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The Effect Of Parity And Body Weight Of Bali Cattle Inseminated With Simental And Limousine Semen On Dystocia

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Abstract
This study aimed to determine the effects of age, parity, and body weight on Bali cows inseminated with semen from exotic cattle breeds, namely Simmental and Limousine. This research was conducted using a survey method, which involved interviews with respondent farmers and inseminators, as well as direct observation of the 97 Bali cows that were the subjects of this study. The study locations included three villages representing high, medium, and low cattle populations in East Lombok Regency, West Nusa Tenggara Province, Indonesia. The data obtained were tabulated, analyzed quantitatively, and presented as percentages. The results were interpreted descriptively. The study results indicate that the percentage of dystocia in Bali cows inseminated with exotic bulls was significantly higher ($P < 0.05$), namely 48.4% for Simmental semen and 20.6% for Limousin semen, with the remaining 31% using Bali cattle semen. The highest incidence of dystocia (100%) occurred at the 2nd parity and at the age of 4 years, with 68.18% of cows inseminated using Simmental semen and the remaining 31.82% inseminated using Limousine semen. The percentages of dystocia occurrence based on the body weight of the cows at calving were 86%, 72%, and 33% for cow body weights of 250–300 kg, 301–350 kg, and > 350 kg, respectively. In conclusion, the parity and body weight of Bali cows artificially inseminated with frozen semen from exotic bulls affect the occurrence of dystocia. The likelihood of dystocia in Bali cows inseminated with Simmental semen was higher than that in cows inseminated with Limousin semen. The greater the body weight of the dam at calving, the lower was the likelihood of dystocia, and the lower the body weight of the dam at calving, the higher was the likelihood of dystocia.

Keywords: *Bali Cows, Artificial Insemination, Exotic Semen, Dystocia*

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I. Introduction

Nusa Tenggara Barat Province (NTB) ranks 6th in terms of the number of cattle in Indonesia and is one of the most promising producers of Bali cattle. In 2023, the beef cattle population in NTB totaled 1,219,784 head, or 14.18% of all cattle in Indonesia (1). Therefore, NTB must maintain its cattle population, as cattle farming is the primary occupation of 192,000 cattle farmer families (3). To help improve the reproduction and productivity of cattle in NTB, Artificial Insemination (AI) has been introduced, utilizing frozen semen from exotic cattle that have a much larger body conformation than Bali cattle (20).

In addition to its positive impact on reproduction and productivity, artificial insemination (AI) has a negative consequence, namely dystocia. This is due to the significant size difference between the two cattle breeds: Bali cattle have an average body weight of 315.8 ± 60.51 kg for bulls and 252.84 ± 25.49 kg for cows (14), whereas Simmental bulls can weigh as much as 814.54 kg (17), 1,150 kg (13), or between 1,000 and 1,200 kg (15). Meanwhile, Limousin bulls weigh approximately 1,050 kg (9) or between 1,000 and 1,100 kg (15). Frequent dystocia in Bali cows can result in significant losses to farmers. Pribadi *et al*. (16) explain that farmers remain highly willing to continue crossing their Bali cows with exotic bulls because the use of exotic bull semen is far more economical and can increase their profits. Therefore, Bali cows selected for insemination must undergo rigorous screening based on body weight, age, parity, and body condition score.

The body weight of Bali cow is a key aspect that serves as a benchmark when crossbreeding Bali cow with exotic bulls. Adequate body weight reflects the level of reproductive maturity and physiological capacity of a female to conceive and bear offspring from a large-sized bull. Female Bali cow to be mated with exotic bulls should have a minimum body weight of 250 kg to reduce the risk of dystocia caused by a body size imbalance between the cow and fetus (20).

Parity is also a benchmark for examining the reproductive rate in livestock (8). Parity is closely related to the incidence of dystocia. Dystocia is a difficulty in the process of giving birth. Cows that give birth for the first time (primiparous) are highly susceptible to dystocia because the birth canal (pelvis) is still narrow and there is a lack of physiological experience (16; 20). Meanwhile, cows that have given birth twice or more (multiparous) tend to have a lower risk of dystocia because the birth canal has undergone adaptation to previous processes, and the cows are better trained physiologically (16). However, at parity six or more, the risk of dystocia can also increase because it is caused by weakening of the uterine muscles, decreased elasticity of the pelvic tissue, and metabolic disorders in older cows (8). Therefore, the author conducted research on "The Influence of Parity and Weight of Bali Beef Bodies Inseminated with Exotic cattle on Dystocia in Aikmel District, East Lombok Regency."

II. Material And Methods

Research Method

This research was conducted using a survey method involving sampling using questionnaires and observations to collect the necessary data. Primary data were obtained from interviews with respondents (farmers) based on a prepared questionnaire. The secondary data used in this study were obtained from the UPT Puskeswan (Animal Health Center) at the research location.

Observed Variables

The variables in this study included the independent, dependent, and supporting variables as follows: First Dependent variable included the incidence of dystocia, which is difficulty in calving that causes the cow to be unable to calve normally without assistance. The second Independent variables included the identity of the farmer, livestock rearing system, age of the cow, type of straw used for AI, parity, and body weight of the cow.

Data Analysis

The data obtained in this study were tabulated and averaged. The level of significance was calculated using a t-test (18). The data were interpreted descriptively.

III. Results And Discussion

Dystocia and Eutokia calving

The percentages of dystocia and eutocia calving in Bali cows inseminated with frozen semen from Simmental and Limousin cattle are shown in Table 1.

Table 1. Number of dystocia and eutocia calvings in Bali cows

Sample number Head (%)	Eutocia Head (%)	Dystocia Head (%)	
		Simental	Limosin
97 (100%)	30 (31%)	47 (48,4%)	20 (20,6%)

Source: Primary data from this research 2025.

Based on Table 1, the percentage of dystocia and eutocia incidents in Bali cows in vitro fertilized using exotic bulls was significantly higher ($P<0.05$), namely 69% (48.4% Simmental semen and 20.6% Limousin semen) compared to 31% eutocia.

The high incidence of dystocia in this study was influenced by Bali cows, a local breed of small beef cattle, being crossbred with exotic cattle with superior genes. These were classified as large beef cattle, resulting in the fetus growing according to its large genes. Supported by management, particularly through adequate feed quality and quantity during pregnancy, the fetal growth rate was maximized in accordance with the sire's genes. Consequently, the large size of the fetus made it difficult for it to pass through the relatively small calving canal of the Bali cow, thus increasing the incidence of dystocia.

The enlargement of the gravid uterus, also known as an oversized fetus, is caused by an extended gestation period (*gravidatum prolongatus*), indigenous breeds bred through artificial insemination with superior males, confining cages that limit exercise and movement, and overfeeding. Consequently, the fetus grows rapidly and may not fit within the pelvic reservoir (5). Additionally, (11) stated that dystocia can occur due to two reasons: (a) continuous confinement of the cows and (b) inadequate exercise during pregnancy. According to (9), providing livestock with freedom of movement can increase their body strength and endurance, resulting in stronger contractions and faster labor.

Incidence Rate Based on cows Parity

The results of the analysis of the percentage of dystocia occurrence in cows based on parity are shown in Table 2.

Table 2. Percentage of Eutocia and Dystocia Occurrence Based on Bali Cows Parities

Parities	Sample (head)	Ages (years)	Calving state: Head (%)			
			Eutocia		Dystocia	
			Simental	Limousin	Simental	Limousine
2	22	4	0 (0.0)	0 (0.00)	15 (68.18)[b]	7 (31.82)[a]
3	35	5	11 (31.43)	4 (11.43)	14 (40.00)[b]	6 (17.14)[a]
4	21	6	5 (23.8)	4 (19.1)	8 (38.00)[b]	4 (19.05)[a]
5	9	7	1 (11.11)	3 (0.00)	4 (44.44)[b]	1 (11.11)[a]
6	10	8	5 (50.00)	1 (10)	2 (20)[a]	2 (20)[a]
Total sample: 97			22 (22.68)	12 (12.37)	43 (44.34)	20 (20,62)

Source: Primary data from this research 2025.

Data on eutocia and dystocia of Bali cows of different ages and parities inseminated with Simmental and Limousin bull semen are presented in Table 2. The highest incidence of dystocia (100%) was observed at parity 2 and 4 years of age. Of the 22 sample cows, 15 (68.18%) were inseminated with Simmental cattle semen, and the remaining seven (31.82%) were inseminated with Limousin bull semen. Table 2 also shows that the incidence of dystocia decreased with increasing age and parity. However, the results of this study cannot conclude that the incidence of dystocia decreases with increasing age and parity of the cow (Table 2). This is because the number of samples at ages 7 and 8 years with parities 5 and 6 is less than half the number of samples at age and parity were less than that the others samples category. However, the decrease in the percentage of dystocia at ages 7 and 8 and parities 5 and 6 may be due to the fact that at these ages and parities, the reproductive organs of the mother cows are in a normal condition, so that they are able to maintain pregnancy and give calving normally.

The results of this study are in line with those of (11) in Bali cattle, which showed that dystocia occurs more frequently in first calvings and in older cows due to the physiological limitations of the reproductive organs. Two researchers (9; 20) explained that the older and more parity the cow, the more the reproductive organ function will decline, including a decrease in the work of reproductive hormones, especially in the pituitary gland, which plays a role in producing the hormone oxytocin, as well as the uterine wall, which begins to lose its elasticity and contraction strength, thereby increasing the risk of dystocia.

The parity of the cows and the type of semen greatly influence dystocia; the higher the parity, the greater the risk of pregnancy and calving, because cows that frequently become pregnant or give calving experience uterine wall laxity (12). Parity and its interaction with the mating system do not directly affect pregnancy; however, the frequency of cows giving calving can affect reproductive quality (10). Fertility in female cattle increases continuously until the age of 4 years, plateaus until the age of 6 years, and then gradually decreases with age (19). In older cows, reproductive function declines due to a decline in the anterior pituitary gland, which is responsible for genital function (7).

Dystocia Rate Based on Bovine Body Weight

The results of the analysis of the percentage of dystocia and eutocia based on the cow body weight at calving are shown in Table 3.

Table 3. Percentage of Dystocia and Eutocia Based on Bali Cows Body Weight

Body weight (kg)	Calving number (Ekor)	Dystocia Head (%)	Eutokia Head (%)	Simental Head (%)		Limosin Head (%)	
				Dystocia	Normal	Dystokia	Normal
250 – 300	21	18 (86%)	3 (14%)	12 (67%)	1 (33%)	6 (33%)	2 (67%)
301 – 350	61	44 (72%)	17 (28%)	33 (75%)	9 (25%)	11 (25%)	8 (75%)
>350	15	5 (33%)	10 (67%)	2 (40%)	6 (60%)	3 (60%)	4 (40%)
Total = 97		67 (69%)	30 (31%)	47 (70%)	16 (53%)	20 (30%)	14 (47%)

Source: Primary data from this research 2025.

Based on Table 3, the percentage of dystocia and eutocia based on the cow body weight at calving shows that at the cow body weight of 250-300 kg from 21 calving, the percentage of dystocia was 18 events (86%) and 3 events (14%) experienced eutocia. In the sample with a body weight of 301-350 kg, from 61 calving, the percentage of dystocia was 44 events (72%) and was significantly higher than eutocia, namely 17 events (28%) experienced eutocia. Meanwhile, at a cow body weight of more than 350 kg, the data came from 15 calvings, 5 events (33%) experienced dystocia, and 12 events (67%) experienced eutocia.

These results indicate that the lower the body weight of the cow (250-300 kg), the higher the incidence of dystocia, whereas at body weights >350 kg, dystocia decreases drastically, and eutocia increases. These results are consistent with those of (6), who reported that cows with higher body weights have a lower risk of dystocia than those with lower body weights. In addition (2) explained that, the body weight of the cow and the calf calving weight are important factors closely related to the incidence of dystocia, the size imbalance between the cow and foetus increases the risk of dystocia.

The high percentage in dystocia rates in cows weighing 301-350 kg was significantly higher compared to cows weighing > 350 kg. This is influenced by the different parities in each cow weight category, calf calving weight, and the strength of the cows' thrust during calving. Unfortunately, the sample size for each cow category was not uniform, so it is possible that even with a uniform sample size, the results would have slightly changed.

The results of this study showed that the different body weights of Bali cows at calving influenced the incidence of dystocia in Bali cows inseminated with exotic bulls. The greater the body weight of the cow at calving, the lower the risk of dystocia, presumably because of a more optimal body condition, larger pelvis size, and greater pushing power. Conversely, the lower the body weight of the cow at calving, the greater is the risk of dystocia (21).

IV. Conclusion

The parity and weight of Bali cows artificially inseminated with frozen semen from exotic bulls influenced the occurrence of dystocia. The likelihood of dystocia in Bali cows inseminated with Simmental bull semen was higher than that in Limousin semen. The greater the body weight of the cows at calving, the lower the chance of dystocia, and the lower the body weight of the cows at calving, the greater the chance of dystocia.

Conflict of Interest

The authors state that no conflict of interest.

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