

# Staphylococcus aureus

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## Background:

Staphylococcus is a general name for a class of bacteria capable of causing mastitis (inflammation of the udder) in dairy cows. Mastitis caused by *S. aureus* is described as contagious. Surveys have reported isolating *Staphylococcus aureus* from bulk tank milk cultures in 43 to 92 percent of sampled herds. Clinical signs can range from abnormal milk to gangrenous mastitis. These pathogens may cause periodic episodes of mild to moderate mastitis that seem to resolve with or without treatment.

However, bacteriological cure of the affected quarter is rarely achieved. Infections are spread from infected cows to non-infected cows during milking via milking machines, milkers' hands, and teat cleaning materials such as towels used on more than one cow. Contact with milk secretions in stalls and bedded packs are a potential point of infection. Flies can serve as vectors of *S. aureus*, transferring it from one animal to another.

*Staphylococcus aureus* can be isolated from many body sites, including the teat skin and nose. Once *S. aureus* gets into the mammary gland, it invades deep into secretory cells and ductal tissue. Staph infections produce scar tissue and cause abscesses in the udder. This tissue destruction limits an infected quarter's ability to produce milk and to respond to treatment efforts.

## Symptoms:

Herds with moderate to high levels of *S. aureus* commonly have elevated bulk tank somatic cell counts in the 300,000 to 750,000 cells/ml range. The percent of cows infected significantly increases with age and days in milk. This is because the milking process provides an opportunity to spread the infection. A majority of infected quarters at dry off will remain infected into the next lactation. The relapse rate of cows treated during lactation is high.

Cows infected with *S. aureus* may have multiple clinical episodes during the same lactation. The milk from infected cows may appear normal or be off-colored with flakes and clots. Somatic cell counts often are normal (<200,000 cells/ml) or slightly elevated for much of the lactation. Chronically infected cows may have abscesses or "knots" in their quarters that can be felt when the udder is milked out. During clinical episodes, quarters can show mild to moderate swelling and their somatic cell value can rise above 1,000,000 cells/ml. Rarely, a cow or heifer will develop gangrene or "blue bag" from a *S. aureus* infection. Infections can occur in heifers and at any time during lactation.



**Diagnosis:**

Culture the bulk tank to determine if *S. aureus* infections are present in the herd. Regularly monitor the bulk tank because the presence of *S. aureus* is variable. The frequency of bulk tank culturing should depend on the herd size and whether the farm is purchasing new animals. If *S. aureus* is present in the bulk tank, culture individual cows with somatic cell counts greater than 200,000 cells/ml (DHI linear scores > 4.0.)

*S. aureus* infections are characterized by intermittent shedding. Bacteria are not always shed in the milk at levels detectable by bacteriological culturing. Therefore, negative culture results do not guarantee that a cow is free of infection. To increase the probability of identifying all the *S. aureus* cows in the herd, consider the following recommendations:

Inform the bacteriological laboratory you are screening for *S. aureus* infected cows or quarters because the lab will use a larger amount of milk for each sample. Freeze samples after collection. Consider sending quarter rather than composite samples.

Finally, the likelihood of correctly identifying *S. aureus* infected cows is improved by sending in multiple samples collected from different milkings. Correct identification increases from about 70 percent to 90 percent by submitting at least three samples taken at different milkings.

**Treatment:**

It's not usually cost-effective to treat for *S. aureus* during lactation because reported cure rates commonly are around 25 percent. However, reported cure rates do vary considerably (5 to 70%). Differences in *S. aureus* strains probably contribute to this discrepancy. Treatment is more likely to work in the following situations: new infections (less than two weeks), single quarter infections, first lactation animals and in front quarters. Extended duration intramammary therapy may further improve cure rates. Consult with your herd veterinarian to design a treatment protocol and decision tree for your farm.



## Preventive Management:

The “five-point plan” for mastitis control developed in the 1970’s is a proven and effective method for controlling contagious mastitis caused by *S. aureus*. The five points are:

1. Post milking teat disinfection.
2. Dry cow treatment with antibiotics on all quarters of all cows.
3. Prompt treatment of clinical case of mastitis with antibiotics.
4. Regular milking system analysis and maintenance.
5. Culling chronically infected cows.

Regular bulk tank culturing will provide an early warning if *S. aureus* infected cows have entered the herd. Culturing all new arrivals to the herd is also a good biosecurity practice to limit the damage of introducing this mastitis pathogen to your herd.

Milker training is very important in contagious mastitis control. The milkers need to understand how the bacteria is spread in order to ensure that their milking habits are not contributing to the problem. The use of latex or nitrile gloves allows the milkers to easily disinfect their hands. Proper milking procedures, employee training and teat dipping can reduce the spread of *S. aureus* within your herd. Use of a single-use paper or cloth towels during the milking preparation procedure is recommended.

Separating the infected cows from the uninfected cows can help reduce the rate of spread of this mastitis causing pathogen. Grouping infected cows together and milking those animals last keeps milk from infected cows away from uninfected cows. Another technique is designating separate milking unit(s) only for infected cows. If you must use the same milking units for both infected and uninfected cows, then backflush between cows.

Herds grouping on *S. aureus* status should develop a continual, systematic culturing program to insure that infected cows remain separate from the uninfected group. Examples of these programs include: culturing all cows after they freshen, monthly examination of somatic cell records and culturing of suspect cows, culturing clinical cases, or periodic culturing of the uninfected group. Your herd veterinarian can help you design a program that will work for your farm.

House calves individually and avoid feeding waste milk from treated cows. Properly pasteurized waste milk will reduce the amount of *S. aureus* below infective levels.

