

VACCINATING HEIFERS REDUCES STAPH MASTITIS

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INTRODUCTION

Staphylococcus aureus mastitis continues to be a major problem for the dairy industry in Louisiana because it is contagious and difficult to treat with antibiotics, especially during lactation. In some herds, *Staph. aureus* mastitis is prevalent in unbred as well as bred heifers, both of which serve as sources for infecting the older milking cows and spreading udder infections throughout the herd. Such intramammary infections in young dairy animals are associated with local swelling and deformity of the affected quarters and extremely high somatic cell counts (SCC), and they have been found in heifers as early as 6 months of age. Likewise, microscopic analyses of the udder have shown that *Staph. aureus* infections adversely affect the development of the milk-producing tissues of the mammary gland.

Use of nonlactating cow therapy in heifers during pregnancy has been shown to cure 90% to 100% of *Staph. aureus* infections, and treated animals can produce up to 10% more milk during early lactation than untreated herdmates. However, the most efficient means of controlling *Staph. aureus* mastitis is to prevent this disease in young dairy animals by boosting their immune systems through the process of vaccination. The present study was designed to evaluate a commercial *Staph. aureus* vaccine when administered to heifers to determine if the practice was effective in reducing the occurrence and severity of *Staph. aureus* mastitis.

PROCEDURE

Seventy Jersey heifers from the Hill Farm Research Station dairy herd were used. Previous microbiological cultures of mammary secretions from this herd indicated that approximately 30% of these animals were infected with *Staph. aureus* by 15 months of age. At approximately 6 months of age, heifers were processed through a restraining chute to collect sterile quarter mammary secretion samples for microbiological analyses to determine the infection status. In addition, all heifers were bled, and serum samples were stored for subsequent analysis of anti-staphylococcal antibody concentrations. Thirty-five heifers were vaccinated with the commercial vaccine Lysigin® (Boehringer Ingelheim Animal Health, Inc., St. Joseph, MO) using a dose of 5 cc intramuscularly administered in the rear leg muscle. The other 35 heifers served as unvaccinated controls.

Fourteen days after the initial processing, the vaccinated group was again processed through the chute and boosted with Lysigin®. All animals were maintained on pasture and rotated by age group through calving; thus, exposure to *Staph. aureus* was through means naturally occurring on the farm premises. At 6-month intervals after the initiation of the trial, the vaccinated group was again processed through the chute for boosting. At 2-mo intervals after trial initiation and through calving, all heifers were bled and serum samples were stored for determination of anti-staphylococcal antibody titers. Mammary secretion samples were also collected at these times for bacteriological culture and for determination of SCC.

RESULTS

Immunization with Lysigin® did not cause any adverse reactions at the injection site. Minimal swelling was occasionally observed but disappeared within 48 hours of administration. Fever or other systemic reactions to vaccination were not evident. Vaccine efficacy data for *Staph. aureus* are presented in Table 1. The percentage of new *Staph. aureus* infections occurring prior to or during pregnancy was lower in vaccinated heifers (14.3%) compared with controls (25.9%), for a reduction of 44.8%. In addition, the percentage of quarters showing persistent or chronic *Staph. aureus* mastitis during this period, which was defined as infections present at three consecutive 2-month sampling periods, was lower in vaccinated heifers (10.7%) compared with controls (18.8%), for a reduction of 43.1%. The most important finding was that at freshening, the percentage of quarters infected with *Staph. aureus* was lower in vaccinates (8.9%) compared with controls (16.1%), for a reduction of 44.7%. The SCC in vaccinated heifers tended to remain lower than unvaccinated controls after vaccination. At calving, SCC were more than twice as high in control than vaccinated heifers ($4,709 \times 10^3/\text{mL}$ vs. $2,263 \times 10^3/\text{mL}$).

Blood antibody concentrations against *Staph. aureus* tended to remain higher in vaccinated heifers compared with unvaccinated controls throughout the trial. Concentrations in vaccinates were significantly elevated over controls at 2 months after receiving the primary immunization and at 2 months after receiving the second booster injection of vaccine. Antibody concentrations in vaccinates were also elevated over those of controls at calving.

In addition to the reduction observed in *Staph. aureus* IMI, the vaccinated group also experienced a reduction in mastitis caused by *Staphylococcus* species other than *Staph. aureus* commonly referred to as the coagulase-negative staph or CNS (Table 2). The numbers of new IMI caused by *Staph. spp.* occurring during pregnancy were similar for treated vs. control animals; 41% vs. 41.8%. However, the percentage of quarters showing persistent or chronic *Staph. spp.* IMI was lower in vaccinated heifers (30.3%) compared with controls (46.4%), for a reduction of 34.7%. Similarly, at freshening, the percentage of quarters infected with *Staph. spp.* was lower in vaccinates (32.1%) compared with controls (46.4%), for a reduction of 30.8%.

CONCLUSION

Results of the present study demonstrated a positive effect of vaccination in preventing new *Staph. aureus* and *Staph. spp.* infections of the mammary gland as well as in reducing the chronicity of infection when the vaccination program was initiated at an early age in heifers from a herd with a high exposure to these mastitis-causing bacteria.

Table 1. Effect of a *Staphylococcus aureus* bacterin on new intramammary infections (IMI) during pregnancy, chronicity of IMI, and new IMI at freshening in heifers.

Treatment	New IMI during pregnancy (%)	% Reduction	IMI becoming chronic (%)	% Reduction	New IMI at freshening (%)	% Reduction
Vaccinated	14.3	44.8	10.7	43.1	8.9	44.7
Control	25.9		18.8		16.1	

Table 2. Effect of a *Staphylococcus aureus* bacterin on percentage of new IMI caused by *Staphylococcus* spp. other than *Staphylococcus aureus*.

Treatment	New IMI during pregnancy (%)	% Reduction	IMI becoming chronic (%)	% Reduction	New IMI at freshening (%)	% Reduction
Vaccinated	41	0	30.3	34.7	32.1	30.8
Control	41.8		46.4		46.4	