Mastitis Bugs – Cause and Control
Mastitis is described as the inflammation of the mammary gland and udder tissue; commonly occurring as a result of bacterial invasion via the teat canal. This can also occur as a result of direct injury to a cow’s teat.

Mastitis can affect the cow during both lactation and during the dry period and infection can be picked up at any point.

In the UK, the average ranges from around 47 – 65 cases per 100 cows (DairyCo. 2009), but farmers should be aiming for well below 40 cases per 100 cows.

With an average case of mastitis costing approximately £250, a reduction in cases for a 100 cow herd from 65 cases per year to 30 cases per year would result in an approximate £8,750 saving per year.
The impact of mastitis in a herd

Mastitis can have a long term impact on the cow’s health and welfare, whilst also having a financial implication for the business through both direct and indirect costs.

For the cow, some of the key impacts include:

- Damage to the udder may prevent complete healing and stop the immune system from reaching the infection, leading to recurrence and chronic mastitis.
- Stress from additional handling. It is the handler’s responsibility to ensure that all treatments are administered in a calm manner to avoid stress. If the animal is stressed this has a negative impact on the recovery of the animal.
- In some cases, mastitis may also result in loss of body condition.
- Reduced life expectancy. Sometimes and for certain types of infections, culling the animal early is the most sensible option to avoid recurrence and reducing the risk of spreading the infection to the rest of the herd.
- A bad case of mastitis may also result in mortality as cows can become seriously ill and are unable to overcome the infection.

Long term damage to the udder can be caused by the immune system fighting the infection. This is linked to inflammation resulting from toxin production and may result in scar tissue, leading to permanent damage of the milk producing glands within the udder (DairyCo. 2013).
Some of the key impacts of mastitis, in terms of the business include:

- Reduction in yields due to the impact the illness has on the cow. Increased pressure on the immune system will draw the focus away from milk production towards fighting the infection in the udder. For chronic cases of mastitis, long term milk yields can be expected to drop as damage done to the udder and teats will impact on future productivity of the cow.

- Utilisation of staff time for correct treatment of the animal – if there wasn’t a case of mastitis, their time could be utilised doing something else.

- Lost revenue from milk, this includes waste milk that has to be dumped due to the presence of antibiotics following treatment, as well as the predicted reduction in yield following a case of mastitis.

- Additional cost of medicines associated with the treatment of the mastitis case. In some cases, it may also require a veterinarian to attend; although this cost should be seen as an investment to safeguard the cow and its ability to produce milk.

- Lost revenue from the cow in terms of cull value; for those cows that suffer with a severe bout of mastitis, this can result in mortality. In turn this will lead to a disposal fee for the animal as opposed to an income from a live cull that walks off the farm. This is termed an involuntary cull and a high percentage of these are costly to the business.

- In many sub-clinical cases, the most common symptom is an increased Somatic Cell Count (SCC). For many businesses this will lead to penalties when the SCC is too high. Not only could it result in penalties, but also the loss of any bonuses.
Indirect costs range from an increased risk of spread of infection to other cows in the herd; to reductions in overall genetic potential of the herd due to involuntary or early culling of problem cows. If mastitis is a commonly occurring problem in the herd, capital investment may be required to improve overall cow comfort and health thus reducing the risk of further cases. This could include investment in cattle housing to improve cubicles/beds or it could be the inclusion of new equipment in the parlour to help improve parlour hygiene.

Ensure that a cow’s teats and udder are kept as clean as possible to avoid contamination and spread of infection.
Types of mastitis

Mastitis can be defined as either clinical or sub–clinical. Clinical cases can either be referred to as acute, sub acute or chronic. Acute cases occur when the disease flares up suddenly in a seemingly healthy animal, resulting in a sick animal quickly.

Sub acute cases tend to be less aggressive, with mild to severe inflammation and small clots or flakes in the milk. Whilst this causes health issues for the cow it is not to the same severity as the acute cases, but is more likely to result in long term consequences.

Chronic cases are long term or recurrent problems in individual cows; where they persistently become re-infected or where existing pockets of infection flare up with little cure success. In these cases, culling as soon as possible is recommended to avoid further health issues for the animal as well as mitigating the long term financial risk from having this type of animal in the herd.

Sub-clinical mastitis is far harder to detect, but the use of a California milk test can further help to determine those infected and which quarter has the problem. Sub-clinical mastitis can be particularly problematic within a herd because there are very few symptoms linked to this type of mastitis. This makes it more difficult to catch early, heightening the risk of spread within the herd.
Mastitis – The symptoms

As stated before, sub-clinical mastitis offers few symptoms, the most obvious being increased SCC. For clinical cases, symptoms are easier to observe and include:

• Heat, redness and pain in the udder
• Swelling and sensitivity of the udder; in some cases the udder may feel quite tight or hard
• Reductions in milk yield
• Temperature of the cow is raised (as the immune system fights infection)
• When observed the milk can have clots, flakes or have a watery appearance. Depending on infection type it might also have some discolouration e.g. pinky/white in appearance
• Reduction in appetite
• General reluctance to enter the parlour or move around (often reduced mobility)
• Sunken eyes, dehydration and a dull coat

Mastitis – The causes

Mastitis is caused by a range of pathogens (disease causing organisms), which are mostly bacteria. These pathogens can be found in the cow’s udder and transfer easily and rapidly from an infected cow to unaffected animals or the environment. Cows fighting infection due to “contagious” pathogens tend to show high SCC, with Bactoscans remaining relatively normal.

Infection via “environmental” pathogens tend to present with relatively normal SCC with higher than expected Bactoscans. These pathogens can be present in housing and bedding as well as in the soil and can be easily passed on during milking. In particular, liner slippage during milking can increase the risk of environmental pathogen infection.

Correct placement of the cow in cubicles will stop muck and wet bedding contaminating the teats and udder.
Table 1: Mastitis Organism Descriptions

<table>
<thead>
<tr>
<th>Contagious Pathogens</th>
<th>Environmental Pathogens</th>
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<tr>
<td><strong>Staphylococcus aureus</strong> – A common cause of chronic mastitis where cure after lactation therapy is often less than 30%. Give priority to culling cows that have repeated cases in the same quarter (three or more in any one lactation). It is also important to check parlour hygiene, teat dipping, dry cow therapy, teat health and skin condition, and the milking plant.</td>
<td><strong>Streptococcus uberis</strong> – Occurs at sites such as skin, tonsils, faeces and bedding. Infections in dry cows are common and cows frequently calve down with mastitis. It is only partially controlled by parlour hygiene and dry cow therapy and attention to the environment is needed to control outbreaks.</td>
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<tr>
<td><strong>Streptococcus agalactiae</strong> – Infections usually respond well to treatment (penicillin therapy). Problems associated with this organism often emerge when control measures such as teat dipping and dry cow therapy are inadequate. It is important to pay attention to milking hygiene, teat disinfection and dry cow therapy. This organism can cause severe problems with Total Bacterial Counts (TBC) and tank milk cell counts. In certain circumstances ‘blitz’ therapy may be required.</td>
<td><strong>Escherichia coli</strong> – This is a faecal organism which can heavily contaminate the environment, such as bedding, especially in wet conditions. Infection normally occurs between milkings but machine faults or poorly cleaned milking equipment can cause a high new infection rate. Most cases are of moderate or mild severity but a few are severe, especially in newly calved cows. Sub-clinical infection is not common.</td>
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<td><strong>Pseudomonas aeruginosa</strong> – This organism can cause severe, acute or chronic mastitis, which is often resistant to treatment. The organism occurs in the environment and often contaminates water supplies. It is worth checking the milking machine cleaning and udder wash system both for efficacy and contamination.</td>
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(Kite Consulting, 2013)
In addition to these pathogens, the following environmental pathogens can also cause mastitis of varying severity:

- **Streptococcus dysgalactiae** – This is frequently isolated from lesions on cows’ teats. The organism spreads mainly at milking time by contact with the milkers’ hands and clusters etc. Pay particular attention to the condition of the teat skin (check pre and post teat dips for efficacy), including milking machine operation, and the hygienic precautions taken during milking.

- **Klebsiella** – These species occur in soil and subsequently in faeces, bedding and especially in sawdust and wood shavings. Check for milking machine faults and poorly cleaned milking equipment as well as checking clusters for contamination.

- **Bacillus cereus** – This organism can cause peracute (even worse and faster than acute!) mastitis where the milk has a port-wine colour. Outbreaks have been associated with stored brewer’s grains and contaminated intra-mammary products. Teat preparation before infusing with intra-mammary products should be fully reviewed.

It is also worth considering the impact problems with fertility and metabolic disorders will have on the risk of mastitis occurring.

Mastitis is often a secondary disorder due to increased stress levels and a reduction in the cow’s ability to deal with bacterial threats following a metabolic disorder.

Table 2: highlights some of the common metabolic disorders seen in dairy herds that can result in mastitis issues.

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<tr>
<th>Primary Discover</th>
<th>Dystokia</th>
<th>Retained Placenta</th>
<th>Metritis</th>
<th>Displaced Abomasum</th>
<th>Mastitis</th>
<th>Poor Conception</th>
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<tr>
<td>Milk Fever</td>
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<td>Metritis</td>
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<td>Displaced Abomasum</td>
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<td>Ketosis</td>
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(Kite Consulting, 2013)
Control and prevention of mastitis

Preventative management as well as treatments must be implemented to avoid mastitis within the herd. Preventative measures can be broken down into three key areas:

**The field**

- Ensure cow tracks are in good order to avoid cows walking through the mud and splashing their udders. This will result in potential contamination from soil borne pathogens; aim to avoid soil/mud on the legs, tail and udders.

- Ensure paddocks and fields are rotated carefully to avoid poaching as this will increase the risk of soil contamination on the udder.

- When walking cows to and from the field make sure this is not rushed, as this may cause stress to the cow.

**Milking parlour**

- Prompt identification of infected cows is critical to ensure successful treatment. Ensure all staff are correctly trained to spot and treat mastitis cases.

- Ensure full parlour preparation is carried out by all milkers: wipe, strip, dip and apply. Milk let down time is particularly important in prevention of mastitis. Aim for 60 – 90 second lag time between preparation and the application of the cluster (see section on ‘stress’ regarding the impact on the udder).

- Ensure you regularly check both the cleaning system in the parlour as well as the vacuum as over-milking can result in teat end damage. Poor cleaning will create the perfect environment for pathogens to breed and infect healthy cows.
• Ensure staff use gloves and dip hands in between cows if they are handling infected animals, to avoid further spread of infection.

• Udder and teat hygiene are key in mastitis prevention. Ensure all teats are thoroughly cleaned either by using a pre-spray/disinfectant wipe or washing the teat. All dirt and contamination must be removed before the cluster is placed on the teat. A separate towel for each cow is necessary to avoid transfer of infection from one cow to the next.

• Clipping tails and the use of udder flaming may also be advisable to limit the amount of bedding/dirt contamination held on the udder; thus making the environment around the teat cleaner.

• Dry cow therapy can also play a key role in preventing infection during the dry period. A dry cow therapy programme should be discussed and agreed with your vet.
**Stress:** If cows are stressed; for example rough handling, pain from sticks, unusual staff around them, changes in routine, additional immune system pressure, post calving metabolic issues, then this will trigger the release of adrenaline. This hormone inhibits the release of oxytocin, which is important for milk let down. If this is inhibited, then the process of milk let down in the udder will not occur correctly and will result in teat end damage, increasing the risk of mastitis as bacteria will easily be able to enter the teat.

Check vacuum speed to ensure cows are not being over milked.
Cattle housing

- Bedding quality, quantity and cubicle design are all crucial for cow comfort and to create an adverse environment for mastitis bugs. Thick, deep bedding with a correctly positioned neck rail and brisket board will ensure the bed remains dry and the cow is positioned correctly to keep the udder clean.

- Sand beds, whilst not practical for all systems, offer excellent comfort and an inert environment, which discourages pathogen survival.

- Check ventilation in sheds to ensure cool air is circulated evenly throughout.

- Good ventilation will ensure buildings remain cool and dry. Warm, humid environments encourage pathogens to multiply rapidly.

- Regularly scrape passageways and clean beds, applying more bedding as often as necessary to ensure beds remain clean and dry and cows are encouraged to lie in the beds.

Cow comfort and bedding provision is key to encourage correct lying position in cubicles.
Summary

- Mastitis is an inflammation of the mammary gland and udder tissue.
- Average cost of mastitis = £250/case.
- Mastitis results in reductions in yield, challenges the immune system and reduces life expectancy. It increases stress to the animal and can result in long term damage to the udder.
- Mastitis can either be sub-clinical or clinical.
- It is caused by a range of pathogens; the key pathogens are Staph. Aureus, Strep. Uberis and E. Coli.
- Ensure cow tracks are well maintained and paddocks are rotated regularly to avoid damaging them.
- Carry out full parlour prep to make sure udders are clean and any early signs of mastitis are detected.
- Ensure staff wear gloves and dip hands and clusters between mastitic cows to avoid spread of disease.
- Keep all handling and stress to a minimum as additional stress will suppress the immune system and reduce milk let down.
- Aim to maximise cow comfort, thus reducing stress on the cow. Clean bedding and regularly scraped passageways will ensure beds and cows’ legs remain clean so the udder and teats will also remain clean, reducing the risk of mastitis.
- Ensure good ventilation to maintain dry clean beds. Sand bedding creates an inert environment which is not conducive to pathogen survival.

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