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Occurrence and Management of Milk Fever in Dairy Cows at Keraniganj, Dhaka

Khadija Akter Bristy, Mim An Jahan and Md Najmul Haque*

Department of Dairy Science, Faculty of Animal Science and Veterinary Medicine, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh.

***Corresponding author:** Dr. Md Najmul Haque, E-mail: mnhaque.dasc@sau.edu.bd

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ABSTRACT

Milk fever is a metabolic disorder that affects high-yielding dairy cows during the periparturient period and causes significant economic losses by reducing milk production, increasing treatment costs, and leading to other complications. This study was conducted in Keraniganj Upazila, Dhaka, from 25 August to 9 September 2025, to assess the occurrence, management, and other risk factors associated with milk fever in dairy cows in small- and medium-scale farms. A total of 36 dairy farms with 150 cows were evaluated using a structured questionnaire through face-to-face interviews. The study revealed that about 86.11% of the examined cows were affected by milk fever, with Kathaltali showing the highest incidence (83.87%). Multiparous cows and cows in 2nd to 3rd lactation showed the highest occurrence (58.06%); however, primiparous cows showed no cases of milk fever. The observed major clinical signs were inability to stand (45.2%) and loss of appetite (32.3%). Intravenous calcium borogluconate was administered, which has high efficacy with a 93.5% successful recovery rate. Additionally, cows receiving pre-calving calcium supplementation showed a lower occurrence rate (43.4%). So, milk fever was frequently observed in dairy cows, particularly in multiparous cows, especially those in the 2nd to 3rd lactation. According to the results, lactation stage and parity are the risk factors for milk fever prevalence. Intravenous calcium therapy showed a significant recovery rate; however, pre-calving calcium supplementation was associated with a lower recovery rate.

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Introduction

Livestock plays a crucial role in ensuring food and nutritional security, employment opportunities, and better livelihoods for rural people and the national economy of Bangladesh. Among the ruminants, dairy cattle are the most important livestock subunit as they provide smallholder farmers with revenue, manure, and draft power (FAO, 2008). The cattle population in Bangladesh exceeds 250 million (DLS, 2024), and dairy production is rapidly expanding nationwide. Millions of cattle are usually reared under semi-intensive and intensive production systems, where the population of crossbred high-yielding dairy cows is increasing. Genetic improvement through crossbreeding has enhanced milk production, but it has also made cows more prone to metabolic disorders, especially during the postpartum period. Dairy cows are particularly susceptible to metabolic diseases such as milk fever, ketosis, and hypomagnesemia during the parturient phase; among these, milk fever (parturient hypocalcemia) is one of the economically significant and most commonly occurring disorders that affects the productivity of high-yielding dairy cows (Mann *et al*., 2019). Though this is not contagious, it is a major concern in dairy herd health management due to its high prevalence and severe consequences.

Milk fever is a metabolic disorder characterized by acute hypocalcemia that usually develops after calving, typically between 24 and 72 hours postpartum. It is frequently detected in high-yielding cows calving regularly, which is associated with poor calcium regulation (Kabir *et al*., 2022). Due to the sudden increase of calcium for colostrum formation and milk synthesis, there is a sharp reduction in blood calcium level around the time of parturition (Roche *et al*., 2013). Because calcium is necessary for smooth muscle function, muscle contraction, enzyme activation, and neuromuscular transmission, hypocalcemia disrupts the nervous system and muscle activity (Constable *et al*., 2016). Besides higher production, other factors, such as older age and poor nutritional management during the dry period and the early postpartum period, are also reported to be linked to milk fever (Sammad *et al*., 2022). Clinical signs of milk fever include muscle tremors, weakness, recumbency, cold extremities, and impaired rumen motility, and severe untreated cases may lead to coma or death (Constable *et al*., 2016). Moreover, subclinical hypocalcaemia is also common and significantly predisposes cows to secondary postpartum conditions such as retained placenta, metritis, mastitis, displaced abomasum, and impaired reproductive and productive performance (Martinez *et al*., 2016). From an epidemiological perspective, milk fever is more common in highly productive dairy herds. According to Reinhardt *et al*., (2011), subclinical hypocalcaemia can affect over 50% of multiparous cows; however, the incidence of clinical milk fever usually varies from 3% to 10% of calvings.

Milk fever has a significant economic impact. Financial losses were due to lower milk production, poor reproductive health, reduced immune responses, and higher culling rates (Pacheco *et al*., 2018). These losses have a direct impact on household income and farm profitability. Like other parts of the country, Keraniganj is a peri-urban area near Dhaka, where dairy farming has expanded rapidly due to high milk demand and convenient market access. However, a very limited study was conducted focusing on the

occurrence of milk fever and its management. We hypothesized that inadequate nutritional management during the transitional period is considerably associated with the occurrence of milk fever in lactating dairy cows in Keraniganj, Dhaka. Therefore, the objective of this study was to determine the prevalence of milk fever in dairy cows under the existing feeding system and management practices in the Keraniganj area.

Materials and methods

Study area and sample size

The research work was conducted in Keraniganj Upazila of Dhaka, from 25 August to 9 September, 2025. Data were collected through farm visits to different unions of Keraniganj Upazila. Both indigenous and crossbred dairy cows under small- to medium-scale farms were considered.

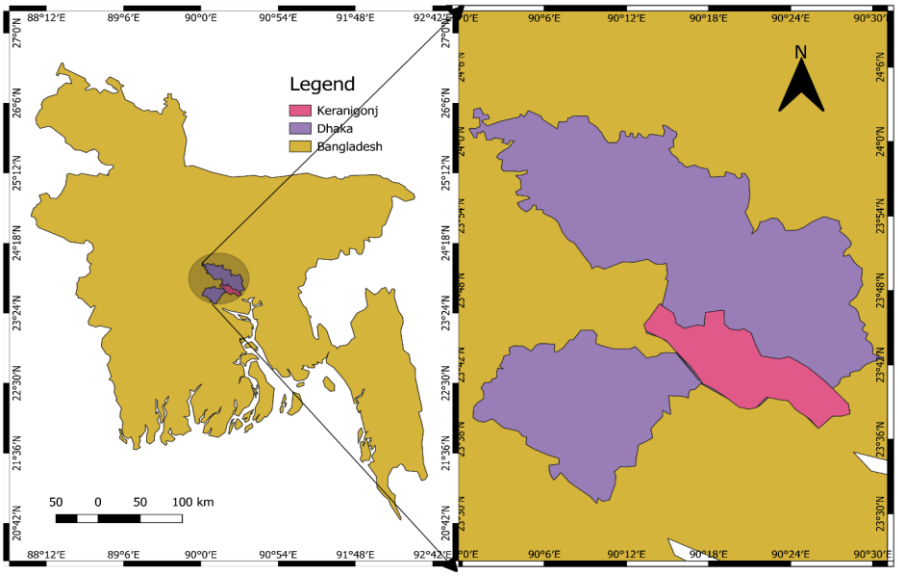

Figure 1. Geographical location of Keraniganj upazila

A total of 36 dairy farms with 150 dairy cows were considered. The farms were categorized into small, medium, and semi-commercial-scale operations based on herd size and management practices. The farm was treated as a single experimental unit, with the cows as replications.

Data collection

A structured questionnaire was designed to collect both quantitative (number of farms, herd size, age of cows, parity, lactation stage, number of affected animals, recurrence cases, recovery time, and mortality) and qualitative information (type of farm, housing system, feeding practices, mineral supplementation, season, and

management practices) related to the occurrence and management of milk fever in dairy cows at Keraniganj upazila. Data were collected using the questionnaire through face-to-face interviews with dairy farm owners or workers in Keraniganj, upazila, Dhaka.

Statistical analysis

Initially, the data were inserted into MS Excel 2019. Exploratory analysis and descriptive statistics were performed to present the parameters as percentages or means. The values were compared using ANOVA, considering a 95% confidence interval.

Results and Discussion

This study evaluated the occurrence, management strategies, clinical signs, recurrence patterns, and related risk factors of milk fever in the Keraniganj area. The results of different parameters are presented in the following subheadings.

Geographical distribution of milk fever

Geographical distribution showed an important factor in milk fever occurrence in the present study (Table 1). The size and density of cases in Kathaltali were significantly higher ($p<0.05$), while Chandipur, Nayabajar, and Vawal accounted for only a small percentage of the overall cases. Previous studies have shown that variations in milk fever prevalence are frequently driven by farm intensity and nutritional management rather than solely by environmental factors (Martinez *et al*., 2016; Saborío-Montero *et al*., 2017). The risk of milk fever is considerably higher in areas experiencing rapid dairy expansion, where transition cows are not properly nutritionally managed (Roche *et al*., 2013; Lean *et al*., 2014). Furthermore, risk is increased in areas with intensively managed dairy farms, probably due to the lack of effective preventive measures such as dietary calcium, dietary cation-anion difference (DCAD) modification, and magnesium supplementation (Reinhardt *et al*., 2011).

Table 1. Geographical distribution of milk fever

Geographical location	Affected cases	Percentage (%)
Kathaltali	26	83.87
Chandipur	3	9.68
Nayabajar	1	3.23
Vawal	1	3.23

Occurrence of milk fever in relation to milk production

As shown in Figure 2, milk production was associated with a higher risk of developing milk fever in the present study. As milk production gradually increased, the risk of milk fever increased as well. The highest percentage of milk fever cases occurred in cows that produced more than 11 L/day, whereas the group with the lowest production (<5 L/day) had the lowest incidence. This pattern shows a positive correlation with milk production and the occurrence of milk fever. According to Hernandez and McArt (2023), calcium loss was directly correlated with milk production. McArt *et al*., (2020) found that during the transition period, the production level amplifies the calcium regulation, which increases the susceptibility to the disease.

The reason for this association is a biological process that includes slower intestinal calcium activation mediated by parathyroid hormone and 1,25-dihydroxyvitamin D_3, enhanced colostral calcium synthesis, and a limited rate of bone calcium mobilization (Goff *et al*., 2020). In high-yielding cows, these mechanisms may not be enough to meet the rapid calcium demand, making them susceptible to milk fever.

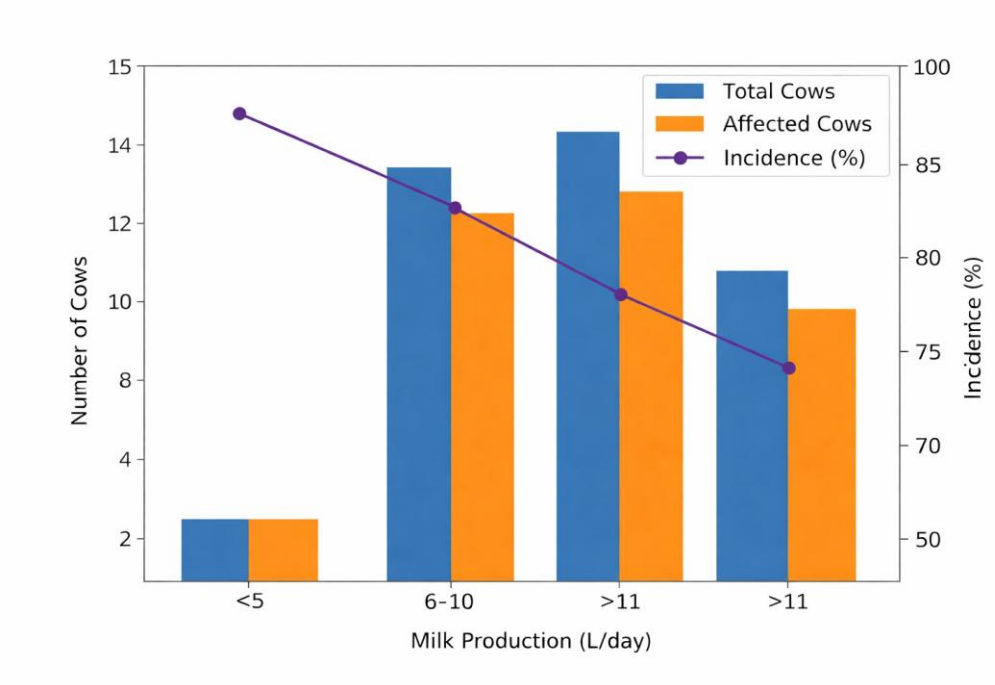

Figure 2. Occurrence of milk fever in relation to milk production

Lactation stage and occurrence of milk fever

The lactation stage was one of the major indicators of milk fever (Figure 3). No milk fever was found in their first lactation, whereas the majority of milk fever cases were observed in the 2nd and 3rd lactations (58.06%), followed by cows in their 4th lactation (41.94%). Multiparous cows were more vulnerable ($p<0.05$) than primiparous cows, and milk fever risk increased with increasing lactation number.

According to Reinhardt and Lippolis (2018) and Lean *et al*., (2019), multiparous cows are the most susceptible to milk fever. Higher milk production and increased metabolic stress during early lactation make cows more vulnerable to milk fever during their second lactation (Venjakob, 2018). While the number of lactations increases, cows show decreased calcium absorption, slower activation of calcium-regulating systems during calving, and lower efficiency of releasing calcium from bone. Also, reduced production of active vitamin D derivatives and a reduced response to parathyroid hormone further limit older cows' capacity to rapidly elevate blood calcium levels after giving birth, increasing the risk of milk fever (Reinhardt & Lippolis, 2018; Lean *et al*., 2019).

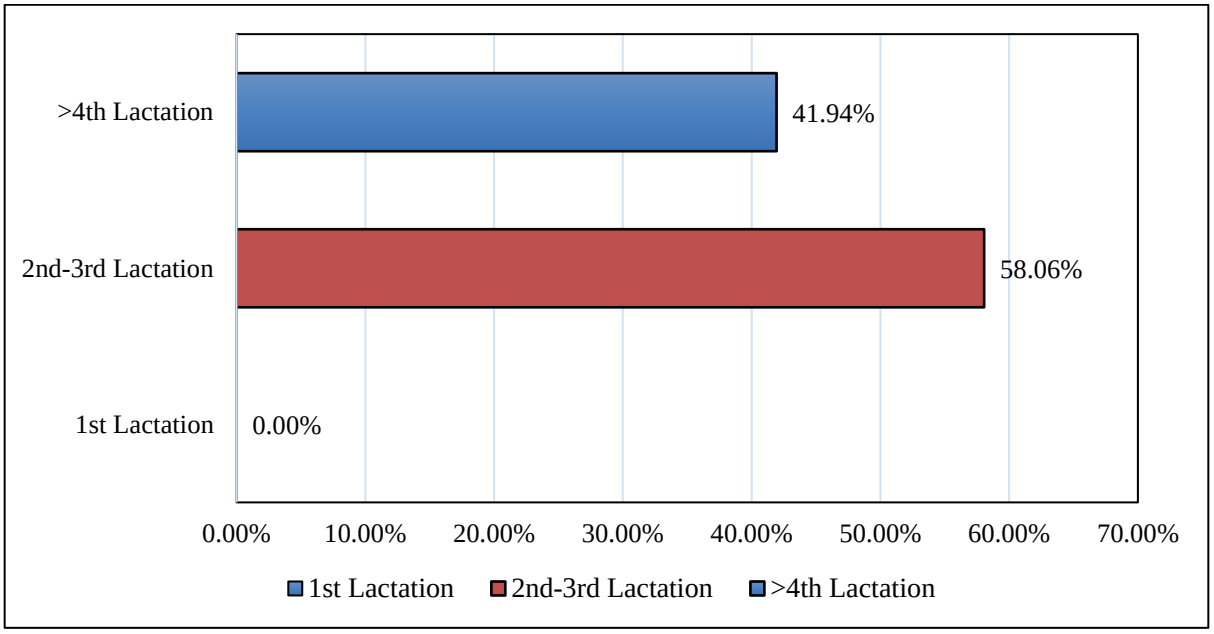

Figure 3. Occurrence of milk fever according to lactation stage

Clinical signs and symptom patterns

The pattern of clinical symptoms seen in dairy cows with milk fever is shown in Figure 4. In this study, the most common clinical sign recorded was difficulty standing, either alone or combined with shivering and appetite loss, indicating that neuromuscular dysfunction was the disease's predominant feature. These findings are consistent with other studies (Reinhardt & Lippolis, 2018; Hernandez & McArt, 2023), which reported recumbency as the primary clinical sign. According to a recent study, recumbency is one of the most common early signs, along with decreased feed intake and mild neuromuscular weakness, indicating mild to severe hypocalcemia. The progressive nature of clinical signs of milk fever is further supported by metabolic and physiological studies, which demonstrate that cows displaying severe symptoms, such as prolonged

recumbency and shivering, undergo significant disruptions in calcium-dependent metabolic pathways during the periparturient period (Zwierzchowski *et al*., 2024). The clinical signs of milk fever explain the essential role of calcium in neuromuscular function. During calving, a sharp drop in blood calcium levels impairs nerve impulse transmission and muscle contraction, resulting in weakness, anorexia, and eventually, the inability to stand. Shivering indicates advanced hypocalcemia and prolonged medical treatment (Reinhardt & Lippolis, 2018).

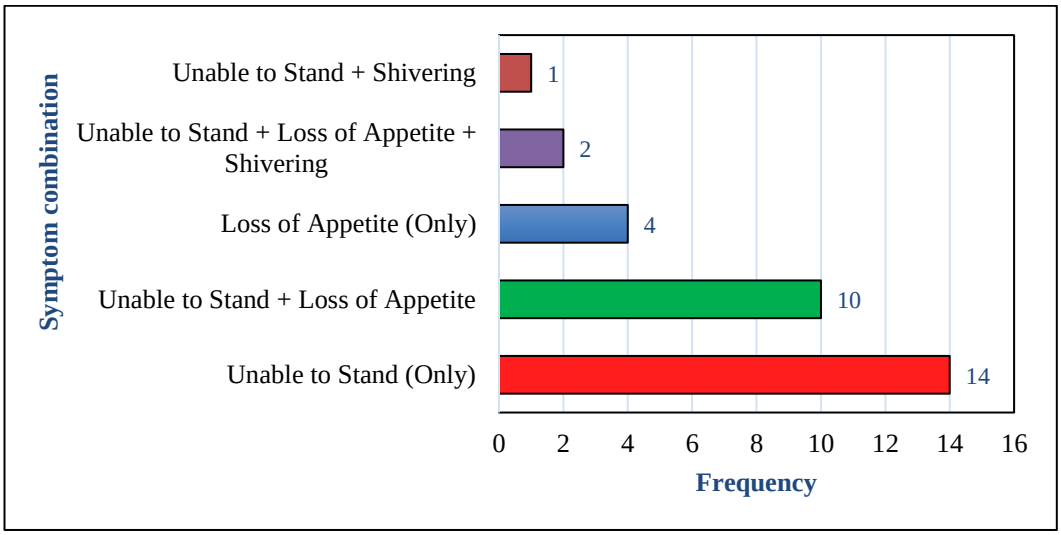

Figure 4. Observation of symptoms

Treatment outcome

Figure 5 shows the treatment outcome. Timely therapeutic management increased the survival rate (93.5%) ($p<0.05$), whereas mortality accounted for only 6.5% of affected cases in milk fever. Hernandez and McArt (2023) noted that early clinical management improves outcomes and reduces the risk of death. If treatment is delayed or a calcium imbalance occurs, it may cause a risk of death for animals. According to epidemiological studies, clinical milk fever mortality is relatively low, around 5-10%, yet the risk increases with the severity of the condition (Bzuneh et al., 2020).

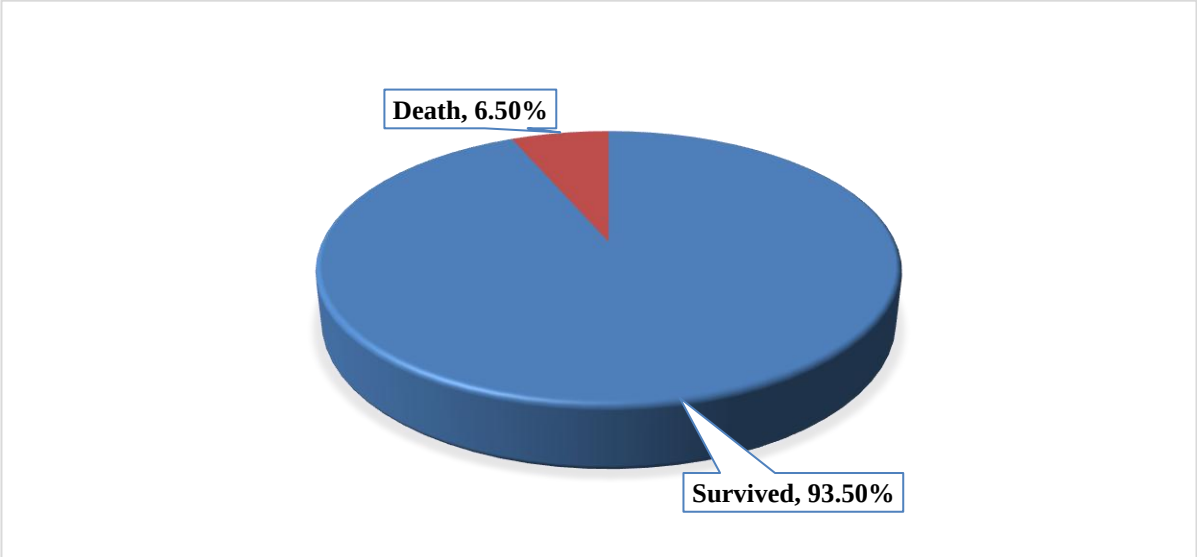

Figure 5. Treatment outcome of milk fever

Recovery time following methods

The treatment method was the key factor influencing the management outcome of the milk fever cases (Figure 6). Among the methods, calcium injection is indicated for its quick, consistent ability to raise blood calcium levels in cows with clinical conditions. Also, oral calcium is used frequently in mild or subclinical cases, and injectable calcium is used in moderate to severe cases because it corrects hypocalcemia immediately. A study by Opgenorth *et al*., (2025) found that intravenous calcium and calcium boluses both reduced hypocalcemia during an immune challenge. In addition, Braun *et al*., (2012) observed that, in the case of milk fever, the combined use of intravenous and oral calcium resulted in better clinical outcomes than intravenous calcium alone. This suggests that oral supplementation can support IV administration in cases of acute clinical hypocalcemia, but it cannot replace intravenous calcium for rapid correction. Some studies support the idea that, in recumbent, hypocalcemic cows, intravenous calcium should be the first-line treatment, and oral calcium should be used as a supplement in less severe cases (Constable *et al*., 2017).

The rationale for using intravenous calcium as a treatment is that milk fever lowers blood calcium levels due to the sudden drop in calcium required for colostrum and milk synthesis. After giving the intravenous calcium therapy, it raises extracellular calcium levels and restores neuromuscular function (Reinhardt & Lippolis, 2018).

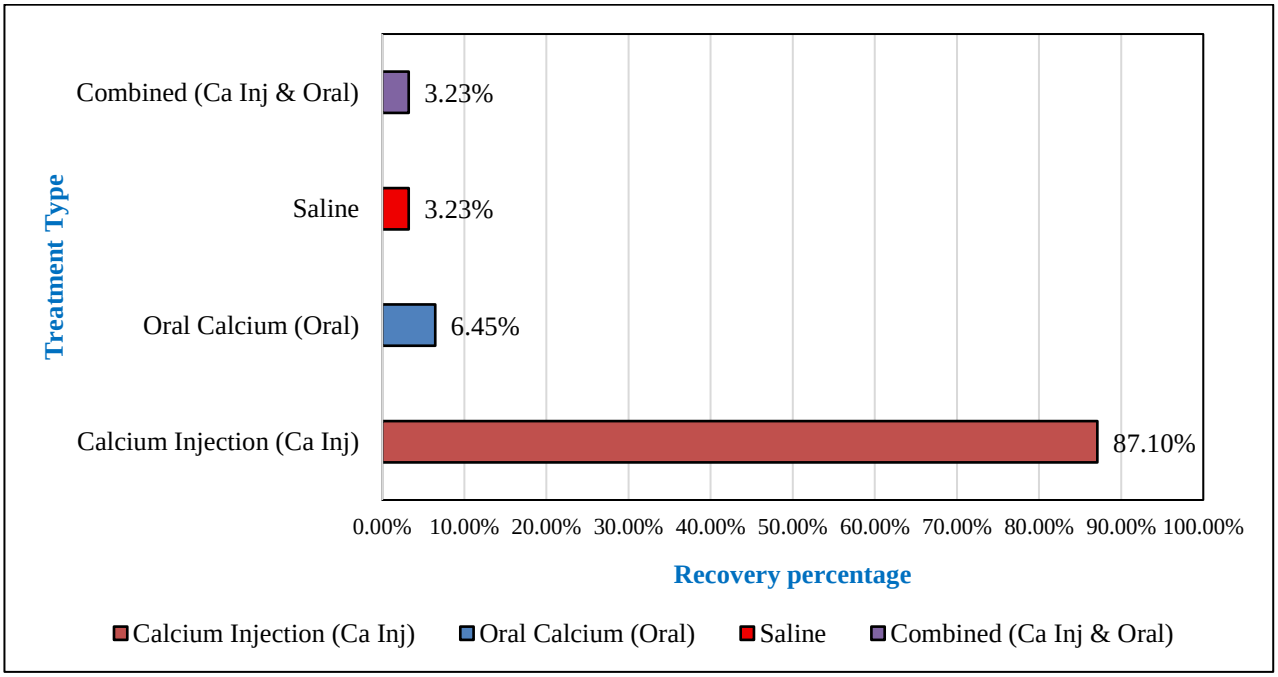

Figure 6. Treatment methods vs recovery time

Balanced feeding on recurrence of milk fever

In this study, balanced feeding was negatively correlated with milk fever recurrence (Figure 7). A lower recurrence rate was found in those cows that were maintained on a balanced ration compared to those without adequate dietary management. This indicates the urgency of nutritional management of cows during the transition period. The prevalence of milk fever can be reduced through optimal dietary management and supplementation, such as controlled calcium intake and a suitable DCAD formulation (Lean *et al.,* 2006*;* Zachwieja *et al*., 2022). However, despite proper balanced feeding, recurrence was still observed in the current study. The possible causes may be explained by higher calcium demand during early lactation, which might not be entirely met by dietary sources, especially in high-yielding multiparous cows (Ametaj, B.N. 2025). Even with properly managed feeding, prolonged endocrine adaptation, and differences in calcium metabolism in individuals may also contribute to long-term risks (Joshi *et al*., 2022).

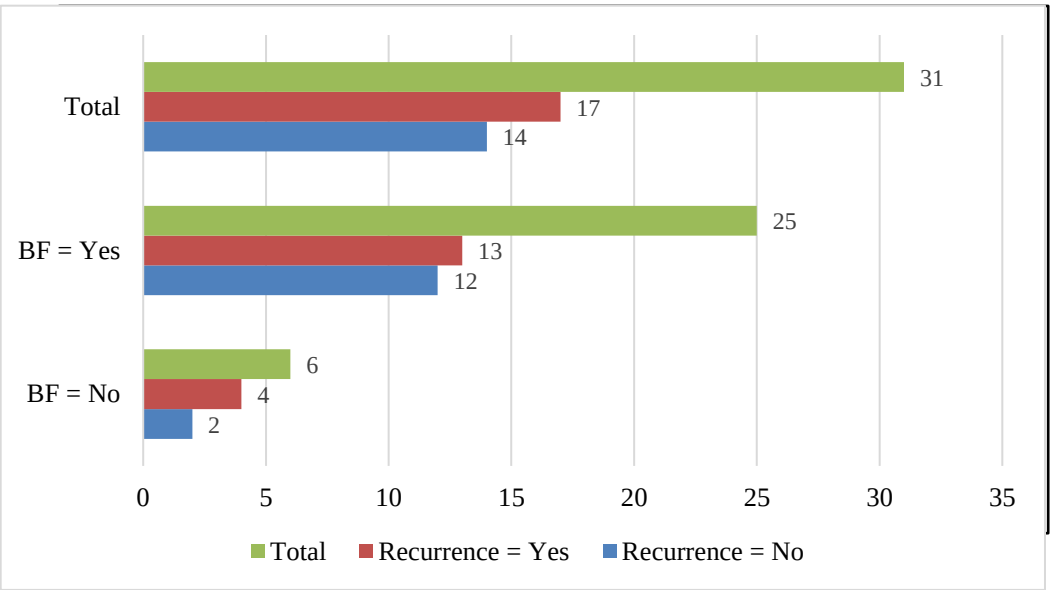

Figure 7. Balanced feeding on recurrence of milk fever

Pre-calving calcium supplementation and recurrence of milk fever

A significant preventive measure against milk fever recurrence was pre-calving calcium supplementation (Figure 8). The recurrence rate is significantly lower in the farms where calcium supplementation was given before calving compared to those where no calcium was given prior to calving. Because of their insufficient metabolic capability during postpartum calcium mobilization, cows that did not receive pre-calving calcium supplements appeared to be more prone to recurrent hypocalcaemia.

These results are consistent with studies showing that calcium supplementation considerably lowers the incidence and recurrence of milk fever during the dry and transitional periods. (Miltenburg *et al*., 2016; Ma *et al*., 2024). According to Mernandez and McArt (2023), giving calcium supplements orally throughout the periparturient phase improved health outcomes and maintained a higher calcium status after giving birth. Numerous studies have revealed that, especially in high-yielding multiparous cows, those that received pre-calving calcium treatments showed a lower risk of postpartum hypocalcaemia than non-supplemented cows. The underlying mechanism is that calcium supplementation helped early activation of parathyroid hormone, accelerated mobilization of bone calcium reserves, and increased intestinal calcium absorption at lactation onset. Without supplementation, cows may experience delayed adaptation and impaired calcium transport, thus increasing susceptibility to recurrent hypocalcaemia.

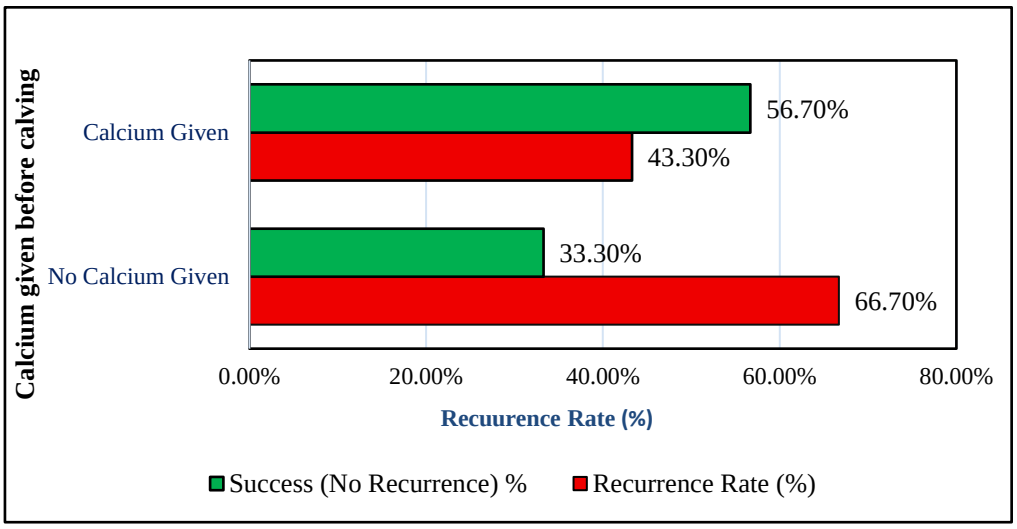

Figure 8. Pre-calving calcium supplementation and recurrence of milk fever

Conclusion

The current study revealed a strong correlation between calcium imbalance, production stress, and the occurrence of milk fever, predominantly in older cows and cows in second and higher lactations, as well as in those with higher daily milk yield. Recumbency and decreased appetite were the most common clinical signs of hypocalcemia-induced neuromuscular dysfunction. The results also showed that intravenous calcium therapy was the most effective treatment, with a higher and more rapid recovery rate within 1-2 days. In contrast, oral or saline therapy alone showed inconsistent and delayed recovery. Milk fever recurrences were frequent despite the high overall recovery rate, suggesting that treatment alone is insufficient to ensure long-term disease control. The significance of preventive measures during the mid-pregnancy to transition phase, along with adequate pre-calving calcium supplementation and balanced feeding management, reduced the recurrence rate in cows regardless of milk production level. This study demonstrates that the incidence and recurrence of milk fever in peri-urban dairy farming systems are strongly influenced by poor nutritional management before and during calving, exacerbated by the lack of preventive measures and inadequate monitoring of high-risk cows. Thus, improved husbandry practices during the gestation period, suitable pre-calving calcium supplements, and increased farmer awareness on transition cow management would be the effective management measures for milk fever in Keraniganj.

Competing Interest

The authors declare that they have no conflict of interest.

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