

A co-development approach to investigating wintering options on dairy farms in southern New Zealand

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Abstract: The Southern Wintering Systems Initiative is a collaboration between farmers, researchers and extension experts aimed at optimising animal performance and profitability, and reducing the environmental impact of dairy farming wintering practices in southern New Zealand. Prior to the commencement of the initiative, the importance of wintering practices was highlighted in a farmer survey. This survey allowed the project team to tailor the project to the needs of farmers in the region. Monitoring and analysis of technical results were combined with decision support tool development, enabling farmers to evaluate and optimise the practices on their farms during the project. A key component of the initiative involved co-learning with the monitor farmers. Important features of the methodological approach were: (1) extensive farmer surveys; (2) active participation of monitor farmers; (3) interaction between farmers, researchers, policy makers, developers and consultants; (4) co-opting other farmers to critique the results and help with the extension of the project findings; Communities of Practice. Lessons on the important features of the Initiative are presented and discussed. This project has provided insights about the ways in which the knowledge of farmers, researchers, developers and consultants can be integrated, to advance understanding and improvement, in an area of critical importance to dairying in southern regions in New Zealand. Integral to the success of the initiative was embedding the aims, results and tools in the DairyNZ regional extension programme allowing the results to reach a large number of farmers and other stakeholders.

Keywords: dairy, wintering, farm system, research, extension, co-development

Introduction to the Southern Wintering Systems Initiative

The South Island, New Zealand has seen significant growth in dairy farming over the last 15-20 years. At present the South Island dairy industry has 38% of New Zealand's dairy cows, producing 42% of the nation's milk (DairyNZ, 2013). Due to both the availability and affordability of the land for dairy farm conversions, especially in the Southland and Otago regions, there is still potential for further expansion of the industry.

In New Zealand's pasture-based seasonal milk production systems, winter management of dry dairy cows ("wintering") is critical to the success of the farm business. It impacts milk production, reproductive performance, the welfare of the cows, and the growth performance of young stock (Dalley 2010). In the southern South Island of New Zealand winter weather and soil conditions result in an absence of plant growth (Dalley & Geddes, 2012) and limit the extent to which

pastures can be grazed. Hence, the majority of farmers winter their dry cows away from the pastures grazed during the lactation season, mainly on forage crops. This comes at a cost: wintering stock is one of the biggest financial costs to dairying in this region, making up on average 20-25% of farm working expenses (Cottier 2000; Dalley 2010), and wintering on forage crops is under increasing scrutiny from the New Zealand public due to potential environmental and animal welfare concerns (Dalley 2011). Consequently, off-paddock management systems such as wintering pad and housed systems are becoming more common. Wintering pads are specifically built areas designed for holding cows for extended periods and providing a suitable surface to lie down on and an area for feeding. The particular system a farmer selects will be determined by individual circumstances, and all systems have an equal opportunity for success or failure (Dalley, 2010). Regardless of the choice of wintering system, it must maintain or improve the profitability of the farm business at the same time as achieving environmental, animal or social goals (Riemersma et al., 2007).

By demonstrating good practice in all aspects of wintering, i.e. feed supply, animal welfare, environmental impact, staff management, finances and across a range of wintering systems, the aim of the project was to increase adoption of practices that minimise environmental and social impacts and maximise returns to the dairy business. The overall goal was to improve understanding of wintering systems and co-develop options for improvement. This paper describes the co-development approach taken, and an initial evaluation of the benefits and pitfalls of the approach.

Approach

Prior to the implementation of the project, six literature reviews were conducted to summarise existing New Zealand knowledge in relation to all aspects of the current wintering systems i.e. environmental impact, financial performance, feed supply and quality, animal welfare, infrastructure requirements and labour use, and to identify information gaps. To document the wintering systems in use, the number of farmers using each system and the farmers' perceptions of them, a farmer network analysis and wintering survey was conducted. These activities indicated that the project required a whole-farm systems approach to assess positive and negative consequences of wintering system choice, and to develop options to improve performance of the range of systems.

A collaboration was started involving people with a wide range of expertise; researchers and developers in farm systems, animal, environmental and social researchers, policy makers, communication experts, extension specialists, consultants and a core group of six monitor farmers (Webby and Sheath, 1991), operating different wintering systems. The farm systems researchers and developers were all employees of DairyNZ (the industry good organization, representing New Zealand's dairy farmers and funded through a levy on milksolids with the purpose to secure and enhance the profitability, sustainability and competitiveness of New Zealand dairy farming). All the collaborators were passionate about the wintering issues and the desire to help farmers in the region to succeed. The six wintering systems investigated were: grazing of crop, grazing of pasture, uncovered wintering pads, loose housed barn with concrete slatted floor, loose housed deep litter barn and a free-stall barn.

In a two day workshop with the project team a Logical Framework was developed for what became the Southern Wintering Systems (SWS) Initiative. The approach utilised Bennett's hierarchy (Bennett 1979) and best practice for extension according to Coutts and Roberts (2003). The final activities combined a participatory research approach with the individual participant groups providing different skills and expertise:

- Farmers provided access to their farms and expertise in commercial farming practice, forming a regional monitor farm network

- Researchers contributed knowledge of a range of disciplines and expertise in research methods to monitor the farm systems and interpret the results
- Developers worked with the researchers and farmers to ensure existing and new information was developed into decision support tools (feed allocation calculator; wintering risk assessment) for farm management and key messages for farmers (fact sheets)
- Consultants, extension specialists and communication experts ensured communication and extension of the SWS initiative and its results to the wider farming community
- Policy makers provided knowledge of community expectations and interpreted results to develop proposals for practical and effective regulation.

Integral to the success was the collaboration between all parties right from the commencement of the initiative. Factors such as understanding the issues, selecting the right farmers (see below) and exposing subject area specialists to the complexities of farm system decision making and implementation all contributed to the final outcomes.

The SWS initiative was launched in 2010 and involved three phases:

1. Start-up (2010)
2. Monitoring (2010-2013); and
3. Co-development (2013)

During the start-up phase local farmers were consulted regarding the key selection criteria for the selection of monitor farmers. The key criteria used for selection were:

1. Farms covered a range of wintering systems and were geographically separated
2. The farmers were:
 - a. Honest, open and well respected by their peers
 - b. Good communicators, prepared to host groups
 - c. Good at record keeping
 - d. Demonstrating good practice in the implementation of their system
 - e. Operating cost effective, achievable systems
 - f. Financially accountable and willing to disclose costs
 - g. Willing to commit to the three years of the project

Two members of the project team visited 14 potential monitor farmers to discuss their farm system, assess their suitability and provide an outline of the project. Following the visits the preferred farmers were invited to join the project team and monitoring commenced. Six farms were identified that represented a range of geographical locations, soil types and wintering systems. An initial monitoring protocol was developed, however progress was evaluated by the project team on a monthly basis, resulting in the adoption of a reflexive monitoring approach (Van Mierlo et al. 2010). This approach ensured that the project could be adjusted to suit the operating environment at the time of implementation. New activities were incorporated as required ensuring that the initiative could react to current events e.g. abnormal seasonal conditions, new policy development and incorporate opportunities as they arose. Monitoring occurred from July 2010 to August 2013.

The decision was made at the outset of the project to appoint a technician to oversee the monitoring on the farms, assist the farmers with measurements where required and collate the data. A dedicated technician resulted in consistency of data collection between farms and also provided a local contact for the farmers if they had queries. The collection of farm data was streamlined to avoid several people requesting the same data from the farmers at different times. All monitoring that was not part of the normal farm practice e.g. quarterly body condition score assessments, monthly forage crop yields, supplementary feed quality and effluent volume recording was com-

pleted by the technician and the data provided to the farmer for their information. The farmers were responsible for herd health recording, milk production and reproduction records and staff related monitoring and for providing the information required to calculate the annual nutrient budget and the winter feed inventories.

At the same time as the monitor farmers were being selected, a Reference Group was formed including other farmers, rural professionals (consultants, bankers, veterinaries etc supporting dairy farmers) and representatives from national government. This group participated in the analysis and interpretation of the results and in the development of decision support tools, and extension and communication materials.

During the period of the Initiative interest in wintering systems increased due to further regulations emerging to limit nutrient loss to the environment. Grazed wintering systems were facing particular scrutiny due to the high risk of nutrient loss when plant growth is minimal and soil water content high. This led to further discussion about the future of winter cropping practices and the requirement for more data to generate robust benchmarks, for environmental impact, animal performance and economics, across the systems being investigated. These discussions resulted in the implementation of Phase 3 of the project “Communities of Practice” to involve more farms for each wintering system.

Evaluation of the approach

Farmer network analysis and wintering survey

The Farmer Network Project utilises social network analysis and diagramming to identify key network farmers and rural professionals. This information aims to contribute to an increased ‘farmer reach’ and ‘on-farm impact’ of DairyNZ through farmer network understanding and collaboration (Tarbotton et al. 2012). A survey incorporating questions pertaining to the farm context and management priorities and about the information and people drawn on by farmers to improve decision making was developed and piloted in the Southland region.

Following the pilot, DairyNZ randomly selected approximately 15 percent of South Otago/Southland dairy farmers from the Dairy Industry Levy Database to be invited to take part in the Farmer Network Project. Letters were posted to the selected farmers providing details about the project and informing the farmer that a representative from DairyNZ may be in contact with them via telephone to make an appointment to take part in an on-farm, face-to-face interview. Wherever possible this interview involved a farming couple. The letter ensured that farmers were informed about the purpose of the study, and about who was conducting it. Interviews were conducted with 315 farmers and identified 62 key network farmers and 26 key network rural professionals in the region. These individuals were identified as being key people in their district and there was real value in DairyNZ nurturing strong and lasting relationships with them, to identify opportunities to partner with these farmers and rural professionals in the future.

An additional wintering system survey was included to provide important insights into the priorities, concerns and opinions of farmers in the South Otago/Southland Region. To gain an understanding of the current winter management practices, farmers were asked to describe: where they wintered their stock; what wintering systems they used; and what their herds were mainly fed over winter. The results of the survey were crucial to identify people to link to the SWS Initiative. It also directed the project team to develop benchmarks and tools to assist farmers to assess the success of their wintering system. From the survey the top criteria farmers used for assessment were economics, control, environmental fit and cow welfare.

A further benefit from the survey at the commencement of the Initiative was the collection of a range of wintering statistics which formed the baseline against which changes in wintering practice during the course of the project could be monitored.

Multi-disciplinary project team

The approach that was adopted was new to many members of the project team who had traditionally worked on discipline focused research projects with clearly defined methods and a high degree of control. While the outcomes of the Initiative were clearly defined at the outset, the methodology and frequency of measurement for the on-farm monitoring were more flexible to allow the project to react to seasonal conditions and for monitoring to be adapted as more was learnt about the individual wintering systems. A two-day workshop at the outset laid the foundation for the first two years of the project, including a detailed project plan and list of deliverables. This meeting was an opportunity for the individual project members to establish their role within the project team and for all team members to share their passion for the wintering issues that were being addressed. On reflection, these two days spent on detailed planning early in the project and developing a cohesive team contributed to the success of the project. Maintenance of this team culture was achieved through monthly project team meetings via video conference and bi-annual face to face meetings in the region involving the farmers and the reference team. The participatory and collaborative approach fostered the development of a close knit project team. Key to the success of this approach was including people on the project team that were passionate about the wintering issues farmers in the region were facing and who also wanted to contribute to solutions. Taking time to select the right farmers for the project and then ensuring they were getting value from their involvement (information to support them with decision making, access to experts to discuss issues) helped foster the collaborative process. A summary of the results were presented to all the farmers on an annual basis and this was combined with a social event where team members could discuss their experiences and learn from each other.

Individual members of the team acquired value from the project in different ways. For the regional extension team involvement in the project made them feel more connected to the rest of DairyNZ and provided them with local information to support DairyNZ messages at discussion groups and field days. For scientists more familiar with controlled research, the project provided an opportunity for interaction between research and the real world. In addition, the range of perspectives people from different disciplines brought to discussions was very valuable for debating approaches, clarifying issues, interpreting results and identifying trade-offs between different areas of the farm system when new systems were adopted. Involvement in the project provided an opportunity for key research findings from other projects to be integrated into the SWS messages and communicated to farmers in the region.

Within DairyNZ the co-development approach involving farmers and linking policy, research development and extension was ahead of its time and resulted in the realisation that existing organizational structures e.g. reporting lines, group structures, accounting requirements etc made implementation of the project as planned more difficult. A project such as this requires a dedicated project manager to monitor progress, maintain relationships and identify opportunities for communication. Managing the departure of key staff from the Initiative was an area that could have been improved. Loss of key staff often resulted in a loss of momentum in that particular area until the new person was fully integrated into the team. Having key staff located in the region where the research is being conducted would also help with maintaining relationships and ensuring timeliness in the messages that are being developed. On a positive note the project was successful in developing capability at all levels of the project team but particularly in the technical staff that were interacting with the farmers on a regular basis. These staff members grew in

confidence, developed a strong rapport with the farmers and gained a more holistic view of wintering and its impact on farm system performance.

Establishing a monitor farm network

All participant farmers identified that the most valuable aspect of involvement in the project for them was having access to the monitoring information. The extent to which this information was used to change practices on the individual farms was associated with how long they had been using the particular wintering system. Some had already ‘ironed out a lot of the hiccups’ before joining the project; but all farmers had examples of where they had used the information to improve their wintering outcomes (Dalley et al. 2013). The farmers also enjoyed the collegial aspects of inclusion in the project with its opportunities to compare practices and management strategies. A common comment was that they obtained a lot of value from direct access to technical experts. They had found it easy having visitors on their properties and had enjoyed those interactions. Preparation for these visits with the regional extension team or other project team members was also highly appreciated.

The project team learned that the approach and results of the SWS Initiative improved understanding of the complexity of wintering systems, giving context to the disciplinary work done in other research projects. It assisted the development and extension of decision support tools and rules for good management practice and provided input into new policy. DairyNZ is now adopting similar approaches in new projects, with teams including a variety of research disciplines, development, extension, farmers and/or other stakeholders.

Some opportunities for improvement were also identified, including: developing a clear plan of what needs to be recorded on-farm before starting; not requesting monitoring that is too detailed and not feasible for a farmer to achieve and ensuring results are returned to the farmers in a timely manner.

Integration with the regional extension plan

Engagement with the DairyNZ regional extension team (local consultants and extension specialists) at the outset of the project provided a strong platform for messages coming out of the monitoring and for the testing and promotion of the decision support tools that were developed from the Initiative. When surveyed using a semi-structured interview two years into the project the regional team reported a good understanding of the Initiative (average 5.5 on a scale of 1-7, 1 being nil, 4 moderate and 7 a lot) and rated the information coming out of the Initiative as having good value (rating 5.8). They had all used the decision support tools and messages in their discussion groups and at other events. The two messages with the highest impact were achieving body condition score targets and the importance of feed allocation. While the regional extension team could identify benefits from the Initiative they viewed the approach taken as only moderately successful (4.5) and rated farmer awareness of the Initiative as low (average 2.7). Reasons for the poor awareness included farmers not linking messages conveyed at groups to the decision support tools and key messages developed during the SWS Initiative, because of generic DairyNZ branding, the number of farmers actively involved was too low and insufficient effort had been made to communicate with a wider group of farmers, especially those not engaged with DairyNZ.

The response regarding not communicating with a wider group of farmers was somewhat puzzling since the project team had documented presenting directly to 1500 people at field days and conferences with positive feedback and an e-newsletter had been sent to more than 800 recipients on a monthly basis. One of the challenges encountered by channeling the delivery through the regional extension team was a lack of attribution to the SWS Initiative. While this was disap-

pointing for attribution to the project team it did mean that there were more people locally with a high knowledge of the Initiative and its outcomes. The regional extension team reported that they enjoyed the practical nature of the project and the fact that photos were used to disseminate information e.g. for crop yields and utilisation, quality of plant components and system setup.

Communities of practice

The Communities of Practice (Wenger 1998) were developed to address some of the concerns raised around the validity of the monitor farm data given only one farm was represented in each system type, and also to increase the number of farmers involved in the project. No monitoring was conducted on these farms but the results from the monitor farms were reviewed by these groups to ensure they represented the system in question. Information was exchanged during three facilitated meetings for each group. Key characteristics of each Community of Practice were (1) the members were all operating the same wintering system as the monitor farm in that particular Community of Practice, (2) the environment supported learning to co-develop best-practice rules for the various systems and (3) the outcomes were translated into 'tips and tricks' and decision support tools relevant to that particular wintering system. The monitor farmers were very supportive of this approach as not only did it address their concerns around data validity but it also gave them specific feedback on their individual system. These forums also provided an opportunity for the project team to identify gaps in the information and issues that were common to a particular wintering system. This information was used to develop the project plan for the next phase of the project.

An important factor with the Communities of Practice was to allow sufficient time for the farmers to discuss and debate aspects relating to their system. The meetings were facilitated by the regional extension team. Meeting planning required flexibility and it was important that the time was not monopolized by the project team. This was an opportunity for the project team to capture the learning's and experiences from farmers who had adopted new wintering systems. This information was used in the development of resources (Tips and Tricks, checklists etc) for use by other farmers. Involvement of the regional extension team provided opportunities for them to hear, first-hand, the experiences from farmers operating the different systems and provided an opportunity for the farmers to interact with the regional extension team.

Conclusions

This project has provided some key lessons about the ways in which research, resource development, extension, policy and practice can be integrated to advance understanding in an area of critical importance to dairying in southern regions in New Zealand. The approach used was central to the success of this integration and the achievement of the project outcomes. Important features of this were: (1) an extensive farmer survey at the beginning of the project to provide an understanding of current practices and criteria farmers used to assess the success of their systems; this proved important to achieve high interest in the project of lessons learned; (2) careful selection of monitor farmers; that they were respected by their peers, willing to learn from the monitoring programme (e.g. prepared to change practice), and engaged actively in communication; (3) the monitor data provided insights into the business of the monitor farmers giving opportunity for interaction between farmers, researchers, consultants and policy makers, and improved understanding of the issues the farmers were dealing with; (4) the Communities of Practice facilitated involvement of more farmers and increased interaction with the regional extension team.

The first years of the SWS Initiative have successfully engaged a large and diverse team of people including the monitor farmers, researchers, developers, the regional extension team, policy makers and other rural professionals and farmers in the region. It was successful in generating

data useful for extension and communication, and in developing and implementing new decision support tools to allow farmers in the region to improve their wintering practices.

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