

Evaluating quarter versus composite milk sampling for detection of subclinical intramammary infections

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Introduction

The objective of our study was to evaluate quarter versus composite milk sampling for detection of subclinical intramammary infections. Mastitis, infection and inflammation of the mammary gland, is the most costly disease facing the dairy industry today, with nearly two-thirds of the cost attributed to subclinical infections. Additionally, as the number one reason for antibiotic usage on farm, improvements must be made regarding the identification and treatment of this disease. Screening for subclinical mastitis has routinely been done using total milk somatic cell counts at the composite level, where milk from all four quarters is pooled into a single vial. This sampling technique is convenient and economical, however little research has been done on its efficacy in identifying subclinically infected animals as compared to quarter sampling.

Materials and Methods

In our study, milk samples were collected from 91 Holstein cows ranging from 78 to 360 d in milk residing on one farm in central New York. All cows had to have 4 milking quarters and could not have had a clinical mastitis event \leq 14 d prior to time of sampling. All lactations were included in this study and ranged from 1st ($n=25$) to 7th lactation ($n=1$). Milk samples were collected aseptically prior to milking, following normal milking preparation. For quarter level samples, approximately 120 mL of milk were collected from each quarter. Equal 20 mL aliquots of milk from each quarter were then pooled to create composites samples for each cow enrolled. A total of 364 quarter samples were submitted for somatic cell count analysis at Dairy One (Ithaca, NY) and aerobic culture at Quality Milk Production Services (Ithaca, NY). Additionally, 91 composite samples were submitted for somatic cell count analysis.

Results

Of the 364 quarter samples, 6 quarter samples were considered contaminated. Culture and somatic cell count data from these animals were not used for analysis result-

ing in a final total of 340 quarter samples and 85 composite samples. On the quarter level, 42 samples had somatic cell counts \geq 200,000 cells/mL and 39 were found to be culture positive (quarter level subclinical intramammary infection prevalence: 11.5%). On the composite level, 18 samples had somatic cell counts \geq 200,000 cells/mL and 26 were culture positive (composite level subclinical intramammary infection prevalence: 30.6%). Cows were considered culture positive on the composite level if at least one quarter cultured positive. Sensitivity and specificity of quarter and composite sample somatic cell counts with a culture positive diagnosis were calculated for the following somatic cell count cut points: 150,000 cells/mL, 200,000 cells/mL, 250,000 cells/mL, and 300,000 cells/mL. For quarter samples at the 200,000 cells/mL cut point, sensitivity was 30.8% and specificity was 90%. For composite samples at the 200,000 cells/mL cut point, sensitivity 34.6% and specificity was 84.7%. Positive and negative predictive values were also calculated for the same cut points. For quarter samples at the 200,000 cells/mL cut point, the positive and negative predictive values were 28.6% and 90.9%, respectively. And for composite samples at the 200,000 cells/mL cut point, the positive and negative predictive values were 50.0% and 74.6%, respectively.

Significance

In our study, low sensitivities and positive predictive values for both quarter and composite samples at all cut points indicate that total somatic cell counts may not be the best screening tool for identifying subclinical intramammary infections. This is due to a high proportion of false negative tests in addition to low disease prevalence. However, as both quarter and composite samples showed similar and strong specificities, we can be confident those cows testing positive are truly positive. Since the positive predictive values for composite samples were higher in our study, composite samples may still prove beneficial when making treatment decisions for subclinically infected animals.