Using Mastitis Tubes to Improve Cure Rate and Lower SCC

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Introduction

For the dairy producer, it is imperative that the bulk tank somatic cell count (SCC) be kept low (goal: less than 200,000/ml) in order to yield a premium from their co-op. To do so, producers must follow recommended mastitis control programs, which include antimicrobial therapy of clinical mastitis. But what about the subclinical cases that go undetected? This form of mastitis increases the herd SCC and decreases milk quality as well as production, and may be spread from one animal to the next, such as cases of *Staph. aureus*. Therefore, mastitis in all forms should be monitored and potentially treated, after factoring in chances for a successful cure, spread to herd mates, cow history, and stage of lactation.

SCC are a useful means to determine udder health. These white blood cells, if elevated greater than 200,000/ml in individual quarters, are, in all likelihood, defending the mammary gland against mastitis-causing bacteria. The DHIA monitors SCC on composite samples monthly, and the California Mastitis Test (CMT) is a good tool to check the status of individual cow quarters in animals with elevated counts. Culturing will then determine those organisms responsible for the mastitis and whether antimicrobial treatment with mastitis tubes should be advised.

Unfortunately, cure rates after using lactating cow antibiotics following label instructions can be quite low, even with expedient treatment. It is believed that by following conventional label instructions, the number of mastitis tubes used and the duration of antibiotic therapy are insufficient to kill all infecting bacteria. Thus, is off-label extended use of lactating cow therapy under veterinary supervision a viable alternative? And in the end, is it worth the time, treatment cost, and additional loss of milk?

Procedures

The purpose of this trial was to determine whether extended antibiotic therapy would result in a greater cure rate for the mastitis-causing bacteria: *Staph. aureus*, the environmental streps, and the coagulase-negative staphylococci (CNS) compared with conventional label instructions. For example, does label therapy over a shorter dosing period provide enough antibiotics to successfully kill the bacteria in the infected quarter resulting in a successful cure, or is extending the therapeutic period (extended therapy) required to ultimately clear the quarter, thereby reducing SCC and increasing milk quality?

To compare these two treatment regimens, 88 infected quarters, (22 clinical and 66 subclinical cases) of 49 lactating Holsteins were used. After the microbial infection status of a quarter was confirmed, it was treated with one of 5 lactating cow antibiotic products, either 1) per label instructions or 2) via extended therapy by administering one intramammary infusion at each of 6 consecutive milkings, for a total of 6

infusions. The 5 lactating cow products were: Hetacin-K, ToDAY, Amoximast, Spectramast LC, and Pirsue. Quarter milk samples were collected prior to treatment and daily after treatment was initiated for one week and then weekly thereafter through Day 36. Samples were processed for SCC and bacterial infection status, and secretions were categorized as either clinical (clots, flakes, watery or blood in the milk) or subclinical (normal upon appearance). A quarter was determined to be cured if, on Day 36 after treatment, it tested negative for microbial infection. Antibiotic residues were monitored by use of the DSM Delvo test, and days to return to bulk tank and milk production were recorded.

Results and Discussion

Cure rates: Among the 88 infected quarters, 54 were treated with extended therapy, and of these, 37 quarters cured, resulting in a 68.5% cure rate (Figure 1). Treatment per label was assigned to 34 quarters, with 17 curing, providing an overall cure rate of 50.0%. For the different bacterial groups, extended therapy resulted in a 59% cure rate for *Staph. aureus* (16 cured/27 treated), a 74% cure rate for the environmental streptococci (17 cured/23 treated), and a 100% cure rate for the CNS (4 cured/4 treated). Among these bacterial groups, label therapy resulted in a 50% cure rate (Figure 1**).**

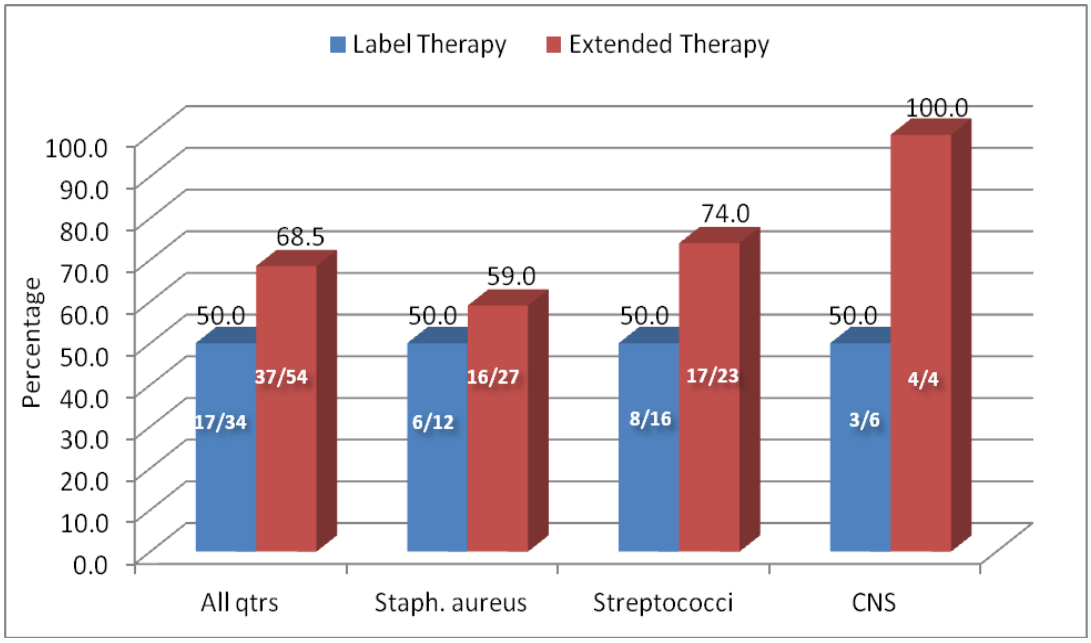

Figure 1. Cure rates[1] for all quarters, *Staph. aureus*, the environmental streptococci, and CNS. [1] = Number of quarters cured divided by the number of quarters treated.

Association of SCC with cure rates: Across all bacterial species (all quarters), those quarters that were destined to cure exhibited an average SCC of 1,320,000/ml just prior to antibiotic treatment, whereas the average SCC of quarters destined to fail was over 2-fold higher at 3,249,000/ml (Figure 2). The respective SCC for individual bacterial species followed the same trend for *Staph. aureus* (1,237,000 vs. 2,648,000/ml), the environmental streptococci (1,266,000 vs. 3,570,000), and CNS (1,458,000 vs. 3,530,000) for quarters destined to cure and fail, respectively. While these counts are excessive, it does

indicate that expedient treatment when SCC are lower (e.g., < 2,000,000/ml) may result in a higher probability of curing an infected quarter.

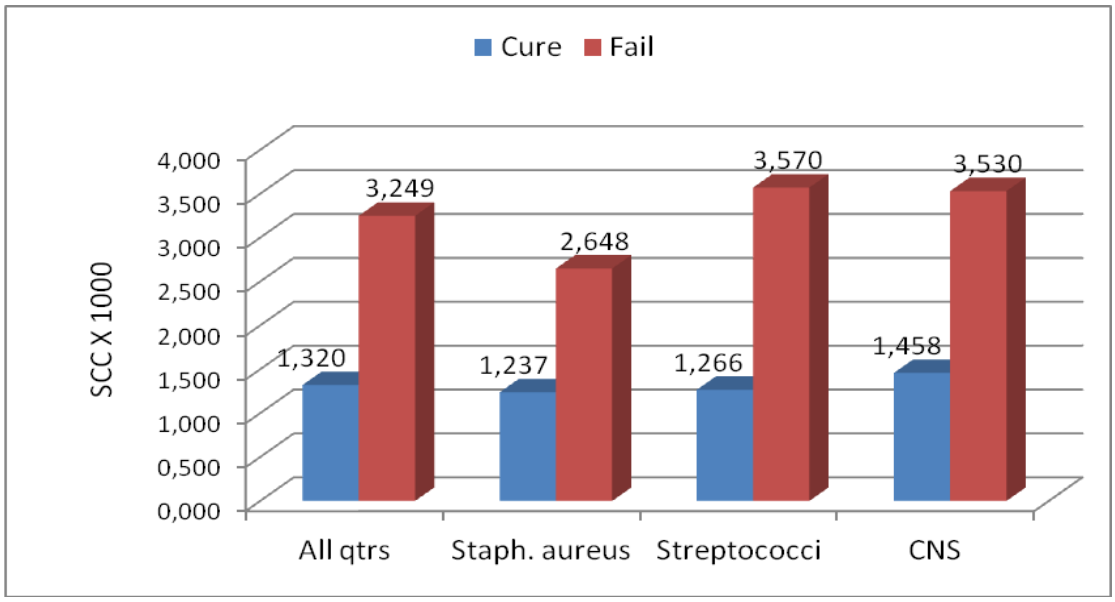

Figure 2. SCC prior to antibiotic treatment for quarters destined to cure or destined to fail.

Interestingly, when SCC data on Day 36 were compared between quarters that cured following label instructions or following extending therapy, extended therapy resulted in lower SCC (261,000/ml) compared with label instructions (564,000/ml) (Figure 3). This suggests that the extended therapy regimen lowered SCC more rapidly than label therapy. In fact, Figure 4 shows that by day 15 after

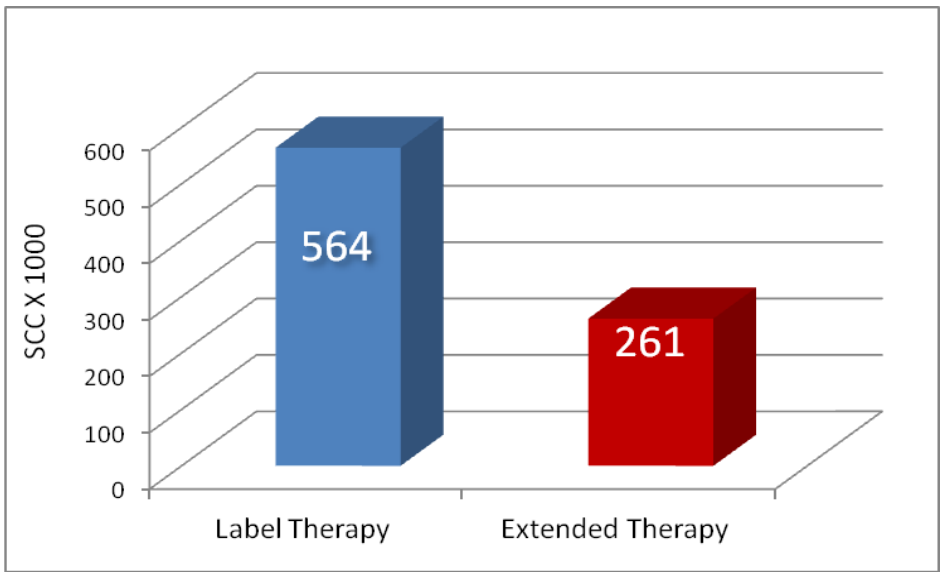

Figure 3. Day 36 post-treatment SCC that cured after Label or Extended Therapy quarters.

treatment, SCC of quarters treated with extended therapy were lower than those treated with label therapy (792,000 vs. 971,000), a trend that continued though Day 36.

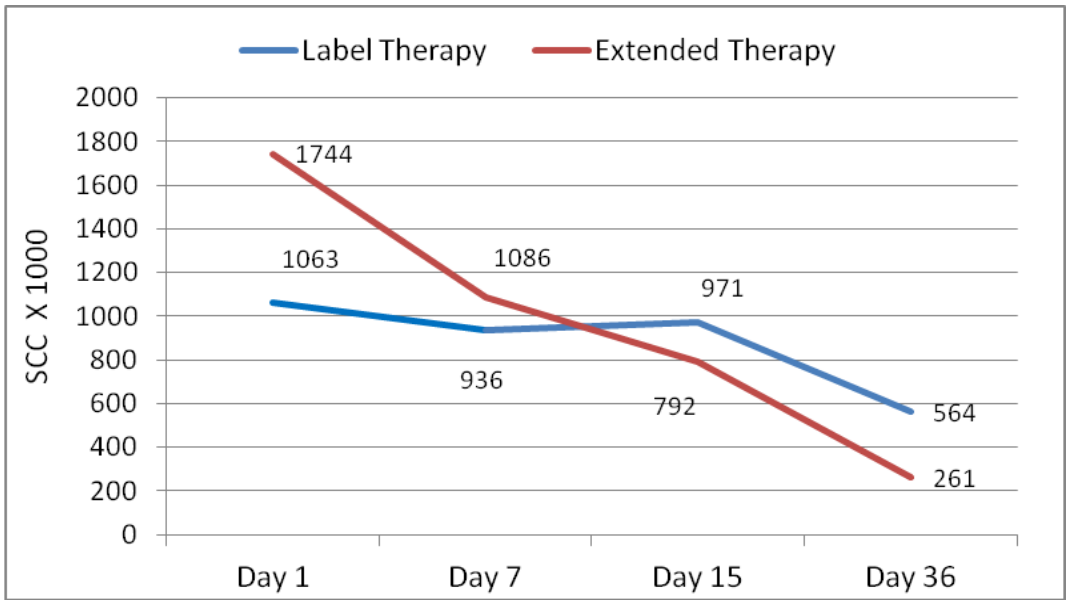

Figure 4. Reduction in SCC using Label or Extended Therapy over time.

Cure rates of subclinical & clinical quarters: Of the 88 quarter samples tested, 75% were subclinical in nature, and the 25% that were classified as clinically infected displayed at least one clinical flare-up during the treatment period. Use of label therapy in subclinically infected quarters resulted in a 50% cure rate, while use of extended therapy resulted in a 79.4% cure rate (Figure 5). Treatment of clinical quarters resulted in a 50% cure whether utilizing label or extended therapy.

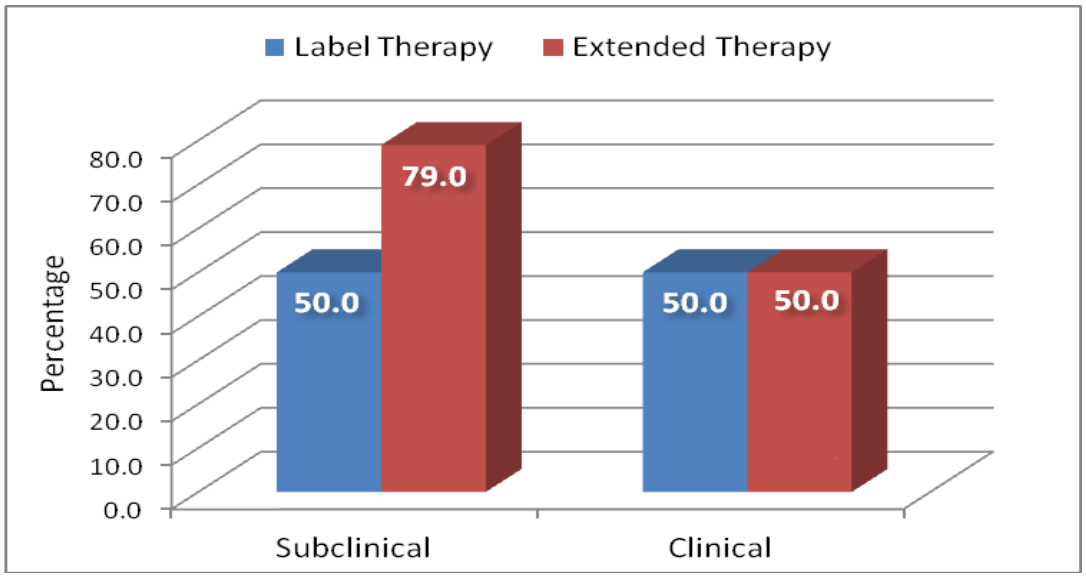

Figure 5. Subclinical & clinical cure rates for Label and Extended Therapy treatments.

Milk production, treatment cost, & milk loss: Milk production was monitored from Day 1 of treatment through Day 36 post treatment. The overall average daily milk production for label treatment over the 36-day period was 68 lb whereas the overall average daily milk production for extended therapy was 62 lb. The reason that milk production during extended therapy was lower (62 lb) was most likely due to the fact that these cows averaged 1.5 lactations and were generally producing lower yields than the more mature cows (3.5 lactations) producing 68 lb that were treated with label therapy.

Label therapy averaged $7.87 for a course of treatment and extended therapy, with its 6 treatments, averaged $20.20. Milk loss was then factored in. Following label instructions, days on treatment plus withdrawal time averaged 8.8 milkings that were discarded, and for extended therapy, 11.6 milkings were discarded. The cost of milk lost was calculated using $25.00 per hundredweight and an average milk weight of 30 lb per milking and found to be $73.87 for label and $107.20 for extended therapy, a difference of $33.33.

Conclusions

Use of antibiotic therapy to control mastitis is usually viewed as a last resort, as current control programs are based on preventing this disease. However, to maintain the herd bulk tank SCC below 200,000/ml, it may be necessary to treat those infected cows that are contributing to elevated SCC if drying off and culling are not options.

Results of antibiotic therapy are generally poor, and unfortunately, producers have at best, a 50:50 chance of successfully curing an infected quarter (50% cure rate). However, findings of this study show that use of extended therapy does improve the overall cure rate to almost 70%, and enhances cure rates for *Staph. aureus*, the environmental streps, as well as the CNS. Moreover, use of extended therapy results in lower SCC at the end of the treatment period than following label instructions (261,000 vs. 564,000/ml) among successfully cured quarters.

Use of extended therapy provided its greatest benefit in treating subclinically infected quarters compared with use of label instructions (~80 vs. 50%) but was not advantageous in treating clinically infected quarters (50 vs. 50%). Regardless of the treatment regimen used, infected quarters that cured had an initial average SCC of 1,320,000/ml, while those that failed had an initial average SCC of 3,250,000/ml, suggesting that if SCC are available, the infected quarters with SCC <2,000,000/ml are more likely to cure than those with an SCC of 2,000,000 to 3,000,000/ml or higher.

Although drug costs ($20.20 vs. $7.87), discarded milk (11.6 vs. 8.8 milkings), and overall costs ($107.20 vs. $73.87) were greater using extended therapy, the improved cure rate and lower SCC at the end of treatment may justify using this therapy regimen when treating subclinical mastitis in attempts to lower herd SCC, depending on market demands.