Insight to the dairy industry's capacity to manage mastitis

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Summary

How and why do farmers make the decisions that affect mastitis control and milk quality on their farms? Who is involved? What can the dairy industry learn from their efforts to help build farm management capacity?

These questions formed the basis of research conducted by Countdown Downunder and the results add to the Australian dairy industry's understanding of how to manage increasingly diverse and complex production environments. With at least $3 million each year invested by industry in change management projects, it is important to learn how and why farmers and advisers are changing as a result of the project interventions and identify factors that inhibit or support change.

The insights presented here provides practical examples of how to build the industry capacity to support change on farm that are pertinent to both Countdown and other change management projects. They were drawn from reflections on the actions, experiences and issues faced by 11 farmers in the 12-18 months after a Countdown Downunder Farmer Short Course.

Since its launch in 2001, more than 1,800 dairy farmers across Australia have participated in a course and developed practical Mastitis Action Plans tailored to their situation and risk management approach. A survey of herds established that Bulk Milk Cell Counts improved in many herds in the year after the course. But could this be attributed to the course and was it sustainable?

Analysis of the case studies showed that a good understanding of the basic principles underlying udder health gave farmers the confidence to change practice and enabled them to work through issues from first principles. All case study farmers made changes to products and routine practices as specified on their Mastitis Action Plans and were often rewarded by immediate improvements in udder health and milk quality.

However progress was not always sustained. To achieve ongoing improvement, the farm team must be actively engaged in the action planning process to ensure:

- Mastitis Action Plans fit the (technical and non-technical) needs of the farm business.
- The day-to-day effort spent on udder health and milk quality by all members of the farm team works toward jointly agreed goals.
- Farm managers regularly review the herd situation and act on emerging issues and opportunities.

Knowing the common impediments to sustaining improvement in udder health opens up significant opportunities for the industry. Most evident is the potential for the advisory sector (including veterinarians, milking machine technicians, dairy company staff and consultants) to make important contributions to herd management and performance. In fact, the research team believes two core changes will help build the udder health capacity on Australian dairy farms:

- Changing the culture of service provision to strategic herd-level management (not just responding to mastitis problems or treating sick cows).
- Reinforcing the action planning process in the design of new services and training packages.

Changing the culture of service provision presents by far the greater challenge for the industry and is likely to take many advisers out of their comfort zone. For advisers to market a service that supports udder health management, they need to convince clients of its value, be in active partnership with herd managers, and have the skills (including facilitation and planning) to support implementation and review of the Mastistis Action Plans.

Apart from their key role in providing these insights, the 11 case studies are rich descriptions of what is involved in managing managing milk quality through time (including issues faced in the 'one-in-100 year' drought in 2003). The case studies are summarised at the end of this report for the reader's own analysis.

The *Insights to the dairy industry's capacity to manage mastitis* is a significant investment by the industry using action research to evaluate a national project. Such learning and reflecting on 'doing' can be used to improve programs and develop theories of change for the benefit of the rural industries. The methodology in this work is considered an original contribution to approaches for understanding processes of change and ways to improve interventions.

What prompted this research

Australian dairy farmers belong to a highly competitive industry of increasing herd size, volatile production costs, rapidly advancing technologies and a relatively low farmgate milk price (Dairy Australia 2005). They face many challenges as they endeavour to sustain and grow their farm business and lifestyle. Dairy Australia (whose aim is to improve the competitiveness, profitability and sustainability of the Australian dairy industry) is supporting projects that build farm management capacity so that dairy farmers can respond effectively to changing circumstances – an attribute that is vital for the continued growth and prosperity of the industry. This requires a good understanding of how farmers, service providers and industry organisations can contribute to farm management capacity. Countdown Downunder (a project of Dairy Australia) has responded to this need by gaining a better understanding of how to support farmers in managing mastitis and milk quality.

Countdown Downunder was created in 1998 to help farmers meet new quality standards, improve farm profitability and protect export markets. The industry goals are for all milk supply to have cell counts below 400,000 cells per millilitre (mL) and at least 90% of supply to be below 250,000 cells/mL, thereby increasing the net return to farms by an estimated $33 million each year (Brightling 2005). Countdown is working toward these goals by improving mastitis control on Australia's 9,730 dairy farms.

Before the project started, the industry had the knowledge to improve performance on farms but this tended to be retained within different disciplines (veterinarians, milking machine technicians, factory field staff and other dairy advisers) and there was limited capacity for professionals to work together to solve complex, multi-factorial udder health problems.

Early project efforts involved establishing clear, consistent recommendations on mastitis control (published as the *Countdown Downunder Farm Guidelines for Mastitis Control*), building regional networks of advisers who have a special interest in solving mastitis and related milk quality problems, and designing the Countdown Downunder Farmer Short Course to promote adoption of best practice on farms.

More than 1,800 farmers from the eight dairying regions across Australia have completed the Farmer Short Course since it was first piloted in 2001. Participants surveyed in November 2004, up to four years after they had attended a course, remained very positive about the experience. Most had fully (40%) or partially (51%) achieved the goals of the Mastitis Action Plans they had developed during the course, they were more confident in managing clinical mastitis and the Bulk Milk Cell Count (BMCC) was lower in many herds (Brightling 2005). But how and why did the change happen? Could it be attributed to the course and was it sustainable?

This research was conducted to gain a 'rich picture' of how Australian dairy farmers make management decisions relating to udder health and milk quality on their farms. Insight into factors that support or inhibit this change enables the industry to continue to build farm management capacity.

Background to the Farmer Short Course

ABOUT THE COURSE

- 89 courses held across Australia between 2001 and 2005
- Small group sessions over 6 days
- 21 hours of adult learning
- 1,804 farmers participated
- Each developed a Mastitis Action Plan for their herd
- 91% participants fully or partially achieved their goals
- BMCC lower in the 12 months following the course
- 65% participants more confident in managing clinical cases by the end of the course

The Countdown Downunder Farmer Short Course helped farmers use their own knowledge and experience to develop practical Mastitis Action Plans tailored to their situation and risk management approach. To stimulate change on farms, the course repeatedly:

- created a challenge for farmers to 'close the gap' between their current management practices and best practice as recommended by the Farm Guidelines;
- encouraged the use of triggers for the early detection of udder health problems;
- promoted a team approach between milk staff, managers and advisers on-farm; and
- helped farmers become more comfortable about using the services of dairy advisers.

'Closing the gap' proved to be a powerful and efficient technique enabling farmers to 'tick off' on elements they already did well and 'fast track' to the things they needed to discuss in detail to improve the situation on their farms. People became more confident in using the resources available to them and worked to improve herd performance within their sphere of technical and managerial responsibilities on the farm (Brightling 2005).

Post-course surveys showed participants were more confident in dealing with clinical cases and BMCC were lower in the 12 months after a course. The survey herds also had lower BMCC than the national herd during the drought of 2003 (Table 1).

Given that the Farmer Short Course was one of the most direct and intensive project intervention that farmers could experience to improve management (apart from one-to-one interaction with trained advisers), the evaluation team used a selection of these farmers to gain a better understanding of what was underpinning change on farm and how the project might improve on this.

Table 1: Countdown Downunder Farmer Short Course survey herds had lower Bulk Milk Cell Counts in the drought of 2003 (Brightling 2005)

In 2003 milk supply with BMCC below...	Farmer Short Course herds (150)	All herds (10,167)
400,000 cells/mL	97.7%	93.8%
250,000 cells/mL	83.5%	71.3%

At the course, farmers developed practical Mastitis Action Plans tailored to their risk management approach and their herd's situation

Research method

The research team (the authors of this report) believed the capacity to improve farm management was likely to vary with a farmer's role and responsibilities on farm, their beliefs about the need to change, the udder health issues of the farm and the availability of advisory support and services in the area. Therefore the Countdown Downunder Regional Project Managers and Farmer Short Course trainers were asked to nominate farmers across a range of these characteristics who had recently completed a Farmer Short Course.

Interviews were conducted within one week of the selected farmers finishing the course (face-to-face) and up to four more times (by phone) over the next 18 months to enable in-depth discussions about changes as they occurred in the context of the issues and events experienced on the farm.

The interviews were semi-structured (Table 2) and explored:

- how the case study farmers were progressing with their Mastitis Action Plans;
- what factors were affecting progress - especially the sourcing and use of information, the support offered by advisers, involvement of the farm team, use of triggers and planning, and the role of Countdown Downunder; and
- why farmers acted on udder health issues – how they made decisions and learnt from their experiences.

Table 2: Lines of questioning used in the semi-structured interviews

First interview (face-to-face a week after the course)
Can you tell me about the way you managed mastitis and milk quality on your farm before attending the course? What was the main reason for attending the course?
What was of greatest interest to you? What had the biggest impact? What did you learn?
Since the course have you talked to anyone about it? What did you talk about?
Could you go through the Mastitis Action Plan you developed through the course with me? (Probe: Why did you choose to change that? What have you put into practice already? What has been the result? How did others on and off the farm react to this? What are you putting off? Why?)
Thinking ahead, what are your next steps in terms of the plan? (Probe: Why have you chosen that step? How is it different to what you used to do? How are you going to go about it and when? Who are you going to involve? What results are you expecting? Is there someone or something that could support you to achieve this?)
Is there anything else you are going to do differently (with regards to udder health) in the next month?
Follow-up interviews (by phone usually coinciding with important management events)
What has happened since the last interview on the farm? What has happened in regards to milk quality and mastitis management?
What are your key thoughts about what is happening? What options are open to you in managing the (specific issue)?
How have you progressed with the tasks on the Mastitis Action Plan? Have you used others (on or off-farm) in your milk quality and mastitis issues? How so?
What are you going to do differently in the next month?
Final interview (by phone)
(As the follow-up interviews plus) How much have you progressed in managing mastitis and milk quality since the course? (Probe for degree of satisfaction with progress, breakthroughs, sustainability of the changes made, use of support systems, and thoughts on their capability to manage milk quality and mastitis going forward)

Table 3: Characteristics of the 11 case study farmers and farms

	Characteristic	Case study coverage (number of cases shown in brackets)
The people		
	Role on farm	Owner (5), partner (1), manager (3), sharefarmer (1), family employee (1)
	Age	Less than 30 years (1), 30-40 years (7), more than 40 years (3)
	Gender	Male (9), female (2)
	Time in dairying	Less than 3 years (4), 3-10 years (2), more than 10 years (5)
	Attendance at industry events	Often (1), regularly (6), rarely (4)
	Feel the need to change	Yes (9), no (2)
	Level of reflecting on self performance	High (8), medium (1), low (2)
The farms		
	Time of calving	Spring (6), year round (4), autumn/winter (1)
	Region	Northern Victoria (4), Western Victoria (2), Gippsland (2), New South Wales (2), South Australia (1)
	Herd size	Less than 200 cows (3), 200-400 cows (5), more than 400 cows (3)
	Number of workers	Range from 2-4 people (plus casual workers in some herds)
	Milk recording	Yes (7), spot (1), no (3)
	Average BMCC for 12 months before course	Less than 200 cells/mL (5), 200-400 cells/mL (5), more than 400 cells/mL (1)
	Clinical case rate (self-reported)	Range from 5-15 per 100 cows (herd level measure not reported for five herds)
	Major mastitis and milk quality issue on farm	Clinical cases at calving (5), stay in premium (3), high BMCC (1), Strep ag (1), reduce risk of infection (1)
	Availability of advisory services in the area	Readily available (7), available on request (4)

Many of the case study farmers had to make decisions relating to drought management during this period (April 2002 to September 2003) and the subsequent risks to mastitis control and milk quality were able to be examined.

The insights were generated by the research team from 11 case study farmers with herds in southeastern Australia. The farm operators and operations covered in the case studies proved sufficiently varied to enable concepts underlying changes in management capacity to be explored (Table 3). The case studies were assigned a title that embodied their situation and a pseudonym to protect their privacy (see box).

All interviews were audio-taped and transcribed. The research team worked through the transcripts for each farm to identify key points where events, actions and issues inhibited or supported management change on farm.

THE 11 CASE STUDIES	
#1	Steve – The development dilemma
#2	Alf – Motivating the farm team
#3	Jason – Negotiating for change
#4	Grace – Dealing with complexity
#5	Alan – Working without cell count incentives
#6	Donald – When to commit to the basics
#7	Tom – What happens after early success?
#8	Ryan – Keeping pace with change in a large herd
#9	Jeanine – Planning for survival
#10	Peter – The risks of acting independently
#11	Scott – A responsive farm team
	A summary of each case study is given at the end of the report

Insight into how and why change happened on farm

Similarities and differences between the cases were developed into themes around practice change relating to udder health and milk quality. This cross-case analysis of the farms provided insight into the motivation for improving mastitis and milk quality management, what practices changed after the course and the essential ingredients needed to sustain change.

The motivation for change

The desire to achieve premium milk payment and/or reduce clinical cases motivated most farmers to take action

It is widely accepted throughout the industry that the milk payment systems used by Australian dairy processing companies to specify the desired cell count and raw milk quality provide a major incentive for farmers to improve mastitis control. Surveys conducted on the last day of Farmer Short Courses held between March 2002 and May 2004 established it was the desire to 'stay in premium' or reduce clinical cases that had motivated most farmers to attend the course. Achieving the premium payment can significantly boost the cash farmers receive for milk.

> Ryan (#8) managed a large herd of 850 cows worked by four full-time employees. The farm team worked well together and consistently achieved low cell counts but wanted to avoid 'blow outs' in cell count that usually occurred in September at calving. The size of the operation meant that achieving premium payments for most of the year would make a large difference to the money they received and was "*worth ... $50,000-$60,000 for us*".

Some case study farmers used the cell count threshold for premium payment as an accepted standard despite having the capacity to achieve better milk quality. Most farms would improve farm profitability above and beyond the gains made from better milk payments by reducing the level of (clinical and subclinical) mastitis in the herd (Brightling 2005). In this sense, the milk pricing signals were a fall-back position rather than a motivator for improving milk quality and farm profitability.

> Jason (#3) milked a 470 cow herd with the owner. The BMCC of the herd was just under premium (250,000 cells/mL) and the goal of Jason's Mastitis Action Plan was to get and keep the count below 200,000 cells/mL. Jason wasn't convinced that the owner was as committed to this threshold saying he "*can't see any point spending time and money to get it lower, we don't get any reward for being any lower than that*".

On one case study farm, the pressure to lower the cell count became a burden because it was beyond the current management capacity of their farm system.

The pressure to lower cell counts became a burden when it was beyond the management capacity of the farm

> Donald (#6) owned a year-round calving herd that he milked with his wife and son. He had always had trouble with BMCC which was regularly above 400,000 cells/mL. The dairy company had encouraged Donald to go to the Farmer Short Course. Donald's goal was to reduce the cell count to below 200,000 cells/mL (and achieve premium milk payment) within six months of the course. Six months later, Donald was not happy with how things had gone saying "*I can't get the cell count down*". Although he had continued some elements of his plan, doing some tasks in part had not been sufficient to effect real change.

Progress in lowering BMCC or reducing clinical rates, or a good result of any kind, reinforced the value of changing practice on farms and motivated ongoing effort.

Advice or measures that provided feedback on progress reinforced the value of changing practice and motivated ongoing effort

> Peter (#10) managed a year-round calving herd of 470 cows with his parents and three casual milkers. Investigation of a high cell count problem had revealed *Strep ag* infection in the herd that Peter suspected had been there for five or six years. He went to the course so that he could take a lead role in controlling the spread of infection and reducing the BMCC of the herd to under 200,000 cells/mL. One of the tasks on the Mastitis Action Plan involved moving to blanket antibiotic Dry Cow Treatment in their year-round calving herd. Although his dad had found it hard at first, he had "*seen the count coming down*" and was prepared to continue with it.

Triggers also provided timely feedback and promoted an immediate response:

> Alan (#5) managed a 280-cow herd that had a problem with clinical cases at calving in spring. Alan made a lot of changes on the farm with a focus on improving teat health. Four months after the course, a rise in BMCC from 98,000 to 168,000 and then to 200,000 cells/mL motivated Alan to strip the whole herd looking for infected cows. He found seven clinical cases in 240 cows and then referred back to the Farm Guidelines to see how close this was to the trigger level.

One of the herd managers used performance incentives to improve the quality and rigour of tasks done by his employees initially with good result:

> Alf (#2) employed two workers in his 260-cow herd. The Farmer Short Course had prompted Alf to focus on the 'routine' of best practice and his main aim was to have the employees placing equal emphasis on things as he did (such as teat spraying). To achieve this, he introduced an employee incentive (a slab of beer) for every week that the herd BMCC was in the factory top 10%. The employees responded by being particularly thorough in detecting clinical cases and bringing suspect cows to Alf's attention.

With improving performance, personal aspirations sometimes overrode the milk pricing signals of dairy companies:

Aspirational targets, awareness of what peers were achieving and aversion to risk motivated farmers to take action

> The BMCC in Alf's (#2) herd went below 100,000 cells/mL a few weeks after the course. Alf then aimed to keep it at that level, this personal goal replacing his Mastitis Action Plan's goal of staying in premium (below 200,000 cells/mL).

Farmers were often motivated by an awareness of what their peers were achieving or de-motivated when they felt there was a low chance of success. They valued the opportunity to interact with other farmers at the Farmer Short Course to discuss issues and compare approaches. Similarly, many owners and managers were keen for other members of the farm team to go to a course to have someone to discuss ideas with or 'act as a refresher'.

> Ryan (#8) saw the course as an opportunity to update his knowledge and practices. He went with his assistant manager so they could "*set proper goals*" to avoid a 'blow-out' in cell counts at calving and "*do it properly*".
>
> Alf's (#2) sent his remaining employee to a course a year after he had been himself. The course reaffirmed their need to focus on mastitis prevention as there had been a recent spate of clinical cases (15 cows in three months) and Alf said the cost of treatment had significantly reduced his profitability.

Aversion to risk or inconvenience also motivated action:

> Jeanine and Frank (#9) managed a herd of 300 cows with their sharefarmers, Helen and Ian. Jeanine and Helen went to a course and wanted to reduce the risk of infection at calving. They made changes to ensure that dry cows stayed in a paddock for no longer than five days to reduce mastitis at calving. This involved including more paddocks in the rotation and changing the placement of hay rings. Although it meant more work, Jeanine said, "*if you can stop your mastitis problem that saves work in the shed which saves stress, saves money ... beforehand we sort of wouldn't have been prepared to do it*".

Having confidence in the planned approach helped initiate change:

> Tom (#7) milked a year-round calving herd of 140 cows with his uncle. He achieved his goal of reducing the herd BMCC to below 200,000 cells/mL and achieving premium payment within a few weeks of finishing the course. Tom, who had always thought it possible to achieve this goal and been keen to get more involved in mastitis control, said the course had given him "*the punch to do it*".

Confidence in the planned approach helped initiate change

Once motivated to change their routine – be it by milk pricing signal, triggers for action or personal standard – how did people act?

Practice changes after the course

The Countdown Downunder Farmer Short Course helped participants convert their knowledge and experience into targeted action. An understanding of the principles underlying udder health management enabled farmers to work through their issues from first principles, make informed decisions and gave them confidence to change practice. For example:

The solid grounding in first principles became the basis for informed action for all case farmers after the course

> Alan (#5), who had been dairying for more than seven years, appreciated understanding the bacteria causing mastitis and the role of cultures: *"I didn't know that there were different sorts of Streps and Staphs…I've just treated mastitis as mastitis. I never got involved with subclinical mastitis because I never really learnt about them".*
>
> The course also increased Donald's (#6) awareness of subclinical mastitis, who said "*. even though you're not getting clots, it can be as bad as or worse than clots*". He planned to wear gloves to reduce the transfer of bacteria and start teat dipping "*to reduce the bugs and improve teat health*".
>
> When Tom (#7) organised for the inflations to be changed after the course, the milking machine technician had shown him the deterioration in the liners. Although it was only eight months since the last service, Tom said "*they were completely had it*" and believed that the resulting cup slip and cross-infection had increased the cell count in the herd.
>
> Jeanine (#9) appreciated the biology section of the course saying "*I thought it was really interesting to understand how the bugs get there*" adding that you think what you are doing was right but this was "*not quite the case*".

Ryan (#8) returned from an overseas trip in September 2002 to many "*dramas*". Although practice changes had been sustained in his absence, without an understanding of the underlying principles they had been inflexible and other employees on the farm had struggled to stay on top of things. Ryan used the Farm Guidelines to set the farm standard of what was acceptable and this helped him quickly get 'on top' of things.

Peter (#10) had asked everyone to wear gloves to help reduce the spread of *Strep ag* at milking. One employee, who also milked on other farms, was not complying but Peter was insistent saying "*With our bug he's a high risk for other herds. Strep ag can live on your hands for three or four days, if he goes to another herd and milks without gloves he could pass it on*".

Scott (#11) was a sharefarmer who ran a spring calving herd of 330 cows with the owner. The main milk quality issue in the herd was clinical mastitis at calving but they also had trouble keeping the BMCC consistently below the premium cell count level of 250,000 cells/mL. Scott found the discussion of triggers at the course as very useful. Prior to the course he had kept records of the mastitis cases but said normally they would "*just sit there*" whereas afterwards "*you've got it in the back of your mind that if you get more than two cases in a hundred in a month you've got a problem*".

Some farmers adopted professional advice that they had resisted before the course because they had a better understanding of how the change in practice would contribute to the outcome and regarded it as a higher priority than previously.

Donald (#6) had never used Dry Cow Treatment in his chronically high cell count herd and had not seen the need for this despite his vet's recommendation. Through the course he learnt more about the reasons behind using antibiotic at drying-off and how to administer it and consequently started a blanket dry cow strategy in his year-round calving herd.

Following the course, farmers were more aware of how to use their advisers to help control mastitis and were more comfortable about discussing issues with them.

Five months after the course, Jason (#3) was frustrated that the BMCC wasn't lower and commented "*there's nothing in the filter sock at the end of milking ... it would be hard to find a cow ... I don't know if it's worth treating or not, I suppose I should really go and ask the vets what they think*".

Advisers played a critical role in change on-farm and the course raised farmers' service expectations

The course also raised expectations about service quality.

Alan (#5) had a good relationship with his vet discussing all aspects of farm management with him and keeping him up-to-date with the BMCC even when the vet was on the farm for another job. When Alan moved to a new farm, he insisted that they used the consulting vet from his previous farm.

The course had raised Peter's (#10) expectations of his milking machine technicians and his attitude now was "*this is what we want ... can you do it for us?*".

Higher levels of change such as planning and acting around risk management were harder to achieve than a change in product or practice, yet farmers had started to apply the course principles, Farm Guideline recommendations and Countdown triggers to reduce the risk of clinical cases or the spread of infection.

> Jason (#3) thought it was going to be a challenge to keep the cell count down in wet, muddy conditions in Western Victoria at the end of 2002 because he had noticed that the cows had started kicking a bit when the cups went on and that their teats were starting to crack. Consequently he was considering adding emollient in the teat spray.

The understanding about best practice learnt at the course was portable and moved with farmers when they changed jobs. This was evident in the way that farmers systematically assessed the mastitis and milk quality status of the new herd and the changes they made to align with best practice. An increased sense of responsibility for milk quality and other management issues often prompted the need to change practices in the new workplace.

> Jason (#3) left his previous employment in autumn 2003 to work on his family's expanding dairy farm. His goal on the new farm was to keep the BMCC below 200,000 cells/mL, recognising that this would be a challenge given the extended calving pattern and mix of fresh and stale cows.
>
> Alan (#5) moved to a sharefarming position on a new farm a year after he had attended the Farmer Short Course. The new farm supplied a specialised cheese factory and did not have a payment incentive for milk quality. Despite limited BMCC information, Alan's goal on the new farm was to reduce clinical cases and keep 'on top' of the BMCC because he knew "*what good milk quality is*".

The benefits of understanding best practice moved with farmers when they changed jobs

All case study farmers improved aspects of their udder health management after the course by making changes to align with best practice as specified on their Mastitis Action Plans. After 12 months, most had completed their planned tasks and many had reduced BMCC and clincial mastitis in their herds. Clearly Mastitis Action Plans tailored for individual farms were very effective in improving milk quality performance.

Mastitis Action Plans tailored for individual farms were very effective in improving milk quality performance

Although practice changes occurred on all case farms, improvements in mastitis control and milk quality were not always sustained. Consequently the research team explored why progress was stalling and the type of support the industry could provide to help farmers incrementally improve udder health in their herds.

Essential ingredients for sustaining change

A consistent finding was that progress on case study farms was most likely to be sustained when the Mastitis Action Plans developed at Farmer Short Courses maintained their relevance and were well-supported by the farm team. Consequently a model enabling continuous improvement and innovation (Clark *et al* 2001) was used as the conceptual framework to describe progress on case study farms and discuss the steps involved in focussing thinking and action on strategic and progressive change. In this framework, farmers who attended a Farmer Short Course started action planning at the review stage of the cycle (assessing the gap between current management on their farm and best practice) rather than the more traditional entry point of goal setting (Figure 1).

The action planning process had the potential to stall at any stage in the planning cycle on case study farms (summarised in Figure 2 with a more detailed analysis given on page 30).

To support sustainable change on farm, it seemed especially important to ensure that:

- Mastitis Action Plans fit the needs of the farm business.
- The day-to-day effort spent on udder health and milk quality by all members of the farm team works toward jointly agreed goals.
- Farm managers regularly review the farm situation and act on emerging issues and opportunities.

The following section gives examples of how improving the capacity to manage udder health depends on these elements.

Figure 1: The action planning process adapted from the cycle described by Clark and Timms 2000

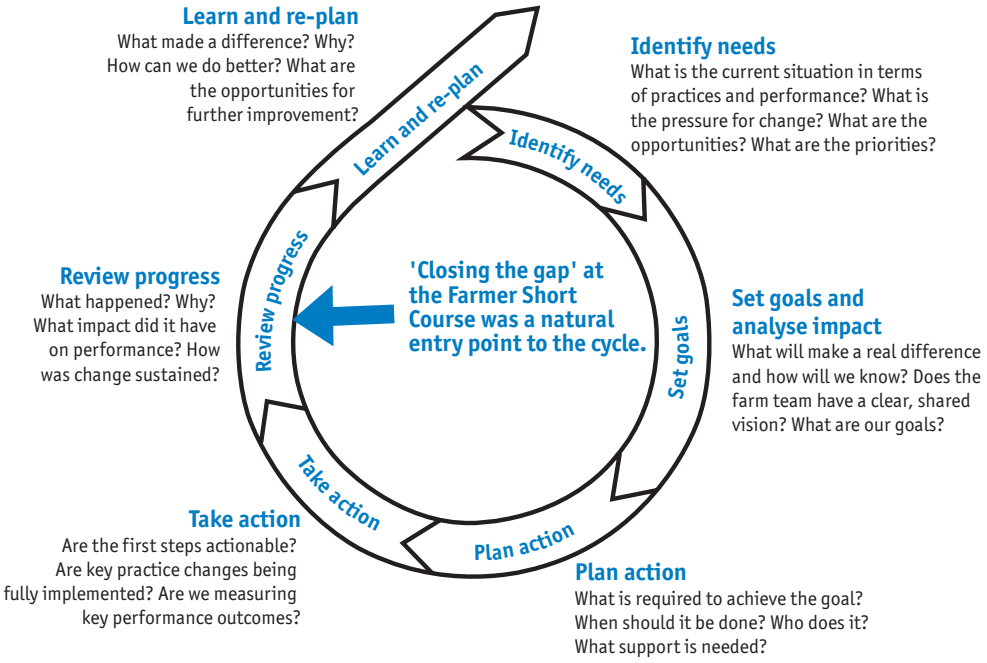
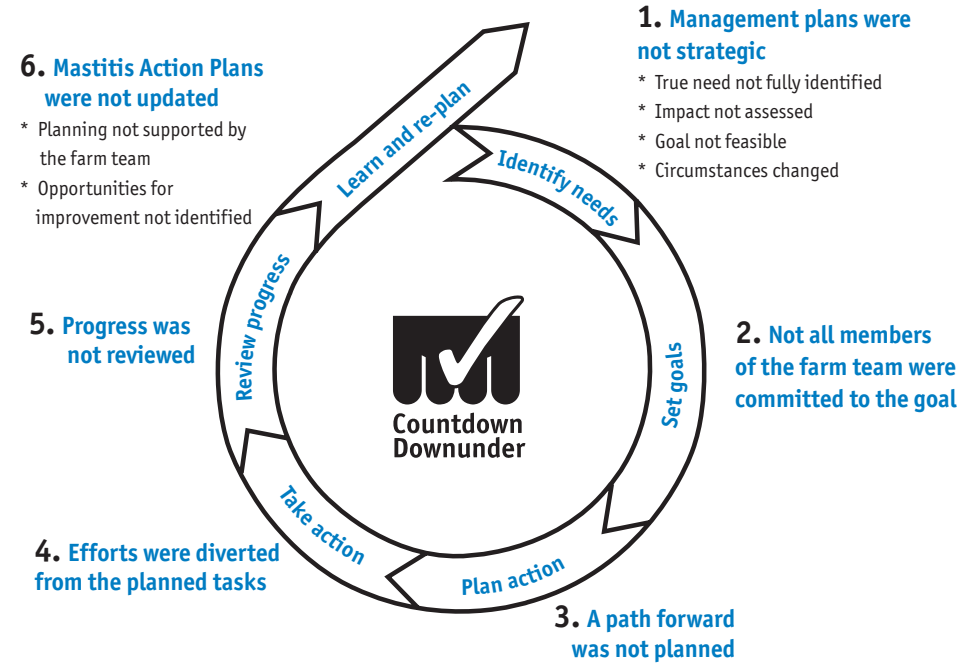


Figure 2: Stalling points for the udder health action planning process on case study farms



Ensure Mastitis Action Plans fit the needs of the farm businesses

Mastitis Action Plans must deal with the true needs of management – not just the technical issues

The udder health and milk quality goals of farms must be consistent with what is happening with the overall farm business (such as plans to increase the herd size) and the planned approach must meet the true needs of the farm. Most of the Mastitis Action Plans focussed on the technical tasks needed to reduce BMCC or clincial cases and had not explored how this was best supported – which was different for every farm. Farmers that required support to prioritise tasks, deal with employee issues or renew their Mastitis Action Plan were unable to progress in these areas:

Having ways of prioritising tasks, dealing with employee issues and supporting implementation and review are necessary for success

Steve and Carla (#1) were in their second season of milking a herd of 150 cows. They had a difficult year prior to coming to the course: managing a new farm and facing issues such as poor tracks, limited subdivision, a wet year, low feed on hand at calving, many high cell count cows and many clinical cases at calving. The goal of their Mastitis Action Plan was to reduce the rate of clinical mastitis at calving to less than five cases per 100 cows calved. They had implemented many of the planned tasks in the three months after the course and their BMCC had moved to below 100,000 cells/mL. With this success, their udder health and milk quality focus started to shift to maintaining a low cell count. The effort that went into managing their clinical cases became less strategic and this may have been costly for the farm business.

The large herd and farm business that Ryan (#8) managed was rapidly growing following the acquisition of a neighbouring farm and herd. The farm team was under pressure to consistently provide low BMCC milk after a production contract was secured with their dairy company and they faced new circumstances and challenges daily. Despite Ryan being intuitively good at building the capacity of the farm team – regularly discussing items of interest with the farm owners, the other staff and his veterinary consultant – he was finding it increasingly difficult to deal with labour and employment issues. Ryan would have both appreciated and benefited from support to develop strategies for employee management.

For Donald (#6) the most appropriate technical path forward for his chronically high cell count herd would have been a full mastitis investigation to clearly define the problem and describe the critical steps for its resolution. However in the months after the course Donald did not fully embrace the management practices he had specified to help control subclinical mastitis. Instead he continued to suspect that there was an unidentified underlying cause to his milk quality problem. Progress is unlikely to be made in this herd until an approach is found to help Donald own the problem and commit to the basics.

Herd managers and their advisers should look beyond the herd's technical issue to identify what is limiting herd performance. This requires a working knowledge of the farm – knowing the priority of milk quality control in the overall farm business, how routine practices on the farm are (or are not) affecting milk quality and how well members of the farm team interact.

The case studies confirmed that the multitude of tasks involved in running a dairy farm business can sometimes be overwhelming. Given the many and often competing demands on the farm resource, it is important to spend effort on things that make a real difference to the herd performance and/or farm situation. Although the Farmer Short Course had continually emphasized the need to establish SMART goals (specific, measurable, achievable, realistic and time-bound) that were within the control of those making the plan, over time some of the goals became more aspirational than achievable:

> Jeanine (#9) and her sharefarmer Helen went to the Farmer Short Course so they could hone their skills and reduce clinical mastitis at calving. They had already taken significant steps including graphing clinical cases. However four months on, in November 2002, the drought conditions were taking a heavy toll on production and hard decisions were made with a focus on financial issues and long-term viability. The sharefarmers left the farm as part of the cost cutting. With the extensive changes to the farm, Jeanine had revisited the aim of her mastitis management. Her new aim was to have no more than one or two cases of mastitis in 170 cows – a higher standard even than the Countdown triggers at a time when attention and resources had diverted to surviving the drought.

Having tools and processes to assess the effect of alternate management strategies would have helped some case study farmers focus attention on economically beneficial actions:

> Jason's (#3) boss was keen to get a better understanding of the recent higher cell counts in the herd. He had encouraged Jason to go to the Farmer Short Course and Jason discussed his Mastitis Action Plan with his boss, who supported all elements except the suggestion to increase the frequency of herd testing – which was currently done every second month during one milking only. The owner hated herd testing because of the additional burden on an already heavy workload ("*with 500 flasks you need an extra two people there to do it*"). Jason may have been able to convince the owner of the value of more frequent herd testing if he had been able to demonstrate its benefits.

Tools and processes should be developed to help managers choose between management options and focus the effort on actions that make a real difference to herd performance

Have all members of the farm team working towards jointly agreed goals

Once the direction of the Mastitis Action Plan has been determined, it is important to ensure all members of the farm team are working toward an agreed goal, the planned approach is 'doable' (the farm team is adequately resourced and supported), and the team remains enthusiastic and committed to achieving the outcome.

Given the impact that every operator on the farm has on mastitis control, topics promoting communication, teamwork and consistent milking routines were woven throughout the Farmer Short Course to focus the mindset and collective efforts of farm workers on the goal of the Mastitis Action Plan. The case studies underlined the need to take this approach.

To make progress, members of the farm team needed to be committed to taking action, share a common goal, and be equipped with the appropriate skills and understanding. There was specifically a need for a way of engaging members of the farm team who did not attend the Farmer Short Course as they were often distant to the Mastitis Action Plan and not especially supportive of change:

Members of the farm team need to be committed to a common goal and equipped with the appropriate skills and understanding

> Jeanine (#9) and her sharefarmer Helen incorporated information from the course into their day-to-day work and to achieve their joint goal of reducing the risk of infection at calving. When Jeanine talked to her husband Frank about aspects of the course and the Mastitis Action Plan, Frank quipped that he and Ian (Helen's husband) should have gone to the course too as they didn't like others coming back and telling them what to do.

Furthermore, advisers should be active team members if the endpoint is incremental improvement in herd performance.

> Scott (#11) had gone through the Mastitis Action Plan with the owner and they had jointly agreed to 'keep on top' of the actions listed to reduce clinical mastitis at calving. Although calving had gone well, Scott wasn't happy as there had been 15 clinical cases of mastitis in the 250 cows that had calved. He believed it was important to keep his vet up-to-date with what was going on so "*if he wants to follow it up he can*". For his part, the vet actively monitored progress even when attending the herd for another reason.

A herd manager acting alone cannot sustain improvement in a herd's performance. The combination of new skills and a rapid success in lowering BMCC increased both the self-confidence and self-reliance of some farmers. Self-reliance sometimes jeopardised progress by overwhelming one person's ability to handle unexpected events or deal with multiple and complex issues.

Being too self-reliant can jeopardise progress

> Alf's (#2) performance incentive had resulted in the earlier detection and treatment of cows with clinical mastitis. Six months after the Farmer Short Course, Alf said his goal of having the team work together was not as effective as he had envisaged and it was his own resources and effort that was still driving cell count status. He had recently moved from a position of personally making the decision about which suspect cows to treat to allowing the employees guide to treatment decisions.

Employers and employees would benefit from processes that repeatedly help focus and invigorate the farm team

Some owners and managers were feeling the pressures of managing employees but not many had identified how they were going to build the capacity of the farm team. Both employers and employees would benefit from products and processes that promote teamwork and consistency – such as developing decision criteria for the farm team members to use or providing regular feedback on specific elements of the farming system.

Help farm managers act on emerging issues and opportunities

Over 18 months, more than half the case study farms faced significant changes in their circumstance that required a review of their Mastitis Action Plan such as changes in farm staff (employees leaving or new people coming to work on the farm), an increase in herd size or deviation from routine practices due to the drought. Such situations flag the need for review:

A change in circumstance or 'things starting to slip' flag a need to review the plan

Five months after the course, Jason (#3) and the farm owner were finding it difficult to keep up with the demands of heavy workloads and some of the planned tasks were starting to slip. The workload reached a crisis point when both he and the owner got ill. In hindsight, Jason believed it had taken "*that event to highlight that we need someone else*".

Tom (#7) was disappointed a year later that the cell count had not been maintained at the low level achieved after the course (below 200,000 cells/mL). It had gone as high as 280,000 cells/mL during a period when he and his uncle had been unable to milk for a number of weeks due to injury and a few different people had been employed. Tom attributed this rise to poor cow management and different procedures used at milking. Although it had come down periodically, "*it hasn't really recovered since that*".

After many years of running their 400 cow herd as a family partnership, Grace (#4) and her husband had employed people for the first time. The cell count, which had been consistently below 250,000 cells/mL, had started to fluctuate after taking on the employees. This may have been avoided if there had been a standard operating procedure to help the new employees understand the management systems on the farm and everyone was encouraged to do things the same way. In fact, Grace's intention soon after the course was to "*sit down with the employees and discuss each section that we have covered and come up with what we're going to call 'best management practices' on this property*".

Peter (#10) was extremely focussed on the tasks in his Mastitis Action Plan to minimise the spread of *Strep ag* infection and had convinced his father of the need to change many practices such as wearing gloves, moving to a blanket dry cow strategy and splitting the herd. Within six weeks, the BMCC went from 470,000 to 280,000 cells/mL and this motivated everyone to continue with the increased workload that the changes entailed. The farm was in a bit of an upheaval six months after the course because all of the employees had left and the family had to cover the labour requirement until new employees were found.

In each case a review of the way milk quality was being managed through the changed circumstance would have helped keep efforts focussed on tasks that could make a real difference to performance.

Review and planning are early casualties of heavy workloads and labour shortfalls

There were also examples of management defaulting to previous practices under pressure. As well as interfering with routine practices and impeding implementation of Mastitis Action Plans, performance review and planning tended to be early casualties of heavy workloads and labour shortfalls and presented a significant risk to milk quality:

Jeanine (#9) felt that things had slipped in terms of mastitis management in the month before the sharefarmers left the farm. Clinical cases had not been graphed as they came in, there was a delay in detecting some cases of clinical mastitis and they had missed the trigger they had set (of six or more clinical cases) to collect milk samples for culture.

Even the most organised of operators buckled under the additional workload needed to deal with drought-related issues:

Risks to mastitis control and milk quality should be an integral part of all decision-making

> By November 2002, Grace (#4) was directing her skills and energy in making plans and decisions to survive the drought and little had been done in terms of mastitis. One-quarter of the herd had been 'parked' on another farm and Grace had done feed, water and financial budgets. Although Grace would have preferred to have a BMCC close to 100,000 cells/mL, her main target had become keeping it under 250,000 cells/mL although they weren't doing anything specific to keep it under that level. In mid 2003 she hadn't had the time to develop 'best management practice' for the farm team saying "*.the amount of time spent doing drought stuff was unbelievable, just the planning and the time put in and to a certain extent it's still going on ...*"

Planning for mastitis control and milk quality became a lower priority for farms as efforts were diverted to surviving the drought, yet the two issues were not distinct. Risks to milk quality and their financial effects are best considered as a routine part of decision-making. For example, planning a dry cow strategy for the parked cows would have helped Grace protect her herd against the risk of mastitis infection in the next lactation.

Some Mastitis Action Plans lost their direction because progress was not being measured and reviewed:

Regular review keeps plans relevant and focused

> Although Peter's (#10) vet had identified the *Strep ag* problem in the herd and encouraged Peter to go to the Farmer Short Course, there had been no interaction between the two in the 11 months after course. By this time it was requiring an intense family effort to keep the BMCC between 150,000-200,000 cells/mL (they had initially kept the count below 150,000 cells/mL). Despite the improvement in BMCC, there was no way of assessing whether the *Strep ag* status of the (now split) herd had changed. In fact, the improvement in the BMCC could be misleading given that many suspect cows had been culled (to relieve the feed pressure) and individual cows with counts above 150,000 cells/mL (based on a conductivity detector) were being milked into a test bucket and the milk fed to calves. Peter believed that the Mastitis Action Plan had helped him keep 'on top' of the cell count and planned to continue implementing the same tasks despite significant changes in the herd circumstances. Interaction with his vet could have helped him plan a way to assess performance, discuss the costs and benefits of the strategy they were implementing and explore cost-effective options for *Strep ag* control.

A review of what happened and why is necessary to continue to make progress. A couple of the case study farms had implemented most of the tasks on their Mastitis Action Plans and achieved their stated goals during or shortly after finishing the course. Pathways for setting new goals were lacking on those farms:

> Tom (#7) had maintained the practice changes from his Mastitis Action Plan more than a year after the course (such as maintaining rubberware, servicing the machine and putting in cup removers) and hadn't gone back to it much as he had "*completed most tasks*".

The concepts of planning have not been embodied on many farms after the course. Although farmers regarded their vets and milk quality advisers highly and believed they had a good relationship with them, they usually consulted them only when there was a mastitis problem and rarely engaged them to work at the herd or management level. The case studies clearly demonstrated that farmers would benefit from services that supported herd level and management processes, not just advice on technical problems or services for individual cows.

Farmers would benefit from services that support herd-level management processes

> Tom (#7) wasn't really sure why he was having trouble attaining his goal of consistently having a cell count below 200,000 cells/mL. Tom's vet was a Countdown Downunder Adviser Short Course trainer and very capable but, instead of using this support to help achieve the cell count goal, the vet's skills were used for pregnancy testing and to resolve cow-level problems such as lameness and treatment of clinical mastitis. Furthermore, Tom said he hadn't had any real need to contact his advisers for mastitis issues but if he had a problem "*it would only be a phone call*" away.

Having a process of planning that is integral to the farm routine would ensure the Mastitis Action Plans maintain their relevance, progress is being reviewed and emerging issues are acted upon.

How industry can build farm management capacity

The industry can help dairy farmers sustain improvement in udder health and milk quality by supporting implementation of Mastitis Action Plans and the action planning process. The research team believes two core changes will significantly build this capacity on Australian dairy farms, namely:

- changing the culture of service provision – equipping the advisory sector with the non-technical skills needed to support strategic herd-level udder health management in a way that is relevant for individual farm businesses; and
- reinforcing the action planning process in the design of new services and training packages.

Changing the culture of service provision

Few livestock producers in Australia work regularly with their veterinarians to improve productivity (Frawley 2003). Instead, dairy farmers tend to use advisers (veterinarians, milking machine technicians, dairy company staff, consultants, etc) to solve problems, provide expert technical input to *ad hoc* queries, and supply products and equipment. Yet, in the 18 months that the case study farms were followed there were many opportunities where specialist skills, knowledge and thinking would have informed decision-making and made a real difference to herd management and performance.

Management services must be regarded as a core activity by both farm and advisory businesses if they are to be successful

Changing the culture of service provision so strategic management of udder health and milk quality becomes part of the routine business of dairying is a challenge for the industry.

The failure of this market is not for want of trying. Formal programs to improve herd health have been available since the sixties. More recently, some of the trainers of the Countdown Downunder Farmer Short Course have modified the services their businesses offer to better fit the needs of their clients. Kyabram Veterinary Clinic for example has put a lot of effort into developing a suite of services to provide their clients with management support for mastitis control and reproduction. This service tended to be regarded as an optional extra by both clients and vets with one of the practice principals commenting that they needed to take the service from being perceived as a "product" to being integral to the "way we do business" (see box on page 25).

The marketability of a service depends on its costs, benefits and complexity

Reasons why advisory services are not used to support management may stem from the beliefs that they are costly and do not add value or because farmers are confident in their ability to manage on their own. For farmers to value professional input into mastitis management, advisers need to identify what individual herds need in terms of processes and support to achieve the milk quality goals of the farm, demonstrate the costs and benefits of making the changes and convey their capacity to work at this level.

Kyabram Veterinary Clinic 'In Control'

'In Control' is a service developed by Kyabram Veterinary Clinic that uses veterinary expertise to co-ordinate management strategies for farmer clients. It is a systems approach that checks each step to ensure the outcome is successful.

Although the idea of services that support management had been around for some time, the impetus to design the first of the 'In Control' series came from troubleshooting complaints about pregnancy test results from a couple of clients in 2000. The finding, that errors in cow identification and not rectal palpation, were the issue gave rise to 'In Control of Pregnancy Testing'.

About 30 clients were surveyed to determine the scope of a potential service. This revealed differences between what veterinarians and their clients thought a pregnancy testing service should deliver. Although most farmers stated the widely accepted reason for pregnancy testing (knowing which cows were empty so they could cull them), what they really wanted was to identify late calving cows to continue milking them for as long as they could. Interviews of the practice staff by an independent third party also informed the service design. The younger staff felt they were "letting the side down" because they couldn't go as fast and maintain the same level of accuracy as the more experienced partners. Consequently, the charge for the service was based on a cost per cow (not per hour) to relieve pressure and reduce the risk of injuries.

In its first year of delivery, 'In Control of Pregnancy Testing' yielded good outcomes for participating herds and received good feedback from both the clients and vets involved.

'In Control of Drying-off' was available in 2003. The farmers who took part were happy with the results, but did not repeat this new approach to developing a drying-off strategy the following year.

Kyabram Veterinary Clinic believes In Control is the way forward for their practice and continues to offer it to clients. For the service to achieve its aim of making strategic management gains, the practice principals believe (1) farmers need to be more aware of the benefits of regularly reviewing their management strategies and (2) the service needs to be an integral part of the clinic's dairy business.

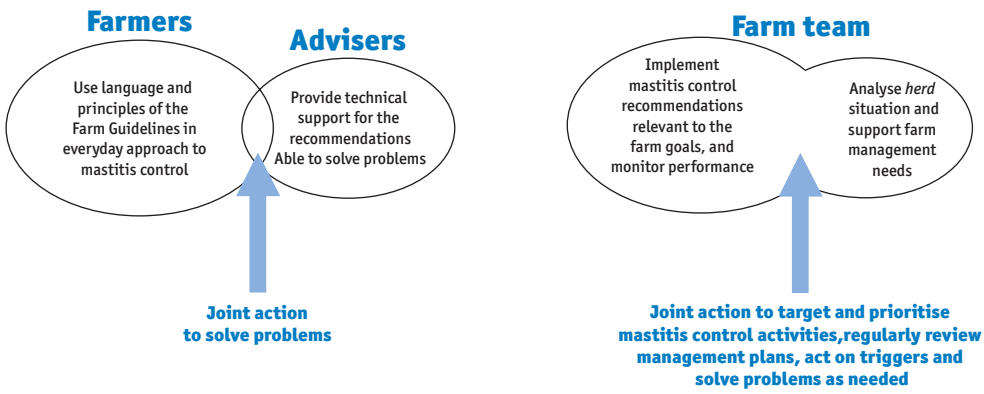
Expanding the skill set and tools of the advisory sector will help advisers support udder health management in a way that is relevant for individual farm businesses (including the system, staff and herd needs). The ability to understand where udder health and milk quality fit within the overall farm business, build the capacity of the farm team to act on relevant issues and facilitate the planning process is as critical for success of management plans as having the technical skills to improve mastitis control. Each of these areas of consideration requires a different skill set.

Advisers need facilitation and planning skills to support management plans, as well as technical skills

An early challenge for advisers is how to integrate diverse pieces of information into a coherent whole and plan a path forward. The more equivocal the information, the more communication cycles (phone calls, visits, etc) are needed to reduce ambiguity and uncertainty to a level that enables players to develop a plan of action. Karl Weick regards this organisational ability as a strength and doing nothing, because information is less than perfect, as failure (Weick 1995). He believes common ends and shared means are the result of effective organising, not a prerequisite. Although the process may appear somewhat chaotic, decisions are likely to be highly repeatable when the fundamentals and the endpoints are well understood.

A common purpose and commitment to joint action is the result of effective organising – not a prerequisite

Figure 3: Active partnerships between herd managers and their advisers enables joint action



A successful outcome depends on consistency of purpose, good communication and regular review. Ideally herd managers would be forming active partnerships with their advisers to ensure routine practices are 'tweaked' to improve herd performance. This involves acting jointly to target and prioritise mastitis control activities, regularly reviewing management plans, acting on triggers and solving problems as needed (Figure 3).

The nature of the relationship between advisers and farmers is most effective when it fits the needs of the farmer: be it as a technical adviser, motivator, facilitator, critical friend or mentor. It is important that advisers expect (even aim for) the relationship they have with their clients to change over time. Techniques are available to help advisers negotiate their roles and responsibilities, build their identities and build more effective relationships with their clients (Paine and Nettle 2003). The nature of the relationship between members of the farm team on Scott's farm (#11) is a good example of an active partnership:

> Scott (#11) actively cultivated a responsive farm team through regular discussions with the owner (the only other worker on the property) and a good relationship with his vet. All three were committed to the same milk quality goals. Scott went out of his way to bring his vet up to speed with the mastitis and milk quality status on the farm and his vet made it his business to understand the situation. The common understanding and level of interaction of the farm team enabled the vet to make practical and timely contributions to decisions that were made on the farm. The vet kept activities focussed on herd-level, cost-effective mastitis management, recognised needs as they arose, offered critical analysis and encouraged Scott to maintain progress.

The way of supporting action planning on farms is itself a process and not a recipe or set of rules

Supporting the planning process – identifying when (and what) is needed to keep the plans 'on track' – will be another new area of involvement for many advisers. The research team believes the way of supporting action planning on farms is itself a process and not a recipe or set of rules. Analysis of the impediments to mastitis management on case study farms identified many situations that could be used to alert the farm team that the plan or planning process may be starting to stall. The team needs to 'unpick' the situation and determine what is needed to keep efforts directed and relevant. Examples of lines of questioning that can be used at the different stages of the planning cycle are given on page 30.

Reinforcing the action planning process in the design of new services and training

This research shows that support of the action planning process is essential to incrementally improving mastitis control and milk quality on farm. The dairy industry could promote this skill by making the planning process an integral component of new training packages and management services.

The design of some core Countdown Downunder resources is being modified as a result of the insights – with changes to the Farm Guidelines, the Farmer Short Course and the development of on-farm management services described below.

The *Countdown Downunder Farm Guidelines for Mastitis Control* describes how to achieve good udder health, why it should be done and how to assess progress. The guidelines were organised by stage of lactation as this was a practical approach that made sense for both seasonal and year round calving herds. Recommendations for review and planning were positioned at one point in the lactation cycle. A conceptual shift for the ongoing project is to embed review and planning elements through all stages of the lactation as the opportunity to make gains from strategic planning occur whenever decisions are being made that may affect mastitis control or milk quality (Figure 4).

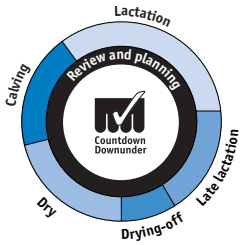


Figure 4: An original Countdown Downunder graphic has been modified to embed review and planning through all stages of the lactation

The lessons for the Countdown Downunder Farmer Short Course are also clear. At the course, farmers identified gaps between current management and best practice in nine areas and used this information to construct their Mastitis Action Plan. Plans were presented to the group at the last session of the course and the ensuing discussion was used to share ideas on ways of improving the plans and measuring progress. Because learning to move through the steps of the action planning cycle requires practice, more opportunities can be created for farmers to exercise their planning skills. It would be helpful to encourage joint input of the farm team into development of the Mastitis Action Plan and to work through scenarios where the plans would need to be modified to accommodate change. Post-course strategies for repeating the planning process (for example three cycles no more than three months apart as suggested by Clark *et al* 2001) would also reinforce the behaviour and benefits of the process.

Ways of supporting the action planning process is also being woven into the design of new services that are being developed by Countdown to promote strategic on-farm management of udder health and milk quality. Rather than waiting for increases in the herd BMCC or clinical case rate before seeking support, farmers will buy a service centred around proactive management. These "service packs" will be used with farm advisers to co-develop management protocols, build the relationship between members of the farm team, and time interactions and interventions for maximum effect. To be successful, advisers who offer the service need to be able to provide necessary and sufficient support to the action planning process on-farm and incorporate management services into the fabric of their businesses. If successful, the ability for farmers to clarify their own goals and possibilities, make more strategic management decisions and use their advisers and their employees for innovation will be commercially available through the existing private service sector.

Conclusion

To build the capacity to progressively improve udder health and milk quality on farm, the industry must move from its current level of service provision (not just responding to mastitis problems or treating sick cows) to a culture where strategic management services are regarded as a routine part of the business of dairying.

This research confirmed that Mastitis Action Plans help keep efforts focussed on tasks that improve farm profitability and manage mastitis. A major insight was that technically sound plans require ongoing support (described by the steps in the action planning process) to ensure they maintain their relevance and adapt to the changing needs of the farm business.

Advisers play a pivotal role in helping farm managers develop and implement their Mastitis Action Plans. Following Countdown's philosophy of having local advisers as the main service and extension frontline, the challenge is then to equip the advisory sector with the non-technical skills and tools to ensure the plans are workable and fit the needs of the farm business, that all members of the farm team understand and are working toward the udder health goals, and communication and review occur in a way that enables emerging issues and opportunities to be identified.

Opportunities could also be created in the design of training packages and new services to enable farmers to practice moving through the steps of the action planning cycle, preferably with input from the whole farm team. Ways of achieving this will be the focus for the Australian dairy industry's investment in mastitis and milk quality in the third phase of Countdown Downunder. These insights will also be helpful for designers of training and services in other areas of farm management.

The case studies

THE 11 CASE STUDIES	

Countdown Downunder applauds the efforts and achievements of the case study farmers. Mastitis management improved on all farms and often translated to better herd performance. Without detracting from this, the research team used their experiences to actively search for factors and processes to support the Mastitis Action Plans through time and promote ongoing improvement in udder health and milk quality.

Presentation of the case stories enables readers to position the Mastitis Action Plans within the context of the case study farms, observe the issues and events experienced by the farmers in the ensuing 12-18 months and examine changes in management practices and mindset. The detail may especially interest advisers wanting to develop, refine and effectively position the tools and services they offer.

The bolded, italicised notes as the bottom of each page are critical comments made by the research team who had skills in mastitis control, social research and facilitation, as well as the privilege of being independent observers and the benefit of hindsight. Similarities and differences between the cases were discussed by the team and the emergent themes formed the basis of the insights.

The first two pages of this section are an analysis of the stalling points in the planning process that were encountered by the case study farmers.

Analysis of stalling points on case study farms

The experiences of the case study farmers will be familiar to many in the industry. The research team used the action planning cycle as a conceptual framework to help describe when mastitis management on these farms became less strategic and focussed. Others may find this approach helpful when developing plans, assessing a situation or reviewing progress. The six steps of the action planning cycle act as a checklist when assessing the management capacity of a farming system. To keep udder health efforts directed and relevant, lines of questioning (the right-hand column of Table 4) can be used to explore situations similar to those faced by the case study farms (the middle column of Table 4).

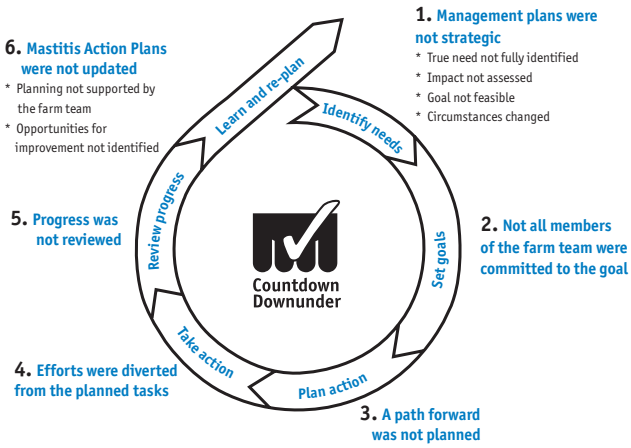


Table 4: Ways of identifying support needed for the action planning process on farm

Stalling points for action planning	Flags to the stalling point (Situations faced on case study farms)	Questions exploring how to support action planning on individual farms
1. True need not fully identified	True management need went far beyond the technical issue (all)	What is limiting the udder health performance in this herd? How do interactions between members of the farm team affect milk quality? How well are planning and review used in the management of milk quality?
	Information and advice sought from many but not applied strategically (#1)	Do the managers have a way of identifying high priority actions and monitoring progress?
	Manager of a large herd feeling the workload pressure (#8)	Given the complexity of managing large herds, how rigorously is herd performance being monitored and actions reviewed? Who does this? When? What services would reduce the management burden?
	Responsibility not taken for the situation on farm (#6)	Is there a way of compartmentalising and acting on the 'must do' steps?
1. Impact not assessed	Benefits of an approach not demonstrated to the owner (#3)	How well have the benefits, costs and risks of the current management strategy been described? Are there any tools available to help do this?
	Owner not convinced their actions could make a difference (#4)	Does the farm team have a solid grounding in the basic principles underpinning mastitis control?
1. Goal not feasible	The milk quality goal was very ambitious (#2, #9)	Why was that goal set? Is it realistic or too ambitious? Is it economic?
1. Circumstance changed	Employees left the farm (#2, #8, #9, #10)	How are labour requirements being met? What is the risk for mastitis and milk quality in the short term? And in the medium term? How can the risks be managed?
	New person working on the farm (#2, #7, #8)	How well do the new entrants understand the milk quality system on the farm? Will their practices fit the existing system?

Stalling points for action planning	Flags to the stalling point (Situations faced on case study farms)	Questions exploring how to support action planning on individual farms
1. Circumstance change (cont'd)	Farm employed people for the first time (#4)	How comfortable are employers with no longer being able to "do everything properly" themselves? Why? Are there systems that could help this changeover?
	Herd size increased significantly (#8)	What are the milk quality implications (including risks) of expanding the business? What are the pressures on the farm team?
	Management defaulted to previous practice in difficult times (#2, #4, #9)	Have management priorities across the farm been re-assessed? Was any external advice sought? In what way might the change affect milk quality in the short and medium term?
2. Farm team not committed to a common goal	One herd with two Mastitis Action Plans (#2, #3, #4)	Does the farm team have a common understanding and focus on what is trying to be achieved? Have team members checked on the compatibility of their plans and agreed on the goals and priorities?
	Other members of the farm team did not fully support the Mastitis Action Plan (#9)	How could joint commitment be brokered between farm team members?
	Service providers unaware of the milk quality goal of the farm (most cases)	How confident are advisers that they understand the farm situation? Do they have sufficient information to make progress on the farm?
3. Path forward not planned for identified needs	Understanding translated into worry rather than a plan for action (#3)	How will inaction affect progress toward the mastitis and milk quality goals on the farm?
	Pressure associated with managing employees (#2, #4, #8)	How is the manager trying to build the capacity of the farm team? What is the strategy? Do individual team members understand how they contribute to milk quality? How can staff be trained or managed to increase their responsibility?
4. Planned tasks not implemented	Tasks on the Mastitis Action Plan started to 'slip' (#3, #9)	Do roles and responsibilities need to be re-described?
5. Progress not reviewed	Goals changed without reviewing the progress in milk quality (#1, #4)	How was progress toward the goals being measured? Who knows the goals? Why did they change? What are the implications?
	Excessive activity required to maintain the *status quo* (#10)	How is progress being monitored? When was the Mastitis Action Plan last reviewed? What has changed on the farm?
	Mastitis Action Plan re-applied next season despite significant changes in the way the herd was managed (#10)	Are the tasks still economic and practicable given the changed circumstances? Has the milk quality goal changed? What needs to be done to achieve the desired goal most effectively?
6. Planning not supported by all members	Tendency toward self-reliance of the on-farm team (#2, #10)	What are the implications of working alone?
	Suggestions of other team members not invited or passed over (#2, #3, #4)	What skills and knowledge do individuals have to offer to the team? Does the farm team have regular joint planning sessions? Are the pros and cons of their suggestions being carefully considered? Has a third party facilitated discussions?
	Advisory support not sought in difficult times (#4)	How are people identifying priorities and assessing risks when things get difficult?
6. Opportunities for improvement not identified	Planning was not repeated once the original Mastitis Action Plan had been achieved (#7)	What are the opportunities for improving milk quality goals (in terms of cell count, clinical cases or risk management) in this herd?
	Management only changed in response to problems (#4, #5, #7)	What are the risks to mastitis control and milk quality using this strategy? What is the value of improving milk quality in the context of the overall farm business? How well have the benefits and costs of strategic management planning been described?
	Veterinary advice sought for individual cows rather than herd-level issues (#7, #10)	How confident are advisers that they understand the farm situation? Do they have enough information to make progress on the farm?

#1 Steve – The development dilemma

Before the course

Steve and Carla were new to dairying after many years in a different profession. They were in their second season milking a herd of 150 cows. Before coming to the course, they had had a difficult year managing a new farm and facing issues such as high cell count cows, poor tracks, limited subdivision, a wet year, low feed on hand at calving and pulsator problems at the dairy. The Bulk Milk Cell Count (BMCC) had been approaching 300,000 cells/mL and they had many clinical cases at calving. Their local vet encouraged them to use a blanket dry cow strategy. Carla had already read the *Countdown Farm Guidelines for Mastitis Control*. They were sponges for information on farming and this, combined with a need to tackle mastitis at calving and encouragement from their vet, motivated them to attend the Countdown Downunder Farm Short Course.

Mastitis Action Plan

Goal: Decrease clinicals at calving to fewer than 5 cases in 100

- At drying-off: check freshly dried-off cows in first week and keep them out of the paddocks with creeks and dams
- Milking machines: test before calving
- Calving management: monitor paddock for dryness and manure, strip graze and back fence, check for leaking milk and spray if necessary, check teat condition, shift 'lead feed' bins to dry area more often

After the course

After the course Steve had focused on minimising clinical cases at calving and was trying to "get cows in without cases of mastitis". He had started taking milk samples from clinical cases for culture. The course had helped him make sense of what he had been observing:

> *"[the course] makes you more aware of the potential hazards ... now, near drying-off, we are moving the cows up and they may not stand where you want them, in the wrong position, and so some of the cups may hang a bit crooked ... so we move them up a set of cups just so the cups fit better and there's better suction."*

They were contemplating pre-milking teat spray for the early calving period and using cup removers. Although machine testing was a normal part of their practice, the course had highlighted the importance of milking machines and how it could affect milk quality:

STEVE
Owner
30-40 years of age
In dairying less than three years
Often attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed five times (until September 2003)

THE FARM
Spring calving in Western Victoria
150 cows
Two workers (husband and wife team of owners)
Not milk recording
BMCC in 12 months before course averaged 160,000 cells/mL (range 102,000-280,000)
Clinical case rate before course was reported as more than 15 per 100 cows calved
The mastitis issue was clinical cases in spring
Advisory support readily available

> *"We have to for our QA anyway ... but this time, as soon as we started having a problem ... we looked it [inflations] up in the guidelines and we thought ... we're overdue – and so we went straight in and ripped them out."*

He realised that doing spot tests would not achieve anything and intended herd testing more regularly.

The next interview was during calving in August 2002. The momentum from the course was still with them and they had reduced the BMCC to below 100,000 cells/mL. Despite this, there had been 22 clinical cases. Steve and Carla had spoken to a nutritionist, who suggested a magnesium deficiency, and to their vet, who suggested the wet, unfenced paddock was contributing to the problem. They had rechecked their machines, changed their teat spray, taken milk samples for culture (which weren't sent for testing) and were stripping cows to detect cases. They hadn't started herd testing but still planned to do it. With the success in lowering the BMCC, their focus had started to shift from clinical cases to cell counts. **(1)**

1. ***Success in BMCC has motivated effort in this area and the goal is starting to shift. This causes confusion over which actions take priority.***

Although Steve aimed to "maintain zero mastitis" he also had a goal "to make sure we get through without a grade whatsoever". **(2)**

*"We had one [cow] yesterday and I thought 'you are not right' so instantly I just treated her on the off-chance ... "***(3)**

By January 2003, Steve and Carla had taken on cows through the cow parking scheme. Although their BMCC stayed around 100,000 cells/mL, they had had more clinical cases. Again they looked into their teat spray and had their milking machine checked. Rather than doing cultures, they changed antibiotics if the initial one didn't work. **(4)** Given the season, Steve had taken some work off-farm, providing him with another source of ideas and suggestions. Steve and Carla gleaned information from regular chats with their neighbours, advisers and vets. **(5)**

By June 2003, the BMCC had increased to almost 200,000 cells/mL with a 'blow out' to 300,000 cells/mL on one occasion. Steve blamed some of the parked cows that got mastitis. This meant they would not get a BMCC award and Steve was "really disappointed". Steve and Carla intended to milk almost 200 cows next season with 100 heifers due to enter the herd.

The final interview was held in September 2003. They had been able to control the number of clinical cases (five in total) and the BMCC as low as it had ever been (60,000 cells/mL). They had culled "pretty hard" at the end of last season to allow the heifers into the herd and to get rid of cows with "a bad history". They had moved calving later into the year and put effort into building grass ahead of the cows for calving. They did not 'lead feed' this year and so reduced the number of cows running milk pre-calving and their potential exposure to environmental bacteria. Their farm development plans had also moved ahead with the creek fenced off and cows calving on clean dry areas. Whenever the BMCC rose, every cow was checked before going in the vat. They planned to selectively use Dry Cow Treatment on 'trouble' cows to save money.

Steve and Carla were still accessing lots of information from different sources. Under the guidance of a farm consultant (the third on their farm over the time of the interviews) and with a focus on profit, they were moving to reduce grain feeding and rely on fertiliser and nitrogen:

"... we dragged [a consultant] in just to have a look and make sure we were heading in the right direction because the margins have been pretty slim in the last 12 months."

CONCLUSION – THE DEVELOPMENT DILEMMA

Steve had increased his knowledge and skills in managing mastitis, developed the farm and made inroads on milk quality. Over the 18 months, the BMCC dropped from more than 300,000 to less than 100,000 cells/mL and the number of clinical cases from 22 to five. He had sustained the practice changes made following the course. However, to make the most of this hard work, his challenge is to become more strategic. He needs ways to filter the vast amount of information he gathers to ensure he maintains focus on the milk quality goal. Steve would benefit from using the frequent interactions with advisers to help him review the farm's performance and prioritise the next steps of the Mastitis Action Plan.

2. ***Advisory input here would reaffirm the value of working toward the clinical case goal and focus actions accordingly.***
3. ***Effort is being diverted into an activity that is not strategic, and is time-consuming and potentially costly.***
4. ***Again this is not strategic and will not progress the udder health status of the herd.***
5. ***Rather than more information, Steve and Carla need a way of using their support to help them strategically plan and prioritise their actions.***

#2 Alf – Motivating the farm team

Before the course

Alf had two employees and milked 260 cows in a split calving herd. He had an agricultural science degree and was an avid reader. He hadn't attended many industry events. Before the course Alf was comfortable with his udder health management.

"We're very lucky, a couple of dry winters, and udder health and cell count were terrific and not an issue for us. And because it wasn't an issue then we just did the same old thing as we always do. We always teat spray and we're always pretty observant, especially on teat health, we were always on the ball with it."

The Bulk Milk Cell Count (BMCC) was normally quite low except for a recent 'blow out' when they milked the cows through a different shed. He hadn't wanted to attend the Countdown Downunder Farmer Short Course, feeling he was too busy, but his wife had put his name down because she felt they could learn more to reduce the risk of future 'blow outs'.

ALF
Owner
30-40 years of age
In dairying more than 10 years
Rarely attends industry events
Went to the Countdown Downunder Farm Short Course in April 2002
Interviewed five times (until June 2003)
THE FARM
Autumn/winter calving herd in Northern Victoria
260 cows
Three workers (owner and two employees)
Milk recording
BMCC in 12 months before course averaged 180,000 cells/mL (range 105,000-310,000)
Clinical case rate before course was reported as less than 5 per 100 cows
The milk quality challenge was to stay in premium
Advisory support reasonably available

Mastitis Action Plan

Goal: To maintain a BMCC below 200,000 cells/mL year round and make this a target that all our workers want to achieve

- Teat disinfection: clearly mark levels on spray bottles for accurate and uniform measurement, improve teat coverage, use only cooled boiled water in mix
- Calving management: clean calving shed – new bedding, better drainage, strip quarters for 4 days after entering shed, improve transition nutrition
- Milking routine: educate workers in best practice aims for stress free milking, increase yard size – don't have cows standing on dirt, decrease human involvement during milking (yelling, radio, overusing polypipe), adopt a standard milking routine so that all workers follow the same procedures, improve cow flow through the shed
- Clinical cases: take culture samples from suspect quarters before starting any treatment, educate staff on all aspects of treating clinical cases, e.g. administration of antibiotics
- Farm water: improve quality and quantity.

After the course

Alf felt the course had reinforced a lot of what he was doing and he understood more about actions to reduce risk.

"It made me a lot more aware of prevention and when I came back I realised there are cows we treat two or three times every year for mastitis and they'll be on the truck soon ... you just think we'll feed calves with that milk ... the increased risk of spread."

The course prompted Alf to focus on the 'routine' of best practice:

"We did all these things before (like milk cultures) but it's doing it right. It used to be haphazard, [a] process of elimination, [we] now do more of a routine. Like on the first cow, stick it in the freezer. And if the first antibiotic we use doesn't work well, get it cultured rather than move onto the next one and maybe waste more dollars."

His main interest became how to communicate the basics to his employees so they had the same emphasis as he did on things like teat spraying, milking environment and how to keep the cell count down **(6)**:

"Cell counts were pretty easy when it was just me, now there are four different people here ..."

"I used to be a religious teat sprayer. I checked myself after the first day of the course, and I was reasonably satisfied, but I only have to look and realise that the other two [employees] weren't. I'd always sprayed twice after the teat cups came off and as they exit – but the blokes ... [weren't]"

Over the course, Alf communicated elements to his employees by demonstrating and explaining how to check teat spray

6. Alf has identified a true management need on his farm.

coverage, the correct technique for cup removal, moving cows without the polypipe and wearing gloves. He believed it had an immediate impact. One of the employees even convinced Alf that the current way they were using teat spray made it hard for them:

"... so I went into town and got them [new bottles] and we use them and now they're a lot happier."

He also introduced an incentive based on milk quality:

"... to remain in the top 10% [of the factory] they get a slab of beer each week ..."

"Before this they wouldn't even look at the milk dockets. Now they are like little kids waiting for a birthday card in the mail and they let each other know the count."

The BMCC stayed under 100,000 cells/mL and he aimed to keep it there.**(7)** However, he did admit that he had a problem with mastitis detection – only identifying clinical cases through the BMCC result.

The next interview was in July 2002. The season had dried off and more feed had been purchased. BMCC had remained below 100,000 cells/mL with a spike of 116,000 cells/mL. Alf had a new person working on the farm with one of his employees leaving.**(8)**

Alf had been having some problems with clinical cases in recent days which he thought was associated with the yards being scraped. He believed that it had "been our detection and treatment" that had kept the cell count down. He felt the employees had been "on the ball", mainly through the continued incentives and that they were getting much better at detection.

*"I know they are looking – everyone's pulling in the same direction."***(9)**

The employees had brought a number of suspect cows to his attention but he hadn't treated them as he felt they weren't a threat. This reduced treatment costs and he felt his decision was vindicated because the BMCC had not been affected (as the employees thought it would be). Alf felt the employees were therefore more aware about not just nominating "any cow for treatment".**(10)**

There had been a small increase in BMCC as well as the increase in clinical cases. Alf commented:

"There had been this gradual rise without clinical signs and perhaps we were having cross-infection happening well before we'd even picked up the first clinical cases – that is our strongest suspicion."

He encouraged the factory to ensure they got their BMCC information as early as possible after one instance of a late arrival delaying identification of a problem. He had also observed that the cows with mastitis all had damaged teats and he had demonstrated this to the employees to show them the importance of cup removal technique.

Due to some personal events in the last months, Alf wasn't so gripped with having the best cell count and said he would be happy as long as the BMCC "stays at a good level".**(11)** He wanted his employees to do the course, he thought he would then take on more of their ideas because they would be more researched. He knew one employee who felt particularly frustrated that his ideas weren't implemented.

By November 2002 Alf's attention had turned to drought and feed issues. He was trying to minimise his cash losses and maintain the herd size and replacement numbers. Another employee had left so he had a relatively new team of employees.**(12)** He had improved cup removal technique and modified his employee incentive scheme in milk quality to a target of keeping BMCC 10% below the previous year. Instead of beer, he let his employees choose the sort of drink they preferred as an incentive. When asked if he believed the incentive was working, Alf said:

*"I think it gives them something to aim towards. They check the tickets and they're more involved. They hate the test buckets too. The sooner they can get cows treated and fixed up they feel better."***(13)**

He had also moved to a position of allowing them to guide the treatment decisions around suspect cows. However, his goal of having the team work together was not as effective as he had initially envisaged with his own resources and effort still driving cell count status.**(14)**

7. ***The BMCC goal has been replaced by a personal standard with the original aim, of staying in premium payment, becoming a fallback position.***
8. ***A new employee can affect milk quality and needs inducting to the farm to promote consistency with existing practices and protocols.***
9. ***The performance incentive is motivating employees to improve clinical case detection.***
10. ***Over-riding their suggestions does not build employee independence or relieve Alf of any of the milk quality burden.***
11. ***Alf's self-reliance may hamper his capacity to deal with unexpected events.***
12. ***New employees need to be inducted to farm practices to reduce the risk of adversely affecting milk quality.***
13. ***The incentive is starting to become the focus rather than what it is trying to achieve.***
14. ***Alf needs to clearly decide in what way he would like to build the capacity of the farm team and, therefore, the capacity of his employees (for example developing decision criteria for treatment, etc).***

In June 2003, the season had got a lot harder for Alf with the drought having an increasing impact. He had culled a lot of cows due to feed shortages and the herd size was down to 230 cows. The BMCC had gone to more than 200,000 cells/mL in summer and was now back to 110,000 cells/mL. Alf believed the nutritional situation led to the high summer count. He didn't make great efforts to get it lower at the time as:

> *"As long as we stayed in premium I was reasonably happy ... the season has made us realise there's probably a lot more important things than just cell count in the operation, and survival was the main thing."*

He had only one employee, the other having left earlier in the year. The remaining employee had just completed the course and Alf hoped he could afford to keep him on. **(15)** Having his employee attend the course had reaffirmed the need to focus on mastitis prevention as the cost of treatment has significantly reduced his profitability. **(16)** Clinical cases were an issue with 15 cows having been treated over the last three months but Alf rationalised this given the season. **(17)** He was feeding some high count milk to calves. They had also split the herd to minimise cross-infection and to give the fresh cows better feed. Alf had no plan for the return of his agisted cows.

CONCLUSION – MOTIVATING THE FARM TEAM

Alf identified that a consistent milking routine was required to achieve his goal of staying in premium and worked at moving all milkers toward best practice and keeping them motivated. However the milk quality burden basically stayed with Alf and by the end of the 18 months it had become a secondary consideration to planning for survival through the drought. The challenge for Alf is to build the capacity of his farm team so that he can delegate tasks and manage emerging issues. He would benefit from having a strategy that supports employee development (increasing their management capacity and responsibility for milk quality on the farm) and using structured support from advisers to assist communication and team building and help him plan ways to reach his goals.

15. To make the most of their efforts, the goals and strategies of Alf's Mastitis Action Plans should be consistent with his employee's plan.

16. Having another team member go to the course acted as a refresher for Alf.

17. Given the changes on farm (drought, employees leaving, clinical case 'blow out'), it would be timely to revisit the milk quality goals and determine what support would help the farm business better survive the difficult times.

#3 Jason – Negotiating for change

Before the course

Jason was a new herd manager on a farm with 470 cows. The owner had an active role in the farm on a day-to-day basis however they tended to operate separately, each having separate working times and tasks, a bit like 'ships passing in the night'. The Bulk Milk Cell Count (BMCC) was under 250,000 cells/mL. Jason had been fairly happy with the farm's milk quality management in the past 12 months but just prior to the course there had been higher counts:

> *"The cell count's been high with fresh cows in. The farm's had over 250 [,000 cells/mL], it's always been just in premium and the aim was to get it down. In terms of clinical cases during the year ... we're pretty good, maybe 45 cases in the last 12 months during lactation in 470 cows that's pretty good ..."*

Jason wasn't motivated to attend the Countdown Downunder Farmer Short Course but the owner said it was good and suggested he should do it even though that put pressure on the workload. The owner had attended the course the previous year and wanted Jason to go both as a refresher for himself and to understand a bit more about their recent higher cell counts. **(18)**

JASON
Manager
Less than 30 years of age
In dairying less than three years
Regularly attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed three times (until July 2003)
THE FARM
Spring calving in Western Victoria
470 cows
Two workers (owner and employee with casual help through calving)
Uses spot herd tests
BMCC in 12 months before course averaged 217,000 cells/mL (range 170,000-324,000)
Clinical case rate before course was reported as about 10 per 100 cows during lactation
The milk quality challenge was to stay in premium by focusing on clinical case management during lactation
Advisory support readily available

Mastitis Action Plan

Goal: To reduce clinical mastitis during lactation and to maintain a BMCC below 200,000 average

- Regular checks of milking plant
- Sample all clinicals
- Culture if several cases occur or if treatment is not successful
- Herd test more frequently to gain more accurate data
- Use herd test results to monitor the spread of mastitis through the herd
- Faster action when clinical cases occur – strip all cows.

After the course

Jason's actions toward his main goal, getting 'on top' of clinical cases earlier, began immediately:

> *"[Before the course] ... you'd pick up clots but you'd only take action if it was still there after two nights. Then you'd strip the problem cows and then end up stripping the whole herd and you've lost four days ... cows with clinical cases, cups not getting disinfected and they might be spreading it ..."*

> *"[Since the course] ... if there is a suspect cow they get drafted out (without getting milked) and they get done last so there is no contamination to the plant. And we talked this morning, we are going to start running a second herd of fresh cows ..."*

He and the owner hadn't used their vets much for mastitis control but felt they could after the course, especially in the area of clinical treatment options:

> *"We couldn't just treat them and hope for the best ... get cultures done and get them [the vets] out as they see a lot more ... talk to them about what you've been doing in case you're missing something."*

During the course Jason had identified that the recent high BMCC was likely to be due to "a lot of subclinicals in the herd that aren't developing" into clinical cases. He hadn't seen the owner's Mastitis Action Plan from the previous year but had shown the owner his from the course.**(19)**

18. The owner valued having another member of the farm team go to the course.

19. Given that there are two Mastitis Action Plans for the herd, it is necessary for the farm team to jointly decide the farm goal and way of achieving it to get the most from their efforts.

In general the owner was happy with the elements Jason suggested except increasing the frequency of herd testing.**(20)** They had implemented quite a few things since the course:

"We're going to do regular checks of the machines, we've already talked about that and we're going to set aside one day a month to do the monthly checks. We pretty much already do all the ones they suggest at each milking. We've already started on reducing clinicals – we had a clinical case last week so I went into the vets and took a sample, and also put one in the freezer, that's something we've changed. There were a couple of cows last year that just kept getting it and we were just treating the same thing all the time."

Jason's real challenge was to convince the owner to increase the frequency of herd testing so better decisions could be made about problem cows (currently this was done once every second month with one milking only):

"He'll do it – it'll just take me a bit of time, I'm pretty confident if I can convince him why it will be beneficial. With 500 flasks you need an extra two people there to do it ."

This was important to Jason as the course had raised his awareness about culling decisions.

*"When we did the course they put that row of 4-6 cows counts up and asked "which one to cull" and everyone picked that fourth one, but when we had the information for the last lactation you would have culled a different cow – so that plays in my mind a bit."***(21)**

Jason and the owner worked very hard with limited extra help. Only one person was involved at each milking and they were aware that their teat spraying practices may not have been up to scratch. Through the course Jason realised the teat spray system probably wasn't doing the best job:

*"We use about 25 litres of teat spray every milking so they're not getting a lot on them and it should be on them straight away (which it's not) and its also not covering the front of the teats. I did do the test and it was probably worse than I thought ... and I know that the older cows with large udders, they hardly get any coverage at all because it [the teat sprayer] is set for the average cow. [When we put it in] we thought we'd do it for the average cow and the heifers with small udders and if those older cows that don't get coverage get a high cell count or mastitis we'll just sell them."***(22)**

Jason was also keen to establish a computerised cow recording system so he could make better decisions. This was a high priority for him as recently they had had a problem with cows calving earlier than expected while they were still in the Dry Cow Treatment withholding period.**(23)**

Overall, the course increased Jason's confidence in tackling the mastitis issues for the farm and he continued to re-read the *Countdown Downunder Farm Guidelines for Mastitis Control* and felt that he and the owner would be able to get 'on top' of cell count issues and clinicals.

At the next interview in October 2002 Jason felt he was keeping 'on top' of clinical cases but wondered why the BMCC, which was around 200,000 cells/mL, wasn't lower:

"[The cell count is] creeping up, we find it hard to keep it there ... it's not worse than other years and we've been in band 1, which is the main thing."

"... it's frustrating because at the moment the cell count's [been] 210 or 215 [,000 cells/mL] in the last few days, and there's nothing in the filter sock at the end of milking. It would be hard to find a cow. I don't know if it's worth treating or not, I suppose I should really go and ask the vets what they think ..."

Jason had had slightly more contact with the vets since the course. He had followed up on cultures earlier in the season resulting in an antibiotic change for a particular cow. He had continued the regular checks of the milking plant and this had been worthwhile:

"We've gone to getting all the pulsators checked every 10 weeks by the milking machine technician ... we've had problems with cows being under milked and we had a little bit of a mastitis problem for a while there ..."

Jason and the farm owner were finding it difficult to keep up with the demands of heavy workloads and sometimes the owner hadn't taken samples when it was required and the milking routines and record keeping had slipped a bit. **(24)** The workload had reached a crisis point when both he and the owner got ill. Jason had spent some time in hospital and both of them were run down. Jason was going to broach the idea of having someone else on permanently rather than just casual help through calving. He believed he had a case and that it had taken "that event to highlight that we need someone else". **(25)**

20. The attempt to convince the owner to increase the frequency of herd testing may have succeeded if the benefits were obvious (demonstrated by a trusted adviser for example).

21. Understanding is translated into worry rather than action.

22. A path forward has not been planned for an identified technical need.

23. Given the many improvements that could be made on the farm, the owner and manager need to agree to the priorities to make progress.

24. "Things starting to slip" suggests a true management need is not being met and flags the need for a situation review.

25. A labour shortfall is adversely affecting milk quality.

Jason had been encouraging the owner to adopt a few of the things in his Mastitis Action Plan. He had been somewhat successful in getting more regular herd testing:

> *"I couldn't get him to go every four weeks like I wanted but I got him to do it every six weeks at the moment through the winter when we've got a higher chance of mastitis and when the cows are letting down a lot of milk. After that we are going back to every eight weeks again. But that I thought was a fair compromise."*

Jason felt the owner had seen the benefits of this because, when they debated which cows to sell, the owner had more easily picked out cows using their individual cow cell count. Jason had also realised that a computer-based cow recording system wouldn't be useful to the owner as he wasn't computer literate, so Jason compromised and now had a comprehensive book system that covered cow breeding information, drying-off dates and calving dates. He was still trying to keep the BMCC under 200,000 cells/mL but wondered how committed the owner really was:

> *"I'd like to get the cell count down a little bit. But then again if you are under 250 [,000 cells/mL] I think [the owner] ... can't see any point spending time and money to get it lower, we don't get any reward for being any lower than that."***(26,27,28)**

Jason believed it was going to be a challenge in the coming months to keep it below that figure. He felt the wet and muddy conditions could continue and had already identified that the cows' teats were starting to crack:

> *"... we aren't putting any emollient in the teat spray, so I think we are going to have to look at that very soon. For probably the last week the cows have started kicking a bit when you put the cups on and the teat ends are getting a bit sore I think ..."***(29)**

Jason reflected that it has been a hard year to try to implement things and the owner wasn't very keen "if they cost a bit of money to do". In terms of his future, he would like to pursue something on his own, such as leasing a farm or sharefarming "in about 18 months".

It was hard to track Jason down for a third interview because he had left the farm in autumn. He was found in July 2003 working on his family's dairy farm. Although he had intended to stay for longer at the previous herd, an opportunity had come up as his parents had purchased more land and were milking more cows. He had bought a house as an investment in a neighbouring town and commuted to work.

Jason still had a good relationship with the previous farm owner. Thinking back, he felt he had achieved at least a maintenance status on the farm he left and that practices had changed. When he left, the cell count was still around 250,000 cells/mL at the end of lactation and he had encouraged spot tests and got the vets involved. Yet, despite Jason's hopes, the owner still resisted extra herd tests because "he just hated herd testing ...".

Jason had a personal goal of keeping the BMCC on his parent's farm below 200,000 cells/mL. He recognised this was difficult given the extended calving pattern which meant there was a mix of fresh and stale cows but he would try to influence milk quality and mastitis management.**(30)** He hoped to get his parents along to a Countdown course and, in the meantime, tried to keep an eye out for clinical cases. He hadn't taken cultures but checked the filter sock to keep on top of issues and minimise spread. Herd testing was not a problem on the family farm with monthly, morning and evening tests.

Jason was gradually buying into the herd but had told his father he would prefer to farm in a region further south near where he had been working.

CONCLUSION – NEGOTIATING FOR CHANGE

Jason gained a good grounding in the basic principles of mastitis control at the course and, being a highly motivated individual, used this to reduce the risk of spread of mastitis in the herd. The challenge for Jason is to have a process that helps him negotiate his ideas for improving herd performance with the owner so that they can discuss plans and commit to a joint outcome. Advisory input could be used to support the planning process – especially to provide much-needed technical guidance for good decision-making (such as working through the pros and cons of more frequent herd testing and developing a clinical case protocol for the herd).

26. The dairy company BMCC threshold for premium payment has become the fallback position even though farm profitability would increase if cell counts went below this level.

27. Jason needs to be able to demonstrate the benefits of lowering BMCC beyond the premium threshold to the owner.

28. A seemingly small difference in the BMCC goal may require a different set of actions.

29. Jason is using Countdown triggers, for change in cow behaviour and teat condition, to initiate management changes.

30. Jason carried the skills developed through the course to the new farm.

#4 Grace – Dealing with complexity

Before the course

Grace and her husband milk a year-round calving herd of 400 cows. They had employed people for the first time this year after many years as a family partnership. Previously, Grace and her husband and their business partners spent equal time in the dairy milking the cows:

> *"... everybody did things very much the same, very little variation and we probably achieved a lot in the mastitis area because of that."*

The Bulk Milk Cell Count (BMCC) had been fairly static at below 250,000 cells/mL and they did not have too many clinical cases. But, after taking on the employees, the cell count had been fluctuating: **(31)**

> *"... three months in we had a couple of major outbreaks relative to previous years. We called in the vets. It didn't fix it. It's quietened down but I can see there is an underlying problem sitting there ..."*

Grace felt there weren't any clear solutions. She had always been sceptical of advice on lowering BMCC, believing there were so many factors at play and therefore little capacity to improve. **(32)** Their vet encouraged them to attend the Countdown Downunder Farmer Short Course and they went because their employees were going and they thought it was important to have the same understanding.

GRACE
Owner
More than 40 years of age
In dairying more than 10 years
Regularly attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed four times (until June 2003)

THE FARM
Year round calving herd in Northern Victoria
400 cows
Four workers (two owners and two employees)
Milk recording
BMCC in 12 months before course averaged 176,000 cells/mL (range 87,000-267,000)
Clinical case rate before course not reported
The mastitis challenge was to reduce the risk of cows becoming infected
Advisory support readily available

Mastitis Action Plan

Goal: Minimise the opportunity for bacteria to enter the udders of both dry and milking cows

- Teat disinfection – clear written procedures for all milkers
- Calving management – to be achieved by involving all milkers in discussion about best management practice
- Milking routine – what will be best management practice on our farm? All milkers must be in agreeance
- Best management practice for calving – to be revised weekly during calving
- Managing clinical cases – clearly defined procedures, especially how information is recorded
- Milking systems – introduce annual or biannual checks by an outside technician – or more frequently if triggers are activated. Identify what our farm triggers are.

After the course

Grace was impressed that the course focused on best practice rather than black and white solutions, and gave her a new way to look at how to minimise the chance of mastitis in the herd:

> *"... it arms you with a lot more information that you can assess, self-determine your approach, with consultation as required."*

The factory milk pricing signals were putting more of a focus on BMCC than they used to and this made outbreaks more noticeable. **(33)** Grace said her employee's goal was to have a BMCC well under 250,000 cells/mL but added "it worries [him] more than it worries us". **(34)** Her aim was to come up with a good management plan for mastitis that would be agreed upon by all workers on the property:

> *"My intention now after doing the course is to sit down with the employees and discuss each section that we have covered and come up with what we're going to call 'best management practices' on this property."*

31. When employing people for the first time, the management practices and values of the farm need to be well understood by the new employees to focus effort and encourage consistency.

32. Grace needs to believe that routine practices do affect a complex system.

33. Udder health practices are being geared to ensure BMCC stays under the dairy company threshold for premium payment.

Her focus was on calving management because the vet had indicated that this was a crucial time "where a lot of our clinical cases and outbreaks and environmental mastitis can come from". The things they were going to try included wearing gloves, changing teat disinfection system, milking machine checks, more use of cultures and veterinary advice on treatments.

The next interview was in August 2002 during calving. Even though Grace had been keen to improve their calving management strategy, calving management had been very similar to what happened last year. Grace was happy with the number of cases of mastitis they had had and felt they had been more rigorous in stripping cows, especially when the cows were moved from the fresh herd into the main herd.

Employee: "For the first eight milkings we would check them every milking, then when they actually go into the main herd then we check them again. I picked up one that way that I obviously missed."

A new teat spray system had been installed in the shed and it had been a great help, being a lot easier and achieving "more coverage over the teats". Grace and the employees were counting the clinical cases and using the level of more than two cases per 100 cows as a trigger for further investigation. **(35)** They were trying to ensure clean paddocks for calving and were monitoring the BMCC (which was at 208,000 cells/mL):

"It's probably higher now than it was in the last few days. But still there are no clinical cases."

They had planned to strip the herd that day to investigate further and then, after the next herd test, identify problem cows.

Although she and the employees hadn't had the opportunity to talk formally about their best practice routines, Grace wasn't too concerned because she didn't want to rock the boat while things are going along well: **(36)**

"If problems occur or [the employee] has a problem, then there's an opportunity to sit down and look at what we are doing now and what are our best practices and what do we want to change."

The situation had changed dramatically by the next interview in November 2002. The drought had become all consuming and little had been done in terms of mastitis. Many decisions had been made with a goal of surviving the drought and "getting the cows through as best we can for next year" and resulted in water budgets, feed budgets, cow parking, agistment for young stock and discussions with financial institutions.

They had parked 84 of 300 cows, sending the ones with low individual cell counts as a courtesy to the farmers taking them. Grace's main target had become keeping the BMCC under 250,000 cells/mL but nothing specific had been done.

By the final interview in June 2003 the focus was still survival, with drought conditions having worsened over the past six months. The cow parking experience had helped them feed-wise but Grace was unsure of how the BMCC would be affected when the cows returned to the farm because Dry Cow Treatment hadn't been part of the cow parking agreement.

"I guess next year will be interesting to see if we did the right thing or not."

Although they had expected the BMCC to jump over the past six months it stayed under 250,000 cells/mL without doing anything specific:

"We haven't had more mastitis than we normally would have had ... how or why we did that we're not really sure ...". **(37)**

One of their employees did keep an eye on particular cows and he sometimes put a suspect cow into the test bucket, particularly if the BMCC had been at risk of going over 250,000 cells/mL.

Some cows had had milk fever at calving and ended up with mastitis. They have since developed a plan for next season to deal with cows with milk fever.

Grace talked about their decision to employ a nutritionist to help manage pastures and overall farm management. They had clear criteria on how to choose that person, what their responsibilities would be and how success would be monitored.

Grace hadn't had the time to develop farm team best practice:

"I've spent all my time doing drought things ... the amount of time was unbelievable, just the planning and the time put in and to a certain extent its still going on ..." **(38)**

CONCLUSION – DEALING WITH COMPLEXITY

The course helped Grace systematically think through risks to milk quality and mastitis and convinced her she had the power to lower the BMCC. The decisions made to help the business survive the drought demonstrated Grace's capacity to take control and develop short-term strategies. However, through these difficult times she regarded mastitis and milk quality management as distinct from other issues and of lower priority. The challenge for Grace is to include consideration of mastitis and milk quality risks in her routine decision-making, for example, planning a dry cow strategy for parked cows would ensure the new lactation was 'off to a good start'.

34. Given the different BMCC goals, there is the potential for the owner and employee to focus on different actions.

35. They are using the Countdown trigger to alert to problems with clinical cases at calving.

36. Avoiding planning discussions until they become necessary suggests the relationship between members of the farm team is not entirely comfortable.

37. Planning a course of action that is cost-effective and doesn't put milk quality at risk is as important in difficult times as at others.

38. Planning to protect milk quality and mastitis control through the drought has received little consideration even as a part of other decisions (such as cow parking).

#5 Alan – Working without cell count incentives

Before the course

Alan has been in the dairy industry for seven years and for the past 30 months has managed a 300-acre investment property, milking 280 cows in a new (two-year-old) dairy. The BMCC averaged about 180,000 cells/mL but there were problems with clinical cases at calving and at the end of the season. He did the Countdown Downunder Farmer Short Course believing you "can't get enough information" and because of their clinical mastitis problem.

Mastitis Action Plan

Goal: Decrease clinical cases and have BMCC less than 150,000

- Teat end inspection more often
- More effectively teat spraying
- More care when drying teats after washing
- Have cultures done (every second cow)
- Use 70% metho and cotton balls and scrub the end thoroughly when using intramammary products
- Get cows used to teat handling
- Gloves on when milking

After the course

Alan appreciated learning the principles behind the management practices. The course gave him a new appreciation and understanding of mastitis bacteria and the role of cultures:

> *"I didn't know that there were different sorts of Streps and Staphs and different cultures of mastitis. I've just treated mastitis as mastitis. I never got involved with subclinical mastitis because I never really learnt about them."*

During the course, he made a lot of changes with a focus on teat health including better teat spraying, using emollient and keeping the plant serviced and running "right". He found the teat dip and hygiene sections the most helpful parts of the course because he changed his teat dip and management with immediate results (a lower BMCC):

> *"... we were teat spraying ... but the first day we were there we got told 'read the label, bring in the sample and do a test' and we learnt about emollients. And after reading it [I] found out that it doesn't have emollient in it. I started mixing emollient with it and spent a little bit more time ... the 20 mL per application and teat dipping ... our count came down, teat health improved like suppleness in the period of the three weeks of the course. And I've never worn gloves and now I do."*

ALAN
Manager
30-40 years of age
In dairying 3-10 years
Regularly attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed four times (until September 2003)
THE FARM
Spring calving herd in Gippsland
280 cows
Two workers (employees)
Milk recording
BMCC in 12 months before course averaged 225,000 cells/mL (range 146,000-436,000)
Clinical case rate before course was reported as 5 per 100 cows at calving
The mastitis issue was clinical cases at calving and at end of season
Advisory support readily available

He was also more confident in explaining to the employees why they had started paying attention to teat dipping and wearing gloves.

Although the goal was to have a BMCC below 150,000 cells/mL, Alan would be happy if the cell count stayed at 180,000 cells/mL. He did recognise he had a clinical mastitis problem but the course had put this into perspective for him:

> *"We had clinicals but nothing excessive ... five in a 100, we weren't really that excessive actually looking at best practices and guidelines ... it wasn't the problem that I thought it was."*

By the time of the next interview in September 2002, Alan had moved into a sharefarming agreement with the owners which meant he had more control over what happened on the farm and he could develop a plan and implement it. **(39)**

His plan was for no more than 13 clinical cases out of the 260 cows to be calved. Since the calving season had started he had been cleaning thistles from the farm, keeping the cows well fed and "keeping the count down":

> *"... if we can linger about the 150 [,000 cells/mL] mark ... under is a bonus, and keep our clinicals down to the recommended two per 100 per month or better."*

39. The change in role, from employee to sharefarmer, increased Alan's sense of responsibility for milk quality and other herd management issues.

He had kept to these goals with only four clinical cases in two months with 200 calved. He compared this to last year which he described as "out of control" with 9-10 cases per month. The BMCC had been as low as 98,000 cells/mL but had jumped in the last week to 168,000 cells/mL so he was going to look for problem cows, although this wasn't going to be an easy task with new cows entering the milking herd every day:

"There's been no evidence of a cow with mastitis, there's nothing in the filter. All fresh ones have just gone into the vat, still stripping them before the cups go on and there's no evidence there. We're herd testing this weekend, that's also going to give me more idea."

To reduce clinical cases, Alan was keeping the calving pad clean and giving the cows a strip of grass through the day to give them a spell off the calving pad.

Alan had a good relationship with his vet and discussed all aspects of farm management with him. His vet was kept up-to-date with the BMCC even when out for other jobs such as induction or bloat. **(40)**

"I was bragging [to him] about my last pick up being 98,000 [cells/mL], but I haven't spoken to him since it's gone up to 160,000. [It] always happens when you have fresh cows come in the herd, there's going to be a high count."

When Alan was contacted a few weeks later to see what had happened with the rising BMCC, he said it had gone up further to 200,000 cells/mL after the herd test (and before the results of the test were known). This had motivated him to strip the whole herd and he had found three clinical cases. He treated those cows and when he had two more cases, collected samples and put them in the freezer. The herd test revealed seven or eight fresh cows with high counts, four of which he had detected in the days after the tests were done. Since his actions the BMCC dropped to 126,000 cells/mL but his clinical total had risen to seven cases in 240 cows – just over two cases per 100 cows. Alan had specifically referred back to the *Countdown Downunder Farm Guidelines for Mastitis Control* to see how close he had come to the guideline triggers. Alan had culled one particular cow that he suspected as the first cow to start the infections (she had had a high individual cow cell count in three of the five herd tests the previous year). **(41)**

It was difficult to get in touch with Alan for a third interview. He was tracked down to a new farm in June 2003 where he was sharefarming. The new farm milked 180 cows and supplied a specialised cheese factory with surplus milk going to another mainstream factory. They had split calving with 80 cows calving in autumn cows and the 100 in spring. Alan faced many challenges on the new farm. The farm and dairy needed a lot of development to make it easier to use and more productive, he had not managed a split calving herd before and was in the middle of staggering the drying-off of the 100 spring-calving cows and there were mastitis and milk quality issues:

"The bloke that was here [before me] basically never worried about cell count, we got here and it was about 350-400 [,000 cells/mL]."

One of the difficulties was patchy reporting of cell counts by the cheese factory. BMCC information tended to come fortnightly from the mainstream factory that took the milk on the weekends. With no payment incentive for milk quality and limited BMCC information, his main goal was to reduce clinical cases and to improve milk quality by improved detection of clinical cases and introducing teat spraying. **(42)** He was happy with his progress:

"All the autumn ones came in good, we've been keeping an eye on them and they don't appear to be getting infected. Just done a herd test last weekend and that's the first one for autumn calvers."

"I have got it [the BMCC] back down to 210 [,000 cells/mL] now and I'm happy with that." **(43)**

When asked what motivated Alan to keep 'on top' of the BMCC he said that he had done the course and knew "what good milk quality is". **(44)**

He hadn't kept up as much contact with his vet as he used to, although he had insisted that the consulting vet from the previous farm was used on the new farm.

CONCLUSION – WORKING WITHOUT CELL COUNT INCENTIVES

Following the course, Alan used his understanding of the principles of mastitis control to support change toward best practice (in areas such as teat disinfection, clinical case detection and use of triggers) and had achieved an immediate improvement in BMCC. These skills and standards were applied on the new farm, despite the patchy BMCC information. The challenge for Alan is to become more strategic in identifying and managing mastitis and milk quality risks rather than reacting to problems as they arise. Given the strong relationship with his vet, there is great opportunity for the two to work together to develop a Mastitis Action Plan to meet the needs and risks faced on the new farm.

40. There is an opportunity here for the vet to help Alan become more strategic in managing risk.

41. More than a year later Alan is still using Countdown triggers to assess performance.

42. A Mastitis Action Plan for the new farm has not been formally developed and, although the farm is benefiting from improved practices, the efforts may not be as strategic as they could be.

43. Alan's approach tends toward solving problems rather than strategically managing risks.

44. Skills and milk quality standards are being introduced to the new farm.

#6 Donald – When to commit to the basics

Before the course

Donald had always had trouble with the Bulk Milk Cell Count (BMCC), which was regularly over 500,000 cells/mL and had been as high as 800,000 cells/mL. **(45)** He did use his local vet service but not generally for mastitis because he didn't believe clinical cases were an issue in his herd. **(46)** Despite this, his vet had initiated the collection of milk cultures and suggested that the herd should be treated with Dry Cow Treatment. Donald had read about the Countdown Downunder Farmer Short Course in a dairy factory newsletter and said he had been "told to come".

Mastitis Action Plan

Goal: To reduce cell count to below 200,000 by November 2002

- Drying-off – use blanket dry cow as recommended by vet.
- Milking hygiene improve
- Cull persistently infected cows
- Ask for professional advice if problem persists
- Reduce exposure to environmental mastitis bacteria
- Monitor and maintain milking machine function
- Set times to do annual mastitis control activities and review achievements (September)

After the course

Donald was familiar with the *Countdown Downunder Farm Guidelines for Mastitis Control* and didn't feel there was anything new in them or the course. He recognised, however, that each person had better knowledge about certain parts of the book than others and were able to share that knowledge through communication. Donald found the communication parts of the course most interesting but didn't believe it was an issue on his farm.

Donald was more aware of issues to do with subclinical mastitis in his herd and had used the Farm Guidelines to explore options for improving teat disinfection:

> *"I probably never understood the subclinical side of it as much. I understand now that the subclinical, even though you're not getting clots, it can be as bad as or worse than clots."*

DONALD
Owner
More than 40 years of age
In dairying more than 10 years
Rarely attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed two times (until November 2002)

THE FARM
Year round calving herd in New South Wales
150 cows
Three workers (owners and son)
Not milk recording
BMCC in 12 months before course averaged 463,000 cells/mL (range 357,000-653,000)
Clinical case rate not reported
The mastitis and milk quality issue was high bulk milk cell counts
Advisory support reasonably available

> *"... that was the thing I did change after going to the course [was to teat dip] to reduce the bugs and improve the teat health."*

They had started wearing gloves as part of their milking routine:

> *"... cleanliness is probably the number one thing we are talking about, the awareness of transfer ..."*

Donald gets individual cow cell count information every 6-8 weeks through milk recording and although he would like to cull cows on the basis of cell count, he had a problem with good cow identification.

He had never used Dry Cow Treatment in the herd and had not seen the need. Through the course, he learnt more about the reasons behind using antibiotic at drying-off and how to administer it. He had started a blanket dry cow strategy using the antibiotic that had been suggested by his vet but had not been finding it easy to accommodate in his year round calving herd. Donald kept track of all treatment records as part of the quality assurance scheme for the herd. The vet had suggested Donald treat problem cows with a new product over longer periods but Donald preferred to cull cows as he believed they weren't worth this costly treatment.

45. This BMCC places the herd in the bottom 6% of the national herd.

46. A full mastitis investigation would clearly define the problem and describe the support needed to achieve critical steps in its resolution.

Overall, Donald was convinced Dry Cow Treatment and improved hygiene would have a significant impact. However other issues such as stray voltage and selenium deficiency played on his mind and he was not confident that "everything will be fixed". **(47)**

The next interview was conducted in November 2002 and Donald was not happy with how things had gone, saying "I can't get the cell count down".

> *"I did believe that by doing these things [on the Mastitis Action Plan] that I could have done it [reached the BMCC goal], but no, it's not happening."*

> *"It [the BMCC] came down, we got it down to nearly 220,000 cells/mL but out of the blue which I don't understand with nothing different being done. It doesn't make any sense to me, I'm just wondering are we getting a fair test?"*

He had continued some elements of the Mastitis Action Plan: teat disinfection, treating all cows with Dry Cow Treatment at drying-off and machine testing. Rather than wear gloves, he was "using the iodine mix on his hands". **(48)** There had been a few cases of clinical mastitis and he hadn't changed the way he managed them. Donald was unsure whether the vet or factory could really help. He hadn't got the vets to come back since the BMCC rose again but felt that it was going to take a lot longer than first thought to get the cell count down:

> *"... I think what we've got in place we've got to let run a course [a whole lactation]."*

He wondered aloud whether it would be better if he just got out of dairying all together.

Donald was unable to be contacted for a final interview.

CONCLUSION – WHEN TO COMMIT TO THE BASICS

Although Donald did not feel he gained a lot from the course, a better understanding of issues encouraged him to implement some of the advice given by his vet and the changed practices resulted in a lower BMCC in the short-term. However the herd had a mastitis problem that warranted a full investigation to identify the key steps for control. The challenge for Donald is to fully commit to a mastitis investigation to clearly define the problem in the herd and take responsibility for the 'must do' actions necessary to control the problem in his herd.

47. Donald is still looking for a single underlying cause to his milk quality problem (but there is no 'silver bullet' for this herd).

48. Even the most basic best practice is being circumvented.

#7 Tom – What happens after early success?

Before the course

Tom had worked in other industries prior to dairying but has been in partnership with his uncle for about three years milking 140 cows in a herd that calves year round. The Bulk Milk Cell Count (BMCC) had been around the 250,000 cells/mL and one of the main motivations for Tom to attend the Countdown Downunder Farmer Short Course was to get the cell count down to the dairy company threshold of 200,000 cells/mL "so we can earn an extra dollar at the end of the day". Tom hadn't had a clinical case for eight months and believed his problems were subclinical.

TOM
Partner
30-40 years of age
In dairying less than three years
Occasionally attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed twice (until August 2003)
THE FARM
Year round calving herd in New South Wales
140 cows
Two workers (he partners with another family member)
Milk recording
BMCC in 12 months before course averaged 242,000 cells/mL (range 215,000-307,000)
Clinical case rate not reported
The milk quality challenge was to stay in premium
Advisory support reasonably available

Mastitis Action Plan

Goal: To reduce cell count below 200,000 by June 2003

- Reduce exposure to environmental bacteria
- Monitor bulk milk cell counts
- Practice good hygiene during milking
- Use blanket dry cow practicing good hygiene
- Fix areas that make udders muddy
- Cull persistently infected cows

After the course

Tom had achieved the goal of his Mastitis Action Plan by the end of the course. The pulsators had been changed just prior to the course and he felt this had made a big difference to cow behaviour at milking and the cell count. He said he got "a lot out of the course" especially the interaction with other farmers and the biology section. Although Tom was mainly responsible for the milking, he felt his uncle was 'old school' and less likely to support change:

> *"... he would throw inflations out [only] when they are broken. I'm working on it ..."*

Tom hadn't been aware of the implications of cup slip and liner deterioration before the course but had had organised to have the inflations changed since the course. The milking machine technician had shown him the liner deterioration:

> *"... mind you they were only eight months from the last service and they were completely had it. I think that probably contributed to 30 [,000 cells/mL] of it ... with cup slip ... a bit of cross-infection there."*

His main focus was to keep the liners up-to-date, reduce muddy areas near the dairy to lessen the exposure to environmental bacteria, and calve on clean, dry paddocks. He was much more aware of some critical management practices he could have done better, especially the administration of Dry Cow Treatment:

> *"We've always teat washed and sprayed in milking but when it came to dry cow we'd just slap it on and it should be right ...".*

Since the course Tom had started administering Dry Cow Treatment to cows with individual cow cell counts over 200,000 cells/mL. He was trying this selective dry cow strategy for one year to decide whether it would suffice or whether to move to a blanket strategy.

Tom had started to keep specific cows out of the vat until they were dried-off and intended checking them for mastitis after they had calved again. He was taking much more care with ensuring good coverage when disinfecting teats. The next step was to reduce the mud around the dairy and in calving areas:

> *"I wasn't keeping a close eye on the dry cows as I do now ...".*

The BMCC fell to around 175,000 cells/mL within a few weeks of finishing the course. Tom was fairly happy with this and they had been receiving premium milk payment:

> *"I didn't think it was impossible to do it. The course gives me the punch to do it, I'd be keen to get more involved in the mastitis thing ...".* **(49)**

49. Confidence in the approach helps initiate change.

Tom felt he had good support around him with his vet, milking machine technicians and department dairy staff. Although he hadn't had any real need to contact them for mastitis issues he said if he had a problem "it would only be a phone call". **(50)**

It was difficult to contact Tom and consequently the next interview was held about a year later in July 2003. Tom said the BMCC had been around 200,000 to 220,000 cells/mL:

"I don't know any real reason and as hard as I'm trying I just can't seem to get it lower than that."

There had been a few problem cows but no real clinical cases, just subclinical mastitis. He believed he could keep the BMCC under 200,000 cells/mL by "culling a bit harder" but needs to have more replacements to do this.

Tom had fed milk from cows with a high individual cow count to the calves and had found it difficult to assess the mastitis status of cows that were high one month and low in other months. However, he believed that diverting this milk to the bucket did help reduce the risk of cross-infection.

Although Tom had maintained the practice changes from his Mastitis Action Plan (such as maintaining rubberware, servicing the machine and putting in cup removers), he hadn't gone back to it much as he had completed most tasks.

He was still trying to keep the entry into the dairy mud free but it was proving difficult to "get the cows out as quick as possible so they are not wallowing in it". His next step was to lay down some road base. They had changed to blanket Dry Cow Treatment and had started to see benefits (by checking that cows returning to the herd were not having mastitis problems).

Tom still wanted to keep the BMCC below 200,000 cells/mL and was disappointed that they had not been able to maintain the low level they had achieved after the course. It had ballooned to 260,000-280,000 cells/mL during a period when he and his uncle had been unable to milk for a number of weeks due to injury and a few different people been employed. Tom attributed the BMCC rise to poor cow management and different procedures used at milking and although it had come down periodically "it hasn't really recovered since that". He wasn't really sure why he was having trouble attaining his goal:

"I don't know whether it's because we are calving all year round and there's always fresh cows coming in, I can't put my finger on it." **(51)**

Tom had been using the vets a little for services such as pregnancy testing or treatment of individual cows with sore feet or particular mastitis cases. **(52)** Cultures hadn't been done but the vet did help them get "good prices" for the drugs they were using. Tom's vet wanted them to try batch or seasonal calving but Tom was sceptical even though he does believe it would help the BMCC.

Overall Tom was optimistic about keeping the cell count down but felt frustrated that he wasn't able to do it consistently. He often thought back to the Countdown course:

"When you come across a problem you think back to it – what did we talk about or what did we do – you might even go and grab the manual off the shelf and do a bit of a flick through it ...".

CONCLUSION – WHAT HAPPENS AFTER EARLY SUCCESS

Tom developed a good understanding of the principles of reducing the risk of infection from the course and had 'ticked off' most of the elements of his Mastitis Action Plan soon after the course with immediate effect on the BMCC. However, new risks to mastitis and milk quality emerged (different milkers in the shed for example) that were not covered by the original plan. The challenge for Tom is to embed the planning process into routine management to the same extent as he has the practice change. He would benefit from using a more strategic approach to identify and manage potential risks to mastitis and milk quality with appropriate input and support from his advisers.

50. Problems, rather than risk management, are triggering action.

51. A new Mastitis Action Plan is needed to identify and prioritise management tasks to continue progress toward lowering BMCC.

52. Advice is being sought for individual cow treatment rather than using this interaction to monitor and advance the herd situation.

#8 Ryan – Keeping pace with change in a large herd

Before the course

Ryan has been manager of a large investment herd of 850 cows worked by four full-time employees (including himself) for two years. The farm had changed the dairy company it supplied four months before the course and now had bigger incentives for contract production. Ryan had always been 'on top' of the Bulk Milk Cell Count (BMCC) and the herd had recently been in their factory's top 10% for cell count. He wanted to maintain this performance and avoid BMCC 'blow outs' (which usually occurred in September during calving) and it was this, along with a recommendation from his vet, which had motivated him to attend the Countdown Downunder Farmer Short Course. Ryan saw the course as a good opportunity to refresh his knowledge and practices:

> *"... even though I try to bring the best practices that I thought of [I] still need a refresher. And I took the assistant manager so you can really set proper goals and do it properly. Instead of last year we had a 'blow out', this year we know we can prevent it before it actually happens."*

He had met the BMCC challenge except for a few 'blow outs':

> *"We got a big one the other day which was 203,000 [cells/mL]. We've set a few systems in place which helps things and we've got a computer ... in the dairy [that] tells everyone which are problem cows ..."*

Ryan's "systems" included regular plant testing every six months (changing the rubberware and checking pulsation), a good relationship with the milking machine technicians and regular consultations on farm management with his vet.

Mastitis Action Plan

Goal: Have the BMCC less than 150,000 for next 12 months

- Teat disinfection – more accurate measurement (laminated sheet of instructions) and measure the rate of spray
- Dry cows – put them in separate mob and change feed routine
- Milking system – spot test completeness of milking and dry teats after washing
- Calving management – keep the pad clean
- Cell counts – graph the cell counts so staff know what's going on
- Culling – make sure we've made the correct decision
- Clinical cases – define what clinical cases are and have staff training

RYAN
Manager
30-40 years of age
In dairying less than three years
Regularly attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed four times (until June 2003)

THE FARM
Spring calving herd in Gippsland
850 cows
Four workers (a manager and three employees)
Milk recording
BMCC in 12 months before course averaged was 139,000 cells/mL (range 95,000-259,000)
Clinical case rate not reported
The mastitis issue was clinical cases in spring
Advisory support readily available

After the course

Ryan found the hygiene focus in the course good:

> *"You know you think you're doing things properly, you're probably causing more damage than what you actually think you're doing right. Like even the teat spraying, that simple test showing you how to test it ... and there's a fair few dollars so we can stay in band 1 for most of the year ... could be worth sort of $50-60 thousand for us."*

He met with the farm owners after the course to bring them up-to-date with what they were going to do as a result of the course. He also discussed the course with his vet, who was very interested having completed a Countdown Downunder Adviser Short Course.

Ryan had just treated some cows for drying-off and paid attention to the *Countdown Downunder Farm Guidelines for Mastitis Control* to do things properly and "set us up for next year". He was implementing other things according to his Mastitis Action Plan such as improving identification of clinical cases, making better culling decisions, changing calving pad management and holding weekly meetings to help the other employees understand more about risk and cell counts. Keeping a clean calving pad had become a priority since the course:

> *"Some of the things before I did the course I already thought that I was going to deal with next year, but yet when you do the course thing, well it's a lot more important than I thought it was ...".*

Ryan planned to get the vet out at critical times such as in spring when they have 'blow outs' to ensure everyone on the farm is working together:

"... and maybe even a half an hour meeting with everybody to say 'it's all going well, keep going' or 'we need to tweak these bits'...". **(53)**

At the second interview in September 2002, Ryan had just returned from an overseas trip. It was a very hectic time and there were many "dramas" for him to sort through on his return to the farm. His assistant manager had struggled to keep 'on top' of things while he was away. **(54)** However calving had gone well with good weather conditions and attention to the calving area:

"... you could just tell by looking at it – pads per square metre you knew when the pad was getting dirty." **(55)**

"We're more conscientious of what happens around us this year. We've cleaned out the calving area three or four times this year, just kept it fresh all the time. We've put a few things in place and been a bit more on the ball."

Ryan had continued to improve milking management and they ran separate mobs and stripped each day.

He was fairly pleased with the level of mastitis so far and although he couldn't remember whether having 10% of the herd with clinical mastitis exceeded the warning level described in the farm guidelines it did act as a trigger to clean the calving pad. The vet had taken milk samples establishing environmental bacteria as the problem. Ryan had treated 71 cases of mastitis in August and 23% of these had needed a second treatment. Some cows were subsequently culled because they had a history of infection and needed multiple treatments this year. Ryan said his employees do get disappointed with the number of clinical cases and the extra work it entails but this has also raised their awareness and their interest in keeping "on top of it".

After calving Ryan's focus moved to milking management: making sure the milking plant was working correctly, that milking times were fair and staff practices in terms of teat spraying were correct. Overall he was very happy with how things were going on the farm with production up significantly, the farm more developed and some extra land available to him for use for feed. The BMCC had dropped to 105,000 cells/mL and averaged about 130,000 cells/mL:

"... it's the lowest we've ever had it at this time of the year [September]. Our highest cell count jumped up to 270 [,000 cells/mL] for one or two days but apart from that we've been around 160 and this week we've dropped to 130."

Ryan was still focused on keeping cell count under 150,000 cells/mL:

"I don't receive any of that money, but I want to be under 150 [,000 cells/mL] just for our sake ... and I like to pride myself that we can get it below 150 all year round just through my management. I don't like to see any blow outs."

Ryan appreciated the farm guidelines because he was able to quickly get 'on top'of things after he returned form his trip – he knew what to look for and what was acceptable or not. **(56)**

At the last interview in June 2003 Ryan had been on holidays for a month in April and there had been some changes on the farm while he had been away. The owners had taken on a large neighbouring farm that he had to integrate into management of the dairy farm on his return. The overall herd size was to increase to 1,000 cows and they had calved 200 cows in the autumn. Some employees had left the farm and there had been some big problems with BMCC. Ryan hadn't had the chance to go back over what may have caused blow outs. **(57)**

"It all sort of happened while I was away on holidays, so I came back to it all and had to work my way through it. We have hired new guys to replace the old ones ... we have taken on more land, milking more cows and chasing higher litreage and ... its added a bit more pressure to things I suppose."

Ryan had a herd test done on his return and found half of the autumn calving cows treated for mastitis had calved with mastitis and the other half had picked it up a week or so after calving. He therefore thought the issues were a combination of calving management and milking management.

With the expansion, the owners had secured a production contract with the milk company and this put further pressure on Ryan. The business still had four staff and had expanded by 15-20%. He was hoping that he would be rewarded for the extra effort he was putting in but said this was an ongoing discussion with the owners.

Labour and employment were becoming increasingly difficult for Ryan to work through:

"Labour is a really big issue at the moment, I had a barny with one of the guys this morning which I'm still trying to come to terms with it, but it just happens and you just have to deal with it. In the past I'd always think "I've got to make sure I do everything properly myself" but now I just can't keep on doing that and I've got to try and train the other guys up properly."

Ryan was able to talk to his consultant about lots of things including his employment hassles, which he found helpful, but he was still unsure how to make progress. **(58)**

53. Ryan has a good sense of how to use of his advisory support.

54. Although the practice change is sustained when Ryan is not on the farm, it is inflexible because it is not supported by understanding.

55. Ryan is using the Countdown trigger to initiate action.

56. The Farm Guidelines are being used to set farm standards.

57. The risks to milk quality when amalgamating the two farms could have been better managed with forethought and planning.

58. Ryan needs support to develop strategies for employee management.

To "get back on top of things", Ryan had been looking for problem cows by herd testing more regularly and keeping an eye on the filter socks:

> *"Usually I don't like herd testing, I don't mind going for two months before we herd test. But I'm trying to get that down to every month to every six weeks, I just want to know who's doing what and sorting everything out ...".*

Ryan planned to manage the spring herd similarly to last year: milking any mastitis cows separately at the end of milking and trying to get the new people trained up in identifying the cows or the problems that are going to cause mastitis. **(59)** He thought he would try a new approach with his employees by giving them responsibility for ensuring limited mastitis in the shed:

> *"... to encourage them to think about the problems which are causing it rather than me sitting up there preaching it and saying we've got a problem we have got to deal with it."* **(60)**

Ryan planned to co-ordinate this himself and was feeling the pressure to be the people manager that was expected of him. **(61)**

> *"Some days you do wonder. I knew all this before I took the job on ... you have your good days and bad days".*

CONCLUSION – KEEPING PACE WITH CHANGE IN A LARGE HERD

Ryan intuitively used many of the course principles to manage a large herd and attain premium payment – such as having regularly meetings with team members and discussing issues with his professional consultants. After the course he started using triggers as an early alert to issues and became more strategic in planning to reduce risks according to stage of lactation. To keep pace with the forever changing circumstances associated with running a large herd, the challenge for Ryan is to make ongoing review of the herd performance his primary responsibility to ensure risks and resources are appropriately managed. There are many opportunities to better use technology and the farm team (employees and advisers) to reduce the management burden on this farm.

59. This would be a good point to have an annual review with his farm consultant to explore how well the Mastitis Action Plan had worked and what changes were needed.

60. Ryan is intuitively building the capacity of the farm team.

61. "Feeling the pressure" flags a management need that is not being met.

#9 Jeanine – Planning for survival

Before the course

Jeanine and Frank milk 300 cows with their sharefarmers (Helen and Ian) who have been on the farm for three seasons and are responsible for most of the milking. The Bulk Milk Cell Count (BMCC) was below 100,000 cells/mL for some of the year and had not exceeded 250,000 cells/mL in 12 months. They regarded clinical cases at calving to be their major issue and, at $150 per case, Jeanine had valued the costs and lost production at about $13,000. Another farmer had recommended the Countdown Downunder Farmer Short Course just prior to the start of the calving season. They decided Jeanine and Helen should go to the course and hone their skills:

"Because we have had the mastitis problems and I just felt that it was probably the better way to get the information with the two of us doing it, rather than me reading it up and saying "there is something wrong"..."

JEANINE
Owner
More than 40 years of age
In dairying more than 10 years
Regularly attends industry events
Went to the Countdown Downunder Farm Short Course in June 2002
Interviewed two times (until November 2002)
THE FARM
Spring calving herd in Northern Victoria
300 cows
Four workers (both owners and sharefarmers are husband and wife teams)
Milk recording
BMCC in 12 months before course was reported to be 120,000 cells/mL
Clinical case rate before course was above the trigger level (more than 5 per 100 cows)
The mastitis issue was clinical cases at calving
Advisory support readily available

Mastitis Action Plan

Goal: Reduce number of clinical cases to less than 6 per month at calving and BMCC below 100,000

- Teat spray: change to pre-mix and use a vacuum pump sprayer – more accurate spraying
- Calving management: regular rotation of calving paddock e.g. 5 days maximum and shorter if wet and muddy conditions, if wet bring home smaller numbers at a time, more milking of leaking cows prior to calving and induce if required, special attention to heifers
- Milking routine: install gates for better cow flow and comfort, install automatic cup removers to decrease over milking.
- Managing clinical cases: take samples from all new clinical cases at the start of season, assess problems if necessary. If still a problem at calving – reassess drying-off.

After the course

Jeanine greatly appreciated the biology section of the course and the demonstration of the cow's udder:

"I thought it was really interesting to understand how the bugs can get there. You think [what you have been doing] should be right but this is not quite the case."

She and Helen incorporated information from the course into their day-to-day work. They had graphed their clinical cases at the course and found that last season 30 cases had occurred in the first month of calving and 20 in the second month. **(62)** Understanding the nature and extent of the problem had motivated them to work toward a joint goal of reducing the risk of infection at calving. **(63)** The first step was to have the dry cows in a paddock for no longer than five days. Jeanine had identified more paddocks to include in the rotation and where to place the hay rings.

"It [moving cows] means more work, but if you can stop your mastitis problem that saves work in the shed which saves stress, saves money ... Beforehand we sort of wouldn't have been prepared to do it."

They also proposed to take milk samples from each clinical case at the start of the season for culture.

Other activities were working toward improving the milking routine and "making the dairy a good place to work". For example at milking the milkers now waited until the cows had let-down before attaching the cups and stall gates and automatic cup removers were being installed.

62. The graphing of clinical cases continued beyond the course, showing the value of having a visual measure of the herd's situation.

63. The two people who attended the course are working toward a joint goal.

Jeanine had talked to Frank about aspects of the course and the Mastitis Action Plan. (Frank thought that perhaps he and Ian should have gone to the course as they didn't like others coming back and telling them what to do!) **(64)**

The second interview was held in November 2002. The drought conditions had had a heavy toll on production. Many hard decisions had been made with a focus on financial issues and long-term viability – they had moved into survival mode. Cows had been parked in Gippsland and Jeanine and Frank were milking only 172 cows compared with 310 the previous year. As part of the cost cutting, their sharefarmers (Helen and Ian) had finished two weeks previously and Jeanine and Frank were working the farm themselves. **(65)**

Jeanine felt that things had slipped in terms of mastitis management in the month before the sharefarmers left (October). Clinical cases had not been graphed as they came in and Jeanine and Frank pulled out three high cell count cows that had undetected clinical mastitis. **(66)** To minimise cross-infection at milking, some cows were sold and some were milked into test buckets and the milk fed to the calves. They also treated some high cell count cows. The BMCC had risen to almost 200,000 cells/mL but had come down to about 100,000 cells/mL once the suspect cows were removed.

Calving had gone reasonably well except for milk fever problems and a higher than desired numbers of clinical cases. Despite this, they had fewer cases than last year reporting 14 out of 90 cows in August, 24 cases in September and seven in October. Jeanine had tried to encourage Ian to separate high cell count cows to "break the cycle" but he felt it was too much extra work. Jeanine couldn't really put her finger on the reasons for the clinical mastitis:

> *"I thought it was a pretty good environment for calving this year [being dry and with what they had done]. I don't know if it was when they got to the shed that the problems started or what it was. That's perhaps what I should do one day, go through who came in with what mastitis and what dry cow product was used, just out of curiosity."*

Some cows hadn't come in with mastitis but had clinical signs of infection four or five days into milking. Jeanine had asked for a list of cows coming in but believed Ian didn't support Helen in doing things like this (and wondered if it was because he hadn't attended the course). She had also asked them to collect milk samples for culture, using six or more clinical cases as a trigger for action, but this had not happened until well into calving.

> *"... some were high cell count cows, some were clinical cases and eight came back contaminated. Few had no answers but most came back with Strep uberis. The environmental one ... we treated five and sold three that we didn't treat."*

With the extensive changes to the farm, they had revisited their mastitis management aims:

> *"Our aim is to have no mastitis but we will allow one or two per month with 170 cows.* **(67)** *We need to get our routine going [now we are on our own] and work from there. Next year is another thing. Drying-off – I'll go through the list working out which cows had the stronger drug and which ones didn't and whether there's any connection.* **(68)** *Try and maintain it ourselves as we won't have a sharefarmer on for a while, just a worker. It's been a good year to get rid of problem cows."*

The stall gates were working well but the cows did find it hard to adjust to them. Their milking machine technician had checked the machine and liners and adjusted the cup remover timing. Jeanine and Frank were monitoring teat condition.

When Jeanine and Frank were contacted again for another interview other issues had emerged that prevented them from continuing their involvement with the 'insights' research.

CONCLUSION – PLANNING FOR SURVIVAL

The course helped Jeanine focus on measures to reduce exposure to environmental bacteria at calving and minimise the spread of infection at milking and this was immediately rewarded by a drop in the clinical case rate. Within five months of completing the course her attention and resources had diverted to surviving the drought. The challenge for Jeanine is how to engage team members who hadn't been to the course and have them commit to a joint Mastitis Action Plan. She would benefit from using her advisers in a 'critical friend' role to discuss her goals and provide informed comment to help her adapt to changing circumstances.

64. Team members are more likely to be supportive of change when they feel part of the planning process.

65. Decisions made under fiscal pressures should consider the risks to mastitis control and milk quality.

66. Slips in the routine flags a management need is not being met.

67. Jeanine's internal standard is higher than the Countdown trigger.

68. Veterinary services should ensure the dry cow strategy for the herd is effective in terms of costs, risks and benefits.

#10 Peter – The risks of acting independently

Before the course

Peter was managing a year-round calving herd of 460 cows on his parent's dairy farm. The BMCC was over 500,000 cells/mL. An investigation identified *Strep ag* as the problem and highlighted a vacuum problem with the milking machine. **(69)** Peter thought it was likely that the herd had been infected for five or six years and that the problem had escalated when they had changed to a new dairy during peak milk production a year ago. The vet suggested Peter attend the Countdown Downunder Farmer Short Course as part of the plan to resolve the problem and it was this, as well as wanting to be able to convince his father of the need for change, that motivated Peter to go:

> *"... to get some information and support behind me. Before the course I had a lot of problems trying to get [ideas] implemented and by doing the course it gives me a bit more leverage, power."*

PETER
Son of owner
30-40 years of age
In dairying more than 10 years
Rarely attends industry events
Went to the Countdown Downunder Farm Short Course in July 2002
Interviewed four times (until June 2003)
THE FARM
Year round calving herd in South Australia
460 cows
Six workers (three family members and three casual milkers)
Not milk recording
BMCC in 12 months before course averaged 287,000 cells/mL (range 204,000-429,000)
Clinical case rate not reported
The mastitis issue on farm was *Strep ag*
Advisory support reasonably available (not many milking machine technicians)

Mastitis Action Plan

Goal: Reduce BMCC to under 200,000 and if get it under 150,000 – a bonus! **(70)**

- Run split herd for 12 months until all cows have had Dry Cow Treatment and reassess in twelve months time.
- Blanket Dry Cow Treatment and a six week dry period
- In freshly calved cows – check clinical cases with a mastitis detector and strip every 4 days
- Once a week check cup-slip as well as any under and over milking.

After the course

The course had prompted discussions between Peter, his vet, his parents, the milking staff on the farm and had raised his expectations of the milking machine technicians ("this is what we want ... can you do it for us?").

Peter was extremely focused on achieving his goal and was following his Mastitis Action Plan to minimise the spread of infection. This included moving to a blanket dry cow strategy, wearing gloves at milking and when administering Dry Cow Treatment, milking to the last day then drying-off (rather than skipping milkings), breaking the vacuum with the hose (rather than using the release buttons) and splitting the herd so that "stale cows are milked last". He had talked the plan through with his employees to get them committed to reducing infection and they were comfortable with what was happening and its purpose. They had started to routinely check teat condition and were taking more care at 'cups on' and 'cups off'. Peter was asking everyone to wear gloves and had to be insistent with one employee who milked on other farms:

> *"We've had trouble trying to get him to wear gloves and he is probably the highest risk person to us. With our bug he's probably a high risk to other herds.* Strep ag *can live on your hands for three or four days, if he goes to another herd and milks without gloves he could pass it on."*

In the six weeks since the course the BMCC had gone from 470,000 to 280,000 cells/mL and Peter regarded this as a "real achievement" given that it was their "stale time".

Peter used his vet and the Countdown resources to plan his dry cow strategy which was based on blanket Dry Cow Treatment, a six week dry period and specific drug treatments to particular cows. He had also got his dad on side with blanket Dry Cow Treatment:

> *"My dad found it hard at first but it's now just another job we have to do. And he's seen the count coming down so he is prepared to do keep doing it."* **(71)**

69. The mastitis problem in the herd is well defined.

70. Peter's goal was to decrease the BMCC in the herd. In hindsight, it should have been to control Strep ag.

71. A good result is highly motivating.

Running a split herd was going to add to the complexity:

"Splitting the herd will be the hardest part and then drying them off at the same time – getting one herd in and following second and release first ... managing that process ... to try and keep clean cows from infected cows."

Peter had constructed his own wall chart for daily milking system checks on vacuum levels and pulsators to achieve best practice. He got the idea for this, and a dot point graph of clinical cases, through general discussion at the course. Peter had built his own teat spray unit to give 360 degree coverage (and had sold one to someone else who had been to the course). He even saw the opportunity for becoming a machine technician given the demand, saying farming was not necessarily a life-long career.

The second interview was held in November 2002. The management practices started after the course had continued and the BMCC had almost halved to under 150,000 cells/mL:

"The count jumped up again to 140 [,000 cells/mL] at the last count we got. We've since dried a few cows off and found a couple of problem cows. We are just waiting on another test ..."

Splitting the herd had created a lot more work, however Peter said everyone remained keen:

"Yes it's been a lot of extra work but it has been manageable. We can really see the rewards now. Mum's the one that's the keenest of the three of us and Dad is keener than what he was. For the first time in 5-6 years we got premium payments last month. We were under the 150 [,000 cells/mL] mark. It works out four cents a litre bonus."

Peter had tried treating high cell count cows but this was expensive (requiring numerous treatments) and it hadn't given the results he had expected. This effort had been replaced by checking cows with the mastitis conductivity detector after they calved: **(72)**

"... and if they're suspect then we keep checking them. We keep monitoring each cow for 4-5 weeks, probably three times a week. If it comes down then well and good and if their count is 400 [,000 cells/mL] or above, or we have a fresh cow that has a high count, they return back to the stale herd to contain any spread. It's one of those bugs that you take no chances with."

Cows in the stale herd were milked, mated with bulls and either treated with Dry Cow Treatment at drying-off or sent to the meatworks "if they're really suspect". Running a split herd had been a joint family effort and required a lot of paper work "to keep on top of what's where and who's who" but Peter wanted to keep the herd split:

"The way it worked this year we hope to get 100% clean up we'll try it [split herd] again next year. Mainly to keep on top of the bug and really get rid of it and clean out the cull cows."

He was trying to get the data computerised after having let things slip for a couple of years.

Peter hadn't seen his vet since the course. He thought he should let him know how things are going:

"... because when we did the course he said 150 [,000 cells/mL] was a bit optimistic and [we] should aim for 200. [I] just want to tell him that we're under 150." **(73)**

Peter planned to cull cows this season that were empty or had high cell counts (using the conductivity detector because they do not herd test) rather than basing the decision on age and udder formation as in previous years.

The third interview was conducted in January 2003. The farm was in a bit of an upheaval with Peter losing all of the employees in the last week and the family having to cover the labour requirements until other employees were found. **(74)** On top of this Peter was busy with a lot of farm development work including laser levelling. They had also decided to supplementary feed as the pasture growth hadn't been as expected and bought-in feed prices were high due to the drought. The BMCC had been higher than in November but was still under 200,000 cells/mL:

"It did jump about Christmas time to about 150–160 [,000 cells/mL] then we brought it down to 130 and last week out of the blue we got one at 185."

He was not unhappy with the BMCC which was half the count that they normally had at this time of year. With the recent BMCC fluctuations he had modified his target:

"...if we go between 150-200 [,000 cells/mL] then we only lose two cents a litre. So we've got to try and keep it under 150 but if it does go over we will lose a little bit of money but not like we were last year."

Measures taken to help keep the BMCC down were to cull some "suspect" and aged cows and to milk cows with counts above 150,000 cells/mL into a test bucket and feed the milk to the calves. **(75,76)** These measures relieved the feed situation in the herd (having fewer "mouths to feed") and ensured a milk supply for the calves (which needed 200 litres per day) respectively.

72. The intense effort required to maintain BMCC flags a need to review the Mastitis Action Plan.

73. Planning an interaction to review performance and assess options (in addition to boasting) would be beneficial.

74. The labour shortfall could adversely affect mastitis or milk quality.

75. The dairy company BMCC threshold for premium milk payment (of 150,000 cells/mL) is being used as the threshold for making decisions about individual cows.

76. Peter has no way of assessing the change in the* Strep ag *status of the herd. The BMCC could be highly misleading given the high culling rate and exclusion of high cell count milk from the vat.

Peter believed that the Mastitis Action Plan had helped him keep 'on top' of the cell count and planned to continue it into next year: **(77)**

"Because it's the first year in a long time that we've dry cowed and we've made sure that they've all had a 6-8 week dry period for self cure and it seems to be working that way ... and running two herds as well. That proved a real bonus for us. A lot of hard work but once you get into a routine it should be pretty easy."

He still hadn't caught up with his vet. He was thinking about running a vealer market from the property and wanted to put a sharefarmer on the dairy farm so that he could spend more time developing that enterprise. He saw this as a way of avoiding price penalties while making good use of the milk.

The final interview with Peter was in June 2003. The previous five months had been difficult. The drought had meant cash flow and feed problems resulting in a large reduction of cow numbers (from 450 to 336). Peter had been using his financial consultant to help make decisions about irrigation infrastructure and a nutritionist to advise him about grain feeding. They needed to invest significantly to upgrade their water infrastructure which was going to be costly despite being subsidised. They planned to cull more cows and keep the herd at 300 cows in the hope that reduced levels of supplementary feeding would help improve farm profitability. Announcement of a lower milk price had dampened Peter's normally positive attitude.

Peter was still trying to keep a focus on milk quality. The BMCC had "been through a few ups and downs and sort of stabilised". He was not happy about a recent 'blow out' in February/March where BMCC rose to 210,000 cells/mL but he was able to get it back to 160,000 cells/mL: **(78)**

"... just through a bit of management and putting the cows in the buckets. Dried a few cows off, sent a few to the meatworks and just looked at our management practice and tried to identify any suspect cows."

Peter was fairly confident he could keep his milk quality under control next year. He wanted to start herd testing next year and thought this was possible given the smaller herd. He hadn't yet spoken with his vet (his mum bought the Dry Cow Treatment). **(79)** Peter was continuing to develop the vealer business with a goal of putting "400-450 calves through in the next 12 months" and intended using any high count milk to feed the calves.

CONCLUSION – THE RISKS OF ACTING INDEPENDENTLY

Peter was highly committed to improving milk quality on the family farm. The course and veterinary interactions helped him to take control and focus his efforts on minimising spread of infection in the herd. He was rewarded by a dramatic reduction in BMCC that was sustained by a lot of hard work. However, *Strep ag* will never be controlled in herds by a single management plan alone. An ongoing relationship between the farm manager and vet is essential to ensure progress is monitored, milk cultures are used to confirm the presence or absence of the bacteria, the drafting criteria for running split herds are reviewed and critical points of the mastitis control plan are being covered. In Peter's herd, there was no way of assessing whether the increasingly complex management changes helped improve the *Strep ag* status of the herd or whether his strategy from 12 months ago remained a cost-effective way of staying in premium. The challenge for Peter is to develop a strategy for monitoring progress that enables ongoing review of the situation to ensure efforts are focused and economic. He would greatly benefit from becoming less self-reliant and using veterinary support to maintain the focus and diligence needed to contain *Strep ag*.

77. The Mastitis Action Plan is being used as a task list and re-applying it directly will only be effective if the circumstances and priorities on the farm have not changed (but they have).

78. The 'blow out' in cell count should flag a review of the Mastitis Action Plan.

79. An in-depth discussion of the dry cow strategy with the vet provides a timely point for professional input and review.

#11 Scott – A responsive farm team

Before the course

Scott has a diploma in farm production and had been working since graduation (10 years ago) as a sharefarmer in a herd of 330 cows. He did most of the farm work sharing some tasks, like irrigation and milking, with the owner. Scott said they had trouble keeping the Bulk Milk Cell Count (BMCC) consistently below 250,000 cells/mL:

"We sort of hovered around 270 to 300 [,000 cells/mL] or whatever a couple of blow outs and then it'll come back down. We found that we do a blanket treatment and then the year after the cell count was fine, and then it would slowly go up and then we'd have to do another blanket treatment ... so we sort of go in waves".

His main issue in milk quality was clinical mastitis cases at calving. His vet, whom he gets along well with, had done a mastitis investigation and this was the stimulus for Scott to attend the Countdown Downunder Farmer Short Course: **(80)**

"We [the owner and I] wanted to find out what other people are doing I suppose and ways we can try and fix the problem."

SCOTT
Sharefarmer
30-40 years of age
In dairying 3-10 years
Rarely attends industry events
Went to the Countdown Downunder Farm Short Course in May 2002
Interviewed five times (until September 2003)
THE FARM
Spring calving herd in Northern Victoria
330 cows
Two workers (sharefarmer and owner)
Milk recording
BMCC in 12 months before course averaged 283,000 cells/mL (range 88,000-546,000)
Clinical case rate before course was reported as more than 10 per 100 cows
The mastitis and milk quality issues were to stay in premium and clinical cases at calving
Advisory support readily available

Mastitis Action Plan

Goal: Stay in premium (less than 250,000) and reduce clinicals at calving

- More care taken to achieve better teat coverage (proper measuring rates mix and add emollient)
- Clean dry calving pad (separate feeding pad beside calving pad)
- More observation of fresh cows (strip when come in, strip when go into vat, strip while in colostrum phase)
- Make sure air holes in clusters are clean – check daily
- Use more cultures (actively monitor records to identify triggers and change using the EasyDairy software)
- Take more care when drying-off (use gloves, clean wipes)

After the course

Scott found the course useful even though much of the technical information was a refresher from his time at college. He found the discussion on triggers most useful:

"... beforehand you just get a mastitis case and you write it down and record it and at the end of the year, if you wanted to, you can print it out and see how many you've had. But normally they just sit there ... whereas now you've got it in the back of your mind that if you get more than two cows in a hundred in a month you've got a problem." **(81)**

Scott and the owner had discussed topics at the end of each day of the course and Scott was confident the owner would support his suggested changes. Since the course Scott had made the changes to their practice: putting emollient in the teat dip, taking care to avoid over milking, wearing gloves at milking and doing machine checks. They were waiting for culture results:

"We used to just treat them and that was it ... since I've been on the farm. This is the only year we've done milk cultures ..."

Scott had a lot of respect for his vet and they work well together on issues. Scott had organised for his vet to do a milking machine 'wet test':

"We've implemented teat spraying and we're doing everything but still we're having a problem with our cell count rising. During the course he talked about all the machine testing and everything. We want to make sure the machines aren't causing the problem."

80. A completed investigation shows the vet is experienced in dealing with herd-level issues.

81. The Countdown triggers are acting as an alert to clinical case problems at calving.

The second interview was in mid September 2002. Since the last interview, Scott had gone through his Mastitis Action Plan with the owner and they had jointly agreed to keep 'on top' of the actions listed. **(82)** Calving had gone well but Scott wasn't happy as they had had 15 clinical cases of mastitis in the 250 cows that had calved:

"It's right on the border of being not good. And we are a tad worried about it and I've sent off some milk samples, [our vet] has got them at the moment. I haven't got the results back."

Scott couldn't "put his finger on" the cause of the problem. Cows that were close to calving were moved to a separate paddock and given 'lead feed' for two weeks before being moved to the calving pad:

"We did that for each weekly group to try to minimise the number of cows that were on the calving pad to minimise contamination of dirt and dung."

Scott said this was the first year they had paid attention to how many clinical cases they had experienced. He kept the owner informed by writing all the treated cows on the whiteboard in the dairy. He also believed it was important to keep his vet up-to-date with what is going on so "if he wants to follow it up he can". The vet had spent less time on the farm than usual because they had few calving problems, however he had dropped in to check how the treatments were working and to collect milk samples for culture.**(83)**

"At one stage he [the vet] did ask and we checked the trigger points. The three in 50 at calving – I was aware and he was aware too – to see where we were. At that stage we were under, but we're right on the border now, getting to be a bit of a problem. ... probably in the past we would have treated them and gone on ... this is the first year we've really taken great steps in trying to fix it."

Scott was waiting for the culture results to see whether he needed to alter the calving pad management for the last 60 cows to calve:

"Well we'll probably have to think about calving them off the calving pad if that's the cause. [Our vet] will come back with the results and he'll make a recommendation as well."

Another check of their milking practices in peak milk flow was scheduled as a follow-up to the vet's initial investigation.

The BMCC, which had been around the 120,000 cells/mL, had risen to 233,000 cells/mL in the last few days but Scott had found three cases in those days and was hoping that "the next slip" would show a drop. Scott was waiting for the herd test figures and culture results to identify and check all the high cell count cows:

"There has been stuff on the filter and I've been checking but I can't find anything, so I'll do that and try and find her that way."

The farm owner was happy as long as the count stayed below 250,000 cells/mL as staying in premium was worth "a fair bit of money for the farm". **(84)**

A brief enquiry was made a few weeks later about the culture results. Some cows had been infected with *Strep uberis*, an environmental bacterium, so with only 30 cows to calve, the vet had suggested removing the cows off the calving pads. Scott had followed this advice, bringing cows back close to the dairy just on calving, and only one of the remaining 30 cows had had clinical mastitis.

The third interview was in January 2003. Although there were difficulties with the reduced water entitlement and drought, they were happy with the progress made with the BMCC which was comfortably under their goal of 250,000 cells/mL:

"The cell count dropped all the way down to under 100,000 [cells/mL]. We only had one or two cases of clinicals. You'd see a little rise in the cell count and you were lucky enough to find a cow with a swollen quarter and we treated her and the cell count dropped down again."

Scott was keeping 'on top' of the BMCC by checking the milk filter and doing strip tests when clots were present and the more effective teat spraying and wearing of gloves into their routine practice. Scott had kept in touch with his vet on a regular basis and had kept him informed of the mastitis status during farm visits:

"We have a mastitis board and it's right at the dairy and I've often see him [the vet] walk past and stop and check what's been happening. He's definitely interested in keeping us down." **(85)**

"I talked to [the vet] when the cell count started to rise and we found 8–10 cows that were high, there were two or three in the millions. I asked whether we should use an injectable antibiotic to hit those high ones ... well we sort of worked it out that it wouldn't be worth it money wise." **(86)**

Scott was planning to have new rice hulls on the calving pad to minimise clinical cases at the next calving. After discussions with his vet, he wanted to use a blanket dry cow strategy but the owner needed to make the final decision about this.

82. Scott and the owner have the same focus and are committed to the same milk quality goals.

83. The vet is actively supporting issues around cell count and clinical mastitis even when attending the herd for another reason.

84. The dairy company BMCC threshold for premium milk payment is motivating change.

85. The vet is actively monitoring progress and contributing to decision-making on the farm.

86. Again the vet demonstrates his focus on herd-level, cost-effective mastitis management.

The final interview with Scott was in September 2003. The farm had been affected by drought and milk production and cow numbers had dropped significantly. They had been able to manage feed wise through watering pasture crops. The BMCC had risen a little but still remained under 250,000 cells/mL. Scott was happy with progress over the last eight months:

> *"Everything has been going very well. We haven't gone over 250 [,000 cells/mL] for our cell count and we have only had about four cows in total for those five months with clinical mastitis."*
>
> *"We are happy with it especially staying in premium in a year like this, a bit of extra money."* **(87)**

Scott puts the progress down to examining individual cow cell counts, following up any movement in the BMCC by filter checks and:

> *"... just been doing what we set out to do: teat spraying, wearing gloves, hygiene, trying to keep everything clean and tidy in the dairy."*

Over the last months he had been planning for mastitis through regular discussions with the vet:

> *"We have talked to [vet] and, because we are trying to keep our cell count like it is under 250 [,000 cells/mL], he suggested anything over 250 we treat and anything under 250 we are going to use Teatseal® this year rather than not treating them at all. So he suggested that because we calve on a calving pad there is a high concentration of manure and stuff, that's something new we are going to try to see if we can go through next year the same as we are going through this year."* **(88)**

Scott believed a dry cow strategy using Teatseal® would help keep the cell count down but it still had to be sanctioned by the farm owner. Otherwise, their plan for next calving was to keep the calving pad as clean as possible by moving cows there just before calved and to strip them for the first four days when they 'come in'.

Scott believed having the Mastitis Action Plan helped them keep on track with his goal:

> *"... and see if I am still doing everything that I planned. And if I think we are drifting we can go back and say that what I think we do. And also the alert when you get more than three cows, or in our case six cows per month with mastitis, you can say well we have got a problem and go from there and get your cultures done and things like that."*

He said the farm owner is really happy too and they were both motivated to try and do it again next year.

CONCLUSION – A RESPONSIVE FARM TEAM

The course gave Scott a plan to achieve his goals and assess his progress. He had a constructive relationship with both the farm owner and the vet that enabled the team effort to remain focused and respond quickly to emerging issues. Scott went out of his way to bring his vet "up to speed" with the milk quality status on the farm and his vet made it his business to understand the situation and contribute to the decisions being made. As circumstances change, the challenge for Scott is to identify what is needed to achieve the udder health goal of the herd. Planning sessions with his vet and the owner through the season would help him better anticipate any changes required in mastitis management.

87. Profit margins and cash flows become a priority in financially tough times.

88. Scott and his vet are using their interactions to work through the action planning process (action and reflection, etc).

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Glossary

Action planning

Action planning is a formal process to give the best chance of achieving change by identifying and prioritising needs, setting goals, planning action, taking action, reviewing progress, learning and re-planning. It enables flexibility in thinking, process and practice to improve herd performance.

Awareness

Conscious of a concept or opportunity.

Building capacity

Increasing the abilities and resources of individuals, organisations and communities to manage change and act effectively.

Change

A transformation from one state to another. It can be at the level of practice (doing something differently) or cognitive (thinking differently).

Facilitators

People with process knowledge and skills required to enable and support change and innovation.

Knowledge

Organised information that conveys meaning in the context of a situation, issue or problem. It constitutes the different ways people can 'know' something (theoretically or through experience).

Learning

A relatively permanent change in behaviour: a process of changing attitudes, aspirations, awareness, understanding and/or practices.

Management capacity

The ability to act (manage) effectively. For example, using knowledge and technology to improve businesses, respond to change or capture emerging opportunities.

Managers

Managers organise resources (people, tools and training) for change and provide leadership to achieve goals and innovation. Their role involves deciding what is to be done, planning how to do it, organising to do it, and reviewing performance.

Mastitis Action Plan

A plan developed by each participant of the Countdown Downunder Farmer Short Course to improve mastitis and milk quality performance in their herd. Farmers wrote their plan on a custom-made wall chart with clear statements of their goal, the months it related to and tasks that needed to be done (specifying what was to change, by who, by when and the Farm Guideline involved).

Motivation

What (need or desire) impels a person to act.

Network

An informal or formal organisation of individuals and groups who exchange inputs and outputs for benefit (purposeful outcomes).

Partnership

An interdependent relationship between people who share in the risks and benefits for a specific purpose. It involves clear rights, roles and responsibilities.

Practice

A social domain of action where doing, not knowledge, is central. It is extended to a group of activities performed by a number of individuals in a common domain – such as the practice of farming or veterinary practice.

Process

A series of connected actions to support change effectively.

Service

Work for others where no transfer of goods is involved.

Skill

A practiced ability – a product or outcome of training, experience and professional history.

Team

A small number of people committed to work together for a common goal and with individual skills, roles and responsibilities.

Training

Enabling people to acquire specific knowledge or skills.

Understanding

The ability to learn, apply and manage concepts and principles, judge and make decisions.