



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; SP-12(9): 2052-2057  
© 2023 TPI

[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 26-06-2023

Accepted: 07-08-2023

**D Anil Pavan Kumar**  
Principal, Animal Husbandry  
Polytechnic, Karimnagar,  
Telangana, India

**M Gnana Prakash**  
Registrar, PV Narsimha Rao  
Telangana Veterinary  
University, Hyderabad,  
Telangana, India

**B Ramesh Gupta**  
Retd. Professor, P V Narsimha  
Rao Telangana Veterinary  
University, Hyderabad,  
Telangana, India

**T Raghunandan**  
Dean of Faculties, P V Narsimha  
Rao Telangana Veterinary  
University, Hyderabad,  
Telangana, India

**A Sarat Chandra**  
Associate Dean, College of Dairy  
Technology, Kamareddy,  
Telangana, India

## Genetic analysis of height at withers, body length, heart girth and paunch girth in Deccani sheep

**D Anil Pavan Kumar, M Gnana Prakash, B Ramesh Gupta, T Raghunandan and A Sarat Chandra**

### Abstract

The present investigation was undertaken to evaluate the effect of various genetic and non-genetic factors on certain body growth measurements in a Deccani flock of 300 animals maintained at Livestock Research Station, Mahabubnagar, Telangana State. Biometric traits pertaining to Height at withers (HAW), Body Length (BL), Heart Girth (HG) and Paunch Girth (PG) included in the study were recorded at birth, 15, 30, 45, 60, 75, 90, 180, 270 and 360 days of age. For HAW the study revealed significant influence of sex of the lamb only at 90 days age while season of birth of the lamb significantly influenced the HAW at all ages except at 90 days whereas the effect of ewe weight was significant during 180, 270 and 360 days of age only. The season of birth of lamb significantly influenced the BL of the sheep at 180, 270 and 360 days while the ewe weight significantly influenced BL at 90, 180, 270 and 360 days. Parity of the ewe significantly influenced BL at 90 days only. The sex of the lamb significantly influenced HG at birth only while the season of birth of lamb significantly influenced HG at 0, 15, 180, 270 and 360 days of age. Paunch Girth revealed that the season of birth of lamb was significantly influenced at birth, 180, 270 and 360 days of age while the ewe weight significantly influenced PG at birth.

**Keywords:** Measurements, Deccani, sheep, growth

### Introduction

Deccani is an important dual purpose sheep breed of Deccan plateau which are medium-sized animals with predominantly black colour or black colour with white markings. This breed is well-suited to the extreme harsh climatic conditions of this region and is capable of long-distance migration being traditionally reared by pastoral communities of the Telangana state. India presently ranks 2<sup>nd</sup> in the World and Telangana state ranks 1<sup>st</sup> in the country in terms of the sheep population. Measurement of various body measurements are of value in judging the quantitative characteristics of meat and are also helpful in developing suitable selection criteria. Because of the relative ease in measuring linear dimensions of the body they can be used as an indirect way to estimate the weight of the animals. As the major emphasis nowadays is on the improvement of the indigenous breeds and their genetic improvement the present study was conducted to investigate the growth performance in Deccani sheep breed with these body measurements.

### Materials and Methods

A total of 300 purebred Deccani lambs which were born to 15 sires were evaluated for certain body growth measurements. The experimental animals were housed in sheds made with mud floor and asbestos sheets as roofing material. Grazing was allowed for 8 hours daily. Green fodder @ 3 kg and concentrate mixture (CP 18%) @ 300 gm/animal was provided to the lambs. The following biometrical measurements were recorded in centimetres using a measuring tape, at fortnightly intervals.

**Height at withers (HAW):** It indicates the nutritional status of the animal and long bone growth. The distance between the surfaces of the platform where the animal stands to the withers is the HAW. The sheep is made to stand squarely on all 4 legs with legs equally spaced while measuring.

**Body Length (BL):** It refers to the distance from base of tail to the base of the neck i.e., first thoracic vertebrae. Care is taken to ensure that the backbone is straight.

### Corresponding Author:

**D Anil Pavan Kumar**  
Principal, Animal Husbandry  
Polytechnic, Karimnagar,  
Telangana, India

**Heart Girth (HG):** It is the theoretical expectation that weight (volume) varies with cube of linear size as there is a close relationship between the HG and body weight. The circumferential measurement taken around the chest just behind the front legs and withers is HG.

**Paunch Girth (PG):** It is a circumferential measurement taken around the abdomen just before the hind legs. In the Deccani sheep, it was made sure to compress the wool while measuring the PG.

Biometric traits pertaining to HAW, BL, HG and PG included in the study were recorded at birth, 15, 30, 45, 60, 75, 90, 180, 270 and 360 days of age. The data was subjected to least squares analysis (Harvey, 1966) [6] and the least square means were compared by Duncan's multiple range test (DMRT) to study the influence of different genetic and non-genetic factors like season of birth (two classes), sex of the lamb (two classes), ewe weight at lambing (three classes) and the parity of ewe at lambing (four classes).

### Results and Discussion

The study revealed significant influence of sex of the lamb only on the HAW at 90 days ( $p \leq 0.01$ ) with higher HAW in males ( $52.37 \pm 0.36$  cm) than in females ( $51.21 \pm 0.36$  cm). Significant influence of sex of the lamb was also reported by different authors (Gopal and Prasad Hari 2007; Gopal, 2008; Ravimurugan and Devendran 2009; Gopal *et al.*, 2012; Rani *et al.*, 2014 and Panda *et al.*, 2014) [3, 2, 11, 4, 10, 9] in Orissa local sheep, Nellore, Ramnad White, Pugal and Muzaffarnagari breeds of sheep at different age groups. The season of birth of the lamb (Table 1&2) significantly influenced HAW at all ages ( $p \leq 0.01$ ) & ( $p \leq 0.05$ ) studied except at 90 days as the lambs born during season II were significantly taller than those born during season I at all the ages studied except at 90 days. The effect of ewe weight was significant during post-weaning periods of 180, 270 and 360 days of age only ( $p \leq 0.01$ ) and the lambs born to ewes weighing more than 30 kg recorded significantly lower HAW than those born to ewes with < 25 and 25-30 kg body weight. The effect of parity was not significant during all the ages at pre-weaning and post-weaning ages that were studied. The male lambs at all stages of growth showed higher values than the female lambs. Tailor and Yadav (2012) [14] reported significant effect of parity and dam's weight at lambing in Sonadi sheep breed. The results were in accordance with the findings who have reported a range of 68.7 to 76.5 cm in Deccani sheep. The different published literature revealed a range of 56.0 to 76.91 cm for HAW at 360 days age in different Indian sheep breeds (Gopal, 2008; Ravimurugan and Devendran 2009; Ravimurugan *et al.*, 2010; Karunanithi *et al.*, 2011; Ravimurugan *et al.*, 2013; Panda *et al.*, 2014; Rani *et al.*, 2014 and Gowane *et al.*, 2015) [2, 11, 7, 13, 9, 10, 5]. HAW at 30 days of age was more in the present study and it increased when compared to the studies of Gopal and Prasad Hari (2007) [3], Mandal *et al.* (2008) [8] and Gopal *et al.* (2012) [4] in Muzaffarnagari sheep whose reports ranged from 32 to 35; 55 to 61; 59 to 65; 68 to 76 and 73 to 79 cm at 1, 3, 6, 9 and 12 months of age. The differences in this trait may be due to the size of different sheep breeds in comparison to Deccani sheep breed and the varied environments where the animals were grown.

The present investigation revealed that the season of birth of lamb significantly influenced the Body length of the sheep at 180, 270 and 360 days ( $p \leq 0.01$ ) while the ewe weight (Table

3&4) significantly influenced Body length at 90, 180, 270 and 360 days ( $p \leq 0.01$ ) & ( $p \leq 0.05$ ). Parity of the ewe significantly influenced BL at 90 days ( $p \leq 0.05$ ) only. Though the effect of sex of the lamb was non-significant, male lambs were lengthier when compared to female lambs except at 90 days of age. Significant influence of sex of the lamb on BL at different age groups was reported by (Gopal and Prasad Hari 2007; Gopal, 2008; Ravimurugan and Devendran 2009; Gopal *et al.*, 2012; Rani *et al.*, 2014 and Panda *et al.*, 2014) [3, 2, 11, 4, 10, 9] in Orissa local, Nellore, Ramnad White, Pugal and Muzaffarnagari sheep breeds. The body length of season II lambs measured  $58.50 \pm 0.58$ ,  $62.75 \pm 0.57$  and  $66.07 \pm 0.56$  cm and had significantly longer bodies than the lambs born during season I which measured  $55.34 \pm 0.73$ ,  $59.87 \pm 0.71$  and  $63.09 \pm 0.70$  cm at post weaning periods of 180, 270 and 360 days of age. BL of the lambs born to ewes weighing < 25 kg and > 30 kg had significantly longer bodies when compared to those lambs born to ewes weighing 25 to 30 kg during the pre-weaning periods. The lambs born to ewes weighing < 25 kg had significantly higher values for BL during post-weaning growth phase. Study by Tailor and Yadav (2012) [14] observed significant effect of parity of the ewe and dam's weight at lambing in Sonadi sheep breed. The literature revealed a BL range of 25 to 28; 49 to 55; 53 to 64; 63 to 71 and 66 to 83 cm at different ages of 1, 3, 6, 9 and 12 months age in Indian sheep breeds by (Gopal and Prasad Hari 2007; Gopal, 2008; Mandal *et al.*, 2008; Ravimurugan and Devendran 2009; Ravimurugan *et al.*, 2010; Karunanithi *et al.*, 2011; Gopal *et al.*, 2012; Ravimurugan *et al.*, 2013; Panda *et al.*, 2014; Rani *et al.*, 2014 and Gowane *et al.*, 2015) [3, 2, 11, 4, 8, 7, 11, 13, 10, 9, 5].

The differences in the BL may be attributed to the sheep breed variations and their body sizes at different stages of growth.

The study on Heart Girth (Table 5&6) revealed that the sex of the lamb significantly influenced HG at birth ( $p \leq 0.05$ ) only while the season of birth of lamb significantly influenced HG at 0, 15, 180, 270 and 360 days ( $p \leq 0.01$ ) & ( $p \leq 0.05$ ) of age. The effect of weight of ewe and parity of the ewe was not significant on this trait whereas Tailor and Yadav (2012) [14] observed significant effect of parity and dam's weight at lambing in Sonadi sheep breed. Male lambs had significantly higher HG of  $40.72 \pm 0.65$  cm than female lambs'  $39.16 \pm 0.66$  cm at birth. Though non-significant, the male lambs at all stages of growth had higher HG than the female lambs. Significant influence of sex of the lamb on HG was reported by (Gopal and Prasad Hari 2007; Gopal, 2008; Ravimurugan and Devendran 2009; Gopal *et al.*, 2012; Rani *et al.*, 2014 and Panda *et al.*, 2014) [3, 2, 11, 4, 10, 9] in Orissa local, Nellore, Ramnad White, Pugal and Muzaffarnagari sheep breeds at different age groups. During pre-weaning stage, lambs born in the season I had significantly higher HG ( $40.93 \pm 0.74$  and  $44.21 \pm 0.61$  cm) than the lambs born in season II ( $38.95 \pm 0.58$  and  $42.91 \pm 0.48$  cm) at birth and 15 days of age, respectively. But in the post-weaning stage of at 180, 270 and 360 days of age season II lambs had significantly higher HG than those born during season I. Different studies revealed a HG range of 35 to 57; 53 to 63; 61 to 70; 65 to 75 and 63 to 86 cm at 1, 3, 6, 9 and 12 months of age in Muzaffarnagari, Malpura, Mecheri, Kilakarsal, Ramnad White, Pugal, Nellore, Deccani and Marwari breeds by (Gopal and Prasad Hari 2007; Gopal, 2008; Mandal *et al.*, 2008; Ravimurugan and Devendran 2009; Ravimurugan *et al.*, 2010; Karunanithi *et al.*, 2011; Gopal *et al.*, 2012; Ravimurugan *et al.*, 2013; Panda *et al.*, 2014; Rani *et al.*, 2014 and Gowane *et al.*, 2015) [3, 2, 11, 4, 8, 7, 11,

13, 10, 9, 5]. These differences in HG between different sheep breeds are due to body size variations.

The present study on Paunch Girth (Table 7&8) revealed that the season of birth of lamb was significantly influenced at birth, 180, 270 and 360 days ( $p \leq 0.01$ ) of age while the ewe weight significantly influenced PG at birth ( $p \leq 0.05$ ). Sex of the lamb and ewe parity were non-significant during pre and post-weaning periods. Though non-significant the male lambs had higher PG than female lambs at all stages of growth. Significant influence of sex of the lamb was reported by Ravimurugan and Devendran (2009) [11] and Rani *et al.* (2014) [10] in Ramnad White and Nellore sheep breeds at different age groups. Lambs born during season I had significantly higher PG (41.48±0.79 cm) than the lambs born during season II (39.79±0.62 cm) at birth. However, lambs born during

season II had significantly higher PG (67.66±0.65, 71.73±0.62 and 74.67±0.59 cm) than the lambs born during season I (64.55±0.82, 68.55±0.78 and 71.43±0.74 cm) during post weaning period. Lambs born to ewes weighing > 30 kg were having significantly higher PG (42.99±1.33 cm) followed by those born to ewes weighing < 25 kg (39.65±0.63 cm) and between 25-30 kg (39.23±0.65 cm) at birth. The ewe weight was not a significant source of variation during 180,270 and 360 days of age. Parity did not have any effect on PG during the pre and post-weaning growth periods. Paunch girth studied at one year age is within the range of 67.53 to 80.70 cm as reported by (Ravimurugan and Devendran 2009; Ravimurugan *et al.*, 2010, Ravimurugan *et al.*, 2013, and Rani *et al.*, 2014) [11, 12, 13, 10] in Kilakarsal, Ramnad White, Deccani and Nellore sheep breeds.

**Table 1:** Least-squares mean HAW (cm) in Deccani lambs during pre-weaning period

Effect	N	HAW 0		HAW 15		HAW 30		HAW 45		HAW 60		HAW 75		HAW 90	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Overall	301	39.47	0.38	42.11	0.36	44.77	0.35	46.68	0.24	48.41	0.31	50.27	0.30	51.79	0.30
<b>Sex of Lamb</b>															
Male	153	39.61	0.46	42.15	0.44	44.87	0.42	46.67	0.39	48.64	0.37	50.63	0.26	52.37 <sup>a</sup>	0.36
Female	148	39.23	0.46	42.06	0.45	44.67	0.43	46.69	0.40	48.19	0.38	49.90	0.37	51.21 <sup>b</sup>	0.36
<b>Season of Birth</b>															
I (Jan-June)	112	38.83 <sup>b</sup>	0.52	41.38 <sup>b</sup>	0.50	43.96 <sup>b</sup>	0.48	46.00 <sup>b</sup>	0.45	47.89 <sup>b</sup>	0.42	49.80 <sup>b</sup>	0.41	51.39	0.40
II (Jul-Dec)	189	40.10 <sup>a</sup>	0.41	42.83 <sup>a</sup>	0.39	45.57 <sup>a</sup>	0.38	47.35 <sup>a</sup>	0.35	48.93 <sup>a</sup>	0.33	50.74 <sup>a</sup>	0.32	52.19	0.32
<b>Ewe Weight</b>															
< 25 kg	140	39.58	0.41	42.27	0.40	44.87	0.38	46.74	0.36	48.60	0.33	50.25	0.33	51.88	0.32
25 to 30 kg	133	39.42	0.43	42.10	0.41	44.62	0.40	46.59	0.37	48.23	0.34	50.10	0.34	51.66	0.33
> 30 kg	28	39.40	0.88	41.95	0.84	44.82	0.81	46.69	0.76	48.41	0.71	50.45	0.70	51.82	0.68
<b>Parity</b>															
1	96	39.86	0.53	42.24	0.51	44.50	0.49	46.40	0.46	47.99	0.43	49.89	0.42	51.29	0.41
2	71	38.63	0.58	41.22	0.56	44.12	0.54	46.09	0.50	47.96	0.47	49.77	0.46	51.28	0.45
3	105	40.02	0.48	42.65	0.46	45.34	0.45	47.27	0.15	48.80	0.39	50.71	0.38	52.12	0.37
4	29	39.35	0.88	42.32	0.85	45.11	0.82	47.01	0.76	48.90	0.71	50.70	0.70	52.47	0.69

Means with similar superscripts in a column within the effect do not differ significantly

**Table 2:** Least-squares mean HAW (cm) of Deccani lambs during post-weaning period

	HAW180			HAW270			HAW360		
	N	Mean	SE	N	Mean	SE	N	Mean	SE
Overall	286	60.47	0.40	264	65.28	0.39	262	68.90	0.38
<b>Sex of lamb</b>									
Male	140	60.45	0.48	132	65.30	0.47	130	69.02	0.46
Female	146	60.48	0.47	132	65.25	0.48	132	68.78	0.47
<b>Season of birth</b>									
I (Jan-June)	112	59.37 <sup>b</sup>	0.55	90	64.43 <sup>b</sup>	0.55	90	67.96 <sup>b</sup>	0.54
II (Jul-Dec)	174	61.57 <sup>a</sup>	0.43	174	66.12 <sup>a</sup>	0.41	172	69.84 <sup>a</sup>	0.40
<b>Ewe weight</b>									
< 25 kg	134	61.96 <sup>a</sup>	0.45	121	66.69 <sup>a</sup>	0.43	119	70.24 <sup>a</sup>	0.43
25 to 30 kg	124	61.33 <sup>a</sup>	0.45	116	66.05 <sup>a</sup>	0.44	116	69.69 <sup>a</sup>	0.44
> 30 kg	28	58.12 <sup>b</sup>	0.91	27	63.09 <sup>b</sup>	0.88	27	66.78 <sup>b</sup>	0.87
<b>Parity</b>									
1	88	60.73	0.58	76	65.31	0.58	76	68.90	0.57
2	67	60.01	0.64	62	65.03	0.60	62	68.73	0.60
3	102	60.83	0.51	97	65.68	0.85	95	69.21	0.48
4	29	60.30	0.92	29	65.08	0.87	29	68.76	0.86

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.01$ )

**Table 3:** Least-squares mean BL (cm) in Deccani lambs during pre-weaning period

Effect	N	BL0		BL15		BL30		BL45		BL60		BL75		BL90	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Overall	301	33.87	0.51	36.15	0.49	38.69	0.50	41.30	0.44	43.95	0.39	46.50	0.36	48.87	0.37
<b>Sex of lamb</b>															
Male	153	34.46	0.61	36.53	0.59	38.98	0.61	41.52	0.53	43.96	0.47	46.56	0.41	48.85	0.44
Female	148	33.29	0.62	35.78	0.60	38.40	0.62	41.08	0.54	43.94	0.47	46.44	0.44	48.89	0.45
<b>Season of birth</b>															
I (Jan-June)	112	34.39	0.70	36.50	0.67	38.92	0.69	41.33	0.60	43.82	0.53	46.39	0.50	48.62	0.50
II (Jul-Dec)	189	33.36	0.55	35.80	0.53	38.45	0.54	41.27	0.47	44.09	0.42	46.61	0.39	49.12	0.40
<b>Ewe weight</b>															
< 25 kg	140	33.43	0.56	35.91	0.54	38.60	0.55	41.36	0.48	44.20	0.42	46.95	0.40	49.30 <sup>a</sup>	0.40
25 to 30 kg	133	32.74	0.57	35.14	0.55	37.65	0.57	40.42	0.49	43.09	0.44	45.76	0.41	48.03 <sup>b</sup>	0.41
> 30 kg	28	35.46	1.18	37.41	1.14	39.83	1.16	42.11	1.02	44.57	0.90	46.79	0.84	49.28 <sup>a</sup>	0.85
<b>Parity</b>															
1	96	33.84	0.71	36.12	0.69	38.55	0.70	41.16	0.61	43.91	0.54	46.29	0.51	48.55 <sup>ab</sup>	0.52
2	71	33.81	0.78	36.17	0.76	38.47	0.77	41.61	0.67	44.22	0.59	47.05	0.56	49.53 <sup>a</sup>	0.56
3	105	33.50	0.65	35.80	0.63	38.22	0.64	40.59	0.56	42.91	0.49	45.49	0.46	47.75 <sup>b</sup>	0.47
4	29	34.36	1.19	36.52	1.15	39.50	1.17	41.84	1.02	44.78	0.90	47.17	0.85	49.65 <sup>a</sup>	0.86

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.05$ )

**Table 4:** Least squares mean BL (cm) of Deccani lambs during post-weaning period

	BL180			BL270			BL360		
	N	Mean	Se	N	Mean	Se	N	Mean	Se
Overall	286	56.92	0.53	264	61.31	0.52	262	64.58	0.51
<b>Sex of lamb</b>									
Male	140	56.97	0.65	132	61.39	0.64	130	64.62	0.62
Female	146	56.87	0.65	132	61.24	0.64	132	64.54	0.62
<b>Season of birth</b>									
I (Jan-June)	112	55.34 <sup>b</sup>	0.73	90	59.87 <sup>b</sup>	0.71	90	63.09 <sup>b</sup>	0.70
II (Jul-Dec)	174	58.50 <sup>a</sup>	0.58	174	62.75 <sup>a</sup>	0.57	172	66.07 <sup>a</sup>	0.56
<b>Ewe weight</b>									
< 25 kg	134	58.12 <sup>a</sup>	0.58	121	62.70 <sup>a</sup>	0.57	119	66.08 <sup>a</sup>	0.57
25 to 30 kg	124	56.14 <sup>b</sup>	0.60	116	60.55 <sup>b</sup>	0.60	116	63.82 <sup>b</sup>	0.59
> 30 kg	28	56.50 <sup>b</sup>	1.23	27	60.68 <sup>b</sup>	1.20	27	63.85 <sup>b</sup>	1.18
<b>Parity</b>									
1	88	57.14	0.76	76	61.73	0.75	76	64.88	0.74
2	67	57.46	0.82	62	61.73	0.81	62	64.90	0.80
3	102	55.70	0.68	97	60.10	0.67	95	63.54	0.65
4	29	57.39	1.24	29	61.69	1.21	29	65.00	1.18

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.05$ )

**Table 5:** Least-squares mean HG (cm) in Deccani lambs during pre-weaning period

Effect	N	HG 0		HG 15		HG 30		HG 45		HG 60		HG 75		HG 90	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Overall	301	39.94	0.54	43.56	0.45	47.56	0.42	50.02	0.41	52.90	0.40	54.82	0.39	56.99	0.40
<b>Sex of lamb</b>															
Male	153	40.72 <sup>a</sup>	0.65	44.10	0.54	47.94	0.50	50.20	0.49	52.52	0.48	54.84	0.47	57.04	0.48
Female	148	39.16 <sup>b</sup>	0.66	43.02	0.55	47.17	0.15	49.83	0.50	52.49	0.49	54.81	0.48	56.93	0.49
<b>Season of birth</b>															
I (Jan-June)	112	40.93 <sup>a</sup>	0.74	44.21 <sup>a</sup>	0.61	47.85	0.57	50.28	0.55	52.74	0.55	55.01	0.54	57.16	0.55
II (Jul-Dec)	189	38.95 <sup>b</sup>	0.58	42.91 <sup>b</sup>	0.48	47.27	0.45	49.76	0.44	52.26	0.44	54.64	0.42	56.82	0.43
<b>Ewe weight</b>															
< 25 kg	140	39.39	0.59	43.39	0.49	47.74	0.46	50.26	0.44	52.80	0.44	55.12	0.43	57.15	0.44
25 to 30 kg	133	39.01	0.61	42.77	0.50	46.58	0.47	49.27	0.46	51.88	0.45	54.33	0.44	56.48	0.45
> 30 kg	28	41.41	1.25	44.51	1.03	48.35	0.97	50.52	0.94	52.83	0.93	55.02	0.91	57.33	0.93
<b>Parity</b>															
1	96	39.65	0.76	43.28	0.63	47.14	0.59	49.56	0.57	52.14	0.57	54.26	0.55	56.39	0.56
2	71	39.67	0.83	43.64	0.69	47.90	0.64	50.37	0.62	52.62	0.62	55.10	0.06	57.25	0.62
3	105	39.48	0.69	43.00	0.57	46.84	0.53	49.41	0.51	52.08	0.51	54.48	0.50	56.67	0.51
4	29	40.93	1.26	44.32	1.04	48.35	0.98	50.73	0.94	52.20	0.39	55.46	0.92	57.64	0.93

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.05$ )

**Table 6:** Least-squares mean HG (cm) of Deccani lambs during post-weaning period

	HG 180			HG 270			HG 360		
	N	Mean	SE	N	Mean	SE	N	Mean	SE
Overall	286	65.33	0.55	264	69.69	0.51	262	72.69	0.48
<b>Sex of lamb</b>									
Male	140	65.46	0.66	132	69.95	0.62	130	72.86	0.59
Female	146	65.19	0.67	132	69.42	0.62	132	72.52	0.59
<b>Season of birth</b>									
I (Jan-June)	112	64.20 <sup>b</sup>	0.75	90	68.64 <sup>b</sup>	0.69	90	71.62 <sup>b</sup>	0.66
II (Jul-Dec)	174	66.45 <sup>a</sup>	0.59	174	70.74 <sup>a</sup>	0.55	172	73.76 <sup>a</sup>	0.53
<b>Ewe weight</b>									
< 25 kg	134	65.88	0.60	121	70.17	0.56	119	73.30	0.54
25 to 30 kg	124	64.67	0.62	116	69.26	0.58	116	72.26	0.55
> 30 kg	28	65.43	1.27	27	69.63	1.17	27	72.51	1.11
<b>Parity</b>									
1	88	65.04	0.78	76	69.77	0.73	76	72.63	0.70
2	67	66.20	0.84	62	70.20	0.79	62	73.18	0.75
3	102	64.47	0.70	97	68.78	0.65	95	71.86	1.62
4	29	65.60	1.27	29	69.10	1.17	29	73.09	1.12

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.01$ )

**Table 7:** Least-squares mean PG (cm) in Deccani lambs during pre-weaning period

Effect	N	PG 0		PG 15		PG 30		PG 45		PG 60		PG 75		PG 90	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Overall	301	40.62	0.58	44.23	0.49	48.07	0.46	50.71	0.45	53.19	0.44	55.37	0.45	57.60	0.46
<b>Sex of lamb</b>															
Male	153	41.13	0.69	44.55	0.59	48.38	0.55	50.85	0.55	53.22	0.53	55.54	0.55	57.83	0.55
Female	148	40.12	0.70	43.91	0.60	47.77	0.56	50.57	0.55	53.04	0.54	55.20	0.56	57.38	0.56
<b>Season of birth</b>															
I (Jan-June)	112	41.48 <sup>a</sup>	0.79	44.72	0.68	47.98	0.63	50.60	0.62	52.94	0.61	55.22	0.62	57.30	0.62
II (Jul-Dec)	189	39.79 <sup>b</sup>	0.62	43.74	0.53	48.17	0.49	50.82	0.49	53.32	0.48	55.53	0.49	57.91	0.50
<b>Ewe weight</b>															
< 25 kg	140	39.65 <sup>b</sup>	0.63	43.70	0.54	48.01	0.50	50.74	0.49	53.15	0.48	55.35	0.49	57.58	0.50
25 to 30 kg	133	39.23 <sup>b</sup>	0.65	43.08	0.56	47.09	0.52	50.01	0.51	52.56	0.50	54.91	0.51	57.23	0.52
> 30 kg	28	42.99 <sup>a</sup>	1.33	45.91	1.14	49.11	0.06	51.38	1.05	53.67	1.03	55.82	1.05	58.00	1.06
<b>Parity</b>															
1	96	40.55	0.81	44.21	0.69	48.03	0.64	50.87	0.63	53.39	0.62	55.46	0.64	57.75	0.64
2	71	40.52	0.88	44.46	0.76	48.49	0.71	51.21	0.69	53.61	0.68	55.83	0.69	57.98	0.70
3	105	39.31	0.73	42.73	0.63	46.61	0.58	49.35	0.57	51.75	0.56	54.09	0.57	56.37	0.58
4	29	42.12	1.34	45.53	1.15	49.53	1.07	51.41	1.05	53.77	1.03	56.11	1.06	58.31	1.07

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.05$ )

**Table 8:** Least-squares mean PG (cm) in Deccani lambs during post-weaning period

	PG180			PG270			PG360		
	N	Mean	SE	N	Mean	SE	N	Mean	SE
Overall	286	66.10	0.60	264	70.14	0.57	262	73.05	0.54
<b>Sex</b>									
Male	140	66.21	0.73	132	70.37	0.70	130	73.21	0.66
Female	146	65.99	0.74	132	69.91	0.70	132	72.89	0.66
<b>Season</b>									
I (Jan-June)	112	64.55 <sup>b</sup>	0.82	90	68.55 <sup>b</sup>	0.78	90	71.43 <sup>b</sup>	0.74
II (Jul-Dec)	174	67.66 <sup>a</sup>	0.65	174	71.73 <sup>a</sup>	0.62	172	74.67 <sup>a</sup>	0.59
<b>Ewe weight</b>									
< 25 kg	134	66.61	0.66	121	70.52	0.63	119	73.43	0.60
25 to 30 kg	124	65.86	0.68	116	70.13	0.65	116	72.98	0.62
> 30 kg	28	65.85	1.38	27	69.78	1.32	27	72.74	1.25
<b>Parity</b>									
1	88	66.49	0.85	76	70.84	0.82	76	73.54	0.79
2	67	66.99	0.92	62	70.82	0.89	62	73.69	0.84
3	102	64.53	0.76	97	68.51	0.73	95	71.68	0.69
4	29	66.40	1.40	29	70.38	1.33	29	73.29	1.26

Means with similar superscripts in a column within the effect do not differ significantly ( $p \geq 0.01$ )

## Conclusion

To conclude the biometric traits HAW, BL, HG and PG were significantly influenced by the non-genetic factors such as sex of lamb, season of birth, weight of dam at lambing and parity of the dam. This indicates that when the optimum conditions are provided the performance can be improved in this sheep breed by following good managerial practices apart from genetics.

Fitting of growth models and evaluation of Marwari sheep under field conditions. *Indian Journal of Animal Sciences*. 2009;79(12):1242-1244.

## References

1. Yadav DK, Reena A, Anand J. Exploring Deccani Sheep ecotypes of Maharashtra: Are these autonomous breeds? *Indian Journal of Small Ruminants*. 2014;20(1):91-94.
2. Dass G. Characterization and evaluation of Pugal sheep in the home tract. *Indian Journal of Animal Sciences*. 2008;78(5):501-504.
3. Dass G, Hari P. Morphological characteristics, live weights and management practices of Muzaffarnagari sheep in the home tract. *Indian Journal of Small Ruminants*. 2007;13(1):27-30.
4. Dass G, Ajoy M, Rout PK, Roy R. Rearing practices, morphological characteristics and growth performance of Muzaffarnagari sheep in its home tract. *Indian Journal of Small Ruminants*. 2012;18(1):37-40.
5. Gowane GR, Ashish C, Prince LLL, Sharma RC. Growth performance appraisal of Malpura and Kheri sheep under field conditions. *Indian Journal of Small Ruminants*. 2015;21(1):24-27.
6. Harvey WR. Least Squares analysis of data with unequal sub-class numbers. USDA-ARS, Washington DC; c1966.
7. Karunanithi K, Thiruvankadan AK, Muralidharan, Narendrababu R. Genetic Analysis of Pre-weaning and Post-weaning Growth Traits of Mecheri Sheep under Dry Land Farming Conditions. *Asian Australasian Journal of Animal Sciences*. 2011;24(8):1041-1047.
8. Mandal A, Roy R, Rout PK. Direct and Maternal Effects for Body Measurements at Birth and Weaning in Muzaffarnagari Sheep of India. *Small Ruminant Research*. 2008;75:123-127.
9. Panda P, Rao PK, Kumar P, Bhujabal BN. Characterization of mutton type indigenous sheep of Puri district in Odisha. *Indian Journal of Small Ruminants*. 2014;20(1):95-97.
10. Rani M, Ekambaram B, Kumari PB. Biometrical Measurements of Nellore Sheep under Field Conditions of Andhra Pradesh. *Indian Veterinary Journal*. 2014;91(5):17-21.
11. Ravimurugan T, Devendran P. Body measurements and body weight of Ramnad White sheep. *Indian Journal of Small Ruminants*. 2009;15(2):266-267.
12. Ravimurugan T, Devendran P, Joshi BK. Distribution and characterization of Kilakarsal (Keezhakaraisal) sheep. *Indian Journal of Small Ruminants*. 2010;16(1):122-124.
13. Ravimurugan T, Thiruvankadan AK, Sudhakar K, Panneerselvam S, Elango A. The Estimation of Body Weight from Body Measurements in Kilakarsal Sheep of Tamil Nadu, India. *Iranian Journal of Applied Animal Science*. 2013;3(2):357-360.
14. Tailor SP, Yadav CM. Studies on morphometric traits and body weight of Sonadi sheep at lambing in their native tract. *Indian Journal of Small Ruminants*. 2012;18(1):41-43.
15. Kumar YD, Gurmej S, Anand J, Surendra S, Kumar PA.