

Field Evaluation of the Finnzyme Mastitis Pathogen Detection System for Cows and Quarters Infected with *Staphylococcus aureus*

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Introduction

Staphylococcus aureus, a contagious pathogen, is one of the most important etiological agents of chronic, clinical and subclinical mastitis (Studer *et al*, 2008). *S. aureus* damages milk-producing tissue and significantly decreases milk production. Since damage is minimal and reversible in early infection and this infection is contagious, it would be advantageous to have a reliable and sensitive detection system in place to identify early infections in order that treatment and management to prevent spread could occur. Subclinical *S. aureus* infections are usually associated with elevated somatic cell counts (SCC) and confirmed by bacteriologic culture. Some significant limitations to the traditional culture-based systems for identifying *S. aureus* exist. Sears *et al* (1990) determined that even under ideal conditions the sensitivity of culturing quarter samples only reached 74.5%. Also, due to the cyclical nature of the shedding of *S. aureus*, the culture of samples collected over multiple days is necessary to conclusively establish the *S. aureus* infection status of a quarter. A real-time PCR-based reagent kit for bovine mastitis has been developed by Finnzymes. While more expensive than traditional culture-based systems, this system has a distinct advantage in that it can be applied to metered milk samples collected for general milk recording purposes by most Dairy Herd Improvement (DHI) organizations. The Finnzymes test system has been shown to be accurate in the detection of most mastitis-associated pathogens in laboratory testing. It has been proposed that this PCR-based test may be more convenient and more accurate than traditional culture-based systems in identifying cows with subclinical *S. aureus* infections. The first objective of this pilot project is to measure the agreement between a PCR-based diagnostic system and a culture-based system for identifying *S. aureus* infected cows and quarters. The second objective is to determine the cause(s) of disagreement that may occur between the two test systems.

Materials and Methods

Approximately 50 lactating dairy cows from two local dairy herds have been selected to participate in this

pilot study. The first group consists of ten lactating cows from a herd known to have a very low prevalence of *S. aureus* mastitis, based on a history of repeated quarter cultures. The second group consists of 38 lactating dairy cows in a herd currently in the midst of a *S. aureus* mastitis outbreak, also with a fairly extensive quarter culture history. Sampling will be done at both the quarter and cow (composite) level. Aseptically collected quarter samples will be submitted for bacteriological culture, PCR analysis and SCC determination. A mixed composite sample from each cow will also be cultured and analyzed with PCR. Finally, a metered sample from each cow will be collected and submitted for SCC and PCR testing. Bacteriologic culture will be performed at the diagnostic lab following established diagnostic criteria. The results of these tests will be used to classify quarters and cows as either *S. aureus* positive or negative. The Kappa statistic will be calculated to determine agreement between the PCR-based and culture-based systems. For those cases in which there is disagreement, follow-up will include repeated culture and investigation of possible routes of contamination, including carryover of milk in the metered samples.

Results

This pilot study will be completed in early July and results and conclusions will be available at that time.

Significance

It is postulated that the PCR mastitis detection system will provide a highly sensitive, quantitative method for detection of *S. aureus*. If *S. aureus* can be detected at meaningful levels *via* PCR from composite metered samples, this would offer a reliable and quantitative test with a straightforward sampling protocol that could be made available to producers through a DHI program. The results of this test would facilitate decision making regarding milking cow management.