BRIEF COMMUNICATION: Influence of Management Techniques on the Levels of Mastitis in an Organic Dairy Herd

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INTRODUCTION

In 2001, Massey University set up its Dairy Cattle Research Unit (DCRU) as a system comparison between organic and conventional farming. It is the only comparative grassland-based open grazing dairy study in the world. The farm is a seasonal producer with calving from late July until mid October. All cows are dried off by the end of May, the exact date depending largely on pasture availability.

The DCRU was split into two similar units. The organic unit covers an area of 20.4Ha and the conventional 21.3Ha, carrying typically 46 organic cows (2.27cows/Ha) and 51 conventional (2.39cows/Ha), respectively. Each of the two units is managed individually according to the “best practice” for its particular type of management system and environmental conditions. Thus, no attempt is made to replicate on one farm what is done on the other. The project has been described in detail by Kelly et al. (2006).

In 2003, the organic unit achieved its full AgriQuality (New Zealand) organic certification. Initially, organic standards were based on those of the EU which allow limited use of antibiotics with extended withholding times. From August 2006, all organic dairy suppliers to Fonterra were required to meet the standards set by the USDA National Organics Program. Under these standards, any animal treated with antibiotics loses its organic status permanently. There was a one year lead-in time for farms already certified which required the use of antibiotics be discontinued from August 2005.

Both herds are milked through the same shed, the organic cows being milked first. Mastitis control for the conventional herd is based on the SAMM Plan. Control in the organic herd is based on the same principles with modifications evolving over time. An iodine-based teat spray is used on both herds post-milking throughout the season.
In November 2003, a sampling regime began whereby aseptically collected milk samples from each quarter per cow in both herds were submitted for microbial culture. Sampling has occurred 4 times per season; at calving, 14 days after calving, at mid lactation and at drying off. Culture and classification of organisms was initially carried out by a post-graduate student (Silva et al., 2005) and subsequently by New Zealand Veterinary Pathology Ltd (NZVP). Additional data were gathered from monthly individual somatic cell counts (ISCC) carried out by the Livestock Improvement Corporation (LIC) as a part of routine herd testing and Bulk Milk Somatic Cell Count (BMSCC) provided by Fonterra at each bulk-milk pick up. Episodes of clinical mastitis were recorded by DCRU staff. An analysis of results up until the end of the 2005/06 season was carried out by McLeod et al. (2008) and to the end of the 2006/07 season by Thatcher et al. (2008).

Relatively early in the study it became clear that the most important mastitis-causing organism in the organic unit was *Staphylococcus aureus*. Once some existing environmental issues were addressed, the incidence of *Streptococcus uberis* mastitis dropped to low levels. Although both herds typically show an incidence of around 8-10% of quarters positive to *S. uberis* culture at calving, the majority of these cows do not develop clinical or subclinical mastitis and are negative 2 weeks later, implying the organism does not establish an intramammary infection. The incidence of dry period mastitis is very low.

**DEVELOPMENT OF CONTROL MEASURES IN THE ORGANIC HERD**

A relatively rapid turnover of farm managers complicated the development of methods of control for contagious mastitis-causing organisms. Each manager had a different emphasis on a variety of control measures. However, this has been of advantage in the development of strategies suited to DCRU as a range of ideas were evaluated. These ideas included different treatment regimes, the use of a quarter milker, milking segregation, and management strategies outlined below.

A number of events in the early autumn of 2006 affected the mastitis incidence in both herds. A manager had recently left, relief milkers were employed until a new manager could start work and there was a drought-induced feed shortage. These circumstances were associated with a rapid increase in the incidence of a positive *S. aureus* culture in
both herds, 35% and 30% of quarters being affected in the organic and conventional
herds respectively. However, the isolate appeared to be of relatively low virulence as the
BMSCC of either herd did not rise significantly until close to drying off. The feed
shortage necessitated the organic herd being dried off early and the inadvertently long dry
period (14 weeks) may have contributed to a substantial decline in the incidence of
cultures positive to *S. aureus* (down to 4%) by 2 weeks after calving. In light of the
change of rules governing the use of antibiotics (and teat sealant) this episode prompted a
review of control methods with particular emphasis on contagious organisms. What
became clear was the importance of training temporary staff in teat spraying technique.

Subsequent to the review, the incidence of positive *S. aureus* cultures has remained low.
However, comparing culture results with individual SCC data demonstrates the
limitations of bacterial culture as a diagnostic tool for subclinical mastitis. Intermittent
shedding of organisms (and other factors) may lead to false negative results. Although an
elevated incidence of positive cultures may be a somewhat useful indicator of the rate of
spread of infection, it seems poorly associated with prevalence of subclinical infections.

The review resulted in a framework of key control measures being put in place:

- Vigilance - early identification and regular monitoring by Rapid Mastitis Test
  (RMT) of the infected cows.

- Separation of infected cows. This can be a problem at DCRU as there is no practical
  way of running separate mobs.

- A clean, stress-free environment.
- High quality teat spraying and ensuring the teats are in a good condition.
- Post-milking stripping of high SCC quarters.
- Appropriate treatment and supportive therapy.
- Appropriate culling.

These measures are all quite standard but their efficacy relies on a consistent integrated
approach. They also require a moderately increased input of labour for the organic unit
compared to that required with a conventionally managed herd.
Approaches within the Framework

The two managers employed since 2006 have represented the two approaches most commonly adopted by organic farmers.

Approach 1: Emphasis on maximising the saleable milk. Vigilance is vital for this to be effective as it involves adding milk from higher cell count cows to the bulk supply when BMSCC is low and withdrawing them when it is high. The risk is that miscalculation may result in a high BMSCC grade, especially on a farm where the milk is being picked up every second day. Perhaps more importantly, the cows with higher ISCC are a risk to uninfected cows unless kept separated.

Approach 2: Emphasis on minimising the BMSCC. This is associated with a relatively higher culling rate and volume of milk discarded but minimises the risk of spread of contagious organisms and is characterised by low levels of subclinical infections.

Table 1. Seasonal average BMSCC (in thousands) 2003 – 2009 for both units at the Massey University Dairy Cattle Research Unit

<table>
<thead>
<tr>
<th>Season</th>
<th>2003/04*</th>
<th>2004/05ns</th>
<th>2005/06*</th>
<th>2006/07*</th>
<th>2007/08*</th>
<th>2008/09ns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>194</td>
<td>199</td>
<td>178</td>
<td>233</td>
<td>226</td>
<td>148</td>
</tr>
<tr>
<td>Conventional</td>
<td>172</td>
<td>192</td>
<td>126</td>
<td>194</td>
<td>195</td>
<td>154</td>
</tr>
</tbody>
</table>

* p < 0.01

In conclusion, although the prevalence of mastitis in the organic herd has remained manageable throughout the trial, the current key control measures introduced since 2006 have reduced it to low levels.

ACKNOWLEDGEMENTS

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Thatcher A, Petrovski K, Holmes C, Dowson K, Kelly T, McLeod K. (2008): A Longitudinal Study of Mastitis on an Experimental Farm with Two Herds, One Managed Organically, the other Conventionally. ISOFAR