

Field Trial Evaluation of Extended Pirlimycin Therapy With or Without Vaccination for Staphylococcus Aureus Mastitis

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Summary and Implications

One objective of this field investigation was to evaluate the efficacy of extended therapy with pirlimycin hydrochloride with or without vaccination prior and during therapy for *S. aureus* mastitis. 80% of cows and 44% of quarters were infected with *S. aureus*. *S. aureus* infected animals were split into 3 groups with all quarters of all cows treated with extended pirlimycin therapy. One group received a vaccine which had herd autogenous strains (AV), and another group received a new trivalent *S. aureus* vaccine (TV) at 14 and 1.5 days prior to treatment, and 6 days after treatment started. Cure rates at 32 days post treatment were 18%, 38%, and 56% for treatment only (TO), (AV), and (TV) groups. Cure rates at 60 days post treatment were 14%, 33%, and 33%, respectively when all cows were included in the analysis, and 14, 17, and 14%, respectively, when high SCC quarters with no 60 day data were excluded from the analysis. Coupling vaccination to extended therapy was not successful in this herd (compared to other data) possibly due to underlying herd nutrition problems. This study also points out that bacteriological cure must be assessed later (>30-45 days post treatment) and / or quarter SCC should be used when multiple therapy strategies are coupled together.

Introduction

The objectives of this field investigation were to 1) examine mastitis infection dynamics in a herd whose normal herd bulk tank SCC was 400,000 cells/ml but had jumped over 1 million for 2-3 months from Jan.-March; 2) investigate herd management and procedures and develop and prioritize necessary changes for mastitis prevention; and 3) evaluate the efficacy of extended therapy with pirlimycin hydrochloride (Pirsue, Pharmacia/Upjohn., Kalamazoo, MI.) with or without vaccination prior and during therapy for *Staphylococcus aureus* mastitis.

Materials and Methods

The herd (40 Jersey cows) involved in this field trial was in danger of market loss due to high SCC. The normal SCC for the herd was ~ 400,000 (culled 3-6 chronic cows/year to maintain this), but had jumped to > 1 million in January following a day where animals were exposed for 12 hours to sub-zero wind chills (cows exclusively inside all winter usually) due to water problems in the barn. During

the initial visit, milking equipment and procedures were evaluated. All cows were CMT'd with aseptic milk samples taken from quarters that were CMT ≥ 1 , and composite milk samples were collected for subsequent SCC analysis. Initial herd visit information showed cows with a 16 kg/day milk average, in good body condition, and both animals and barn facilities very clean. Animals were housed in a 3 row stanchion barn and milked in a bucket or floor pail milking system utilizing 3 units. Premilking sanitation consisted of washing teats using water with iodine udder wash using a common rag, no drying, and some forestripping although milk was not being evaluated closely. Producer was milking problem cows last but poor visual appraisal meant many were being missed. Teats were dipped post milking with a germicidal teat dip but coverage was only fair. Approximately 25% of cows were showing clinical mastitis signs on initial sampling. Initial aseptic quarter samples from 30 cows showed that 80% of cows and 44% of quarters were infected with *S. aureus*. Milking equipment analysis revealed adequate pump capacity, poor regulator performance (spring loaded regulator), 2 of 3 pulsators not functioning properly, high teat end vacuum (14.2"), and a leak in a seal on the receiver for the milk vacuum transfer system. DHIA data also showed milk urea nitrogen to be very low (< 5 mg/dl) indicating animals being protein starved or deficient. Ration analysis showed that the producer cut back all protein supplements when milk production had dropped and protein from the sole forage source (hay) was not sufficient to meet protein demands. Strategies for preventing new IMI were categorized as immediate (pulsators/ regulator/ teatdip/milking procedures/ better clinical observation), short (nutrition strategies), or long term (heifer evaluation), discussed, and implemented. *S. aureus* infected animals were split into 3 groups, with an attempt to balance the number of infected cows/quarters in each group as well as age and stage of lactation. Quarter milk samples for bacteriology, SCC, and other milk components were taken 3 times prior to treatment and at 14, 32, and 60 days post treatment. All quarters of all cows were treated with pirlimycin (2 total tubes 24 hrs apart, repeated 3 times, with 48 hrs in between treatment series). One group received a vaccine which had herd autogenous strains incorporated, and another group received a new trivalent *S. aureus* vaccine (Dr. Phil Sears- Michigan State Univ.) Cows were vaccinated in the supramammary lymph node area at 14 and 1.5 days prior to treatment, and 6 days after treatment started. All cows received 5 cc Vital E on vaccination days. Blood and milk samples were also collected at the beginning, end and 3 times during the trial for antibody analysis.

Results and Discussion

Cows/quarters with *S. aureus* in the treatment only (TO), autogenous vaccine (AV), and trivalent vaccine (TV) groups were 11/22, 10/21, and 7/18 cows respectfully. Cure rates at 32 and 60 days post treatment are shown in Table 1. Cure rates at 32 days post treatment were 18%, 38%, and 56% for TO, AV, and TV respectively. However, quarter SCC of many cured quarters, especially vaccinated cows, was still high at this time. Cure rates at 60 days post treatment were 14%, 33%, and 33%, respectively when all cows were included in the analysis. Some cows had been dried off or sold so data on 6 vaccinated cows could not be obtained at 60 days, so their 30 day cure rate data was used

even though 30 day quarter SCC was high on many of these quarters. If these high SCC quarters with no 60 day data are excluded from the analysis, 60 day cure rates were 14, 17, and 14%, respectively. Cure rates for all treatments were low compared to other studies. During the trial, milk component analysis showed low milk urea nitrogen across the herd, indicating some protein starving and nutrition problems. This probably played a major role in decreased immunity and ability to cure infections. The data also bear out that sampling cows at 30 days post treatment when both treatment and vaccination are coupled may not be sufficient time to assess true bacterial cure. Potentially waiting until 60 days or using quarter SCC was a better cure indicator.

Table 1. Staphylococcus aureus cure rates for cows receiving pirlimycin extended therapy with or without adjunct vaccination for Staphylococcus aureus

| Group | Quarter cure rates (%) | |
|-------|------------------------|----------------|
| | 32 days | 60 days |
| TO | 18% | 14% |
| AV | 38% * | 33%** (17%)*** |
| TV | 56% * | 33%** (14%)*** |

TO = extended pirlimycin therapy only (EPT); AV = EPT + autogenous vaccine;

TV = EPT + trivalent vaccine

* high % of cured quarters with SCC \geq 500,000 cells/ml

** 6 vaccinated cows culled/dried off so 30 day cure rates used for those cows/quarters

*** Quarter data from 6 vaccinated cows culled/dried off before 60 days post trt. excluded