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Mastitis: *Staphylococcus aureus* Diagnostic Aid

Background

Staphylococcus aureus is a coagulase-positive bacteria, which is a general name for a class of bacteria that are small, round, and gram-positive. *Staph. aureus* is a contagious pathogen, which is transmitted from infected glands or teats during the milking process. It is a major cause of chronic or recurring clinical mastitis infections in dairy cattle and is believed to be the most significant contagious mastitis pathogen.

Source and Transmission

Staph. aureus is a commensal organism of the skin and mucosal surfaces, It is also found in the environment. Infected cows, either purchased as new additions to the herd or chronically infected, are the major source for new infections. Heifers that are persistently colonized are the primary reservoir. Fresh heifers with colonized body sites can be a source of *Staph. aureus* when they are introduced into the herd. Chapped, damaged, or broken skin greatly increases the likelihood of *Staph. aureus* infections. The primary mode of transmission is from cow-to-cow during milking, particularly if poor hygiene is a factor and if milking gloves are not worn. Flies have also been implicated in the transmission of *Staph. aureus*. Infections increase with age and days of milking.

Disease

Staph. aureus infections are typically chronic and subclinical with periodic, recurring mild or moderate clinical signs. There is a positive correlation between bacterial count and somatic cell count (SCC), when *Streptococcus agalactiae* is not present, but changes in the SCC may be intermittent as bacteria are shed variably and often in low numbers. Chronically infected cows will have an increased SCC and decreased milk production. *Staph. aureus* may induce gangrenous mastitis that will produce necrosis of the udder tissue and potentially cause a systemic infection that could lead to death of the animal. Abscess formation and tissue damage can occur in chronically infected cattle. Abscesses within the udder tissue can rupture and cause reinfection. If abscesses and scar tissue form, permanent damage may occur, reducing milk production and hampering antimicrobial treatment.

Treatment

The expected cure rate for *Staph. aureus* infections during lactation is 20%. Higher cure rates can be expected in younger animals with only one quarter infected and with a lower SCC at the time of infection. These animals are not likely to be chronically infected. Extended antimicrobial therapy or combination therapy can increase success rates up to 30%, but all cow factors should be considered when attempting treatment. Dry cow therapy may also improve success rates.

Prevention and Control

Treatment options for *Staph. aureus* infections can be difficult and infected animals should be identified for their likelihood of cure. Identifying and eliminating cows through strategic treatment or culling is important for controlling disease. Using herd records to isolate cows with high SCCs or recurrent clinical mastitis is necessary to target infected cattle for testing. Herds with greater than 50% of positive milk cultures would indicate a significant problem. It is more common for herds to have less than 30% of milk samples that are positive for *Staph. aureus*. Cows that have an SCC of greater than 400,000, but test negative for *Staph. aureus* should be retested within 2-4 weeks due to sporadic shedding of the bacterium. Frequent samples provide a better idea of the infection rate.

Prevention is achieved by way of a good, long-term *Staph. aureus* management program and is more successful than antimicrobial therapy. Mastitis vaccination programs are currently not very efficacious against *Staph. aureus* infections. *Staph. aureus* infections are caused by contamination during the milking process in many cases, which is why excellent pre- and post-milking teat sanitation, milking hygiene including wearing gloves, using single-use towels, and maintaining clean milking equipment are necessary for reducing transmission of this and many other contagious pathogens. All cows should be segregated and a plan for housing and milking should be developed. Purchasing animals should be avoided until prevention practices are in place, and all purchased animals should be tested for contagious pathogens and quarantined until tests are performed. As a screening tool, regular bulk tank cultures are valuable, and mastitis milk cultures for those who do not respond to therapy are necessary.

References

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