

Dairy Directions — Analysing Farm Systems for the Future

Providing robust analysis of the impact of on-farm changes and innovation on the profitability of dairy farm systems

Alternative futures for a dairy farm under increased water availability

Background

Rainfall events in recent years have replenished water storages in Victoria and it is expected that irrigation water allocations in the Northern Irrigation Region will return to 100% high reliability water share for the next few seasons. The objective of this work was to investigate the options available to dairy farmers who now have more water available compared with the past decade. A farm in northern Victoria that had changed its feeding system to manage dry seasonal conditions was chosen to examine the implications on profit, cash flow and wealth of options under increased water availability.

A whole farm budget was used to examine how the farm would perform over the next 10 years if it continued to operate in the same way compared to if some system changes were made. Risky variables such as milk price, supplementary feed prices, end of season water allocation and temporary water price were represented as probability distributions. The performance of the alternatives were judged using the criteria of:

- ◆ Economic efficiency (nominal internal rate of return). Internal rate of return can be used to compare between investing in one of these system changes and an alternative investment such as the share market.
- ◆ Liquidity (annual net cash flows).
- ◆ Growth (increase in wealth).



Base farm and development options

The farm had adapted its feeding system to include a partial mixed ration (PMR) as a result of several years of low water allocations and dry seasonal conditions. Alternative futures with and without the PMR were investigated. Physical details for the base farm and the alternative futures are given in Table 1. The alternative options involved:

- ◆ Introducing perennial ryegrass into the system.
- ◆ Extensifying by reducing stocking rate and herd size to 500 cows, removing the PMR and using a more traditional feeding system of grazed perennial pasture and grain fed in the bail.
- ◆ Intensifying by increasing herd size to 1000 cows.
- ◆ Intensifying by increasing herd size to 1500 cows and implementing a full cut and carry system where the cows were housed all year.

Table1. Basic physical details for the base farm and options analysed

	Base farm	100% perennial ryegrass	Extensify (500 cows)	Intensify (1000 cows)	Intensify (1500 cows)	Fodder block (1000 cows)
Cow numbers	652	652	500	1000	1500	1000
Stocking rate (cows/ha)	1.8	1.8	1.4	2.8	4.1	2.8
Milk production (L/cow)	6,984	6,984	6,984	8,225	9,000	8,225
Milk fat + protein (kg/cow)	527	527	527	620	675	620
Feed conversion efficiency	1.1	1.1	1.1	1.2	1.3	1.2
Home area (ha)	373	373	373	373	373	373
Water use (ML)	1,898	2,458	1,623	1,898	1,898	2,248
% of diet from purchased feed	28	24	23	42	68	36

- ◆ Incorporating a fodder block by irrigating part of the farm which was too far from the dairy and growing and conserving forage (cereals, maize and lucerne).

Other assumptions specific to the intensification (1000 and 1500 cows) and fodder block options were:

- ◆ When mixed ration comprised a greater proportion of the cow's diet, feed conversion efficiency and milk production per cow increased.
- ◆ To reflect productivity incentives that could be obtained, the probability distribution for milk price was modified so that the mean increased by 5% compared with the price used in the base farm, and standard deviation reduced by 50%.

How did the different options perform?

Each of the alternative systems performed well in terms of nominal internal rate of return and annual net cash flow (Figure 1 and 2). Intensifying the system to 1000 or 1500 cows and incorporating a fodder block returned the highest median nominal internal rate of return and annual net cash flow compared with the base farm and alternate options. The performance of these intensified systems relied on obtaining an increased milk price and increased feed conversion efficiency to achieve the improved return.

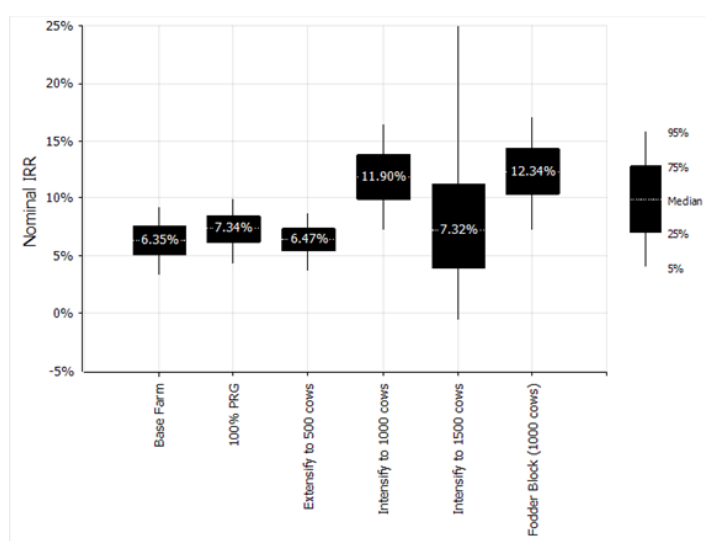


Figure 1. Nominal Internal Rate of Return (IRR) for the base farm and alternate options

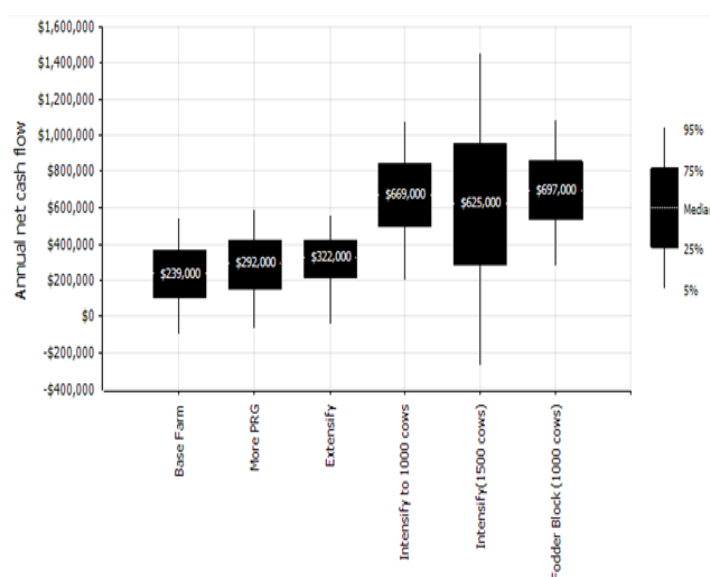


Figure 2. Annual net cash flow for the base farm and alternate options

While intensifying the system to 1000 or 1500 cows and incorporating a fodder block were the most profitable, they were the most variable. Intensifying to 1500 cows by implementing a total mixed ration system, had the most variable internal rate of return and annual net cash flow. The main cause of this was exposure to the supplementary feed market, as purchased feed made up 68% of the cows' diet. While intensifying the system was considerably more risky, this type of system is also more likely to be able to capitalise when seasonal conditions are good and milk prices high (as indicated by the long whiskers on the box and whisker plot). However, this system was unlikely to be an attractive option for a risk averse operator who would forgo some profit for decreased risk.

A key goal of farmers is to increase the net wealth in their farming business. By comparing the nominal owners' capital at the end of the 10 years, the option that best achieves this can be assessed. Intensifying the system to 1000 cows, with or without a fodder block, returned the owners the highest median wealth out of the options analysed (Figure 3).

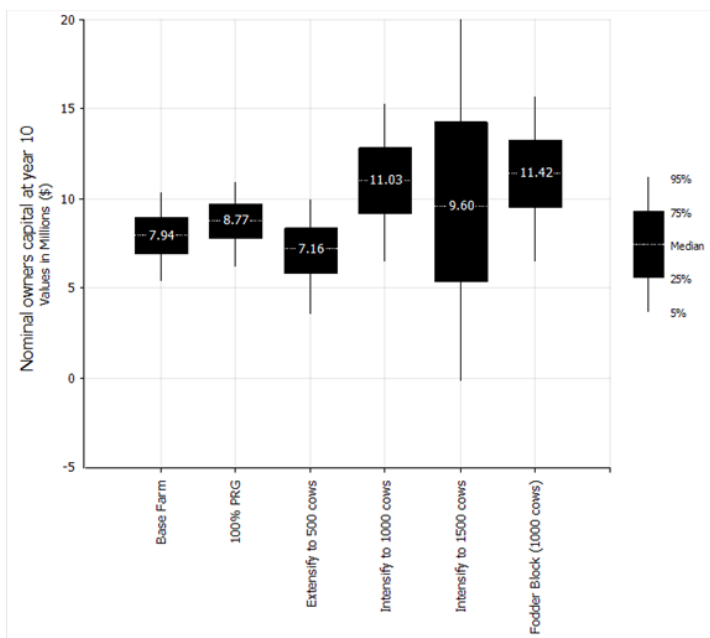


Figure 3. Nominal owners end capital for the base farm and alternate options



Introducing perennials back into the system also increased owner's wealth compared to the base farm. While variability in returns between this option and the base farm was similar, the exposure of the business which had 100% perennial pastures to potentially high priced and variable supplementary feed markets was reduced, as more feed was grown on the home area. At the same time, increased water purchases, required for irrigation, increased the exposure to the temporary water market.



Extensifying the dairy system to 500 cows was more profitable than the base farm, but slightly decreased owners' capital at the end of year 10. This system is representative of a traditional grass and grain in the dairy system, but without the costs and complexity of feeding a PMR.

Key points

There are many different systems that can improve the profitability of a dairy system. This analysis showed that there is no one best farm under increased water availability for irrigated dairy businesses.

- ◆ A risk averse operator is more likely to opt for options such as extensifying the system, or 100% perennial ryegrass which had higher returns than base farm and for similar risk. By reducing the proportion of purchased supplements, the system could reduce its exposure to external feed markets.
- ◆ Intensifying the system was the most profitable but also the most risky option. The performance of the intensified system relied on an increase in feed conversion efficiency and receiving an increased milk price.

Ultimately there are a range of factors including risk preference that farmers will take into account when deciding what is the best system for them.



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Acknowledgements

We thank the farm family who participated in this study and acknowledge the input and insights from the project steering committee.



Funded by
Dairy Australia
and your
dairy service
levy



Australian Government
Department of Agriculture, Fisheries and Forestry



Published by the Victorian Government Department of Environment and Primary Industries, April 2014

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ISSN: 2201-4764

ISBN: 978-1-74326-892-6 (online)

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