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Correlation of Body Condition Score and Parity in Dairy Cows that Experienced Repeated Breeding in Sendang, Tulungagung

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ABSTRACT

Repeat breeding is a syndrome which affected the reproduction and production efficacy of dairy cattle. Dairy cow is one of an animals which produce milk. This syndrome may cause high economic losses in dairy cattle farm. This research was conducted from February to March 2023. The aim of this research was to determine the correlation of body condition score and parity of repeat breeding on the dairy cow at Tani Wilis Cooperation, Sendang, Tulungagung. A total of 46 dairy cows that contributed to the repeat breeding were used in this study. Sampling was done by purposive sampling with the following condition the date AI and the date of parturition. This research was conducted in a survei with primary and secondary data collection. Primary data retrieval is done by interviewing farmers, body condition score of each dairy cow, and direct observation. As for the secondary data obtained by recording the card Artificial Insemination (AI) owned by inseminator. Data were analyzed using correlate statistics followed by Spearmann Test. The result of the research indicated that no significant difference (P>0,05) in body condition score and parity. In conclusion, repeat breeding in dairy cow caused by many factors that provided by the farmers, and small disturbances due to some diseases and abnormal reproductive organs.

Keywords: Dairy cows, repeat breeding, body condition score, parity

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Introduction

The government is trying to achieve national food, such as beef and cow's milk, which is currently still hampered. One of the contributing factors is the high number of reproductive disorders that occur in cows. Reproductive disorders that occur in dairy cows will inhibit milk production (Khan *et al.*, 2016). The problems that occur certainly have a negative impact on the government and breeders in various aspects. As a concrete example, the government still has to import beef and milk from abroad to meet domestic needs to date, while farmers face economic losses for their livestock in terms of maintenance and inspection. Economic losses experienced due to long dry periods, decreased calving percentage, fewer lactations per animal, decreased number of calves born, reduced livestock productivity and increased management costs (Kok *et al.*, 2017).

One of the reproductive disorders in cattle which is quite high in Indonesia is repeated breeding. According to Pérez-Marín and Quintela (2023) repeated breeding is a situation

where a female cow that has given birth, has a normal or close to normal estrus cycle, and has been mated naturally or with Artificial Insemination (AI) three or more times does not become pregnant. The epidemiology of repeated breeding varies, a study conducted by Ayalon in 1980 in Jordan had a 5% incidence, a study by Zambrano in 1982 in Cuba had a 3.5% incidence. The incidence of repeated breeding in cattle is 5-32% and buffalo is 6-30% and in commercial dairy farms it is 14% (Saraswat and Purohit, 2016). The incidence of repeated breeding in Sendang District is quite high, so it is a concern about the low mating success of dairy cows in Indonesia. This condition is worrying if appropriate treatment is not immediately carried out.

Pregnancy failure that occurs can cause the days open or time without pregnancy to become longer. The length of days open that dairy cows have during normal conditions is 85 days (Temesgen *et al*., 2022). Under these conditions, it is possible for a cow to give birth once in one year. The main causes of repeated breeding are failure of fertilization and premature embryo death (Nowicki, 2021). Factors that can cause these two things to occur include hormonal balance, nutrition, infection, stress, and maintenance management (Liu *et al*., 2017).

The relationship between reproduction and nutrition is closely related to the Body Condition Score (BCS). Body Condition Score is a method of measuring an effective feeding system for dairy cows. According to Roche *et al*. (2009), this method is used to observe BCS visually or by touch of body fat with the aim of determining the standard achievement of body fat reserves. BCS can also affect reproductive efficiency and affect milk production. Animals with ideal body weight have optimal milk production. Body weight conditions that are more than ideal can cause reproductive and metabolic disorders, while body weights that are less than ideal affect the performance of the reproductive system and decrease productivity. Cows with low BCS values will experience prolonged postpartum estrus due to ovarian hypofunction.

Repeated breeding is also thought to be related to livestock parity. This is due to low reproductive efficiency in livestock, especially at parity to parity, which experiences a decline in reproductive performance. Parity is a condition where the mother cattle gives birth to a calf. The first parity means a mother who has given birth to a calf once, likewise the second parity and so on is used for subsequent births (Alam *et al*., 2017).

Based on this background, research was conducted to determine the relationship between repeated breeding and BCS and ideal parity in dairy cows in Sendang, Tulung Agung. The information obtained can increase reproductive efficiency in dairy cows by reducing the number of repeat breeding events.

Materials and methods

Research design

The research was carried out in several villages that are members of the Tani Wilis Village Unit Cooperative, Sendang, Tulungagung starting from February 2023 to March 2023. The sampling technique for the research was carried out using purposive sampling, namely selecting subjects based on Body Condition Score (BCS) and parity. Holstein Friesian cattle have previously been known to experience repeated breeding. Samples were obtained through AI and birth data from productive female Holstein Friesian cows that had been recorded by inseminator officers.

Determining the sample size can be done using the statistical calculation formula, namely Slovin. The Slovin formula is a formula used to determine the minimum sample size from a finite population survey. The total number of cows that experienced repeated breeding was 46 Holstein Friesian dairy cows which will be measured for Body Condition Score (BCS) and analysis based on parity grouping.

Research procedure

The research was carried out in three stages, namely the preparation stage, data collection stage, and data analysis stage. The preparation stage began with recording and determining the number of samples used in Sendang, Tulungagung with details of 46 individuals for analysis. The identity of livestock is known through data recording of livestock reproduction owned by breeders and inseminators.

Data taken through primary data collection techniques and secondary data. Primary data was obtained through interviews with breeders. Secondary data includes recording data on livestock reproduction and repeated breeding from inseminator records provided to the cooperative. The data that has been collected is assessed by Body Condition Score (BCS) and grouped based on parity.

Data analysis

The data collected in this research is in the form of primary data and secondary data. Next, correlation analysis was used to test the relationship between Body Condition Score (BCS) and parity on the incidence of repeat breeding. BCS and parity are independent variables (free) while Holstein Friesian dairy cows that have experienced repeated breeding are the dependent variable (dependent). To

determine linearity, a Spearmann Correlation Test analysis was carried out. Data is processed using software that functions to analyze data, namely Statistical Package for Social Science (SPSS) version 26.

Result

Number of repeat breeding cases

This research was conducted in Sendang, Tulungagung from February 2023 to March 2023 to determine the relationship between body condition score and parity in Holstein Friesian dairy cows that experienced repeated breeding. Based on secondary data from inseminator records provided to the cooperative from 111 female dairy cows who experienced failed pregnancy. For a sample of dairy cows that experienced repeated breeding, data was obtained for 46 female dairy cows. The percentage of cows that experienced repeated breeding was 42%, which can be seen in Figure 1.

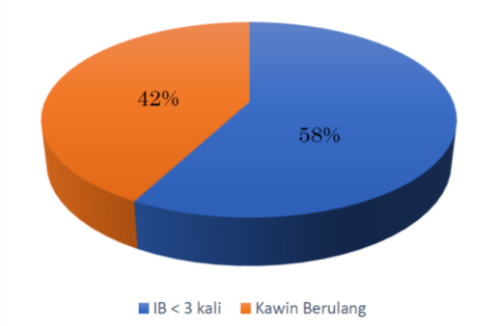

Figure 1. Diagram of repeated breeding incidents in Sendang District, Tulungagung Regency in 2023

Relationship between BCS and repeated breeding

Based on the analysis results from statistical tests, it is known that the significance value is 0.777, indicating that there is no significant relationship (P>0.05) between BCS and repeated breeding. The correlation coefficient (r) shows a value of 0.43. The results of the analysis can be seen in table 1.

Table 1. Results of analysis of the relationship between BCS and repeated breeding

Variable	Significance value	Correlation coefficient (r)	Note
BCS against repeat breeding	0.777	-0,43	Not correlated (P>0.05)

The relationship between parity and repeated breeding

Based on the analysis results from statistical tests, it is known that the significance value is 0.744, indicating that there is no significant relationship (P>0.05) between parity and repeated breeding. The correlation coefficient (r) shows a value of 0.49. The results of the analysis can be seen in table 2.

Table 2. Results of analysis of the relationship between parity and repeated breeding

Variable	Significance value	Correlation coefficient (r)	Note
Parity against repeat breeding	0.744	-0.49	Not correlated (P>0.05)

Discussion

Repeated breeding

Low reproductive efficiency in cattle can indicate reproductive disorders, namely repeated breeding (Maulana *et al.*, 2022). Repeated breeding is a parent with a normal lust cycle and clear lust symptoms, but if it is mated with a fertile male or undergoes regular artificial insemination with sperm three or more times, pregnancy does not occur (Pérez-Marín and Quintela, 2023).

The results showed that the number of cows that experienced repeated breeding was 46 with a percentage value of 42% (Figure 1). It is very likely that the large number of cases of repeated breeding in Sendang, Tulungagung is due to inappropriate rearing management by breeders. Many factors can influence the incidence of repeated breeding, including maintenance management, hormonal imbalance, and infection of the reproductive organs.

Maintenance management can be seen from the housing system owned by the breeder. Based on the results of a survey of dairy cattle sheds owned by farmers with an average roof height of around 3.25 m and a pen area of 10 x 5 m for a population of 10 cows per pen. The average temperature of each cage is 26°C. These two things are in accordance with the statement by Asmarasari *et al.* (2023) that the temperature suitable for dairy cattle is around 15-22°C, whereas in Indonesia there is high temperature and humidity caused by solar radiation, the heat produced by livestock is in the form of sensible (heat that causes changes in temperature), height, area, roof material, and improper air circulation cause high temperature and humidity in the dairy cow pen.

Farms with poor and dirty cage hygiene have the potential to cause repeated breeding. Poor cleanliness of the environment around the cage and drains provides a place for microbes to breed. Microbes generally enter the uterus when the cow gives birth and after parturition. The presence of microbes on the first day post partum is around 99% in the uterus, on days 10-14 post partum it decreases by around 90%, and on days 40-60 it is around 9% (Adnane and Chapwanya, 2022). The time required to expel

contaminating bacteria depends on the process of uterine involution, endometrial regeneration, and the effectiveness of the body's defenses (Sheldon *et al*., 2008). Microbes in the uterus during post partum do not always cause infection in the uterus, but can cause infection in the endometrium or subclinical endometritis (Sheldon *et al*., 2009). In general, cows infected with subclinical endometritis have a normal estrous cycle but if they are bred they will experience difficulty getting pregnant.

Body Condition Score (BCS)

Body Condition Score (BCS) is a subjective assessment method to assess the amount of energy stored as fat reserves in the body through inspection and palpation. BCS provides an indication of energy status in dairy cows (Singh *et al*., 2015). BCS can be used to explain the status of energy reserves through evaluating fat reserves for giving birth and producing milk (Wang *et al*., 2019).

Based on the analysis results from statistical tests, it is known that the significance value is 0.777, indicating that there is no significant relationship (P>0.05) between BCS and repeated breeding. The correlation coefficient obtained is 0.43, which means the level of strength of the relationship is medium. The correlation coefficient number is negative so that the relationship between the two variables is not in the same direction, thus it can be interpreted that the higher the BCS value, the lower the incidence of remarriage and vice versa.

The BCS measurements carried out refer to the BCS assessment table on a scale of 1 to 5. The results of the BCS measurements can be seen from the cow's body, side view and rear view. The side view of the body shows that the pelvic line with the defining points of the transverse processes and hooks is visible. The side view of the body of the dairy cow can be seen in Figure 2. The rear view of the body shows that at the pins area there is a prominent fat pad. The rear view of the body of the dairy cow can be seen in Figure 3.

Figure 2. Side view of the cow's body

Figure 3. Rear view of the cow's body

Many factors can influence the BCS value, including feed factors, livestock management, cage management, and livestock health. Female dairy cows selected for AI must be in good health, have a positive energy balance and will receive increased nutrition two to five weeks before breeding (Fenwick *et al*., 2008). The results of the survey showed that all breeders in the Tani Wilis village cooperative area provided forage and concentrate for nutritional needs. The minimum technical requirement for administering concentrate to lactating dairy cows is a crude protein content of 16-18% (Dersjant-Li *et al*., 2023). Concentrate feed is given twice a day, namely in the morning and evening after milking and forage feeding. Provision of other feeds such as silage is not practiced due to materials that are difficult to obtain and lack of understanding.

The food and drink provided is not measured and is given based on the farmer's estimates and experience. The feeding and management carried out by each breeder is different, poor quality can affect reproductive ability. The nutrients contained in the feed must be balanced with an amount that is appropriate to the nutritional needs of the livestock's body so that reproductive health can be maintained (Pomar *et al*., 2021). Lack of feed given to livestock can cause ovarian hypofunction and no ovulation, abnormal egg cells produced and imperfect embryos. This occurs because the function of all glands in the body decreases, the secretion of gonadotropin hormones also decreases, namely follicle-stimulating hormone (FSH) and luteinizing hormone (LH) (Bosch *et al*., 2021). Forage given in excessive amounts over a long period of time can cause obesity, resulting in reproductive problems.

Parity

Parity is the condition where a mother gives birth to live or dead offspring, regardless of the number of offspring. In the case of twin births, it is only counted as one parity. Parity is the stage at which a parent produces offspring. First parity is the birth of the first calf that a

female livestock has. This applies to future births, namely second parity and beyond (Oattes *et al*., 2021).

Based on the analysis results from statistical tests, it is known that the significance value is 0.744, indicating that there is no significant relationship (P>0.05) between parity and repeated breeding. The correlation coefficient obtained is 0.49, which means the level of strength of the relationship is medium. The correlation coefficient number is negative so that the relationship between the two variables is not in the same direction, thus it can be interpreted that the higher the parity value, the lower the incidence of remarriage and vice versa. Kudo *et al*. (2021) stated that there was no significant relationship between reproductive disorders and parity, except in primiparous cows and cows that had experienced more than five births.

Parity can be determined by the horn rings of each dairy cow. The rings on the horns of a dairy cow can indicate the number of parturitions that have been experienced. Data obtained through parity observations are then compared with the lactation period recorded in the inseminator records. The formation of horn rings occurs due to increased calcium requirements during the gestation period. Observations of the rings on the horns can be seen in Figure 4.

Figure 4. Rings on cow horns

Parity can provide an overview of the physical maturity of the cow. Nevard *et al*. (2022) stated that the parity of the mother has an influence on the time of the second estrus after parturition, namely that the mother of parity I takes longer than the mother of parity II and III because the role of leptin, insulin and IGF-I in the energy metabolism of the mother of parity I prioritizes the needs growth to perfect physical maturity. The metabolic results are used by parity II and III mothers for growth and maturation of follicles and milk production. Although feeding does not differentiate between parent parities, there are differences in the use of metabolic products between parent parities. Several studies state that the intensity of estrus is not influenced by the parity of the mother but is due to management, environmental and physiological factors of the mother cow. The performance of the second estrus after parturition reflects the physiology of the mother being ready for the next pregnancy, indicated by the uterus having experienced involution.

Based on the results of field surveys, breeders' knowledge of detecting estrus also influences the incidence of repeated breeding. There are some breeders who still don't understand how to detect lust, supported by less than 5 years of breeding experience. The importance of knowledge in detecting lust influences the success of reproductive management. Farmers' ignorance regarding lust detection can increase the rate of infertility and pregnancy failure which is characterized by repeated breeding (Tzelos *et al*., 2020). Based on observations made in the field, there is good coordination of lust detection between breeders and inseminators as well as checking again by the inseminator before AI is carried out. Most breeders said that reporting to the inseminator was done immediately when the cattle were found to be in heat and the time needed for the inseminator to arrive was around 1-6 hours after reporting. This is in accordance with López-Gatius (2022) who stated that a good time for carrying out AI starts from mid-estrus to ± 6 hours after estrus ends. Mating done too early can cause spermatozoa to wait too long so that spermatozoa become old and their ability to fertilize becomes lower (García-Vázquez *et al*., 2016).

Conclusion

Based on the results of the research that has been carried out, it can be concluded that the Body Condition Score does not have a significant relationship (P>0.05) with the incidence of repeated breeding. The correlation coefficient obtained is 0.43, which means the level of strength of the relationship is medium. The correlation coefficient number is negative so the relationship between the two variables is not in the same direction. Parity did not have a significant relationship (P>0.05) with the incidence of repeated breeding. The correlation coefficient obtained is 0.49, which means the level of strength of the relationship is medium. The correlation coefficient number is negative so the relationship between the two variables is not in the same direction.

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