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GROWTH TRENDS IN BODY DIMENSIONS OF HARNALI LAMBS AT DIFFERENT AGES

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ABSTRACT

The present study was conducted to see trends in nine body measurements of 94 Harnali lambs at 3, 6, 9 and 12 months of age. The least squares means for BL, BH, HG, PG, TL, HC, EL, EW and FL of lambs at 3 months of age were estimated as 52.32±0.83, 54.38±0.70, 55.70±0.82, 56.50±0.91, 20.36±0.52, 35.36±0.44, 14.90±0.23, 8.04±0.13 and 15.06±0.22 cm, respectively in males; 51.04±0.66, 53.54±0.81, 55.84±0.74, 55.11±0.90, 19.04±0.48, 35.11±0.40, 14.54±0.26, 7.93±0.14 and 14.61±0.26 cm, respectively in females. The corresponding estimates at 12 months of age were estimated as 67.44±0.95, 70.66±0.63, 73.44±0.86, 75.22±0.96, 26.75±0.89, 43.71±0.74, 16.64±0.63, 8.77±0.23 and 22.54±0.39 cm, respectively in males; 61.17±0.59, 63.14±0.47, 66.55±0.54, 68.10±0.70, 23.74±0.38, 39.62±0.39, 16.35±0.29, 8.74±0.16 and 18.30±0.14 cm, respectively in females. The linear body measurements in Harnali lambs showed a continuous increase from 3 to 12 months of age. There was a significant difference between male and female lambs at all ages with regards to body measurements except for EL and EW. It was noticed that BL, BH, HG, PG, TL and HC increased 23.61 to 33.13 per cent in male lambs and 12.84 to 23.57 per cent in female lambs between 3 to 12 months of age. EL and EW showed least increase during this period in lambs of both sexes which was between 9.08 to 12.45 per cent. Maximum increase was observed in FL of male lambs (49.67%). The growth trends in body dimensions of Harnali lambs from 3 to 12 months of age clearly indicated that surplus animals should be disposed off between 6-9 months of age for better returns.

KEYWORDS: Growth Trends, Harnali Sheep, Linear Body Measurements

Sheep with its multi-facet utility for wool, meat, skin and manure, form an important component of rural economy particularly in the arid, semi-arid and mountainous areas of the country. In the present times, the economy of sheep farming depends mainly on production of heavier lambs as the importance of wool has reduced due to availability of synthetic fiber, which resulted in a shift to the emphasis from wool to production of faster growing lambs. The body dimensions of an animal have direct relation with its body weight.

Harnali sheep is a new synthetic strain which has been evolved by cross breeding for superior carpet wool, better growth and adaptability. The crossbreds having 62.5 per cent exotic inheritance from Russian Merino and Corriedale and 37.5 per cent from local Nali breed were mated inter se for several generations for stable performance. Harnali population has now become stable (Sehrawat, 2005) and stability is one of the most desirable properties of a genotype to be released as a breed for wider utilization.

Growth is an economically important trait of farm animals which can be interpreted mathematically. It is a time (age) dependent change expressed in the weight or size of organ, composition of tissue/organ, size or number of cells and in live weight (Eisen, 1976). Growth rate is related to rate of maturing and mature weight and these traits have been suggested to have association with lifetime productivity parameters in animals (Pala *et al.,* 2005). Slow growth rate causes low market weight and has been identified as one of the limiting factors affecting the profitability of any production system (Abegaz *et al.,* 2010). Hence, the present study was conducted to study Growth trends in body dimensions of Harnali lambs at different ages.

MATERIALS AND METHODS

All the procedures have been conducted in accordance with the guidelines laid down by the Institutional Ethics Committee.

Data Recording: The data for the present study were recorded on 349 Harnali animals maintained in the Department of Animal Genetics and Breeding, Lala Lajpat Rai University of Veterinary and Animal sciences, Hisar. The adult animals above 2 years of age were recorded for body measurements. The body measurements (cm) were taken using a graduated measuring tape. All body measurements were taken when the animal was in standing position with head raised and weight on all four feet without body movement. Physical restraint was sometimes applied to limit movement. Body weight was taken using a hanging digital scale. Pregnant females were excluded from sampling to remove the effect of pregnancy on some of body parameters. Following nine body measurements were taken on each animal along with adult body weight (ABW).

Body Length (BL): distance from base of tail to the base of the neck (first thoracic vertebrae); **Body height (BH):** distance from the surface of the platform on which the animal stands to the withers; **Heart girth (HG):** body circumference around the chest just behind the front legs and withers; **Paunch girth (PG):** circumference of body measured just before the hind legs; **Head circumference (HC):** circumference of head as above the eyebrows and ears and around the back of the head; **Face length (FL):** distance from the beginning of the upper lip to the external occipital protuberance; **Ear length (EL):** length of ear from base of ear; **Ear width (EW)**: width of ear at the middle of ear; **Tail length (TL):** length of tail from base of tail.

Statistical Analysis: Least-squares and maximum likelihood computer programme of Harvey (1990) using mixed linear model with dam's weight at lambing as covariate for estimation of various tangible factors on body measurements and adult body weight was used. The following mathematical model was used:

$$\mathbf{Y_{ijklm} = \mu + S_i + P_j + B_k + A_l + b\ (X_D - \bar{X}) + e_{ijklm}}$$

Where Y_{ijklm} is the observation on m^{th} animal belonging to l^{th} age group of dam, of k^{th} sex born in j^{th} period of birth, of i^{th} sire; **μ** is the overall mean; S_i is the random effect of i^{th} sire; P_j is the fixed effect of j^{th} period of birth (j = 1,2,3,….6); B_k is the fixed effect of k^{th} sex (k = 1, 2); A_l is the fixed effect of l^{th} age group of dam (l = 1,2,….7); b is the linear regression coefficient of trait on dam's weight at lambing; X_D is the dam's weight at lambing; $\bar{X}$ is the mean dam's weight at lambing and e_{ijklm} is the random error component. Modified Duncan's multiple range test was used for comparing subgroup means (Kramer, 1957).

RESULT AND DISCUSSIONS

The least squares means for L, H, HG, PG, TL, HC, EL, EW and FL of lambs at 3 months of age were estimated as 52.32±0.83, 54.38±0.70, 55.70±0.82, 56.50±0.91, 20.36±0.52, 35.36±0.44, 14.90±0.23, 8.04±0.13 and 15.06±0.22 cm, respectively in males; 51.04±0.66, 53.54±0.81, 55.84±0.74, 55.11±0.90, 19.04±0.48, 35.11±0.40, 14.54±0.26, 7.93±0.14 and 14.61±0.26 cm, respectively in females. The corresponding estimates at 12 months of age were estimated as 67.44±0.95, 70.66±0.63, 73.44±0.86, 75.22±0.96, 26.75±0.89, 43.71±0.74, 16.64±0.63, 8.77±0.23 and 22.54±0.39 cm, respectively in males; 61.17±0.59, 63.14±0.47, 66.55±0.54, 68.10±0.70, 23.74±0.38, 39.62±0.39, 16.35±0.29, 8.74±0.16 and 18.30±0.14 cm, respectively in females (Table 1). The linear body measurements in Harnali lambs showed a continuous increase from 3 to 12 months of age. There was a significant difference between male and female lambs at all ages with regards to body measurements except for EL and EW. It was noticed that L, H, HG, PG, TL and HC increased 23.61 to 33.13 per cent in male lambs and 12.84 to 23.57 per cent in female lambs between 3 to 12 months of age. EL and EW showed least increase during this period in lambs of both sexes which was between 9.08 to 12.45 per cent. Maximum increase was observed in FL of male lambs (49.67%) which might be due to the reason that some of the male lambs were sold during this period on the basis of body weight. The least squares means for L, H, HG, PG, TL, HC, EL, EW and FL of lambs at market age (six month) were estimated as 61.42±0.69, 60.44±0.80, 67.12±0.91, 73.66±0.91, 24.60±0.58, 37.58±0.51, 16.12±0.23, 8.66±0.23 and 18.22±0.20 cm, respectively in males; 59.11±0.86, 58.72±0.65, 63.39±0.88, 67.45±0.92, 23.27±0.66, 36.54±0.53, 16.00±0.34, 8.54±0.43 and 17.93±0.19 cm, respectively in females. The linear body measurements estimated in present study are higher than those reported by Younas *et al*. (2013) in Hissardale sheep and Kumar *et al*. (2015) in Mandya sheep.

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Table 1: Least Squares Means Along With Standard Error for Body Measurement Traits of Harnali Lambs at Different Ages

Age (Month)	Sex	No. of Observations	Traits								
			L(cm)	H(cm)	HG(cm)	PG(cm)	TL(cm)	HC(cm)	EL(cm)	EW(cm)	FL(cm)
3	M	50	52.32^{a}±0.83	54.38^{a}±0.70	55.70^{a}±0.82	56.50^{a}±0.91	20.36^{a}±0.52	35.36^{a}±0.44	14.90±0.23	8.04±0.13	15.06^{a}±0.22
	F	44	51.04^{b}±0.66	53.54^{b}±0.81	55.84^{a}±0.74	55.11^{a}±0.90	19.04^{b}±0.48	35.11^{a}±0.40	14.54±0.26	7.93±0.14	14.61^{b}±0.26
6	M	48	61.42^{a}±0.69	60.44^{a}±0.80	67.12^{a}±0.91	73.66^{a}±0.91	24.60^{a}±0.58	37.58^{a}±0.51	16.12±0.23	8.66±0.23	18.22^{a}±0.20
	F	43	59.11^{b}±0.86	58.72^{b}±0.65	63.39^{a}±0.88	67.45^{a}±0.92	23.27^{a}±0.66	36.54^{a}±0.53	16.00±0.34	8.54±0.43	17.93^{a}±0.19
9	M	41	62.57^{a}±0.86	62.90^{a}±0.93	68.35^{a}±0.92	74.37^{a}±0.96	25.66^{a}±0.79	40.95^{a}±0.50	16.63±0.40	8.71±0.21	18.26^{a}±0.24
	F	37	60.11^{b}±0.76	59.96^{b}±0.52	64.99^{a}±0.80	67.16^{a}±0.89	23.66^{a}±0.64	38.43^{a}±0.40	16.10±0.32	8.65±0.17	17.94^{a}±0.22
12	M	34	67.44^{a}±0.95	70.66^{a}±0.63	73.44^{a}±0.86	75.22^{a}±0.96	26.75^{a}±0.89	43.71^{a}±0.74	16.64±0.63	8.77±0.23	22.54^{a}±0.39
	F	31	61.17^{b}±0.59	63.14^{b}±0.47	66.55^{a}±0.54	68.10^{a}±0.70	23.74^{a}±0.38	39.62^{a}±0.39	16.35±0.29	8.74±0.16	18.30^{a}±0.14

Means with different superscripts for an effect differed significantly ($P<0.05$)