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Morphometric characteristics of Mecheri lambs at birth

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Abstract

The study was conducted to find out the effect of non-genetic factors on birth weight, morphometric traits like heart girth, paunch girth, body height and body length of lambs and to correlate the birth weight of lambs with its morphometric traits and dam weight at lambing. The data were collected on dam weight at lambing (DW), birth weight (BW), heart girth (HG), paunch girth (PG), height at withers (BH) and body length (BL) with in 24 hours of lambing at Sheep breeder unit, Livestock Farm Complex, Veterinary College and Research Institute, Namakkal. The overall mean $\pm$ SD estimates of DW, BW, HG, PG, BH and BL were 31.75 $\pm$ 0.53 kg, 3.07 $\pm$ 0.06 kg, 33.94 $\pm$ 0.027 cm, 30.25 $\pm$ 0.048 cm, 37.19 $\pm$ 0.034 cm, and 28.83 $\pm$ 0.34 cm, respectively. The male lambs had significantly ($p<0.05$) higher BW, HG, PG, BH by 0.40 kg, 1.07 cm, 2.17 cm and 1.60 cm than the female. Birth weight of lambs had significant difference ($p<0.001$) between summer, monsoon and winter season. Dam weight at lambing directly had significant ($p<0.001$) effect on the birth weight of lambs as proportionately. Similarly, the birth weight of lambs born having direct relationship with parity of the sheep. From this study, it can be concluded that the morphometric traits are highly correlated with each other except body length.

Keywords: Mecheri lambs, birth weight, morphometric traits, correlation

Introduction

Mecheri sheep breed are spread over the Salem, Namakkal, Erode, Karur and Dharmapuri districts of Tamil Nadu. Mecheri sheep are medium sized animals with compact body and covered with short hairs and are mainly reared for meat purpose. The colour of the sheep is light brown and both sexes of this breed are polled. Mecheri sheep having straight and medium sized legs with brown hooves, evenly set under the body. Udder is small and round, tightly attached to the belly with small conical teats placed laterally and the teats are directed slightly outward (Karunanithi *et al.*, 2005) ^[11].

The success of sheep farming is mainly dependent on birth weight of lamb as it having impact on survival and subsequent growth of lambs. Birth weight is considered as an important economic trait as it affects the overall growth of the body (Bukhari *et al.*, 2022) ^[4] and lambs having higher birth weight will gain more body weight in the early growth period of its life. The average birth weight of Mecheri sheep is around 2.82 kg for male and 2.77 kg for female (Karunanithi *et al.*, 2005) ^[11]. The male lambs have higher body weight than female lambs. At the age of 3 months, males will attain the body weight of 11.0 kg and female about 10.8 kg. Similarly, the same growth trend was observed at six months, nine months and beyond. In general, morphometric traits, such as body condition score, heart girth and others, are easy to measure and of low cost. Besides that, they can be used as indirect indicator traits for selection of animals (Van Burgel *et al.*, 2011) ^[22].

Materials and Methods

The breedable ewe are maintained under semi-intensive system of rearing with good ventilated open sided pen and run housing at Livestock Farm Complex, Veterinary College and Research Institute, Namakkal. Body weight is measured by weighing scale in kg and morphometric

traits are measured by measuring tape in centimetre (cm). The data pertaining to dam weight at lambing (DW), birth weight (BW) and other parameters are measured with the following descriptions from 77 numbers of ewes at different seasons viz. summer (March to May), south west monsoon (June to August) north east monsoon (September to November) and winter (December to February) during the year 2024.

Body length (BL)	:	Distance from point of shoulder to the point of tuber ischii
Height at withers (BH)	:	Distance from the base of hoof to the highest point of withers
Heart girth (HG)	:	Body circumference around the heart just behind the front legs and withers
Paunch girth (PG)	:	Circumference of body measured just before hind legs

The means, standard deviations and coefficient of variations of dam weight, birth weight and all morphometric traits were analysed by using standard statistical procedures. An analysis of variance was employed to evaluate the effect of sex, season, dam weight and parity on birth weight and morphometric traits of lambs. The correlation between the dam weight, birth weight, heart girth, paunch girth, body height and body length of lambs was performed using a Pearson's correlation coefficient test. The statistical analysis was made using SPSS 16.0 (IBM Corporation, Armonk, New York, USA).

Results and Discussion

Morphometric traits of Mecheri lambs

The present study recorded the mean values of dam weight (DW), birth weight (BW), heart girth (HG), paunch girth (PG), body height (BH) and body length (BL) were 31.75±0.53 kg, 3.07±0.06 kg, 33.94±0.027 cm, 30.25±0.048 cm, 37.19±0.034 cm, and 28.83±0.34 cm, respectively. The percentage of coefficient of variation (CV%) in all morphometric traits were low indicating that low variability was noticed among the traits in Mecheri lambs. (Table 1). The results are similar to the findings of Bukhari *et al.* (2022) [4] who found that the coefficient of variation (CV%) of morphometric traits were ranged from low (7.37%) to medium (32.62%) in Bakerwal kids. Similarly, Karunanithi *et al.* (2005) [11] observed body length of 29.30±0.20 cm in Mecheri lambs, Ravimurugan *et al.* (2007) [17] found the heart girth of 34.81±0.50 cm in Vembur lamb and Mandal *et al.* (2008) [13] in Muzaffarnagari sheep (34.61±0.07 cm). However, Zarger *et al.* (2017) [24], observed higher mean value for body weight, body length, height at withers and heart girth of 3.28±0.05 kg, 30.00±0.42 cm, 42.22±0.42 cm and 41.12±0.43 cm with corresponding CV (%) of 11.28, 10.10, 7.01 and 6.03, respectively in Bakerwali kids.

Effect of non-genetic factors on birth weight and morphometric traits of Mecheri lambs

Effect of sex

The morphometric traits in male lambs like BW, HG, PG, BH, BL, are superior to females by 0.40 kg, 1.07 cm, 2.17 cm, 1.60 cm and 0.56 cm in respectively (Table 2). The body length, height at withers, heart girth in Male lambs of Shahabadi sheep at birth were significantly ($P<0.01$) higher than females by 1.16 cm, 1.04 cm, 1.05 cm, respectively (Chandran *et al.*, 2014) [5] and similar to that of observations made in male lambs of Vembur sheep than females by Ravimurugan *et al.* (2007) [17]. The superiority of male lambs at birth might be attributed to differences in the endocrine

profiles, especially role of testosterone, faster growth rate of male foetus during prenatal development, various gene combinations and their differential expressions in both the sexes. In contrary, to the present study Tailor and Yadav (2011) [21] in Sonadi sheep and Sivakumar *et al.* (2009) [20] in Madras red lamb reported that there is no significant effect of sex on birth weight.

Effect of season

Birth weight of lambs differed significantly ($p<0.001$) between summer, monsoon and winter season. The lambs born during winter season had higher birth weight (3.46 ± 0.12) than summer (2.87 ± 0.58 kg) and monsoon season (3.10 ± 0.32 kg) (Table 2) which is contradictory to the findings of Ramesh Saravana Kumar *et al.* (2007) [16] found the higher birth weight of lambs during the monsoon season than the summer and winter season. They suggested that that this could be due to the availability of sufficient pasture in their last stage of pregnancy. Renuka *et al.* (2024) reported that the Sonadi lambs born in the winter season (2.73 ± 0.03 kg) had significantly ($p \leq 0.01$) lower body weight than in the monsoon season (2.89 ± 0.03 kg). Similar findings were reported in Nellore lambs by Reddy *et al.* (2009), on birth weight of Sonadi sheep by Meena *et al.* (2019) [14] and Sharma *et al.* (2019) [19]. There is no significant differences observed in birth weight of male and female lamb in Madras red lamb by Sivakumar *et al.* (2009) [20] and in Dorper Rambouillet lamb (Zaffer *et al.*, 2015) [23].

The higher body weight was recorded in off-season-born lambs because of the availability of resources, and it was greater (Balasundaram *et al.*, 2023) [2]. In previous reports, it was observed that the season was found to be an influence on body-weight traits in different Indian, hair-type meat breeds of sheep (Jeichitra *et al.*, 2016) [10].

Effect of dam weight at lambing

Dam weight at lambing had significant effect ($p<0.001$) on the birth weight of lambs. Lambs born to ewes weighing 34-36 kg were having significantly higher birth weight (3.46 ± 0.12 kg) followed by those born to ewes weighing 31-33 (3.04 ± 0.34 kg) and 28-30 kg (2.84 ± 0.08 kg). It is consented to the findings of Prince *et al.*, 2010 [15] and Dass *et al.* 2014 [6] due to better nutrition and more uterine space. This study supports the findings of Kumar *et al.* (2018) [12] proved that the significant effect of dam's weight at lambing on lamb birth weight. This can have positive implications for lamb survivability and growth rates.

Lambs born to ewes weighing 34-36 kg were having significantly higher paunch girth (33.25 ± 0.75 cm), height at withers (39.33 ± 0.33 cm) followed by those born to ewes weighing 31-33 (29.70 ± 0.42 cm), (37.09 ± 0.25 cm) and 28-30 kg (29.16 ± 0.83 cm), (36.00 ± 0.77 cm), at birth (Table 2). Dam's body weight at the time of lambing significantly influences morphometric traits of the lambs. The findings agree with the results of Anil Pavan Kumar *et al.* (2023) [1] in their study lambs born to ewes having higher weight had significantly higher paunch girth.

Effect of parity

The parity of the dam had significant effect ($p<0.001$) on the birth weight of lambs. The lambs born from multiparous animals had higher birth weight (3.36 ± 0.13 kg), paunch girth (32.33 ± 0.76 cm) and body length (30.00 ± 0.25 cm) than the primiparous animals (2.95 ± 0.51 kg), (29.35 ± 0.43 cm), and (28.25 ± 0.41 cm), respectively. (Table 2).

Reddy *et al.* (2018) reported that the parity of dam

contributed significantly for all growth traits of Nellore Jodipi lamb. An increasing trend in body weight was observed with increase in parity up to fifth parity and there after it decreased. This could be due to the relative nutritional competition between the still-growing pregnant ewes and the growing fetus, as well as the age of the dam (Bhakthavatchalam, 2019) [3]. As the age of the dam increases, uterine space and other factors necessary for lamb growth improves and after fifth parity ewes tend to lose their teeth and old age causes poor nutrition to lambs in uterus and suckling as well.

Correlation of birth weight and morphometric traits

All the morphometric traits studied in Mecheri lambs had positive correlation with each other. DW had the positive correlation with the BW (0.87), HG (0.69), PG (0.63) and BH (0.71). BW had positive correlation with DW (0.87), HG (0.67), PG (0.83) and BH (0.91); HG had positive correlation with DW (0.69), BW (0.67) and BH (0.76); PG had positive correlation with DW (0.63), BW (0.83) and BH (0.79); BH had positive correlation with DW (0.71), BW (0.91), HG (0.76) and PG (0.79) (Table 3). Strong correlations exist between birth weight and morphometric traits; it can be used to indirectly assess birth weight particularly in locations where weighing scales are unavailable. Gizaw *et al.* (2018) [9] reported that the genetic correlation of body weight ranging from 0.89 to 0.98 between heart girth and body length. Bukhari *et al.* (2022) [4] found that a strong positive correlation among all the morphometric traits in Bakerwal kids except chest circumference and body height. Significant correlation coefficient between the weight of the dam at

lambling and the birth weight of the lambs was observed by Geetha *et al.* (2023) [8]. Positive and moderate to high genetic correlations between growth traits suggest the synergism between traits (Jeichitra *et al.*, 2016) [10]. Chest circumference had the highest correlation with body weight compared to body length in fat-tailed sheep (Fajar and Nugartiningih, 2024).

Conclusion

Morphometric traits are easy to measure and of low cost and they can be used as indirect indicators for selection of animals to improve breeding programs, manage sheep more effectively and develop more efficient and sustainable farming practices.

Table 1: Morphometric traits of Mecheri lambs (n=77)

	Mean±S.E	SD	CV (%)	Range
DW (kg)	31.75±0.53	2.32	7.31	28 to 36
BW (kg)	3.07±0.06	0.28	9.12	2.65 to 3.85
HG (cm)	33.94±0.27	1.14	3.36	32 to 35
PG (cm)	30.25±0.48	2.17	7.17	27 to 35
BH (cm)	37.19±0.34	1.50	4.04	35 to 40
BL (cm)	28.83±0.34	1.46	5.06	24 to 31

DW - dam weight at lambing;

BW - birth weight;

HG - heart girth

PG - paunch girth;

BH - body height;

BL - body length

Table 2: Effect of non-genetic factors on birth weight and morphometric traits of Mecheri lambs

Effect	N	BW	HG	PG	BH	BL
Overall	77	3.07±0.06	33.94±0.27	30.25±0.48	37.19±0.34	28.83±0.34
Sex		0.00**	0.05*	0.02*	0.01**	0.43
Male	37	3.29±0.88	34.44±0.33	31.44±0.76	38.00±0.44	29.11±0.67
Female	40	2.89±0.05	33.37±0.37	29.27±0.46	36.40±0.40	28.55±0.17
Season		0.00**	0.11	0.00**	0.03*	0.08
Summer	19	2.87 ± 0.58	33.16 ± 0.47	29.33 ± 0.55	36.25 ± 0.49	28.42 ± 0.20
Monsoon	40	3.10 ± 0.32	34.33 ± 0.21	29.71 ± 0.60	37.42 ± 0.29	28.42 ± 0.75
Winter	18	3.46 ± 0.12	34.40 ± 0.60	33.25 ± 0.75	38.50 ± 0.86	30.25 ± 0.25
Dam weight		0.00**	0.03*	0.00**	0.00**	0.10
28-30	25	2.84±0.08	33.00±0.70	29.16±.83	36.00±0.77	28.00±0.00
31-33	37	3.04±0.34	33.88±0.30	29.70±0.42	37.09±0.25	28.72±0.48
34-36	15	3.46±0.12	35.00±0.00	33.25±0.75	39.33±0.33	30.33±0.33
Parity		0.00**	0.14	0.00**	0.04*	0.01**
Primiparous	30	2.95±0.51	33.63±0.30	29.35±0.43	36.69±0.36	28.25±0.41
Multiparous	47	3.36±0.13	34.50±0.50	32.33±0.76	38.16 ±0.60	30.00±0.25

**Values differed significantly at 0.01 ($p < 0.01$)

* Values differed significantly at 0.05 ($p < 0.05$)

Table 3: Phenotypic correlations among morphometric traits and birth weight of Mecheri lambs (n=77)

	DW	BW	HG	PG	BH	BL
DW						
BW	0.87**					
HG	0.69**	0.67**				
PG	0.63**	0.83**	0.41			
BH	0.71**	0.91**	0.76**	0.79**		
BL	0.41	0.43	0.20	0.28	0.22	
**Correlation is significant at the 0.01 level (2-tailed)						
*Correlation is significant at the 0.05 level (2-tailed)						

DW - dam weight at lambing;

BW - birth weight;

HG - heart girth;

PG - paunch girth;

BH - body height;

BL - body length

Conflict of Interest

Not available

Financial Support

Not available

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