***Original Research Article***

**EFFECT OF TANUVAS BIOTEAT DIP ON CONTROL OF MASTITIS IN DAIRY COWS**

**ABSTRACT**

Mastitis is inflammation of the udder and is the most common economic important disease in dairy cattle. The present study was conducted at Pillipakuttai village of Namagiripettai block in Namakkal district of Tamil Nadu. The lactating cows in early lactation were screened by using TANUCHEK SCC kit for intramammary infection by somatic cell count. A total of 40 cows with no intramammary infection were selected for this study and divided into three groups. Group I was kept as control with 10 animals which did not receive post-milking teat dipping. Group II and III were the treatment groups having 15 cows each. In group II post milking teat dipping was done with one percent potassium permanganate and in Group III with a Bioteat dip solution. The overall SCC count was significantly (P<0.01) decreased in potassium permanganate group (184x103 cells/ml) and bioteat dip group (171x103 cells/ml) compared control (211x103 cells/ml). The overall pH was higher in control group (6.5) followed by potassium permanganate group (6.4) and bioteat dip group (6.4) after treatment. The overall milk yield was significantly (P<0.01) higher in potassium permanganate group (8.66 lit/day) and bioteat dip group (8.68 lit/day) compared control (8.39 lit/day) after treatment. The herbal teat treatments performed better than the chemical teat dipping and no teat dip.

**Key words:** Intramammary; Mastitis; Somatic; Herbal and Bioteat dip.

1. **INTRODUCTION**

The anatomical positions of the udder are more prone toinflammatory and non inflammatory conditions of the mammary glands of the udder (Sudhan& Sharma 2010). Mastitis isinflammation of the udder and is the most common economic multi-etiological disease (Gomes &Henriques 2017). The important species are *Actinomyces, Pseudomonas, Nocardia, Clostridium, Mycobacterium, Mycoplasma, Pastuerella and Prototheca*and yeasts etc. (Sharma et al., 2012).

Mastitis can be classified into clinical, sub-clinical, and chronic mastitis. The clinical mastitis can be easily detected by visible abnormalities, such as red and swollen udder, watery milk with flakes and clots and fever in dairy cow (Khan & Khan 2008). The clinical mastitis can be further sub-divided into per-acute, acute, and sub-acute based on degree of the inflammation (Kibebew,2017). In contrast to clinical mastitis, sub-clinical not showed visible abnormality in the udder or milk, but decreased milk production with increased Somatic Cell Count (Gruet et al., 2001) The sub-clinical mastitis cause more financial loss than the clinical mastitis and difficult to eliminate from the herd (Zhao &Lacasse 2008; Romeroet al. 2008).The mastitis cases continuing more than 28 days is chronic mastits which causes the transmission of intra mammary infections and milk production loss(Bonestroo et al., 2023).

Prevention is very important in mastitis management in dairy farms. Presently, teat dipping is an important procedure for reduction of intra mammary infection. Teat dipping is a simple and economic procedure for mastitis control (Oliver et al.,2001).

The post milking teat dipping decrease the colonization, contamination and decrease the bacterial population on teat skin and improve the skin health of teat . Chemical teat dipping causes irritation to the teat skin and residue in the milk (Yanuartonoet al., 2020). To overcome these effects herbal medicine was used to reduce the side effects and avoid residue in the milk.

There are many *in vitro* studies on herbs to antibacterial activity. However, in *vivo*studyonthe efficacy of herbal teat disinfectants was scant. There are few herbal teat dips available in the market and very few studies compared their efficacy with chemical teat disinfectants (Kapooret al 2023). The ethno-veterinary preparation showed zones of inhibition against field isolates *E. coli, S. aureus*and *P. aeruginosa* (Punniamurthy et al 2017).

The current study aimed to compare the bioteat dip with chemical teat dip on SCC, pH and milk yield in dairy cows.

1. **MATERIALS METHODS**

The study was conducted at Pillipakuttai village of Namagiripettai block in Namakkal district of Tamil Nadu. The lactating cows in early lactation were screened by using TANUCHEK SCC kit for intramammary infection by somatic cell count. A total of 40 cows with early lactation and no intramammary infectionwere selected for this study and divided into three groups. Group I was kept as control with 10 animals which did not receive post-milking teat dipping. Group II and III were the treatment groups having 15 cows each. In group II post milking teat dipping was done with one percent potassium permanganate and in Group III with a Bioteat dip solution. Bioteat dip is a herbal nano biopolymer solution was purchased from Jeshron Biotech solutions Private Limited, Veterinary Incubatee Foundation,TANUVAS used to prevent mastitis. This solution is biodegradable, eco-friendly and consists of natural food grade materialwhich is easily washable from the udder.The experiment was carried for 3 months. The teat of treatment cows were dipped in post milking teat disinfectant, twice daily immediately after milking with a contact time of 20-30 seconds.

The cow milk samples (30 ml) were collected from afternoon milking for SCC count and estimation of pH in the milk at weeklyinterval for 4 months. A drop of collected milk sampleswere added in a TANUCHEK SCC tube and 3 drops of enhancer was added in the milk sample, allowed to wait 30 minutes..The substrate in the TANUCHEK SCC tube changes to blue colour by membrane bound enzymes from the somatic cell.The developed colour in the sample was compared with standard colour card and somatic cell count was measured. The pH of the milk was measured by using pH papers. The milk yield of treatments and control was recorded during the experiment period. The data collected on various parameters were statistically analyzed as per the method of Snedecor and Cochran (1989) and the means of different experimental groups were tested for statistical significance by Duncan’s multiple range test (Duncan, 1955).

**RESULTS**

The SCC in the control group and treatment groups were not significantly different before experiment. However, post milking teat dip significantly (P<0.01) decreased SCC <200 (103 cells/ml)compared to control up to three months (Table 1). Among the treatment groups Bioteat dip significantly decreased SCC compared to chemical teat dip. Further, bioteat dip showed decreased SCC from first month to third month, where as in chemical group SCC decreased only up to the end of second month. Similarly, The overall SCC count after treatment was significantly (P<0.01) decreased SCC count <200 (103 cells/ml) compared to control at the end of three months.

**Table 1.Effect of post teat dip on somatic cell count (x103 cells/mL) in different treatment groups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | **SCC count Before experiment** | **SCC count after treatment** | | | |
| **First Month** | **Second month** | **Third month** | **Average SCC count** |
| **Control** | 211 | 210c | 207c | 215c | 211c |
| **KMnO4 teat dip** | 209 | 199b | 175b | 177b | 184b |
| **Bioteat dip** | 208 | 186a | 162a | 158a | 171a |
| **Pooled SEM** | 1.13 | 2.48 | 2.95 | 3.46 | 1.77 |
| **P Value** | 0.41 | P<0.01 | P<0.01 | P<0.01 | P<0.01 |

**Table 2.Effect of post teat dip on pH in different treatment groups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | pH Before treatment | pH after treatment | | | |
| First Month | Second month | Third month | Average pH |
| **Control** | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |
| **KMnO4 teat dip** | 6.5 | 6.5 | 6.5 | 6.4 | 6.4 |
| **Bioteat dip** | 6.5 | 6.5 | 6.4 | 6.5 | 6.4 |
| **Pooled SEM** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **P Value** | 0.48 | 0.36 | 0.50 | 0.18 | 0.09 |

The pH values did not differ significantly between control and treatment groups before and after treatments (Table 2). The overall pH was higher in control group followed by potassium permanganate group and bioteat dip group after treatment.

Table3.Effect of post teat dip on milk yield in different treatment groups

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatments** | Milk yield before treatment | Milk yield after treatment | | | |
| First Month | Second month | Third month | Average milk yield |
| **Control** | 8.45 | 8.41 | 8.36 | 8.11a | 8.39a |
| **KMnO4 teat dip** | 8.48 | 8.48 | 8.56 | 8.74b | 8.66b |
| **Bioteat dip** | 8.38 | 8.70 | 8.68 | 8.68b | 8.68b |
| **Pooled SEM** | 0.07 | 0.07 | 0.06 | 0.08 | 0.03 |
| **P Value** | 0.84 | 0.26 | 0.11 | P<0.01 | P<0.01 |

The milk yield did not differ significantly (P<0.01) before initiation of treatment and upto two months after initiation of treatment. However, treatment groups were significantly (P<0.01) increased milk yield compared to control at the end of three months after treatment. Similarly the overall milk yield was significantly (P<0.01) higher in treatment groups compared control after treatment.

1. **DISCUSSION**

Subclinical mastitis predicted by elevation of Somatic Cell Count (Sharma et al., 2011). SCC are composed of udder epithelial cells and white blood cells which are neutrophils, phagocytes and lymphocytes. The difference in SCC in milk determined by shift of leukocytes from blood to milk due to inflammation of mammary gland caused by bacteria (Rainard et al., 2018). SCC which differentiatesthe uninfected cows from infected cows (Alhussien et al., 2018). .The threshold of somatic cell count was <200 (103 cells/ml)under field conditions in healthy cows(Petzer et al., 2017). Someof the reports suggested that milk with high SCC not confirmed invasion of mastitis pathogen and there is a presence of pathogen in milk with very low SCC (Petzer et al., 2017, Oliveira et al., 2013 and Alekish et al., 2015). Hence SCC carefully interpreted with demographic characteristics of cows.

In the present study, the overall SCC count was higher in control group followed by potassium permanganate group and bioteat dip group after treatment. Similar to results of the present study (Waghmare et al., 2013, Sharma et al., 2014; Kapoor et al., 2023) who reported that, herbal teat dip decreased the somatic cell count compared to control.

In this study, there was no significant difference in pH values in control and treatment groups. Our findings are in agreement with (Kapoor et al., 2023) who reported no significant difference in pH of milk after treatment of herbal teatdip. The pH of milk is not clinically helpful for diagnosing subclinical mastitis in cattle (Ogola et al., 2007;Kandeel et al., 2019).

The treatments had higher milk yield than control by third months of treatment. Similar to results of the present study were reported(Waghmare et al., 2013;Wicaksono et al., 2019). The increases of average milk production due to anti-inflammatory and anti-microbial properties of teat dipper which enhance recovery of the mammary glands from inflammation.

1. **CONCLUSION**

The present study concluded that, the animal receiving teat dip solution decreased SCC count and increased the milk yield compared to that of control. These results indicated that herbal teat dip performed better in preventing subclinical mastitis. Also bioteat dip had no corrosive and side effect on teat skin. Hence the farmer advised to adopt post teat dip to reduces sub-clinical mastitis and contamination in milk.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that no generative AI technologies such as large language models (chat, GPT, COPILOT etc) and text-to-image generators have been used during writing or editing of this manuscript.

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**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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