

Sustainable dairy farm systems for profit

An executive summary of the Final report and an acknowledgement of the farmers, advisers, facilitators, experts and colleagues who contributed to this project

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EXECUTIVE SUMMARY

Introduction

In 1999 industry consultation meetings to prioritise research requirements with sub-regional teams of the Subtropical Dairy Program, leading farmers, milk processors, agribusiness representatives and extension officers identified the 'forage system' as the priority issue. There was strong interest in what were the limits of pasture-based systems, both dryland and irrigated and whether these limits could be significantly extended by incorporating crops in place of pastures. With the increase in intensity of production systems through increased use of irrigation and crops, a number of unknowns associated with four key areas in the farming system were identified. The areas identified were, **Natural resource efficiency, Economic viability, Environment** and the **Social system**.

A steering committee for a proposed project was formed to assist in developing the project and an external review of the proposal initiated by Dairy Australia. The project included 20-cow farmlets, which represented the main options available to farmers, to be established within the controlled environment of Mutdapilly Research Station. As well as farmlet research, an action-learning extension program was developed. Social studies were to be undertaken by a PhD student with a focus on adjustment of family dairy farms and the support provided for farm adjustment by Dairy Australia (DA) and the Queensland Department of Primary Industries and Fisheries (DPI&F) dairy group. The project aimed to provide a validated production model for decision support within each system, showing the profitability and sustainability or otherwise of intensification. It would also answer questions relevant to the four key areas in the farming system.

Summary of findings

Five farming systems designed to represent a cross-section of systems found in the subtropics were established as 20-cow farmlets at Mutdapilly Research Station. The project team identified key drivers of profit for farm businesses, published the results in an information series, the *M5 Info series*, which is available at www.dairyinfo.biz and held a series of extension activities to communicate the findings to industry.

The modelled farming systems generally achieved milk production targets. Two of the five farmlets at Mutdapilly met their production targets and two were within 6% of the target. Mutdapilly was a less than ideal environment for the seasonally calved, raingrown pasture with winter cropping farming system, which was 13% below its production target over the 4 years. There was higher than predicted costs for purchased feed, due to drought conditions across Australia in 2002-2003 and lower forage production due to reduced rainfall over the study period, 670 versus 800 mm/annum. This resulted in those systems heavily reliant on raingrown forage and purchased supplements achieving unsatisfactory economic results; assessed in terms of return on assets, operating profit and cash flow.

Supplementary irrigation had a very positive impact on forage productivity. The benefits measured were amplified by the rainfall shortfall during the investigative period. While tropical grasses were found to have high water use efficiency (kg DM/L water) compared to temperate species, this efficiency was offset by their lower nutritive value. This needs to be considered in forage selection. Farming systems need to fully exploit climatic patterns (summer dominant rainfall, continued high radiation levels in winter) and grow forage all year round (target 30 t DM/ha). This study showed that a double-crop of short rotation annual ryegrass or barley followed by summer forage crop including forage sorghum or maize was the most water efficient and recorded total forage yields of 29 t DM/ha. Water use efficiency (WUE) is more than just improving the efficiency of irrigation infrastructure. It is also about making best use of rainfall, selecting species best suited to farming systems, good grazing management and application of fertiliser.

With respect to environmental management, intensifying the farming system required greater investment in specialist plant and equipment to reduce the risk of point source pollution. Whole farm nutrient balances showed that with higher levels of supplementary feed inputs, fertiliser recommendations needed to be reviewed and often reduced. Current fertiliser recommendations were established during periods of more reliable rainfall, greater access to irrigation water and lower inputs of supplementary feed. On farms where cropping is routinely practiced, a benefit of intensification is an increased cropping frequency which has positive outcomes in maintaining higher levels of soil cover, maintaining or increasing levels of soil organic matter and reducing the risk of nutrient and water loss below the root zone.

At the time the project was being planned and developed, industry modelling indicated one way to generate the returns to stay in business was to increase milk production, herd size and stocking rate. The quicker herds moved towards 300 cows, the better the returns and sustainability appeared to be. It was found that rapid intensification of farming systems imposed a great deal of strain in terms of cash flow and level of indebtedness on farming businesses. Rapid expansion is sensitive to the cost of inputs, supply management, herd factors and acquisition of new management skills. These problems were exacerbated with intensification coinciding with a period of low rainfall as occurred during this study.

The results from the companion farms generally indicate that farmers consider a range of agrarian values before they adjust their farming system. That is they consider the needs of their family, their value orientations towards their lifestyle and their farmland, their attitude towards non-family labour, their perceptions of their own limitations and willingness to sacrifice aspects of both time and money to reach their goals. Farmers considered the new milk price

received to be low and unpredictable. This engendered a general lack of confidence in the industry and while farmers were willing to invest in assets that were not dairy specific, such as land, or were easily realisable, cattle, there was a resistance to invest in dairy-specific infrastructure such as milking parlours, feed pads, forage conservation and effluent management systems. Without these dairy-specific resources, farm intensification increased the demands on family labour and made environmental management harder due to the impact of increased cow numbers. Labour management was also an issue for farmers inexperienced in employing labour. These farmers continued to avoid employing staff, even during or after a period of farm expansion. Farming families considered the view of the farm as a business that is highly focused on profit maximisation as being too narrow. Issues such as labour management, the intentions of the next generation, time demands, living with debt and the desirability of the farm and its environs as a place to live were all strong influences on the reaction of farm families to the process of rapid business growth.

This study not only identified issues for farm families, but also for the M5 team, especially in regards to the application of farming system research methodology (FSR). Project teams using FSR methodology are sensitive to factors associated with 'invested interests' and 'available time'. The FSR methodology is based on collaboration of a multi-disciplinary team; it is essentially a participatory philosophy and methodology. The results of this study suggest that to generate commitment to a project the team members need to participate in the project development from the beginning.

The project developed two decision aids, Dairy Predict and Farm Gate Nutrient Balances - Dairy and revised a third, Dairy Herd Model v3. The M5 project has led to a greater understanding of the production, business, environmental and the farm family components of a dairy farming system that will be invaluable in further research projects.

Conclusions. Intensifying current farming systems through increased stocking rate, greater forage production and utilisation and increased use of purchased feeds does achieve higher milk output and economies of scale. However, appropriate phasing and sizing of the development process is necessary to match labour and budgetary constraints. Unpredictable climatic conditions increase the risk of business failure during periods of rapid intensification. A reduction in both effective rainfall and its reliability, due to climate change, poses a major threat to dairying systems not well buffered against low rainfall. Uncertainty of the business future due to a more open and competitive milk pricing environment and/or continued poor seasonal conditions leads to an unwillingness of farmers to invest in dairy-specific plant and equipment which is required if intensification is going to be managed successfully from a lifestyle and environmental perspective.

Recommendations for future research

Future multi-disciplinary RD&E projects should not underestimate the importance of the project team being involved in project development. If novel or new methodologies are proposed, every effort should be made for all members of the project team to understand the new concepts. In this project, the new concepts were farmlets as research tools vs. farmlets as action-learning platforms and using companion farms in FSR methodology.

The level of interest by farmers in the physical farmlets as an action-learning platform was not as high as expected. The inflexible design and lack of novel management practices in Farmlets M1, M2, M3 and M4, due to research requirements, contributed to the lack of interest. The exception was the M5 feedlot farmlet, which generated a lot of interest. For farmlets to provide an action-learning platform, they need to be dynamic, flexible and have a degree of novelty about them. Not all farmers could relate the M5 farmlets to their own farm or farming system. As information was not individualised the M5 project did not drive change as much as it could have. Farmers that lacked the necessary skills to apply the findings from M5 to improve profit on their farms require follow-up at farm level, not solely one-off extension activities or access to information on the internet.

The successful production and business analysis desktop modelling undertaken in this project, which was validated and accepted by the broader dairy community, suggests modelling which includes business analysis, should be a component of future research projects. Future models would benefit if they could limit some and optimise other resource inputs.

Predictions that climate change will increase annual rainfall variability, reduce effective rainfall through higher temperature regimes and place more pressure on water resources has particular implications for the northern dairy industry. Lower rainfall and reduced access to good quality irrigation water in this study led to the use of marginal quality water for irrigation. There is a need to investigate whether the same pressures and responses are occurring in the wider dairying community and develop strategies to ensure that long-term sustainability of feedbases is not compromised.

The project has confirmed that the challenge facing northern Australian dairy farmers is to produce substantially more homegrown forage and milk from this forage by using existing infrastructure and natural resources more efficiently. Taking Stock identified the top five issues limiting milk production in Queensland as cash flow and profitability, fodder production, fertiliser use and planning, grain and concentrates purchases, pasture production and utilisation. These observations and the project team's experiences with farmlets for research, farmlets as action-learning platforms, the involvement and role of farmers in RD&E projects plus the messages and findings generated in the M5 project, have contributed greatly to the development of a new project, Forage Plus.

The final report was prepared by

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Jeff Andrews was the project leader until December 2004 and oversaw the establishment of the farmlets at Mutdapilly, the initiation of the social stream of investigation and the extension program development. Ross Walker was project leader for the remainder of the project.

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