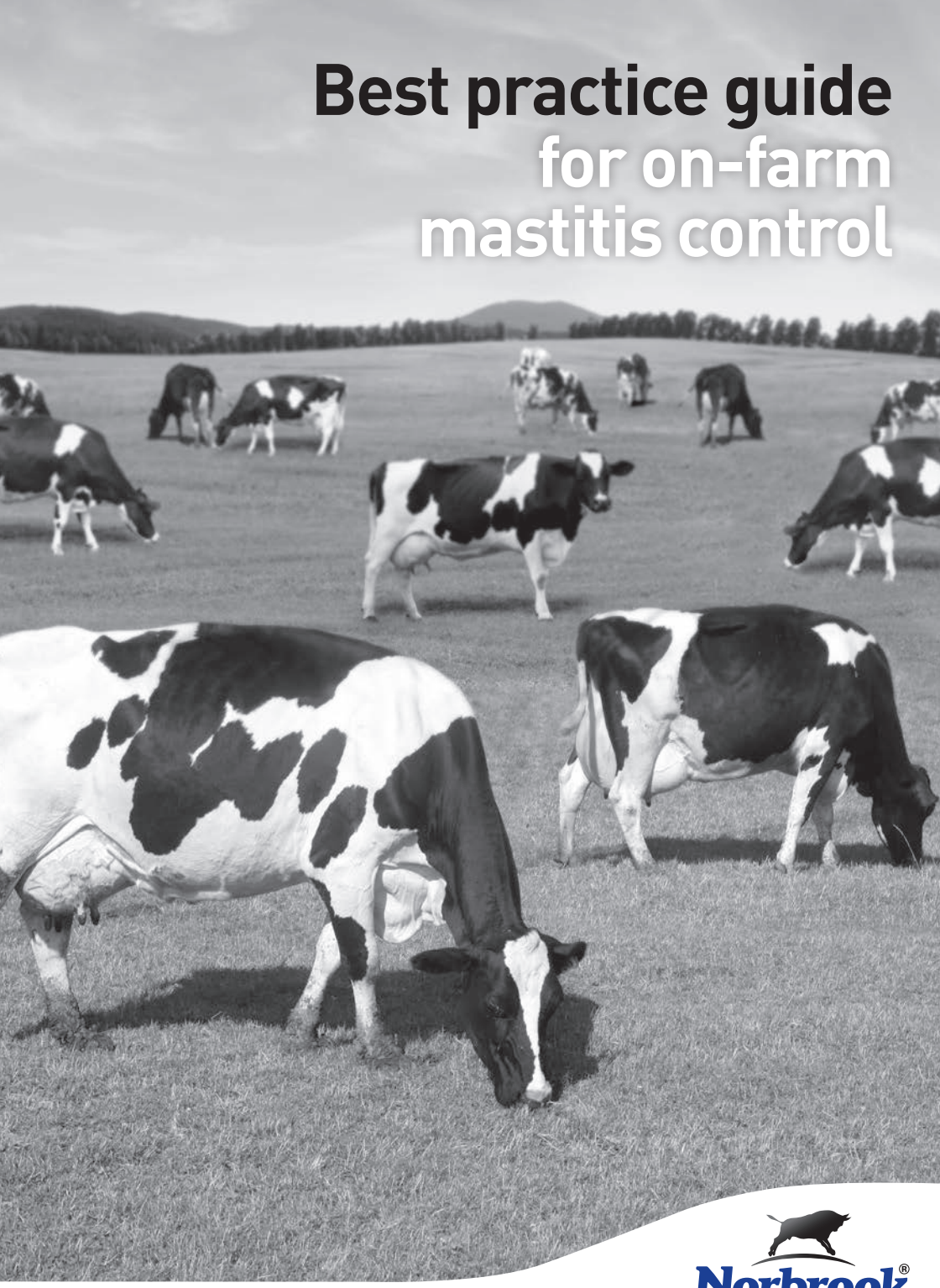
Best practice guide for on-farm mastitis control



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Introduction

This guide has been put together as a handy quick reference guide to help stockmen deal with the practical control of mastitis on-farm.
For more information you should speak to your veterinary surgeon.

The information is provided by Norbrook Laboratories, manufacturers of products including Cefimam, Lactaclox, Multiject IMM, Noroclav, Combiclav, Noroseal, Noroclox, Bovaclox DC and Bovaclox DC Xtra.

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What is mastitis?

Mastitis is one of the most common and costly diseases of dairy cattle and can be of significance in beef herds too. As well as causing heavy production losses, mastitis is a significant cause of culling, and in severe, acute cases can quickly lead to death.

Mastitis literally means inflammation of the udder (also known as the mammary glands). This inflammation can be caused by bacteria, which travel up the teat canal, colonise and multiply, leading to damage of the udder tissue.

Types of mastitis

Clinical mastitis is an inflammatory response to infection, characterised by visible abnormalities in the milk or the udder. **Subclinical mastitis** is inflammation of the mammary gland that does not create visible changes in the milk or the udder and requires special diagnostic tests for detection. Monitoring and detection of both are key components of a herd health plan.

> **'Approximately 90% of cases are mild, causing a 5% fall in yield during the lactation, 9.8% are severe, causing a 50% reduction in yield, and 0.2% are fatal.'**

Mastitis organisms responsible for the infection can be classified as either contagious or environmental, depending on the origin of the pathogen.

Contagious bacteria are spread from a cow with an infected udder to a healthy cow. Transfer of pathogenic bacteria between cows usually occurs at milking time. The main culprits are *Streptococcus agalactiae*, *Staphylococcus aureus* and *Mycoplasma* species.

Environmental bacteria come from the cow's environment (bedding, soil, manure, etc.) and consequently are highly influenced by management practices. They are ever present where the animals live, and can be controlled by improving cleanliness of cows, their surroundings and the route which they have to take to get to the parlour.

The disease is often a result of faecal contamination e.g by *E. coli*. Other 'true' environmental causes of mastitis include *Pseudomonas*, *Klebsiella* and *Streptococcus uberis* which can also behave as contagious pathogen.

Summer mastitis is a little different and will be covered on page 10.

Milk sampling

Routine milk sampling and record keeping are essential for optimal herd management to reduce the levels of mastitis within a herd and subsequent productivity losses. Samples can be taken from the bulk milk tank or from individual cows (explained in table opposite). The various types of tests and what they mean can get confusing, so we hope the following guide is helpful.

1. Somatic cell counts

'Somatic cells' are cells from the cow that are found in the milk. The majority of these cells are white blood cells, which are used to fight infection.

> **'Therefore, the higher the somatic cell count, the more inflammation there is in the udder.'**

The count is given in number of cells per ml and can be determined for individual cows or from the bulk milk tank and must be determined by sending a sample of milk to a lab.

2. Californian milk test

The Californian milk test is insensitive and crude but it is a quick and cheap way of identifying cows with a high somatic cell count. Equal amounts of milk from each quarter are added to one of four wells on a plastic paddle. An equal amount of test reagent is then added to each well, and the sample is mixed. The reaction is then scored on a scale of 0-3, with a score of 2 or 3 confirming a likelihood of inflammation.

The score is determined based on the consistency of the sample once mixed with the test agent. If there is almost a solid gel forming, the score would be 2 or 3. Although this test does not give an indication as to the type of bacteria causing the infection, a treatment plan can still be devised to eliminate infection from the udder.

3. Bactoscan counts

This is an automatic way of telling the number of bacteria in a sample of milk. It does not require culturing of the bacteria, so is a quick test. It does not tell you which bacteria are present, only the total number. This is carried out on samples from the bulk milk tank, so bacteria can come from:

- **The udder – high counts can be due to subclinical, clinical mastitis or unclean udders**
- **Contaminated equipment**
- **Refrigeration failure**

4. Culture and sensitivity

'Culturing' milk samples involves placing the sample in a petri dish and providing ideal conditions for bacteria to survive. The bacteria that were causing the mastitis can thus be identified. It is not a way of measuring the number of bacteria or the degree of infection, just which bacteria are present.

Culture analysis is useful for deciding how to treat an individual cow, but multiple samples over a period of time are also useful in determining common causes of mastitis on the farm, and therefore the best way of controlling the condition in that herd. **One important factor is – how many cases are due to contagious versus environmental bacteria?**

Sensitivity analysis involves exposing the bacteria identified to various different antibiotics, and finding out which ones stop the growth of the bacteria. This then helps determine which antibiotic should be given to the cow to treat the mastitis effectively.

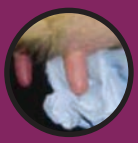
'Because culture and sensitivity testing involves growing the bacteria, it can take a few days to get results back.'

5. PCR testing

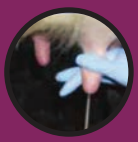
PCR (Polymerase Chain Reaction) is a modern way of testing which bacteria are present in a milk sample involving identifying bacterial DNA in the sample. The testing is quick, but it requires specialist equipment and it does not generally tell you which antibiotics the bacteria are sensitive to (although it can tell you if they are resistant to penicillins without clavulanic acid).

Norbrook guide to taking a milk sample for culture and sensitivity

1. As soon as you suspect a case of mastitis, take a sample before any form of treatment begins.
2. Always wear clean gloves.
3. Wash/clean the teat and dry thoroughly. Pre-dip the teat, leave for the appropriate contact time, then dry teat with a clean paper towel. Some people advise applying surgical spirit following teat preparation.



4. Hold teat at a 30 degree angle toward you, strip foremilk two to three times.



5. Hold collection tube with unscrewed cap as horizontal as possible. Lift the lid up as if attached to the top of the sample pot like a hinge.

6. Take two or three direct streams of milk into the sampling pot. Replace the lid tightly.

7. Write the cow number and the date that the sample was taken on the pot.

Control of mastitis

The National Institute for Research into Dairying introduced the 'Five Point Plan' in the 1960s to try and tackle and reduce the incidence of clinical and subclinical mastitis in UK dairy herds, primarily through the control of contagious pathogens.

The five point plan:

1. Treat and record all cases of clinical mastitis
2. Perform post-milking teat disinfection of all teats immediately after every milking
3. Instigate dry cow therapy of all cows at the end of their lactation
4. Cull chronic cases of mastitis
5. Carry out regular milking machine maintenance

There are two basic principles of mastitis control

- **Elimination of existing infections**
- **Prevention of new infections.**

'The following pages will concentrate on prevention; and we will deal with clinical cases at the end.'

Controlling mastitis in the parlour

Infected cows' udders act as a source of contagious bacteria to other cows and transmission of contagious and environmental pathogens to uninfected animals can occur at milking time, so parlour hygiene is paramount.

'Firstly, cows with mastitis should be identified to prevent poor quality milk entering the bulk tank as well as to prevent transmission to other cattle.'

Cattle previously identified as having a problem should be clearly marked so that they can be recognised and their milk disposed of to prevent poor quality milk entering the bulk tank and antibiotic residues entering the tank.

These cattle should ideally be kept separate from the herd and milked last. Clusters used on these cows should be thoroughly cleansed before use on another cow.

'The ideal method of mastitis detection is fore milking.'

In-line filters are insensitive but can be used to detect milk that contains clots. In-line electrical conductivity testing is sometimes used but has been proven to be a poor means of detecting subclinical disease.

No single control method will prevent infections by all pathogens but the following will help:

1. Any dirty teats must be **washed**, **dried** and **pre-dipped**.
2. It is critical that all external surfaces of the milking clusters are kept clean during milking.
3. Milk removal should be as rapid as possible (should normally be completed within ten minutes of milk let-down). The majority of milking machine-induced intramammary infections occur towards the end of milking a cow.
4. Post-Milk Teat Disinfection – see next page.

Post Milking Teat Disinfection (PMTD)

Post milking teat disinfection (PMTD) is crucial in the control of *Staphylococcal* and *Streptococcal mastitis*. Disinfectant is applied directly to the teat immediately after milking to kill organisms deposited there during milking. The contact time between disinfectant and teat is important, as is disinfecting the teat quickly following cluster removal.

'The teats, particularly the ends, should be examined periodically for evidence of injury caused by the milking machine, as well as for signs of infectious conditions.'

Cluster dipping is the routine dipping of clusters in a bucket containing disinfectant solutions between cows. Routine PMTD is aimed at preventing cow-to-cow transmissions of infection at milking time.

Controlling environmental mastitis

Most methods of control for environmental mastitis are common sense management factors, but efforts to improve these factors should be made if records indicate a high number of cases of environmental mastitis.

'It was mentioned earlier that the most common bacteria responsible are *E. coli*, *Pseudomonas*, *Klebsiella* and *Streptococcus uberis*.'

E. coli is present in faeces and soiled bedding, and numbers increase if hygiene is poor. These infections can be fatal. They tend to be of short duration but occasionally can become persistent.

Although the bacteria originate from the environment, the infection can then continue to be spread contagiously at milking time so care needs to be taken to avoid contamination when dealing with environmental mastitis at milking.

Both hot and cold weather can influence the infection rate. High humidity levels lead to increased bacterial multiplication. Poor ventilation and overcrowded housing can increase the viability of *E. coli* allowing it to survive and multiply in the cow's environment.

'The risks of environmental mastitis are greatest just after drying off and just before calving.'

The risk around drying off can be reduced by using dry cow therapy (see later). Hygiene at calving is also critical. Every effort should be made to ensure that standards of housing, bedding and feeding are such that cows enter the milking parlour with clean teats.

Areas to consider to control environmental mastitis:

1. Building ventilation and drainage
2. Correct stocking density
3. Frequent 'bedding up'
4. General hygiene
5. Frequency and effectiveness of scraping out of passage ways
6. Reducing teat exposure to the disease
7. Parlour routine

Controlling contagious mastitis

Contagious mastitis originates from a source which is contaminated with the infection, for example the milking machine. Contagious mastitis organisms, such as *Streptococcus agalactiae* and *Staphylococcus aureus*, are more dependent on close contact with their host for survival and symptoms tend to be more subclinical.

'Good parlour hygiene and good management practices will prevent contamination occurring and consequently, contagious mastitis spreading amongst the herd.'

Streptococcus agalactiae vs. *Staphylococcus aureus*

Streptococcus agalactiae is a contagious mastitic agent which can spread rapidly through a herd as there are very limited clinical signs.

An increase in herd somatic cell count is usually an indication that there is an infection present and as a consequence management strategies and antibiotic treatment should be put in place to eradicate the infection. Treatment and eradication of the *Streptococcus agalactiae* infection is practical and cost effective.

Staphylococcus aureus is more difficult to eradicate than *Streptococcus agalactiae* but is still controllable. The udder harbours the infection and therefore clinical abnormalities are an indication that the infection is present.

' Bacteria cause a lot of damage to the milk-producing tissue and therefore significantly decreases milk yield. '

Abnormalities in the milk such as clots or flakes are often said to be common with this bacteria but confirmation is only possible by laboratory analysis.

Mycoplasma species

Mycoplasma are highly contagious organisms but are less common than *Streptococcus agalactiae* and *Staphylococcus aureus*.

' Their presence can be suspected if clinical mastitis cases do not respond to therapy.'

Mycoplasma mastitis should be suspected in herds where there is a large outbreak of clinical mastitis in more than one quarter. Your veterinary surgeon may advise culling some cattle in order to control this pathogen.

Controlling Summer mastitis

Summer mastitis, as the name suggests, tends to occur during the Summer and is almost classified as a separate disease to other mastitic strains as the pathogens are neither contagious nor environmental in their origin.

‘The spread is usually linked to flying insects, specifically the head fly.‘

Head flies feed from body secretions and are therefore attracted to udders secreting milk. Summer mastitis usually occurs in dry cows at pasture. Bear in mind that this disease can also affect maiden heifers and even bullocks at grass.

‘Damaged teats are usually a perfect environment that flies are attracted to so the spread of pathogenic bacteria can occur here.’

Animals affected by summer mastitis often require treatment with intramammary and systemic antibiotics, along with antiinflammatories. Once an infected animal is identified, it should be isolated from the rest of the herd.

Using preventative methods, such as teat sealants and fly control products as part of drying off therapy will help avoid the likelihood of head flies spreading infection between cows once they are out to graze.

Dealing with a clinical case

You will have Standard Operating Procedures for the detection and treatment of mastitis cases within your Herd Health Plan, so the following is just a brief overview.

Clinical mastitis can present itself in a variety of symptoms which can range from mild to severe.

'The most obvious symptoms of clinical mastitis are abnormalities in the udder such as swelling, heat, hardness, redness or pain and the milk consistency, such as a watery appearance, flakes, clots or pus.'

The infection can cause other symptoms not necessarily specific to mastitis such as a reduction in milk yield, an increase in body temperature, lack of appetite, sunken eyes and reduction in mobility due to the pain of a swollen udder.

1. Remember to take a milk sample according to the procedure outlined on page 4 before any treatment is commenced. If it is not used to guide initial treatment, this can be stored in the freezer in case the animal does not respond to treatment.
2. Ensure that the teat is clean and disinfected before administering the tube. Bacteria harbouring on the outside of the teat can be carried into the teat canal on the tube when the medicine is injected causing further infection.
3. Remove the cap and gently insert the tube nozzle into the teat canal but not to its full depth as this can dilate the teat canal excessively and predispose the cow to mastitis.
4. Infuse the content of the syringe into the teat. Massage it up the teat into the udder.
5. Teat dip treated quarters with freshly made-up teat dip immediately after treatment.
6. Check you have correctly marked the cows and their udders.
7. Record cow ID, date and product details.

When to call the vet

As stated earlier, you should have guidelines on your HHP on standard treatment of routine cases of mastitis, which will include administration of intramammary tubes. You should also be clear on when it's necessary to call a vet to treat a sick cow.

If a mastitis case is chronic and management practices have not been successful in treating the infection, a vet should be called out to aid with further treatment or advice for the cow.

'The vet may have other forms of treatment which they can administer to help fight the infection.'

If the initial use of intramammary tubes has not been successful, if the cow appears painful or is struggling to stand, then contact your veterinary surgeon. The vet can also advise on management practices to control the spread of infection.

The importance of Dry Cow Therapy

The dry period is a critical time for udder tissue repair and the formation of fresh udder tissue ready for the next lactation.

'It is essential to optimise the health of the cow in order to maximise productivity.'

During this time, the udder will rid itself of many harmful pathogens which could potentially lead to a mastitis infection. However, the udder is not immune from contracting infections during the dry period and it is therefore imperative that management practices are put in place to prevent the contraction of any infections as well as eliminating any existing subclinical infections.

'A significant number of new infections are contracted during the first two weeks and last two weeks of the dry period.'

Dry cow antibiotics

Dry cow antibiotics aim to prevent new udder infections in the early dry period and can eliminate subclinical infections persisting from the previous lactation. One dry cow antibiotic tube per quarter is sufficient and should be administered immediately after the last milking of lactation as part three of the five point plan.

Teat sealants

Teat sealants can be used further to limit bacterial entry to the teat canal, particularly as the natural keratin 'plug' that forms under normal circumstances to seal the teat ends between milkings and during the dry period often fails to be adequately produced in the modern dairy cow. Please remember to administer dry cow products hygienically - a guide is available on page 12.

Recent recommendations are to be very selective in terms of which cows in which herds should receive an antibiotic or a sealant tube, based for example on somatic cell count. Follow your vet's advice on which antibiotic and sealant dry products to use and when.

Importance of record keeping

1. The use of veterinary medicines should be recorded as part of good agricultural practice as well as being required by law.
2. Records are a true representation of the incidence and cure rates of mastitis on your farm.
3. Records can be used for comparative purposes.
4. Some milk buyers require records of all mastitic infections and somatic cell counts within a herd.
5. Records are useful as a basis for decision making including which cows to treat, which to cull, which cow's milk should be withheld from the bulk tank and which cows to group into a high somatic cell count group (will need extra monitoring).

What you should record:

1. Cow identity.
2. The quarter(s) affected.
3. Details of clinical symptoms, including dates observed.
4. All treatment details, including dates of administration and the number of antibiotic tubes used.
5. Details of response to treatment.
6. Ideally subsequent cases should be recorded in a way that links to the original case.
    - Recording of incidence and treatment is point 5 of 5 point plan.
    - SCC trends over a period of time can also be analysed to provide clues as to whether mastitis on the farm is of the contagious or environmental type.

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