**Strep uberis**

What are the keys to controlling *Strep uberis* mastitis in dairy herds?

The bacteria *Streptococcus uberis* (also known as *Strep uberis*) is a common cause of mastitis in dairy cattle in many countries around the world. Over the past two decades it has become the leading cause of clinical and subclinical mastitis in Australian and New Zealand dairy herds (J Malmo unpublished data 2010, McDougall 1998, Petrovski et al 2009).

*Strep uberis* is passed in the faeces of cattle (and other ruminants) and can survive for up to 2 weeks in fresh dung or faecal-contaminated mud or straw (Lopez-Benavides et al 2007). It is regarded as an ‘environmental pathogen’ because cows are likely to develop intramammary infections if their udders are exposed to contaminated material, especially if they have damaged teat skin or open teat ends.

The emergence of *Strep uberis* as a problem for pasture-based herds follows intensification of the Australian industry, with higher stocking rates increasing cow exposure to environmental bacteria. Typical changes in farm systems that have increased the risk of environmental infection include widespread use of calving and feed pads, loafing areas and heavy traffic around water troughs, gateways and laneways. Higher yielding cows and those fed concentrate-based transition diets may also be more at risk.

Many cows in the herd can become infected if exposed to environmental bacteria at a vulnerable time: especially in the fortnight after drying-off and the weeks either side of calving – or in the hour immediately after milking.

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**Increasing trend in the proportion of *Strep uberis* isolates from milk cultures in the Maffra, Victoria, region from 1997 to 2009**

It is likely that faecal shedding by cows is needed to maintain *Strep uberis* in the environment. *Strep uberis* contamination is common in laneways with medium to high traffic. Paddocks show a high degree of contamination immediately after grazing but minimal contamination before grazing.
Strep uberis

Typically pre-milking preparation in Australia and New Zealand does not involve washing and drying teats with an individual paper towel. This minimalist pre-milking routine probably contributes to the increasing prevalence of Strep uberis infections. Importantly Strep uberis can also spread from cow-to-cow at milking (Zadoks et al 2009). Most quarters that become infected have high cell counts (often above 500,000 cells/mL) that return to a normal cell count within 2-3 weeks but a small percentage of cows remain chronically infected and shed bacteria in their milk (Hogan and Smith 1997). This allows the bacteria to spread from cow-to-cow via the mechanisms associated with contagious mastitis bacteria. So despite its reputation as an environmental pathogen, control of Strep uberis also requires attention to management practices that minimise milk droplet ‘impacts’ during milking, reduce the number of bacteria around the teat end and maintain healthy teats.

There are a large number of strains of Strep uberis. In an Australian study, 62 different strains were found in 138 isolates from four herds, with between 10 and 26 different strains in each herd (Phuektes et al 2001). Some strains are more able to adapt to specific host tissues (survive in mammary epithelial cells for example) while the less host-adapted strains are rapidly eliminated by the cow’s immune system (Tamilselvam et al 2006). The implications of strain differences on spread of infection, treatment efficacy and control options are still unfolding. There is no effective vaccine on the horizon yet.

Because cows are likely to be regularly exposed to Strep uberis in the environment, mastitis management should aim to reduce the likelihood of cows becoming infected rather than to eliminate the infection from the herd. The focus of attention here is on having a dry cow strategy and drying-off process that ensures that teat canals are sealed; a calving management plan that minimises exposure to contamination; and milking management routines for putting teatcups on clean, dry teats, and minimising exposure of susceptible cows to high traffic areas.

Teat sealants provide an immediate seal to the teat canal at drying-off and are a highly effective way of reducing the incidence of clinical mastitis around the time of calving. They have been widely available in Australia since 2003 for use in uninfected (low cell count) cows to protect them from infection for the duration of the dry period. Recent experience in Australia shows administration of antibiotic Dry Cow Treatment AND teat sealant at drying-off provides significant further reductions in new infection rates at calving (Runciman et al 2008). Although it is more expensive and a larger job (all quarters receive two intramammary tubes) this pairing is now being used as a fundamental plank in the control program for many herds with endemic Strep uberis problems. Farmers need to discuss treatment options and strategy with their veterinarian.

The main opportunity for the treatment and cure of Strep uberis infections that have occurred during lactation is through antibiotic Dry Cow Treatments at drying-off. The drug of choice also needs to be discussed with the herd’s veterinarian as longer-acting preparations are likely to be recommended.
Strep uberis

Treatment of clinical cases during lactation often removes clinical symptoms although it may be difficult to achieve a bacteriological cure in some cases.

A recent review (Zadoks 2007) examined the results from 17 field studies on treatment of clinical and subclinical *Strep uberis* mastitis during lactation. Experimental infection studies were not included in this work. The field studies employed a wide range of antimicrobials and treatment routes. The treatment duration varied from conventional treatments of 2-3 days to extended treatment periods of up to 8 days for subclinical infections and longer for non-responsive clinical cases. The bacteriological cure rates for clinical cases with conventional treatments ranged from 50% to 90%. For untreated clinical cases, the cure rate averaged 19%.

*Strep uberis* infections are normally susceptible to antimicrobials such as penicillins and cephalosporins. Macrolide antibiotics (erythromycin, tylosin, tilmicosin) have the advantage of being able to penetrate intracellularly but *Strep uberis* often shows resistance to this drug family.

After comparing different treatment regimens, Hillerton and Kliem (2002) recommended intramammary treatments *not* combined with intramuscular antibiotics, and that extended intramammary treatment courses may be required.

Given the relatively low cure rate it is important to remain vigilant for recurrence of clinical cases of *Strep uberis*. In practical terms, if a treatment regimen appears to be successful on a farm (if no more than 2 clinical cases in 10 require a second course of treatment) it is worth sticking with that protocol.

Treatment recommendations for subclinical infections during lactation are even less certain. Cure rates in high cell count cows are even lower than clinical cases (Zadoks 2007). Given the variable and possibly poor response to treatment the cost-effectiveness of treatment of subclinical infections during lactation is questionable.

In some circumstances the only way to remove udder infections is to cull persistently infected cows: those that have had three or more clinical cases in one lactation OR cows that have had cell counts above 250,000 cells/mL in two consecutive lactations despite intervening antibiotic Dry Cow Treatment.

Research priorities

Research into the benefits and practicality of modifying pre-milking cow preparation practices in Australia and New Zealand to reduce new infection rates with *Strep uberis* and other environmental bacteria is a HIGH priority.

Little is known about the strains of *Strep uberis* found on Australian dairy farms. Strain typing of isolates from herds with high numbers of repeating clinical cases may be worthwhile and is a MEDIUM priority.

The efficacy and cost-effectiveness of treatment of subclinical mastitis caused by *Strep uberis* during lactation is not well enough understood. Further study of possible treatment options in lactation is a MEDIUM priority.
**Strep uberis**

**General approach to investigating a mastitis problem**

To solve a mastitis problem advisers must be confident that they have clearly defined the nature of the problem, determined the bacteria involved and identified the factors on the farm that are likely to be contributing to the problem. This usually requires coordinated input from several disciplines including veterinarians, milking machine technicians and, in the case of Strep uberis mastitis, nutritionists. They can then help the farm team to build and implement a plan that will work. This general approach is shown in the flowchart below.

1. **Describe the presenting problem**
   - Describe the problem as the farmer sees it
   - Examine and interpret the available information and identify information gaps
   - Make your preliminary definition of the problem
   - Plan how to start gathering the next set of critical information

2. **Define the problem more specifically using milk culture results**
   - Interact with a vet to determine what milk cultures are available. If adequate milk culture results are not available, the vet should plan the detailed milk sampling strategy and organise sampling and transport of samples to the laboratory
   - Interpret milk cultures to determine the bacteria causing the problem in the herd
   - Consider the likely sources and modes of transmission of the bacteria in the herd

3. **Activate your advisory team**
   - Identify who needs to be involved in this investigation
   - With the advisory team, plan relevant examinations using the Investigation Master Sheet
   - Do the tests and analyse the results

4. **Collate and assess findings with the advisory team**
   - With the advisory team, collate and assess the results using the Investigation Master Sheet
     - Consider bouncing ideas off an experienced mentor
     - Identify further examinations, do them and assess the results
     - Agree to the key factors critical to resolving the problem (check against presenting and re-defined problem)
   - Report initial findings to the farm owner and discuss options for plan development

5. **Develop a farm plan with the farm team**
   - Organise a farm meeting and involve the whole team in planning practical ways of addressing the key areas needed to resolve the problem for this herd
   - Summarise them on a report [e.g. Farm Mastitis Action Plan]
   - Activate processes, agree to triggers for action and set a date for review

6. **Review progress**
   - Measure progress in each of the key areas and make a date to review overall progress
Strep uberis

Describe the presenting problem

Strep uberis can cause high bulk milk cell counts or clinical case problems in herds.

All cows with clinical mastitis caused by Strep uberis will (by definition) have changes in their milk (wateriness or clots that persist for three or more squirts of milk) but only half of them will also have an enlarged, inflamed quarter. In about 10% of cases the cows develop a fever and go off their feed.

The timing of the occurrence of clinical cases can assist with problem definition.

Intramammary infection with environmental bacteria usually occurs in the first two weeks of the dry period or in the weeks around calving, especially if there is teat end damage or oedema.

Certain circumstances during lactation will predispose cows to infection by environmental bacteria. When conditions get wet, muddy and humid the risk of clinical and subclinical mastitis greatly increases, especially if teats are not washed and dried before milking. Exposure to the bacteria is higher and the teat skin and teat ends tend to be less healthy.

Another time at which cows may become infected is when intramammary treatments (antibiotic treatments, teat sealants or other infusions) are administered without maintaining meticulous hygiene. In this situation specks of dirt on the tube or teat skin are forced through the teat orifice and teat canal into the udder.

The following types of presenting problems could be seen in herds with Strep uberis:

- Clinical mastitis in cows at calving or in the first 100 days of lactation (even though cows may have been given antibiotic Dry Cow Treatment).
- Clinical cases in first lactation heifers before or after calving.
- High Individual Cow Cell Counts (greater than 250,000 cells/mL) in heifers or cows at the first or second herd test after calving.
- Higher than expected numbers of clinical cases throughout the lactation.
- A Bulk Milk Cell Count greater than 250,000 or trending up over a premium milk quality band threshold (not necessarily at the same time as clinical cases of mastitis).

Establishing the timing of new infections and the rate at which infection is spreading can greatly facilitate problem diagnosis. This can be done by generating a Countdown Mastitis Focus report through the local herd recording organisation (or go to www.mastitisfocus.com.au).
This example Mastitis Focus report incorporated herd test information with clinical case treatment and dry cow treatment records from the on-farm herd management software. This report was generated in response to an increase in new clinical mastitis cases during and after the August and September calving period. The month by month analysis of clinical case rates (Your calving system box and Clinical mastitis box) indicates the timing and rate of new infections. A total of 27 milk samples were collected from clinical cases during August and September. These frozen samples grew eight Strep uberis positive cultures from a total of 18 positive culture results. Subsequent investigation revealed a change in risk factors for new infection from Strep uberis during the calving period on this farm. In the wet weather, tracks had broken down and the feeding area had not been cleaned.
**Strep uberis**

**Define the problem as *Strep uberis***

As with any mastitis investigation, milk culture results are required from a sufficient number of typically affected cows to determine whether *Strep uberis* is the cause of the problem in the herd.

Common sampling strategies include:

- Taking samples from every newly identified case of clinical mastitis (immediately before starting a course of treatment). Samples can be refrigerated and submitted to a laboratory within 48 hours OR frozen for up to 3-4 months (see Technote 4.3). The samples are immediately available for culture should a problem start to escalate. Because the percentage of ‘no-growth’ cultures appears to increase markedly when samples are held frozen for longer than 1 month, PCR rapid screening (see ‘Molecular tests’ below) may be the preferred option for any samples held frozen for longer periods.

- Using herd recording results to identify subclinically infected cows (cows with an Individual Cow Cell Count greater than 250,000 cells/mL). Countdown Technote 13 (section C) indicates that it is important to have at least 20 effective milk culture results when conducting a herd mastitis investigation. Isolation of *Strep uberis* in around 25% or more of these samples indicates an increased risk of udder infections associated with this bacteria.

**Molecular tests**

DNA tests for bovine mastitis pathogens are now commercially available in Australia. These systems provide a rapid screen for the presence of DNA from multiple bacteria at a single test.

The company that does the Bulk Milk Cell Count testing for most Australian herds is now offering a ‘Pathoproof’ Polymerase Chain Reaction screening test to detect the presence of *Strep uberis* DNA in bulk milk samples.

As with any vat test, care must be taken when interpreting the results. Molecular tests are highly sensitive and can detect very small numbers of bacteria. The challenge is to ensure that these bacteria have come from within the udder, not from teat skin, hands, dirt and faecal particles or unwashed equipment. Follow-up sampling of suspect cows is strongly recommended after a screening test.

Because *Strep uberis* is associated with cow faeces in the environment it is important to ensure milk samples sent to the laboratory are taken from a stream of milk that has not touched the teat skin or any other surface. Factsheet A of the Countdown Downunder Farm Guidelines for Mastitis Control provides a comprehensive description of how to collect milk samples aseptically. If there is any doubt about quality, have an experienced person collect the samples.

Technote 4.3 gives a detailed description of sampling strategies and reasons for milk samples yielding ‘no growth’.

The ‘Vat milk tests FAQ sheet’ describes some of the issues that need to be considered when testing bulk-tank milk sample.
Strep uberis

Activate your advisory team

Resolution of a Strep uberis issue is likely to involve the farm manager, veterinarian, milking machine technician and milking staff at a minimum. Nutritionists also have an important role to play around the advice and support for management of the transition period.

It is recommended that advisers use a team approach when identifying and prioritising action around the key factors contributing to the problem. This approach gives the best chance of success as each profession understands how their contribution can progress the situation on farm.

Collate and assess findings with the advisory team

Once Strep uberis has been confirmed the job of the advisory team is to identify how and when cows are becoming infected, especially the sources of infection and important risk factors, as these are critical for control.

This is best done systematically to avoid oversights given the multifactorial and often complex nature of herd mastitis problems. The aim of the investigation is for the team to agree to prioritise the key factors and discuss control options with a farm owner.

Develop a farm plan to control Strep uberis

Control programs should minimise both environmental and cow-to-cow mechanisms of spread even though one may dominate in individual herds.

Key elements in the control of Strep uberis mastitis are discussed in order of priority:

✔ At the time of drying off: to remove existing infections and prevent new infections which tend to occur early in the dry period.

✔ In the transition and calving periods: to minimise exposure of susceptible cows to faecal contamination, maximise immunity, ensure that cows are milked as soon as possible after calving and monitor closely for signs of clinical mastitis.

✔ During lactation: to minimise the risk of teat end damage and reduce the number of bacteria on the teat skin.

To get good take-up of all recommendations it is important to have the whole team on the farm understand the approach to be implemented. For Strep uberis herds this includes milking staff and those involved in paddock work and feeding.

Strep uberis does not simply ‘disappear’. A successful control program can take more than a year to achieve because each cow will need to go through a full cycle of the required drying-off, calving and milking management. The plan for controlling Strep uberis in a dairy herd requires this timeframe and it is important that the farm team have realistic expectations of progress.

The People in Dairy resources contain useful information on planning the farm roles, responsibilities and workplan. See the Working Together Live Library section of the website (www.thepeopleindairy.org.au)
Strep uberis

At the time of drying-off ...

A good dry cow strategy and drying-off process is the most important control step to get right in Strep uberis herds. The plan must check off all of the steps that the farm team will need to manage in the lead up to drying-off, in choosing and using appropriate treatment strategies (antibiotics and teat sealants), and managing cows after they are dried-off (see example on page 10).

Use dry cow treatments to cure existing infections and protect cows

The main opportunity to cure Strep uberis infections that have occurred is with antibiotic Dry Cow Treatment. The drug of choice is often a longer-acting preparation. The product to be used should be discussed with the farm’s veterinarian.

Strep uberis can enter the udder while the teat canal is still closing in the days after drying-off (Leigh 1999). The main objective for prevention of infection is to ensure that teat canals remain sealed throughout the dry period. The use of teat sealant has significantly improved the success of farms in controlling Strep uberis mastitis.

In herds where selective antibiotic Dry Cow Treatment is an option, including teat sealant in the treatment regimen for cows with Individual Cow Cell Counts under 250,000 cells/mL should be considered.

For herds where maiden heifers are becoming infected, the use of teat sealants (alone) in the 2-8 weeks prior to calving can markedly reduce the incidence of clinical mastitis in the post-calving period (Parker et al 2007).

Minimise contamination of udders after drying-off

Teat skin must be completely covered with teat disinfectant after drying-off treatment. Cows should be moved out of the shed to a clean area and encouraged to stand (for example by having feed available) for at least an hour so that udders don’t become contaminated.

Freshly dried-off cows must go into an area with minimal faecal contamination (not grazed for at least two weeks beforehand) for at least a week after Dry Cow Treatment. It is preferable not to transport cows immediately but if they must be transported or walked after treatment it is an additional indication to use teat sealant.

Cull persistently infected cows

If they haven’t been culled already, drying-off is the opportunity to remove cows that have had three or more clinical cases during this lactation or cell counts above 250,000 cells/mL in the last two lactations despite receiving antibiotic Dry Cow Treatment. These cows are likely to be carrying chronic Strep uberis infections that may present a risk to other cows.

Technote 14 describes the closure of the teat canal during the dry period.

Technote 16 explains the importance of drying cows off when they are producing between 5 to 12 L per day and why it is necessary to plan for this.

The ‘Teat sealants FAQ Sheet’ (Feb 2003) describes the use of inert compounds to protect uninfected cows for the duration of the dry period.
**Checklist for Drying-off Plan**

**STOP** – The udder needs a clear message to stop making milk.

**SEAL** – Each teat needs a quick, clean seal in the teat canal. A natural seal takes days, a Teat Sealant operates immediately.

**HEAL** – The udder needs time to remove and repair milk-producing tissue, and help from antibiotics to remove infections.

**Get the timing right**

- What length dry period do you want? There are issues such as feeding, cow condition and time for staff holidays to consider. You may decide to dry-off high cell count cows early.

- How accurately can you estimate calving dates? Do you have preg test records?

- How will you manage cows to dry off when they are producing between 5 and 12 litres per day?

- What's required to ensure that newly treated cows can go to a clean location?

**Get everything you need ready**

- Have you discussed the choice of products with your veterinarian and purchased what you need – tubes, teat wipes, etc?

**Get the administration technique right**

If a Dry Cow Treatment or Teat Sealant is administered poorly it can carry bacteria into the udder. It is essential to get it right.

- Do you have sufficient time/people allocated? Plan to do batches – to do the job well you can only treat about 20 cows per hour.

- Can everyone who is involved do the job well? Provide a training session for anyone administering Antibiotic Dry Cow Treatment or Teat Sealant or both.

**After the cows are treated ...**

- Will the cows go into a clean area for at least a week after Dry Cow Treatment. Never put them in areas that have had effluent spread.

- Don't transport cows immediately if you can help it. If cows must be transported or walked, will you use a Teat Sealant?

- What procedure will you use for checking cows for swollen quarters for the next week. Who will do it? How? When? Preferably don't bring cows back through the shed.

- How will you deal with cows that leak milk?
**Strep uberis**

**In the transition and calving periods ...**

In the period leading up to and immediately after calving it is extremely important to minimise exposure of cows’ udders to faecal contamination and ensure that teat canals remain closed.

**Use good transition management programs to promote cow health**

Healthy cows spend more time on their feet and less time lying down in contact with potentially contaminated soil and pasture.

- Plan and implement a good transition feed management program to keep the incidence of milk fever at or below the target levels of 1-2%.
- Apply the normal post-milking teat disinfection when the transition diet is being fed in the milking shed (McDougall *et al* 2010, Lopez-Benavides *et al* 2007). Disinfect each teat of each animal at each feed.

**Control udder oedema and leaking milk before calving**

With the advent of concentrate-based transition cow rations in the mid-1990s there has been an increase in cows that have udder oedema and leak milk close to calving. The same is true for heifers fed a transition concentrate (‘lead feed’). Animals that drip milk prior to calving or have udder oedema (flag) have patent teat canals and are at risk of clinical and subclinical infection with environmental bacteria such as *Strep uberis*.

- If springing cows and heifers drip milk prior to calving, milk them twice a day and disinfect their teats after milking. Store colostrum from these animals (or from an alternative source) to feed to their calves. Use the same process for heifers displaying udder oedema even when they are not observed leaking milk.
- Cows and heifers with severe udder oedema may be milked more easily if they are induced to calve.

**Minimise faecal contamination of calving and feeding areas**

Wherever cows and heifers are calved it is important to keep the area as clean as possible. Having cows in groups based on expected calving date can assist in managing the population density of calving areas.

- Where possible chose paddocks with good drainage and keep them free from cows for a few weeks to minimise contamination and achieve some grass cover before the springers arrive.
- For cows calving on pasture, provide a clean break of feed each day by ‘back fencing’ to stop grazing over previously contaminated areas.

InCalf describes a practical approach for reducing retained foetal membranes, acidosis and milk fever at calving in the transition management fact sheet ‘Springers: repro ready’ at www.dairyaustralia.com.au
Calving pads can be difficult to manage well. Scraping dirt-based calving pads weekly, and scraping or hosing concrete calving pads daily, removes dung pats and soiled material but can also spread faecal material across the area. Some field reports indicate an increase in *Strep uberis* mastitis after dirt-based calving pads have been scraped.

- The calving pad can be a handy ‘plan B’ area to use for a few days at a time if there are periods of very wet weather during calving.
- If using bedding material, maintain a fresh surface. Sand is often preferred as it is a less favourable substrate for *Strep uberis* than organic materials (Leigh 1999). However, well-maintained straw bedding also does the job (fresh straw bedding has a lower bacterial load than sand that is not regularly replaced for example).

A new calving area should be used if the clinical mastitis rate at calving goes above 5 cases per 100 freshly calved cows per month or when there is a noticeable increase in the clinical case rate among calving cows.

Maintain as clean an area as possible wherever cows and heifers are being fed prior to and after calving.

**Milk freshly calved cows and heifers as soon as possible**

Get freshly calved cows and heifers into the milking herd as soon as possible, preferably within 12 hours of calving (rather than 24 hours).

Monitor closely for signs of clinical mastitis by visual appraisal or quarter stripping all freshly calved cows. *Strep uberis* cases that are detected early are more likely to respond to treatment.


**Strep uberis**

**During lactation ...**

The key to controlling *Strep uberis* in herds during lactation is to minimise the risk of teat end damage and reduce the number of bacteria on the teat skin.

**Ensure milking machine operation is not damaging teat skin or teat ends**

Damage to teat ends predisposes cows to *Strep uberis* infections. Assessment of the machine function during milking is essential during the investigation of a mastitis problem. Milking time observations, especially teat scoring, are also recommended on a regular (3-6 monthly basis) while control measures are being implemented.

- Organise for a complete AMMTA ‘dry test’. This will confirm whether machine settings such as pulsation, vacuum and liner shell compatibility are adequate. Have a Countdown-trained milking machine technician also conduct a milking time performance test on the plant.
- Have an experienced milk quality adviser conduct milking time observations to assess if teatcups are frequently slipping, cows are uncomfortable during milking, they milk slowly or incompletely, or teats are abnormal or are open after cups come off.

**Put cups on clean, dry teats**

Milking routines in Australia and New Zealand place emphasis on preparing cows to promote good ‘let down’ but most milking staff do not wash and dry dirty or soiled teats. Cleaning and disinfecting teats prior to cups-on may reduce the incidence of new infections (Zadoks 2007).

- Wash all dirty or soiled teats (not udders) using low-pressure water. Teats that needed to be washed must then be individually dried with one paper towel per cow. In rotary dairies the cups on position may need to be changed to accommodate this.
- Washing and drying of teats is especially important during wet, muddy, humid conditions where many cows are entering the milking shed with soiled teats.
- Where there is evidence of an increase in clinical mastitis caused by *E coli* a herd may consider the use of pre-milking teat disinfection. Care should be taken to only use a teat disinfectant registered for this purpose and the product should be used according to the manufacturer’s recommendations. In all circumstances these products are designed to have a certain contact time on the teats and then be removed through wiping prior to cups being placed on teats.

In extreme situations (adverse environmental conditions or when dealing with an outbreak of clinical mastitis) it is worthwhile putting an extra person into the shed to focus on critical procedures before, during and immediately after milking. This includes:

- ensuring teats are washed and dried before cups go on;
- stripping cows every day to detect, treat and isolate clinical cases; and
- thoroughly applying post-milking teat disinfection.

Revised Technote 13 (February 2003) contains a Mastitis Investigation Pack with a recording sheet for teat condition (Sheet I). This is available from www.countdown.org.au

Technote 9 describes how to score teats and interpret the findings. Machine factors, milking management and environmental factors can all cause teat damage.

Washing and drying dirty teats prior to milking means mastitis-causing bacteria are less likely to enter the teat during milking. Drying teats prevents cup crawl and damage to teat ends.
Strep uberis

Technote 7 describes how to check teat coverage and other significant considerations when reviewing the post-milking teat disinfection procedure used on farm.

The milking hygiene and routines recommended in the Countdown Downunder Farm Guidelines for Mastitis Control should be established practice on farms. Check that all milking staff wear gloves at milking and cups-on and cups-off procedures are not contributing to the risk of new infection. Technotes 5 and 8 recap the main considerations here.

Technote 4 explains the critical elements of managing clinical cases in fresh cows.

Implement effective post-milking teat disinfection

Post-milking teat disinfection with emollient reduces the number of bacteria on the teat skin and helps maintain teat skin health between milkings, provided coverage is adequate and the product is used at the correct concentration.

- Use a product that contains emollient.
- Use a Ready-To-Use product if water quality fluctuates or is uncertain.
- Check that the volume of product used allows 20 mL per cow per milking.
- Check that the coverage on individual teats is adequate. Best practice is to cover all parts of the teat skin in contact with the liner.
- For herds that use automatic teat sprays, consider switching to hand spraying when conditions are wet or muddy.

Detect, treat and isolate clinical cases as early as possible

Clinical cases that are treated early have a better chance of cure. Isolation and treatment reduces the chance of infection spreading to other cows.

- At times of high risk strip quarters before every milking to check for new clinical infections, changes in milk or an abnormal quarter. Discuss ideas with the farm team about ways of making this do-able as a routine, for example stripping two teats of every cow at each milking (front in the morning, back in the evening).
- Recheck suspect cows at the next milking (cows with flecks in one or two strips before the milk changes to normal).
- Milk clinical cases last or use a separate cluster attached to a test bucket. Strep uberis has been isolated from liners after two cows have been milked following a cow shedding the bacteria (Zadoks et al 2001).
- Run a separate hospital herd of mastitis cases and others (such as lame cows).
- Set up a mastitis treatment protocol in consultation with the farm veterinarian.

Minimise exposure of cows to faecal contamination

Manage how cows use highly trafficked areas before and after milking. Exposing cows to medium or high traffic areas is likely to increase new infection rates (Zadoks 2007). Regard any area that contains a lot of fresh faecal material (deposited within the past few days) as an infection risk.

- Minimise crowding and pushing in the dairy yard as cows are waiting to be milked. Use backing gates judiciously.
- Fix areas in laneways and gateways that are high risk for splashing faeces or at least use temporary fencing to restrict access to these areas.

Set up a routine so cows don’t lie down in the hour after milking. For example have feed available when cows leave the shed (on feed pads).

Design feed pads for regular and easy cleaning, and effective draining.

The Grains2Milk fact sheet provides information on the design of feeding areas. This is available at www.dairyaustralia.com.au
**Strep uberis**

**Review progress**

Conditions that predispose to environmental infection or cow-to-cow spread of *Strep uberis* can (and do) change. Regular reassessment of risk factors on every farm is necessary to achieve mastitis control.

In all herds the described Countdown triggers provide the ability to measure the effectiveness of tailored control plans. The triggers for review and re-planning are:

- clinical mastitis case rate during the calving period of 5 or more cases per 100 calvers
- clinical case rate during lactation of greater than 2 cases per 100 milkers per month
- overall new infection rate (based on Individual Cow Cell Count changes) of 5 cases per 100 milkers per month.

These measurements are provided on a Countdown Mastitis Focus report.

In all scenarios, the use of culture information from clinical cases is integral to reviewing progress on farm.
Strep uberis

Key papers

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