SmartSAMM extension programme seeks transformation to achieve mastitis and milk quality targets

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Abstract. SmartSAMM is the New Zealand dairy industry's mastitis extension program, building on the SAMM Plan and Dairy Australia's Countdown program. SmartSAMM aims to achieve, by 2016, a national average bulk milk somatic cell count of 150,000 cells/mL, meeting the original SAMM Plan target set two decades ago. In 2012, SmartSAMM refreshed its 2009 plan with more rigour towards the 2016 targets, including use of ADOPT software. It appeared change on farm would need to be transformational rather than incremental. Farmer case studies with advisor input report transformational changes occurring. The challenge is to combine Technology Transfer, Problem Solving and Facilitation of SmartSAMM principles and interventions, through four complementary channels: 1) Marketing and communications, 2) The veterinary channel, 3) Advisor networks, and 4) Milk processors. The plan incorporates in the design Key Result Areas, and Success Outcomes Markers, as a basis for evaluation against targets and expected outcomes.

Keywords: Adopt, technology transfer, problem solving, facilitation

Introduction

With over 95% of its milk exported around the world, the New Zealand dairy industry is the leading export earner for New Zealand, contributing over 2.8% of GDP and providing 26% of NZ's total exports (Schilling et al. 2010; DCANZ 2013). To remain competitive internationally, New Zealand farmers need to produce high quality milk at low cost.

Since 1993, expansion of the New Zealand dairy industry has seen a decline in milk quality (Blackwell and Lacy-Hulbert 2012). In 2008 the industry decided to respond to restore the international competitiveness of the New Zealand milk supply. Planning commenced for a new national approach for mastitis extension, which became known later as SmartSAMM (Smart Approach to Minimising Mastitis) (Blackwell and Lacy-Hulbert 2012).

Industry targets were developed in 2009, which specified that by 2016 bulk milk somatic cell counts would have reduced by 10,000 cells/mL/annum and all milk from all herds would be below 400,000 cells/mL. To deliver on these targets, investment in SmartSAMM commenced in 2009, overseen by the National Mastitis Advisory Committee.

It was recognised early on that industry targets would not be achieved with a 'business as usual' approach. The earlier SAMM Plan (Seasonal Approach to Managing Mastitis) employed a 'one size fits all' technical approach and this had not achieved sustainable improvements in milk quality. SmartSAMM would need to help farmers undergo a mind-shift, or a paradigm change towards milk quality, and the continuous improvement process was seen as crucial in achieving this.

Continuous improvement is associated with Dr. W.E. Deming (Anon 2013) whose philosophy has been summarised as follows (Haven 1998):

> Dr. W. Edwards Deming taught that by adopting appropriate principles of management, organizations can increase quality and simultaneously reduce costs (by reducing waste, rework, staff attrition and litigation while increasing customer loyalty). The key is to practice continual improvement and think of manufacturing as a system, not as bits and pieces.

To this end, SmartSAMM has developed innovative tools and resources that help farmers and their advisors use continuous improvement to develop customised solutions. Called the SmartSAMM 4-step process (DairyNZ 2013), it provides a central framework for the SmartSAMM programme that involves, but is not restricted to:

1. Assess performance using:

- Mastitis Focus Report
- Mastitis Investigation Kit.

2. Identify scope for improvement using:

- SmartSAMM Gap Calculator.

3. Review options using:

- Healthy Udder
- SmartSAMM Guidelines for farmers

- SmartSAMM Technotes for advisors.

4. Implement a plan using:

- Healthy Udder Service.

SmartSAMM plan to 2016

In 2012 the SmartSAMM team were asked by DairyNZ to refresh the 2009 adoption plan with the aim of adding more rigour to the way in which targets were to be achieved and sustained. The new plan was to cover the years 2012 to 2016. This call for an updated adoption plan coincided with the release of ADOPT software (Kuehne et al. 2011), a tool to predict adoption and diffusion outcomes. ADOPT guides the user through 22 questions to produce estimates of (1) years for Time to Peak Adoption and (2) a percentage for the Peak Adoption Level. ADOPT was used to evaluate the SmartSAMM programme. By varying the parameters it was possible to get a sense that SmartSAMM would reach a maximum adoption level of 33% after 5 years, and 66% after 10 years. This is about half the required rate to meet industry targets by 2016.

DairyNZ had identified that mastitis and milk quality ranks low on dairy farmer priorities in today's large and complex dairy farming businesses (I. Tarbotton, DairyNZ, pers. comm.). Further, mastitis control involves mature technologies and well known practices on-farm. Often the implementation of these practices is not done to a high enough standard to achieve the targets the industry requires. So SmartSAMM is not about simple 'adoption of new technologies'. Rather it is about the effectiveness with which people on farm, guided by their individual skills and motivations, implement their mastitis control plans.

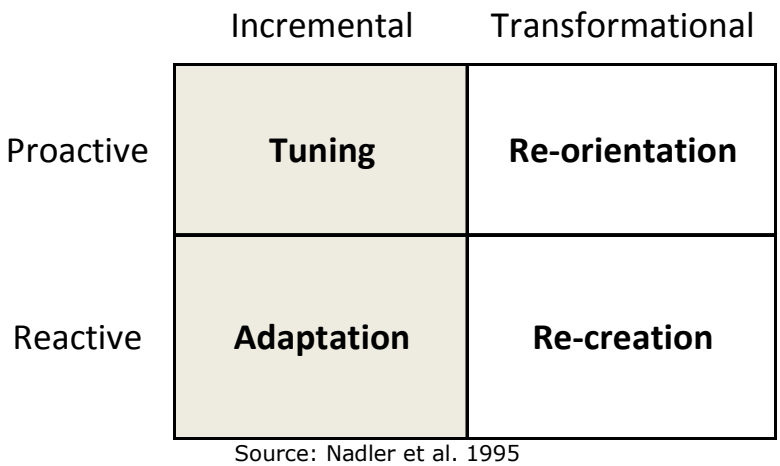
At the same time, there were examples emerging of individual farmers working with specialist mastitis advisers showing marked performance gains within two seasons and profound attitudinal change occurring (Shelgren and Anderson 2012). This was largely achieved through customising and fine-tuning systems and procedures for their unique herd situation.

The most common type of change is said to be incremental, where the aim is to improve efficiency, to do things better. However, incremental changes can also achieve large gains if they accumulate over time.

Transformational change

SmartSAMM was drawn towards a model of change (Figure 1) that described transformational as well as incremental change. It was thought that this was the change model SmartSAMM needed to achieve its challenging targets. We decided that 'Tuning' systems might be more relevant to farmers whose performance was already at industry target levels, and/or a minority of farmers in easy-to-reach market segments. For farmers whose herds were performing poorly in terms of mastitis, a 'Re-orientation' of thinking will be required to achieve transformational change in systems and practices. In practical terms this would mean doing things quite differently and/or doing different things.

Figure 1. Types of organisational change



Source: Nadler et al. 1995

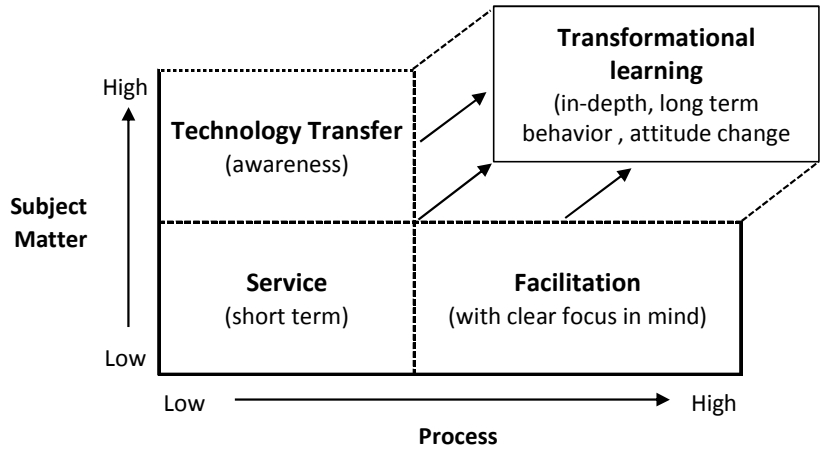
A common example of doing things differently might be to improve the application and coverage achieved by teat spraying, a control measure that has been used by farmers for many years. An example of doing different things could be the use of internal teat sealants to prevent clinical mastitis in first calving heifers, a strategy that has only been available in the past 5 years. Both

practices complement an overall strategy of incremental improvement of practices and behaviours.

Ultimately, SmartSAMM requires that the majority of farmers achieve, and sustain, improvements in mastitis control systems through engaging with a process of transformational learning. A transformational change occurs when significant and important changes in policy, behaviour and attitude occur. Underpinned by a change in mind-set, or shift in paradigm, this involves farmers 'seeing' their mastitis problem in a different light, and identifying their own personal benefits or opportunities for improving udder health. These changes are represented by KASA (knowledge, attitudes, skills and aspirations) in Bennett's hierarchy (Bennett 1975).

Transformational extension programmes (Figure 2) are said to go beyond service (problem solving), technology transfer and facilitation to concentrated, in-depth programmes that help individuals develop and grow. When these elements combine, transformational learning occurs with corresponding behaviour change (Rockwell et al. 2003).

Figure 2. Model of extension programming



Source: Rockwell et al. 2003

Healthy Udder Service

The Healthy Udder Service is a new service initiated by SmartSAMM through the veterinary channel in 2013. It is an example of a programme targeting such transformational learning. The service combines use of technologies, service provision (problem solving) and facilitation towards achieving sustained improvements on farm. The aim of the Healthy Udder Service is to align these elements into a commercially viable service, delivered by vets to dairy farm clients.

Currently, specialist mastitis veterinarians make recommendations about technologies and practices, based on observation, investigation and analysis. However implementation of these recommendations often fails to deliver the desired results (Joe et al. 2010) and a significant disconnect has been identified between vets and farmers as to the best ways to improve mastitis (McLeod 2008). Design of the Healthy Udder Service aims to bridge this disconnection, providing a framework of engagement that helps vets and their farm clients bridge the gap between recommendations and results. At its core, this involves identifying or refining existing farm policies, clarifying procedures, and providing skills training around prioritised mastitis management areas.

Engagement and efficacy of interventions

While adoption is a goal of any extension programme, the ultimate goals sought by programme investors are results beyond adoption. These desired outcomes include social, economic and environmental benefits, experienced by some or all stakeholders. These benefits are a function of both the rate of adoption and the efficacy of the innovation as it applies on farm, and before adoption can occur, engagement with the programme is required. Assessment of the potential benefit could be summarised as follows:

20% Engagement level x 50% Efficacy of that engagement = 10% Potential benefit

In our SmartSAMM Plan to 2016 (Blackwell 2012), the required level of engagement, and efficacy of that engagement, was estimated across four intervention areas or channels. This analysis suggested SmartSAMM could potentially influence 22% of all herds annually, and over three years to 2016, some 67% of farmers could be influenced. The efficacy of this engagement

was assumed to be half that achieved in reported case study herds. Thus some 2,500 engaging herds could potentially reduce the national average bulk somatic cell count by >10,000 cells/mL per season.

Monitoring and evaluation

Monitoring and evaluation is viewed as an intervention in its own right, complementary to the four principle channels that were identified for the SmartSAMM programme (Blackwell 2012). These four interventions or channels are:

- marketing and communication
- veterinary channel
- advisor networks
- milk processors.

An important role of monitoring and evaluation will be to identify interventions that are performing well and indicate where best to direct limited resources to support those channels that are struggling to meet expectations.

Key Result Areas (KRAs)

Working with Jeff Coutts, an evaluation expert from Australia, led us to identify Key Result Areas (KRAs) for each channel. These are intermediate target statements that can be used to indicate, and report on, progress towards engagement targets (Coutts 2011). These statements will help the programme assess the number of herds engaging through the four SmartSAMM interventions, both separately and together, when aggregated.

Table 1. An example of the Key Result Areas associated with a specific channel

As a result of Marketing and Communications targeting farmer segments we expect:	**Data sources**
4,000 herds to engage annually with SmartSAMM via comms & website	Web statistics Annual Survey
Of the above, 400 herds annually make effective use of SmartSAMM tools & resources, using a DIY approach	Annual Survey

Outcomes thinking

In 2005, Kay Rockwell, then Professor and Extension Specialist at University of Nebraska Lincoln, visited Hamilton, New Zealand and led a two day workshop titled 'Outcomes Thinking'. The aim of this workshop was 'Enhancing programme development, and performance in dairy research, development, and extension/education'. In this workshop, she introduced us to Success Outcomes Markers (SOMs) which are identifiable actions or behaviours that indicate successful accomplishment of the learning outcome. These SOMs are new or improved practices, actions and behaviours that lead to successful programme outcomes with respect to industry targets (Rockwell 2003). Evidence of this progress can be described and indicated at three levels (Table 2) by creating different outcome challenges for targeted groups, such as farmers, farm staff and advisors:

Table 2. An example of the Success Outcomes Markers associated with a specific channel

As a result of Marketing and Communications targeting farmer segments, we would:	
Reaction level	Expect to see farmers go to SmartSAMM website
Testing level	Like to see farmers access Guidelines and Factsheets
Adoption level	Love to see farmers raise new issues and questions with their advisors

This could include:

1. 'Expect to see' SOMs (reactions) These state the initial reaction to the programme subject matter, before practices start to change, which are consistent with the knowledge, attitudes, skills and aspirations promoted by the programme, e.g. 'Staff follow agreed procedures'.

2. 'Like to see' SOMs (testing) These are practices and behaviours that start to happen as a result of changes in knowledge, attitudes, skills or aspirations, and are sustained, e.g. 'Staff observe cows and see changes to udder health'.

3. 'Love to see' SOMs (adoption) These are longer term, higher order behaviours that are adopted as farmers and staff apply new skills in their lives and in the workplace and are sustained over time. This is where transformational learning and sustained change is occurring, e.g. 'Staff respond with the big picture in mind'.

SOMs have been developed for the four principal interventions and are described for farmers, their farm staff and advisors. These SOM statements become a basis for evaluation questions, designed to track progress from reactions to adoption, which lead towards the desired outcomes of the programme.

Summary

SmartSAMM has created a plan towards achieving industry targets for mastitis and milk quality that are challenging yet achievable. To achieve these industry targets, transformational learning will be required around the design and implementation of mostly well-known and proven practices and behaviours on-farm. A monitoring and evaluation plan using KRAs and SOMs has been designed to inform the programme about progress, and help identify where project resources should be directed, to achieve industry targets by 2016.

Acknowledgements

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