The many costs of heifer mastitis

Heifer mastitis can be a significant problem for some herds, threatening production and udder health in the first and subsequent lactations. Catherine McAloon, University College Dublin School of Veterinary Medicine and member of Animal Health Ireland's CellCheck Technical Working Group, explores the many costs associated with heifer herd mastitis

It has been demonstrated that heifers that develop mastitis in the first 30 days after calving produce less milk and are likely to be less profitable over their lifetime. Given the substantial costs associated with rearing heifers until first calving, and given breakeven point is not achieved until the second lactation, it is imperative that mastitis is prevented in the first lactation. In addition to the direct costs associated with a case of mastitis, the effect on longevity in the herd and detrimental effects on production must also be considered and it is, potentially, a significant welfare issue.

DEFINITION

Mastitis is caused by a variety of bacterial pathogens and results in inflammation in the udder, most often caused by bacterial infection. Mastitis can be defined as clinical or subclinical. Clinical mastitis can also be recognised in colostrum. Subclinical mastitis exists without obvious changes in the milk, but there is an increase in somatic cell count (SCC), and relies on indirect tests such as SCC counts on milk records to detect it. It should be remembered, also, that unlike research studies that may evaluate quarter-level infection, most of the proxy measures used for infection is composite cow level SCC. There are many definitions for what constitutes a case of subclinical mastitis, but a widely accepted definition is that of a SCC >150,000 cells/ml for first-lactation animals, at any milk recording, is indicative of subclinical mastitis. This lower threshold is usually accepted for lactation-one animals. In-keeping with the standard threshold of SCC used to determine infection, a threshold of 200,000 SCC/ml can also be used. Even in the absence of visible changes in the milk, bacteria can still be present, causing infection in cases of subclinical mastitis. Heifer mastitis also includes cases where one or more quarters are non-functional in animals in their first lactation. Although it is unusual to see clinical mastitis in heifers before calving, it is possible that heifers develop subclinical infections with mastitis pathogens before calving. It is most common that heifer mastitis is diagnosed after calving when the animal begins milking and either abnormal milk is detected, or an increased SCC. In order for mastitis to develop, bacteria must gain entry to the teat canal via the teat orifice to establish infection and provoke an inflammatory response that results in either clinical or subclinical mastitis. Although many similar pathogens that cause mastitis in adult cows can result in heifer mastitis, pathogens like *Streptococcus uberis* and non-*aureus staphylococcus* (NAS), previously known as *Coagulase negative staphylococcus*, are often involved in heifer mastitis. Other environmental pathogens are also often involved in cases of heifer mastitis. Exposure of the teats to pathogens in the pre-calving environment can result in infection before calving. Some infections may arise from bacteria living on the teat skin as well as from bacteria from the environment that enter the teat and initiate infection. The role of *NAS* is much debated; and its ability for pathogenicity varies. Some *NAS* species may result in intramammary infection quite capable of causing both clinical and subclinical mastitis as well as persistent infection. Some are more virulent than others and some more contagious in nature. For example, *Staph. chromogenes, Staph. simulans, Staph. xylosus, Staph. epidermidis, Staph. haemolyticus* are thought to have a more serious impact on udder health. It is worth noting that identification of NAS and its role in mastitis problems likely requires molecular analysis, this may limit our understanding of the pathogen in commercial farms. The magnitude of the effect of heifer mastitis on an individual animal is influenced by the form of mastitis (clinical versus subclinical), the virulence of the causative pathogen(s) (major versus minor pathogens), the time of onset of infection relative to calving, cure or persistence of the infection when milk production has started, and the host's immunity.

RISK FACTORS

There are several risk factors for heifer mastitis that have been identified but are often farm and region specific. There are studies that show infection of heifer quarters can occur well before calving and the pre-calving heifer must be treated with the same care and hygiene standards as are applied to dry cows. Before considering strategies for control, a threshold for specific intervention must be set; international standards for heifer mastitis are set at a threshold for intervention of 15% of the first calving heifers.

CONTROL

First it must be decided if the problem is specific to heifers, or rather first lactation animals after calving. Records are, therefore, paramount; a herd with high SCC in the adult herd needs a holistic approach to SCC and mastitis control. If the pattern is mainly the heifer/first lactation group affected with either clinical mastitis or high SCC, then control can be targeted at them specifically. This will require good record keeping, including milk recording early enough in lactation to disentangle the effect of the pre-calving/calving period risk from lactation-origin mastitis. An integrated strategy to prevent and control heifer mastitis should include goal setting, assessment of the current farm systems, application of farm-specific interventions and monitoring of outcomes. Again, and very importantly, this will require good records of clinical mastitis cases and a first-milk recording carried out early in the year. Much like most infectious diseases, control relies on both reducing infection pressure and maximising the host response. Some general approaches to heifer mastitis include:

- Improve general udder health management at farm level to decrease the pressure of infection with udder pathogens from older cows to heifers;

- Prevent cross-suckling in calves and young stock, this practice can be implicated in the development of heifer mastitis in later life;
- Implement an effective and efficient fly-control system as flies can have a role in the development of summer mastitis. It is often the case that fly control is not provided for a long enough duration;
- Address any issues that cause teat-skin lesions, for example if teat warts are an issue, a short- and long-term control strategy should be pursued, and these issues dealt with well in advance of calving. Teat skin lesions or abrasions of any kind are a risk factor for mastitis and should be addressed;
- Keep young and pre-calving heifers in a clean and hygienic environment. It is important that the pre-calving accommodation is fit for purpose, has enough space and provides a clean, dry, hygienic environment – as much attention should be provided to this group of animals related to hygiene and cleanliness, as is spent on lactating animals. Stocking rate is hugely important. If cows and heifers are kept together and space is tight then the heifers are likely to get bullied and suffer the worst consequences of overstocking;
- Avoid any nutritional deficiency – particularly with regard to vitamins and minerals, such as vitamin E and selenium;
- Minimise the risk of negative energy balance before and after calving through appropriate transition feeding systems;
- Reduce the incidence of udder oedema through optimised peripartum management; although this area is poorly understood, some contributing factors are thought to relate to feeding practices such as sodium intake and over-fat heifers, as well as having a genetic component. The interval from calving to first milking is also important. Topical agents may help with control of this in individual animals;

- If more than 15% of heifers have clinical mastitis at/around calving or
- If more than 15% heifers have a SCC > 150,000 cells/ml, when measured at first-day milk recording (done in the first month after calving)

This warrants investigation and control.

- Minimise stress around calving (e.g., by not moving heifers to the calving pen when already in labour) and minimise incidence of dystocia and peripartum disease. Consider training of heifers in the milking area pre-calving; and
- Ensure the calving pen is clean and well maintained and try to ensure that the calving area is not the same area that is used as the hospital pen for sick animals.

Other farm-specific measures used in mastitis control in heifers include:

- Measures such as teat spraying three times per week with an iodine-based teat spray during the last weeks before calving has been shown to reduce the number of certain bacteria at the teat ends. Teat spraying will help train the heifers if being completed through the parlour, knapsack sprayers have also been used to deliver teat spray to pre-calving heifers. Although the work done in this area was on an iodine-based disinfectant, which could be washed off completely in preparation for first milking after calving, it is likely other teat disinfectants may work similarly if used appropriately to reduce bacterial contamination of skin;
- The use of teat sealant pre-calving in heifers is used in some countries but this product is not licensed for use in heifers in Ireland. In other countries, teat sealant administered six weeks pre-calving in herds with heifer mastitis issues, when administered correctly and hygienically, was shown to effectively reduce heifer mastitis. Teat sealing heifers is not without risk, for human safety as well as for the heifer, as any dirt introduced at the time of application may prove disastrous, hence hygiene cannot be overstressed in this context;
- Currently no external teat sealant/barrier products have been proven to be very successful in reducing heifer mastitis although research continues.

There are wide variations between studies and between pathogens making generic advice impossible. In all cases of herds with heifer mastitis problems, risk factors should be investigated and attention to hygiene is f the utmost importance.

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