

Impact of Intramammary Infection of *Serratia* Species on Milk Production, Somatic Cell Count, and Survival in Dairy Cattle

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Introduction

Serratia species are gram-negative bacilli commonly found in soil and water. They have been associated with disease in humans, companion animals, and dairy cattle. In dairy cattle, infections have originated in the dry or lactation period in both small and large herds. The infection can result in clinical and subclinical mastitis. Clinical cases occasionally cause severe symptoms such as hard, hot quarters and systemic signs of illness or death; however, subclinical cases are more common. Individual infections have been reported to last as long as 10 months. Although some reports have suggested successful treatment with neomycin, most studies suggest that a majority of *Serratia* spp infections cure spontaneously. Most studies have described individual herds and focus on the source of the organism. Little is known about the long-term impact of intramammary infections of *Serratia* spp on milk production, milk quality, and herd life of affected cows. The goal of our study is to analyze the effect of *Serratia* spp detection on milk production, somatic cell count (SCC), and survival across multiple herds.

Materials and Methods

Herds were selected based on culture results from voluntary whole herd samplings. Most of the herds requested sampling due to a recent outbreak from a teat disinfectant product. Only herds that participated in the Dairy Herd Improvement (DHI) program, including production records and somatic cell count testing, were included in the study. Reasons for cows leaving the herd were also recorded using the DHI data. Cows that tested with a pure culture result for *Serratia* species were considered case cows. Cows that had a negative culture result on the first whole herd sampling were considered control cows. Linear regression was used to analyze the relationship between case vs control status

and milk production and somatic cell count. Kaplan-Meier product-limit survival distribution was used for survival analysis. To determine whether reasons for culling differed, chi-square analysis was used. Statistical significance was declared at $P < 0.05$.

Results

Twenty herds were included in the analysis. There were 883 control cows and 90 case cows. Milk production was not significantly different between case and control cows. *Serratia* spp positive cows had a significantly higher SCC compared to control cows at the first DHI test day after diagnosis. Linear somatic cell count (LNSCC) was 1.26 units higher in case cows than control cows at the first test day after diagnosis. The least squared means LNSCC in the first 30 days at or after *Serratia* spp positive sample was 6.57 and 4.76 in control cows. *Serratia* spp positive animals had a significantly lower survival rate than control cows. After 365 days, 45% of case cows had been culled or removed from DHI testing while only 30% of control cows had been culled or removed from DHI testing. Of all the reasons listed for culling in the DHI data, only mastitis had a statistically significant difference between case and control cows.

Significance

The multi-herd outbreak provided a unique opportunity to study the organism's effect on SCC, milk production, and survival across herds. *Serratia* spp infection resulted in a chronic infection based on the prolonged increase in SCC; however, despite the prolonged increase, milk production was not significantly different significantly compared to control cows. The prolonged increase in SCC increased culling of cows due to mastitis and served as the driving force of removal of the herd.