

RELATIONSHIP OF BIRTH WEIGHT OF LAMBS WITH AGE OF EWES AT SERVICE IN RAMBOUILLET SHEEP

S. ALI, A. HUSSAIN, P. AKHTAR, M. YOUNAS¹ AND M. A. KHAN²

Department of Animal Breeding and Genetics, ¹Department of Livestock Management, University of Agriculture, Faisalabad and ²Directorate of Livestock and Dairy Development, NWFP, Peshawar, Pakistan

ABSTRACT

Data on birth weight of lambs and age of the dam at service in Rambouillet sheep maintained at the Livestock Experimental Station, Jaba, District Mansehra (NWFP), Pakistan were analyzed. The average age of the dam at service was 1337.57 ± 10.55 days. The least-square means for birth weight were 3.63 ± 0.11 and 3.41 ± 0.07 kg for single male and female lambs and 3.45 ± 0.12 and 3.29 ± 0.12 kg for male and female lambs born as twins. Age of the dam at service had a significant relationship with the birth weight of lambs. The correlation and regression coefficients between the above mentioned two traits were 0.37 and 0.025 ± 0.0001 , respectively. Analysis of variance of age of the dam at service and birth weight of lambs due to regression revealed that this regression was statistically significant ($P < 0.01$).

Key words: Rambouillet sheep, birth weight, Pakistan.

INTRODUCTION

Higher birth weights of lambs is a desirable trait of economic importance in sheep, and helps in early selection of lambs. An increase in the number of lambs marketed per ewe per year offers the greatest single opportunity for increasing the efficiency of lamb meat production. It has been reported that there is a positive correlation between ages at different stages in sheep starting from birth to maturity (Babar, 1994).

Keeping in view the importance of birth weight for economical sheep production, a project was planned to study the effect of age of the dam at service on birth weight of their lambs in Rambouillet sheep. The Rambouillet breed, of Merino origin, is one of the better breeds for early breeding. The crosses among the three breeds viz. Rambouillet, Targhee and Columbia, form the basis of most commercial ewe flocks in western United States (Iniguez, *et al.*, 1986). Thus, it is envisaged that the analysis of data will ultimately be helpful in early selection of lambs for better growth rate and for more carcass yield.

MATERIALS AND METHODS

Source of data

The performance data of Rambouillet sheep maintained at the Livestock Experimental Station, Jaba, District Mansehra (NWFP) Pakistan during the period from 1957 to 1986 were used in the present study. Data on 1816 dam-lamb pairs were collected to study the

relationship between the age of ewes at service and birth weight of lambs.

Statistical procedure

In order to study the relationship between birth weight of lambs and age of ewes at service, the correlations between two traits were calculated. The regression coefficients between birth weight of lambs (dependent variable) were also worked out according to the procedure described by Steel *et al.*, (1997). Least-square means (\pm SE) for birth weight were also worked out for different age groups of ewe using the Harvey's computer software (Harvey, 1990). Following statistical model was observed:

$Y_{ij} = \mu + a_i + \epsilon_{ik}$, Where

Y_{ij} = birth weight of j^{th} lamb

μ = Population mean

a_i = effect of i^{th} age of ewe

ϵ_{ik} = random error. It was assumed that ϵ_{ik} was normally and independently distributed with mean zero and variance σ_e^2 .

RESULTS AND DISCUSSION

The overall birth weight of Rambouillet lambs averaged 3.67 ± 0.08 kg in the present study, whereas age of the dam at service ranged from 1 to 9 years with an average value of 1337.57 ± 10.55 days. These findings are in line with those of Fireman and Siewerdt (1996), who reported that birth weight averaged 3.69 ± 0.02 kg in Santa Ines lambs.

The least-square means of birth weight according to sex, birth type and age of the dam have been given in Table 1. The overall least-square means were 3.63 ± 0.11 and 3.41 ± 0.07 kg for single born male and female lambs, respectively, while the values for twin born male and female lambs were 3.45 ± 0.12 and 3.29 ± 0.12 kg, respectively. These results showed that males were heavier than females at birth and single born lambs were heavier than twin born lambs. Bemji *et al.* (1996) reported that birth weight was significantly affected by the type of birth (twin vs single) and sex of lambs.

Correlation between the age of the dam at service and birth weight of lambs

The correlation coefficient between age of the dam at service and birth weight of lambs was 0.37 ($p < 0.01$). This is a medium value of correlation, showing a scope of improvement in birth weight of lambs by selecting the dams with advanced age. Berra and Raimondi (1986) reported that the birth weight of lambs increased significantly with increasing age of dam in Biella breed of sheep.

Regression of age of dam at service on birth weight of lambs

In order to study the magnitude of effect of age of the dam at service on birth weight of the lambs, the regression coefficient was calculated which was 0.025 ± 0.0001 (Table 2). The regression analysis (Table 3) depicts that this regression was highly significant ($p < 0.01$). This positive and significant coefficient indicates that for one-year increase in the age of the dam, the increase in birth weight of lambs was 25 grams. Thus, younger ewes produced lighter (3.40 ± 0.29 kg birth weight from 1-3 years dam age) lambs and the birth weight of lambs increased with advancing age. The older ewes produced the heavier (3.75 ± 0.18 kg from 4-9 years of dam age) lambs.

Increase in birth weight of lambs due to increasing age of ewes reflects physiological phenomena that the size of ewes, as well as the uterus where the fetus is to be nourished, is increased with advancing age. Also younger ewes develop in size and weight and hence utilize energy for their own growth and development, which might affect the birth weight of lambs produced by them. Contrarily, older ewes attain their full growth and development and can divert their all energies for productivity. Hence, the older ewes probably produced the heaviest lambs at birth. El-Karim and Qwen (1988) also reported a significant effect of age of dam on birth weights of lambs.

Table 1: Least square means (\pm SE) for birth weight of single and twin lambs according to sex, type of birth and the age of dam at service

	Birth weights (kg)			
	Single		Twin	
	M	F	M	F
Over all	3.63 ± 0.11 (796)	3.41 ± 0.07 (704)	3.45 ± 0.12 (172)	3.29 ± 0.12 (144)
Age of the ewe (years)				
1	3.40 ± 0.09 (169)	3.18 ± 0.07 (168)	3.04 ± 0.17 (21)	2.94 ± 0.23 (18)
2	3.52 ± 0.08 (175)	3.25 ± 0.09 (145)	3.24 ± 0.15 (28)	3.16 ± 0.21 (13)
3	3.68 ± 0.09 (157)	3.58 ± 0.09 (122)	3.39 ± 0.13 (34)	3.27 ± 0.19 (17)
4	3.71 ± 0.17 (96)	3.43 ± 0.09 (110)	3.51 ± 0.13 (34)	3.31 ± 0.29 (27)
5	3.68 ± 0.12 (91)	3.58 ± 0.11 (76)	3.39 ± 0.17 (22)	3.18 ± 0.27 (23)
6	3.86 ± 0.16 (48)	3.72 ± 0.16 (40)	3.67 ± 0.21 (14)	3.56 ± 0.55 (19)
7	4.02 ± 0.25 (21)	3.77 ± 0.24 (17)	3.75 ± 0.57 (11)	3.32 ± 0.35 (15)
8	3.87 ± 0.44 (17)	3.58 ± 0.32 (10)	3.84 ± 0.25 (8)	3.64 ± 0.55 (12)
9	4.13 ± 0.83 (22)	3.86 ± 0.50 (16)	-	-

Note: Figures in parentheses indicate the number of observations (M = Male and F = Female).

Table 2: Regression coefficients for birth weight of lambs due to the age of the dam at service

Traits (Regressed)	No. of records	Regression coefficient	Regression equation
Age of dam at service (X_1)	1816	0.025 ± 0.0001	$Y_1 = 1.063 + 0.025X_1$
Birth weight of lambs (Y_1)			

Table 3: Analysis of variance showing the effect of age of the dam at service on birth weight of lambs due to regression

Source of Variation	df	Mean Square	F. Ratio
Due to regression	1	11.940	10.354**
About regression	1814	1.153	
Total	1815		

**Significant ($p < 0.01$).

REFERENCES

- Babar, M. E., 1994. Genetic and phenotypic parameters of some performance characteristics of Lohi sheep. PhD Dissertation, Univ. Agri. Faisalabad, Pakistan.
- Bemji, M. N., Q. A. Osinowo, O. W. Ehoche and O. A. Aduku, 1996. Birth weight and litter birth weight in Yankasa sheep; Environmental factors and heritability estimates. Nigerian J. Anim. Prod., 23(1/2): 5-11.
- Berra, G. P. and R. Raimondi, 1986. Some factors influencing birth weight in Biella sheep reared in the high Alps. Rivista di Zootechnia Veterinaria, 14(1): 56-61 (Anim. Breed. Abst., 54(9): 5928, 1986).
- El-Karim, A. I. A. and J. B. Owen, 1988. Environmental and genetic aspects of preweaning weight in two types of Sudan desert sheep. Res. Dev. Agri., 5(1): 29-33.
- Fireman, A. K. B. A. and F. Siewerdt, 1996. Some factors affecting birth weight of Santa Ines lambs in Sergips State. Archivos Latinoamericanos de Prod. Anim., 4(1): 45-54 (Anim. Breed. Abst., 65(10): 5280, 1997).
- Harvey, W. R., 1990. User's Guide for LSMLMW and MIXMDL, Mixed Model Least-Squares and Maximum Likelihood Computer Program. PC-2 version. The Ohio State University, Columbus, OH, USA.
- Iniguez, L. C., G. E. Bradford and O. A. Mwai, 1986. Lambing date and lamb production of Spring-mated Rambouillet, Dorset and Finnsheep ewes and their F_1 crosses. J. Anim. Sci., 63:715-728.
- Steel, R.G. D., J. H. Torrie and D. A. Dickey, 1997. Principles and Procedures of Statistics. A biometrical approach. 3rd Ed., McGraw Hill Book Co., New York, USA.

Data on birth weight of lambs and age of the dam at service in Rambouillet sheep maintained at the Livestock Experimental Station, Jaba, District Mansehra (NWFP), Pakistan were analyzed. The average age of the dam at service was 1337.57 ± 10.55 days. Age of the dam at service had a significant relationship with the birth weight of lambs. The correlation and regression coefficients between the above mentioned two traits were 0.37 and 0.025 ± 0.0001 , respectively. RELATIONSHIP OF BIRTH WEIGHT OF LAMBS WITH AGE OF EWES AT SERVICE IN RAMBOUILLET SHEEP, Pakistan Veterinary Journal, 2008, pp. 187-189, Volume 4

Changes in birth and weaning weights across ewe age groups were modelled using hybrid curves that combined asymptotic regression models to describe initial increases in lamb weight as ewes moved into adulthood with second order polynomials to describe declines in lamb weights in older ewes. Lamb birth and weaning weights were highest (and the asymptotic and polynomial forms comprising the hybrid curves intersected) at ewe ages of 76 and 52 months, respectively. Adjustment factors for 120-day weaning weight in Rambouillet range lambs. Journal of Animal Science 67: 1107-1115. CrossRef Google Scholar. Notter, D. R. 2002. Opportunities to reduce seasonality of breeding in sheep by selection. Sheep and Goat Research Journal 17: 20-32. Google Scholar.

weight at birth, in other words, the higher body weight of lambs at birth gives greater potential force for growth in the first month, in contrast to lambs with less weight and thus less power of growth (Petrović et al., 2013). weaning weight in Merino lines divergently selected for ewe multiple rearing ability. South African J. Anim. Sci., 33, 248-256. CLOETE S.W.P., GREEFF J.C., LEWER R.P. (2001): Environmental and genetic aspects of survival and early live weight in Western Australian Merino sheep. South Afr. J. Anim.