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Original article

Uterine prolapse and related factors in beef cow at the Besuki Animal Health Center, Situbondo regency, East Java, Indonesia

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ABSTRACT

This study aims to determine the factors related to uterine prolapse in beef cow in the Besuki Animal Health Center working area in Situbondo regency. The sample consisted of 100 cows that calved in 2020-2022, whose data was obtained from the Department of Animal Husbandry of Situbondo regency, East Java, Indonesia. Determination of the months of the rainy and dry season was obtained from the Meteorological, Climatological and Geophysical Agency, Juanda Class I Meteorological Station. Other data regarding breed, age, parity of cow and dystocia incidence in cow was obtained by conducting interviews with farmers followed by confirmation with inseminator records, and direct observation of the housing system. The collected data were cross-tabulated and analyzed using Chi-square analysis to determine possible factors causing uterine prolapse. The results showed that the incidence of uterine prolapse in beef cow in the working area was 35% (35/100). The factors of housing, age, parity, and incidence of dystocia were significantly related ($p < 0.05$) to the incidence of uterine prolapse, while breed and season did not have a significant influence ($p > 0.05$). It could be concluded that the age and parity of the cow at the time of calving, the practice of housing cow, and the incidence of dystocia were related to the incidence of uterine prolapse in cows in the Besuki Animal Health Center operational area.

Keywords: age, dystocia, housing, parity, season

INTRODUCTION

Uterine prolapse is a reproductive disorder that could occur in beef cow. This is a condition in which the uterus is inverted inside out from its normal position, usually occurring a few hours after the expulsion of the fetus. This condition could be characterized by the expulsion of part or all of the uterine and is a common complication following parturition (Martin *et al*., 2023). Dystocia, or difficulty in calving, was generally one of the contributing factors to the occurrence of uterine prolapse after parturition. Dystocia could cause injury or irritation to the external reproductive tract. An excessively large fetus could cause the cow to experience excessive straining during parturition (Bahrami-Yekdangi *et al*., 2022). In addition, undue pressure during fetal extraction often resulted in the uterine wall being forced outward,

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particularly when the cervix was still wide open and the hindquarters of the cow were positioned lower than the front of the body, increasing the risk of uterine prolapse (Martin *et al*., 2023). Expulsion of the fetus, along with the fetal membranes and uterine wall, was typically caused by strong uterine contractions, accompanied by excessive pressure from the abdominal wall during parturition (Ward and Powell, 2018).

Various predisposing factors that could contribute to the incidence of uterine prolapse included the practice of confining livestock, which reduced their mobility, low blood calcium levels, and inadequate nutritional intake during gestation (Risco *et al*., 1984). Such deficiencies could lead to the ligaments supporting the uterus becoming loose, weak, and slow to return to their original position after the cow has calved (Matamala *et al*., 2021). Uterine prolapse was also associated with extreme weather conditions, high estrogen content in feed, and insufficient levels of phosphorus or magnesium in diet. This condition occured more often in cows that were confined with excessive feeding compared to those that were pastured (Noakes, 2018).

Uterine prolapse could have significant financial implications for farmers as well as health consequences for the affected animals (Deka *et al*., 2021). The treatment of uterine prolapse in beef cows typically involved repositioning the uterus and suturing the vulva. However, the high cost of treatment posed a challenge for farmers (Martin *et al*., 2023). As a result, many farmers chose to sell affected animals, which caused a decrease in market value and resulted in financial losses (Deka *et al*., 2021). Therefore, this study aims to determine the relationship between the incidence of uterine prolapse and related factors so that farmers could mitigate risks and obtain appropriate handling from a qualified veterinarian.

MATERIALS AND METHODS

This study has been approved by the Department of Animal Husbandry of Situbondo regency, East Java, Indonesia, and the farmers who own the cows as the objects of the study.

Place of study

Situbondo regency has six animal health centers, the Banyuputih, Jangkar, Mangaran, Panarukan, Bungatan, and Besuki. The Besuki animal health center is located in Jetis village, Besuki district, Situbondo regency with an operational area covering Besuki, Jatibanteng, Sumbermalang, and Banyuglugur subdistricts (Department of Animal Husbandry of Situbondo regency, 2021).

Survey method

This study used a retrospective cohort study design, involving secondary and primary data collection. Secondary data on the population of calved cows in the 2020-2022 period was obtained from the Department of Animal Husbandry of Situbondo regency, East Java, Indonesia. The samples were cows that calved and were recorded in the report on the handling of reproductive disorder by the Department of Animal Husbandry of Situbondo regency during the years 2020-2022. The sample size was determined using the Slovin's formula (Formula 1), with a maximum margin of error of 10% (Pourhoseingholi *et al*., 2013), resulting in 100 beef cows.

$$n = \frac{N}{1 + N(e)^2}$$

Formula 1 Slovin's formula for sample size number (Pourhoseingholi *et al*., 2013); n: number of samples; N: number of population (22,634 cows); e: maximum error rate (10%)

Determination of the months of the rainy season and dry season was obtained from the Meteorological, Climatological and Geophysical Agency, Juanda Class I Meteorological Station (https://stamet-juanda.bmkg.go.id/webkantor/prakicu.php?id=501304). Primary data were obtained by interviewing farmers followed by confirmation based on inseminator records (cow breed, cow

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age, parity, incidence of dystocia), and direct observation of the housing system.

Data analysis

Data analysis carried out included testing the predisposing factors or causes of uterine prolapse in cows using the Chi-square test at a 95% confidence level, using Statistical Product and Service Solutions (SPSS) software, version 23 for Windows.

RESULTS

Based on data collected from reports on reproductive disorder from the Department of Animal Husbandry in Situbondo, from 100 cows that calved, there were 20 cows that experienced uterine prolapse (Figure 1). The distribution of the incidence of uterine prolapse based on season at calving, cow housing system, breed of dam, age of dam at calving, the parity of the dam at the time of uterine prolapse, and instances of dystocia is presented in Table 1-6.

Chi-square analysis revealed that the factors of housing system, age of the dam, parity of the dam, and the incidence of dystocia had a significant effect ($p < 0.05$) on the incidence of uterine prolapse, while breed of the dam and season had no significant effect ($p > 0.05$) on the incidence of uterine prolapse.

Figure 1 Uterine prolapse (left), and it reposition (right) in the work area of Besuki Animal Health Center, Situbondo regency.

Table 1 Incidence of uterine prolapse based on the season at the time of calving

uterine prolapse	dry season	rainy season
yes	15.79% (6/38)	22.58% (14/62)
no	84.21% (32/38)	77.42% (48/62)

Chi-square value is 0.679 with asymptotic 2-sided significance of 0.41 > 0.05, indicating that there is no influence between season and the incidence of uterine prolapse.

Table 2 Incidence of uterine prolapse based on the cows' housing system

uterine prolapse	dam in shed all the time	dam had some time outside the shed
yes	27.27% (15/55)	11.11% (5/45)
no	72.73% (40/55)	88.89% (40/45)

Chi-square value is 4.040 with asymptotic 2-sided significance of 0.044 < 0.05, indicating that there is an influence between housing system and the incidence of uterine prolapse.

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Table 3 Incidence of uterine prolapse based on the breed of the dam

uterine prolapse	Limousin	Simmental	Ongole-cross
yes	15.39% (8/52)	14.81% (4/27)	38.1% (8/21)
no	84.61% (44/52)	85.19% (23/27)	61.9% (13/21)

Chi-square value is 5.444 with asymptotic 2-sided significance of 0.066 > 0.05, indicating that there is no influence between the breed of the dam and the incidence of uterine prolapse.

Table 4 Incidence of uterine prolapse based on the age of the dam at the time of calving

uterine prolapse	2 years	3 years	4 years	5 years	6 years
yes	15.62% (5/32)	0% (0/11)	0% (0/11)	25% (2/8)	33.33% (13/39)
no	84.38% (27/32)	100% (11/11)	100% (11/11)	75% (6/8)	66.67% (26/39)

Chi-square value is 10.091 with asymptotic 2-sided significance of 0.039 < 0.05, indicating that there is an influence between the dam's age and the incidence of uterine prolapse.

Table 5 Incidence of uterine prolapse based on the parity of the dam

uterine prolapse	parity				
	I	II	III	IV	V
yes	14.29% (5/35)	0% (0/11)	0% (0/10)	31.25% (5/16)	31.25% (10/28)
no	85.71% (30/35)	100% (11/11)	100% (10/10)	68.75% (11/16)	68.75% (18/28)

Chi-square value is 11.551 with asymptotic 2-sided significance of 0.021 < 0.05, indicating that there is an influence between parity and the incidence of uterine prolapse.

Table 6 Incidence of uterine prolapse based on the presence of dystocia

uterine prolapse	dystocia	no dystocia
yes	41.03% (16/39)	6.56% (4/61)
no	58.97% (23/39)	93.44% (57/61)

Chi-square value is 17.665 with an asymptotic 2-sided significance of 0.000 < 0.05, indicating that there is an influence between the presence of dystocia and the incidence of uterine prolapse.

DISCUSSION

Uterine prolapse occurred more often in the rainy season than in the dry season. This might be because during the rainy season, cows tended to be kept in shed more often. The abundant availability of forage this season also caused the amount of feed given to cows to increase compared to the dry season. The incidence of uterine prolapse was higher in cows that were housed and given excessive feed (Noakes, 2018). In addition, the nutritional quality of grass decreased in the dry season, which could contribute to the occurrence of uterine prolapse. On the other hand, during the rainy season, even though the quality of the feed was good, farmers often keep their cows indoors because of the bad weather conditions.

This restriction in movement could result in poor body condition and excess weight, which might become a predisposing factor for the occurrence of uterine prolapse (Scott *et al*., 2011). However, in this study, the occurrence of uterine prolapse was not influenced by the season. This was attributed to the continuous availability of forage throughout the year. Furthermore, the research indicated that cow

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kept in cowshed consistently experienced a higher incidence of uterine prolapse compared to those that were periodically allowed to roam outside during gestation. Lack of movement or physical activity in pregnant cow could also predispose them to uterine prolapse. Increasing physical activity during gestation could positively impact muscle tone, which was crucial for the parturition process (Funnell *et al*., 2016). In the study area, the majority of beef cow were kept in cowsheds due to land limitations, making it impossible to let the cows outside to increase their physical activity. Excessive feeding could cause animals to become overweight and increase the size of the fetus, which ultimately caused difficulties during delivery (Cai *et al*., 2024).

It was important to note that uterine prolapse was not a genetic condition associated with cows' breed (Kumar and Yasotha, 2015). However, cows with structural weaknesses in the reproductive tract that allowed part of the uterus to prolapse post-calving (Borah *et al*., 2019) might experience an inherited problem (Murphy and Dobson, 2002). Bulls whose mothers or female ancestors had this weakness might sire daughters that were prone to prolapse, potentially passing this tendency to their offspring. To mitigate prolapse problems within a herd, it was advisable to cull cows that experienced prolapse. In addition, neither male nor female offspring from these cows should be retained for breeding (Ward and Powell, 2018).

The occurrence of uterine prolapse was influenced by the age of the cow at the time of parturition. Cows that calved at older ages (five and six years) were more likely to experience uterine prolapse. According to Noakes (2018), older beef cow have a higher risk of developing hypocalcemia. Hypocalcemia, or low levels of calcium in the blood, could cause uterine inertia, thereby triggering uterine prolapse. Calcium deficiency could make it difficult for beef cow to stand, causing the vulva to be positioned lower than the body of the cow. This lower position of the vulva, combined with excessive straining during labor, could result in uterine prolapse (Risco *et al*., 1984). Older cows that calved more frequently could cause weakening of the supporting ligaments of the uterus lead to weakened ligaments supporting the uterus, thereby increasing the risk of uterine prolapse (Martin *et al*., 2023). The rise in intra-abdominal pressure caused by the enlarging uterus, in conjunction with the growing size of the fetus, could push the uterus outward from the vulva, resulting in uterine prolapse (Purohit *et al*., 2018). The expected interval between the first calving and subsequent births was approximately 12 months; hence, each cow was anticipated to produce one calf per year (Purohit *et al*., 2018). Cows that frequently calved and were over five years old had a higher risk of developing uterine prolapse (Miesner and Anderson, 2008). The uterus of cows that had calved multiple times might descend into a lower position within the abdominal cavity (Gardner *et al*., 1990). In this study, the parity of the cow during parturition affected the incidence of uterine prolapse, with more cases occurring in cows calving for the fourth and fifth times.

Dystocia, or difficulty in calving, could lead to cases of uterine prolapse due to injuries or irritation in the reproductive organs (Ward and Powell, 2018). Dystocia could also weaken the uterus, thereby increasing the likelihood of uterine prolapse (Murphy and Dobson, 2002). Beef cow experiencing dystocia often required forced extraction, which could cause pressure following the assistance. This study found that the incidence of uterine prolapse was influenced by cases of dystocia occurring during parturition.

CONCLUSION

Understanding the factors that influence the occurrence of uterine prolapse in beef cow is crucial to help farmers developed prevention strategies and improved animal welfare and overall livestock productivity. The factors of age and parity of cows during parturition, cow housing practices, and the incidence of dystocia had a significant effect on the incidence of uterine prolapse in cows in the operational area of the Besuki Health Center in Situbondo regency.

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AUTHOR'S CONTRIBUTIONS

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KM, ES, and DL conceived the idea and designed the main framework of this manuscript, as well as handled the acquisition, analysis, and interpretation of data and drafted the manuscript. SU, HAH, and AH critically read and revised the manuscript for intellectual content. All authors read and approved the final version of the manuscript.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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