Review Article

Control of Mastitis Through Dry Cow Therapy: A Review

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ABSTRACT

Mastitis is considered one of the significant productions limiting disease of dairy animals of underdeveloped and developing countries. It is a common problem right after parturition as most of udder infections occur during dry period. In countries like Pakistan which lacks adaptation of modern techniques have higher incidents of mastitis. Mastitis can be controlled by adopting modern techniques like teat dipping, use of vaccine, regular use of SCC at farm at individual level and dry cow therapy. Dry cow therapy is one of the most important and easy technique among the above mentioned control measures. The aims of dry cow therapy include elimination of current infection and prevention from new infections. Recently, dry cow therapy is being practice via two different techniques i.e. use of intra mammary and systemic administration of antibiotics prior to calving (dry period). Systemic administration of antibiotics at drying off or some weeks before parturition looks to be nominal accompanying treatment for intra-mammary therapy, which may
Some animals are very sensitive and do not allow to touch their tear and udder. Such animals are good candidates for such kind of therapy. Systemic administration of antibiotics during dry period may be better alternate to the intra mammary therapy in animals like buffalo having tight teat sphincter.

INTRODUCTION

Mastitis in milch animals is considered as one of the most important monetarily diseases and also causes changes in glandular tissues results in altered quality and quantity of milk (Ullah et al., 2005). Mastitis endures to be the most expansive disease of dairy animals. Mastitis is ranked as number one disease of dairy animals in Pakistan (Cady et al., 1983; Khan et al., 1991). Mastitis condenses lactation period of effected animal by 57 days on an average and losses 438 L of milk per lactation in Nili-Ravi buffaloes (Cady et al., 1983). In Pakistan, Statistics of current losses due to mastitis are not yet available, but in province of Punjab alone, Rs. 240 million per year are the total losses caused by clinical mastitis (Chaudhry and Khan, 1978). These all are in in terms of reduction in milk yield, discarded of spoiled milk, premature culling of animals and replacements of effected animals. In Pakistan, dipping of teat (Pre and Post milking) and dry cow therapy (dry period Intra-mammary antibiotic infusion) are not so far being carried out (Shakoor, 2004).

Mastitis occurs in two farms i.e. clinical and subclinical. Clinical mastitis is defined as inflammation of udder regarded as by visible abnormalities in the milk and udder or both. The clinical cases can be defined on the basis of severity as mild, moderate, or severe (International Dairy Federation, 1999). The incidence of clinical mastitis in buffalo ranges from 8 to 40% (Pathak and Sharma, 1988). Subclinical mastitis show no macroscopic evidence inflammation, but examination of the milk reveals udder infection, increased cell count and also alteration in the chemical properties of the udder. The quarter wise prevalence of intra-mammary infection in buffalo was 66%. Since the mammary gland is highly susceptible to infection during the periparturent period, the incidence was highest during the 30 days after calving (Moroni et al., 2006).

Mastitis can be prevented when an effective control measures are adopted. Dry period therapy is an vital part of this control program. Recommended control practices for environmental control, equipment management and milking management should be adopted in conjunction with dry period therapy (Cousins et al., 1980; Radostitis et al., 2007). Dry cow therapy is practice of treatment, an intra-mammary infusion of antibiotic in udder or systemic treatment with an antibiotic administered at the time of drying or the end of lactation. Aims of antibiotic treatment at drying off are excluding the existing intra-mammary infections and avoiding new infections (Janosi and Huszenicaza, 2001).

Aims of dry cow therapy: Antibiotic treatment at drying off of animal aims at both, removing the prevailing intra-mammary infections and inhibiting new infections (Neave et al., 1966). During the dry period, elimination and control of infection with an antibiotic treatment is more prospective and easy during dry period than during lactation as the drug is not excreted out along milk and a higher and more uniform concentration of antibiotics is sustained in udder. In addition there are no economic losses due to discarding of antibiotic containing milk (Sandholm and Pyorara, 1995). In many experimental studies, it is suggested that dry period therapy is the best and effective way of controlling intra-mammary infections caused by *Streptococcus agalactiae* and some what effective against *Staphylococcus aureus* infection (Natzke 1971,
During the dry period, chances of mammary gland to expose these contagious pathogens is mostly minimized in the absence of regular milking, so that therapy at drying off inclines to control these pathogens efficiently (Oliver and Sordillo, 1988). Some studies revealed that new infections of contagious pathogens, especially *Staphylococcus aureus* are likely to be established after drying off in those herds’ where they are prevalent (Smith *et al*., 1966; Pankey *et al*., 1982).

**Treatment of Intramammary infections by dry cow therapy:** Neave and Oliver (1962) stated that after the last milking of lactation, *Staphylococcus aureus* could often be secluded from the teat skin, but it can’t be done after 28 days from uninfected quarters. This revealed that disclosure to contagious pathogens concentrated is extensively higher at the start of the dry period but become lessened as the dry period progresses. Schukken *et al.* (1993) reported that by antibiotics therapy at drying off in low somatic cell count herd, resulted in minor incidence of clinical mastitis in the dry period. The reduction in minor mastitis pathogens were observed in quarters that were infused with antibiotics at calving. Hogan et al conducted study in Herds with Low Somatic Cell Count (SCC), on efficacy of Dry cow therapy and a product *Propionibacterium acnes*. Four commercial herds with low SCC were selected for evaluation of Dry cow therapy and a *Propionibacterium acnes* product. They treated about 90 cows in four groups with *P. acnes*, dry cow therapy, dry cow therapy plus *P. acnes*, and no treatment in control group. In dry cow therapy group 300 mg of cepahpin was infused in each lactating quarter of cows via the teat duct at drying off. Cows that were treated with *P. acnes*, were intravenously injected with 4 mg of killed *P. acnes* at time of drying off, at 7 to 10 days pre-partum, and within 7 days after parturition. Bacteriological cures of intramammary infections(IMI) especially *Staphylococcus aureus* and *Corynebacterium bovis* enhanced by adopting dry cow therapy at drying off. Incidence of new IMI by environmental streptococci and *C. bovis* that is opportunities during the dry period is reduced by using Dry cow therapy. That group of cows had a higher incidence of new IMI by Gram-negative bacilli originating through the dry period which was treated with *P. acnes* than other treatment groups. The cows receiving dry cow therapy, *P. acne*, or dry cow therapy plus *P. acnes* were more prone to intra-mammary infections and clinical mastitis at calving than cows receiving no treatment.

Williamson *et al.* (1995) conducted a study to check the prophylactic treatment of a dry cow antibiotic against *Streptococcus uberis* infection. Incidence of both dry period and post calving infections were reduced significantly by adopting dry cow therapy. Hassan *et al.* (1999) reported the effect of dry cow treatment just two weeks after drying off. He examined marked declined in the number of clinical mastitis cases and infected quarter by *Streptococcus dysgalactiae* and *Streptococcus uberis*. They suggested that during the dry period, new infections with these environmental organisms can be prevented by adopting dry cow therapy. Berry and Hillerton (2002) revealed in their study that in all four quarters of all cows, Dry cow antibiotic treatment has been shown to reduce the number of mastitis infections at the end of their lactation, and to prevent new mastitis infections in the late dry period and to reduce the number of infections detectable at the next calving. So it was revealed that dry cow antibiotic therapy is more efficient as compared to treatment during lactational period and more important thing is to have very monor chances of milk residue. Dry cow antibiotic therapy, even in herds with low bulk tank somatic cell counts has been concluded as to be reasonable and valuable in terms of milk production in the
following lactation. By adopting dry cow antibiotic therapy the incidence of new udder infections can be reduced significantly throughout the dry period, at calving and post parturient as compared to non-treated controlled cows. Dry cow antibiotic therapy is a sensible and effective utility in the control of mastitis in dairy herds.

Petzer et al., 2009 conducted study on intramammary infection rate during the dry period in cows. In this study their purpose was to conduct efficacious comparison among 6 different dry-cow intramammary antimicrobial products on the basis of somatic cell count (SCC) during early lactation of dairy cows. 162 cows are selected for this study and each product is randomly allocated in all cows due for drying off. Prior to drying off and after calving for detection of SCC level and presence of microorganisms, all cows were sampled twice. At drying off and post-calving, prevalence of pathogens in each quarter, the overall udder cure rate and the incidence of new intramammary infections happening during the dry period were determined. The overall prevalence of intramammary infections (IMIs) of each quarter at drying off was calculated as 29.78% and after calving 22.22% in that herds. In this way they revealed the difference in efficacy of antimicrobial intramammary dry-cow products and their ability to treat and avoid new IMIs through the dry period. However, Dry-cow therapy is a holistic approach to prevailing infection in dry period which is considered as cow factors, microorganisms, and dry-cow management.

**Systemic dry cow therapy:** Systemic therapy in dry period may have advantages, uniform drug distribution in the udder tissue that may help in quick cure rate of intra-mammary infections (Ziv, 1980) and prevention of possible risk of new infections at time of administration of intramammary infusion (Boddie and Nickerson, 1986). Systemic administration of antibiotics at drying off or some weeks before parturition, intra-mammary therapy is advisable for effective supplementary treatment (Bolourchi et al., 1995; Nickerson et al., 1999; Zeconi et al., 1999). Some animals are high strung and do not like their teat and udder to be touched. These animals are good consider for systemic dry period therapy. The sphincter in buffalo is tighten than in cow, so insertion of the nozzle of the intra-mammary tube may traumatized the teat opening and lead to mastitis. Perhaps due to tight teat opening of buffalo, our farmers are averse to treatment or control of mastitis by the use of intra-mammary tubes. It is recommended to go for systemic dry cow therapy with high infection rate herds (Sandholm and Pyorara, 1995). Poutrel and Rainard (1981) piloted a study of systematic treatment of all mammary quarters at time of drying off has been highly effective for both treatment and prevention of intramammary infection. Because the economic aspect is a determining factor in the fight against mastitis, some researchers proposed treating with antibiotics only those quarters infected at time of drying off. Under these conditions, however, one would no longer benefit from the preventative effect against new intra-mammary infections. Soback et al. (1990) conducted a study to evaluate the efficacy of three different treatment programs for the elimination and prevention of *Staphylococcus aureus* intra-mammary infection in a herd of 106 cows in dry cow periods. For this purpose, at drying off, norfloxacin nicotinate was injected subcutaneously, oxytetracycline-HCl was administered intramuscularly, cephapirin benzathine was infused into each udder quarter. It was observed that only in the norfloxacin nicotinate treatment group, number of existing *Staphylococcus aureus* intramammary infections was reduced significantly. They recommend norfloxacin nicotinate for better efficacy in systemic dry cow therapy, which possesses more and uniform distribution volume, more half-life, and is vastly active against the pathogen involved.
Erskin et al. (1994) determined the efficacy of intramuscular oxytetracycline as a supplemental dry cow treatment for Staphylococcus aureus mastitis. They randomly assigned Holsteins cows into two treatment clusters, commercial product cephapirin benzathine was infused intracisternal at drying off in 20 cows and second cluster of 17 cows was infused with cephapirin benzathine at time of drying off and after parturition oxytetracycline intramuscularly at dose of 11 mg/kg once daily on day 7, 8, 9, and 10. The cure rate on 30th day after calving for systemic oxytetracycline (in combination with cephapirin treatment) was noted as 29.4% for infected teats and 29.4% for infected whole udders, as compared with cephapirin treatment only, cure rate was somewhat less 27.5% for infected teats and 25% for infected whole udders respectively. Results including the culture at 60 days after calving, culture sensitivity of milk sample revealed 21.2% for combination therapy and 22.5% for cephapirin therapy alone. It was unfortunately revealed that combination of systemic oxytetracycline and intramammary dry cow therapy didn’t increase the cure rate of mastitis for Staphylococcus aureus infection.

Bolourchi et al. (1995) conducted study to compare systemic verses intramammary administration of antibiotics in eliminating intramammary infection (IMI) of Staphylococcus aureus in large Holstein dairy herd. They organized three groups of cows. They infused intra-mammary ointment comprising penicillin, nafcillin and dihydrostreptomycin (DC) along with systemic injections of tylosin (TY) and enrofloxacin (EN). The frequency of IMI was 26.7% at the time of therapy, the prevalence of three groups containing staphylococcal IMI as:(1) Tylosin (2) enrofloxacin, and (3) an ointment containing penicillin, nafcillin and dihydrostreptomycin were 28.5, 29.8 and 21.7% respectively. The differences among three figures were not statistically noteworthy. The rate of cure in the tylosin, enrofloxacin and ointment containing penicillin, nafcillin and dihydrostreptomycin groups were 77.4, 85.2 and 92.3% accordingly, which were also not ominously dissimilar. After treatment incidence of new infections in TY, EN and DC clusters, were 7.5, 6.1 and 4.4%, accordingly, presenting no statistically major difference among the three clusters. They determined that enrofloxacin or tylosin as systemic dry cow treatment, could be an alternative therapy for eradication of staphylococcal IMI during the dry period, though, most effective method for IMI after parturition, is considered locally opted dry cow therapy using partially inserted cannulas.

Hassan et al. (1999) concluded that, two weeks after drying off, dry cow treatment causes patent decline in the figure of infected teats and clinical mastitis cases caused by Streptococcus uberis and Streptococcus dysgalactiae. They recommended that during dry period, dry cow therapy have a vital role in the avoidance of new infections with these environmental microbes. Janosi and Huszenicz (2001) reported that systemic administration of antibiotics at drying off or some weeks before parturition looks to be significant supplementary therapy for intramammary treatment of Staphylococcus aureus other udder infections. This treatment declined significantly the occurrence of both dry period and post parturient infections. In the herd with a high infection rate, systemic dry cow treatment is suggested. Teat dipping with germicidal is suggested during the dry period for these herds to lessen the contact of pathogens on the teat end. Tarabla and Canavesio (2003) reported that the cure rates of intramammary treatments of clinical and subclinical mastitis can be improved by adopting systemic therapy. Intramuscular treatment about 15 days weeks before the expected date of parturition and subcutaneous norfloxacin nicotine injected at the cessation of the milking proved beneficial in prevention of Staphylococcus aureus infections. After systemic
dry cow therapy, incidence of this pathogen may be ominously lower as compared with untreated control clusters.

Musal and Izgur (2006) assigned three different therapy groups and a control group each including 20 cows to compare the efficacy of systemic, intramammary and systemic plus intramammary dry cow treatments in the eradication of current subclinical intramammary infections (IMI) and control of new infections occurring in the dry period. Milk samples from each teat were collected for microbiological isolation and identification from all cows before entering in dry period and without regarding the results, the treatments were administered. Rates of elimination and prevention of IMI and for intramammary and combined therapy group were higher than systemic therapy group. The intramammary dry cow product used in this study seems effective in preventing new IMI and eliminating existing IMI. Better results were obtained in the combination therapy group while systemic dry cow therapy alone did not provide effective results in the prevention and eradication of IMI in the dry period. Milk samples from each teat were collected for microbiological isolation and identification from all cows before entering in dry period and without regarding the results, the treatments were administered. Rates of elimination and prevention of IMI and for intramammary and combined therapy group were higher than systemic therapy group. The intramammary dry cow product used in this study seems effective in preventing new IMI and eliminating existing IMI. Better results were obtained in the combination therapy group while systemic dry cow therapy alone did not provide effective results in the prevention and eradication of IMI in the dry period.

REFERENCES


