Udder Health and Communication

Edited by H. Hogeveen
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H. Hogeveen and T.J.G.M. Lam

Proceedings of the international conference

25-27 October 2011

Utrecht, the Netherlands

Wageningen Academic
Publishers

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Wageningen Academic Publishers,
P.O. Box 220,
NL-6700 AE Wageningen,
The Netherlands.
www.WageningenAcademic.com
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ISBN: 978-90-8686-185-9
e-ISBN: 978-90-8686-742-4
DOI: 10.3920/978-90-8686-742-4

First published, 2011

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The Netherlands, 2011

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Preface

Mastitis probably is the most studied disease in the dairy industry. That is for obvious reasons. Mastitis has an effect on welfare, on milk quality, it disturbs working routines and it is an important reason for culling. Additionally, most antibiotics in dairy cattle are used in the udder.

We live in a dynamic world. The dairy industry is quickly changing with all over the world decreasing numbers of herds with rapidly increasing numbers of cows per herd. At the same time, in the rich part of the world, society is demanding. Animal welfare is becoming more important, as are requirements on safety, taste and price. These changes lead to technical innovations such as automatic milking systems that may have consequences on the health of the most important organ of the dairy cow: the udder.

The importance of continuous research is beyond doubt. Research leads to increased knowledge. Knowledge comes to value if it is used. Over the years we have learned that in order for knowledge to be applied, communication is as important as the technical content of the message. We need to have our technical knowledge up to standards and there is a continuous need to optimize that. At the same time we need to motivate farmers, veterinarians and other workers in the field to adopt new technologies and to optimize management. This requires knowledge about the (economic) effect of new technologies and improved management on udder health, but this also requires optimal communication.

In the changing dairy industry, not only the farms changed, the farmers also changed. Today's dairy farmer is not quite comparable to the dairy farmer of ten or twenty years ago. We can wonder whether advisers changed as quick as farmers did. And we can wonder whether we know enough about communication, about mindset and motivation to optimally serve that dairy farmer. From October 25-27 2011 a conference on this topic was held. It aimed at science that is useful for practice, in all its meanings. This book covers the proceedings of the material that is presented and discussed during the International Conference on Udder Health and Communication and consists of papers of keynote and other oral presentations and abstracts of all poster presentations.

We are happy that so many people show interest in this subject. On behalf of the organizing committee we are happy to invite you to use these proceedings to the best to further improve udder health. Finally, we would like to acknowledge all the people that made this conference and the publication of these proceedings possible: the authors, the scientific committee and the editors of Wageningen Academic Publishers.

Henk Hogeveen and Theo Lam

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Keynotes

National mastitis control schemes: experiences from implementation of a nationwide scheme in Great Britain

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Abstract

To reduce levels of mastitis on British dairy farms, a mastitis control programme was developed, tested in a clinical trial, and is being implemented on a nationwide scale. The scheme, the DairyCo Mastitis Control Plan, is discussed here on the basis of describing some of the challenges encountered when attempting a nationwide scheme. We describe reasons for starting a new scheme, the major challenges faced, and how the scheme was designed and implemented. Lines of communication were important and sometimes difficult to manage; from the overseeing body through to scheme coordinators, to plan deliverers, to farmers and to the industry as a whole. Lessons were learned from other national mastitis schemes and a variety of communication methods have been used to reach farmers. Continued specialised training on farmer segmentation and motivators is being provided to plan users to further improve uptake. The control plan itself is heavily structured in terms of guiding plan deliverers to make a herd diagnosis of a mastitis problem and in providing a structured, farm-specific approach to identify the important areas of management that need to change. Bespoke software has been developed to enable this to be carried out. Each plan user receives direct support from the central team and this has proved to be one of the most popular and important aspects of the control programme. All farms that implement the plan are recorded and their data are (anonymously) analysed. In the first $2^1/_2$ years of the scheme, >250 vets/consultants have been trained, over 10% of British dairy cows have received the full plan, and a further ~10% have received a partial plan. Initial analysis suggests that, on average, a reduction of around 10-20% is being achieved in clinical mastitis and somatic cell counts.

Keywords: mastitis, control, national scheme

Introduction

National schemes, programmes and campaigns have been used for mastitis control in dairy cows for many years. An early example in the 1960s was the five point plan in which a basic

H. Hogeveen and T.J.G.M. Lam (eds.), *Udder Health and Communication*,
DOI 10.3920/978-90-8686-742-4_1, © Wageningen Academic Publishers 2011

set of measures was proposed that were considered to have a beneficial effect on clinical and subclinical mastitis (Neave *et al.*, 1966). At this time, control plans were relatively straightforward, because with mastitis incidence and prevalence at very high levels (e.g in the UK the incidence rate of clinical mastitis was around 150 cases per 100 cows /yr), and contagious pathogens being responsible for the majority of mastitis that occurred, the scope for improvement using relatively simple measures, was huge. Since then, levels of production have escalated, cow genetics have altered radically and management systems have changed dramatically, thus the management of mastitis has become much more challenging. In general environmental pathogens have become increasingly important and the prevention of environmental infections is often more complicated than reducing the transmission of contagious pathogens; environmental management often requires more detailed, close to farm evaluations and farm-specific advice.

Implementing mastitis control on a national basis requires knowledge, motivation, widespread participation, excellent communication, financial backing, industry and political cooperation and probably most of all a dogged determination. Some very successful schemes have been set up, for example, Countdown Downunder (Australia), the SAMM Plan (now Smart SAMM. New Zealand), the Dutch Udder Health Program and the Norwegian Mastitis Control Program. A new scheme has recently been launched in Great Britain led by a collaboration of the national dairy levy board (DairyCo) and a team of researchers and veterinary surgeons. This scheme is not proposed here as the 'best way' to approach mastitis control, but is discussed on the basis of describing some of the challenges encountered when attempting to improve mastitis control on a nationwide basis. The aims of this paper are to describe the reasons for starting a new scheme in Great Britain, the major challenges faced, how the scheme was designed and works and the current situation.

Why attempt mastitis control on a nationwide scale?

There are many reasons why a reduction of mastitis on nationwide scale is important, both to individuals and the industry. These include:

Financial benefits

Mastitis is generally accepted, in financial terms, as the most important disease of dairy cattle, causing annual production losses of more than £170M in the UK (Bradley, 2002), US$ 2.0B in the USA (DeGraves and Fetrow, 1993) and A$ 150M in Australia (Mein and Smolenaars, 2000); the condition accounts for 38% of the total direct costs of the common diseases of dairy cattle (Kossaibati and Esslemont, 1997).

Dairy cow welfare

The welfare implications of mastitis are severe and were highlighted in recent UK Farm Animal Welfare Council (FAWC) Reports on the Welfare of Dairy Cattle (FAWC, 2009). Indeed, FAWC stated in October 2009 that 'the incidence of endemic diseases in dairy cows, particularly mastitis and lameness, should be reduced urgently'. In a modern society, the wellbeing of farmed animals is a moral issue and, in the UK, public concern for farm animal welfare appears to be increasing.

Public health considerations and public perception

The importance of mastitis in public health should not be overlooked. The extensive use of antibiotics in the treatment and control of mastitis has possible (though unproven) implications for human health through an increased risk of antibiotic resistant strains of bacteria emerging that may enter the food chain. Recent concerns about a new strain of MRSA in milk (Garcia-Alvarez *et al.*, 2011) recently reignited this debate in the UK and gained significant attention in the media. Although any direct link between antimicrobial use in dairy cows and the emergence of bacterial resistance is unclear, mastitis (therapy and prevention) constitutes a major reason for antimicrobial use in dairy cattle and thus optimising non-pharmaceutical prevention of the disease is viewed as critical. The responsible prescribing of antimicrobial agents for dairy cows is now coming under close scrutiny.

An example of the media hype surrounding antimicrobial use in dairy cows can be seen from copy in a national newspaper, which carried the following quote following the recent MRSA identified in bulk tank milk (Daily Mail, 2011):

> 'The discovery raises concern that intensive farming methods may be encouraging the emergence of new MRSA strains which are resistant to an ever-wider range of antibiotics'.... Organic farming lobby The Soil Association last night called for a complete ban on routine use of antibiotics in livestock because of fears they may promote drug-resistant bacteria. Helen Browning of the Soil Association, said: 'Under acute price pressure, dairy systems are becoming ever more antibiotic dependent. We need to get farmers off this treadmill, even if that means that milk has to cost a few pennies more.'

Food security

Food security is becoming an increasingly important global issue. The Foresight report (www.bis.gov.uk/assets/bispartners/foresight/docs/food-and-farming/11-546-future-of-food-and-farming-report.pdf) published in 2011 set out to explore the pressures on global food supply up to 2050. These were key findings:

The global food system will experience an unprecedented confluence of pressures over the next 40 years:

- global population size will increase from nearly seven billion today to probably to over nine billion by 2050;
- many people are likely to be wealthier, creating demand for a more varied, high-quality diet requiring additional resources to produce;
- competition for land, water and energy will intensify, while the effects of climate change will become increasingly apparent;
- the need to reduce greenhouse gas emissions and adapt to a changing climate will become imperative;
- globalisation will continue, exposing the food system to novel economic and political pressures.

Efficient production in agriculture, including prevention of disease in farmed animals to minimise waste (culling and non-saleable product) has an important role to play in food security. Mastitis is one of the key production diseases worldwide that results in such wastage and thus national control programmes will help maintain national milk supplies going forward and improve either self sufficiency or export opportunities. For example, in the UK, the estimated number of cases of clinical mastitis is >1,000,000/yr. The milk retrieved if we could prevent half this number of cases would be sufficient to supply >50 small towns. If we could halve the number of cows culled each year because of mastitis, this would equate to around 250 extra dairy units containing 200 cows/unit. When food starts to become increasingly short and expensive, such losses will become important.

Environment

The impact of bovine mastitis on the environment has not been thoroughly evaluated. However, since it is clear that dairy farming is an important worldwide contributor to greenhouse gas emissions (FAO, Consulted November 2009), an increased incidence of mastitis will certainly be detrimental to the environment because of increased cow numbers required to produce a given quantity of milk.

General challenges of setting up a nationwide scheme

There are a variety of obstacles to be tackled when setting up a national programme for mastitis control (or any other endemic disease), and good communication throughout the industry is an important feature (although often difficult to achieve!). These are some of the major challenges likely to be encountered.

Who leads, starts initiates...?

In the context of cow health, dairy industries can be rather fragmented, with no particular bodies responsible for nationwide initiatives. To whom should this responsibility fall? Many parties have an interest, from consumer through to government, but often there is no particular body or organisation who naturally takes the role of 'initiator' when it comes to endemic disease. Ideally, the lead body should have the respect of, and be credible for, all participants and stakeholders, and in addition have the motivation to carry out the scheme, excellent communication to carry along the industry, and sufficient financial capacity to ignite the scheme! In the UK, the initial driving body was the dairy levy board, DairyCo, who had the foresight to commission research around the design of a suitable control programme and since then have played an integral role in setting the national scheme in place.

What type of scheme – what is the model?

Early on in the development of a national programme, it is important to consider what general type of approach will be taken. This can be thought of as a spectrum from the promotion of very general control measures (e.g. regularity of milking machine maintenance, improved yard management etc) to very farm-specific measures (that can only by decided from a detailed evaluation of the farm itself). The advantage of the more general approach is that it is relatively straightforward to reach many farms. The disadvantage of a general approach is that the measures being promoted may already be in place or may be unimportant for mastitis control on many farms. For the British scheme, we decided to adopt the detailed approach at first (with possibly more general routes to follow later) so that despite the fact that farms may will be reached relatively slowly, once included the farms would obtain detailed farm specific information. Lessons about farmer segmentation and motivational differences from the Dutch programme and UK research, (Jansen *et al.*, 2010a,b; Rehman *et al.*, 2008) suggested that we would need to adopt a variety of methods to reach different farmers, and this is being adopted within the scheme (see later).

Who coordinates and drives the scheme, who should participate, what is the structure?

The organisation that initiates a scheme may not be the major player in terms of subsequent coordination and running of the scheme, and this is the case with the British programme. We have opted for a two stage process whereby in the initial three year period, during which time the scheme is being established, a small group of DairyCo staff and veterinary surgeons (from university and industry) conduct participant training and coordination of the set up phase. This period of time is nearing an end, and going forward it is anticipated that a steering group of enthusiastic participants will be formed, alongside staff at DairyCo and the University of Nottingham, to drive the scheme in future.

In terms of who delivers the DairyCo control programme on farm, it was decided from the outset that this could be vets, specialist farm advisors, or farmers. In practice, because the training is very technical in nature, the vast majority of trained participants are vets and specialist mastitis advisors. The scheme structure is described in detail below, but we have chosen a process whereby participants are required to undergo a 2 day training programme and then become official 'DairyCo Mastitis Control Plan' (DMCP) deliverers. To remain involved in the scheme, and to have continued access to software, written materials and support from the central team, participants are required to attend an annual update course. Participants deliver the plan onto farm and charge fees agreed locally. Farmers generally choose their own vet or advisor, but have the right to choose any deliver; all names and locations of deliverers are published on an interactive map (www.mastitiscontrolplan.co.uk).

Evidence based?

When deciding on specific control measures to be included in a national scheme, the strength of evidence required for any intervention has to be considered. How do you decide when there is sufficient evidence (whether published or expert opinion) for a measure to be included? This rather difficult issue was circumvented in the DairyCo scheme because it was decided to design a specific scheme and then test it in an intervention study. Whilst this made the whole process rather drawn out (the scheme was initially designed in 2004-5), it did mean that the effect of the scheme was evaluated and published (Green *et al.*, 2007).

Communication structures: methods of outreach

Lines of communication in a nationwide scheme can be complicated and there are many links to be maintained. We found that the whole chain of communication was important and sometimes difficult to manage; from the overseeing body through to scheme co-ordinators, to plan deliverers, to farmers and to the industry as a whole. An essential component of a national scheme is to bring it to the attention of the industry in a positive manner, and maintain its profile over a prolonged period. In the first two years we have used a variety of methods of communication throughout the industry, to farmers, vets and advisors. Whilst this hasn't been perfect, the nationwide plan now has a clear branding and has reached a place of acceptance within the industry as an acknowledged route of mastitis control. This is demonstrated by the support and promotion of the scheme by the major retailers, regional funding bodies and also farmer groups and veterinary bodies. It has reached the psyche of the government veterinary advisors who have quoted the scheme as a successful industry initiative to combat an important endemic disease.

Routes chosen to communicate the scheme to stakeholders have included:

- widespread use of farming media (including publishing of success stories). Some examples are:
  - www.thedairysite.com/news/27151/vets-begin-training-on-dairyco-mastitis-plan;

  - www.fwi.co.uk/Articles/2009/08/07/117064/Mastitis-plan-cuts-cases-and-saves-money.htm;
  - www.farmersguardian.com/three-stage-control-plan-for-high-cell-counts-and-mastitis/27598.article;
- use of direct mailings from DairyCo to farmers;
- New DMCP website (www.mastitiscontrolplan.co.uk);
- agricultural and veterinary conferences;
- agricultural shows;
- veterinary media (journals and websites);
- farmer discussion groups;
- farmer meetings;
- local veterinary newsletters, e.g.:
  - http://www.highgate-vets.co.uk/farm/train/dmcp.htm;
  - www.xlvets.co.uk/userfiles/file/documents/Articles/FW%20DairyCo%20Aug%2009.pdf;
  - www.delawarevets.co.uk/files/DVG_Spring_2010_newsletter.pdf), secondary media;
- Independent sources, e.g.:
  - www.nfuonline.com/Your-sector/Dairy/News/Dairy-Cow-Welfare-Summary/.

One challenge for a national initiative is that there may be organisations or companies, with particular (often commercial) interests who do not wish to support the scheme. This can be problematic. However, as a scheme grows and gains momentum, many of these situations can be sorted out although vested interests may present a challenge to large scale schemes.

Features of the on-going scheme: continuing to meet consumer and industry needs...

Although the DMCP is in its infancy, we are conscious of the need to plan for the future. Maintaining momentum and sustainability of the control scheme is critical and something we need to ensure. We believe it will be important that the scheme remains up-to-date and that new research is incorporated over time. To achieve this, we need to remain flexible, with an open mind about what the scheme looks like and how it is delivered. We will need to identify reasons for poor penetration and try to address these. For us, continued involvement and enthusiasm of plan participants is a critical element, and we hope that by having a wide involvement of participants in steering the scheme, we may be able to maintain momentum. Similarly, it is vital that the control scheme delivers what dairy farmers require and this should be evaluated regularly. Clearly, funding of the scheme in a sustainable manner is essential, and this is probably linked to delivering what the industry needs.

A further opportunity the scheme provides is as a basis for future research. Large quantities of data are being collected from each farm on the occurrence and patterns of clinical and subclinical mastitis as well as the management changes made. Funding has been secured to

evaluate the cost effectiveness of different interventions in different farm situations and it is intended that results from this research will be used to directly inform use of the control plan.

Our nationwide scheme

Development of the plan

The principle when developing the DMCP was that it should be possible, by gaining a detailed insight and understanding of the mastitis epidemiology on an individual unit, to target mastitis control measures specifically and thereby provide farm-specific, cost effective mastitis control. A central precept of the plan was the requirement to 'diagnose' and define the mastitis patterns on a particular unit. Using this approach it was possible, through the analysis of data and strategic bacteriology, to categorise farms according to whether mastitis on the farm was mostly of dry period or lactation origin, whether the pathogens were behaving mostly in an 'environmental' or 'contagious' manner and what seasonal/age variations occurred. Once farms have been categorised in this manner, the principle was that interventions could then be 'targeted' to attempt to achieve the biggest return on investment.

Existing literature was reviewed to identify interventions associated with improved mastitis control. The plan now contains over 300 points (attempting to encapsulate best practice for UK conditions) but the concept is that the 'diagnosis' allows the user to target a small number (10-20) points in the Plan to achieve improved mastitis and milk quality control. To this end the Plan was divided into sections (mirroring cow management and the lactation cycle) and within each section different aspects are categorised as things the farmer 'could', 'should' or 'must' be doing – the exact weighting of these points then varies according to the 'diagnosis'. The approach is outlined below:

1. Define the herd situation, using a set method that comprises appropriate clinical mastitis and cell count indices.
2. Using software provided, compare farm management practices to the 'best practice' defined by the Plan.
3. Again using software, define areas of control that need to be addressed but prioritise them according to the patterns of mastitis identified on the unit.
4. Make an agreed action plan with the farm staff that incorporates 8-10 actions.
5. Confer with the farmer approximately every 3-4 months to re-appraise the data and re-assess the targeted control plan.

Testing the plan: an intervention study

An intervention study was conducted in 2004/5 to validate and test the method of mastitis control and this has been described in detail (Green *et al.*, 2007). During the study, each farm was categorised according to the degree of compliance with respect to the carrying out the control measures, as follows; group 1: <33% of recommendations implemented, group 2: >33%

but <66% of recommendations implemented, group 3: >66% of recommendation implemented. The study found that intervention farms experienced an average decrease in mastitis incidence of approximately 20% in a year, compared to control farms. When the degree of compliance was considered in the analysis it became clear that the level of compliance was a significant factor in determining the likely benefit of the plan; significant improvements were only achieved by herds in compliance groups 2 and 3. The findings on compliance have formed an important component of subsequent training to deliver the mastitis control plan.

Follow up: a pilot study

Following the successful implementation of the DMCP in a research context, the decision was taken to trial its implementation by a separate group of veterinary surgeons. This was done to identify potential issues that may be encountered with a nationwide 'roll out' and generalisation of the plan. In the summer of 2006 a number of farmers were approached to participate in the study. Once accepted they were asked to approach their veterinary surgeons to request their participation. Twenty two farms agreed to participate encompassing nineteen veterinary surgeons. A series of lessons were learned from the pilot scheme, especially; how training and support were provided; the difficulties with involving veterinary surgeons through their farming clients; the importance of communication both between the central plan team and the vets, and between the vets and farmers. Having completed the pilot study, DairyCo decided that a nationwide scheme was possible and worthwhile.

The DairyCo mastitis control plan nationwide

In October 2008, a project started to commence delivery of the DMCP on a nationwide basis. In April 2009, following a campaign to launch the nationwide initiative, the first participants were trained to use the DMCP. Prior to launch, the following actions were undertaken:

- Bespoke software was developed which allowed easy and secure implementation of the plan on-farm.
- Supporting materials were developed including a Plan folder to act as a field resource.
- A website was developed to support implementation of the Plan.

Training of veterinary surgeons, advisors and farmers to become Plan participants was undertaken by the appointed Plan team. Training included all technical aspects of the Plan, approaches to facilitate improved farmer compliance and a consideration of the possible fee structures to be charged by Plan users. Attendance at an initial 2 day course was essential to become a DMCP participant, obtain access to the resources and carry out the plan on farm. The two training days were made up of Day 1, to introduce the concept of the plan, deliver instruction in how to use the plan and interpret mastitis data, as well as providing basic IT training where required and Day 2 (one month later and after the trainees have conducted the plan on one farm) to offer guidance in interpretation of the data and on farm findings.

Telephone and email support was provided for participants to implement the Plan on three farms in their first year of being trained. At the end of the first year a series of 'update' meetings were held, providing further in-depth training from experts in specific fields of mastitis control. These meetings also allowed feedback of experiences in the use of the Plan and act as a period of 'team building' and sharing of experiences, to foster a network of Plan Users. On an on-going basis, attendance at one annual update course is a prerequisite for continuing as a DMCP licensed participant and extends the ability of delegates to continue to use the electronic resources.

At the outset, DairyCo set a target of 150 plan participants to be trained and undertaking the plan within three years of the first training courses. The target number of farms to have had the DMCP carried out within the first three years was 750.

Two years and three months into the three year period since training commenced, there has been an excellent response to the initiative. Over 250 participants have been trained in use of the DMCP and over 760 farms have already received the plan. Since cow numbers on these farms is above average for British farms, we estimate that >10% of British dairy cows are on farms that have received the plan. Feedback from participants indicates that a partial plan has been used on approximately the same number of additional farms (although we cannot capture these data) and thus it is possible the plan has reached as many as 20% of British dairy cows in some form.

Measuring the outcome of DMCP implementation

Data has been collected prospectively from Plan users and processed electronically by the DMCP team. Key performance indicators have been developed in consultation with DairyCo and comprise incidence rates of clinical mastitis and apparent infection rates calculated from somatic cell count (SCC) data. Farms are followed over time and the year before Plan implementation is considered the 'baseline' year for each farm to determine Plan effect. Headline figures from these analyses will be presented, and at the time of writing, the reduction in mastitis appears to be very similar to that found in the original research project.

Future of the DairyCo mastitis control plan

Consideration is being given to how the nationwide scheme will continue and how the scheme will be funded going forward. Although details are not yet decided, DairyCo have declared the intention to remain involved and it is hoped that a steering group, to include enthusiastic plan participants, will be formed. We anticipate maintaining a similar structure to the present one, to include regular annual update meetings for participants, in particular to encourage participants to remain in close contact with each other and the scheme organisers. This should facilitate important exchanges of information about mastitis control. It is also hoped

that future training in providing the plan will be undertaken by a wider group of tutors who are themselves experienced plan deliverers.

Some highs and lows we experienced when developing the nationwide scheme

- Highs:
  - when DairyCo accepted a proposal to develop a structured plan suitable for nationwide delivery;
  - when it turned out the plan worked under research conditions;
  - when anybody (in fact 20 people) turned up for the first training meeting;
  - when suddenly six months later many people wanted to be trained;
  - when we reached 150 trained deliverers (the project target);
  - when we reached 500 farms and realised we definitely would hit the target of 750 within the first 3 years;
  - when we reached 750 farms after 2 years and 3 months.
- Lows:
  - when it dawned on us that taking 150 people through 2 days of intensive training in groups of about 25 people was a large task;
  - when we realised that software development was frustrating;
  - when it became apparent that plan deliverers (as with the trainers) didn't like to read instructions about how to use software;
  - when only about three people had used the website forum in the first year;
  - understanding that there was a large variation between vets in how they saw their role in terms of mastitis control;
  - realising that recording of clinical mastitis data was very poor in many herds, leading to an over-reliance on somatic cell count data.

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Countdown Downunder: development led innovation in a national mastitis control program

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Abstract

In the late 1990's the Australian dairy industry initiated a national mastitis control program named Countdown Downunder. This initiative continues to the present day. The program was responsible for providing leadership in milk quality, pre-farm gate, for farmers, their advisers and the wider industry. As such, it assumed the role of creating the resources around mastitis control best practice and driving change in this area towards defined goals. The route to change, facilitated by Countdown, required the continual refinement of a development process linking mastitis research with extension and education. The path required clear, consistent mastitis control messages that would create both the desire and means to achieve best practice on farm. It needed uptake by not only farmers, but all advisers contributing to mastitis plans and actions with their farmer clients. The development process for a change management program, such as Countdown, required a multi skilled approach from the program team where a thorough knowledge of the domain was vital. Development is an iterative process demanding a high degree of reflection, adaption and engagement of stakeholders. If considerable resources are not put into the development process the outcomes of research are likely to lead to poor extension outcomes.

Keywords: control program, mastitis, development, change management

Introduction

Countdown Downunder is the Australian dairy industry's national mastitis and milk quality program. Commencing in 1999, the program has operated continually since that time with a varying level of resourcing from the industry. It is the oldest of the Australian dairy industry's national animal performance programs.

The program is funded through the resources of the national dairy development body, Dairy Australia, which in turn is funded via both farmer levy contributions and matching Federal Government funds. The program is now into its fourth cycle of development and implementation with most of the cycles being three years in length. Based on the collective experience of the program team, the process of how the program operates within a research, development and extension framework has evolved. This paper will describe aspects of that evolution.

H. Hogeveen and T.J.G.M. Lam (eds.), *Udder Health and Communication*,
DOI 10.3920/978-90-8686-742-4_2, © Wageningen Academic Publishers 2011

Countdown Downunder (Countdown) is a change management program and should not be viewed simply as an extension program. As an industry good initiative, it has been charged with providing leadership in the area of mastitis, cell count and milk quality control. It has the responsibility of identifying the desired change around mastitis for Australian dairy farmers, their advisers and the wider industry, and creating the route to change to deliver the identified outcomes. The method by which the program team has articulated this path to change has become better understood as the program has aged.

One of the foundation principles of Countdown is the provision of clear and consistent mastitis control recommendations to all sectors of the industry – not just the dairy farming community.

Identifying the dairy industry need around milk quality

Measurement and reporting of bulk milk or bulk tank somatic cell count (BMSCC) has occurred in Australia since the early 1980's and by the start of 1990 many processors were providing BMSCC information to farmers for each vat pickup. In 1992, one processor commenced a payment system which included a quality component based, in part, on BMSCC. The lead of this individual processor was soon followed and by 1995 many of the milk processors in Australia were enforcing a quality payment system. Part of the impetus for this was the recognition by processors that our overseas trading partners were moving towards a description of product quality based on somatic cell count. This was later confirmed through a European Union directive (92/46/EEC) indicating that raw milk with a BMSCC in excess 400,000 cells/ml geometric mean should not be used in the production of human food products. Approximately 50% of the milk produced in Australia is exported in a wide variety of dairy products.

Whilst common knowledge now, in the 1990's Australian dairy farmers did not fully appreciate that there was no post-farm gate solution for somatic cells in milk. The quality of the milk as it left the farm vat could not be manipulated at the individual vat level. What was also poorly understood was the impact the raw milk BMSCC had on the economics of manufacturing at the processor level. Milk with an elevated BMSCC, for example, increased the rate at which milk dryers became clogged with cellular debris necessitating the drying plant going off-line for cleaning. The imperative to reduce the operating costs of producing milk powder, cheese and yogurt by individual processors also drove the formation of quality payment systems based on BMSCC.

By 1998 there was also the realisation, again at the milk processor level, that pricing signals to farmers were not enough to bring about altered milk quality through a reduction in mastitis levels and new infection rates. Whilst the financial rewards were apparent there was a lack of consistent advice available to farmers to facilitate meaningful mastitis control plans on farm. In essence, the mastitis control advice being offered to farmers from different adviser groups, and within groups, was often poorly articulated and piecemeal in its technical content. The