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CLINICAL MASTITIS PERCEPTIONS OF KANSAS DAIRY PRODUCERS

J.R. Roberson¹

Summary

Mastitis is considered the most costly disease in the U.S. dairy industry. Treatment of clinical mastitis is the major reason for antibiotic contamination of products on U.S. dairy farms. A survey of 183 dairy producers was conducted to determine their perceptions regarding clinical mastitis treatments and what constituted their treatment regimens. Results indicated that 33% of dairy producers used a coliform vaccine, 10% used a *Staphylococcus aureus* vaccine, and 38% did no prestripping before milking cows. Obtaining a clinical cure (restoration of normal milk) was considered the most important aspect of mastitis treatment success (110/183; 60%) compared to bacteriological cure (absence of bacterial pathogen), somatic cell count cure (cells count back to near normal concentrations), milk production (back to near pre-mastitis levels), and udder firmness (back to near normal firmness). Average treatment success for mastitis reported by the 183 producers was 70%, with a range of 10 to 100%. Seventy-three (92%) producers listed "off-feed" as a good measure of the severity of clinical mastitis, followed closely by general appearance (91%). Appearance of udder and milk, droopy ears, appearance of the eyes, and low milk production were other popular methods used to determine the severity of clinical mastitis. Dairy producers believed that 5.3 days (range of 1 to 45 days) passed between first recognition of a

clinical case until normal milk was restored. Only 34% of producers utilized rectal temperatures as a diagnostic tool for mastitis. Many treatments used were extra-label and some were potentially illegal. However, the results presented demonstrate a wide diversity of products used and a general lack of consensus of what is considered efficacious mastitis treatment. In addition, drug dosages and duration of therapy varied considerably. Greater education on proper dosages, durations, and potential efficacy of treatments should be beneficial. A clear need exists for conducting efficacy studies to help establish necessary and justified treatments for clinical mastitis.

(Key Words: Milking Routines, Mastitis Survey, Mastitis Therapies)

Introduction

Although mastitis is considered the most costly disease in the U.S. dairy industry and treatment is the major reason for antibiotic contamination of dairy products, few published, peer-reviewed studies that document effective antibiotic therapies are available. Despite the lack of efficacy data, dairy producers and veterinarians desire to treat cases of clinical mastitis, sometimes with extra-label or illegal antibiotic therapies. A prior message on American Association of Bovine Practitioners (AABP-L) reported the use of gentamicin, enrofloxacin, and florfenicol for

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treatment of clinical mastitis; tilmicosin and florfenicol were administered to cows entering the non-lactating period (March 1997). None of the aforementioned antibiotics is approved for use in lactating dairy cows, and use of enrofloxacin is illegal. This extra-label use of antibiotics for clinical mastitis illustrates the frustration and lack of faith dairy producers and veterinarians have with approved mastitis treatment products. Research documenting the most effective methods of treating clinical mastitis would benefit producers, veterinarians, and consumers by determining economical treatments and decreasing the risk of antibiotic residues in consumer milk products.

In the early 1990s, two intramammary antibiotic preparations were compared to oxytocin for treatment of mild clinical mastitis in three California dairies. No significant differences in clinical or bacteriological cures were reported among the 254 cases studied. Most mastitis researchers generally agree that antibiotic therapy with approved intramammary preparations for mastitis caused by gram-negative pathogens is of little value. Further, antibiotic therapy against gram-positive organisms also may be ineffective to produce clinical recovery. Anti-inflammatory therapy has not been shown to alter recovery rates.

Few controlled studies have been published regarding efficacy of non-antibiotic mastitis therapies. Frequent milk-out (FMO), a common therapy for clinical mastitis, was found to be ineffective when compared to nontreated controls. Fluid therapy (intravenous, oral, and hypertonic) is considered vital for cases of acute clinical mastitis, yet little research has been performed. Calcium therapy has been recommended for gram-negative mastitis. Little applied and practical research has been conducted to aid the producer and veterinarian in treating or managing mastitis.

The primary objective of this observational study was to document dairy producer perceptions about clinical mastitis treatment and what constituted their treatment regimens. A questionnaire was administered regarding treatment methods and the expected outcomes.

Experimental Procedures

A list of Kansas dairy herds was obtained from the 2001 Kansas Dairy Producer Directory. An effort was made to administer the questionnaire to 25% of dairy producers within any given county. Dairy producers were contacted by telephone, the project was described, and producers were asked if they would be willing to participate. If agreeable, a time was set to administer the questionnaire. The questionnaire was administered in person by the author.

Results and Discussion

One hundred eighty-three dairy producers were surveyed. Only two were not available at the time of appointment. The first questionnaire was administered in December 2001 and the last was August 2003. The rolling herd average for milk, according to producer estimates, was 18,733 lb, with a range of 3,660 to 28,000. The average estimated rolling herd somatic cell count (SCC) was 318,000 cells/mL, with a range of 75,000 to 729,000. Twenty-one herds (11.5%) milk at least a portion of their cows more than twice daily. Average number of cows (both lactating and dry) per herd was 345, with a range of 9 to 7,000.

Thirty-three percent of producers use a coliform vaccine, but only 10% of producers use a *Staphylococcus aureus* vaccine. Two producers reported using an autogenous streptococcus vaccine.

Thirty-eight percent of producers reported that pre-stripping was not a routine milking procedure in their herds, suggesting that mild cases of clinical mastitis would not be identified. Twelve percent reported forestripping some of the time, whereas the remaining 50% routinely performed forestripping. Among those using forestripping, only 7 of 91 (7.6%) strip the milk on objects other than the parlor floor or gutter. Only three reported using a strip cup.

Producers were asked to rank clinical cure (normal milk), bacteriological cure (absence of bacterial pathogen), SCC cure (cell count back to near normal levels), milk production (back to near pre-mastitis levels), and udder firmness (back to near normal firmness) in order of importance to mastitis treatment success. Obtaining a clinical cure was considered the most important aspect of treatment success (110/183). Thirty-four producers considered getting the udder back to normal firmness most important, 17 (9.3%) considered lowering the SCC most important, 12 (6.6%) considered a bacteriologic cure most important, and 10 (5.5%) considered milk production most important to evaluate treatment success. The factor considered least important was bacteriologic cure (71/183; 38.8%); whereas only 8 (4.4%) producers considered clinical cure least important. The average treatment success reported by the 183 producers was 70% with a range of 10 to 100%.

Producers were asked how many days passed between recognition of the clinical case to normal milk. The average number of days was 5.3, with a range of 1 to 45. Likewise producers were asked the number of days until a bacteriologic cure. The average number of days was 10.7, with a range of immediate cure (2 producers) to never cured (12 producers). Average days reported to near normal

SCC, milk production, and udder were 16.8, 9.8, and 10.2, respectively.

Seventy-nine producers were queried concerning methods used to determine severity of clinical mastitis. Seventy-three (92%) producers listed “off-feed” as a good measure of severity, followed closely by general appearance (91%). Appearance of udder and milk, droopy ears, appearance of the eyes, and low milk production were the other major methods used to determine the severity of clinical mastitis. Only 27 (34%) producers used rectal temperatures, and the average critical rectal temperature was 102.8°F, with a range of 100 to 104. Other methods listed as aids to determine severity were diarrhea, respiratory signs, kicking or touchy, entering the parlor out of order, dehydrated, slobbering, not cleaning nose, isolated, and walking stiffly.

Five typical cases of clinical mastitis were described to dairy producers (chronic, mild, moderate, severe, and non-responding), and they were asked how each case would be managed. Only data on the chronic, mild, and moderate cases are reported herein.

Chronic Mastitis

Chronic cases consisted of excellent milking cows that were 4 to 5 months pregnant displaying milk clots from a single quarter. These cows had episodes of clinical mastitis every 1 to 2 months, and each clinical phase lasted 1 to 2 weeks regardless of management or treatment. These cows were not clinically ill or had firm or hard udders. Thirty-eight percent of producers used antibiotics in an extra-label manner, with only 4.4% using antibiotics according to label directions. Eight percent used no drugs, but would take extra care to strip out the clots, 4.4% used no treatment of any kind, 14% used only oxytocin for

chronic cases, and one producer removed teats from the offending quarter.

Intramammary treatment. Approximately 31% of producers reported using intramammary antibiotics to treat chronic cases. Of the 56 herds that used a product intramammary, 38% use a cephalosporin product (Today® or Cefa-Lak®), 21% used pirlimycin (Pirsue®), and < 4% of producers used other labeled intramammary antibiotics. One producer used a veterinarian-mixed product, one used vinegar, and one used a neomycin/dexamethasone mixture. Five producers reported using two different intramammary products in some combination on chronic mastitis.

Systemic Treatment-Antibiotics. Eighteen percent (33/183) of producers reported using systemic antibiotics to treat chronic cases. Eleven producers used penicillin either intramuscularly or subcutaneously on chronic cases, with daily dosages ranging from 20 to 50 mL as a one-time treatment or until clots were resolved. Fifteen producers use a ceftiofur product (Naxcel® or Excenel®), most often following label directions. Other products listed were oxytetracycline, a custom, veterinarian-mixed product, and LS-50.

Systemic Treatment-Anti-Inflammatory. Four of the 183 producers reported using an anti-inflammatory drug for chronic mastitis cases. Products used were intramammary and external dimethyl sulfoxide (DMSO), aspirin (orally), dexamethasone intramammary, and a combination of dexamethasone and intramuscular injections of Banamine®.

Miscellaneous Treatments. Other products and procedures used included: vitamins A, B, D, and E, hyperimmune serums, whey products, Tramisol®, mint or oil products, hydrotherapy, and energy or stress boluses.

Mild Clinical Mastitis

A mild case was indicated when a cow had clots in one quarter, but no evidence of systemic illness or firmness of the affected quarter. This would be the very first case of clinical mastitis observed in the cow. Sixty-four percent of producers used antibiotics in an extra-label manner, whereas 13% reported using antibiotics according to label directions. One producer did not use any drugs, but would take extra care to strip out the clots, 11% used no treatment of any kind, and 8% use only oxytocin on mild cases.

Intramammary Treatment. Approximately 62% of producers used intramammary antibiotics to treat mild cases. Of the 113 producers who used intramammary products, 49% used a cephalosporin product (Today® or Cefa-Lak®), 27% used pirlimycin (Pirsue®), about 7% used amoxicillin, 4% each used either novobiocin/penicillin or cloxacillin, 3% used penicillin with or without a steroid, 2% used ampicillin, and one producer each used a homebrew, dry-cow antibiotic, gentamicin with dexamethasone, and neomycin with dexamethasone. Two producers used two different intramammary products in sequence.

Systemic Treatment-Antibiotics. Thirty-two percent (58/183) of producers reported using systemic antibiotics to treat mild cases. Twenty-five producers used ceftiofur (Naxcel® or Excenel®), 19 producers used penicillin or a penicillin-like antibiotic, five used a tetracycline antibiotic, and six producers used a veterinarian mix, spectinomycin-lincomycin (LS-50), Micotil®, or Albon® (sulfadimethoxine).

Systemic Treatment-Anti-Inflammatory. Only 3 of the 183 producers reported using an anti-inflammatory drug for mild cases.

Miscellaneous Treatments. Sixty-five producers reported using various other products. Fifty-one producers used oxytocin once or for the rest of the lactation, mostly pre-milking, at doses ranging from 0.5 to 5 mL. Four producers routinely used vitamins or nutritional supplements. Four producers used a hyperimmune serum product. Two producers routinely used ointments, and one used a teat cannula.

Moderate Clinical Mastitis

The moderate case was described as a cow with clots in one quarter that was slightly firm and warm. This cow had a temperature of 104.5°F, but was not off-feed or dehydrated. Clinical mastitis had not previously occurred in this quarter.

Fluid Therapy. Five percent of producers would administer some type of fluid therapy (hypertonic saline, dextrose, 3 to 5 gallons of water orally, or an oral drench mixture consisting of beer, rumen fluid, water, and propylene glycol).

Intramammary Treatment. Seventy percent of producers would use intramammary antibiotics and three producers relied on their veterinarians to treat the cow with moderate clinical mastitis. Of the 128 herds that used a product intramammary, 52% used a cephalosporin product (Today® or Cefa-Lak®), 20% used pirlimycin (Pirsue®), about 6% used amoxicillin, 4% used novobiocin/penicillin, and 2% used cloxacillin. Four producers used a single intramammary product without a preference. Nine producers routinely used a combination of intramammary products (five used two intramammary labeled products either one after the other or at the same time; two used a veterinary mix and an approved intramammary product; one used spectinomycin and Today®, and one used a dry cow product followed by Pirsue®). Ten producers used other combinations or dry cow

intramammary antibiotics (five used penicillin and a steroid; two used a dry-cow intramammary antibiotic, one used penicillin-vitamin mix, one used a neomycin-dexamethasone mix, and one used a gentamicin-dexamethasone mix).

Systemic Treatment-Antibiotics. Five producers relied on their veterinarian to treat their cows with moderate clinical mastitis. Sixty-three percent (112/178) of producers reported using systemic antibiotics to treat moderate cases. Producers reported using penicillin (23%), ceftiofur (19%), tetracycline products (9%), a combination of antibiotics (4%: penicillin and tetracycline, sulfa-containing drugs or ceftiofur, erythromycin and tetracycline, ceftiofur and Albon®), ampicillin (2%), vet mixes (2%), sulfa products (2%), LS-50 (<1%), Micotil® (<1%), and one producer had no preference. Dosages for penicillin ranged from 10 to 75 ml. Dosages for ceftiofur ranged from 10 to 30 mL. Dosages for tetracycline products ranged from 20 to 110 mL.

Systemic Treatment-Anti-Inflammatory. Nearly 75% of producers do not use anti-inflammatory products to treat cows with moderate clinical mastitis. Banamine® was routinely used by 12% of producers, with doses ranging from 10 to 25 mL. A steroid was used by 8% of producers, with dosages ranging from 1 to 110 ml. Five producers used aspirin as their sole anti-inflammatory drug. Four producers used a combination of anti-inflammatory drugs, and two producers had no specific preference.

Miscellaneous Treatments. Forty-two percent of producers (75/178) that treated their own moderate cases of clinical mastitis used other forms of treatment. Oxytocin was used by 60 producers, 12 used some form of mint oil externally, 10 used vitamins or nutritional supplements, five used hyperimmune serum,

one used DMSO, one used cold water hydrotherapy, one used an antihistamine, and one used Tramisol®.

Conclusions

The purpose of this study was to neither support nor condemn treatments for clinical mastitis used by Kansas dairy producers. Many of the treatments used are extra-label and some were potentially illegal. However, the results presented demonstrate a wide diversity of products used and a general lack of consensus of what is considered effective mastitis treatment. In addition, drug dosages

and duration of therapy varied considerably. Greater education on proper dosages, durations, and potential efficacy of treatments should be beneficial.

Although the producers generally did not have a severity scoring scheme, the amount of treatment seemed to increase with increasing severity of mastitis. Producer-reported treatment success rates were not different for those who used intramammary antibiotics compared to those who did not. A clear need exists to conduct efficacy studies to help establish necessary and justified treatments producers can use for clinical mastitis.