A national program for mastitis control in Australia: Countdown Downunder

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ABSTRACT

In 1998, Countdown Downunder, Australia's national mastitis and cell count control program, was created. With funding from the country's peak dairy organisation, Dairy Australia, this program was originally intended to run for three years but is now in its 10th year. As it was the first time Australia had attempted a national approach to mastitis control on farm, the first three years of the program were largely concerned with the development of resources to be used by farmers and service providers. The second three years were devoted to training with both groups. Since that time, Countdown Downunder has entered into a second resource development phase.
The goal of the program was to achieve a reduction in the bulk milk somatic cell count from the Australian dairy herd. To achieve this, the program had to develop resources with clear and consistent messages around mastitis and somatic cell count control on farms. It was determined that progress toward the goals would be made more rapidly if service providers were trained in the use of these resources prior to farmers. This paper reviews the Countdown Downunder program from 1998 to 2007.

KEYWORDS: advisor extension; Countdown Downunder; mastitis ontrol; national program

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INTRODUCTION

The Australian dairy industry produces high quality milk at a competitive price. Dairying is distributed over eight regions in six states of the country. Although the number of dairy farms has declined over the last decade from over 12,000 to 8,800, the size of the national herd is relatively stable at 1.8 million cows. The average herd size (of 225 cows) and production per cow (of 5,163 litres) has increased significantly in the past decade through improved genetics, good pasture management and supplementary feeding regimes. The total milk output of the industry is 9.5 billion litres per year with 50% of all manufactured product being exported (Anon 2007). The price paid for milk at the farm gate is low by world standards so farmers must operate highly cost-efficient systems.

During the 1980s and 1990s mastitis extension was ad hoc and not coordinated across the industry. Regionally-focused farmer advisory materials were technically sound, but not farmer-friendly in design or applicable to the wider national dairying audience.

When faced with mastitis issues, people would often delay action due to technical uncertainty or seek simple technological solutions rather than clearly define the problem and exercise corrective management. With the advent of processor-based milk quality payment schemes during the mid 1990's, and the European Union export requirements, a more lateral thinking and industry-wide extension program was required. Countdown Downunder was initiated in 1998 to improve farm profitability and the sustainability and competitive advantage of the Australian dairy industry. The program continues to the present day.

PROGRAM DESCRIPTION

Organisational structure and funding

Countdown Downunder was guided from its inception by a steering committee known as the Australian Mastitis Advisory Council (AMAC). This council was comprised of representatives from dairy farmer organisations, dairy processing companies, the advisory professions and the Australian Dairy Industry Council. AMAC has been responsible for guiding the goals and strategic direction of Countdown Downunder for each stage of its funding cycles. The project team has consisted of a project leader, scientific officer and project managers in each of the eight dairying regions, with many other experts and consultants contributing to the design and delivery. The

role of the project leader has been to articulate issues, broker agreement and broad-based ownership of technical recommendations suitable for the Australian dairy industry, suggest strategies to achieve the program objectives, and design and implement activities in support of the approach endorsed by AMAC. The role of the regional co-ordinators has been: to promote the program and its activities within the region; build regional advisory and farmer networks; help ensure program products and messages are appropriately pitched and relevant to the region; organise venues and catering for locally-held courses and meetings; provide local media with the latest technical messages and stories; and, provide regional feedback for the project evaluation.

The first six years of the program were funded predominately by farmer levies and a matching government co-contribution through the Dairy Research and Development Corporation. State governments paid the salary and operating costs for a part-time regional coordinator position in five of the states.

The funds have been spent on the design and pilot of program resources, communication and evaluation strategies, and skills development for course trainers. The core technical resources and training courses have been available to farmers and service providers at a fee that covers the cost of their publication and delivery respectively.

OBJECTIVES

The objective of Countdown Downunder is to help deliver the industry-agreed goals of having all of the vats of milk collected from farms with bulk milk somatic cell counts (BMCC) less than 400,000 cells/mL and that 90% of vats with a BMCC less than 250,000 cell/mL. Given the large volume of Australian milk products exported, the target of 400,000 cells/mL broadly relates to the of EU Directive 92/46/EEC (Anon. 1992) advising that milk collected on farm for human purposes should have a geometric BMCC mean of below 400,000 cells/mL. As well as helping achieve this, the 250,000 cells/mL target was set to improve farm profitability and processing productivity to a level that was challenging yet attainable.

The cell count goals were set by AMAC in 1998 and ensured the program had measurable, industry-accepted targets to define its progress. Although there was no way of assessing the national cell count situation at this time, the industry remained committed to them when a national statistic first became available in 1999.

PROGRAM DESIGN PRINCIPLES

Countdown Downunder's approach to building industry capacity to manage mastitis is described in the report of the second funding cycle (Brightling *et al.* 2005) and is to:

- Have all industry sectors agree on the technical recommendations for mastitis control and establish clear, consistent messages for the Australian dairy industry;
- Use the Countdown Downunder Farm Guidelines for Mastitis Control (Brightling *et al*. 1998) as the cornerstone of the project's communication strategy and training packages;
- Have key messages delivered by local advisers, the people that farmers contact in their routine interactions (be it one-to-one or though group activities, publications or presentations);
- Build the competence and capacity of service providers, so the ability to respond to issues and to support farmers in change is located within the regions;
- Promote technology transfer by having the whole farm team (herd managers, employees and advisers) work together systematically toward an agreed outcome;
- Promote practical, robust plans to deal with mastitis problems through joint action of multiple disciplines (veterinarians, dairy company staff, milking machine technicians, herd improvement organisations);
- Maintain active networks of regional advisers (networks need to be active to be effective);
- Provide ways for new information to enter the industry and for new entrants to be able to readily access existing information and resources;
- By staying independent of commercial interests, enable the project to be used as a vehicle for negotiating change across industry sectors;
- Have regular interactions with key decision-makers of each sector to ensure resources are a good fit with the marketplace; and,
- Use a working knowledge of the dairy industry to develop ways to enable effective relations with and between key players in terms of beliefs, actions and evaluation for control of mastitis.

CYCLICAL PROGRAM REVIEW

The Countdown Downunder program had funding cycles each lasting three years. At the end of each period, a review was conducted by the funding body (initially the Dairy Research and Development Corporation and more recently Dairy Australia) to assess the program's performance against the industry cell count goals, the level of adoption of the technical recommendations, and its effectiveness in building the industry's capacity to control mastitis.

The core resources were developed in the early stages of the program, followed by intensive delivery of training courses to service providers and farmers, and more recently the development of new products and services to achieve on-going incremental improvement in mastitis control and milk quality in the industry (**Figure 1**).

RESULTS AND DISCUSSION

Countdown Downunder was one of the first national extension programs to be delivered by Dairy Australia. This section of the paper describes the outcomes that have been achieved and lessons learned, emphasising differences in the approach to the previous forms of extension.

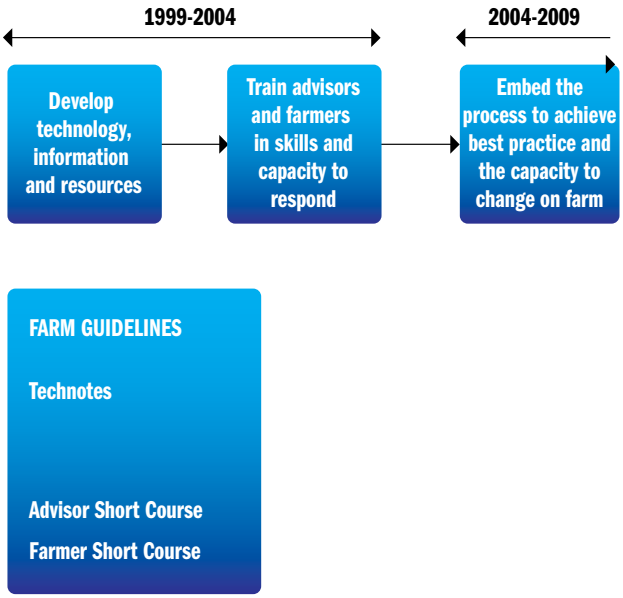

Figure 1: Countdown Downunder overview with outputs.

Core program resources

The first task of the program was to publish a set of management recommendations for use on farm that were relevant to mastitis control in Australia. Australia had never before attempted to amass the collective knowledge on mastitis control as it related to farming practice in one publication before 1998. All previously published material which had emanated from state Departments of Agriculture and individual research and extension groups had been inconsistent in its presentation and approach. They did not have the desired penetration within the wider dairy farming community and multiple reference sources sometimes resulted in confusing or conflicting information. The core technical resources of the program needed to be applicable without modification across the entire Australian dairy industry and contain clear and consistent messages around mastitis control.

The main resource material developed for farmers was the Countdown Downunder Farm Guidelines for Mastitis Control (Brightling *et al*. 1998). The guidelines were written by a technical working group with drafts passing through several meetings with industry bodies and AMAC. Mastitis control information was arranged according to the stage of lactation (calving, lactation, late lactation, drying-off and the dry period) to provide a new format that would work well for seasonal calving herds and still be applicable to year-round calving herds. In this way, the same publication could be used within all dairying areas of Australia. The publication layout was designed to be functional and engaging for farmers by colour-coding sections by stage of lactation, using large text and simple language, and including graphics. The Farm Guidelines are available both as a book and as a free download from the internet. Since 1999 over 11,000 books have been sold and distributed (Brightling *et al.* 2005).

The Countdown Downunder Technotes for Mastitis Control (Brightling *et al*. 2000) is the principal technical resource of the project for advisers. The technotes give the scientific rationale, robustness and a research priority for each guideline recommendation in the Australian dairy industry. They follow the same layout format as the Farm Guidelines: for example, all of the information relating to teat disinfection contained within the Farm Guidelines can be easily located within the corresponding section of the technotes.

The notes are available as a kit consisting of 221 pages of technical information, a copy of the Countdown Downunder Farm Guidelines for Mastitis Control, a professional index and bookmark, a booklet of 'Farm presentation kit notes for presenters', and a compact disk with electronic versions of the Farm Guidelines and Technotes. The kits have been sold to advisers within Australia (Brightling 2001).

Information in the 'technotes' can be updated as new information and technologies become available as the kit comes in a folder and there is a date on each page. An update pack was released in 2003 and included more practical detail around choosing and using teat disinfectants (a need identified during the farmer training), major revisions to the teat end scoring system, a new comprehensive and systematic approach to mastitis investigations (the 'Countdown Downunder Mastitis Investigation Pack'), and the role of teat sealants following their release into the Australian market.

Regional advisory capacity

Early program activities aimed to increase service provider awareness of Countdown Downunder's technical recommendations and their capacity to work with other disciplines when responding to mastitis issues.

Most activities in the first 12 months of the program were focused on identifying and building a connection with those advisers and organisations that dealt with issues relating to mastitis and milk quality as a routine part of their business. The target audience was primarily veterinarians, milking machine technicians, dairy processing company staff, staff from agricultural departments, herd improvement organisation personnel, pharmaceutical, equipment and chemical suppliers, and consultants. Regional co-ordinators were asked to compile contact details of these service providers in their regions so they could be sent personal and timely communications, such as information bulletins and invitations to program events. Adviser seminars were held in 1999 at 34 locations across Australia to inform service providers of the rationale for the program, its objectives, the need to deliver clear, consistent advice to farmers, and the resources and opportunities on offer (Brightling 2001). By inviting experienced practitioners from a broad mix of disciplines, the seminars were the first step in significantly expanding regional milk quality networks. More than 800 advisers attended sessions of five to six hours. At the end of the seminar, 18% of participants indicated they were keen to increase contact with other advisers in the local area for

information or advice, help with solving problems or for referral. This was very encouraging as it was important to the success of the program that service providers took ownership of the new recommendations, using them when providing advice on farm or at least acting as advocates of the program and its principles.

Countdown Downunder encouraged advisers to present program information to their dairy farmer clients and a 'Countdown Downunder farm presentation kit' was developed from the adviser seminar materials to facilitate this. The kit consisted of a PowerPoint presentation (Microsoft Office) divided into three sections: a mastitis overview, calving and lactation, late-lactation and drying-off. The kit was available on a compact disc and as flipcharts to enable its use in small groups on farm, as well as more formal presentations to larger groups. Presenters had the flexibility to tailor presentations and could use a notes page that came with each slide to lead the discussion or personalise the information from their experiences. Advisers started using the kits once they had been to a seminar or had attended the Countdown Downunder adviser training. By June 2001, more than 5,500 farmers had attended presentations by local advisers (Brightling 2001). This was the first manifestation of the power of using local, private service providers as the new frontline for a national extension program.

The next step in building a regional advisory capacity was to hold specific networking and training events within each region.

Skills development and awareness

Separate training courses were designed for advisers and farmers. Again the adviser activity took place first so they had the skills and knowledge to respond to farmer enquiries as well as become the frontline of extension of the program. Rather than a lecture format, the style of the courses facilitated learning in small groups.

The Countdown Downunder adviser short course aimed to provide local service providers from different disciplines to work together to solve complex, multi-factorial mastitis problems. It was designed to attract experienced practitioners and be of a duration that was effective without taking them away from their businesses for too long. Its final format was four days of training for 10 veterinarians, 10 milking machine technicians and 10 other dairy advisers. The course content was based on case studies of recent mastitis investigations on real farms and required participants to work in small groups with a mix of disciplines. In the course, the trainer introduces the topic, and the case study then facilitates each group's exploration of the issues they face so they can reach a consensus on recommendations they would make for the herd. In doing so, participants became familiar with a standard approach to mastitis investigations described in Technote 13 and technical content from other sections of this core resource. The fourth day of training is held one month later, allowing time for participants to investigate a problem on a client's farm as a multi-disciplinary team so they have the opportunity to apply their new skill set on farm. Teams then present their results to others on the fourth day for discussion. The cost of the course was originally $AU740 per participant (Brightling 2001) and 420 advisers had completed the training by 2007.

By June 2001, more than half of the service providers to the dairy industry were aware of and supporting the principles of Countdown Downunder (**Table 1**).

Table 1: Service providers offering advice on mastitis or milk quality in Australia, June 2001 (Brightling 2001)

Service sector	Estimated number of advisers	Countdown Downunder aligned advisers*
Milking machine technicians	200	64%
Veterinarians	500	54%
Other dairy advisers	500	64%

* Attended an adviser seminar or an adviser short course

Thirty-seven of the advisers who completed the Countdown Downunder adviser short course attended a 'train-the-trainer' workshop and became approved trainers of the farmer course.

The course aimed to improve farm profitability by encouraging farmers to build a team approach to issues on their farm, adopt best practice and be comfortable about seeking advice from professionals. The program's brief was to design the course, prepare trainers to deliver it and organise for an independent administrative mechanism to enable future courses to be held on demand. The final format was 21 hours of adult learning held in six sessions. To encourage group discussion and interaction, courses were limited to a maximum of 21 participants. The course covers 24 topics and four themes to support the management planning process. In the course, participants use a technique (known by the program as 'closing the gap') to determine how well their current practices aligned with best practice described in the Farm Guidelines. This then enables them to readily identify elements they need to discuss in detail to improve the situation in their herd to address their own risk management approach. In each session of the course they build a 'Mastitis and milk quality action plan' for their herds and present this for group discussion at the final session. The course originally cost farmers $AU69; including administration, training, materials, venue hire and lunch for six days (Brightling 2001). A subsidy has been available to many participants through state government training schemes. More than 1,900 farmers had completed the farmer short course by 2007 (Brightling *et al*. 2005). 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 was lower in many herds (Brightling *et al*. 2005).

Intensive regional delivery of the courses for advisers and farmers occurred in the first two funding cycles of the program. Countdown Downunder now has a commitment to run at least one adviser short course each year to facilitate training for new entrants to the dairy service provider sector.

Almost 400 advisers attended 12 conferences held in regional centres across Australia in 2003. The conferences were held to introduce service providers to the new information and materials in the 2003 technote update pack, discuss how expectations of their farming clients may change as a result of the farmer short course, as well as being an opportunity to reconnect with the broader network. Participants paid a fee of $AU93.50 to attend and feedback showed that most (89%) had enjoyed the day 'a lot'.

In 2004, the project team developed a companion product from the farmer short course in response to the high demand from farmers for refresher courses and staff training. The 'Countdown Downunder cups off cups on course' is one and a half days of training for milk harvesters who are not necessarily involved in many of the higher-level mastitis control management decisions. The course aims to inspire all the milking staff on farm, including casual and relief workers, to use consistent, best practice milking routines to prevent the spread of new infections and reduce the risk of antibiotic residues. Countdown Downunder developed and trialed the training and materials, and courses are now accessed through the National Centre for Dairy Education, Australia.

New services for farmers

The farmer short course was successful in reducing bulk milk cell counts of herds and increasing peoples' confidence in managing clinical cases in the 12 months after the course (Brightling *et al*. 2005) but an equally important question for the dairy industry was whether or not this change was sustainable. Consequently some of the program funds in the second funding cycle were directed into research to better understand how farmers were making management decisions relating to udder health on their farm and what factors were supporting or inhibiting progress. This body of work has become known by the project team as the 'insights' and is described in detail in a publication by Nettle *et al*. 2005. In brief, interviews were conducted at regular intervals with 11 case study farms in the 18 months following a farmer short course. For all cases, 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 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. Farmers had not been able to review and update their Mastitis Action Plans in the subsequent seasons despite initially having relevant plans at the end of the course. The authors believed that two core changes were needed to 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.

The program's response to this has been the co-development of three new initiatives with industry for delivery by the private sector: Countdown Downunder MAX, the Countdown Downunder Mastitis Focus report and Cell Count Solutions. All of these initiatives encourage ongoing interaction between farmers and their advisers to plan and act on priority udder health issues, with the ultimate aims of incrementally improving risk management and milk quality.

Countdown MAX is a service that enables the farm team working with an experienced adviser to identify the udder health goals of the herd and work efficiently toward making suitable management plans to achieve these within the context of the farm business. It uses the strengths of the farmer short course by having the farm team identify risks in the current management and 'closing the gap' between current and best practice at strategic times of the lactation, especially drying-off, calving and lactation. There are many advantages in providing a local service that enables mastitis action plans to be developed collaboratively by the farm team: recommendations can be pitched within the context of the whole farm business (and not just from a purely mastitis control point of view); local service providers better understand the goals of the farm business and can regularly check whether the management efforts of their clients are contributing to the longer term objectives as farm circumstances change; and, the farm teams have greater commitment to an approach that they helped develop.

Countdown MAX was a collaborative development between the project team and a working group of experienced practitioners to ensure the resulting service model was a good fit with the mode of operation of businesses: a necessary first step for it to be embraced by the private sector. This represented a major shift in the design approach for Countdown Downunder as it was the first time the project team had not guided associates along a planned route, the nature of the end product being totally unformed at the beginning of the working group discussions.

When offering a management service, the ability of service providers to take a whole farm view has proved to be very important. An individual does not have to be expert in all areas but must be able to signpost when input from other disciplines would be desirable and, where appropriate, help massage potentially conflicting needs and suggestions into an agreed and manageable approach.

The development of Countdown Downunder Mastitis Focus is also an example of the value of the co-development process. Its development started in 2004 but underwent a major revision in 2006 when it was realised, through discussions with the Countdown MAX working group, which

the mastitis control performance measures needed to be presented in a way that advisers could easily apply in practice.

Mastitis Focus is a one-page report that measures key aspects of the udder health performance of individual herds in the past 12 months. Having a software package that analyses mastitis-related data for individual herds is critical to future udder health programs as it provides ready access to a high-level of analysis, enabling farmers and advisers to move from problem-solving to management planning. Time that was previously spent by farmers and advisers (sometimes crudely) assessing the situation can now be used to expose gaps in key management areas and monitor changes in performance over time.

The Mastitis Focus report is the first time in Australia that stock register information, individual cow cell counts, clinical case and dry cow treatment data have been brought together to provide a succinct assessment of the mastitis situation in the herd. The software uses the industry-standard data file formats (specified by the Australian Dairy Herd Improvement Scheme) when accessing data to increase its likely compatibility with variety of herd management software packages commercially available to farmers. Work is currently underway to develop a system that enables the report writer to be accessible on the internet, in support of the philosophy of having core program resources applicable across the entire industry.

Both Mastitis Focus and Countdown MAX are still in their initial implementation phases. Analysis and reporting of their usefulness to the farming community and the associated service provider businesses will not be completed until 2009.

The final initiative, Cell Count Solutions, is owned by dairy processing companies. Countdown Downunder took a lead role in identifying the industry need, co-designing resources that would be a good fit with processors' businesses, promoting the initiative across the regions, and providing processors with details of skilled advisers who could act as case managers. In essence, the initiative enables farms with chronically high cell counts to correct the underlying mastitis problem in their herd by facilitating interactions between field officers and locally-based experienced mastitis investigators.

Table 2: The average net benefit of lowering herds' annual average bulk milk cell count based on the Countdown Downunder mastitis model (Brightling *et al.* 2005)

Annual average bulk milk cell count of herd (cells/mL)	Value of moving to the bracket below ($ per cow per year)	Value of moving to the 0-100 cells/mL bracket ($ per cow per year)
0-100	$0	$0
101-200	$24	$24
201-300	$47	$71
301-400	$55	$126
401-500	$118	$244
501-600	$180	$424
601-700	$147	$571
701-800	$147	$718

Experience with Countdown MAX and Cell Count Solutions has shown that new services need to be well understood and valued by the whole business to be successful. For example, there has been a higher level of adoption of Cell Count Solutions in regions where managers have given their staff clear directions about when and how their business is choosing to apply the initiative and allocate the necessary resources. Similarly encouraging veterinary practices and consultancies to incorporate Countdown MAX into their businesses has required much more support than simply handing over the technical resources. Proprietors must first decide where, and if, the service fits with their vision of the business. The next step is to then discuss the nature of the service, what roles will be required to make it successful, how everyone in the business is involved and plan the necessary resources. Finding appropriate models to help integrate new services into the private sector remains a challenge for the program.

Progress toward industry cell count goals

Economic analysis based on a mastitis model developed by Countdown Downunder utilising 2005 milk pricing information has shown that there are substantial benefits from improved milk quality available for virtually every dairy farm in Australia (**Table 2**). Lowering a herd's bulk milk cell count is likely to result in substantial savings from reduced costs of mastitis control and treatment – even in herds already receiving premium payments for their milk. Dairy farmers also attach great importance to the 'ease of mind' gained from knowing that outbreaks of clinical mastitis are less likely to occur and easier to curtail.

The success of the program is ultimately measured by achievement of the cell count goals. Progress was made toward both goals in the first four years after measurement of the national bulk milk cell count (**Figure 2**). However,

The upward trend toward the industry cell count goals has slowed following the two severe droughts experienced in recent years

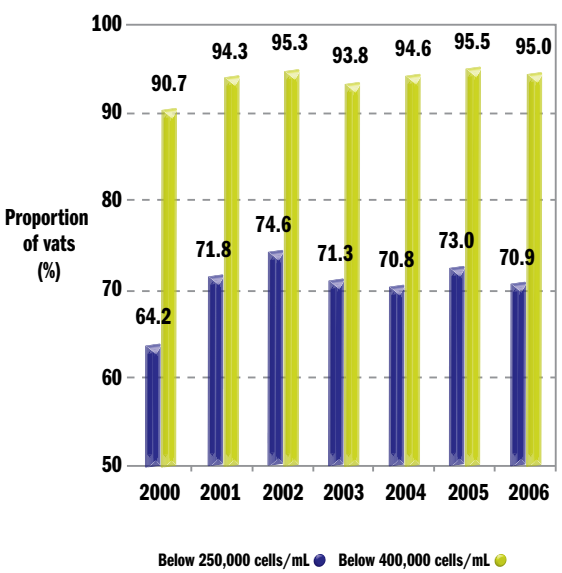

Figure 2: Progress toward the Australian dairy industry cell count goals.

unprecedented regional issues associated with severe, extended dry environmental conditions in recent years (the first being the '1 in 100 year' drought in 2003) have since reversed this trend.

Monetary pressures due to high feed costs and historically low milk commodity prices in 2003 resulted in reduced expenditure on some products and services associated with mastitis control in some herds such as milk recording, testing of milking machines, regular replacement of teatcup liners and use of dry cow treatments (Brightling *et al*. 2005). Stock movements, and presumably the opportunity for spread of mastitis bacteria between farms, increased as many cows were sold or sent to other farms. Heifers were similarly sold to reduce the need for supplementary feed and the subsequent lack of replacement stock has then restricted the opportunity for strategic culling. Nevertheless, bulk milk cell counts of a subset of 150 herds whose managers had participated in the farmer short course suggested these herds maintained better milk quality in 2003 (Brightling *et al*. 2005). This was very encouraging as these farmers had maintained their milk quality even in adverse circumstances.

CONCLUSION

Countdown Downunder is now approaching the end of its 10th year. Whilst the cell count goals are still to be achieved, the program has dramatically changed the approach to mastitis control and management on Australian farms. Farmers and advisers across Australia now speak a common technical language and many have developed technical and planning skills that enable ongoing improvement in milk quality. It is now well accepted that a self-organising team of advisers and farmers can make inroads into mastitis problems and udder health risk management. It has become second nature for veterinarians to call in their preferred milking machine technician when investigating mastitis problems, for factory field staff to discuss their concerns with veterinarians proven to have an interest in milk quality, and for veterinarians to consider the capacity of farm management when designing control options.

The program's approach of having regional service providers as the main extension frontline has resulted in multiple opportunities for delivery of key messages to farmers and has since been replicated by many other national dairy extension initiatives. In recent years, Countdown Downunder's role has increasingly become one of articulating udder health needs of industry and facilitating private-public partnerships. The program's original extension principles of having clear, consistent industry-agreed messages, a regional advisory capacity for mastitis control, delivering extension messages through local advisers and using a team approach when dealing with mastitis issues are as pertinent today as when they were instituted.

Core elements of a national mastitis and milk quality program into the future are being able to measure and report a national cell count, respond adequately as an industry to emerging mastitis control issues and helping maintain an effective advisory capacity in the regions to support dairy farmers.

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