



Coagulase-negative Staphylococci and *Staphylococcus hyicus*: A Practical Summary for Controlling Mastitis

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Coagulase-negative staphylococci (CNS) and *Staphylococcus hyicus* are mastitis-causing pathogens that originate from skin flora and are generally considered to be the most commonly isolated pathogens in well-managed herds. A prevalence of 10 to 15 percent infected quarters is common (Hogan et al. 1999), but an intramammary infection rate as high as 43 percent of infected quarters is reported in some studies (Dufour et al. 2012).

Surprisingly, CNS infections only represent 10 percent of all clinical cases of mastitis. As a result, CNS infections are usually mild and subclinical, that will not create a visible change in the milk's appearance, but will still cause a two- to three-fold increase in somatic cell count. While many CNS infections are short-lived, certain species of CNS, such as *Staphylococcus chromogenes* and *Staphylococcus hyicus*, persist for longer periods of time (Hogan et al. 1999).

All staphylococci bacteria are Gram-positive and similar in structure to *Streptococcus* spp. Milk culturing laboratories can distinguish CNS and *S. hyicus* from other staphylococci using a coagulase test. Organisms with characteristics of staphylococci and a negative coagulase test are called "coagulase-negative staphylococci," while those that display a positive coagulase test are considered "*S. aureus*." The coagulase test for *S. hyicus* is characterized as negative at four hours and positive at 18 hours.

Where are these organisms found?

Reservoirs of CNS and *S. hyicus* can be found as part of the normal skin flora and occasionally in the environment.

How does CNS and *S. hyicus* spread to the mammary gland?

The spread of CNS and *S. hyicus* can occur from skin sources. During milking, irregular vacuum fluctuations can force bacteria up into the teat canal, leading to the potential for new infection.

How can you prevent and control mastitis caused by CNS and *S. hyicus*?

Because CNS and *Staphylococcus hyicus* originate from skin sources, proper milking procedures — including the use of effective post-milking teat disinfectants and milking clean, dry teats — will help to reduce the number of new infections.

Prior to milking, teats should be cleaned with an effective pre-milking teat disinfectant. The pre-milking teat disinfectant should remain on the teats for 30 seconds; afterward, the teats should be thoroughly dried with a single-use paper or cloth towel. After unit detachment, the application of a proven post-milking teat disinfectant should be applied with coverage over at least two-thirds of the teat barrel.

Lastly, broad-spectrum dry cow therapy is effective in controlling and treating CNS and *S. hyicus* mastitis (Hogan et al. 1999).

When are CNS and *S. hyicus* mastitis infections most likely to occur?

New infections are most likely to occur in first lactation animals after calving for the first two weeks of lactation. Infection is most likely to occur in mature cows (two or more lactations) towards the end of lactation (Pyörälä and Taponen 2009).

How likely are CNS and *S. hyicus* to be cured?

Treating subclinical cases of CNS and *S. hyicus* is not beneficial. However, in the event of a clinical case, treatment with a broad-spectrum antibiotic is appropriate. Lastly, dry cow therapy should eliminate approximately 90 percent of all cases of CNS and *S. hyicus* (Hogan et al. 1999).

Quick Notes

- CNS and *S. hyicus* are part of the skin flora and are the most commonly isolated mastitis-causing pathogens.
- Most cases of CNS are mild, subclinical infections that result in a two- to three-fold increase in somatic cell count.
- New infections are typically seen during the first two weeks of lactation in first lactation cows and at the end of lactation in mature cows.
- Broad-spectrum antibiotic therapy is appropriate for clinical cases.
- Use of an effective post-milking teat disinfectants and dry cow therapy will help to control these pathogens.

References

- Dufour, S., I. R. Dohoo, H. W. Barkema, L. DesCoteaux, T. J. DeVries, K. K. Reyher, J.-P. Roy, and D. T. Scholl. 2012. Epidemiology of Coagulase-Negative Staphylococci Intramammary Infection in Dairy Cattle and the Effect of Bacteriological Culture Misclassification. *Journal of Dairy Science* 95, 3110-3124.
- Hogan, J. S., R. N. Gonzalez, R. J. Harmon, S. C. Nickerson, S. P. Oliver, J. W. Pankey, and K. L. Smith. 1999. **Laboratory Handbook on Bovine Mastitis**. Madison, WI: National Mastitis Council.
- Pyörälä, S., and S. Taponen. 2009. Coagulase-Negative Staphylococci — Emerging Mastitis Pathogens. *Veterinary Microbiology* 134, 3-8.

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