Ovozoa 14 No. 1, April 2025 p-ISSN 2302-6464 e-ISSN 2722-967X
Available at https://e-journal.unair.ac.id/OVZ/index

Original article

Incidence and associated risk factors of uterine prolapse in dairy cows in Manoharganj Upazila, Cumilla District, Bangladesh

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Open access under CC BY – SA license, DOI: 10.20473/ovz.v14i1.2025.25-33
Received February 17 2025, Revised April 9 2025, Accepted April 12 2025
Published online April 2025

ABSTRACT

Uterine prolapse is a medical emergency in cows that can be life-threatening if not promptly treated. This study aimed to determine the incidence, associated risk factors, survival rate, conception rate, and management practices related to uterine prolapse in dairy cows in Manoharganj Upazila, Cumilla District, Bangladesh. Data collected from cow owners were analyzed using the Chi-square test. A total of 102 cases of uterine prolapse were manually corrected. The incidence was found to be higher in crossbred (61.76%) compared to local (38.24%) cows. Similarly, cows that were artificially inseminated showed a significantly higher incidence (93.14%) than those bred naturally (6.86%). Pluriparous cows had a greater incidence (77.45%) than primiparous cows (22.55%). Additionally, cows with a previous history of vaginal prolapse (48.04%) or dystocia (59.80%) were more likely to experience uterine prolapse than those without such histories. Following treatment, 91.18% of the affected cows survived, while 8.82% died. Among the survivors, 15.05% were culled, and the remaining cows were artificially inseminated of which 82.27% successfully conceived. The study also observed that 3.92% of cows were diagnosed with hypocalcemia shortly after prolapse correction. These findings highlight the importance of immediate veterinary intervention and the need for proper nutritional management during pregnancy to help prevent uterine prolapse.

Keywords: Bangladesh, correction, dairy cows, incidence, risk factors, uterine prolapse

INTRODUCTION

Uterine prolapse is broadly the complete eversion of gravid uterus through the vaginal orifice from its normal position in ruminants and is a common complication following parturition (Martin *et al*., 2023). After parturition, dystocia is typically one of the contributing factors to uterine prolapse. A cow that has an oversized fetus strains excessively during parturition (Bahrami-Yekdangi *et al*., 2022). During parturition, severe uterine contractions combined with high abdominal wall pressure usually result in the expulsion of the fetus, fetal membranes, and uterine wall (Ward and Powell, 2018). It is most often observed in pluriparous

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dairy cows although it has been recorded in all animal species (Roberts, 1986). Typically, it occured post-partum during the third stage of labor (Joseph *et al*., 2001) than pre-partum.

The precise cause of uterine prolapse remains unknown (Noakes *et al*., 2019), despite the reality that antepartum vaginal prolapse is expected to be predominantly caused by an elevated estrogen level (Roberts, 1986). Several factors may predispose dairy cows to uterine prolapse including, uterine inertia from hypocalcemia or prolonged dystocia, oversized fetus, twin calves, retained placenta, paresis, delayed cervical closure, confined cows during the winter, hormonal imbalance due to estrogen in the feed or plants (Phyto-estrogen), and excessive laxity of the perineal tissues (Risco *et al*., 1984; Potter, 2008). Some deficits may cause the ligaments holding the uterus to weaken, become loose, and take longer to recover to their normal position (Matamala *et al*., 2021).

Bovine uterine prolapse is a sporadic but potentially fatal condition that occurs after birth. A prolapsed uterus is extremely vulnerable to injury, trauma, and environmental contamination which can increase the risk of maternal health complications, and may even result in death from trauma, lacerations, severe hemorrhage, tissue death, bacterial infections, sometimes urinary incontinence, stress incontinence, or shock (Jana and Ghosh, 2004). In a small number of cases, significant internal hemorrhage, organ prolapses, and the incarceration of abdominal viscera may cause hypovolemic shock in cows (Potter, 2008). When third-degree prolapse happens, the entire uterus and caruncles are exposed to the external environment (Juneja *et al*., 2022).

Failure to conceive, longer calving-to-conception interval, increased calving interval, declined fertility, sterility, reduced production, and reproductive performance of the treated cows, and economic loss to the farmers are remarked. There has been evidence of a 40–60% post-operative fertility rate if medical therapy is administered right after (Tyagi and Singh, 2002). Severe septicemia may result from untreated patients (Bhattacharyya *et al*., 2007). Uterine prolapse may have major financial implications for producers as well as health concerns for the affected animals (Deka *et al*., 2021). However, the high cost of treatment posed a challenge for farmers (Martin *et al*., 2023). As a result, many farmers decide to sell affected animals, which reduces their market value and leads to financial losses (Deka *et al*., 2021).

If corrected at the right time, the uncomplicated cases of uterine prolapse usually have a good prognosis, hence it should always be treated as a veterinary emergency. Without treatment, the affected cow is usually to die within a short time, making it crucial to address the condition before excessive swelling, mucosal damage, contamination, or severe bleeding leads to a worsened prognosis. Dairy farming is rapidly growing in Bangladesh due to the high demand for milk in the huge population. However, various reproductive diseases and disorders like uterine prolapse, pose a significant challenge to dairy production. Therefore, this study aimed to determine the incidence of uterine prolapse, identify associated risk factors, and assess fertility in dairy cows. This finding will help the farmers mitigate the risks and seek timely treatment from an expert veterinarian for sustainable dairy production.

MATERIALS AND METHODS

Study area and period

The study was conducted on 102 uterine prolapsed dairy cows, including both local (39) and crossbreds (63), over three years (from January 2021 to December 2023) in the Manoharganj Upazila of Cumilla District, located in the eastern region of Bangladesh (23° 7' 36" N, 91° 4' 8" E). The study was based on clinical observations, and cows were diagnosed with uterine prolapse when the uterus was visibly turned inside out and protruded outside the vulva (Figure 1A, 1B). Data collection took place on those farms where the owners requested assistance to correct uterine prolapse. After each correction, the data were recorded from owners

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through a well-prepared questionnaire and preserved for further study.

Management of uterine prolapse

At first, the cows were properly restrained, and the perineal area was first cleaned with fresh water, followed by the everted mass with clean water (Figure 1C). The placental part attached to the everted uterus was carefully removed to prevent bleeding. Then, the sugar solution was used to reduce swelling and edema (Figure 1D). For easy replacement of the prolapsed part, jute bags filled with straw were placed under the cows' hindquarters. Local anesthesia was administered into the epidural space for low epidural anesthesia (Ismail, 2016, Table 1, Figure 1E). Then, the uterine mass was cleaned with normal saline solution, lubricated with sterile vaseline, and finally repositioned with gentle pressure into the original position of the cows' pelvis (Bhattacharyya *et al*., 2012). In case of standing cows, the cleansed uterus was elevated to the level of the vulva supported by assistants. In case of recumbence, the patient was positioned sternally, with the hind limbs extended caudally. Tilting the pelvis forward helped prevent straining, aiding in the successful repositioning of the uterus (Peter, 2015). While repositioning, care was taken to avoid rotating the uterus in order to minimize straining of cows. Then, the perineal region, including the vulvar lips, was disinfected by using 1.0% potassium permanganate ($KMnO_4$) solution (Gowda *et al*., 2014). Metronidazole bolus (Table 1) was introduced into the uterus to prevent uterine infections. After replacement, the vulva was temporarily closed using a horizontal mattress suture. In a few cases, a modified Buhner suture (Figure 1F) or quill suture was used.

Following manual correction, antibiotics, non-steroidal anti-inflammatory drugs, antihistamine were given intramuscular (IM) for five days to prevent secondary bacterial infections; Downer cows showing clinical signs of hypocalcemia were treated with Calcium borogluconate administered slowly; in the condition of uterine involution, synthetic oxytocin was given within 2-4 hours of birth (Table 1).

Table 1 Drugs used in the management of uterine prolapse

drug (trade name)	active ingredient	dosage and route	manufacturer, country
inj. Jasocaine	2% lidocaine HCl	8-10ml/cow, epidural	Jayson, Bangladesh
inj. Renamycin-100	oxytetracycline HCl	5-22mg/Kg bw, IM	Renata, Bangladesh
inj. Pif R vet	flunixin meglumine	1.1-2.2mg/Kg bw, IM	SKF, Bangladesh
inj. Phenadryl vet	diphenhydramine HCl	1mg/Kg bw, IM	Acme, Bangladesh
bol. Diro Vet	metronidazole	4 pcs/cow, IU	Acme, Bangladesh
inj. Oxcin-10 vet	synthetic oxytocin	5 ml/cow, IM	Techno, Bangladesh
inj. Caldex Forte	calcium borogluconate	250 ml-500 ml/cow, IV	Popular, Bangladesh

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Figure 1 Condition of uterine prolapse and treatment procedures; A: uterine prolapse in a local breed; B: uterine prolapse in a Holstein Friesian crossbreed; C: cleaning the prolapsed uterine mass with clean water; D: reducing the size of the uterine mass by applying a sugar solution and ice water; E: administering local anesthesia; F: suturing the vulva using a modified Buhner's technique.

Data collection

A total of 102 cases of uterine prolapse were recorded by a well-structured and prescribed questionnaire. The questionnaire included variables such as breed, parity, service type (artificial or natural), history of dystocia, previous history of vaginal prolapse, and fertility status. All cases were presented to the Upazila Veterinary Hospital, where owners requested to visit their farms for correcting these prolapse cases. Upon visiting the farms, the cases were diagnosed, corrected carefully and relevant data was collected from the owners for this research.

Statistical analysis

The collected data were organized using Microsoft Excel 2016. Pearson's Chi-square test was performed using Minitab 17 statistical software (Minitab Ltd., UK) to identify significant associations among the variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The frequency and distribution of uterine prolapse cases in relation to breed, parity, service type, history of dystocia, previous history of vaginal prolapse, voluntary culling, mortality, and conception rates are presented in Tables 2-6. Chi-square analysis revealed that breed, service type, parity, previous history of vaginal prolapse, history of dystocia, and survival status were significantly associated with the incidence of uterine prolapse ($p < 0.05$). However, fertility status did not show a significant association ($p > 0.05$) with the occurrence of uterine prolapse. Table 2 demonstrated that uterine prolapse occurred more frequently in crossbred cows (61.76%) than in local breeds (38.24%). The incidence was markedly higher in cows that underwent artificial insemination (AI) (93.14%) compared to those bred through natural service (6.86%). Furthermore, pluriparous cows exhibited a higher incidence (77.45%) than primiparous cows (22.54%). Dairy cows with a previous history of vaginal prolapse during the third trimester of pregnancy had a higher incidence of uterine prolapse (48.04%) compared to those without a history of vaginal prolapse (37.25%), and 14.71% cases were remained as unclassified (Table 3).

Table 2 Incidence of uterine prolapse based on breed, service types, and parity of the dam (n=102)

risk factor	incidence (%)	p-value
Breed		
local	39 (38.24%)	0.017
crossbred	63 (61.76%)	
Service type		
natural	7 (6.86%)	<0.001
artificial	95 (93.14%)	
Parity		
primiparous	23 (22.55%)	<0.001
pluriparous	79 (77.45%)	

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Table 3 Incidence of uterine prolapse based on previous history of vaginal prolapse (n=102)

previous history	incidence (%)	p-value
vaginal prolapse	49 (48.04%)	<0.001
no vaginal prolapse	38 (37.25%)	
unknown	15 (14.71%)	

Table 4 Incidence of uterine prolapse based on history of dystocia (n=102)

risk factor	incidence (%)	p-value
dystocia	61 (59.80%)	0.048
no dystocia	41 (40.20%)	

Table 5 Incidence of hypocalcemia in cows with uterine prolapse (n=102)

complication	incidence (%)	p-value
hypocalcemia	4 (3.92%)	NA

Table 6 Survivability and fertility outcomes in cows after uterine prolapse correction (n=102)

factor	incidence (%)	p-value
Survivability		
survived	93 (91.18%)	<0.001
mortality	9 (8.82%)	
culled	14 (15.05%)	
Fertility		
inseminated	79 (77.45%)	0.243
conception rate	65 (82.27%)	

The incidence of uterine prolapse was notably higher in cows that had suffered from dystocia (59.80%) compared to those without dystocia (40.20%) (Table 4). A small proportion of affected cows were diagnosed with hypocalcemia, with only 3.92% (Table 5). The survival rate of uterine prolapsed cows affected cattle was 91.18% after successful collection and management, whereas mortality rate was 8.82%. Also, 13.72% of cattle were culled, due to economic considerations or the severity of the prolapse. Among the 77.45% cows with uterine prolapse were inseminated, 65 cows become pregnant with conception rate 82.27% (Table 6).

DISCUSSION

This study is mainly focused on risk factors of uterine prolapse as well as its impacts on dairy cow's performances. Uterine prolapse is more frequent in the postpartum phase than in the prepartum (Miesner and Anderson, 2008). This is primarily because of ruminant species uterine inertia, loss of muscular tonicity, or sudden release of elevated intra-abdominal pressure (Noakes *et al.*, 2001). When the fetus is completely oversized and the dam is undernourished, in such case, the cow encounters uterine prolapse. The study found that crossbreds had a higher incidence of uterine prolapse compared to local breeds. This difference may be due to genetic factors, where crossbred cows, often a mix of high-yielding dairy breeds, may have weaker uterine support structures or increased susceptibility to uterine atony. This finding is comparable with the studies of vaginal prolapse where it has been reported as a common obstetrical problem throughout the country during last trimester of gestation (Hasan *et al*., 2017). Moreover, AI is a potential predisposing factor for dystocia (Wasef and Islam, 2024) leading to uterine prolapse (Ali and Amin, 2016). This study indicated that cows undergoing AI had a significantly higher incidence of uterine prolapse compared to those bred through natural service. Our previous studies reported that smallholder farmers in Bangladesh are increasingly crossing native cattle with Holstein Friesian or Sahiwal breeds to enhance productivity (Wasef and Islam, 2024). As a result, these cows face various pregnancy-related issues such as vaginal prolapse, dystocia, uterine prolapse, prolonged gestation period, and retention of placenta. AI protocols, particularly if poorly managed or when cows undergo multiple inseminations, may contribute to uterine trauma or complications during the breeding process.

According to this study, uterine prolapse was more common in pluriparous cows than in primiparous cows. The current data supports the higher occurrence of uterine prolapse in

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pluriparous cows that has been reported in several studies (Carluccio *et al*., 2020; Bhoi and Parekar, 2009; Noakes *et al*., 2001). The cows that are over five years old and have calved multiple times are at greater risk of experiencing uterine prolapse (Miesner and Anderson, 2008). However, other studies (Murphy and Dobson, 2002) reported the higher occurrence in younger cows than in pluriparous cows. We revealed that the risk of uterine prolapse increases with parity because repeated pregnancies and parturitions weaken the uterine walls and ligaments that support the uterus especially if the birth process is prolonged or complicated. Older cows that are in fat or in poor condition are more prone to experience vaginal prolapses during the third trimester of pregnancy (Srivastava and Pande, 2018) and a potential risk factor for uterine prolapse (Purohit *et al*., 2018) later in life due to the strain and potential damage it places on the pelvic floor muscles and ligaments. We recommend to monitor and manage pelvic health during and after pregnancy to reduce the risk of further prolapse. In this study, cows that experienced dystocia had a higher incidence of uterine prolapse compared to those that did not undergo dystocia which is supported by Mardotillah *et al.* (2024). Uterine prolapse can occur due to difficult calving that results in injury or irritation to the external birth canal, intense straining, or excessive pressure applied while pulling the calf. Furthermore, cows that experience prolonged dystocia are more prone to uterine prolapse because of the stress and trauma associated with assisted births (Potter, 2008).

The survival percentage of cows treated for uterine prolapse in this study was higher (91.18%) compared to previous studies in dairy cattle (73.5%, Jubb *et al*., 1990; 80%, Murphy and Dobson, 2002; 64.7%, Ishi *et al*., 2010), and is similar to Carluccio *et al.* (2020) and Bhattacharyya *et al*. (2012) who reported 91.7% and 90.9%. The incidence of uterine prolapse leads to increased voluntary culling and, in some cases, higher mortality rates. The overall mortality (8.82%) from uterine prolapse in this study is similar with Carluccio *et al.* (2020) who reported (8.30%) mortality in cows. In this current study, veterinary assistance was provided within one hour of initial call, which helped minimize animal discomfort and tissue damage in dairy cows. Timely intervention is regarded to improve the prognosis for survival (Miesner and Anderson, 2008), which may explain the lower fatality rate observed in this study. Furthermore, Odegaard (1977) found a severe mortality rate in uterine prolapse cases linked with hypocalcemia. In the present study, the prevalence of concurrent hypocalcemia in dairy cows with uterine prolapse was 3.92%, which is consistent with 4.2% reported by Carluccio *et al.* (2020). This figure is considerably lower than the 19.0% reported by Risco *et al.* (1984) in dairy cows; 44.0% found by Murphy and Dobson (2002) in both dairy and beef cows. Most cows with uterine prolapse also suffer from hypocalcemia, which can be treated with intravenous administration of calcium borogluconate following suture insertion (Richardson *et al*., 1981). The survival rate of cows with uterine prolapse can be improved by delivering a live fetus (Potter, 2008), though this information was not recorded in this study.

In this study, the culling rate of dairy cows after uterine prolapse was 15.05%, which is higher than the 8.30% reported by Carluccio *et al.* (2020). The high culling rate of dairy cows might be due to delayed prolapse correction, uterine mass laceration, tearing off the uterus during calf extraction, secondary infections, and farmers' tendency to cull cows with reduced milk production. Farmers may choose to cull cows that have suffered prolapse, especially if they are older, and have experienced multiple reproductive issues. While this may help prevent further complications, it also results in the loss of valuable animals, particularly high-yielding dairy cows. In cows, endometrial repair starts right after calving, with complete epithelial regeneration in severely damaged areas, like the caruncles, occurring within 25 days (Dobson-Hill, 2009; Lara *et al*., 2017). The degree of uterine damage and the time needed for healing play a crucial role in fertility (Odegaard, 1977).

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A prolonged calving-to-conception interval can result from uterine prolapse and certain predisposing factors, such as dystocia and hypocalcemia. These conditions can delay the involution of the uterus (Borsberry and Dobson, 1989). In the present study, recovered cows from uterine prolapse showed the favorable fertility. The overall conception rate (82.27%) within 5-6 months of calving was consistent with data from previous studies (Jubb *et al*., 1990; Murphy and Dobson, 2002; Miesner and Anderson, 2008; Ishii *et al*., 2010; Carluccio et al., 2020). This result can be considered satisfactory when compared to optimal fertility, defined as 90% pregnancy rate three consecutively services in healthy dairy cows (Peter, 2015). The calving-to-conception interval was shorter than what was reported by Odegaard (1977), especially for primiparous cows.

Conclusively, we recommend that an animal effectively treated animal has the potential to return to the herd and maintain normal reproductive function. However, if an infection develops during the uterine replacement, the cow may experience delayed rebreeding or may not conceive again. Early and immediate management, therapy, and precise repositioning of the uterus prognosis are good, and in delayed cases (after 24 hours) it is poor. Early and proper treatment significantly improves the cow's chances of recovery and future reproductive success. Uterine prolapse have significant economic implication for farmers, particularly for those in rural areas where veterinary services are limited. It reduces the production levels but raises veterinary expenses. To prevent issues with uterine prolapse, efforts should be made to reduce the cow's exposure to predisposing factors.

CONCLUSION

Uterine prolapse in dairy cows is influenced by a combination of genetic, reproductive, and metabolic factors. Crossbred cows, pluriparous cows, and those subjected to AI are at higher risk for this condition. Effective management strategies, including proper nutrition, timely intervention during calving, mineral and calcium supplementation, can help mitigate the risk. To minimize its incidence and the associated economic losses, dairy farmers should prioritize early detection, controlled breeding programs, comprehensive postpartum care, regular veterinary support, stress reduction, and overall improvement of farm management practices. Based on the findings, it is also recommended that local cows be inseminated using either AI (with frozen or fresh semen) or natural service with local bulls to ensure genetic suitability and lower the risk of uterine prolapse.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to Md. Mominur Rahman (Upazila livestock officer, ULO), Md. Imran Ibn Monju, Md. Bipul Islam (Livestock Field Assistant, LFA) and Md. Motiur Rahman Shawon (Staff) of Upazila Livestock Office and Veterinary Hospital, Manoharganj, Cumilla, Bangladesh, for their valuable support and the provision of necessary facilities and assistance during the course of this study. The authors also extend their appreciation to Dr. Mahfuzul Islam, Associate Professor, Department of Microbiology and Parasitology, Sher-e-Bangla Agricultural University, for his kind assistance with data analysis.

AUTHOR'S CONTRIBUTION

Al Wasef (AW), Md. Rashedul Islam (MRI), Vijay Kumar Sah (VKS), Nita Khadka (NK), Nabina Budhathoki (NB), Md Shakil Islam (MSI), Uday Kumar Mohanta (UKM) contributed to the study as follows, AW: Conceptualization, methodology, data analysis, manuscript writing and editing; MRI: Draft writing, data analysis, manuscript review and editing; VKS, NK, NB: Data analysis and manuscript writing; MSI: Reviewing and editing manuscript; MSI, UKM: manuscript reviewing and editing. All authors have read and approved the final version of the manuscript.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest about this publication.

FUNDING INFORMATION

The study had no funds.

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How to cite this article: Wasef A, Mohanta UK, Sah VK, Islam MdR, Khadka N, Budhathoki N, Islam MdS. 2025. Incidence and associated risk factors of uterine prolapse in dairy cows in Manoharganj Upazila, Cumilla District, Bangladesh. Ovozoa: Journal of Animal Reproduction. 14: 25-33.

