418	6,507	7,627			
Milksolids %	7.65%	7.30%	6.95%			
Milkfat %	4.20%	4.00%	3.80%	4.20%	4.00%	3.80%
Protein %	3.45%	3.30%	3.15%	3.45%	3.30%	3.15%
Milk price per kgMS	\$6.00	\$6.50	\$7.00	\$6.00	\$6.50	\$7.00
Milk price per litre	45.9	47.5	48.7			
Milk price per litre (ECM)	44.3	47.5	50.5			
<b>Cost of production per kgMS</b>	\$5.10	\$5.45	\$5.80			
Cost of production per litre	39.0	39.8	40.3			
Cost of production per litre (ECM)	37.6	39.8	41.8			
<b>Profit (EBIT) per kgMS</b>	\$0.90	\$1.05	\$1.20			
Profit (EBIT) per litre	6.9	7.7	8.3			
Profit (EBIT) per litre (ECM)	6.6	7.7	8.7			
<b>Operating profit margin</b>	15.0%	16.2%	17.1%			

ECM = 'Energy Corrected Milk' corrected to 4.0% milkfat and 3.3% protein

averaging 6% ROC, the third quartile averaging 4% ROC, and the bottom quartile averaging 2% ROC. Although this may not consistently provide the bottom quartile with a cash profit once debt servicing and other adjustments are included, it should provide the balance of farmers with every opportunity of being profitable at average milk prices. It should also provide a sufficient profit margin to provide a financial buffer for the majority of farmers when commodity prices and/or weather run against them. However, it is important that whatever profit target is adopted by the industry, that this has widespread support from farmers before being selected.

For the Australian dairy industry to measure profitability against a target, it is also important that this target does not vary too significantly year-on-year. However, all ratios that include total revenue within the calculation will exhibit significant variability year-on-year due to the impact of changes in milk price. This irregular annual result will mean it is not possible to monitor the industry’s performance effectively or assess progress against a meaningful target. This can be highlighted by year-on-year variability of the plot points in Figures 2-4.

Figure 7. Four year rolling average profit (Return on Capital)



Source: Red Sky, Dairy Farm Monitor Project

This issue can be addressed by using a rolling multi-year averaging of a ratio. It is common to have high or low milk price, or significantly adverse climatic conditions, impact on two consecutive years of performance. As a result, a four-year rolling average would be the minimum required to provide a relatively robust and consistent measure of profitability. Figure 7 outlines the rolling four-year average of ROC for Victoria, the three main dairy regions in Victoria, and Tasmania. The shapes of the graph lines are not significantly different for a five-year rolling average. As a result, a four-year rolling average of a 5% operating ROC is proposed as the industry target for profitability.

Table 4. Example ratios for states and regions based on 5% Return on Capital

PROFITABILITY STATES and REGIONS	Tasmania	Victoria	Gippsland	South West Victoria	Northern Victoria	New South Wales	Queensland	South Australia	Western Australia
<b>Return on capital</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>
Investment per cow	\$12,000	\$12,000	\$13,800	\$12,500	\$10,000	\$18,800	\$17,900	\$16,700	\$19,900
<b>Profit per cow</b>	<b>\$600</b>	<b>\$600</b>	<b>\$690</b>	<b>\$625</b>	<b>\$500</b>	<b>\$940</b>	<b>\$895</b>	<b>\$835</b>	<b>\$995</b>
Stocking rate	2.78	2.50	2.65	2.00	2.90	2.75	1.75	2.10	1.80
<b>Profit per hectare</b>	<b>\$1,668</b>	<b>\$1,500</b>	<b>\$1,829</b>	<b>\$1,250</b>	<b>\$1,450</b>	<b>\$2,585</b>	<b>\$1,566</b>	<b>\$1,754</b>	<b>\$1,791</b>
Production per cow (kg milksolids)	430	440	430	443	446	475	345	480	440
Production per cow (litres)	5,471	5,836	5,621	5,875	6,003	6,606	4,707	6,742	6,162
Production per cow (litres ECM)	5,796	5,979	5,825	6,022	6,077	6,523	4,724	6,595	6,061
Milksolids %	7.86%	7.54%	7.65%	7.54%	7.43%	7.19%	7.33%	7.12%	7.14%
Milkfat %	4.35%	4.13%	4.20%	4.14%	4.05%	3.91%	4.03%	3.83%	3.91%
Protein %	3.51%	3.41%	3.45%	3.40%	3.38%	3.28%	3.30%	3.29%	3.23%
<b>Milk price per kgMS</b>	<b>\$6.20</b>	<b>\$6.20</b>	<b>\$6.20</b>	<b>\$6.20</b>	<b>\$6.20</b>	<b>\$7.75</b>	<b>\$8.50</b>	<b>\$6.40</b>	<b>\$7.50</b>
Milk price per litre	48.7	46.7	47.4	46.7	46.1	55.7	62.3	45.6	53.6
Milk price per litre (ECM)	46.0	45.6	45.8	45.6	45.5	56.4	62.1	46.6	54.4
<b>Cost of production per kgMS</b>	<b>\$4.80</b>	<b>\$4.84</b>	<b>\$4.60</b>	<b>\$4.79</b>	<b>\$5.08</b>	<b>\$5.77</b>	<b>\$5.91</b>	<b>\$4.66</b>	<b>\$5.24</b>
Cost of production per litre	37.8	36.5	35.2	36.1	37.7	41.5	43.3	33.2	37.4
Cost of production per litre (ECM)	35.6	35.6	33.9	35.2	37.3	42.0	43.1	33.9	38.0
<b>Profit (EBIT) per kgMS</b>	<b>\$1.40</b>	<b>\$1.36</b>	<b>\$1.60</b>	<b>\$1.41</b>	<b>\$1.12</b>	<b>\$1.98</b>	<b>\$2.59</b>	<b>\$1.74</b>	<b>\$2.26</b>
Profit (EBIT) per litre	11.0	10.3	12.3	10.6	8.3	14.2	19.0	12.4	16.1
Profit (EBIT) per litre (ECM)	10.4	10.0	11.8	10.4	8.2	14.4	18.9	12.7	16.4
<b>Operating profit margin</b>	<b>22.5%</b>	<b>22.0%</b>	<b>25.9%</b>	<b>22.8%</b>	<b>18.1%</b>	<b>25.5%</b>	<b>30.5%</b>	<b>27.2%</b>	<b>30.2%</b>

ECM = 'Energy Corrected Milk' corrected to 4.0% milkfat and 3.3% protein

## Application of a 5% Return on Capital (ROC) profit target

Table 4 outlines how an industry profit target of a 5% ROC could be applied to each state and the three main regions of Victoria. The table is based on recent benchmark data, though it has only been created as a guide to highlight how this profit target could be applied. However, the 5% ROC target can readily be developed into a full range of targets for each state and region.

The problem with using any ratio other than ROC can be seen in this table. Profit per cow targets in the table range from \$500 to \$995 per cow, profit per hectare targets range from \$1,250 to \$2,585 per hectare, cost of production per kgMS targets range from \$4.60 to \$5.91 per kgMS, profit (EBIT) per kgMS targets range from \$1.12 to \$2.59 per kgMS, and operating profit margin targets range from 18% to 31%.

Table 5 outlines how an industry profit target of a 5% ROC could be applied to a range of farm production systems. Again, the table is loosely based on potential Victorian data, though it has only been created as a guide to highlight how this profit target could be applied. However, the 5% ROC target can readily be developed into a full range of farm production system targets for each state and region.

Once again, the problem with using any ratio other than ROC can be seen in this table. Profit per cow targets in the table range from \$550 to \$750 per cow, profit per hectare targets range from \$1,238 to \$1,788 per hectare, cost of production per kgMS targets range from \$4.63 to \$5.85 per kgMS, profit (EBIT) per kgMS targets range from \$1.10 to \$1.47 per kgMS, and operating profit margin targets range from 16% to 24%. These ranges in ratios are solely for one region or state, and the ranges would be much wider if applied across the entire country.

## Weaknesses in ADP Appendix F: Measurement of profitability on Australian dairy farms

ADP Appendix F presents the basis on which profitability will significantly increase for Australian dairy farmers over the next few years. This is an essential component to having growth in national milk production recommence, and due to this, meet the medium-term growth target outlined in ADP Appendix A "Growth Scenarios Paper". This medium-term growth target is for an estimated 1.7% year-on-year increase in national milk production (litres) for the period 2020 to 2025, compared to the -1.4% year-on-year **decrease** in national milk production for almost two decades since 2002.

ADP Appendix F appears to base the dairy industry's forecast improvement in profitability on the supposition that setting a profit goal for the industry, and further investing in existing programs that encourage farmers to analyse their business with DairyBase and develop strategic plans for their business, will deliver these improvements. No evidence is provided to support this supposition. It would appear to presuppose that most dairy farmers do not presently have goals to increase profit, which is most improbable. And it presupposes that if a farmer does set a new goal, one directed by an external party and not by the farmers themselves, and then gets assistance in financially analysing their business using a different methodology to the one they and their accountant presently use, that their profit will start increasing. This does not appear to be a rational supposition and it is not supported by any known evidence.

**Table 5. Example ratios for variations in farm production system based on 5% Return on Capital**

PROFITABILITY PRODUCTION SYSTEMS	Low Production	Moderate Production	High Production	Feedlot Production
<b>Return on capital</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>5.0%</b>
Investment per cow	\$11,000	\$12,000	\$13,000	\$15,000
<b>Profit per cow</b>	<b>\$550</b>	<b>\$600</b>	<b>\$650</b>	<b>\$750</b>
Stocking rate	2.25	2.50	2.75	N/A
<b>Profit per hectare</b>	<b>\$1,238</b>	<b>\$1,500</b>	<b>\$1,788</b>	<b>N/A</b>
Production per cow (kg milksolids)	375	460	540	680
Production per cow (litres)	4,601	6,013	7,552	10,000
Production per cow (litres ECM)	5,009	6,231	7,413	9,453
Milksolids %	8.15%	7.65%	7.15%	6.80%
Milkfat %	4.50%	4.20%	3.85%	3.65%
Protein %	3.65%	3.45%	3.30%	3.15%
<b>Milk price per kgMS</b>	<b>\$6.10</b>	<b>\$6.25</b>	<b>\$6.35</b>	<b>\$6.95</b>
Milk price per litre	49.7	47.8	45.4	47.3
Milk price per litre (ECM)	45.7	46.1	46.3	50.0
<b>Cost of production per kgMS</b>	<b>\$4.63</b>	<b>\$4.95</b>	<b>\$5.15</b>	<b>\$5.85</b>
Cost of production per litre	37.8	37.8	36.8	39.8
Cost of production per litre (ECM)	34.7	36.5	37.5	42.1
<b>Profit (EBIT) per kgMS</b>	<b>\$1.47</b>	<b>\$1.30</b>	<b>\$1.20</b>	<b>\$1.10</b>
Profit (EBIT) per litre	12.0	10.0	8.6	7.5
Profit (EBIT) per litre (ECM)	11.0	9.6	8.8	7.9
<b>Operating profit margin</b>	<b>24.0%</b>	<b>20.9%</b>	<b>19.0%</b>	<b>15.9%</b>

ECM = 'Energy Corrected Milk' corrected to 4.0% milkfat and 3.3% protein

Countries that have consistently exhibited higher levels of profit, such as New Zealand and Ireland, have had industry organisations that are able to clearly describe the farm production systems that deliver a lower cost of production and a higher profit margin, and have delivered projects and advice that outline what actions farmers should take on-farm to implement these production systems. Countries that have moved from Australia's present position of low profitability to levels of higher profitability, such as South Africa, determined that cost of production needed to be reduced and profit margins increased, and identified how their production system needed to change, and then encouraged farmers to focus on making these changes.

Unfortunately, at this time, Dairy Australia and the other lead farmer organisations are not developing or supporting projects that address on-farm management change that specifically target reductions in cost of production based on evidential economic analysis. There are no planned projects specifically targeting farm production systems that reduce cost of production and increase profit margin other than in relation to increasing pasture harvest.

Although it is true that the ADP workshops did not identify reducing cost of production via on-farm management change as a major concern of farmers, this was also the case in South Africa prior to a change in focus and strategy occurring there. In South Africa this required a small group of high-performing farmers to lead change by securing new knowledge on production systems, primarily from New Zealand, including knowledge on optimising pasture harvest, and then demonstrating these changes on-farm for other farmers to follow. There was an associated extension 'project' that was privately funded, and a farmer conference established that focused exclusively on how to improve profit on farm. South Africa did not have a well-funded RD&E organisation like Dairy Australia to support this change.

South African pasture-based farmers have arguably become the most financially literate group of farmers outside the US, although importantly the improvements in this area began subsequent to the initial changes in production system and improvements in profit. In New Zealand, the development and implementation of DairyBase, plus the emphasis on business planning, has not led to a significant improvement in profit for the industry. There appears to be no known evidence to support the supposition that an increased investment in farm business analysis (including DairyBase) and strategic planning in Australia will result in a change to the level of profitability in the industry. This is not to argue that an investment may not be worthwhile for other reasons, just not with an expectation this will change the level of industry profitability. It is also worth noting that there is no evidence to support a supposition that Australian farmers are less business or financially skilled compared to farmers in other countries. Anecdotally Australian dairy farmers are no less competent than their peers in most other countries with regard business and financial skills.

Given there is no evidence to support the supposition that setting a profit goal for the industry or increasing expenditure on farm business analysis and strategic planning will lead to improvements in farm profitability, there is no basis to presume the present levels of industry profitability and national milk production will move from their negative trends. The presumption in ADP Appendices A and F that both profitability and national milk production will increase in future years would appear to be unsound.

Although the error in ADP Appendix F of selecting Profit (EBIT) per kgMS as the dairy industries target level of profit has already been highlighted in Tables 2, 4 and 5, Table 6 further highlights this issue. Table 6 outlines the range in Profit (EBIT) per kgMS that would be required to attain a 3%, 4%, 5% or 6% ROC for each state and the three main regions in Victoria. Selecting a nominal Profit (EBIT) of \$1.50 per kgMS would not be a consistent profit target for any state or region.

**Table 6. Profit (EBIT) per kgMS for states and regions with variances in Return on Capital**

Profit (EBIT) per kgMS	Tasmania	Victoria	Gippsland	South West Victoria	Northern Victoria	New South Wales	Queensland	South Australia	Western Australia
3% Return on capital	\$0.84	\$0.82	\$0.96	\$0.85	\$0.67	\$1.19	\$1.56	\$1.04	\$1.36
4% Return on capital	\$1.12	\$1.09	\$1.28	\$1.13	\$0.90	\$1.58	\$2.08	\$1.39	\$1.81
<b>5% Return on capital</b>	<b>\$1.40</b>	<b>\$1.36</b>	<b>\$1.60</b>	<b>\$1.41</b>	<b>\$1.12</b>	<b>\$1.98</b>	<b>\$2.59</b>	<b>\$1.74</b>	<b>\$2.26</b>
6% Return on capital	\$1.67	\$1.64	\$1.93	\$1.69	\$1.35	\$2.37	\$3.11	\$2.09	\$2.71

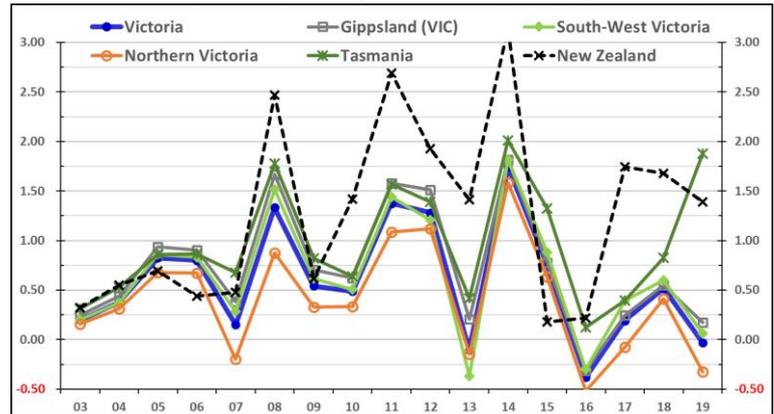
Table 7 outlines the range in Profit (EBIT) per kgMS that would be required to attain a 3%, 4%, 5% or 6% ROC for a range of production systems in Victoria. Again, selecting a nominal Profit (EBIT) of \$1.50 per kgMS would not provide a consistent profit target for any of these systems.

Figure 8 outlines how Profit (EBIT) per kgMS varies year-on-year based on data for Victoria and each of its three main dairying regions, as well as Tasmania and New Zealand. This highlights how significantly this ratio changes year-on-year, and additionally confirms that it could not be utilised in a relevant way even if it were adopted by the dairy industry as the primary ratio to monitor profit.

**Table 7. Profit (EBIT) per kgMS for variations in farm production systems with variances in Return on Capital**

Profit (EBIT) per kgMS	Low Production	Moderate Production	High Production	Feedlot Production
3% Return on capital	\$0.88	\$0.78	\$0.72	\$0.66
4% Return on capital	\$1.17	\$1.04	\$0.96	\$0.88
<b>5% Return on capital</b>	<b>\$1.47</b>	<b>\$1.30</b>	<b>\$1.20</b>	<b>\$1.10</b>
6% Return on capital	\$1.76	\$1.57	\$1.44	\$1.32

**Figure 8. Profit (or EBIT) per kg milk solids (USD/kgMS ECM)**



Source: Red Sky, Dairy Farm Monitor Project, DairyBase

**References**

Australian Dairy Plan, Appendix F (September 2020), ‘Measurement of profitability on Australian dairy farms. Historical trends and future targets.’

Beca, D. (2020), ‘Evaluating the Loss of Profitability and Declining Milk Production in the Australian Dairy Industry’, *Australasian Agribusiness Perspectives* 23, Paper 9, pp. 136-164.

Beca, D. (2020 #2), ‘Key Determinants of Profit for Pasture-based Dairy Farms’, *Australasian Agribusiness Perspectives* 23, Paper 16, pp. 247-274.

Malcolm, B., Makeham, J. and Wright, V. (2005), *The Farming Game*, Cambridge University Press, Melbourne.

**Definitions**

**Energy Corrected Milk (ECM):** determines the amount of energy in the milk based upon milk, fat and protein and adjusted to 4.0 per cent fat and 3.3 per cent protein. ECM formula = milk production x ((0.383 x fat% + 0.242 x protein% + 0.7832) / 3.1138). AUS and US report true protein, whereas NZ, ARG, URU and RSA report total protein, so non-protein nitrogen was assumed to be 5.5 per cent of total protein to correct for this. Converting all milk ratios to energy corrected milk is required due to the otherwise confounding impact of the wide range in fat and protein per cent internationally as a result of differing cow types, diets and production systems. This formula is used by the Dairy International Farm Comparison Network, as outlined in the following:

<https://dairymarkets.org/PubPod/Reference/Library/Energy%20Corrected%20Milk>.