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Economic loss due to milk fever in dairy animals of Tamil Nadu

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Abstract
Milk fever is a major metabolic disorder in dairy cattle occurring around calving, leading to reduced milk yield, impaired reproduction, and substantial economic losses. Stratified random sampling procedure was adopted to select the dairy farmers from the selected district, blocks and villages. A total of 120 farmers (3 districts X 2 Blocks X 2 Villages X 10 Respondents) were selected and data was collected. The average milk loss per affected dairy animal was 276.67 litres with the value of loss accounted for Rs. 8,899. Total direct economic loss in dairy animals subsequent to the incidence of milk fever in a single lactation was estimated to be Rs.4,322.82 in dairy cows and Rs.1,323.33 in buffaloes whereas the total indirect economic loss was estimated to be Rs.18,445.30 in dairy cows and Rs.6,666.67 in buffaloes. Total economic loss in dairy animals affected with milk fever was Rs. 22,768.12 for cows and Rs.7,990.00 for buffaloes. Overall, it was estimated that economic loss in dairy animals affected with milk fever was Rs. 22,398.67 of which 81.04% (Rs. 18,150.83) was contributed by the indirect losses like reduction in milk yield and distress sale whereas 18.96% (4,247.83) was contributed by direct losses like expenditure incurred towards treatment of milk fever affected animals by veterinarians, purchase of medicines; purchase of oral supplements and incidental charges.

Keywords: Milk fever, dairy, loss, yield, expenses, veterinary, medicine

Introduction
The production diseases of dairy cow are a manifestation of the cow's inability to cope with metabolic demands of high production and they continue to be a cause of economic loss to the dairy industry (Mulligan and Doherty, 2008) [2]. Milk fever is one of the major metabolic diseases that affect dairy animals within 48-72 hours of calving, which might even appear 10 days before and after calving although sometimes it may occur in late lactation (Radostits *et al*., 2007) [4]. During this period the animal is tremendously challenged to maintain calcium homeostasis. Milk fever management is economically most important, as it results in not only reduction in milk production, but also loss of animals. As a result, this disease becomes extremely important from the economic view point. The economic implications of animal diseases are becoming increasingly important at both farm and national levels, especially in cross breeds which are easily more susceptible to diseases (Thirunavukkarasu *et. al*., 2010) [6]. Disease outbreak among dairy cows constitutes a problem both in terms of financial losses (value of dead cow, decreased production and extra labour) and compromised animal welfare (Thomsen and Houe, 2006) [7]. The reproductive capability of animal is a major concern in its economic value in dairy farming and frequently related to peri-parturient events because any undesirable health related events during this period might result in tremendous economic losses to farmers. The estimation of the effects of these diseases on milk production, fertility and survival is of great importance to assess the cost-benefits of diagnosis, treatment and prevention efforts. Quantification of economic losses due to milk fever is important to help in understanding the economic impact of this disease, which can aid in avoiding losses in dairy farming. A deeper insight into the animal diseases will help to provide a better view of the overall economic losses and the extent to which these losses could be avoided.

Materials and Methods

The districts of Tamil Nadu were classified into low, medium and high category based on cattle and buffalo population (20th Livestock Census, 2019) [1] by using Dalenius-Hodges stratification procedure. From each category, one district was randomly selected *viz*., Karur (Low), Namakkal (Medium) and Salem (High).From each selected district, two blocks were selected randomly and from each block two villages were randomly selected for the study. Stratified random sampling was adopted in the present study. A sampling frame was developed with the farmers in the villages based on the incidence of milk fever in consultation with veterinarians of animal husbandry department, cooperatives and private diaries. From the sampling frame, 10 respondents were randomly selected from each village. Thus, a total of 120 farmers (3 districts X 2 Blocks X 2 Villages X 10 Respondents) were selected and data was collected through personal interview methods using pre-tested interview schedule.

Results and Discussion

Economic loss due to reduction in milk yield in dairy animals affected with milk fever

The results from table 1 show that 299.10 litres of milk was lost per exotic / cross bred dairy cows in a single lactation due to milk fever. In monetary terms, the loss in milk yield due to milk fever was estimated as Rs. 9,620.72 per affected exotic / cross bred dairy cow. Interestingly, the dairy farmers reported that no loss was observed in case of native cows and buffaloes due to milk fever which might be due to their low milk yield. Overall, the average milk loss per affected dairy animal during the entire lactation after the incidence of milk fever was 276.67 litres which accounted for Rs. 8,899.17 per dairy animal.

Table 1: Economic loss due to reduction in milk yield in dairy animals affected with milk fever

Particulars	Exotic / Crossbred Cows		Native Cows		Buffaloes		Overall	
	No of animals	Loss of milk (In lts)	No of animals	Loss of milk (In lts)	No of animals	Loss of milk (In lts)	No of animals	Loss of milk (In lts)
Average quantity of milk lost per animal	111	299.10	6	0	3	0	**120**	**276.67**
Value of milk loss per animal	Rs.9,620.72		0		0		Rs.8,899.17	

These findings are in line with results of Kossaibati and Esslemont (1997) who reported that the economic loss due to milk fever in Holstein cows as 200 litres per animal, costing Rs. 4,716(£40) for a mild case and 500 litres per animal, costing Rs. 11,790 (£100) for a severe case of milk fever in England.

Direct economic loss in dairy animals affected with milk fever

The direct economic loss in dairy animals are mainly due to expenditure incurred towards treatment of milk fever affected animals by veterinarians, purchase of medicines for treatment; purchase of oral supplements for follow-up and maintenance; and other incidental charges like hired labour for transport and taking care of milk fever affected dairy animals. The total direct economic loss in dairy animals subsequent to the incidence of milk fever in a single lactation was estimated to be Rs. 4,322.82 in dairy cows and Rs.1,323.33 in buffaloes. Overall it was estimated that Rs. 4,247.83 was incurred as total direct economic loss (A) in a single lactation in the dairy animals which are affected with milk fever.

Results from the Table 2 clearly indicates that dairy farmers spent Rs.2,654.27 towards the purchase of medicines and treatment of milk fever affected dairy cows whereas Rs.833.33 only was spent for purchasing medicines and treatment of milk fever affected buffaloes. Overall, dairy farmers spent Rs. 2,608.75 for purchasing medicines and treating their bovines affected with milk fever by qualified veterinarians which accounted for 61.41% of the total direct economic loss in dairy animals due to milk fever in a single lactation, which emphasized the need for early treatment of milk fever cases to be the first priority of the farmers, since the delay in treatment could further reduce milk yield or even lead to fatality.

Table 2: Direct economic loss in dairy animals affected with milk fever

S. No.	Particulars	Cows affected with milk fever (N=117)		Buffaloes affected with milk fever (N=3)		Overall (N=120)	
		Cost (In Rs)	%	Cost (In Rs)	%	Cost (In Rs)	%
1	Expenses on veterinary services & medicines	2,654.27	61.40	833.33	62.97	2,608.75	61.41
2	Purchase of oral supplements	1,124.10	26.00	490.00	37.03	1,108.25	26.09
3	Incidental charges (Transport, machine, labour)	544.44	12.60	0.00	0.00	530.83	12.50
Total Direct Loss (A)		4,322.82	100.00	1,323.33	100.00	4,247.83	100.00

Similarly, dairy farmers spent Rs.1,124.10 towards the purchase of oral supplements for their milk fever affected dairy cows whereas Rs.490 only was spent by the dairy farmers for purchasing oral supplements for milk fever affected dairy buffaloes. Overall, dairy farmers spent Rs. 1,108.25 towards purchase of oral supplements for their milk fever affected bovines which accounted for 26.09% of the total direct economic loss in dairy animals due to milk fever in a single lactation. The dairy farmers also expressed that Rs.544.44 was incurred as incidental charges for the treatment of milk fever affected dairy cows. No incidental expenses were incurred in case of buffaloes since these animals tend to recover very fast and don't require any hospitalization unlike the crossbred cows. The incidental charges accounted for only 12.50% of the total direct economic loss in dairy animals due to milk fever in a single lactation.

These findings are in line with the results of Thirunavukkarasu *et al*., (2010) [6] who estimated that the average loss per animal due to the treatment of milk fever was higher for cows (Rs. 618 per cow) than buffaloes (Rs. 488 per buffalo) and the average loss due to treatment being Rs. 608 per dairy animal. However, it can be justified that cost of veterinary services, medicines and oral calcium supplements have risen over time. In addition, the use of machines for lifting recurrent case of milk fever affected animals has grown in recent years. Similarly, Senthilkumar *et al*., (2016) [5] also

estimated that Rs.641.25 was towards direct loss for milk fever affected dairy cows. Puri *et al*., (2025) [3] also estimated that the average direct loss encountered by the dairy farmers in Uttar Pradesh was Rs. 1,319.80 per cow affected by milk fever.

Indirect economic loss in dairy animals affected with milk fever

The indirect economic losses in dairy animals are mainly due to loss in milk yield consequent to milk fever incidence for the entire lactation and selling the affected animals for throw away prices fearing relapse and recurrence. The total indirect economic loss in dairy animals subsequent to the incidence of milk fever in a single lactation was estimated to be Rs. 18,445.30 in dairy cows and Rs.6,666.67 in buffaloes. Over it was estimated that Rs. 18,150.83 was incurred as total indirect economic loss (B) in a single lactation in the dairy animals which are affected with milk fever.

Table 3: Indirect economic loss in dairy animals affected with milk fever

S. No.	Particulars	Cows affected with milk fever (N=117)		Buffaloes affected with milk fever (N=3)		Overall (N=120)	
		Cost (in Rs)	%	Cost (in Rs)	%	Cost (in Rs)	%
1	Loss due to milk yield	9,127.35	49.48	0.00	0.00	8,899.17	**49.03**
2	Loss due to distress sale	9,317.95	50.52	6,666.67	100.00	9,251.67	**50.97**
Total Indirect Loss (B)		18,445.30	100.00	6,666.67	100.00	18,150.83	100.00

Results from the table 3 indicates that Rs.9,127.35 was lost due to reduction in milk yield in the entire lactation subsequently the dairy cows were affected with milk fever. However, no milk yield loss was reported in case of buffaloes because there was no significant reduction in the milk yield despite the incidence of milk fever. Overall, it was estimated that Rs. 8,899.17 was incurred as loss due to milk yield reduction consequent to the incidence of milk fever in their bovines which accounted for 49.03% of the total indirect economic loss in dairy animals affected with milk fever. Similarly, the dairy farmers also incurred Rs. 9,317.95 and Rs. 6,666.67 as economic loss in cows and buffaloes respectively due to distress sale of their dairy animals affected with milk fever. Overall, it was estimated that Rs. 9,251.67 was incurred as loss due to distress sale consequent to the incidence of milk fever in their bovines which accounted for 50.97% of the total indirect economic loss in dairy animals affected with milk fever. These findings are in contrast with the results of Thirunavukkarasu *et al*., (2010) [6] who estimated that the average loss due to mortality and culling was Rs. 105 per affected cow.

Overall economic loss in dairy animals affected with milk fever

The results from the table 3 clearly indicates that the overall economic loss in dairy animals affected with milk fever was Rs. 22,768.12 for cows and Rs. 7,990.00 for buffaloes. This difference in the economic losses between cows and buffaloes was mainly explained due to apparent loss of milk yield, treatment expenditure of milk fever affected animals, purchase of medicines and oral supplements subsequent to the milk fever incidence in cows than buffaloes. Overall, it was estimated that economic loss in dairy animals affected with milk fever was Rs. 22,398.67of which 81.04% (Rs. 18,150.83) was contributed by the indirect losses like reduction in milk yield and distress sale whereas 18.96% (Rs. 4,247.83) was contributed by direct losses like expenditure incurred towards treatment of milk fever affected animals by veterinarians, purchase of medicines; purchase of oral supplements and incidental charges.

Table 4: Overall economic loss in dairy animals affected with milk fever

S. No.	Particulars	Cowsaffected with milk fever (N=117)		Buffaloesaffected with milk fever (N=3)		Overall (N=120)	
		Cost (in Rs)	%	Cost (In Rs)	%	Cost (In Rs)	%
1	Total Direct Loss (A)	4,322.82	18.99	1,323.33	16.56	4,247.83	18.96
2	Total Indirect Loss (B)	18,445.30	81.01	6,666.67	83.44	18,150.83	81.04
Overall Economic Loss (A+B)		22,768.12	100.00	7,990.00	100.00	22,398.67	100.00

These findings are contrast with results of Thirunavukkarasu *et al*., (2010) [6] who estimated that the total economic loss due to milk fever for a dairy cow was Rs. 1,068 and for a buffalo was Rs. 665 and the overall economic loss due to the incidence of milk fever in a dairy bovine was estimated as Rs. 1,039 in a single lactation. Similarly, Senthilkumar *et al*., (2016) [5] also estimated that the total loss in a milk fever affected cow was Rs.802.60 and buffalo was Rs.871.19 per incidence. Overall, the total loss in a milk fever affected bovine was Rs.818.30 per incidence. This wide cost variation might be due to severe or recurrent cases of milk fever, demanding repeated interventions, leading to higher treatment frequency, prolonged recovery and greater cumulative losses.

Conclusion

The present study reaffirms that milk fever is a critical production disease with profound implications for farm-level profitability and dairy sector sustainability, with crossbred cows being more affected than native cattle and buffaloes. Indirect economic loss arising from reduced milk yield and distress sales of milk fever affected animals were observed to constitute the major share of the total economic impact accounting for more than 80 percent of the overall economic loss. The average overall economic loss per affected dairy animal was estimated at Rs. 22,398.67, with losses per cow (Rs. 22,768.12) far exceeding that of buffaloes (Rs. 7,990.00). The findings underscore the need for targeted disease prevention and control strategies to mitigate the adverse economic implications of milk fever, particularly in high-yielding crossbred animals that are inherently more susceptible. Breed-specific management approaches, encompassing timely mineral supplementation, balanced nutrition and regular veterinary supervision are imperative to reduce the incidence of milk fever and its associated costs. Moreover, strengthening farmer awareness and extension services regarding early detection and intervention can contribute significantly to minimizing both direct and indirect economic losses.

Conflict of Interest
Not available

Financial Support
Not available

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