

Minimising heifer mastitis: What's new?

Chris Compton, Scott McDougall

Cognosco, Anexa Animal Health, P O Box 21 Morrinsville

The SmartSAMB team has reviewed the literature about managing heifers to minimise the risk of mastitis. This review has been incorporated into Technote 2, which has been reproduced as the body of this paper (see below).

The key points from this Technote include:

- Infusion of an internal teat sealant before first calving reduces the risk of new intramammary infection and of clinical mastitis associated with *Streptococcus uberis* by about two thirds.
 - A very high degree of hygiene is required when infusing heifers to reduce the risk of introducing infection.
 - At the current milk price, it is likely economic to use teat sealants in heifers where the incidence of clinical mastitis around calving is >8%.
- Pre-partum intramammary infusions of either dry cow or lactating cow therapy have been assessed in a number of studies. However while this may be effective, the off-label use of antimicrobials may increase the risk of antimicrobial residues and of antimicrobial resistance and is not recommended.
- Treatment before or at calving with parenteral antibiotics has been shown to reduce the risk of clinical mastitis postpartum. But as above, there is a risk of residues and such an approach should be used with caution.
- Application of teat antiseptics (teat spray) regularly (three times weekly) pre calving reduces the risk of clinical mastitis associated with *Strep uberis* by about 50%. Such an approach may be feasible where herdowners are bringing heifers up close to the parlour or other handling facilities on a regular basis.
- Removing calves from heifers on a twice (rather than once) daily basis with immediate milking results in a 45% reduction in the clinical mastitis incidence rate.
- Other strategies that may reduce the incidence of clinical mastitis in heifers include:
 - Minimising the risk of dirty udders by managing pasture allocation following rain.
 - Minimising the risk of dystocia or retained foetal membranes.
 - Maintaining physically separate heifer and cow mobs pre and post calving.
 - Pre-calving milking, although this may increase the risk of a negative energy balance through the pre-partum period.
 - Ensuring optimal trace element (particularly selenium) concentrations.
 - Use of ionophores pre-calving.

This Technote, and its associated Guideline, provide a SmartSAMB 'trigger for action' of 15% of first calving heifers developing clinical mastitis within the first 14 days after calving. This is considered to be close to the median performance of NZ dairy herds; however depending on the herd circumstance, there are likely to be considerable economic and other benefits experienced at a lower incidence of mastitis. For instance, use of an internal teat sealant has been found to be cost-effective at 8% incidence of clinical mastitis at the current milk price.

From a practical perspective, selecting the most appropriate strategy for a herd will depend on:

- Gap in performance between usual incidence of clinical mastitis for first-calving heifers and industry targets.
- Costs, potential risks and likely benefits of each approach.
- Availability of infrastructure for safe administration of ITS to heifers, four weeks before planned start of calving.
- Labour availability to pick up newly-born calves twice per day and bring newly-calved heifers in to be milked.
- Opportunities to allow heifers' teats to be teat sprayed regularly (2-3 x per week) in the last three weeks before planned start of calving.

TECHNOTE

2

Take care with heifers

In recent years researchers have explored ways to minimise mastitis in first-calving heifers. The following strategies have proven effective in preventing mastitis at and around calving.

Infusion of internal teat sealant pre-calving

Infusion of an internal teat sealant (ITS) into heifers' glands, approximately 1 month before calving, was associated with a reduction in mastitis post-calving (Parker *et al* 2007, Parker *et al* 2008). In one study (Parker *et al* 2007) involving more than 1000 glands across 255 heifers and 5 herds, ITS reduced the risk of intramammary infection (IMI) post-calving due to *Strep. uberis* by 84%, and the risk of clinical mastitis by 68%.

In another study (Parker *et al* 2008), using more than 1000 heifers across 30 herds, ITS reduced the prevalence of post-calving infection by 65%, reduced the risk of new infection with *Strep. uberis* by 70% in quarters with an IMI pre-calving, and reduced the incidence of clinical mastitis, from which a pathogen was isolated, by 70%.

The teat sealant provides a physical barrier in the teat canal that prevents the entry of bacteria. It may also reduce the incidence of milk leakage pre-calving, which is itself a risk factor for mastitis in heifers (Waage *et al* 1998). Milking staff need to be aware that flecks of teat sealant may persist in milk for some weeks after calving (Berry and Hillerton 2002) and may be incorrectly diagnosed as cases of clinical mastitis.

Good hygiene at the time of application is imperative and some veterinary practices provide technicians to perform the task. For herds with an above average rate of heifer mastitis (15% or more heifers clinical at calving), this approach becomes cost effective.

Intramammary infusion of dry cow or lactating cow antibiotics pre-calving

Studies conducted in the US, to examine the effects of infusing lactating or non-lactating cow preparations of antibiotics into heifer glands, have been reviewed by Nickerson (2009). A one-time infusion of non-lactating cow antibiotic preparations into infected glands during different stages of

gestation resulted in cure rates for *Staph. aureus* infection of 67-100% but benefits were only observed in herds with a high prevalence of *Staph. aureus*.

Infusing lactating cow antibiotics 1-2 weeks pre-calving, were reasonably successful, showing cure rates of 59-76% compared to 26-31%, but these benefits did not necessarily translate into lowered SCC and higher milk yields during the subsequent lactation (Nickerson 2009). Little benefit was observed for prevention of infection by environmental pathogens.

Parenteral treatment of heifers at calving

Using 597 heifers across three commercial herds, treatment by injection with 15 million IU micronised procaine penicillin at the first milking after calving was compared with no treatment. Treatment reduced the odds of clinical mastitis within the first 7 days by more than 50% and mastitis within the first 100 days by nearly 50% (Bryan and Taylor 2009).

In another study, across 967 heifers and 17 commercial herds, treatment with 15 million IU micronized procaine penicillin within 7 days prior to calving resulted in a 30% reduction in risk of clinical mastitis within the first 21 days after calving. The greatest benefit was observed when the treatment was administered on the day of calving (Williamson and Lacy-Hulbert 2010).

In New Zealand, use of antibiotics prior to calving in heifers represents an off-label approach. These practices are not recommended, due to the high cost of treatments and risks of inhibitory substance residues in the colostrum or milk after calving. However use of antibiotics on the day of calving may be considered in the face of an outbreak.

Application of external teat sealants pre-calving

External teat sealants are non-irritant latex, acrylic or polymer-based films that are applied like a teat dip to produce a layer over the teat end that prevents entry of bacteria into the teat canal. Application of an external teat sealant to heifers commencing approximately 10 days before calving and again as required, resulted in a decrease in prevalence for all IMI by 19%, by 40% for major pathogens and by 50% for environmental streptococci; but no significant reductions in CNS or Gram negative IMI (Timms 2001).

Twice weekly application of an external teat sealant pre-calving reduced the risk of IMI post calving significantly in a study of NZ heifers (McDougall *et al* 2008). Across four herds and approximately 200 heifers per treatment, an external teat sealant, applied twice a week when calving was imminent, was compared with receiving no treatment. Treatment with the external teat sealant reduced the prevalence of any infection by 27%, and infection caused by a major pathogen by 36%, compared with controls. However, the external teat sealant did not significantly alter the risk of clinical mastitis.

Thrice weekly teat spray application pre-calving

Application of an iodine teat spray three times weekly pre-calving for at least 3-weeks pre-calving tended to reduce the prevalence of *Strep. uberis* on the teat-end 24-48 hours before calving and reduced the prevalence of subclinical mastitis associated with *Strep. uberis* at the first milking after calving (Lopez-Benavides *et al* 2006). Using a total of 397 heifers across six farms across NZ, sprayed heifers had 50% less clinical mastitis by *Strep. uberis* although the incidence of clinical mastitis caused by all

pathogens was not different between sprayed and un-sprayed heifers.

Removing calves and milking newly-calved heifers within 12 hours of calving

Reducing the interval between calving and first milking, from an average of 19.5 hours to 9.8 hours, resulted in a significantly lower prevalence of clinical and subclinical mastitis at calving (Compton and McDougall 2008a). Using 480 heifers across 4 commercial herds, twice-daily removal of freshly-calved heifers from the 'springer' mob and immediate milking resulted in a 45% fewer cases of clinical mastitis, compared with once-daily removal of calved heifers in the morning, and first-milking in the afternoon. Less udder oedema was observed for the heifers in the twice-daily calf removal treatment. Farmers reported other practical benefits, including less mis-mothering and greater ease of dealing with smaller batches of freshly calved heifers.

Other Strategies

Strategies that are likely to be helpful (McDougall *et al* 2009) include:

- Minimising the risk of dirty udders by managing pasture allocation following rain.
- Minimising the risk of dystocia or retained foetal membranes.
- Maintaining physically separate heifer and cow mobs pre- and post-calving.
- Pre-calving milking, although this may increase the risk of a negative energy balance through the pre-partum period.

While there is evidence that nutrition pre-calving influences the risk of mastitis (Waage *et al* 1998), increasing hay intake pre-calving did not reduce the incidence of clinical mastitis under NZ management systems (Compton and McDougall 2008b).

Supplementation with selenium also showed no benefit in otherwise Se-replete heifers (Compton and McDougall 2008a).

Use of ionophores (e.g. lasalocid sodium and sodium monensin) to change the bacterial microflora of the rumen led to reductions in risk of ketosis and less udder oedema but these changes did not translate into significant reductions in mastitis in heifers at calving (McDougall *et al* 2008).

For reducing the risk of mastitis in first-calving heifers:

1. Use of an ITS approximately 4 weeks before planned start of calving has shown the most dramatic results in the field.
2. Farmers who are able to implement twice daily collection of calves and application of teat spray pre-calving are also finding good results.
3. Use of antibiotics in heifers pre-calving is not recommended from a cost or antibiotic residue risk.

2.1

Choose the heifer pre-calving management that is most suitable for the herd.

Choice of strategy for an individual herd will vary, depending on a combination of factors, which include:

- Gap in performance between usual incidence of clinical mastitis for first-calving heifers and industry targets.
- Costs, potential risks and likely benefits of each approach.
- Availability of infrastructure for safe administration of ITS to heifers, 4 weeks before planned start of calving.
- Labour availability to pick up newly-born calves twice per day and bring newly-calved heifers in to be milked.
- Opportunities to allow heifers' teats to be teat sprayed regularly (2-3 x per week) in the last 3 weeks before planned start of calving.

The SmartSAMM "trigger for action" is that herds experiencing more than **15 cases of clinical mastitis within 2 weeks of calving, per 100 heifer calvings** should consider ways to reduce heifer mastitis more proactively.

SmartSAMM Mastitis Focus report can calculate the incidence of clinical mastitis among heifers in the calving period (14 days before and 14 days after calving) if clinical case treatment records and cow SCC records are available in herd improvement systems

Discuss options and the most suitable approach or combination of approaches for your herd with your vet.

2.2

Train heifers in the milking area before calving.

It takes about two weeks for most heifers to establish a quiet, reliable response to milking. To maximise production and minimise risk of injury to milkers and animals, milking staff must be patient and as gentle as possible during this period.

Extra labour may be required for the calving period in seasonal herds. Training heifers by moving them through the milking parlour pre-calving was found to reduce difficult behaviour post-calving (Eicher *et al* 2007) although wide variation is observed between individuals animals (Bremner 1997).

2.3

Take your time moving animals into the farm dairy - don't rush.

Technote 5.1 describes how to ensure cows enter the farm dairy willingly.

2.4

Attend to heifers with severe udder oedema.

Udder oedema is a swelling that occurs under the skin of the udder, and sometimes along the belly, in cows prior to calving. It mostly occurs in heifers at their first calving, but can occur at subsequent calvings, and is commonly observed during late pregnancy and early lactation. It is a significant risk factor for mastitis (Compton *et al* 2007).

Oedema largely results from compromised fluid drainage from the udder and the surrounding areas. A small amount of oedema is a normal (physiological) occurrence as the blood supply to the udder increases and changes during the period before calving.

In most cases the oedema disappears within a day or two of calving but, in severe cases, it can interfere with milking. Once milking is started, the volume of the udder is reduced and the oedema is usually cleared.

Veterinary advice should be sought if cows are very uncomfortable. Diuretics used prior to calving are less effective – possibly because of the large volume of foetal fluids present.

Factors that may lead to high numbers of animals with udder oedema or increased severity of cases include:

- excessive feeding immediately prior to calving,
- excessive dietary sodium or potassium,
- over-fat heifers, and
- hereditary predisposition to oedema.

Advice on heifer nutrition should be sought to ensure that the diet does not contribute to severe oedema.

2.5

Ensure all quarters of all cows are milked out.

Ensure that all cows and heifers in particular, have a milk let-down response at each milking after calving. The injectable form of the let-down hormone, oxytocin may be recommended for heifers that are taking time to establish a good let-down response.

Use of oxytocin can be prescribed by a veterinarian for animals described in the farm's Animal Health Treatment plan. Such animals may include:

- Cows or heifers that have not had a full let down within 24 hours after calving
- Cows or heifers that have severe udder oedema preventing proper milk let down.

Use of oxytocin as a general treatment for helping heifers to establish a milk let-down response is unproven. No advantage, in terms of less mastitis

Prior to calving, options for treating cows and heifers with oedema include:

- Milk them out. Commence regular milking and save colostrum for their calf, or make alternative arrangements; or
- Induce calving (especially if natural calving is not expected for some time). Make alternative arrangements to provide colostrum to their calf.

No diuretics (either oral or systemic) are available for lactating cattle in NZ. Anti-inflammatories such as dexamethasone may be used 'off label' in severe cases under the direction of a veterinarian.

Guideline 5 describes how to establish a good let-down response in heifers

or increased milk production were observed, when the effect of oxytocin, administered at each milking for the first 5 days after calving, was compared with normal milking routine across 536 heifers on three commercial farms (Williamson and Garrett 2010).

Acknowledgements

DairyNZ and NMAC (NZ National Mastitis Advisory Committee) acknowledge the huge contribution of Dairy Australia's Countdown Downunder as the original source material from which SmartSMMM Technotes are derived, being updated and adapted for NZ dairy farming in 2011.

These SmartSMMM adapted resources are made available to NZ dairy farmers and advisors through a Memorandum of Understanding between Dairy Australia and DairyNZ.

The SmartSMMM programme is funded by DairyNZ, and supported by the MPI Sustainable Farming Fund.

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