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Impact of KVK interventions on sub-clinical mastitis in Dairy cattle using SFMT reagent: A case study of Sannapalle village of YSR Kadapa district

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Abstract

The main focus of this study was to assess the impact of KVK intervention on sub-clinical mastitis in cattle using the SFMT reagent. Subclinical mastitis is a major economic problem for livestock farmers, who are often unaware of this hidden form of disease that leads to significant production and economic losses. Hence, the study aimed to create awareness on the early diagnosis and management of Sub-clinical mastitis in livestock. This study was conducted in Sannapalle village of Khajipeta Mandal by adopting case study research design. A sample of village 60 dairy farmers was selected using the simple random sampling method. The results revealed that farmers gained the ability to diagnose the Subclinical mastitis at an early stage (within 1-2 days). The disease could be prevented at a relatively low cost (Rs. 600 - 800/-). As a result of this intervention, the entire village successfully prevented the disease and emerged as model for neighbor villages. A major constraint identified was the unavailability of post dip solution at the village level. Hence, it is recommended that the Dept. of Animal husbandry and KVK ensure regular supply of post dip solution to the farmers.

Keywords: Sub-clinical mastitis, SFMT reagent, diagnosis Sannapalle and case study

1. Introduction

Mastitis is one of the most important causes of economic losses in dairy farming. It refers to inflammation of Udder, which is especially common in crossbred cows and high milk yielding buffalos. This disease is usually caused by micro organisms that enter the udder through the teat canal. Major causative agents include streptococci, staphylococci, Corynebacterium, mycobacterium, E-coli etc. once infection occurs, symptoms may appear within a week. If not detected and treat in time, Mastitis can become chronic and permanently damage the udder tissues, leading to a sharp decline in milk production and serious economic loss to the farmers.

Causes and risk factors for Mastitis

- Improper cleaning of the udder and teats before milking
- Unclean hands of the milker
- Unhygienic cattle shed condition
- Irregular milking times and faulty milking method
- Incomplete milking, leaving residual milk in the udder

Types of Mastitis

The disease spreads in three stages, they are

1. Asymptomatic stage (Sub clinical)

This is the first stage of the disease. At this stage the disease is very dangerous. At this stage it is very difficult to detect the symptoms. Only a slight swelling of the uterus is seen. So if the disease is not detected and treated at this stage, the disease will turn into second stage and non-fatal.

2. Clinical symptomatic stage

Symptoms appear in this stage. The clinical stage of mastitis is characterized by lumps in the milk, discoloration of the milk, redness of the udder, firmness of the udder and feeling hot to touch.

3. Chronic stage

As it is very difficult to treat in the third stage, the disease should be detected and treated in the first stage. The chronic stage of mastitis is characterized by symptoms includes a

hard fibrotic udder, atrophy of affected quarter, reduced milk yield and poor milk quality such as flakes and clots.

Sannapalle village profile

Sannapalle is a small dairy based village in Khajipeta mandal of YSR Kadapa district, with 160 families, of which around 100 families depended mainly on dairy farming for their livelihood. The village is geographically located between the Kundu River and the KC canal, ensuring year

round water availability. Its proximity to nearby towns like Khajipeta, Chapadu and Kamalapauram further enhance the demand for milk and dairy products. The village has about 700 dairy cows and buffalos, predominantly high-yielding HF jersey and Graded Murrah breeds. However, it was observed that every 12-14 cattle, at least one suffered from sub-clinical mastitis, leading to considerable financial loss for the farmers.

Table 1: Sannapalle village profile

S. No.	Particulars	Details
1	Name of the village	Sannapalle
2	Mandal	Khajipeta
3	No of house holds	160
4	No of dairy farmers	100
5	No of cattle in the village	450 - Cows (HF Jersey) 250 - (Graded Murrah)
6	Farming situations	Irrigated Black soils and Irrigated Red soils
7	Main occupation	Dairy, Agriculture (Paddy + Fodder)
8	No. of animals diagnosed with sub clinical mastitis per month	12-14 per month
9	Total No. of animals diagnosed with sub clinical mastitis per month	156 (22.28%)

KVK Interventions

To address this issue, the Subject Matter Specialist (Animal Husbandry) of KVK, Utukur participated in diagnostic field visits and livestock knowledge school meetings at Sannapalle village, during these interactions, dairy farmers, veterinary officers and Gopal Mithras were sensitized about the seriousness of the Sub-clinical mastitis. The KVK scientist emphasized that "Prevention is better than cure", especially for Sub-clinical mastitis. Accordingly, the technical interventions of Krishi Vigyan Kendra, Utukur were introduced through:

- On-Farm Trials (OFTs)
- Front Line Demonstrations (FLDs)
- Training Programmes
- Method demonstrations and
- Group discussions

The primary objective of this study was to assess the impact of KVK's technical interventions in preventing subclinical mastitis using SFMT reagent in Sannapalle village of Khajipeta Mandal.

Critical inputs facilitated by Krishi Vigyan Kendra, Utukur

- Pre dip - 1:10000 ppm Potassium permanganate solution
- Post dip - 1% Povidine Iodine and 10% glycerin
- Trisodium citrate - 30g per day
- Teat dipper and milk test paddle
- Training Programmes and timely advices to the farmers

Methodology

The case study was undertaken after detailed discussions with the Subject Matter Specialist (Animal Husbandry) of KVK, Utukur, The Veterinary Assistant Surgeon of Eturu Village, Village Animal Husbandry Assistant and Gopal Mithras of Sannapalle village. A Case study research design, which involves intensive examination of single unit analysis, was adopted. The primary objective of this study was to assess the impact of KVK's technical interventions in

preventing subclinical mastitis using SFMT reagent in Sannapalle village. A total of 60 dairy farmers were selected as the sample through simple random sampling. Data were collected using a well structured interview schedule, focus group discussions and direct observations. The parameters were recorded from the respondents both before and after implementation of the KVK intervention.

Results

1. Adoption level of KVK intervention on sub-clinical mastitis in cattle with SFMT reagent

It is clearly evident from fig. 1 that, two-third of the beneficiary respondents (66.66%) had high level of adoption in the case of Trisodium citrate at the rate of 30g per day, Trisodium citrate helps to reduce the milk pH, hence, it is useful in controlling Mastitis. The high adoption rate of Trisodium citrate could be attributed to the fact that, after applying SFMT reagent, farmers are able to diagnosis the disease at the right time. This timely diagnosis enables them to take appropriate preventive measures, such as feeding of trisodium citrate at rate of 30g per day to the infected animals, which helps in reducing the disease incidence. Hence, the above adoption trend was observed. Similar findings was supported by the results of Nimbalkar *et al.* (2020) ^[6].

The perusal data presented in fig 1 shown that, with regard to intervention of 1% Povidine Iodine and 10% Glycerine solution, the majority of the respondents (88.88%) reported a high level of adoption. The solution being an antiseptic and disinfectant is widely used as a post-milking teat dip to prevent sub-clinical mastitis disease in cattle by reducing bacterial infection. The reason for above trend might be due to technological interventions introduced by KVK, Utukur which demonstrated a significant impact on both the prevention and management of mastitis through small simple tools such as teat dippers and milk test paddle. Furthermore, the technology cost - effective, easy to use and farmer friendly, which further contributed to its wider spread acceptance. The result derived support from the findings of Rahman *et al.* (2018) ^[7].

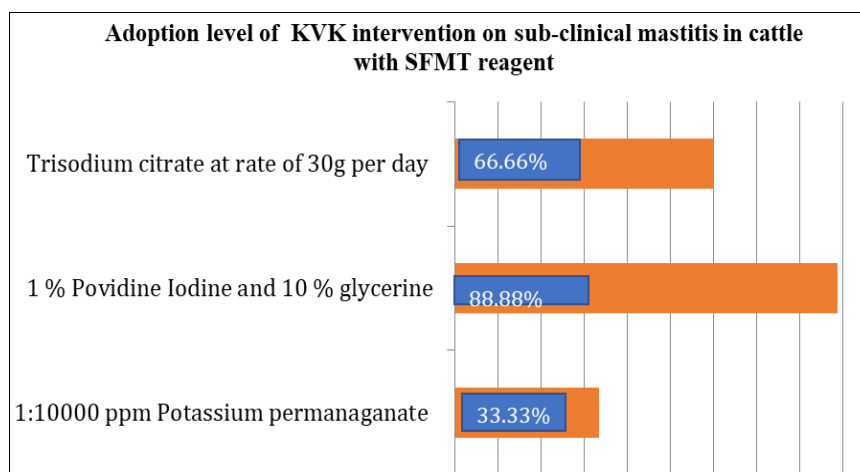


Fig 1: Adoption level of KVK intervention on sub-clinical mastitis in cattle with SFMT reagent

In the case of intervention of Pre dip with 1:10000 ppm Potassium permanganate solution, only one-third of the respondents (33.33%) reported a low level of adoption. The reason for above low adoption rate might be due to certain misconceptions among dairy farmers. Since the solution appears like light pink colour, many farmers believe that its use as a pre-dip could alter the colour of milk or cause spoilage, which discourages them from adopting the practice.

2. Impact of KVK intervention on sub-clinical mastitis in cattle

The data from Table 2 clearly indicates that, the time required for diagnosis reduced significantly from 5-6 days to just 1-2 days with the adoption of KVK intervention, thereby enabling farmers to initiate timely preventive measures. Overall, the intervention exhibited an 66 percent positive impact on the beneficiaries.

Table 2: Impact of KVK intervention on sub-clinical mastitis in cattle (n=60)

Particulars	Before KVK (for one Cattle) (Farmer Practice)	After KVK (for one Cattle) (S.F.M.T Method)	't' - value	'p' - value	Impact (%)
Time to diagnosis of subclinical mastitis	5-6 Days	1-2 Days	24.72	3.92	66
Treatment time to cure of subclinical mastitis	14Days	2Days	122.40	5.21	85.71
Loss due to lack of milk production during disease period (Rs.) (Days X Milk lits X Cost)	5600 (14 x 10x 40)	800 (2x10x40)	489.78	1.73	73.33
Subclinical mastitis treatment cost (Rs.)	3000-5000	800-1000	817.44	1.31	83.33
Loss due to reduced milk yield (During calving period)	18000	3000	137.71	5.19	112.5
Decreased incidence of Subclinical mastitis disease	40%	85%	47.51	4.94	75.00
Recurrence rate of Subclinical mastitis disease	60%	15%	45.75	4.32	66.66
Value of cattle infected with Subclinical mastitis (average)	30000	50000	23.19	1.22	66.00
Total impact					78.60
Statistical test: Paired t test					

**: Significant at 0.01 level of probability

An analytical look at the table 2 made it clear that, the treatment time required cure subclinical mastitis reduced extensively from 14 days before the KVK intervention to just 2 days after its adoption. This intervention showed a 85.71 per cent of impact on reducing the time taken for diagnosis. The possible reason could be that by adoption, the SFMT reagent reacts with infected milk, causing visible color changes and clot formation. This enables farmers to detect the disease at its initial stage, thereby preventing further complications. As a result, the economic loss due to reduced milk production during the disease period was minimized. Overall, the intervention demonstrated on 85.71% positive impact on the beneficiaries. The findings were in accordance with the studies conducted by Kurjogi M.M. and Kaliwal B.B. (2014) [5].

As evident from the table 2, The loss due to lack of milk production during the disease period was reduced from Rs.

5,600 ($14 \times 10 \times 40$) before the KVK intervention to only Rs. 800 ($2 \times 10 \times 40$) after intervention, which indicates 73.33 percent positive impact on the beneficiaries. The probable reason for above trend might be that early diagnosis and timely treatment, which shortened the disease duration from 14 days to just 2 days, thereby minimizing milk yield losses. The result derives support from the findings of Kucevic *et al.* (2013) [4].

It is transparent from the table 2 that, the cost of treatment for subclinical mastitis reduced significantly after the KVK intervention, from about Rs. 3000-5000/- to just Rs. 800-1000/-. This intervention has created 83.33% impact on the beneficiaries. The probable reason could be that, with the help KVK intervention, farmers were able to diagnose the infection at an early stage and take preventive measures, thereby lowering treatment costs. In contrast, before the KVK intervention, farmers were unable to detect the

infection early and often relied on ethno-veterinary practices, which led to higher treatment expenses. This finding was in line with the finding of Biradar *et al.* (2022) [2].

An outlook from the Table 2, it is evident that with the adoption of KVK intervention, 40 percent decrease in the incidence of subclinical mastitis was recorded, in contrast to the 85 percent recurrence of the disease observed before adoption. The probable reason is that, use of pre-dip and post-dip solutions, which facilitated early detection of the disease. Furthermore, supplementation with Trisodium Citrate at 30 g per day contributed to rapid recovery and effective management of the infection. Similar findings were observed by Nimbalkar *et al.* (2020) [6].

It is keenly observed from the Table 2 clearly showed that, The loss due to reduced milk yield during the calving period declined markedly from Rs. 18,000 before the KVK intervention to Rs. 3,000 after the intervention, indicating a 112.5% positive impact. The reason could be that early diagnosis and timely management of subclinical mastitis, which helped maintain milk production levels and substantially reduced economic losses. Similar findings were reported by Kasinath and Reddy (2010) [3].

It is obvious from the data in table 2, the recurrence rate of subclinical mastitis reduced considerably from 60% before the KVK intervention to just 15% after its adoption, showing a 66.66% positive impact on the beneficiaries. The probable reason could be that, early detection using the SFMT reagent and the adoption of preventive measures, which minimized repeated infections and improved udder health. This finding was in line with Sharma *et al.* (2007) [8].

It is clear from the data in table 2 states that the average value of cattle infected with subclinical mastitis increased from Rs. 30,000 before the KVK intervention to Rs. 50,000 after the intervention, reflecting a 66% positive impact with KVK intervention. This improvement can be attributed to early diagnosis and effective management practices, which helped in maintaining better animal health, thereby enhancing their market value. This finding was in tune with Bansal & Gupta (2009) [1].

Overall, the paired comparison test across all parameters indicated that KVK interventions had created 78.60 percentage total impact on the beneficiaries of dairy farmers and it confirming that KVK interventions were highly effective in reducing disease incidence, lowering treatment costs, minimizing production losses, and improving cattle value.

Conclusion

The study clearly indicates that the adoption of KVK interventions had a significant positive impact on the management of subclinical mastitis in dairy cattle. Early diagnosis using the SFMT reagent, coupled with preventive and curative measures such as Trisodium Citrate supplementation and pre- and post-milking hygiene practices, led to a substantial reduction in disease incidence, recurrence, treatment time, and economic losses. Farmers benefited through lower treatment costs, improved milk yield, reduced production losses, and enhanced market value of cattle. Overall, the interventions proved to be cost-effective, farmer-friendly, and sustainable strategies for controlling subclinical mastitis, thereby improving both

animal health and the economic well-being of dairy farmers. The collective effort not only benefitted Sannapalle village but also set a progressive example for other villages in the YSR Kadapa district.

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