Mastitis in Sheep

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**Key points**

- Acute mastitis affects between 4-5% of lowland ewes and 1-2% of hill ewes each year. Chronic mastitis affects between 1-15% of ewes.

- Ewe mastitis has important impacts on ewe mortality, premature ewe culling, lamb mortality and growth.

- Mastitis can be peri-acute, acute, chronic and clinical or sub-clinical depending on the severity and duration of clinical signs in the ewe.

- The main risk period for clinical mastitis is the first week post lambing to around peak lactation at 3-4 weeks post lambing.

- The most common bacteria found in mastitis cases are *Staphylococcus aureus* and *Mannhaemia haemolytica*, although other bacteria may occur.

- The bacteria enter the udder through the teat canal, some are transferred from the lambs’ mouths when sucking.

- Factors which damage the ewes’ teats, e.g. chapping, orf or excess sucking by hungry lambs, increase the risk of a ewe developing mastitis.

- Ewes feeding 3 or more lambs are at increased risk of mastitis.

- Treatment of ewes with mastitis should be prompt and is aimed at saving the ewe’s life as damage to the udder can be permanent.

- Ewes chronically affected by mastitis should be culled.

- All ewes’ udders should be inspected at weaning and at the pre-tupping check.

- Preventative strategies for mastitis should be discussed with your vet as part of your health planning for the flock. Consideration should be given to ewe and lamb nutrition pre and post lambing, maintaining good ewe teat condition, and environmental hygiene.

- The viral infection Maedi-Visna can cause chronic mastitis in sheep and requires a separate approach.
Introduction

Mastitis is a significant ewe health problem for both dairy and meat sheep farmers worldwide. In UK lowland flocks, acute mastitis affects between 4-5% of ewes each year and in hill flocks, it affects 1-2% of ewes. Chronic mastitis is estimated to affect between 1-15% of ewes.

Mastitis is an inflammation of the ewe’s udder and is usually caused by bacterial infection. It is a serious welfare and economic problem for many sheep farms. For the ewe, the inflammation and swelling of the udder is acutely painful and the toxins produced by the bacteria can make her feel ill, inappetant and even kill her. As the damage caused to the udder is often permanent and results in decreased milk production, mastitis is also associated with premature ewe culling. Mastitis impacts on lamb welfare as the reduction in milk production, milk fat and milk protein lead to reduced lamb growth and higher risk of lamb mortality.

Q1. What are the signs of mastitis in a ewe?

Mastitis in ewes occurs mostly post lambing when the ewe is milking. It can be divided into per-acute, acute, chronic, clinical and subclinical mastitis depending on the clinical signs seen and the duration of the problem.

- In per-acute mastitis the ewe is ill, and both the udder and the milk are abnormal.
- In acute mastitis, only the udder and the milk are abnormal.
- In chronic mastitis only the udder and milk are abnormal but the visible changes in the udder are different between acute and chronic mastitis. In acute mastitis, the udder is swollen. In chronic mastitis, the udder tends to be shrunken or lumpy.
- In subclinical mastitis, there are no visible changes in the ewe, her udder or the milk but there are changes in the composition of the milk due to low-level inflammation. Subclinical mastitis does occur in meat sheep, but it will be more familiar to keepers of dairy cows and dairy sheep as it requires testing of the milk to show it is present. However, we now know it is important for meat sheep as it causes a reduction in milk production and noticeable reduction in lamb weaning weights.

Per-acute and acute mastitis are usually observed in the first month post lambing, often around peak lactation. Chronic mastitis can be noticed at any stage of lactation, but is often not picked up until the pre-breeding check of ewes or at the following lambing.

Per-acute mastitis is an extremely serious condition and frequently results in the death of the ewe or loss of the affected half of the udder, due to the toxins produced by the bacteria.
The ewe will appear dull and depressed and she will have a reduced appetite. The animal may appear lame and lame ewes should be checked for mastitis, particularly if lameness occurs in the first weeks after lambing. Signs of disease will be more readily detectable when ewes are housed but regular, careful inspection of the grazing flock post lambing should allow affected ewes to be recognised in the field, enabling prompt treatment.

The changes in the udder seen with mastitis are quite variable; in acute mastitis the udder is swollen, hot, red and painful (Figure 1); in gangrenous mastitis (black bag) (Figure 2) the udder will be swollen, cold, and blue and it may eventually slough off; in chronic mastitis (Figure 3) the udder maybe enlarged or shrunken, hard and lumpy.

Figure 1: This ewe had acute mastitis; you can see the left side of the udder (on the right side of the picture) is swollen and red. The udder was also hot and painful to touch and the milk was abnormal. She required immediate treatment with antibiotic injection and anti-inflammatory pain relief. Her lambs also required supplementary feeding.
Figure 2: This ewe had gangrenous mastitis. Note the large blue discoloured area of her udder. This tissue will die and slough off. In this situation consider euthanasia or seek immediate veterinary advice on treatment.
Figure 3: This ewe had chronic mastitis. Note the pus coming from the teats from both halves of the udder. The udder tissue was lumpy and hardened. This ewe will be unable to feed lambs and should be culled.

Q2. What are the causes of mastitis?

The main causes of mastitis in sheep are bacteria and the two most commonly isolated bacteria are *Staphylococcus aureus* and *Mannhaemia haemolytica*. Other *Staphylococcus* species and *Streptococcus* species may also occur, including *Streptococcus dysgalactiae*, which has also been found in lambs with arthritis (joint ill). Most of these bacteria can also be found in healthy animals. *Staphylococcus aureus* is found normally in the nose and on the teat skin of ewes and *Mannhaemia haemolytica* is found in the throats of lambs. Infection of the udder occurs through the ewe’s teat canal.

Damage to the teat, for example by lambs constantly sucking on an empty udder, teat injuries or an orf infection (contagious ecthyma) is believed to be central to the development of udder infections by these bacteria. Importing animals from other countries may lead to introduction of organisms that don’t normally occur in the UK, as recently happened with *Mycoplasma agalactiae* which was detected in imported goats, leading to culling of the animals.
Infection by the Maedi Visna virus can also cause chronic mastitis in ewes. This should always be borne in mind if increasing problems with chronic mastitis are seen in a flock. Development of MV infections may take years, they will not respond to any treatment, and control is based on testing and culling and prevention of re-introduction. Through the Premium Sheep & Goat Health Schemes, flocks can become certified MV free.

Q3. What tests are used to diagnose mastitis?

To detect the bacteria causing mastitis, a milk sample can be submitted to a laboratory. This can be useful when clinical mastitis is observed or when there is a suspicion of subclinical mastitis because optimal treatment may be different for different bacteria. Testing for subclinical mastitis can be done with a California Mastitis Test (CMT, also called California Milk Test), which measures the cell count of the milk. This method is routinely used on dairy farms, only takes a minute to conduct and consists of a simple plastic paddle and a detergent. For detection of bacteria, the sample must be collected using a sterile technique (Figure 4) and should be tested using bacteriological culture. In dairy cows, DNA-based testing methods such as PCR can be used to detect bacteria but those methods were not developed for sheep mastitis and they do not detect all bacterial species that are important in sheep.

Figure 4: Disinfect teat ends before collection of milk samples for laboratory-based detection of bacteria that cause mastitis
Q4. Why do my ewes suffer from mastitis?

An important part of developing farm strategies to prevent diseases such as mastitis is understanding the farm and sheep factors which contribute to the disease occurring. So for example, why does one sheep go on to develop mastitis and the sheep in the next pen does not? Much of recent research effort has tried to address these questions.

It is widely accepted that the bacteria that cause mastitis enter the udder and cause mastitis through the teat canal and that damage to the teat and teat canal are key factors in the development of mastitis. It is also now thought the lambs play an important role by transferring the mastitis bacteria from their mouths onto the ewe’s teat.

In addition, lambs contribute to teat damage by vigorous sucking. Ewes feeding 3 or more lambs, ewes with teat chapping, teats affected by orf, or poor udder and teat conformation are all at an increased risk of mastitis. Traumatic teat lesions (believed to be caused by lambs’ teeth) are more commonly seen in younger ewes, ewes 3 to 4 weeks post lambing, thin ewes, ewes with abnormal teat or udder conformation, large litters and ewes with abnormal udder skin. Non-traumatic teat lesions (such as orf and warts) occur more commonly in thin ewes.

Figure 5: This ewe had chronic mastitis with abscesses and scars, which can be seen or felt as lumps and bumps, reducing her ability to produce enough milk to feed two lambs. A ewe like this should be culled rather than tupped.
Breeding for resistance to mastitis could also be a potentially very useful preventative strategy for sheep farmers. However there are currently few practical tools for farmers to use for selecting sheep for mastitis resistance. Because animals with mastitis are usually culled prior to the next tupping cycle, selection for udder health is already part of routine management for ewes, but it is “management after the fact” rather than prevention. Selection of rams based on genetic merit for udder health is not possible yet, but efforts to develop such schemes are underway, e.g. by the British Texel Sheep Society (BTSS) in collaboration with SRUC.

Q5. How do I treat mastitis?

The first place to start is a discussion with your vet before lambing even begins on what your first line treatment for mastitis should be. This should include antibiotics to kill the bacteria and anti-inflammatory pain relief to support the ewe.

Treatment of mastitis in sheep is usually aimed at saving the ewe’s life rather than at full recovery, because the damage to the udder tissue is often severe and permanent. Such damage is highly likely to reduce her ability to rear lambs in the future.

As the disease can progress very quickly, prompt treatment with antibiotic injections and anti-inflammatory drugs, as prescribed by your vet, is essential. Grazing and penned ewes should be closely monitored post lambing for signs of ill health in the ewe.

Hunger in the lambs or limping in the ewe may be indirect indicators that mastitis is present. The ewe is often very ill, so she should be penned up, provided with fresh food and water and the lambs must be bottle fed.

In gangrenous mastitis large amounts of udder tissue will slough off, putting the ewe at risk from fly strike and other bacterial infections. For welfare reasons, veterinary advice on treatment should be sought immediately and euthanasia of affected ewes should always be considered.

If a ewe does recover from mastitis, she should be marked to allow her identification for culling at the post weaning check. If chronic changes in the udder are detected after weaning, affected ewes should be culled from the flock, as they will have a reduced ability to feed and rear lambs in their next lactation.
Q6. How can I prevent mastitis in my flock?

As treatment of the ewe for mastitis is often unsuccessful, prevention of disease needs to be the priority for sheep farmers. Again, the first place to start is a discussion with your vet on prevention in your flock as part of your flock health planning process. Surprisingly, an important part of mastitis prevention has little to do with the udder, at least at first sight: mastitis prevention starts with good nutrition to help avoid thin ewes, poor milk production and hungry, hard-sucking lambs.

Figure 6: Plan good pre and post lambing ewe nutrition to ensure good ewe milk production and reduce the risk of mastitis

In cattle, vaccines are available to help prevent mastitis. No such products are on the market for sheep. As research in sheep mastitis progresses, hopefully, in the near future, there are likely to be many more strategies based on sound scientific evidence for farmers to use. However, at the moment, some of the advice is based on “common sense” and experience.
MASTITIS PREVENTION STRATEGIES

1) Cull all ewes chronically affected by mastitis
   - Use records or ear tags to mark ewes affected by mastitis and cull.
   - Check all ewes’ udders for mastitis at weaning and at pre-tupping check.

2) Ewe nutrition
   - Ensure good ewe nutrition and body condition score pre and post lambing to maintain good milk supplies.
   - If mastitis is a problem in your flock review your nutrition plan with your vet or nutritionist well in advance of lambing.

3) Prevent teat damage
   - Do not expect ewes to rear triplets.
   - Consider creep feeding lambs from 3-4 weeks of age.
   - If orf is present on your farm devise a control programme, and consider vaccination for ewes and lambs.
   - Avoid chilling of the udder post lambing turnout by:
     - Providing shelter
     - Planning winter shearing so ewes are turned out with good fleece length
     - Don’t dock tails too short
     - Avoid excessive crutching

4) Hygiene
   - Ensure housing and bedding conditions are clean and dry at lambing time.

5) Weaning policy
   - Remove both lambs from the ewe at same time.
   - Keep ewes on a reduced diet.
   - Keep ewes on pastures as far away as possible from lambs.
   - Ewes should always have access to water.

6) Biosecurity
   - As part of your flock biosecurity policy, consider the risk of buying in sheep affected by Maedi Visna or other mastitis causing organisms.
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