Staphylococcus aureus (S. aureus) Mastitis Management

What is S. aureus?

Staphylococcus aureus causes one of the most common types of chronic mastitis. Though some cows may flare up with clinical mastitis (especially after calving) the infection is usually subclinical, causing elevated somatic cell counts (SCC) but no detectable changes in milk or the udder. The bacteria persist in mammary glands, teat canals, and teat lesions of infected cows and are contagious.

Once the infection is clinical, it can present with abnormal milk texture and consistency, offensive flavors, and high levels of bacteria present in the milk that can interfere with culturing and shorten shelf life. In severe cases, S. aureaus can appear as visible lesions and abscesses on the teats and udder.

Can S. aureus be cured?

No. Personally, this has been a very hard herd management reality for me to accept because for some unfortunate reason, the Staph cow is NEVER a cow that looks unhealthy (one you might already be considering culling). She is often the cow with the best body condition, the most beautiful udder; that is your poster-cow. Antibiotics generally do not cure S. aureus and these bacteria can go in and out of remission without clinical signs of infection. Because antibiotics do not cure, shedding can be intermittent, and most Staph aureus infections are subclinical, culling is recommended to prevent spread of infection to healthy cows and calves.

Even a negative milk test on a previously positive cow does not indicate that she has been cured. Rather, it indicates that the bacteria have temporarily hidden itself within abscesses inside the udder. Given time, the abscesses will rupture and the cow will once again resume shedding S. aureus.

Why is Staph aureus a big deal?

Having a protocol that screens for Staph aureus is very important for these reasons:
1. S. aureus is contagious:

   Infection is spread at milking time when S. aureus-contaminated milk from an infected gland comes in contact with an uninfected gland, and the bacteria penetrate the teat canal.

   The major reservoirs of S. aureus are infected udders, teat canals, and teat lesions, but these bacteria also have been found on teat skin, muzzles, and nostrils. The bacteria are spread to uninfected quarters by teat cup liners, milkers’ hands, washcloths, and flies. Staphylococci do not persist on healthy teat skin but readily colonize damaged skin and teat lesions.

2. S. aureus lowers milk production and effects milk quality:

   S. aureus bacteria produce toxins that destroy cell membranes and can directly damage milk-producing tissue. Milk with high level of S. aureus can have offensive flavors and texture, but often times, Staph is not noticeable in milk flavor.

3. S. aureus affects your replacement herd:

   Heifers can become infected from their mother during pregnancy and calving. Heifer calves may colonize S. aureus in their milk-producing tissue because calves fed colostrum from an S. aureus infected dam is likely to become infected, therefore feeding calves’ milk from an infected cow is not recommended.

*How is S. aureus detected?*

At Organic Pastures Dairy, we send a milk culture for every cow a few days after calving to check for the presence of pathogens (Staph aureus, Strep ag., C.N.S., Coliform, Strep uberis, and other bacteria or fungi). The culture is done by our Veterinarian for a reasonable price. We are careful to disinfect the milk claw before sharing with other cows until the culture results are confirmed free of pathogens. It is important to follow proper steps when collecting milk samples for microbial testing to ensure the sample is not contaminated, which would make it useless. This website is helpful. [http://articles.extension.org/pages/28320/collection-and-preparation-of-milk-samples-for-microbiological-culturing](http://articles.extension.org/pages/28320/collection-and-preparation-of-milk-samples-for-microbiological-culturing)

Elevated Somatic Cells Counts can indicate the presence of S. aureus so culturing any cows with an SCC greater than 400,000 is recommended. A cow-side SCC test such as
The California Mastitis Test (CMT) or Portacheck can be used to identify quarters for culturing. *It is important to identify infections early in order to prevent spread to other animals.*

In addition, an elevated Standard Plate Count, despite proper cooling and milk handing processes, can indicate an issue with mastitis, and warrants additional culturing to determine if *S. Aureus* is the cause.

**How do you prevent *S. aureus***?

The most effective way to prevent *S. aureus* infections is to cull any cow who tests positive cows from the herd. If replacement heifers are needed, they should only be purchased from farms that practice proper calf management, and do not feed milk from *S. aureus* dams to calves. Dams should be confirmed to be free of *S. aureus* post-calving, as the bacteria can be transmitted to calves during pregnancy and birth.

While culling positive cows is important for controlling the spread of *S. aureus*, it is impossible to determine that your remaining herd is completely free of *S. aureus*. Positive cows may not be shedding at the time of screening. Therefore, it is also important to eliminate conditions that expose teat ends to bacteria and reduce the possibility of spread from cow to cow – many of which are discussed below.

1. Hygienic procedures
   a. Milkers should always wear gloves and change them frequently, especially when dirty or after stripping an animal known or suspected to be infected. It is recommended to forestrip five squirts of milk from each quarter and check for abnormal milk or flakes.
   b. Dirt should be brushed off teats with the use of a dry, single-use towel. Water should not be used as part of any milking procedures, even if a sanitizing solution is added. Sanitizers do not maintain activity throughout a milking, and water can introduce pathogens that are very difficult to cure.
   c. A commercially available pre-dip (or homeopathic pre-dip) should be applied with a dipper or cup and given 30 seconds of contact time. Sprayers can be used, but proper coverage is difficult to attain, especially on the teats furthest from the milker. Foamers are also commonly used, but caution must be taken to ensure that adequate parts per million of the active ingredient reach the teat end and teat skin.
d. A separate paper or cloth towel should be used to dry teats and scrub teats five times or for 20 seconds (Rasmussen et al. 1992). Towels must not be used on more than one cow.

e. Milking units should be attached 90 seconds after first tactile stimulation (stripping or wiping, whichever comes first).

f. Teat ends should be examined for evidence of chapping, cracks, or lesions, which may harbor mastitis-causing bacteria.

g. An effective post-milking teat dip should be applied after milking, ensuring that the entire barrel of each teat is covered. At the end of each milking any teat dip left in the dip cup should be discarded and cups should be rinsed with water and allowed to dry.

2. Milk S. aureus-infected cows separately and last

3. Milking equipment should be properly maintained

Staphylococcus aureus infections can occur during milking when organisms penetrate the teat canal. Irregular vacuum fluctuations caused by liner slips, flooded lines, etc., may cause a backflow of milk against the teat end. With sufficient force, bacteria can be propelled up into the teat canal and teat cistern. Therefore, properly functioning equipment is essential in preventing new infections.

Conditions that are associated with high-impact force against the teat end – including liner slips, excessive temporary vacuum losses, low vacuum reserve, inefficient vacuum regulation, an abrupt milking unit removal – should be minimized. Teat cups should not be removed from the cow until the vacuum has been shut off. Research has shown that slipping teat cup liners may cause 10 to 15 percent of new mastitis infections. Liner slippage early in milking often results from a low vacuum level, blocked air vents, or restrictions in the short milk tube. Liner slippage late in milking is commonly caused by poor cluster alignment, uneven weight distribution in the cluster, or poor liner condition. Incomplete milking can be caused by poor type or condition of liner, a mismatch between claw inlet and short milk tube, clusters that are too light, clusters that do not hang evenly under the udder, or high milking-vacuum levels (Halleron 1997).

Regular, preventive maintenance is essential for milk quality and mastitis prevention. Vacuum controllers (regulators), pulsators, and air filters need to be
cleaned monthly. All rubber components must be changed according to the manufacturer’s instructions. Rubber that is cracked, flattened, or otherwise deteriorated should be replaced even if the recommended life of the product has not been reached. The milking system should be evaluated every three months or 500 hours of operation, to include the following tests: vacuum reserve, vacuum level, vacuum recovery time, vacuum regulator response, pulsator graphs, and stray voltage. Many of these tests need to be conducted during milking time and not between milkings.

4. Precautions at calving

Many mastitis infections (not specifically S. aureus) originate in the peripartum period. A well-drained pasture is preferred as a calving area, with no access to ponds, swampy areas, or drainage ditches. A clover-grass sod is desired, in contrast to fescue or muddy, beaten-up lots. Lots and pastures should be managed to prevent muddy areas where cattle would lie down. Filthy, damp, or muddy pens, lots, or pastures continually expose the teat end to a barrage of bacteria. Pens should be well-bedded, clean, dry, and comfortable. Selenium-vitamin E supplementation or injections at two to three weeks before expected calving have been shown to reduce mastitis after calving. Vitamin E levels of 1,000 IU/day during the dry period and 500 IU/day during lactation are recommended by the National Research Council. Other minerals and vitamins shown to reduce the incidence of mastitis include vitamin A/ beta-carotene, copper, and zinc. By testing animals to identify micronutrient deficiencies, providing a balanced ration, avoiding poorly fermented silages, and including dietary supplementation of vitamin E and selenium, proper nutrition can be maintained to reduce incidence of mastitis.

5. Have a fly management to prevent biting on teat ends and the spread of infection.

*Do cows with S. aureus have a better chance in a small herd?*

No they don’t. If anything, a cow with S. aureus in a small herd has a greater potential for negatively effecting raw milk flavor and quality since small herds often bottle milk from a single cow individually, without bulk-tank dilution.
What do you do with your *S. aureus* cow?

As difficult as it is, all of our Staph cows are immediately segregated from the herd and culled as soon as possible. They are milked last, the milking equipment is carefully sanitized before used on other cows, and the milk is discarded.

*S. Aureus cows can sometimes be re-purposed as nurse cows on beef cattle ranches where they are not used to raise replacement heifers, as an alternative to culling.*

Is it safe to drink milk from *S. aureus* infected milk?

I am not an expert but I have read different opinions on this issue. Some say it may cause illness in humans, others say it is highly unlikely. As a raw milk producer, who sells milk to people outside my family, I would not risk the potential for illness. The negative consequences to my herd health are a top priority. Cows known to be *S. aureus* positive simply have no place in a raw milk herd.

Reference

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Staphylococcus aureus Mastitis: Cause, Detection, and Control https://pubs.ext.vt.edu/404/404-229/404-229.html