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Gestation Period and Calving Interval of Balinese Cows at Various Parities in CV. Darmapuri Agro Semesta Klungkung Bali

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ABSTRACT

The purpose of this study is to identify the effect of parity on calving interval and gestation period in Balinese cattle in CV. Darmapuri Agro Semesta Klungkung Bali. The research method used in this study is a survey method conducted on female Balinese cows that have undergone Artificial Insemination (AI) at least once, are pregnant, or have given birth, as well as the results of interviews and direct observations. The research material used in this study consists of Balinese cattle, specifically 10 female Balinese cows, which are selected annually over five years, resulting in a total of 50 heads. There are five treatments, namely 1st parity (P1), 2nd parity (P2), 3rd parity (P3), 4th parity (P4), and 5th parity (P5). The variables observed were gestation period and calving interval. Data were analysed using analysis of variance with a completely randomised design, followed by the Least Significant Difference test. The results of the study showed that parity had a highly significant effect ($P < 0.01$) on gestation period and calving interval. The duration of gestation from shortest to longest in sequence is P5 (272.00 ± 23.07 days), P2 (276.90 ± 24.16 days), P1 (307.00 ± 20.65 days), P3 (322.40 ±35.14 days), P4 (325.70±27.62). Meanwhile, the calving interval values are P1 (0.00 ± 0.00 days), P2 (351.90 ± 85.61 days), P4 (376.90 ± 103.69 days), P5 (383.30 ± 94.58 days), and P3 (603.20 ± 218.30 days). The second (P2) and fifth (P5) gestation periods were significantly shorter than those of the first parity (P1). The shortest gestation period is at the 5th parity, while the shortest calving interval is at the 2nd parity. This study concludes that the various parities on calving interval and gestation period show a significant difference.

Keywords: Bali Cattle, the length of pregnancy, calving interval, parity

INTRODUCTION

Bali cattle are one of the pure and original cattle breeds originating from Indonesia, characterised by distinctive genetic characteristics and advantages that are not inferior to those of other cattle breeds. (Hoesni, 2015). Bali cattle have several advantages, including rapid reproduction, high fertility, ease of adaptation to their environment, the ability to thrive in challenging land conditions, good feed digestibility, and a high carcass percentage. Another ability that can be relied on for the development of the Bali cattle population is a reasonably good birth interval. (Suharyati & Hartono, 2017).

One of the challenges in increasing the cattle population is reproductive issues. Natural obstacles in cattle reproduction include their monotonous nature and long birth intervals. In addition to natural barriers in cattle, farmers often fail to recognise that their cows are in estrus, resulting in delayed mating and contributing to the long line of non-pregnant cows. To address this problem, one activity that can be done is to synchronise estrus. (Handayani et al., 2014).

To increase the reproductive rate of beef cattle, effective reproductive health management is essential for beef cattle farmers. Livestock reproductive health management is the process of planning, organising, implementing, and controlling reproductive factors through the optimisation of available resources, so that livestock productivity can be maximised, livestock health can be optimised, and the quality of livestock reproduction can be improved according to the desired standards. (Unsunnidhal et al., 2021).

Information on the gestation period and calving interval based on parity will help farmers better understand the reproductive cycle of their cattle. With this information, farmers can make more informed plans in terms of reproductive management, such as determining the optimal time for insemination, enhancing feed quality, and optimising livestock health management.

Ultimately, this knowledge can improve reproductive efficiency, shorten calving interval, and increase livestock productivity, which has a positive impact on farmers' profits. The purpose of this study was to identify the effect of parity on calving interval and gestation period in Bali cattle. The research hypothesis is that parity affects the gestation period and calving interval in Bali cattle.

MATERIALS AND METHODS

The research material used in this study consisted of 10 Balinese cows each year for five years, totalling 50 cows owned by CV Darmapuri Agro Semesta, Klungkung Regency, Bali. The research method employed in this study was a survey conducted on female Balinese cows that had undergone in vitro fertilisation at least once or had given birth, as well as the results of interviews and direct observations. There were five treatments, namely parity 1 (P1), parity 2 (P2), parity 3 (P3), parity 4 (P4), and parity 5 (P5). The variables observed were gestation period and calving interval. Data were analysed using analysis of variance with a completely randomised design, then tested with the Least Significant Difference test.

RESULTS AND DISCUSSION

Gestation Period

The average gestation period of Balinese cattle during the research each year is presented in Table 1. Based on these results, the average gestation period at CV. Darmapuri Agro Semesta is 300 days. The normal gestation period for Balinese cattle is generally 283-315 days. This is not much different from Mappanganro et al. (2022) Who stated that the gestation period for Balinese cattle is approximately 280 to 294 days? Variations in parity can be caused by several factors, namely the physiological condition of the mother and age. (Fadillah et al., 2014). The study's results revealed variations in the gestation period of Balinese cattle across different parities, as presented in Table 2.

Table 1. The average of the gestation period in Balinese cattle during the research each year

Variable	Year				
	2019	2020	2021	2022	2023
Average of gestation period (days)	304	277	318	326	278

Table 2 shows that the gestation period ranged from 272 to 325 days, with an overall average of 300 days. The differences in gestation period among each parity were analysed using statistical tests, showing a highly significant difference among the parity groups ($p < 0.01$). The second (P2) and fifth (P5) parities had significantly shorter gestation periods compared to the first (P1), third (P3), and fourth (P4) parities. There was no significant difference between P1, P3, and P4, all of which had more extended gestation periods. The fourth parity (P4) had the highest average gestation period among all parities, at 325.70 days. The gestation period in the first, third, and fourth parities tended to be longer, which may be due to the body's adaptation to the first reproductive process. This is supported by Fadillah et al. (2014), who stated that age is one of the factors that influence the estrus cycle of feed, maintenance systems, and the environment.

The gestation period in the fifth parity (272.00 days) was significantly shorter than in P1 (307.00 days). This decrease is likely due to a physiological decline in cows as they age. Reproductive senescence may begin to affect the ability of the cow's body to maintain pregnancy for an optimal duration. (Mappanganro et al., 2022).

Table 2. Gestation period at various parities

Parity	Gestation Period (days)
P1	307.00 ± 20.65^{b}
P2	276.90 ± 24.16^{a}
P3	322.40 ± 35.14^{b}
P4	325.70 ± 27.62^{b}
P5	272.00 ± 23.07^{a}

Description: The a-b notation shows a very significant effect ($P<0.01$) of parity on the length of pregnancy.

In the third (322.40 days) and fourth (325.70 days) parities, the gestation period increased again. This phase is often referred to as the optimal reproductive period, where the cow is in her best physiological condition. The size of the

fetus may also be larger because the cow reaches peak growth. Variations in gestation periods based on parity indicate the influence of the mother's physiological condition at each reproductive phase. (Fadillah et al., 2014). The first parity and subsequent parities (P2 and P5) exhibited relatively shorter gestation periods compared to the middle parities (P1, P3, and P4), which had the most extended duration. Gestation period in beef cattle is approximately 283 days among many B. taurus breeds, 285 days among B. indicus–B. taurus crosses, and approximately 290 days in Bos indicus (Zebu) (Herring, 2014). Reproductive management for beef cows' centres on achieving a short and controlled calving season. It is typical for beef cows not to return to oestrous activity until approximately 30 days or more after calving.

Calving Interval

The results showed a significant difference in calving interval ($P < 0.01$) across various parities. The calving interval was calculated as the time interval between two consecutive births, which includes the gestation period (averaging 300 days) and the interval from birth to the cow's readiness to conceive again. The average calving interval data based on parity are presented in Table 3.

Table 3. Calving intervals at various parities

Parity	*Calving interval* (days)
P1	0.00±0.00[a]
P2	351.90±85.6[b]
P3	603.20±218.30[c]
P4	376.90±103.69[b]
P5	383.30±94.58[b]

Description: The notation [a-c] shows a very significant effect ($P<0.01$) of parity on the calving interval.

In the first parity, the calving interval value was not calculated (0.00 ± 0.00 days) because the cows in this group had just given birth for the first time, so there was no time interval between the previous birth and this birth. The average calving interval in the second parity was 351.90 ± 85.61 days, which was the shortest. This indicates that the cows have reached reproductive maturity, exhibiting good reproductive efficiency following their first birth. This is reinforced by the statement of (Fadillah et al., 2014; Suharyati & Hartono, 2017) About the effect of parities on the percentage of oestrous and conception of Bali cows after oestrous synchronisation with prostaglandin F2α (PGF2α) injection, which states that virgin cows up to 6 years old are in their productive period. The study of the calving interval of tropical cows based on the age of jabres cattle in tropical countries (Budiyanto et al., 2022) Showed that the average calving interval at 11 years, respectively, was 13.36 ± 1.777; 13.76 ± 2.006; and 13.50 ± 1.792 months. Jabres cattle are a breed that exhibits unique reproductive performance characteristics. Up to the age of 14 years, they can still become pregnant. This research data proves that age in Jabres cattle does not affect the quality of their reproductive physiology.

The third parity had the most extended calving interval, which was 603.20±218.30 days, significantly different from the other parities ($P<0.01$). The leading cause was probably reproductive disorders, such as undetected estrus, silent heat, or postpartum reproductive health problems. The significant standard deviation value (±218.30) also indicated high variation among individuals in this group, which diverse physiological conditions could cause, uneven management influences, reproductive disorders, and environmental stress. In the fourth parity, the average calving interval decreased to 376.90 ± 103.69 days, approaching the value observed in the second parity. This value indicated a recovery in reproductive performance after the third parity, which could be caused by improved management or better physiological conditions of the cows. (Mappanganro et al., 2022).

The fifth parity showed an average calving interval of 383.30±94.58 days, which was relatively stable compared to P4 and close to the ideal standard (±365 days). However, this also indicated a decrease in reproductive performance due to age factors or reproductive senescence. This is by what (Zainudin et al., 2014) said that the decline in reproductive organ capacity will cause the hormonal system to be disrupted, even though the hormonal system affects the reproductive capacity of livestock in terms of ovulation, estrus, fertility and maintaining pregnancy.

Calving intervals in the second to fifth parities showed varying patterns, with the most extended interval occurring in the third parity (P3). These results indicate the importance of good reproductive management, especially in the third parity (P3), to prevent significant extension of the calving interval. Inappropriate mating time will result in failed conception, preventing pregnancy from occurring, and will extend the

calving interval because the livestock must wait for estrus again. (Kusumawati, 2021; Kusumawati et al., 2019; Kusumawati, Ikhwan, et al., 2024a; Kusumawati, Karyasa, et al., 2024b; Wulansari et al., 2024).

CONCLUSION

The conclusion of this study is that parity has an effect on the gestation period and calving interval. The various parities on calving interval and gestation period show a significant difference. The shortest gestation period is at the fifth parity, while the shortest calving interval is at the second parity. The second and fifth gestation periods were significantly shorter than those of the first parity.

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