



Correlation between Sheep Body Condition Score and Lambing Interval in Langkat District of Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. Author MAK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SAS managed the analyses of the study. Author GA managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJBGMB/2023/v14i1304

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/99475>

Original Research Article

Received: 20/02/2023

Accepted: 29/04/2023

Published: 09/05/2023

ABSTRACT

The Body Condition Score relates to livestock reproduction, such as estrus, pregnancy, the birth process, and the condition of lambs. If the lamb has a bodyweight exceeding the ideal body weight, the animal will experience reproductive disorders to metabolic diseases. However, if the mother sheep has a body weight less than ideal, it can disrupt the reproductive system, affecting the symbol interval. This research aims to find out the relationship between Body Condition Score and the reproductive performance of sheep in Langkat Regency, namely Service Per Conception and Lambing Interval. The study design is Deskriptif analysis. Research conducted in Langkat Regency, Indonesia, between November 2022 and January 2023. The method used in this research is a case study, namely by collecting primary and secondary data. The observed variables are

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Body Condition Score (BCS) and Lambing Interval. The results of the study are The value of the Body Condition Score with the Lambing Interval regression equation $Y = 15.677 - 0.818X$. (R^2) 12.8%. (r) of 0.358. The relationship between Body Condition Score and Calving Interval is positive, with an R^2 value of 12.8%. The conclusion of the research is The relationship between the lambs Body Condition Score (BCS) and the Lambing Interval had a good correlation with an average Calving Interval ranging from ≤ 8 to 9 months.

Keywords: Body condition score; lambing interval; sheep.

1. INTRODUCTION

Sheep is one of the good livestock commodities that can be beneficial to meet food needs, especially animal protein [1]. The reason for increasing the role of sheep farming is to support efforts to increase food security both as a provider of food and nutrition and as a source of income, both of which increase food availability and accessibility [2]. To achieve this program needed to increase the production and productivity of sheep good livestock production will also follow reproductive processes that generally run [3]. The higher the reproductive increase, the higher the productivity of the livestock [4].

Lambing interval is a factor of reproductive efficiency in livestock [5]. The longer the lambing interval, the higher the money for raising livestock [6]. One of the contributing factors is the body condition of the lamb. Sheep that are too thin or too fat will cause difficulties in mating and fertilization [7].

The success of Artificial Insemination in sheep is an essential factor in efforts to increase the sheep population in Indonesia. Most sheep breeders by smallholder breeders with little capital, low technological adaptation, and shared knowledge of sheep farming coupled with traditional maintenance patterns [8]. It causes efforts to increase the population to be constrained, and the genetic quality of existing sheep could be better, resulting in a low Body Condition Score (BCS) [9]. The BCS of lambs when giving birth is highly correlated with subsequent reproduction [10].

Langkat Regency is where many people farming sheep to increase their income. Breeders only consider the livestock business a sideline, and the labor comes from family members [11]. To support the implementation of animal husbandry development, primarily sheep, to maximize the productivity of sheep livestock. Objective data and information are needed, actual, and meet

information standards [12]. To find out the reproductive potential of sheep in Langkat Regency necessary to evaluate the reproductive properties of sheep. This observation is necessary to obtain data on the level of reproducibility and reproductive efficiency of sheep in terms of the body condition of the mother sheep.

The Body Condition Score is related to livestock reproduction, such as estrus, pregnancy, the birth process, and the condition of lambs [13]. Parent body shape and size, age, parity, and heredity also strongly influence the reproductive system [14]. Ideally, the sheep should have a BCS of 3 (moderate) on a scale of 1-5. If the sheep has a bodyweight exceeding the ideal body weight, the livestock will experience reproductive disorders and potentially be affected by metabolic diseases. However, if the lamb has a body weight that is less than ideal, it can disrupt the reproductive system [15].

Sheep Body Condition Score is a level of body fatness that can describe live weight combined with body size. The BCS value is the result of assessing the condition of muscle and fat in the loin. It is helpful as an indicator to evaluate changes in the nutritional status of broodstock from time to time [16]. The BCS value of each sheep varies significantly due to various factors, including age, sex, and management of livestock rearing.

This research is essential to maintain the sustainability of the sheep farming business in Langkat Regency. Efforts to maintain an ideal body condition according to physiological status can use the BCS, which is a method to score the body condition of cattle both visually and by touch [17]. BCS determination in lambs has several advantages: easy to learn, not requiring special equipment, and is entirely accurate, cheap, and straightforward. BCS is necessary for management on sheep farms in Langkat Regency because it is effective and efficient, especially in livestock breeding programs.

2. MATERIALS AND METHODS

2.1 Research Approach

This research approach is descriptive quantitative research that describes the condition of the variables obtained by the sheep farming business actors. The place of this research is in Langkat Regency, North Sumatra Province. The method used in this study was direct interviews with farmers using a questionnaire. The research location was purposively (intentionally) considering that it is one of the areas with great potential in efforts to develop a sheep farming business.

The material in this research is sheep farmers related to all the data and field studies obtained, namely the Body Condition Score and the interval symbol of sheep. Research design by making observations to study the difficulties that arise. The results of observations made scenarios that support and create a flow of problems. The second stage is the data analysis stage. The third stage is data interpretation by interpreting the results of the predicted values of each variable and comparing them with the theory and results of previous studies. Interpretation can prove the theory, challenge the theory, and develop a new theory as a reference for research results.

2.2 Location and Time of Research

This research will be carried out from November 2022 to January 2023 in Langkat Regency because this area has excellent potential to develop a sheep farming business. Respondent requirements are sheep breeders in the study area. The research method used was a survey method with a unit of analysis of breeders who raise sheep.

2.3 Variable Operational Parameters

The research parameters observed were: Body Condition Score, service per conception, and the relationship between Body Condition Score and service per conception.

2.4 Body Condition Score (BCS)

The BCS assessment is by observing and feeling the fat deposits on the body parts of the animal, namely on the back and quarter of the back, such as on the spinous process, spinous process to transverse process, transverse process, look

hungry, tuber coxae (hooks), between the tuber coxae and tuber ischiatic (pins), between the tuber coxae right and left, and the base of the tail to the tuber ischiatic. Sheep have a score of 1 fragile, score two thin, score three moderate, score four fat, and five very fat.

2.5 Lambing Interval

Lambing interval is the distance or interval of time to give birth from the first birth to the second birth. The shorter the lambing interval, the more reproductive efficiency in livestock will increase.

2.6 Population and Sample

The population in this study were all sheep farmers in Langkat Regency. In this study, sampling by the census. The census method is also known as the complete enumeration method, in which all individuals in the population are investigated or interviewed as respondents [18].

3. RESULTS AND DISCUSSION

3.1 Body Condition Score (BCS)

The body's energy reserves can be known using a visual assessment method such as the Body Condition Score. The relative score obtained from the BCS assessment helps farmers obtain an overview of the level of muscle reserves and body fat of each sheep, Table 1.

Based on Table 1, the results of the research data for the Body Condition Score of sheep in Langkat Regency with the first highest score in Body Condition Score 2 with a percentage of 51.90%, second in Body Condition Score 3 with a percentage of 40.51%. In comparison, the lowest score in the Body Condition Score (BCS) 1 with a percentage of 7.59%. Body condition scores that are too low (<2.00) tend to cause conditions that cause ovarian hypofunction, where the ovaries will shrink, the surface is smooth (without follicles/corpus luteum), and the uterus is not talus with a soft consistency [10]. Livestock with skinny bodies have less fat reserves, resulting in low reproductive rates. Fat is an energy reserve stored in the animal's body that comes from nutrients in the feed. Lack of energy consumption in young sheep will cause delayed growth and reproduction [19].

3.2 Lambing Interval (LI)

Lambing Interval is the period from the date of lambing until lambing again or the distance between lambing from one lamb to the next, Table 2.

Based on Table 2, the results of the Lambing Interval study of sheep in Langkat Regency with the first highest percentage value of Lambing Interval of 45.57% at a distance of ≤ 8 to 9 months, the second with a Lambing Interval percentage value of 40.51% at a distance of 9 to 10 months and the lowest is found in the Lambing Interval with a percentage value of 13.92% at a distance of $11 \geq$ months. The ideal spacing of kid is eight months. Factors affecting reproductive efficiency are the length of the Lambing Interval, including Service Per Conception (S/C), the accuracy of mating, and whether there is a pregnancy [20].

3.3 Relationship between Body Condition Score and Lambing Interval

The lambing interval is between birth and the next or previous birth. In this study, the lambing distance between one sheep and another had variations in each Body Condition Score (BCS) group, Table 3.

The results showed that the Body Condition Score 1, 2, and 3 showed a difference of one and two months. It means it is still in average condition. The ideal birth spacing is eight months [8]. The relationship between Body Condition Score (BCS) (X) and Lambing Interval (Y) has a regression equation $Y = 15.677 - 0.818X$, which means that for every addition of Body Condition

Score (BCS) 1 point, the Lambing Interval will decrease by 0.818%, with a coefficient of determination (R²) 12.8% means that the Body Condition Score (BCS) contributes 12.8% to the Lambing Interval. In contrast, the remaining 78% comes from other factors. Value (r) correlation coefficient of 0.358. Other factors that affect the value of the Lambing Interval are if there is a long calving interval primarily due to long DO (Days Open).

It is due to:

1. The child is not weaning, so the appearance of the first post-partum heat takes a long time,
2. Breeders marry their mothers after giving birth for an extended period so that their vacancy becomes long,
3. High failure of artificial insemination resulting in high Service Per Conception (S/C),
4. The age at first mating is slow.

Several factors strongly influence the occurrence of pregnancy in sheep, including environmental conditions, especially nutrition before and after lambing [21].

Balanced nutritional needs are essential for the continuity of sheep reproduction [22]. Suppose nutritional deficiencies in protein, energy, minerals, and vitamins will cause late estrus, silent heat to anestrus [23]. Lack of protein causes weak estrus, estrus, anestrus, repeated breeding, early embryonic death, absorption of dead embryos by the uterine wall, weak childbirth, or premature birth [7]. In addition to nutritional influences, mineral deficiencies, and imbalances also affect repeated mating, ovarian activity, and low reproductive efficiency [20].

Table 1. Research data based on the total Body Condition Score (BCS) of sheep in Langkat Regency

BCS	Total	Percentage (%)
1	6	7,59
2	41	51,90
3	32	40,51

Source: Data processed (2023)

Table 2. The results of the research on the number of sheep lambing intervals in Langkat Regency

LI	Total	Percentage (%)
≤ 8 s/d9month	36	45,57
9 s/d10month	32	40,51
$11 \geq$ month	11	13,92

Source: Data processed (2023)

Table 3. Lambing interval in various groups of Body Condition Score (BCS)

	BCS		
	1 (n=6)	2 (n=41)	3 (n=32)
CI	14,17±1,94	14,24±1,34	13,09±1,12

Source: Data processed (2023)

4. CONCLUSION

The relationship between the lambs' Body Condition Score (BCS) and the Lambing Interval had a good correlation with an average Calving Interval ranging from ≤8 to 9 months.

ACKNOWLEDGEMENTS

The authors would like to thank the University of Pembangunan Panca Budi for funding this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Hasan F, Sitepu SAP, Alwiyah A. The Influence of Parity Against a Percentage of Estrus of Ekor Tipis Sheep that are Synchronized Estrus Using Prostaglandin F_{2α} (PGF_{2α}). *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*. 2017;5(1): 46-48.
- Marisa J, Sitepu SA, dan Rianto AA. Analysis of actors and activities in value chain business sheep faulting. In *Proceeding International Conference of Science Technology and Social Humanities*. 2022;1:69-76.
- Sitepu SA, Marisa J. Combined effect of streptomycin and sweet orange essential oil to membrane and acrosome integrity boer goat frozen semen. *Journal of Community Research and Service*. 3(2): 89-92.
- Marisa J, Sitepu SA. Relationship analysis between production factors and business production of beef cattle livestock in West Binjai District, Indonesia. *Asian Journal of Advanced Research and Reports*. 2020; 1-7.
- Abdoli R, Mirhoseini SZ, Hossein-Zadeh NG, Zamani P, Moradi MH, Ferdosi MH, Gondro C. Genome-wide association study of first lambing age and lambing interval in

- sheep. *Small Ruminant Research*. 2019; 178:43-45.
- Batubara J, Sitepu SA, Putra A. A value of Body Condition Score (BCS), service per conception (S/C) and calving interval (CI) ongole crossbreeds in Deli Tua District. *Infokum*. 2022;10(03):216-219.
- Notter DR. Genetic improvement of reproductive efficiency of sheep and goats. *Animal reproduction science*. 2012; 130(3-4):147-151.
- Sodiq A, Tawfik ES. Productivity and breeding strategies of sheep in Indonesia: a review. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*. 2004;105(1):71-82.
- Kenyon PR, Maloney SK, Blache D. Review of sheep body condition score in relation to production characteristics. *New Zealand Journal of Agricultural Research*. 2014;57(1):38-64.
- Vatankhah M, Talebi MA, Zamani F. Relationship between ewe body condition score (BCS) at mating and reproductive and productive traits in Lori-Bakhtiari sheep. *Small Ruminant Research*. 2012; 106(2-3):105-109.
- Marisa J, Sitepu SA, Kurniawan R. Analysis of sheep farmer supply chain integration LANGKAT Regency. In *Proceeding International Conference Keputeraan Prof. H. Kadirun Yahya*. 2022; 1(1):104-112.
- Sitepu SA, Marisa J, Putra A, Asmaq N. *Technology in Livestock Development*. Throne Media Group; 2021.
- Carlos MML, Leite JHGM, Chaves DF, Vale AM, Façanha DAE, Melo MM, Soto-Blanco B. Blood parameters in the Morada Nova sheep: Influence of age, sex and body condition score. *J. Anim. Plant Sci*. 2015;25(4):950-955.
- Land RB, Robinson DW. (Eds.). *Genetics of reproduction in sheep*. Elsevier; 2013.
- Phythian CJ, Hughes D, Michalopoulou E, Cripps PJ, Duncan JS. Reliability of body condition scoring of sheep for cross-farm

- assessments. *Small Ruminant Research*. 2012;104(1-3):156-162.
16. Sezenler T, Özder M, Yildirir M, Ceyhan A, Yüksel MA. The relationship between body weight and body condition score in some indigenous sheep breeds in Turkey. *The Journal of Animal & Plant Sciences*. 2011;21(3):443-447.
 17. Morgan-Davies C, Waterhouse A, Pollock ML, Milner JM. Body condition score as an indicator of ewe survival under extensive conditions. *Animal Welfare*. 2008;17(1): 71-77.
 18. Mathlin J, Le Pera L, Colombo T. A census and categorization method of epitranscriptomic marks. *International Journal of Molecular Sciences*. 2020; 21(13):4684.
 19. Sawyer G, Narayan EJ. A review on the influence of climate change on sheep reproduction. *Comparative endocrinology of animals*. 2019;10.
 20. Abdoli R, Mirhoseini SZ, Hossein-Zadeh NG, Zamani P, Moradi MH, Ferdosi MH, Gondro C. Genome-wide association study of first lambing age and lambing interval in sheep. *Small Ruminant Research*. 2019; 178:43-45.
 21. Fitriani N, Astuti P, Airin CM, Sarmin S, Adiando N. Comparison of Albumin/ Globulin (A/G) Ratio Between Pregnant and Lactation of Thin-Tail Sheep. In *BIO Web of Conferences*. 2022;49: 01010. EDP Sciences
 22. Martin GB, Walkden-Brown SW. Nutritional influences on reproduction in mature male sheep and goats. *Journal of reproduction and fertility. Supplement*. 1995;49:437-449.
 23. Blache D, Adam CL, Martin GB. The mature male sheep: A model to study the effects of nutrition on the reproductive axis. *Reproduction-Cambridge-Supplement*. 2002;219-233.

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