

Prevention of Mastitis in Cattle During Dry Period Using Herbal Formulation

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ABSTRACT

Recent studies indicated that the bacterial infections persist during the dry period and are responsible for clinical mastitis in the subsequent lactation. Dry cow therapy generally in managing existing infection and in preventing new infection during the dry period. It involves in use of intra-mammary antibiotics. The Ethno-veterinary formulation consisting of *Aloe vera*, *Curcuma longa* and *Calcium hydroxide* is effective in prevention of mastitis during the dry period under field conditions in comparison with regular antibiotics therapy. The study indicated that the natural plant based formulation helped to contain the microbial infection of the udder better than the control. The pH of the milk during dry period and early lactation found to be normal. Somatic Cell Count (SCC) is higher in the control group on the day of complete drying, day of calving and 5th day of calving.

INTRODUCTION

Cows are most susceptible to new mastitis infections during the beginning of the dry period, dry cow management includes attention to proper procedures for drying-off cows, feeding a special ration and prevent infection. Major part of the new infections caused by environmental pathogens leading to mastitis occur during dry period ^[1]. The procedure for drying off in cows is vitally important in keeping the Somatic Cell Count (SCC) levels low during the dry period ^[2]. The incidence of intramammary infection increases in both the early and late dry periods ^[3,4]. Because of changes in the anatomy and function of the mammary gland, intramammary infection during the dry period increases the risk of clinical mastitis (CM) in the early subsequent lactation ^[5]. Inorder to eleminate infections and prevent new infections generally people use intramammary infusion with antibiotic dry cow therapy (DCT). However this cannot prevent the infection from resistant organism.

Ethno-veterinary practice (EVP) can prevent the mastitis during the dry period. EVP has decentralized local resource based applications which are both safe, efficacious and have much fewer adverse effects in the animals ^[6]. The objective of the current study is to assess the efficacy of ethno-veterinary formulations in preventing mastitis during dry period under field conditions.

MATERIALS AND METHODS

The present study was conducted in Bangalore Milk Union (BAMUL) of Karnataka milk Federation, (KMF) North Bangalore.

Sample design

60 female pregnant cows were selected for the study. Simple Random techniques were used to allocate the animals for each group. The selection of animals was based on exclusion and inclusion criteria. Informed consent was taken from the owner of the animals. The study period was 45 days plus 5 days after lactation.

Inclusion criteria

- Breed of the animal: cross breed
- Age of the animal: greater than 3 years and lower than 6 years

- Calving status: first calving onwards

Exclusion criteria

- Native breeds
- Less than 3 years and more than 6 years
- First calving and after 3 calving

Parameters used for assessment

- pH of the Milk, Somatic cell count (SCC) in the milk, Swelling/Hardness of udder and tenderness

Study design

Study design from below **Table 1.**

Table 1. The animals were grouped in to three groups.

SL No	Group Number	Drug Intervention	No. of Animals	Formulations & dose
1	I	Ethnoveterinary Formulation	20	<i>Aloe vera, Curcuma longa</i>
		For single day application		<i>Calcium hydroxide</i>
2	II	Modern Medicine (Dry cow therapy) Ampiclox oil base	20	Single Dose
3	III	Control	20	No application of Herbal or Ampiclox

Method drug preparation and application

In the group 1, a watery paste of *Aloe vera, Curcuma longa* and *Calcium hydroxide* was applied on the cleaned udder with gentle massage twice a day (morning and evening) throughout the dry period. The second group was inoculated intra-mammary with Ampiclox (oil base Ampicillin+Cloxacillin) and retained during the dry period. The control group was not treated with any type of medication.

The milk samples were collected for testing the pH and Somatic Cell Count (SCC) on Day-0 (Partial drying off), Day -15 (Complete drying off), Day of calving and 5th day after calving.

RESULTS AND DISCUSSION

Animals

The color of the milk was normal on partial drying off in all the three groups. The group treated with antibiotic has slight inflammation in the in the hind quarter of the udder in two animals on two days prior to calving and in three animals on the day of calving. Average pH is less in group treated with Ethno-veterinary practice (EVP) and control group when compared to Antibiotic treated group (**Table 2**). The SCC in the control is higher than the other two groups. All the three groups exhibited milk pH in the normal range with exception in some cases. In the day of partial drying, the SCC is slightly more in the EVP group (**Table 3**). However SCC is higher in the control group in day of complete drying, day of calving and 5th day of calving (**Tables 4-6**). The pH is under the limit in all groups.

Table 2. Comparison of average pH and SCC in three groups studied (from day 0 to 5th day of calving).

Average	EVP group (I)	Antibiotic group(II)	Control group(III)	P value	EVP vs. Antibiotic
pH	5.69 ± 0.80	6.18 ± 0.77	5.43 ± 0.72	<0.001**	<0.001**
SCC	1.48 ± 0.74	1.60 ± 0.61	2.08 ± 1.06	<0.001**	0.628

Table 3. Comparison of variables in three groups studied - Day of partial drying.

Day of partial drying	EVP group (I)	Antibiotic group(II)	Control group(III)	Total	P value
pH	6.16 ± 0.67	6.83 ± 0.30	5.48 ± 0.79	6.16 ± 0.83	<0.001**
SCC	2.00 ± 1.17	1.33 ± 0.57	1.68 ± 0.85	1.67 ± 0.92	0.069+

Table 4. Comparison of variables in three groups studied - Day of complete drying.

Day of complete drying	EVP group (I)	Antibiotic group(II)	Control group(III)	Total	P value
pH	5.66 ± 0.83	6.69 ± 0.63	5.56 ± 0.71	5.97 ± 0.88	<0.001**
SCC	1.48 ± 0.55	1.50 ± 0.69	2.13 ± 1.37	1.70 ± 0.97	0.054+

Table 5. Comparison of variables in three groups studied - Day of Calving.

Day of Calving	EVP group (I)	Antibiotic group(II)	Control group(III)	Total	P value
pH	5.51 ± 0.76	5.67 ± 0.60	5.31 ± 0.63	5.50 ± 0.67	0.24
SCC	1.25 ± 0.34	1.90 ± 0.60	2.15 ± 0.95	1.77 ± 0.77	<0.001**

Table 6. Comparison of variables in three groups studied - 5th day of calving.

5th day of calving	EVP group (I)	Antibiotic group(II)	Control group(III)	Total	P value
pH	5.45 ± 0.79	5.53 ± 0.45	5.36 ± 0.76	5.44 ± 0.67	0.747
SCC	1.18 ± 0.24	1.65 ± 0.46	2.35 ± 0.95	1.73 ± 0.78	<0.001**

Statistical methods

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, **Assumptions:** 1. Dependent variables should be normally distributed, 2. Samples drawn from the population should be random, Cases of the samples should be independent.

Analysis of variance (ANOVA) has been used to find the significance of study parameters between three or more groups of patients. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis.

Significant figures

* Suggestive significance (P value: 0.05 < P < 0.10)

* Moderately significant (P value: 0.01 < P ≤ 0.05)

** Strongly significant (P value: P ≤ 0.01)

Statistical software: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

CONCLUSION

The present study indicates that the Ethno-veterinary preparation used as a dry cow therapy was effective in preventing mastitis. According to Ayurveda the formulation consisting of *Aloe vera*, *Curcuma longa* and *Calcium hydroxide* improves the status of metabolism (*Agni deepana*), cleanses the toxins in the body and the udder (*Amapachana*), pacifies the aggravated Pitta dosha and Raktha dooshya (*Pitta* and *Raktha Shamaka*), cleanses the channels of lactiferous glands (*Srotoshodaka*), cleans the wounds of lactiferous glands (*Vranashodaka* and *ropaka*), pacifies the inflammation due to infection (*Shothahara*) and decreases the microbial load (*Krimihara*)^[7].

The results of this study implicates that the group treated with Ethno-Veterinary preparation is having similar results that of the group treated with antibiotics and better results of the control group. So this study shows that the EVP preparation can be adopted by our dairy farmers during the dry period itself to prevent the mastitis after parturition. These practices not only prevent the diseases incidence but also very cost effective for the poor farmers having 2 or 3 dairy animals as their livelihood and also this helps in reducing the use of antibiotic and other veterinary drug in animal management.

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