

Project Title: Sustainable Productive Support Land for South Island Dairying
Project No: 05/126
Date: 31 July 2008

1. Project Objectives

An increasing number of NZ dairy farmers, especially in the South Island, have chosen to use their land as a milking platform, and therefore rely on feed and grazing from other farm sectors, or from their own support blocks. Support land for dairying therefore includes run-offs, peripheral or adjoining land to the milking platform, and non-dairying land farmed by others that is used to provide grazing or feed inputs.

Problems identified with support land were as follows:

- (a) Current use of dairy support land was considered to be well below optimal, with low economic returns.
- (b) Productivity was severely affected by yield and utilisation aspects, and
- (c) The current use of dairy support land poses significant risk to the environment and also lowers public and market perceptions of the industry – domestic and international.

The overall project OBJECTIVE was to lift the productivity of dairy support land, improve the sustainability of this land use, and enhance its associated contribution to the dairy farm business, through:

- Lifting the productivity of dairy support land.
- Improving land use decisions.
- Minimising and mitigating environmental impacts.
- Improving the skills and capabilities of dairy support unit farmers.
- Improving the business performance of the integrated Whole Farm enterprise – milking platform and support land.

2. Approach

The project was conducted in four integrated parts, these included Research and Demonstration, Survey, Case Study farms and Technology Transfer (extension).

a) Research and Demonstration

Two projects were completed under the heading of research and demonstration. Both projects were completed on an 18 ha support block located next to the Lincoln University Dairy Farm. The first involved cropping sequences and cultural practices for dairy support land; the second analyzed the use of nitrification inhibitors on dairy support land. At the end of the first year, the cropping portion of the project was incorporated into a larger trial which involved Dairy Insight funding. Results from the two projects are included in section #3A below.

b) Survey

Two projects were completed by Masters Students at Lincoln University.

The first project involved six case study support blocks in Canterbury and focused on reasons for farmers owning support blocks and the economic returns being generated.

The second study involved meeting with Consultants in Canterbury and Southland to gain their views on support blocks (part 1) as well as to obtain potential case study farmers. These farmers were identified as operating at “best practice levels” from a sustainability stand point, and were the subjects for an in depth interview (part 2). Results are summarized in section #3B.

c) Case Studies

Two support farms, one in Canterbury and one in Southland were studied to illicit strategies for the operation of dairy support blocks in two very different climates.

The first study was on a Southland farm that featured very "heavy" clay type soils. A comparative trial was conducted that looked at wintering cows on traditional brassica crops versus an "indoor" system. This project formed the basis of the Professional Masters of Abe de Wolde.

The second study analysed a Canterbury farming system (G & R Roadley) that had developed sheltered stand off areas for use during times of winter weather challenges.

Results from both studies are included in section #3C

d) Technology Transfer/Extension

Key technology transfer tools included field days, discussion groups, event presentations, articles and the SIDDC website. The technology transfer plan included the following:

1. The SIDDC partners' unified network of extension specialists including 30 Dexcel consulting officers and business developers, 70 Ravensdown field officers, LU lecturing staff, Crop & Food staff, and the SIDE network of farmers.
2. Relevant project results were presented at focus days organised by SIDDC, as well as events such as the SIDE conferences. SIDDC events include LUDF Focus Days [4 per year with an average of 240 farmers per day], region specific field days and road shows, presentations at the South Island Dairy Event [over 550 people per event] and SIDE Road shows, as well as the large numbers of visitors to the LU dairy farm [over 4,000 in the past three years].
3. Education and technology transfer also occurred through the teaching of students at Lincoln University [e.g. over 400 Degree, Diploma and postgraduate students per year studying related subjects].
4. In addition, project results were disseminated through the SIDDC partners' newsletters for farmers (circulation over 60,000) and in industry journals (e.g. Dairy Exporter), on the SIDDC website, and on SIDDC partner websites.

3. Main findings from this project

a) Research and Demonstration

Dairy support land project- Research component on cropping sequences

Forage crops were established on the Lincoln University Dairy Farm support block in the autumn of 2006. The aims of the project were to:

- demonstrate two forage cropping sequences in a two-year pasture renewal system,
- maximise yield and quality by using best management practices on all crops,
- produce at least 22t DM/ha in both systems, and
- compare the effects of grazing in very wet and drier conditions during winter on soil quality and the performance of subsequent crops and pasture.

Area #1 was in oats and area #2 in triticale. In area #1, 3.87 t DM/ha was harvested. The levels of utilization varied based on weather conditions. Under wet conditions utilisation was 44% and under dry conditions utilisation was 51%.

In area #2, 2.72 t DM/ha. of triticale was harvested. It was grazed in dry weather and achieved utilisation of 48%. Re-growth over winter was poor, thus the triticale was replaced in spring with Barley to be harvested as whole crop silage in summer.

The project was consolidated into an expanded programme with Crop & Food Research, which was funded by Dairy Insight.

Mitigation of nitrate leaching from dairy support land using *eco-n* nitrification inhibitor technology.

Intensive grazing on dairy support land creates a risk of nitrate leaching losses occurring from urine that is deposited by large numbers of animals being 'break-fed' on soil over winter. The objective of this part of the dairy support land project was to evaluate the effect of using *eco-n* nitrification inhibitor technology to reduce nitrate leaching losses from animal urine patches deposited during winter.

Soil monolith lysimeters were collected in February 2006 from the Lincoln University Dairy Farm East Block and installed in the Lincoln University field lysimeter facility. The lysimeters (500 mm diameter x 700 mm deep) contained a Templeton fine sandy loam. Because the main source of nitrate leaching losses is from animal urine patches, the key treatments (each replicated four times) were: 1. Urine (30 June) and 2. Urine (30 June) + *eco-n* nitrification inhibitor.

The results showed that the application of the nitrification inhibitor reduced the total amount of potentially leachable nitrate present within the urine patch soil profile from 250 kg N/ha to 160 kg N/ha (35% reduction) and increased the amount of ammonium retained in the soil from 35 kg N/ha to 47 kg N/ha. The amount of nitrate leached below the top 20 cm of soil of animal urine patches was reduced from 160 to 105 kg N/ha (35% reduction).

b) Survey

Dairy Runoff Management and Profitability

A dissertation for a M. Applied Science was completed by B Richards which examined six dairy support blocks in Canterbury. The main driver for the purchase of a support block for participants was to gain greater control of their business. A secondary driver was the opportunity to increase profitability, which included operating returns and capital gains.

Farmers also reported to enjoy the diversity of operations and decision making challenges that support block ownership provided. The annual operating returns (EBIT) were between 3.4% to 6.0% for the 2004/05 year. Capital gains ranged from 15.5% to 23.9% compounded per annum, from the year of purchase through to 2005 (net of development expenditure).

Best Practice Management of Dairy Support Land.

The aim of this project was to investigate best practice management of dairy support land (DSL). The project conducted by M Bennett as part of his M. Com. Ag. thesis, investigated areas where farmers at the forefront of the industry were doing well, as well as areas in which they are struggling. The goal was to understand how successful DSL farms work, describe what they do well and develop awareness of areas which may create difficulty in the long term (for these farmers as well as the industry as a whole). The two parts of the study included:

Part 1. Focus groups with consultants

Two focus groups were held with primary industry consultants, one in Canterbury and one in Southland. The objective of the focus groups was to assist the participants to create a collective concept of good management of dairy support land (DSL), with a focus on financial, farm systems and environmental sustainability. Once this was achieved, consultants were asked to provide examples of farmers who demonstrated aspects of good DSL management as defined in the focus group and specify why they chose them.

The common opinions of Consultants in Southland and Canterbury.

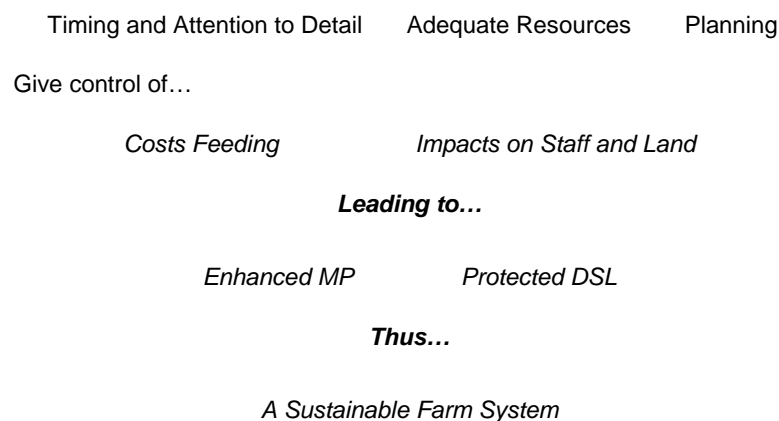
- Purchase of DSL needs to be justified by a goal or objective that cannot be achieved in another way at less cost.
- Successful DSL blocks must be large enough to have dedicated management and have addressed issues with the strain that running a DSL block puts on labor, machinery, decision making capacity and other resources.
- Smaller DSL blocks can be successful if they fit in well with existing systems (decision making capacity, labour, machinery) and are close (within walking distance for cows). They should produce synergies and reduce costs.
- Management must have the technical knowledge to run the system well. To achieve this they need to know the cost of achieving control and need to be aware of the current state of the farm system.

- When wintering on crops, farmers should attempt to feed a ration with a 40:60 fibre:brassica ratio, however a 30:70 ratio is more common. The management of cow diet at transition could often be better.
- Most farmers are aware of environmental issues and are motivated to make substantial investments in environmental protection, especially if there is a scientific basis to the practice. Examples include; riparian strips, re-doing 'tile' drains, use of eco-n, better management of N and a proactive attitude to dealing with effluent.
- A consistent typology emerged:
 1. Independent economic unit over (approximately) 200 ha.
 2. Adjacent to and integrated with the milking platform.
 3. Dairy support needs to be viewed as a separate business.

Part 2. A Study in the Sustainability of Dairy Support Land (DSL)

The goals of DSL management are to enhance the milking platform while avoiding unsustainable outcomes on the DSL unit. Three policies need to be in place: Adequate resources, good planning, and timing and attention to detail with key tasks.

The Relationship between Practice and Sustainability



In other words adequate resources, planning and attention to detail should lead to a reliable supply of feed to the dairy farm without sacrificing the economic, environmental or social sustainability of the DSL.

Conclusions

Dairy farming systems are exposed to a number of external risks and DSL is one way of managing them. Whatever means is used to manage external factors, it is clear that time and money needs to be invested for the dairy farm to be sustainable.

The participants believed that they were successful in using DSL to control how cows are fed over winter and that environmental risks can be contained. There may be some social impacts that need to be managed.

To successfully manage production risk while avoiding undesirable impacts on staff, management or the physical environment, specific policies need to be in place. The DSL must be well-resourced, there must be good planning and timing and attention to detail is essential to succeed with sensitive tasks like crop management.

There are a wide variety of DSL situations, but the fundamentals of practice remain constant. The same concept of appropriate practice applies across all types of DSL, regardless of location or local conditions.

3. Case Study Farms

SOUTHLAND

The Southland case study farm is owned and operated by Abe and Anita de Wolde. The results from this project formed the Professional Masters dissertation of Mr. de Wolde at Lincoln University. The case study farm compared outside wintering vs. indoor systems in the winter of 2006. The following observations were made:

- that cows wintered inside had lower feed requirements.
- less land was required to provide feed for an indoor wintering system due to better utilisation.
- labour requirements were lower in indoor systems.
- effluent is captured in an indoor system allowing for lower nutrient losses and giving the ability to utilise this fertiliser in the spring.
- the indoor systems can be utilised to extend lactation
- although gross wintering costs are higher for the inside system, the extra milk thru extended lactation and the value of the saved fertiliser more than compensate.

CANTERBURY

The Canterbury case study farm described the wintering system of Greg and Rachel Roadley. The Roadleys have

- developed gravel strips (150m X 12m) next to shelter belts on their farm.
- The cows are fed silage under a hot wire on the strip each morning for 1 to 2 hours before the cows are put on Kale.
- Utilisation of silage has improved to 90% and because the cows have eaten silage before being put on the crop, then don't rush through the crop. This improves utilisation of the crop and helps prevent health problems.
- Because the cows are only on the strips for a few hours each day effluent systems are not needed and maintenance is minimal.
- Although expensive to set up, the strips are estimated to have a payback period over five years from improved silage utilisation.
- The Roadleys also found the sheltered strips beneficial during the snows of 2006, keeping the cows warmer and off paddocks.

4) Technology Transfer/Extension

2006

- SIDDC focus day at the LUDF featured research on East block on winter crops and utilisation. Thirty five farmers attended this afternoon addition to the Focus Day programme. Topics discussed were poor utilization, winter management, and research on cropping options
- Media releases prepared included:
 - Article on Brassicas published in Otago/Southland Farmer
 - Press release on Sustainable Support Land Project

2007

1. Results from the projects were published:
 - Winter edition of Dexcelink featured Roadley case study
 - 2007 SIDE Conference included poster of survey research of B Richards.
 - SIDE Proceedings featured a summary of the project to date
 - Lincoln University Dairy Farm and Southland Focus Farm Field days. Results included in the SIDDC website

- Abe and Anita de Wolde won the Lincoln University Foundation Farmer of the Year, based on partly on the case study research. Their project was published widely in the agricultural media

2008

1. South Island Dairy Event

- Presentation by M Bennett on “Sustainability of Support Land” to two groups of 100 participants per session.
- Handout on results from “Sustainability of Support Land” made available to all Conference participants and printed in Conference Proceedings.
- Poster on research from B Richards on reasons that farmers own support land and the economic returns was displayed at the Conference with handouts available.
- A poster outlining the total Support Land Programme was on display.
- Presentation by D Dalley and D Wilson on “Getting the best from your support land—tips for allocating winter forage” presented to three groups of 90 participants per session.
- Presentation included in the Proceedings.
- Participation by Southland farmer A de Wolde in a debate on wintering methods. Results from the Southland Survey farm formed the basis of the debate. Attendance of 600

2. DairyNZ Discussion Groups have ongoing inputs from the results of the project.

3. Southland Demonstration Farm

- May Focus day featured presentation by D Dalley entitled, “What to Watch Out for this Winter”, based on results from project research. Attendance of 100.

4. Publications

- DairyNewz, Winter 2008, “Going Undercover in Southland”, p 4 and 5

5. Websites

SIDDC website is continually updated with new information from project

6. Lincoln University Dairy Production classes. The results from parts 1, 2 and 3 have been included in the lectures for ANSC 072/272 in the autumn of 2008 (33 students).

7. Future publications:

It is envisaged that a number of publications will be prepared in the future which will include data from this project, they include:

- New Zealand Institute of Primary Industry Management---article from M Bennett research on issues of sustainability with support blocks.
- Journal of Sociology----article on the use of Yin’s method for case study research in agriculture.
- Farm Facts for DairyNZ website on Why to own Support Blocks, Suggestions for Managing Support Blocks, etc.
- Agricultural Economic Research Unit booklet on the research of Michael Bennett into issues of sustainability with support blocks.

5. Project Outcome

The project has heightened awareness of all issues relating to sustainable dairy support land amongst South Island dairy farmers. Findings listed below have been presented to the farming and scientific community, resulting in debate and further on-farm experimentation:

1) Research and Demonstration

- utilisation of winter forages is much poorer than previously perceived
- background information on cultural practices was obtained. These findings have followed through to increased yields in the Dairy Insight project
- nitrification inhibitors (eco-n) have been successful in reducing nitrogen leaching and greenhouse gas emissions from support blocks, which has encouraged more farmers to incorporate inhibitors into their farming programme

2) Survey

- Farmers own support blocks primarily to gain control of wintering, young stock rearing and feed production
- although cash returns (EBIT) from support blocks was lower than the cost of capital employed, most of the support blocks had been owned for five years and showed a capital gain of 23.9% per annum.
- Critical management issues for the operation of support blocks as identified by consultant groups included: need to justify ownership by an objective that cannot be reached by other means, must be large enough for independent management or located close to present system, farmers need to gain technical knowledge to operate and most farmers are aware of environmental issues and are prepared to invest to protect their environment.
- The case study analysis in Canterbury and Southland confirmed that DSL is seen by farmers as a way to manage external risk. Successful DSL operations involved the following key components:
 - adequate resources
 - good planning
 - the operator is aware of the importance of timing and attention to detail

(Project managed by SIDDC. Funded by MAF [SFF] and SIDE).