Agr. Nat. Resour. 58 (2024) 689–694

AGRICULTURE AND NATURAL RESOURCES

Journal homepage: http://anres.kasetsart.org

Research article

Incidence of reproductive prolapse in cows in western Thailand: Severity and treatment

Smit Srisomrun[a], Pipat Arunvipas[b], Niorn Ratanapob[b], Anawat Sangmalee[b,*]

[a] *Veterinary Teaching Hospital, Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand*

[b] *Department of Large Animal and Wildlife Clinical Sciences, Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand*

Article Info

Article history:
Received 14 May 2024
Revised 30 September 2024
Accepted 31 October 2024
Available online 31 December 2024

Keywords:
Cattle,
Reproductive prolapse,
Severity,
Treatment

Abstract

Importance of the work: There is limited information on reproductive prolapses in Thai cattle, especially in terms of the characteristics of demographics and severity.

Objectives: To determine the demographic characteristics and severity of reproductive prolapses of cattle in western Thailand and to evaluate the associated factors and the response to treatment.

Materials and Methods: Data were collected (January 2016–June 2020) from 100 reproductive prolapse cases submitted to Kasetsart University Veterinary Teaching Hospital Kamphaeng Saen, Thailand. These data included the grade and part of the prolapsed organ, type of cattle, parity, time and the history of the previous prolapse and the exercise allowance. Statistical analyses were performed to identify the severity and factors associated with the severity of reproductive prolapse using Fisher's exact test and logistic regression.

Results: In total, 100 reproductive prolapse cases were classified as 8 intermittent vaginal prolapses, 15 continuous vaginal prolapses, 56 cervical prolapses and 21 uterine prolapses. Beef cattle were the dominant cases compared to dairy cattle (79 and 21 cases, respectively). The factor associated with the severity found in this study was the type of cattle, with greater severity found in dairy compared to beef cattle and the odds ratio being 10.37 (95% confidence interval (CI) 3.42, 31.42; $p < 0.001$).

Main finding: Based on the results, vaginal and cervical prolapses made up most of the cases of reproductive prolapse. Almost 80% of the cases were in beef cattle. However, the proportion of uterine prolapse was greater in dairy cattle than in beef cattle.

* Corresponding author.
E-mail address: anawat.s@ku.th (A. Sangmalee)

https://doi.org/10.34044/j.anres.2024.58.6.02

Introduction

Reproductive efficiency is important for successful beef and dairy businesses (Sharma et al., 2017). However, reproductive insufficiency has been considered one of the most common issues affecting farm profits (Harichandan et al., 2018). The most frequent clinical periparturient uterine disease in cattle was reported to be reproductive prolapse, followed by metritis and pyometra (Jesse et al., 2019). Periparturient uterine diseases can lead to substantial economic losses, delayed estrous cycle, increased calving interval and involuntary culling. Consequently, the incidence of peripartum uterine diseases can be reduced by proper management (especially in nutrition, cow comfort and environment) during the transitional period to avoid metabolic stress and improve immunity.

The definition of prolapse is an abnormal repositioning of an organ from its normal anatomical position, with two types of reproductive prolapse in cattle being vaginal and cervical prolapse, and uterine prolapse (Powell, 2005). Vaginal and cervical prolapse can be divided into three grades, where grade 1 is the intermittent prolapse of the vagina, grade 2 is the continuous prolapse of the vagina and grade 3 is the continuous prolapse of the vagina, cervix and urinary bladder (Wolfe and Carson, 1999).

Typically, vaginal and cervical prolapses occur before calving (Peter, 2014). Predisposing causes of vaginal and cervical prolapse are an elevated plasma estrogen concentration (Drost, 2007) in combination with the production of relaxin (Ibrahim, 2017) and increased intra-abdominal pressure during late gestation (Powell, 2005). Older cows, obese cows, cows having twins and cows with poor vaginal conformation are more likely to suffer from vaginal and cervical prolapse (Powell, 2005). There have been some reports of genetic predisposition of vaginal and cervical prolapse in cattle, with the incidence levels being higher in *Bos indicus*, Herefords, Charolais, Limousin and Shorthorns than in other breeds (Coulthard, 1991; Dawson and Peter, 2012; Woodward and Quesenberry, 1956). Culling vaginal and cervical prolapsed cattle is recommended due to the possibility of genetic inheritance (Powell, 2005).

Generally, uterine prolapse occurs within a few hours after calving. Frequently, affected cows have a low calcium level and a high packed cell volume (Odegaard, 1977). There is no genetic predisposition to uterine prolapse; however, poor body condition, reduced uterine contractility and dystocia are common predisposing factors (De Amicis et al., 2018). Recurrence is not uncommon for uterine prolapse (Powell, 2005). Uterine prolapse is considered as an emergency; the affected beast can be shocked or die from blood loss (Powell, 2005). Thus, intravenous fluid therapy should be provided.

The prolapsed reproductive tract should be cleaned before replacement to avoid secondary bacterial infection (Carluccio et al., 2020; Powell, 2005). Replacement should be done as gently as possible to minimize trauma. The Bühner technique is commonly applied for the retention of reproductive prolapse (Pittman, 2010).

Since the information on reproductive prolapse in Thai cattle is limited in terms of demographic and severity characteristics, there is a possibility that the breed or type of animal is a contributing factor to the symptom. Therefore, the current study aimed to determine the demographic and severity characteristics of the reproductive prolapses of beef and dairy cattle in western Thailand. Additionally, factors were evaluated associated with the severity of reproductive prolapse and the response to the treatment protocol.

Materials and methods

Data collection

This study investigated the reproductive prolapse cases submitted to Kasetsart University Veterinary Teaching Hospital Kamphaeng Saen, Thailand from January 2016 to June 2020. After a careful examination of the prolapsed parts, the cases were classified into three grades of vaginal prolapse based on Wolfe and Carson (1999) and uterine prolapse. A questionnaire was designed to obtain information from the cases, including the type of cow, lactation number, timing of the occurrence, history of a prior reproductive prolapse and exercise allowance.

Statistical analyses

Stata®, version 13, (StataCorp, 2013) was used for statistical analyses. The severity of the prolapse and demographic information obtained from the questionnaire were analyzed using descriptive statistics. Since the proportions of cattle in some grades were low, the severity of reproductive prolapse was reclassified into two levels for further statistical analyses, consisting of vaginal prolapse and cervical prolapse, and uterine prolapse. Fisher's exact test was performed to compare the

characteristics of cases according to the severity of reproductive prolapse as univariate analyses. A multivariate backward elimination logistic regression analysis was performed to identify factors associated with the severity of reproductive prolapse when all factors were evaluated simultaneously. Significance was tested at $p < 0.05$, with $p < 0.001$ being used to test for highly significant results.

Results and discussion

In total, 100 reproductive prolapse cases were submitted to Kasetsart University Veterinary Teaching Hospital Kamphaeng Saen, Thailand during the study period, consisting of 8 intermittent vaginal prolapse cases, 15 continuous vaginal prolapse cases, 56 cervical prolapse cases and 21 uterine prolapse cases. Of all the cases, over three-quarters were beef cattle, which aligned with another report where the prevalence of reproductive prolapse was higher in beef cattle than in dairy cattle (Carluccio et al., 2020). Out of the 79 cases of vaginal and cervical prolapse, 44 cases occurred before parturition. The distribution of cases across the trimesters of pregnancy was: 3 cases were recorded in the first trimester, 7 cases in the second trimester, and 34 cases in the third trimester. In addition, 21 cases occurred after calving. Almost all of the uterine prolapse cases (20/21) occurred within the first day after calving. In the current study, 55% of the uterine prolapse cases were in primiparous cows. Conversely, another investigation in Italy indicated that 84.7% of cases involved multiparous cows (Carluccio et al., 2020). Dystocia may arise when native bloodline heifers, which are relatively small in size, are bred with a larger-breed bull. The disparity in size between the heifer and the larger calf produced can contribute to birthing difficulties. Furthermore, this could be a predisposing cause of uterine prolapse after calving in primiparous cows. Farmers should be educated to breed heifers in optimal breeding conditions to avoid any negative consequences on the reproductive tract. Other characteristics of the cases are presented in Table 1.

Based on univariate analysis using Fisher's exact test, three factors were significantly associated with the severity of reproductive prolapse: type of cattle, lactation and time of occurrence (Table 1). The incidence of uterine prolapse was highly significantly greater in dairy cattle than in beef cattle. Furthermore, the occurrence of vaginal and cervical prolapse was more prevalent in prepartum cattle than in postpartum cattle ($p < 0.001$). Additionally, there was a greater proportion of reproductive prolapse in primiparous cows than in multiparous cows ($p < 0.05$).

Due to missing data for the design analysis and some collinearity between variables, two factors (time of occurrence and exercise area) were not included in the multivariate analysis using multiple logistic regression. The type of cattle was the only factor highly significantly associated with the severity of reproductive prolapse. The odds of uterine prolapse for dairy cattle were 10.37 times greater than for beef cattle. This might have been due to the regularly lower blood calcium levels during parturition in dairy cattle, which reduced uterine contraction. This situation led to evidence of uterine atony, which was reported to be the major predisposing cause of reproductive prolapse in cattle and might explain the higher proportion of uterine prolapse in dairy cattle over beef cattle

Table 1 Univariate analysis for factors associated with reproductive prolapse severity using Fisher's exact test

Variable	Category	Vaginal and cervical	Uterine	Total	*p*-value
Type	Dairy	9	12	21	< 0.001
	Beef	70	9	79	
	Total	79	21	100	
Lactation	0–1	20	11	31	0.022
	2–3	32	8	40	
	> 4	21	1	22	
	Total	73	20	93	
Time of occurrence	Before calving	44	0	44	
	After calving	35	21	56	< 0.001
	Total	79	21	100	
History of prior reproductive prolapse	No	63	19	82	0.348
	Yes	16	2	18	
	Total	79	21	100	
Exercise area	Yes	70	17	87	0.464
	No	9	4	13	
	Total	79	21	100	

in the current study in contrast with other reports where beef cattle were much more affected (Risco et al., 1984). In addition, Tolosa et al. (2021) reported the significance of hypocalcemia on major reproductive disorders including reproductive prolapse by impairment of myometrium contraction, as well as, affecting the incidence of mixed reproductive disorders. In the current study, time of occurrence, which was highly significant based on the univariate analysis, could not be included in the multivariate analysis because uterine prolapse before calving is impossible—usually, the prolapse is seen immediately or within a few hours after calving (Powell, 2005). Because of the difficulties of avoiding selection biases in a hospital-based study, further studies may be required to confirm the associations found in the current study.

In the current study, three cases of suspected hypocalcemia were confirmed by low blood calcium concentrations. Notably, phosphorus concentrations in these cases remained within the normal range, in contrast to another report (Rosol and Capen, 1997). This observation may be attributed to the fact that all the cases of hypocalcemia in the current study were not in the progressive stage, where the parathyroid hormone (PTH) plays a pivotal regulatory role (Venjakob et al., 2017; Leduc et al., 2023); notably, recumbency was not observed. PTH is essential for maintaining calcium homeostasis and influences phosphorus metabolism by promoting increased renal excretion of phosphorus. Specifically, PTH decreases phosphate reabsorption in the renal tubules, leading to elevated urinary phosphorus levels and, consequently, reduced serum phosphorus concentrations (Hernandez-Castellano et al., 2020). Calcium solution was administered to the affected cows prior to the replacement of the reproductive tract, consistent with the recommendations for managing concomitant clinical hypocalcemia (Ibrahim, 2017). Notably, oxytocin should not be administered before the replacement procedure to avoid uterine contractions, which may disrupt the process (Yimer et al., 2016).

The treatment protocol for uterine prolapse commenced with a thorough cleansing of the prolapsed reproductive tract using chlorhexidine or povidone scrub to reduce the risk of infection. Cattle were restrained in a standing position, and epidural anesthesia was administered via 40 mg of 2% lidocaine hydrochloride in the sacrococcygeal or intercoccygeal region. In cases of postpartum prolapse, any remaining placenta was gently removed. Next, the prolapsed tissues were carefully repositioned into the pelvis using clean, gloved hands. Subsequent to repositioning, uterine lavage was conducted with a 0.05–0.1% povidone-iodine solution, followed by intrauterine administration of antibiotics, including 1 g of trimethoprim and 200 mg of sulphamethoxypyridazine. The vulvar lips were sutured using the Bühner technique, utilizing either Bühner tape or a silicone infusion tube. The critical aspects of managing reproductive prolapse involve the reduction, replacement and retention of the prolapsed organs. The Bühner technique, implemented in the current study, is recognized as an effective and straightforward method for addressing reproductive prolapse (Pittman, 2010), likely due to its ease of application. The treatment yielded a success rate of 100%, with no reported recurrences. For cows with high body condition scores, the modified Bühner technique is recommended to mitigate the risks of stitch failure and re-prolapse (Pittman, 2010). However, this technique was not utilized in the current study, as no high-body condition cows were included in the population. Yimer et al. (2016) proposed the use of a modified bootlace suture for vulvar closure, which preserves blood circulation and minimizes edema; however, it is time-consuming and requires prompt removal to avoid damage during expulsion. In contrast, some previous studies have indicated that temporary closure of the vulva may be unnecessary (Potter, 2008; Carluccio et al., 2020). Carluccio (2020) further advocated alternative methods, such as using a harness or rope to maintain the position of the prolapsed reproductive organ without leading to subsequent prolapses.

The choice of anti-inflammatory and antibiotic treatments was influenced by the type of cattle (dairy or beef) and the severity and cleanliness of the reproductive tract. In cases of vaginal and cervical prolapse in dairy cattle, an intramuscular dose of 2 mg/kg flunixin meglumine was administered. Conversely, beef cattle received a regimen of penicillin-streptomycin, consisting of 10,000 international units (IU)/kg of benzylpenicillin procaine, 10,000 IU/kg of benzathine benzylpenicillin and 20 mg/kg of dihydrostreptomycin sulfate via intramuscular injection. For uterine prolapse cases, 2 mg/kg of flunixin meglumine and 20 mg/kg of long-acting oxytetracycline were also given intramuscularly. In instances of suspected hypocalcemia, particularly in cows that were reluctant to stand, 200 mg/kg of calcium solution was administered prior to the replacement procedure. Blood samples were collected beforehand to measure calcium and phosphorus levels. Furthermore, all cases underwent a Rose Bengal test to screen for brucellosis prior to the correction of prolapse. The anti-inflammatory and antibiotic medications utilized in this study—including dexamethasone, flunixin meglumine, penicillin, and tetracycline—aligned with those recommended for addressing reproductive prolapse

(Jesse et al., 2019; Lima, 2018). Additionally, a study by Haimerl et al. (2017) recommended ceftiofur for the management of uterine infections in dairy cattle. However, it is essential to minimize antibiotic use in dairy cattle to avoid prolonged milk withdrawal periods. Other research has suggested using bacteriophages and vaccines as alternatives to antibiotics for preventing uterine infections and metritis in cases of reproductive prolapse (Lima, 2018). The owners were advised to continue to apply tincture-iodine and an insect-repellent powder on the suture site for at least 7 d. In prepartum cases, the suture must be loosened at the time of calving to allow parturition and then re-tightened to prevent a recurrence of the evidence. In all cases, the suture material must be maintained for at least 30 d after parturition. The sutured region must be kept in a clean and dry state to avoid wound infection. The vaginal and cervical prolapse cases were rechecked 3 d post-treatment, while uterine prolapsed cases were rechecked 7 d post-treatment. The replacement of vaginal, cervical and uterine prolapse was performed as a routine therapeutic procedure in the hospital; consequently, ethical approval was not required.

The duration of the prolapse, severity of the tissue damage and bacterial contamination were factors related to the success rate of treatment (Yimer et al., 2016). In the current study, there was no recurrent reproductive prolapse, probably because all cases were unrelated to trauma, infection, and necrosis. Farmers should be educated to provide proper hygienic practices on the prolapsed reproductive tract to prevent contamination; furthermore, they search for veterinary assistance as soon as possible to ensure successful correction and acceptable further reproductive efficiency.

In conclusion, this study primarily identified cases of vaginal and cervical prolapse among submissions related to reproductive issues. About 80% of these cases involved beef cattle, which was likely due to genetic factors and the overall health of the animals. Notably, uterine prolapse was found to be significantly more common in dairy cattle than in beef cattle. This difference was probably linked to the hypocalcemia often seen in dairy breeds. Furthermore, vaginal and cervical prolapse occurred much more frequently in cattle during the prepartum period than postpartum. The Bühner technique was successfully used to correct these prolapses, with no reported complications from the procedure. The findings from this study should provide valuable insights for developing monitoring programs aimed at preventing and treating reproductive prolapse in cattle.

Conflict of Interest

The authors declare that there are no conflicts of interest.

Acknowledgements

This study was financially supported by Funding from the Faculty of Veterinary Medicine, Kasetsart University, Bangkok, Thailand.

References

Carluccio, A., De Amicis, I., Probo, M., Giangaspero, B., Veronesi, M.C. 2020. Prevalence, survival and subsequent fertility of dairy and beef cows with uterine prolapse. Acta Vet. Hung. 68: 91−94.

Coulthard, H. 1991. Treatment of bovine vaginal prolapse. Vet. Rec. 129: 151−151.

Dawson, L.J., Peter, A.T. 2012. An update on vaginal and uterine eversions in cattle. Clinical Theriogenology. 4: 115−131.

De Amicis, I., Veronesi, M.C., Robbe, D., Gloria, A., Carluccio, A. 2018. Prevalence, causes, resolution and consequences of bovine dystocia in Italy. Theriogenology. 107: 104−108.

Drost, M. 2007. Complications during gestation in the cow. Theriogenology 68: 487-491.

Haimerl, P., Arlt, S., Borchardt, S., Heuwieser, W. 2017. Antibiotic treatment of metritis in dairy cows—a meta-analysis. J. Dairy Sci. 100: 3783−3795.

Harichandan, P., Barik, A., Mishra, P., Patra, B., Jena, B., Patra, R., Kund, A. 2018. Prevalence of reproductive disorders in Niali and Kantapara block of Cuttack district, Odisha, India. Int. J. Curr. Microbiol. Appl. Sci.7: 1683−1689.

Hernandez-Castellano, L.E., Hernandez, L.L., Bruckmaier, R.M. 2020. Review: Endocrine pathways to regulate calcium homeostasis around parturition and the prevention of hypocalcemia in periparturient dairy cows. Animal. 14: 330−338.

Ibrahim, N. 2017. A review on reproductive health problem in dairy cows in Ethiopia. Canadian J. Sci. Res. 6: 1−12.

Jesse, F., Peter, I., Chung, E., Tukiran, N., Bitrus, A., Hambali, I., Paul, B. 2019. Incidences and veterinary clinical management of postpartum diseases among domestic cows and does in Klang Valley, Malaysia. J. Anim. Health Prod. 7: 113−118.

Leduc, L., Arango-Sabogal, J.C., Francoz, D., Nichols, S., Desrochers, A., Schelcher, F., Fecteau, G. 2023. Presence or severity of hypophosphatemia is not associated with survival outcome in postpartum downer dairy cows. J. Am. Vet. Med. Assoc. 261: 852-857.

Lima, F. 2018. New advances in the management of uterine diseases. Adv. Dairy Technol. 30: 283−295.

Odegaard, S.A. 1977. Packed cell volume (PCV) in connection with uterine prolpse and in parturient paresis in cows. Acta Vet. Scand. 18: 451-457.

Peter, A.T. 2014. Vaginal, cervical, and uterine prolapse. In: Hopper, R.M. (Ed.). Bovine reproduction. John Wiley & Sons, Inc. Somerset, NJ, USA, pp.383−395.

Pittman, T. 2010. Practice tips. Can. Vet. J. 51: 1347.

Potter, T. 2008. Prolapse of the uterus in the cow. UK Vet. 13(1): Clinicals pathology updates: News fromthe cutting edges 2007−2008.

Powell, J. 2005. Reproductive prolapses of cattle. Livestock health series. 1−2.

Risco, C.A., Reynolds, J.P., Hird, D. 1984. Uterine prolapse and hypocalcemia in dairy cows. J. Am. Vet. Med. Assoc. 185: 1517−1519.

Rosol, T.J., Capen, C.C. 1997. Calcium-regulating hormones and diseases of abnormal mineral (calcium, phosphorus, magnesium) metabolism. In: Kaneko, J.J., Harvey, J.W., Bruss, M.L. (Eds.). Clinical biochemistry of domestic animals. Academic Press. San Diego, CA, USA.

Tolosa, F., Netsere, M., Habtamu, Y. 2021. Assessment of major reproductive disorders in dairy cattle in and around Bale Robe, Oromia regional state, Ethiopia. Vet. Med. Int. 2021: 8855718. doi: 10.1155/2021/8855718.

Sharma, A., Singh, M., Kumar, P., Sharma, A., Neelam, A.M.J., Sharma, P. 2017. Postpartum uterine infections in cows and factors affecting it–a review. Int. J. Curr. Microbiol. App. Sci. 6: 1020−1028.

StataCorp. 2023. Stata Statistical Software: Release 13. StataCorp LLC. College Station, TX, USA

Venjakob, P.L., Borchardt, S., Heuwieser, W. 2017. Hypocalcemia-cow-level prevalence and preventing strategies in German dairy herds. J. Dairy Sci. 100: 9258-9266.

Wolfe, D.F., Carson, R.L. 1999. Surgery of the vestibule, vagina, and cervix: Cattle, sheep, and goats. In: Wolfe, D.F., Moll, H.D. (Eds.). Large animal urogenital surgery. Williams and Wilkins. Baltimore, MD, USA. pp. 397-411.

Woodward, R.R., Quesenberry, J.R. 1956. A study of vaginal and uterine prolapse in Hereford cattle. J. Anim. Sci. 15: 119−124.

Yimer, N., Syamira, S., Rosnina, Y., Wahid, H., Sarsaifi, K., Bukar, M., Yap, K. 2016. Recurrent vaginal prolapse in a postpartum river buffalo and its management. Buffalo Bull. 35: 529-534.