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Genetic Evaluation of Dam Weight at Lambing in Birth Weight of Sandyno Sheep

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ABSTRACT: The body weight of lambs at birth has an important role in achieving good sheep production. The study investigated the influence of the body weight of ewes at lambing on the birth weight of lambs using data from the Sandyno breed of sheep reared at the Sheep Breeding Research Station, Sandynallah, over the period of 1993-2021. The average weights of the lambs at birth and the dam's weight at lambing were reported as 2.67 ± 0.08 kg and 31.28 ± 0.04 kg, respectively. The study found that the weight of the dam had a significant impact on lamb birth weight, with a correlation coefficient of 0.449 and a regression coefficient of 0.203 ± 0.55. The analysis of variance of the weight of the dam at lambing and birth weight of lambs due to regression indicated that this regression was statistically significant ($p < 0.01$). The findings of the study revealed a positive correlation between the dam's weight and lamb birth weight, suggesting that the weight of the dam could be used as a predictor for lamb birth weight. This information can be valuable for selecting young lambs even before they are born, aiding in better herd management and improving overall sheep production efficiency.

Keywords: Dam weight at Lambing, Birth weight, Sandyno.

INTRODUCTION

Good sheep production is significantly impacted by the birth weight of the lambs (Petrovic *et al*., 2011). Birth weight is highlighted as a factor with substantial economic impact, and understanding its determinants can aid in improved herd management, benefiting both farmers and animal breeders, as noted by Bermejo *et al.* (2010). Although birth weight has historically received less attention in sheep breeding programs, it holds potential economic significance due to its influence on pre-weaning growth, which ultimately affects the profitability of producing slaughter animals, as suggested by Al-Shorepy (2001). Birth weight, along with weaning weight, could be valuable selection criteria in breeding programs, contributing to improved productivity and economic viability. However, for selection to be effective, accurate genetic parameter estimates for birth weight and weaning weight are crucial. These estimates enable breeders to make informed decisions regarding the selection of animals with desirable traits, thereby enhancing overall flock performance and economic returns.

The economic significance of higher birth weights in sheep, particularly in facilitating the early selection of lambs. Birth weight is identified as the earliest quantifiable characteristic in animals, making it a valuable trait for assessment and selection purposes. Researchers, such as Raman and Sivaraman (1974); Gupta and Reddy (1988), have extensively studied the variables influencing birth weight in various sheep breeds. Their work has contributed to understanding the factors that contribute to variations in birth weight, including genetic, environmental, and management factors. The importance of increasing the number of lambs marketed per ewe annually as a significant factor in raising lamb meat production efficiency. This strategy focuses on maximizing the productivity of each ewe within a flock, ultimately leading to higher yields of lamb meat. Additionally, the statement mentions that sheep's ages correlate favorably with their developmental phases, from birth to maturity, as noted by Babar and Khalid (1994). This suggests that as sheep age, they progress through various stages of development that impact their growth, reproduction,

and overall health. Furthermore, the statement emphasizes the importance of good growth in sheep, as it is indicative of good lifetime performance. Sheep that experience robust growth are more likely to exhibit higher productivity in terms of their ability to produce offspring, reproduce successfully, and maintain good health throughout their lives.

The rapid growth rate of sheep is highlighted as a key factor influencing their ability to produce meat until selling age, making it a vital selection criterion in breeding programs. Both hereditary and non-genetic factors play significant roles in determining growth characteristics in sheep. It also emphasizes the importance of data analysis in early lamb selection to optimize growth rates and carcass production. Understanding the factors influencing growth, such as the dam's weight at lambing, can provide valuable insights into improving birth weight and subsequent growth in lambs, ultimately enhancing the economic efficiency of sheep production. The study mentioned aims to investigate the impact of the dam's weight at lambing on the birth weight of lambs in Sandyno sheep, recognizing the significance of birth weight in economically producing sheep. This research contributes to the broader understanding of growth dynamics in sheep and informs strategies for improving production efficiency in the industry.

MATERIALS AND METHODS

The study conducted on Sandyno sheep collected data spanning a 28-year period from 1993 to 2021, focusing on birth weight trait records of 5601 lambs born to 523 sires and 1349 dams at the Sheep Breeding Research Station, Sandynallah. The objective was to investigate the influence of the ewe's body weight at lambing on the birth weight of the lambs. Both dam weight and birth weight were routinely recorded at the time of lambing. Ewes and rams were first mated at approximately 18 months of age, and the ewes' weights were categorized into 28 sub-classes at intervals of 1 kg. Statistical analysis was performed using the analysis of variance (ANOVA) method as described by Snedecor and Cochran (1968). The statistical software SPSS 23.0 was utilized for data analysis. Means were compared using Duncan's multiple range test (Duncan, 1955). This approach allowed for a comprehensive examination of the relationship between ewe weight at lambing and lamb birth weight, providing valuable insights into the factors influencing birth weight in Sandyno sheep.

The study examined the relationship between the weight of ewes at lambing and the birth weight of lambs by calculating the correlation between these two traits. Additionally, the regression coefficient between the birth weight of lambs (dependent variable) and the weight of the dam at lambing (independent variable) was determined following the procedure outlined by Steel and Torrie (1980). The correlation between dam weight and lamb weight was calculated using the method described by Snedecor and Cochran (1996). A positive and highly significant correlation coefficient of 0.449 was observed between birth weight and dam weight. This finding suggests that improving dam weight through enhanced nutrition and management during pregnancy can lead to a notable increase in the birth weight of lambs. The statement also emphasizes the importance of body condition before pregnancy and late gestational energy intake in influencing birth weight in sheep, citing research by Gardner *et al.* (2007). This emphaizes the significance of proper nutrition and management practices for optimizing lamb birth weights and overall productivity in sheep breeding programs.

RESULTS AND DISCUSSION

The study on Sandyno lambs revealed that the average birth weight of the lambs was 2.67 ± 0.08 kg. The weight of the dam at lambing ranged from >=17 kg to >=45 kg, with an average value of 31.28 ± 0.04 kg. There was a statistically significant correlation coefficient of 0.449 ($p > 0.01$) between the weight of the dam at lambing and the birth weight of the lambs, indicating a favorable association that can benefit breed improvement programs.

Several previous studies, including those by Aliyari *et al.* (2012); Aktas *et al.* (2015); Amr *et al.* (2016); Sahani *et al.* (2005); Haider and Shah (1974); Speedy *et al*. (1978), also highlighted the positive relationship between ewe weight and lamb birth weight. The regression coefficient for the weight of the dam on lamb's birth weight was calculated to be 0.203 ± 0.55, with a significant result ($p < 0.01$). This suggests that for every kilogram increase in the ewe's weight, there is a corresponding increase of twenty grams in the birth weight of lambs. These findings are consistent with previous research by Chopra and Acharya (1970); Maroof *et al*. (1986).

Furthermore, studies by Dey (2004); Nehra and Singh (2006); Mishra *et al*. (2008); Singh *et al*. (2013); Kumar *et al*. (2018) have also demonstrated the significant effect of dam's weight at lambing on lamb birth weight. Heavier dams tend to give birth to heavier lambs due to better nutrition and more uterine space, as observed by Prince *et al*. (2010); Clarke *et al*. (1997); Dass *et al*. (2014).

The study also utilized a heat map based on the significance value of the dam's weight at lambing on lamb birth weight, dividing it into five clusters (> 22, 22-26, 26-30, 30-34, and < 34 kg). The correlation and regression analysis indicated that the weight of the dam at lambing significantly affected the birth weight of the lambs, with the highest birth weights observed in the < 34 kg weight group of dams. This suggests the importance of considering the weight of the dam at lambing for optimizing lamb birth weights in breeding programs.

Table 1: Mean (±SE) of dam and birth weight of lambs (n =5601).

Traits	Mean±SE (kg)
Weight of the dam at lambing	31.28±0.04
Birth weight of lambs	2.67±0.08

Table 2: Regression coefficient for birth weight of lambs due tothe weight of dam at lambing (n = 5601).

Traits	Regression coefficient	Regression equation
Weight of the dam at lambing and birth weight of the lambs	0.203 ±0.55	$Y_1=1.063+0.025X_1$

Table 3: Analysis of variance of weight of the dam at lambing andbirth weight of lambs due to regression.

Traits	D.F	Mean square	F. Ratio Due to regression
Due to regression	1	451.026	1.469E3**
About regression	5600	0.307	
Total	5601		

**Significant (p<0.01)

CONCLUSIONS

The findings of the present study confirm a positive relationship between the dam's weight at lambing and the birth weight of its lambs. Similar results have been observed in previous studies, indicating that lamb birth weight tends to be higher for heavy ewes and lower for lighter ewes. This positive relationship is valuable as it can aid in the selection of superior lambs even before their birth. Improved management and feeding practices for dams in Sandyno sheep can potentially enhance the birth weight of the lambs. By ensuring proper nutrition and optimal care for pregnant ewes, breeders can optimize the growth and development of the unborn lambs, ultimately leading to higher birth weights and improved productivity within the flock.

FUTURE SCOPE

Advanced statistical methods can be used in future to get more accurate genetic parameter estimation in Sandyno sheep breed.

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Conflict of Interest. None.

REFERENCES

Al-Shorepy, S. A. (2001). Estimates of genetic parameters for direct and maternal effects on birth weight of local sheep in United Arab Emirates. *Small Ruminant Research*, *39,* 219- 224.

Aktas, A. H., Dursun, S., Dogan, S., Kiyma , Z., Demirci, U. and Hal, I. (2015). Effects of ewe live weight and age on reproductive performance, lamb growth, and survival in Central Anatolian Merino sheep. *Arch. Anim. Breed*., *58***,** 451–459.

Aliyari, D., Moeini, M. M., Shahir, M. H. and Sirjani, M. A. (2012). Effect of Body Condition Score, Live Weight and Age on Reproductive Performance of Afshari Ewes. *Asian Journal of Animal and Veterinary Advances*, *7,* 904-909.

Amr, A. Gabr, A. Shalaby, M. and Ahmed, E. (2016). Effect of Ewe Born Type, Growth Rate and Weight at Conception on the Ewe Subsequent Productivity of Rahmani Sheep. *Asian Journal of Animal and Veterinary Advances*, *11* (11), 732-736.

Babar, M. & Javed, Khalid (2009). Non-genetic factors affecting reproductive traits in Lohi sheep. *Acta Agriculturae Scandinavica Section A-animal Science*, *59*, 48-52.

Bermejo, L. A., Mellado, M., Camacho, A., Mata, J., Arévalo, J. R. and Nascimento, L. (2010). Factors Influencing Birth and Weaning Weight in Canarian Hair Lambs. *Journal of Applied Animal Research, 37*, 29-31.

Chopra, S. C. and Acharya, R. M. (1970). Relationship of ewe size with birth and weaning weights of lambs. *Indian Journal of Animal Sciences, 40,* 508-510.

Clarke, L., Yakubu, D. P. and Symonds, M. E. (1997). Influence of maternal bodyweight on size, conformation and survival of newborn lambs. *Reproduction Fertility and Development, 9*, 509-514.

Dass, G. Mandal, A. and Rout, P. K. (2014). Genetic and phenotypic parameters of growth traits in Muzaffarnagari sheep. *Indian Journal of Animal Sciences, 84* (12), 1328–1331.

Dey, B. (2004). Genetic studies on reproduction and production traits of Nali sheep. M.V.Sc. Thesis. College of Animal Sciences, CCS Haryana Agricultural University, Hisar , Haryana, India.

Duncan, D. B. (1955). Multiple range and multiple F tests. *Biometrics, 11*, 1-42.

Gardner, D. S., Buttery, P. J., Daniel, Z. and Symonds, M. E. (2007). Factors affecting birth weight in sheep: Maternal environment. *Reproduction, 133,* 297-307.

Gupta, B. R. and Reddy, K. K. (1988). Factors affecting the birth weight in Nellore and Dorset × Nellore synthetic lambs. *Indian Journal of Animal Science, 58,* 391-393.

Haider, U. and Shah, S. K. (1974). Relationship between body weight of Harnai and Bibrik ewes and birth and weaning weight of their lambs. *Pakistan Journal of Agriculture Sciences, 25*, 209-218.

Kumar, S. Dahiya, S. P. Malik, Z. S. Patil , C. S. and Magotra, A. (2018). Genetic analysis of performance traits in Harnali sheep. *Indian Journal of Animal Research, 52*(5), 643-648.

Maroof, N. N., Juma, K. M., Arafat, E. A. and Chakmakchy, A. M. (1986). Evaluation of factors affecting birth and weaning weight and milk production in Hamdani sheep. *World Review of Animal Prod., 22*, 51-55.

Mishra, A. K., Arora, A.L., Prince, L. L. L. and Kumar, S. (2008). Performance evaluation of Garole × Malpura halfbred sheep evolved in semiarid region of Rajasthan. *Indian Journal of Animal Sciences, 78* (7), 746–750.

Nehra, K. S. and Singh, V. K. (2006). Genetic evaluation of Marwari sheep in arid zone : growth. *The Indian Journal of Small Ruminants, 12* (1), 91-94.

Petrovic, M. P., Muslic, D. R., Petrovic, V. C. and Maksimovic, N. (2011). Influence of environmental factors on birth weight variability of indigenous Serbian breeds of sheep. *African Journal of Biotechnology, 10*(22), 4673-4676.

Prince, L. L. L., Chopra, A., Gowane, G. R. and Arora, A. L. (2010). Factors affecting growth in Avikalin sheep. *Indian Veterinary Journal, 87,* 1104-1108.

Raman, K. S. and Sivaraman, T. (1974). Breed characteristics of the south Indian fine wool sheep "Nilagiri". *Cheiron, 3*, 138-140.

Sahani, M. S., Bapnaz, D. L., and Mehta, S. C. (2005). Effect of ewes' weight at lambing on growth of Marwari lambs, *Indian Journal of Animal Sciences, 75*(11), 132 1-1 322.

Singh, H., Pannu, U., Narula, H. K., Chopra, A., and Murdia, C. K. (2013). Influence of genetic and non-genetic factors on pre-weaning growth in Marwari sheep. *The Indian Journal of Small Ruminants, 19* (2), 142-145.

Snedecor, G. W. and Cocharan, W. G. (1968). Statistical Methods. Oxford and IBH Publication Co., New Delhi, India.

Speedy, A. W., Black, W. J. M. and Fitzsimons, J. (1978). The effects of autumn management and winter feeding of Border Leicester X Blackface ewes on the subsequent birthweights of lambs. *Anim. Prod., 26,* 391-392.

Steel, R. G. D. and Torrie, J. H. (1980). Principles and Procedures of Statistics: A Biometrical Approach. 2nd Edn., McGraw Hill Book Co., New York, USA., Pages: 633.

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