THE MDC PLAN – A WAY FORWARD FOR UK MASTITIS CONTROL?

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SUMMARY

Bovine mastitis remains as a significant cause of financial loss to the UK dairy industry and there is little evidence that the situation has improved in recent years. This paper is designed to ‘update’ the reader on the most recent findings of the Mastitis Diagnosis and Control Plan (The MDC Plan) first outlined in the 2005 conference. In addition it details a pilot project currently being undertaken to assess the best route for ‘roll out’ of the Plan.

INTRODUCTION

Mastitis in UK dairy herds remains a major problem with clinical episodes alone considered to cost the industry in excess of 160 million pounds each year (2). Further losses are caused by sub-clinical infections through loss of milk yield and a potential reduction in milk price if bonuses are lost. Mastitis has further ramifications namely an important impact on cattle welfare and potential influences on public health (2) and the environment.

Despite the clear importance of bovine mastitis and an abundance of peer-reviewed literature on the subject, it is hard to be convinced that the UK has made any significant progress in preventing the disease for the last 15-20 years. The incidence rate of clinical mastitis is difficult to determine precisely but the most recent estimate, based on a prospective survey, places the figure at over 50 cases per 100 cows per annum (4) which is in excess of other estimates (1, 6, 3) and the last prospective survey in the 1980’s (7). We have also seen a dramatic shift in the aetiology of bovine mastitis over the past 30 years with a clear shift away from the classical ‘contagious’ towards ‘environmental’ mastitis pathogens (2). One ‘much heralded’ success has been the decrease in bulk milk somatic cell counts (SCC) since the implementation of financial penalties in 1991; whilst this reduction has been coupled with a decrease in the incidence of contagious mastitis, unfortunately there is little evidence it is reflected in a reduction in new infection rates on farm and on the
contrary there is significant evidence that infection rates have increased. Thus the bulk milk SCC reduction may simply have been through increased culling of high cell count cows.

The paper below briefly outlines the salient points of the development of the MDC Plan and details the outcomes of the intervention study that were used to demonstrate the efficacy of its application - a more detailed description and analysis has been published elsewhere (5). The approach to further validation of the Plan and subsequent national ‘roll out’ is also discussed.

DEVELOPMENT AND INITIAL TESTING OF THE MDC PLAN

The principle of the MDC Plan is that it should be possible, by gaining a better insight and understanding of the mastitis epidemiology on an individual dairy unit, to target mastitis control measures more specifically and thereby assure more cost effective mastitis control. Following development of the Plan an intervention study was developed to test the hypothesis that this well specified plan would result in a reduction in disease incidence in herds with an above average incidence of clinical mastitis; through the intervention study it was also hoped that we would be able to gain a better understanding of the importance of individual control measures – this aspect of the research is still ongoing.

Implementing the Plan – Making a Diagnosis.

A central precept of the plan is the requirement to ‘diagnose’ and define the mastitis patterns on a particular unit. Using this approach it is then possible, through the analysis of data and strategic bacteriology, to categorise farms according to whether the mastitis on the farm is of dry period or lactation origin, whether the pathogens are behaving in an ‘environmental’ or ‘contagious’ type manner as well as defining seasonal variations in aetiology. Once farms have been categorised in this manner it is then possible to ‘target’ interventions to achieve the biggest return on mastitis control investments. Examples of the approach to diagnosis will be provided at the conference.

The Intervention Study

An intervention study was conducted in 2004/5 to validate and test the MDC Plan as well as to investigate on farm factors important in mastitis control. The salient points of this study are outlined below:

- The MDC Plan was developed using current literature as its basis. The plan contained over 300 points (encapsulating best practice) 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 is 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 appropriate clinical mastitis and cell count indices.
2. Use strategic bacteriological samples to confirm pathogens
3. Assess current herd control measures against the Plan ‘gold standard’.
4. Define areas of control that need to be addressed but prioritise them according to the patterns of mastitis identified on the unit.
5. Confer with the farmer every four months to re-appraise the data and re-assess the targeted control plan.

- 52 herds were selected at random from herds that undertook milk recording with NMR and that had an incidence rate of clinical mastitis above the national average (taken to be 35 cases per 100 cows per year)
- The average herd size in the study was around 150 cows and the average incidence of clinical mastitis before the study commenced was approximately 85 quarter cases per 100 cows per year.
- Herds were split into two groups of 26 (intervention and control) and matched on bulk milk cell counts and geographical location.
- The mastitis control plan was carried out on the 26 intervention farms but not on the 26 controls. All farms were closely monitored throughout the study period.
- During and at the end of the study, prior to analysis, each farm was categorised according to the degree of compliance with respect to the Plan. Herds were group according to compliance as outlined below:
  - Group 1: <33% of recommendations implemented
  - Group 2: >33% but <66% of recommendations implemented
  - Group 3: >66% of recommendations implemented
- The change in incidence of clinical and sub-clinical mastitis over a 24 month period was assessed between intervention and control farms, using the parameters outlined below:
  - IRCA: Incidence rate of cows affected with clinical mastitis (within a lactation cycle).
  - IRCM: Incidence rate of clinical mastitis (within a lactation cycle).
  - SCCNI: Proportion of cows calving in with an elevated somatic cell count.
Main causal factors that influenced the success of the control strategy were investigated.

**The Impact of the Plan**

The impact of the Plan was assessed using both univariable and multivariable analyses, the key findings of which are outlined below. A more in depth analysis has been published elsewhere (5).

As one would expect the rates of mastitis changed in both intervention and control herds, with herds in both categories experiencing increases and decreases in mastitis – this change is illustrated for all farms in Figure 1. However, when considered overall, more intervention farms experienced a decrease in mastitis incidence than control farms, and those intervention farms which experienced an increase, experienced a smaller increase (on average) than control farms. This is not unexpected as there are likely to be significant year on year variations and although the control farms did not receive the Plan they were not precluded from seeking mastitis advice elsewhere.

**Figure 1** Individual farm results for the proportional change in IRCA after implementation of the mastitis control intervention (after Green et al 2007).

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. The impact of compliance on the median changes in the rates of the measured indices is outlined in Table 1. Significant improvements were only achieved by herds in compliance groups 2 and 3. Only the highest
compliance group (Group 3) experienced significant reductions in all the measured indices.

Table 1 Proportional changes in IRCA, IRCM and SCCNI after the mastitis control intervention was carried out (after Green et al. 2007).

<table>
<thead>
<tr>
<th></th>
<th>Control Farms</th>
<th>All Intervention Farms</th>
<th>Compliance Group 1</th>
<th>Compliance Group 2</th>
<th>Compliance Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>26</td>
<td>26</td>
<td>9</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Median Change in IRCA</td>
<td>0.11</td>
<td>-0.02</td>
<td>0.10</td>
<td>0.01</td>
<td>-0.20</td>
</tr>
<tr>
<td>Median Change in IRCM</td>
<td>0.09</td>
<td>-0.05</td>
<td>0.08</td>
<td>-0.03</td>
<td>-0.18</td>
</tr>
<tr>
<td>Median Change in SCCNI</td>
<td>0.12</td>
<td>-0.08</td>
<td>-0.03</td>
<td>-0.14</td>
<td>-0.22</td>
</tr>
</tbody>
</table>

The MDC Plan – A way forward? – Issues and Challenges.

Our findings from this research suggest that there is significant scope to improve the mastitis situation in the UK through the application of current knowledge. The challenge that now remains is how best to convey and implement that knowledge on a national scale. To that end the Milk Development Council commissioned a further pilot study to investigate ways of ‘rolling out’ the plan. This study is still ongoing as this paper is being written – an update will be given at the conference.

Whatever the outcome of the pilot study the difficult question will remain as to ‘whose responsibility is it and can we find a better model for mastitis prevention in the UK?’. Implementing a national mastitis control plan that works would benefit the producer (financial), the milk purchaser (milk quality, residues), the veterinary surgeon (more fee paying time less reliance on medicines), the ‘dairy industry’ (better image for milk quality and welfare), the consumer (happy with reduced disease in farmed animals), and the politicians (lower endemic disease, better welfare, better structure for farm vets to work in). Given that the MDC Plan has been demonstrated to work – How do we make it happen?

THE PILOT STUDY

Background

Following the successful implementation of the MDC Plan in a research context, the decision was taken to trial its implementation via a third party (i.e.
implementation was not carried out by the original authors of the plan) in order to identify potential issues associated with the ‘roll out’ and ‘generalisation’ of the MDC Plan.

**Approach**

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 initially agreed to participate encompassing nineteen veterinary surgeons.

The veterinary surgeons were invited to attend two days training in the autumn of 2006, an initial day to receive training in the approach to diagnosis and implementation of the plan and a subsequent day to discuss individual issues. Following this, and as an integral part of the training, the veterinary surgeons were facilitated in implementation of the plan on farm. This facilitation comprised support in data analysis and interpretation, but did not include specific advice with respect to plan implementation on farm as the purpose of this pilot study is to better understand the issues involved in the implementation of the plan by third parties.

As this paper is being written the final stages of implementation are being undertaken, with a view to collating and analysing data to assess the impact of the plan this autumn. Following final collation of the data the twenty two intervention farms will be compared to a similar cohort of controls and the efficacy of the plan, when implemented by third parties, assessed.

**THE FUTURE**

The strategy for national ‘roll out’ of the MDC Plan is currently being developed and will be refined later this year in the light of the findings of the Pilot Study.

**CONCLUSIONS**

The MDC Plan offers a potential route and opportunity for improved mastitis control in the UK. Its effective implementation will require the cooperation of all members of the industry from farmers and herdspersons through consultants and veterinary surgeons to recording organisations. Whilst the plan has been demonstrated to work on farms where it is wholeheartedly implemented the real challenge lies in persuading the not insignificant minority of the industry who lack the ‘motivation’ (be that financial or otherwise) to engage in the process.
ACKNOWLEDGEMENTS

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REFERENCES