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Control of Mastitis through dry cow therapy: A review

Muhammad Kashif[a], Muhammad Rizwan[b]*, Muhammad Ali[b], Tanveer Ahmad[c], Aneela Zameer Durrani[d]
[a]Department of Clinical Sciences, College of Veterinary & Animal Sciences, Jhang, Pakistan
[b]Bahauddin Zakariya University, Bahadur Campus, Layyah
[c]Department of Clinical Sciences, Bahauddin Zakariya University, Multan
[d]Department of Clinical Medicine and Surgery, University of Veterinary & Animal Sciences, Lahore

Abstract
Huge economic losses occur due to mastitis in the dairy industry all over the world. These losses can be reduced if mastitis is controlled by effective mastitis control programme. Among these programme dry cow therapy is very much effective to eliminate the existing intramammary infections and preventing new intramammary infections during the dry period and after calving. By adopting dry cow therapy through intramammary route at dry off or systemic dry cow therapy 2 weeks before parturition or combination of these two along with other proper mastitis control managements, we can get rid of these injurious losses in dairy industry. In this review article, advantages of dry cow therapy, methods of dry cow therapy and practical aspects of dry cow therapy are discussed.
Keywords: Dairy Animals, Mastitis, Dry cow therapy.

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***Corresponding author**: Muhammad Rizwan **E-mail:** drrizwanmgh@gmail.com

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Introduction

Mastitis is one of the most economically important diseases of milch animals and also causes the changes in glandular tissues affecting quality and quantity of milk [1]. Mastitis continues to be the most costly disease of dairy animals. Field surveys of major livestock diseases in Pakistan have ranked mastitis as number one disease of dairy animals [2,3]. In Nili-Ravi buffaloes, mastitis shortens lactation period of each animal by 57 days on an average and reduces 438 kg of milk per lactation [2]. Statistics of current losses in Pakistan due to mastitis are not yet available, but in Punjab alone, the total losses caused by clinical mastitis amount to Rs. 240M per year [3,4]. These occur through discarded milk, reduction in milk yield, premature culling of animals and replacements. Dipping of teat and dry period therapy are not so far being carried out in Pakistan [5]. Mastitis occurs in two farms i.e. clinical and subclinical. Clinical mastitis is defined as udder inflammation characterized by visible abnormalities in the milk or udder or both. Severity of clinical cases can be described as mild, moderate, or severe. The incidence of clinical mastitis in buffalo ranges from 8 to 40% [6]. Subclinical mastitis show no macroscopic evidence of inflammation, but examination of the milk reveals udder infection, increased cell count and also alteration in the chemical properties of the milk. 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 [7].

Mastitis can be prevented when an effective control program is adopted. Dry period therapy is an essential part of this control program. To be fully effective dry period therapy should be used in conjunction with recommended practices for environmental control, equipment management and milking management [8, 9].

Dry Cow Therapy

Dry cow therapy is an intra-mammary treatment of udder or systemic treatment with an antibiotic administered during dry period. The use of antibiotic dry cow therapy and the treatment of intramammary infection at drying off has been a basis for mastitis management and control [10]. Dry cow therapy eliminates existing intra-mammary infections (IMI) and in preventing new IMIs; a fundamental part of a successful mastitis control programme [11, 12, and 13].

Advantages of Dry Cow Therapy

The use of dry-cow therapy is usually associated with less cases of clinical mastitis during the dry period and after calving [14-16]. Cure rate is higher in dry period than during lactation, higher concentration of drugs can be used, reduce new intramammary infections during dry period, damaged tissue may regenerate prior to calving, incidence of clinical mastitis at caving is also reduced [17]. During the dry period, elimination of infection with an antibiotic is easier than during lactation because the drug is not milked out and a higher and more uniform concentration of antibiotics is maintained in udder. In addition there are no economic losses due to discarding of antibiotic containing milk [18].It was suggested

that dry period therapy is effective in controlling IMI due to *Streptococcus agalactiae* and *Staphylococcus aureus* [19]. During the dry period exposure of pathogens to the mammary gland is mostly reduced due to the absence of regular milking, so that therapy at drying off tends to control mastitic pathogens effectively [20].Several studies showed that contagious pathogens, especially *Staphylococcus aureus* established new infections after drying off in herds. Pankey and Schukken [21] found that the administration of antibiotics at drying off resulted in lower clinical mastitis incidence in the dry period. The quarters that were infused with antibiotics had a reduction of mastitis pathogens at calving. Williamson [22] examined the prophylactic effect of a dry cow antibiotic against *Streptococcus uberis*. This therapy significantly reduced the incidence of mastitic pathogens both during dry period and post calving. Dry cow antibiotic treatment is more efficacious than lactational therapy and has less risk of milk residue [23].

Two methods of dry cow therapy

- Intra-mammary Dry cow therapy
- Systemic Dry cow therapy

Intramammary Dry Cow Therapy

The intramammary route is good choice for the distribution of drug during dry cow therapy and has the advantages of being well researched. It delivers high concentrations of antibiotic as compared to systemic route of adminisstration. Its disadvantages are the risks of both physiological and anatomical damage to the streak canal and inoculation of organisms at the time of infusion. Bradley and Huxley [24] studied the efficacy of intamammary dry cow therapy found that the incidence of mastitic pathogens was significantly lower in cows receiving dry cow therapy as compared to those not received treatment [25]. Hassan [26] illustrated obvious decreased in the number of infected quarters and clinical mastitis cases caused by *Streptoccocus uberis* and *Streptoccocus dysgalactiae* after dry cow treatment in dry period and their finding suggested that dry cow therapy can play important role in the prevention of new infections with these environmental pathogens during the dry period. Berry and Hillerton [27] described that dry cow antibiotic treatment in all four quarters of animal at the end of their lactation had reduced the number of mastitis pathogens already existed and prevented new mastitis pathogens in the dry period and also after calving, so dry cow therapy practically is very effective tool in the control of mastitis in dairy animals. Musal and Izgur [28] compared the efficacy of intramammary, systemic and intramammary plus systemic dry cow therapies in the exclusion of existing subclinical IMI and avoidance of new infections occurring in the dry period and their findings suggested that combined therapy group were higher efficacy than alone systemic therapy group. Petzer [29] suggested that dry cow therapy should always be a part of a complete mastitis control programme during dry period. Thereby intramammary dry cow therapy should be done when animal dry off using either commercially prepared intramammary antibiotic tubes or intramammary injectors containing antibiotics like penicillin, cloxacillin, cephalosporin and spiramycin. While infusing the dry cow preparation in teats care should be taken not damaged the teat canal and cause minimal tissue irritation, to avoid damaging the secretory tissue and to prevent fibrosis.

Systemic dry cow therapy

Systemic dry cow therapy is the administration of broad spectrum antibiotic through intramuscular or intravenous route of drug administration before parturition. Systemic dry period therapy may have advantages, better distribution of drug in the udder tissue which may lead to better cure of intra-mammary infections [30] and avoidance of new infections which is possible risk at administration of intra-mammary infusion [31].Systemic administration could simplify dry cow therapy routine. It would also eliminate the risk of introducing infections through non-sterile intramammary injection [32]. Systemic administration of antibiotics at drying off or some weeks before parturition seems to be effective supplementary treatment for intra-mammary therapy which may advisable for practice [33]. Systemic therapy has been attempted as a way of improving the cure rates of intramammary treatments of clinical and subclinical mastitis [34]. Some animals are high strung and do not like their teat and udder to be touched. These animals are good candidates 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. Systemic dry cow therapy is recommended for herds with high infection rate [35]. Poutrel and Rainard [36] described that systematic

administration of antibiotics at time of drying off has been highly effective for both treatment and prevention of intramammary infection. 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 [35] suggested that systemic dry cow therapy using norfloxacin nicotinate, which possesses large distribution volume, long half-life, and is highly effective against the mastitic pathogen [36]. Erskine [37] determined that systemic oxytetracycline, in combination with intramammary dry cow treatment may improve the rate of cure for *Staphylococcus aureus* mastitis [38]. Bolourchi [39] compared systemic verses intramammary administration of antibiotics in eliminating intramammary infection IMI of *Staphylococcus aureus* in large holstein dairy herd and concluded that systemic dry cow therapy using enrofloxacin or tylosin can be an alternative to the conventional local method for elimination of staphylococcal IMI during the dry period, although, local dry cow therapy using partially inserted cannulas is the most effective method when considering IMI at calving. Janosi and Huszenicza [40] reported that systemic administration of antibiotics at drying off or some weeks before parturition effective treatment for *Staphylococcus aureus* intramammary infection which is advisable for practice. This therapy reduced significantly the incidence of both dry period and post calving infections. Systemic dry cow therapy is recommended for herd with a high infection rate. Use of germicidal teat dipping during the dry period is also advised for these herds to reduce the exposure of pathogens on the teat end. Tarabla and Canavesio [41] reported that systemic dry period antibiotic therapy has been good choice as a way of improving the cure rates of clinical and subclinical mastitis. Intramuscular treatment with antibiotics 2 weeks before the expected date of calving significantly reduced incidence of mastitic pathogens as compared with untreated control groups. Hovareshti [42] compared systemic versus intramammary administration of antibiotics in eliminating IMI of *Staphylococcus aureus* in holstein heifers and concluded that prepartum systemic treatment by Tylosin, which is easier to apply and prevents injuries for both heifer and milker, might replace intramammary dry cow therapy for controlling staphylococcal mastitis in dairy heifers. Kashif [43] illustrated that systemic administration of enrofloxacin or oxytracycline one to two week before parturition cures the infected quarters and prevent the new intramammary infections postpartum.

Conclusion

Optimum production and maximum daily yield of milk can only be achieved if mastitis is prevented at herd level by adopting guidelines of mastitis control program. The dry period offers the best opportunity to remove existing, persistent intramammary infections and prevent new intramammary infections. Dry cow therapy has the dual purpose of treatment and prevention. Intramammary dry cow therapy is most effective method to control mastitic pathogen. However in lrage dairy herd if it seems impractical then systemic dry period therapy should be used. It is easy and farmer friendly and recommended for herds with a high infection rate. In order to achieve the best cure rates it is important to select an appropriate antibiotic in the light of the prevailing mastitis epidemiology and aetiology on an individual unit. Dry cow management should be optimized to ensure that good cure rates are obtained. Dry cow therapy become a potent component of mastitis control in dairy animals.

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