

Effectiveness of pre-calving treatment on post-calving udder health in nulliparous dairy heifers – a systematic review

S. Ali Naqvi^{1,2}, D.B. Nobrega¹, P.E. Ronksley², H.W. Barkema¹

¹Department of Production Animal Health, Faculty of Veterinary Medicine, University of Calgary, Calgary, AB; ²Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, AB

Why is this important?

Mastitis is one of the most economically important diseases in the dairy industry, as it has implications on animal health and welfare as well as milk quality and production. The occurrence of mastitis is high in both lactating cows and heifers in the first weeks after calving. Heifers with mastitis or other intramammary infections (IMI) prior to calving are often not identified because they are not milked and their teats are therefore not examined. However, the prevalence of IMI in the months before the first calving is high, resulting in a high prevalence of heifers calving with IMI.

Although non-lactating heifers are often not included in standard mastitis prevention plans, such as the 10-point plan published by the National Mastitis Council, a variety of treatments to prevent or cure IMI in these heifers has been studied. Some commonly used pre-calving treatments are vaccines, non-antimicrobial teat sealants, short- and long-term antimicrobials, and combinations of these treatments. Previous studies have demonstrated a net positive benefit of various pre-calving treatments and have also characterized the type of pathogen causing the infections. The objectives of this study were to synthesize results from previous studies to determine and compare the effectiveness of various types of pre-calving therapies aimed at improving udder health and to compare the effectiveness of various types of pre-calving therapies against different types of pathogens.

What did we do?

The authors completed a systematic review and meta-analysis that examined a number of studies (62 studies for the systematic review; 48 studies for the meta-analysis). The population of interest was first calf heifers, with the treatment applied during pregnancy and udder health measured after calving. The interventions of interest were any kind of treatment applied pre-calving aimed specifically at improving udder health.

What did we find?

The overall risk ratio (RR) of udder disease of any sort in treated compared with untreated heifers was 0.60, indicating a reduction in udder diseases after calving in treated compared with untreated heifers. (NOTE: A risk ratio of <1.0 indicates a reduction in risk of treated vs. untreated; 1.0 represents equal risk, and >1.0 indicates an increased risk in treated vs. untreated).



Overall, there were differences in effectiveness of different interventions on treatment of clinical mastitis, subclinical mastitis, and IMI. Teat sealants and combination therapies were the most effective, although antimicrobials, vaccines, and other treatments still reduced the risk of udder disease compared with untreated controls. Teat disinfection before calving did not reduce udder disease compared with untreated controls. Other effective management strategies were the use of physical intramammary devices, implementing fly control for heifers on pasture, and earlier removal of calves after calving to prevent suckling.

There were some notable differences in effectiveness of treatments depending on the type of mastitis (contagious, environmental, or CNS; Table 1). Antimicrobials, teat sealants and vaccines reduced infection from contagious pathogens. However, antimicrobials, teat disinfection, and vaccines did not have any benefit when dealing with environmental pathogens. In this case, teat sealants and combination therapies were most effective in reducing the occurrence of infection.

Table 1. Meta-regression of records in a systematic review of pre-calving treatment for improving udder health in primiparous dairy heifers on the type of treatment assessed.

Pathogen and intervention type	Risk ratio
Contagious	
Antimicrobial	0.41
Teat sealant	0.40
Teat dips/spray	1.48
Vaccine	0.56
Combination	0.93
Environmental	
Antimicrobial	0.58
Teat sealant	0.27
Teat dips/spray	0.56
Vaccine	0.78
Combination	0.25

What does it mean?

Management of mastitis on dairy farms typically starts after the heifer's first calving, often resulting in sub-optimal udder health for first lactation heifers. Many housing and management practices that result in improved udder health for older cows will also improve udder health for first calf heifers. Preventative treatment of the udder before calving (e.g. antimicrobial dry cow therapy or internal teat sealants) is widely used in the lactating herd but is less commonly used in heifers. This study demonstrated an overall benefit to udder health in heifers when using any kind of pre-calving preventative treatment. Treatments vary in both cost to purchase and cost and labour associated with application, so understanding the effectiveness of treatments is important in informing management decisions. Additionally, the effectiveness of treatments varies considerably depending on the type of bacteria causing the IMI. It should also be noted that the management of non-lactating heifers is often less than ideal, with practices such as commingling with older cattle and moving cows close to calving and increasing stress being common on most dairy farms. This may be why treatments were effective in improving udder health and it is likely that effectiveness of some treatments (such as antimicrobials) would be less on farms that devote more attention to heifer management.

Of note, although the effectiveness of antimicrobials was consistent across most pathogens, their use needs to be balanced with concerns around antimicrobial resistance. The National Mastitis Council's 10-point plan can help producers to decide when antimicrobial use is warranted.

Summary Points

- Any type of pre-calving therapy improved udder health by reducing occurrence of udder disease.
- There is significant variation in effectiveness of different treatments depending on the pathogen involved.
- The use of antimicrobials should be balanced by concerns around antimicrobial resistance – a mastitis control plan can help producers make decisions on drug usage.