

Case Study of Prevention and Therapy Strategies for a High Somatic Cell Count Herd

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Summary and Implications

Objectives of this field investigation were to examine the etiology and mastitis infection dynamics in a 60 cow herd in danger of market loss, prioritize and implement prevention strategies, and evaluate the efficacy of recommended and extended therapy (*S. aureus* only) with pirlimycin hydrochloride (Pirsue, Pfizer Animal Health) for gram positive intramammary infections (IMI). Initial percentages (October) of cows (quarters) uninfected or infected with *Staph. aureus*, *Strep. dysgalactiae*, alpha hemolytic strep., and *Strep. uberis*, were 42(65); 33(15%); 20(9); 3(1); and 2(0.4), respectively. Overall streptococci cure rates were 91% and 89% of cows and quarters, respectively and was higher than average published values (65-70%). Cure rates for *Staph. aureus* (extended pirlimycin therapy) were very low at 7% and 4% of cows and quarters, respectively. Overall results showed excellent therapy response for *Strep.* IMI but very low *S. aureus* cure rates. However, some therapy success coupled with critical and mandatory prevention strategies (including a strict milking order) resulted in a 50% decrease in SCC by January and limited new infections. Failure to continue these proper prevention strategies resulted in many new IMI and high herd SCC in February, and demonstrates the mandatory requirements for proper mastitis prevention strategies (including a milking order) in a comprehensive mastitis and milk quality program.

* Lorilee Schultz presented this original field trial and research at the 2005 American Dairy Science Association meeting and was awarded first place in the Undergraduate Original Research Presentation competition.

Objectives

The objectives of this field investigation were to: 1) examine the etiology and mastitis infection dynamics in a 60 cow herd during the fall-winter- spring of 2004-05 whose normal herd bulk tank SCC was 500,000 cells/ml but had jumped to >750,000 cells/ml for 8 months; 2) investigate herd management and procedures and develop and prioritize necessary changes for mastitis prevention; and 3) evaluate the efficacy of recommended and extended therapy with pirlimycin hydrochloride (Pirsue, Pharmacia/Upjohn Co. Kalamazoo, MI) for gram positive intramammary infections (IMI).

Materials and Methods

This case study involved a 60 cow dairy (very high genetic potential) whose DHIA average somatic cell count (SCC) was > 750,000 cells/ml (linear scores 4.3-5.2) for eight months prior to study initiation. Initial study DHI SCC showed a 948,000 herd average SCC with 56% of the cows >300,000 (36% >1,130,000). Seventy-five percent of first lactation animals had SCC < 140,000 and represented an excellent uninfected nucleus for the herd. Major priorities were to assess the initial infection status of all animals, keep milk sold under the legal SCC limit, prevent new infections, and reduce SCC through successful targeted therapy.

A California mastitis test was conducted and aseptic quarter milk samples on every quarter of every cow were obtained in late October (first screen). All samples were cultured according to NMC protocols and MIC's were conducted on representative organism samples. Based on these initial cultures, a new milking order was immediately established to stop infection spread. Uninfected cows were milked first, followed by *Strep.*-infected cows, with *Staph. aureus* cows milked last. Only one new infection (based on DHI-SCC) occurred before the therapy trial began 8 weeks later, attesting to the compliance and success of a defined milking order. Within 4 weeks of initial sampling, an on-site herd visit at milking time was conducted which included obtaining a second set of aseptic quarter milk samples. Major areas for observation and evaluation were teat health assessment, milking procedures, milking equipment, cow environment, and animal nutrition and health.

Average teat score was 2.4 (1=normal, 2=smooth ring, 3=rough ring, 4 = very rough ring). Although many teats were normal and healthy, there was evidence of some cracking and hyperkeratosis as a result of overmilking, and may account for *Strep. dysgalactiae* and *Staph. aureus* being present in the herd.

Milking procedures showed animals being washed with individual towels dipped in water containing a germicide, no drying or forestripping, and fair teat coverage with post milking teat dip. Cows were not receiving adequate stimulation and excessive milk hose manipulation and holding pressure on units resulted in delayed milk let downs and excessive overmilking, respectively. Overall milking procedures evaluation revealed inadequate udder stimulation, no drying of teats, and improper prep lag timing. Based on these observations, corrective milking procedures were instituted using a 2 cow- 6 step coordinated approach.

Milking system was sized and arranged properly with adequate vacuum pump capacity and reserve, excellent pulsator function, and proper line and milking vacuums. Regulator only had 80% efficiency due to dirty air dumps,

and monthly corrective cleaning steps were instituted. Excessive time at high teat end vacuum was experienced at end of milking due to improper stimulation / overmilking.

Cow environment was rated excellent. Tie stalls were deep bedded with fresh straw and new freestalls were bedded with fresh sand. Over 95% of animas scored cleanliness 1 or 2 (1= very clean, 5 = very dirty) with only a few 3's. Hocks were scored on a 1-5 scale (1= excellent, 5 = abscessed) and ranged from 1-3 with most cows ≤ 2 . Body condition score averaged 3 and was very consistent and appropriate across the herd.

MIC data showed all organisms showing excellent sensitivity to pirlimycin so it was chosen as the antibiotic for treatment. Nine Strep. cows (20 quarters) were treated using recommended pirlimycin therapy (one 10 ml plastet 50 mg pirlimycin HCl (Pirsue, Pfizer, Inc.)) at 24-hour intervals for two days. Eleven Staph. aureus cows (19 quarters) were treated using an extended pirlimycin therapy (one plastet every 24 hours for eight days). 7 cows were dried off and 2 were sold for unrelated reasons. Individual cow SCC were run 28 days post treatment and the herd was visited 40 days post treatment to obtain aseptic quarter milk samples and assess prevention changes and therapy results.

Results

Herd culture results prior to the therapy trial are shown in Table 1. Percentages of cows (quarters) uninfected or infected with Staph. aureus, Strep. dysgalactiae, alpha hemolytic strep., and Strep. uberis, were 42(65); 33(15%); 20(9); 3(1); and 2(0.4), respectively. Therapy cure rates for different organisms are shown in Table 2. Overall streptococci cure rates were 91% and 89% of cows and quarters, respectively and was higher than average

published values (65-70%). Cure rates for Staph. aureus (extended pirlimycin therapy) were very low at 7% and 4% of cows and quarters, respectively. This is lower than average published values although there is tremendous within and across herd variability due to duration and SCC level of existing infected quarter, as well as other herd stressor factors. Many of the animals in this herd had a long chronic high SCC history. Successful therapy of Strep. IMI coupled with prevention of new infections through a strict milking order and other milking changes resulted in a January SCC of 484,000 but still showed ~ 50% of animals > 300,000. February DHI SCC was 832,000 with 5 new Staph. aureus and 2 new alpha strep. infections found during the herd visit and therapy follow up cultures. Herd observations showed milking practices not being followed and no strict milking order, and communication issues between the herd manager and employee (milker-herdsperson). With the achievement of a lower SCC in January, the herd relaxed its prevention practices even though it was specified how critical these were. The study is still ongoing and includes monthly monitoring of DHIA information, culturing suspected new infections, new dry cow treatment protocols, selling some chronic cows, and investigating new treatment options. Overall results showed excellent therapy response for Strep. IMI but very low S. aureus cure rates. However, some therapy success coupled with critical and mandatory prevention strategies resulted in a 50% decrease in SCC and limited new infections. Failure to continue proper prevention strategies resulted in many new IMI and high herd SCC, and demonstrates the mandatory requirements for proper mastitis prevention strategies (including a milking order) in a comprehensive mastitis and milk quality program.

Table 1. Herd culture results prior to therapy based on 2 different samplings.

	No. (%) cows	No. (%) quarters
Uninfected	25 (42%)	156 (65%)
Staph. Aureus.	20 (33%)	35 (15%)
Strep. Dysgalactiae	12 (20%)	21 (9%)
Strep. Alpha hemolytic	2 (3%)	3 (1%)
Strep. Uberis	1 (2%)	1 (.4%)

Table 2. Cure rates for gram + IMI using recommended (*) or extended pirlimycin therapy ().**

	Strep. dysgalactiae *	Strep. (alpha hemolytic) *	Strep. uberis *	Staph. aureus**
Cow cure rate	100%	50%	100%	7%
Quarter cure rate	100%	33%	100%	4%

*Recommended therapy = treated intramammary 2x with one 10 ml plastet 50 mg pirlimycin HCl 24 hrs apart;
 **Extended therapy = 1 tube pirlimycin / day for 8 days (24 hrs apart)