MASTITISCONTROL

AHDB

Control of heifer mastitis

DAIRY

Contents

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Introduction

Mastitis treatment and control is one of the largest costs to the dairy industry in the UK and is also a significant factor in dairy cow welfare.

Mastitis infections in heifers around the time of calving are important for lifetime udder health. They are also important as a source of new intramammary infection in the herd.

Heifer mastitis will also reduce milk production in the first and subsequent lactations.

Udder infections may be picked up from the environment or transmitted from cow to cow, i.e. contagious transmission. Analysis of clinical mastitis records and individual cow somatic cell counts can reveal which of these 'infection patterns' is most important in a herd at a particular time.

The Mastitis Pattern Analysis Tool (MPAT) provides a simple automated way of determining the transmission pattern. The Tool also highlights if the data shows there are potential heifer management issues.

This factsheet provides information relevant for herds with specific heifer mastitis issues.

This resource has been produced as part of the QuarterPRO initiative. Other resources include:

- ***Managing mastitis***
- ***The QuarterPRO approach*** factsheet
- ***Control of contagious mastitis***
- ***Control of environmental mastitis in lactation***
- ***Dry cow management***

For a more detailed mastitis/udder health investigation, consider the Dairy Mastitis Control Plan: **mastitiscontrolplan.co.uk**

In the AHDB 'Sentinel Herds' group in 2018, there were specific heifer management issues in 58% of herds.

Derek Armstrong
Lead Veterinary Science Expert

Evaluating heifer mastitis and its costs

The aim in rearing replacement heifers is a healthy adult cow producing high-quality milk. Success depends on how heifers are managed from birth to first calving. Rearing an animal to first calving is a considerable investment, which is generally not recovered over the course of a single lactation. You can use the **AHDB Heifer Rearing Cost Calculator** to estimate the costs of rearing.

Mastitis before or after calving, or during the first lactation, will significantly affect lifetime yield and udder health. Prevention and management of mastitis in heifers is, therefore, critical on dairy farms.

Awareness of heifer mastitis

Heifers with intramammary infections before calving are often not identified because they are not milked and few farms actively look for an infection before they calve.

There is scope to improve the control of mastitis infections in heifers when:

- More than 1 in every 12 heifers that calve into the herd have clinical mastitis in the first month or have blind quarters around calving, with no or very reduced milk production from those quarters
- More than 10% of all heifers have a first-test-day somatic cell count (measured between 5 and 35 days in milk) greater than 200,000 cells per ml

These problems should be investigated urgently. The Mastitis Pattern Analysis Tool will highlight when there are specific issues with heifers.

Targets

Less than 1 in 12 heifers with clinical mastitis within the first 30 days of lactation.

Less than 10% of heifers with a somatic cell count over 200,000 cells/ml at the first milk recording after calving (within the first 30 days of lactation).

What do mastitis infections in heifers cost your business?

Heifers with mastitis infections at calving are likely to have reduced performance in the first and subsequent lactations. The effect of clinical mastitis on heifers is more severe than that in older animals. Heifers that calve with subclinical or clinical mastitis are more likely to be culled during their first lactation.

The impact of heifer mastitis on an individual animal is influenced by:

- The type of mastitis (clinical or subclinical)
- The severity of the infection
- The time of infection relative to calving
- Cure or persistence of the infection when milk production has started
- The animal's own immunity

At the herd level, the impact of mastitis in heifers will depend on:

- The number of cases of mastitis in heifers
- The nature of the problem (clinical, subclinical, non-functional quarters)
- The pathogens involved (major versus minor pathogens)
- The ability of the animals to cope with the disease
- The response of the farm team to control the disease

Research

Impact of increased SCC on lifetime milk production

Simon Archer and colleagues at Nottingham University and at the Animal and Grassland Research and Innovation Centre in Ireland looked at milk-recording data from more than 50,000 heifers in nearly 6,000 Irish herds over an eight-year period. Specifically, the group were interested in the impact of an increased somatic cell count (SCC) in heifers at calving on lifetime milk production.

> Heifers that calve in over 200,000 cells/ml lose at least 1,000 litres in their lifetime.

Archer, S. C., Mc Coy, F., Wapenaar, W., Green, M. J. (2013). *Association between somatic cell count early in the first lactation and the lifetime milk yield of cows in Irish dairy herds.* Journal of Dairy Science. 96: 2951–9.

www.journalofdairyscience.org/article/S0022-0302(13)00204-X/pdf

Mastitis pathogens in heifers

Major pathogen infections in heifers

The most common major pathogens causing environmental mastitis are the same as in dairy cows – *Streptococcus uberis* (*Strep. uberis*) and *Escherichia coli* (*E. coli*). Others include *Klebsiella*, *Pseudomonas* and *Trueperella* species.

The most common major pathogens causing contagious mastitis are also the same as for dairy cows –*Staphylococcus aureus* (*Staph. aureus*), *Streptococcus agalactiae* (*Strep. agalactiae*) and *Streptococcus dysgalactiae* (*Strep. dysgalactiae*).

See ***Control of contagious mastitis*** and ***Control of environmental mastitis in lactation*** guides for more detail.

Summer mastitis pathogens

Summer mastitis is caused by a number of different bacteria, most notably *Trueperella pyogenes* and *Streptococcus dysgalactiae*. Other anaerobic bacteria, such as *Peptococcus indolicus*, may also be involved.

Trueperella pyogenes, the environmental bacterium most commonly implicated in summer mastitis, is a cause of opportunistic infection in all months of the year.

Coagulase-negative staphylococci (CNS)

Coagulase-negative staphylococci (CNS) are commonly isolated from clinical mastitis cases and quarters with a high somatic cell count, both in cows and heifers, although the significance of CNS infections appears to be more important in heifer mastitis.

The CNS group consists of more than 50 different species and subspecies of bacteria, although a relatively small number of these CNS species are reported as causing infections resulting in mastitis. Some CNS species appear to be more 'contagious', and some CNS species more 'environmental', in terms of the ability to elevate cell count and persist in the udder.

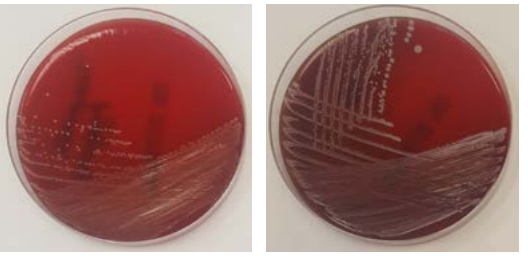

Figure 1. *Trueperella* (left) and CNS (right) species in laboratory cultures

Research

The impact of CNS infections in heifers?

Coagulase-negative staphylococci are associated with a moderate increase in somatic cell count but may also have a protective role in heifer udder health. Heifers infected with CNS in very early lactation tended to have fewer cases of clinical mastitis throughout lactation compared with non-infected herd mates. In addition, milk yield was higher in CNS-infected heifers and cows compared with culture-negative animals.

Piepers, S., Schukken, Y. H., Passchyn, P., De Vliegher, S. (2013). *The effect of intramammary infection with coagulase-negative staphylococci in early lactating heifers on milk yield throughout first lactation revisited.* Journal of Dairy Science 96: 5095–5105

Clinical and subclinical mastitis in heifers

Heifer mastitis can affect the profitability of dairy farming because of potential long-term effects on udder health and milk production and an associated culling risk, especially when major pathogens are involved. Prevention and control is not easy but is possible through changes in youngstock and heifer management.

It is important to monitor the rate of new high-cell-count infections in heifers (target: less than 10%) and the rate of new clinical mastitis cases in the first 30 days of the lactation (target: less than 1 in 12 heifers affected). These thresholds should provide a starting point to review current heifer management. Monitoring the mastitis in heifers allows us to understand the variation and the impact of any control measures.

We also need to monitor what types of mastitis infections may be present. Individual quarters from affected heifers should be sampled for bacteriology using an aseptic technique (see ***Aseptic milk sampling*** factsheet for full details).

Sample both:

1. Clinical mastitis cases before starting treatment.
2. High-cell-count quarters (identified using the California Milk Test) in heifers with an increased somatic cell count.

Samples can be stored frozen for submission to a laboratory in batches.

See ***Dry cow management guide*** for a step-by-step protocol for the California Milk Test.

Heifers become susceptible to mastitis pathogens as soon as they begin to produce mammary secretions. The infections may be picked up at any stage between birth and calving down. Clinical mastitis in heifers is typically caused by the major pathogens associated with mastitis in dairy cows. The highest risk factor in the development of heifer mastitis is exposure to organisms causing mastitis.

Coagulase-negative staphylococci (CNS)

Infection with CNS is most commonly found immediately after calving. These infections are most likely to have been picked up in the two months prior to calving. Prevention should be focused on providing a clean, dry environment to heifers and cows during the weeks before and during the time of calving. The bacteria are often established on teat skin and even in the teat canal, therefore there is also a risk of new infection with CNS species once heifers are coming through the milking parlour. Milking preparation routines that effectively disinfect the teat end, milking equipment function that does not damage the teat end and post-milking teat dip are important to reduce the risk of these CNS infections.

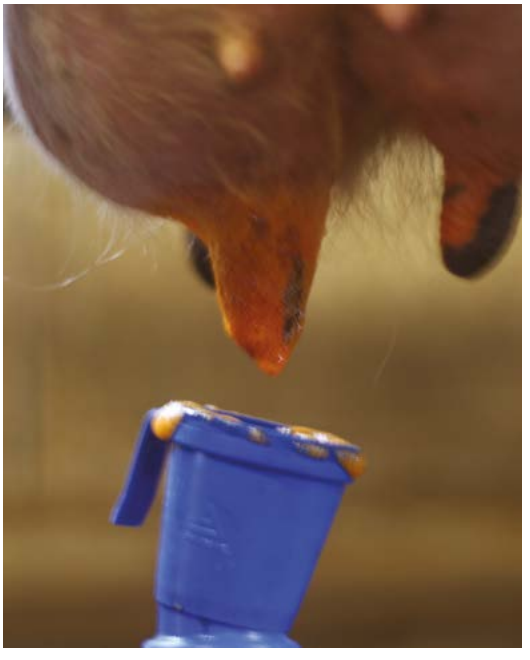

Figure 2. Teat treated with disinfectant

Lost quarter/blind quarter at calving

Fresh calved heifers with blind quarters and/or non-functional teats may have been born with this issue or the damage may have occurred during rearing. If born with the problem, there may either be no teat canal but a teat which fills with milk, or, less commonly, no milk in the teat and a persistent membrane between the teat cistern and canal at the base of the teat.

A thickened central core in the teat canal may also be caused by summer mastitis or be the result of damage from being suckled as a calf. The quarter may be dry at calving or there may be milk in that quarter immediately after calving due to accumulated milk, but this quarter later shrinks as it dries off.

Summer mastitis

The typical sign of summer mastitis is a very swollen teat and/or udder shortly before the heifer or cow becomes ill.

It most often occurs in summer at pasture. It can be easily identified by careful observation, particularly when flies become attracted to unpleasant-smelling yellow secretions on the teat, which will become worse as the disease progresses.

The affected quarter is very painful, with a thick secretion that is very smelly and difficult to strip. Saving the heifer may require surgical drainage. Further signs as the illness spreads to affect the entire body are swelling of the hind legs, obvious lethargy and separation from the herd, abortion and even death. The affected heifer can often present as lame, due to swelling of the udder and hind legs.

If left untreated, the bacterial toxins will damage the udder tissues irreversibly; in many cases, the quarter affected will be lost entirely or be so badly affected by the infection that it produces very little milk. In serious cases, the battle will be to keep the heifer alive.

Figure 3. Udder cross section showing abscesses as a result of summer mastitis

Reducing the risk of mastitis in heifers

Reducing the risk of infections of the udder in heifers should focus on prevention of environmental infection and optimising management and husbandry. Pay particular attention to the calving environment, fly control and ensuring adequate nutrition and mineral supplementation.

Herd-specific management interventions should include the following:

- Segregation of close-to-calving heifers away from dry and calving cows
- Environment management of pre-calving heifers
- Regularly checking heifers for mastitis pre-calving
- Avoiding cross-suckling in calves
- Feeding, with particular emphasis on avoiding overconditioning
- Preventing summer mastitis – effective fly control

Also consider:

- The use of internal teat sealants
- The use of vaccination

Segregation of close-to-calving heifers away from dry and calving cows

Mixing in-calf heifers and dry cows prior to calving should be avoided since this has been associated with an increased risk of mastitis in heifers.

Milk fresh heifers first, using clean milking equipment. Good control of mastitis in the main herd will also help. Contagious mastitis is more likely to spread to heifers if there is a high incidence of mastitis on the farm.

It takes up to two weeks for most heifers to settle into the milking routine. It is important to be patient and gentle during this period to maximise production, minimise milking times and reduce the risk of injury. Taking care when adjusting first-calvers to the milking routine will also reduce the risk of mastitis.

Treatment of mastitis in heifers

The treatment of existing mastitis infections in heifers using antibiotics should not be considered as 'control', rather it should be used as a short-term approach while management is improved and preventative strategies are put in place.

Antibiotic dry cow therapy in heifers

Although the use of antibiotic dry cow therapy in heifers prior to the expected calving date can be expected to cure existing major pathogen infections, the variation in infection pressure between herds, the long withdrawal periods and the importance of prudent use of antibiotics means that antibiotic dry cow therapy should not be used to control mastitis infections in heifers.

Antibiotic injections in heifers

There is no published evidence to suggest that the use of injectable antibiotics given to heifers prior to the expected calving date improves chance of cure or reduces risk of new infections around the time of calving and, therefore, the use of injectable antibiotics to control heifer mastitis infections prior to calving should be avoided.

High cell count at first milk recording

Prompt effective treatment is important in heifers as cure of infections may affect lifetime saleable milk yield. Do a CMT on all heifers with a cell count over 200,000 at first recording and discuss the merits of treating infected quarters with your vet.

Treatment of summer mastitis

A key part of treatment of summer mastitis is regular and repeated stripping of the affected quarter, to remove as much affected material as possible.

Use intramammary antibiotics to treat the bacterial infection in the quarter and an anti-inflammatory injection to counter the systemic effects of bacterial toxins. An antibiotic injection should only be used if the heifer is unwell.

Environment management of pre-calving heifers

Heifers need adequate space, with good access to feed, water and clean, dry housing or pasture, pre-calving. A clean calving environment and minimising stress around calving are also very important.

The hygiene and cleanliness of heifers before calving should receive as much attention as for dry cows. Refer to the ***Dry cow management guide*** for recommendations on space requirements and management of the environment when housed and at pasture.

- Lying area in straw yards: a bedded lying area of 1.25 m^2/1,000 litres of milk/cow (herd annual milk yield)
- Loafing area of at least 2 m^2/cow

At grass, only keep animals in the same lying area (pasture, paddock, field) for a maximum of two weeks, followed by at least four weeks' rest for that area.

Regularly checking heifers for mastitis pre- and post-calving

Most infections are subclinical pre-calving but may result in clinical mastitis in early lactation and/or an increased somatic cell count (SCC) at first recording.

Check heifers for mastitis when handling them for other reasons, e.g. AI or pregnancy check. It is important to train heifers in the milking area pre-calving and this can be an opportunity to check for mastitis. If levels of mastitis in heifers are high, consider doing a CMT on all freshly calved heifers to detect infected quarters.

Ensure each cow has milk let-down at each milking, particularly heifers. Avoid both over- and under-milking. Reducing the interval between calving and first milking will help reduce udder oedema and help to reduce the incidence of clinical and subclinical mastitis at calving.

Early detection of heifer mastitis and prompt treatment will improve herd health, production, and milk quality.

Cross-suckling

Heifers that are reared in herds with a high bulk milk SCC are more likely to be infected with major pathogens in early lactation.

There may be a risk that mastitis pathogens are transferred to the developing udders of young calves via suckling, especially if feeding milk from infected cows.

- Aim to prevent cross-suckling in groups of calves
- Feed milk replacer or pasteurised milk

Other reasons not to feed waste milk include the risks of antibiotic residues and infection with *Mycobacterium avium paratuberculosis* (Johne's disease). Pooled colostrum, as well as colostrum from infected cows or cows of unknown status, should not be fed to calves.

Do not feed waste milk from infected cows to replacement heifers.

Heifer feeding and nutrition

The key to successful heifer rearing for calving at 24 months is to maximise weight gains without creating overfat animals. Calving at 24 months requires challenging but perfectly achievable liveweight gains.

- Set appropriate rearing targets for calving at 24 months and monitor progress regularly
- A growth rate of 0.8 kg/day is recommended for Holstein-Friesian heifers to achieve the required body weight at calving and age at first calving of 24 months
- Avoid heifers getting overfat
- Feed to meet these targets from birth to calving
- Reduce the risk of negative energy balance before and after calving by proper transition feeding
- Avoid any nutritional deficiency, especially vitamins and minerals and vitamin E and selenium, in particular

Regularly review pre-calving feeding, with particular emphasis on dry matter intake, energy density and mineral supplementation to ensure targets are met.

Age at first calving

Heifers should calve into the herd for the first time between 22 and 26 months of age.

The age at first calving has been shown to relate to risk of requiring assistance at calving (higher risk if too young or overconditioned) and to poor performance in first lactation and risk of culling (higher risk if too old). Culling more heifers leads to older animals being retained in the herd.

Research

How do UK herds perform with this measure of heifer management?

Ginny Sherwin and colleagues at Nottingham University looked at data from 437 UK herds, containing records from more than 18,000 first-lactation heifers. The average age at first calving was 29 months old, with just over half of all the heifers in the data set calving at more than 28 months old, and more than one-third of all the heifers in the data set calving at more than 30 months old.

The optimal age at first calving was 23 to 24 months old. The risk of a heifer being culled in first lactation increased significantly for those heifers calving at more than 30 months of age, compared with those calving at 23 or 24 months of age.

Sherwin, V. E., Hudson, C. D., Henderson, A., Green, M. J. (2016). *The association between age at first calving and survival of first lactation heifers within dairy herds.* Animal 10: 1877–1882.

Further information on heifer management can be found in ***The InCalf Guide for GB farmers calving all-year-round*** and ***The InCalf guide for GB farmers with block calving herds***.

Overconditioning

Overconditioned heifers are more at risk of requiring assistance at calving and this may increase the risk of udder oedema and mastitis infections around the time of calving.

90% of heifers should be between body condition score (BCS) 2.5 and BCS 3.5 at calving (BCS 3 for Holstein-Friesian heifers). See the ***Body condition scoring*** factsheet for further information.

Important

- Avoid overconditioning at calving
- 90% of heifers should be between BCS 2.5 and BCS 3.5 at calving
- Age at first calving: 23–24 months old (but not less than 22 months)

Preventing udder oedema

Swelling of the udder is the result of excessive accumulation of fluid, although there is no involvement of the actual milk-producing tissue. Some cases of udder oedema can be the result of disease. However, it is more common to see udder oedema before calving.

Udder oedema prior to calving may relate to a number of factors, including genetic predisposition, energy density of the ration, overconditioning and high milk yield. Excessive feeding of salt may be an issue and circulatory problems have been suggested in some cases.

Why is udder oedema a problem?

- Pain, causing reduced lying times and poor mobility
- Poor circulation of blood around the udder and teats, causing increased risk of mastitis and increased risk of damage to teat skin
- Altered udder pressure, causing poor milk let-down
- Shortened teats, resulting in poor milking cluster alignment

Prevention of udder oedema in heifers involves:

- Reducing cation content (sodium and potassium) of the ration
- Providing adequate loafing and exercise area. See Environment management of pre-calving heifers section on page 10 for more information
- Monitoring BCS and not letting heifers get overfat. Check the ration and its mineral content with your nutritionist or vet to ensure diet is not a factor in severe oedema

The key point is to reduce the risk of udder oedema and risk of assistance at calving due to high BCS.

The aim of treatment of udder oedema is to prevent, control and relieve the side effects until the swelling eases. Anti-inflammatory treatment should be used and ask your veterinary surgeon for advice if cows are very uncomfortable.

Reducing the risk of summer mastitis

The spread of summer mastitis is linked to flying insects, specifically the sheep headfly (*Hydrotaea irritans*). The actual means of infection is likely to be more complex, with a mixture of routes and bacteria involved.

Prevention

The risk of summer mastitis can be reduced by various measures:

- Implementing measures to control and minimise exposure to flies
- Isolation of heifers and cows with summer mastitis to prevent the spread of the illness
- Checking cattle for mastitis on a regular basis
- Avoiding grazing areas known to be associated with summer mastitis
- Avoiding areas where teats may be damaged or areas where flies are a particular problem, such as damp, sheltered areas near rivers and woods
- (In cows – maintaining good teat condition pre-drying off, having good dry cow nutrition and observing/ checking cattle on a regular basis)

Discuss with your vet the use of internal teat sealants and antibiotic dry cow therapy in high-risk situations.

Important

- **Start fly control before the fly season**
- **Isolate heifers and cows with summer mastitis to prevent spread**

Fly control

Fly control is key to minimising the risk of summer mastitis. Effective fly control must be used in heifers at pasture, and reapplied regularly, particularly in periods where expected challenge is high.

Implement measures to control and minimise exposure to flies. Flying insects should be controlled early on, before the fly season, by the use of pour-on or spot-on antiparasitic treatments. Remember, the chemicals take time to distribute themselves around the coat, so don't delay until there are a lot of flies.

The use of fly ear tags, and the application of fly repellents such as traditional Stockholm tar and brown salves to teats, can also be helpful.

Internal teat sealants to control heifer mastitis pre-calving

Where there is a high risk of environmental infections or a perceived increase in risk, consideration could be given to the use of internal teat sealants (ITS) to reduce infection pressure in heifers. The teat sealant forms a physical barrier in the teat canal – the aim is to prevent the entry of bacteria. It may also reduce milk leakage pre-calving – a risk factor for mastitis.

A protocol to administer teat sealant and dry cow therapy can be found in the ***Dry cow management guide*** or at **www.youtube.com/watch?v=gJHv177D1xc**

Good hygiene at the time of application is critical – any bacteria introduced when administering the teat sealant will be trapped in the quarter and can cause a severe acute and often fatal mastitis.

Important

Think about how to administer internal teat sealants to heifers. If you are going to use ITS on your heifers, consider both your safety and the safety of the heifers. Milking parlours are not ideal to be infusing tubes in small heifers.

In New Zealand, many farms use vet technicians and special equipment, like a trailer designed for operator safety.

Alternatives

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. You can start to use external teat sealant on heifers from around 10 days before calving and again as required to reduce the risk of infection getting in through the teat canal.

Teat dip or teat spray could be used on heifers which are being trained through the milking parlour – an iodine teat spray three times weekly for at least three weeks pre-calving may help to reduce the prevalence of *Strep. uberis* on the teat end 24–48 hours before calving and the prevalence of subclinical mastitis associated with *Strep. uberis* at the first milking after calving.

Research

The impact of internal teat sealants in heifers?

Katrina Parker and colleagues in New Zealand looked at the use of an internal teat sealant one month before the expected calving date in 255 heifers from five herds. The risk of an infection with *Strep. uberis* after calving was significantly decreased in those quarters that did receive a teat sealant (13 infections in 471 quarters) compared with quarters that did not receive a teat sealant (29 infections from 483 quarters). Overall, the use of a teat sealant in heifers before calving tended to reduce the overall risk of clinical mastitis after calving. In New Zealand, it is regarded as cost-effective in herds where 15% or more heifers have clinical mastitis at calving.

Parker, K. I., Compton, C., Anniss, F. M., Weir, A., Heuer, C., McDougall, S. (2007). *Subclinical and clinical mastitis in heifers following the use of a teat sealant precalving.* Journal of Dairy Science. 90(1): 207–18.

Vaccination

In herds with a high incidence of severe *E. coli* mastitis, you could consider vaccination. Vaccination has been shown to reduce the severity of *E. coli* mastitis, although not the number of cases. Discuss this with your veterinary surgeon.

Overall summary

The control of infections of the udder in heifers should focus on prevention of environmental infection and optimising management and husbandry, particularly related to the calving environment, fly control and ensuring adequate nutrition and mineral supplementation.

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