



# Influence of non-genetic factors on body weight traits of goats reared in hot humid climate

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**ABSTRACT :** Growth is of great economic importance and requires particular attention for increasing total productivity in goat. The birth weight and early growth rate of animals are determined not only by genetic potential and also by maternal and environmental factors. Hence, an attempt has been made to know the effects of various non-genetic factors on the body weight at birth and different stages of growth. Data were collected from 180 goats belongs three genetic groups *viz.*, Malabari, Attappaddy and crossbred Malabari maintained at Goat and Sheep farm, Kerala Veterinary and Animal Sciences University, Mannuthy for the period from 2010 to 2013. The traits recorded were birth weight (BW), body weight at three (BW3), six (BW6) and nine months (BW9) of age. Birth weight (BW), body weight at three (BW3), six (BW6) and nine months (BW9) were analyzed to find out the effects non-genetic factors *viz.*, breed, sex, season and type of birth using least square fixed model analysis of variance as described by Harvey (1990) for non-orthogonal data. Crossbred had significantly higher body weights at birth, three, six and nine months of age than Malabari and Attappaddy goat breed. However, the two native breeds of Kerala (Malabari and Attappaddy) did not differ significantly with respect to body weight at different stages of age. Season had significant influence on birth weight. Kids born as single had significant growth rate compared to twins and triplets upto nine months of age.

**KEY WORDS :** Non-genetic factors, Malabari goat, Attappdy goat

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## INTRODUCTION

In the present scenario of rapidly declining natural resources, goat has tremendous potential to be projected as the 'Future Animal' for rural prosperity that can provide nutritional as well as financial security to millions of deprived people. They are prolific breeders and thrive mainly on wild grasses, tree buds and leaves. They require less care and reproduce quickly as they start to bear kids from the age of one year old. The improvement of

productivity of goat is vital to enhance the socio-economic status of large rural people as well as to combat the food crisis. Among production traits, body weights are of great economic importance and require particular attention for increasing total productivity. They are polygenic in nature and influenced by environmental factors such as feeding and management. Moreover, the environmental influences can be controlled and corrected to permit more accurate identification of genetic differences between individual goats. The birth weight and early growth rate of animals are determined not only by genetic potential and also by maternal and environmental factors. Hence, an attempt has been made to know the effects of various non-genetic factors on the body weight at birth and different stages of growth.

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## MATERIAL AND METHODS

The data were collected from 180 goats belongs three genetic groups (Mablabari, Attappaddy and crossbred Malabarix Alpine/ Sannen/ Boaer) maintained at Goat and Sheep farm, Kerala Veterinary and Animal Sciences University, Mannuthy for the period from 2010 to 2013. The traits recorded were birth weight (BW), body weight at three (BW3), six (BW6) and nine months (BW9) of age. The calendar year was divided into three season summer (Feb. to May), rainy (June to Sep.) and winter (Oct. to Jan.) after Mathai and Raja (1976). Details on age, breed, sex, season and type of birth were also recorded. The animals were fed with compounded pellet feed in the morning and lead for grazing between 10 am and 2.00 pm. About one kg of green roughage CO<sub>3</sub> was fed in the evening. After kidding, the new born kids were marked and weighed within half an hour. Birth weight were recorded and kid were left with their dams for suckling till weaning age of three months. Kids were provided with concentrate feed having yellow maize (52.5 %), soya (40 %), de-oiled rice bran (3.7 %), calcite (1.2 %), Di-sodium phosphate (2.1 %), salt (0.5 %). Trace mineral mix (0.125 %), vitamin mix (Zagromix-0.025 %), herbal liver tonic powder (Tefroli-0.03 %) and Toxin binder (0.1 % UTPP-Ultimate Toxin Prevention Programme). Kids were allowed to access for *Ad libitum* water and green grass from third week. They were lead to graze from 4<sup>th</sup> months of age. All the animals above the age of five months were vaccinated against Peste des petits ruminants and Foot and Mouth disease. Animals were treated for internal and external parasites as per the approved schedules and guidelines. Birth weight (BW), body weight at three (BW3), six (BW6) and nine months (BW9) were analyzed to find out the effects non genetic factors *viz.*, breed, sex, season and type of birth using least square fixed model analysis of variance as described by Harvey (1990) for non-orthogonal data. The model used was :

$$Y_{ijklmn} = \mu + B_i + S_j + A_k + T_l + e_{ijklmn}$$

where,

$Y_{ijklm}$  = m<sup>th</sup> observation of i<sup>th</sup> type of breed of j<sup>th</sup> sex of k<sup>th</sup> season of l<sup>th</sup> type of birth

$\mu$  = General mean

$B_i$  = Effect of i<sup>th</sup> breed (i=1 to 3)

$S_j$  = Effect of j<sup>th</sup> sex (j=1 to 2)

$A_k$  = Effect of k<sup>th</sup> season (k=1 to 3)

$T_l$  = Effect of l<sup>th</sup> type of birth (l=1 to 3)

$e_{ijklmn}$  = Random error.

## RESULTS AND DISCUSSION

The mean with standard error for the effect of breed, sex, season and type of birth on birth weight, body weight at three (BW3), six (BW6) and nine months (BW9) are presented in Table 1. The overall birth weight of kids ranged from 1.0 kg to 3.10 kg with mean of  $1.83 \pm 0.39$ . The crossbred kids had significantly ( $P < 0.01$ ) higher birth weight of 0.27 kg and 0.32 kg compared to Malabari and Attappaddy kids, respectively. Though, male kids are heavier than female at birth, but not-significant. Similar reports were made by Ershaduzzaman *et al.* (2007); Jedhe *et al.* (2009) and Sandip and Debasis (2010).

Kids born during rainy /South west monsoon had significantly ( $P < 0.05$ ) higher weight at birth ( $1.97 \pm 0.08$  kg) followed by summer and winter season. The significant effect of season on birth weight of kids were reported by many authors (Paul *et al.*, 1990 and Das *et al.*, 1995 and Bharathidhasan *et al.*, 2009) reported that birth weight of kids born during October-February had higher birth weight than March-September season. Kids born single had significantly higher birth weight of 0.27 kg and 0.36 kg than twins and triplets, respectively; however, it is not significant between twins and triplets. The present study finds consonance with results obtained by Raghavan *et al.* (1999); Soundararajan *et al.* (2006) and Bharathidhasan *et al.* (2009).

The overall mean body weights at three, six and nine months of age were  $7.58 \pm 0.98$  kg,  $12.25 \pm 1.71$  and  $20.40 \pm 1.53$  kg, respectively. Crossbred showed significantly higher body weight in all age groups compared to Malabari and Attappaddy goats. However, the two native breeds of Kerala (Malabari and Attappaddy) did not differ significantly with respect to body weight at birth, three, six and nine months of age. There is no significant influence of sex on body weight upto nine months of age in the present study. These results agree with other studies by several researchers (Browning *et al.*, 2004 and Jimenez-Badillo *et al.*, 2009).

Type of birth significantly ( $P < 0.01$ ) influenced the body weight at all stages of growth, single born kids weighed heavily than twins and triplets. However, the influence of type of birth was not significant between twins and triplets after weaning. The results are in agreement with the Kumar *et al.* (2007); Bharathidhasan *et al.* (2009) and Jedhe *et al.* (2009). All the three genetic group showed a similar trend of

Table 1 : Least squares means of body weights in goats grouped for various factors

	Birth weight (kg)	Three month weight(kg)	Six month weight (kg)	Nine month weight (kg)
<b>Breed</b>	**	**	**	**
Malabari	1.81±0.07 <sup>a</sup> (58)	7.39±0.16 <sup>a</sup> (58)	11.97±0.32 <sup>a</sup> (58)	20.14±0.28 <sup>a</sup> (58)
Crossbred	2.08±0.08 <sup>b</sup> (41)	7.90±0.17 <sup>b</sup> (42)	13.07±0.34 <sup>b</sup> (42)	21.16±0.31 <sup>b</sup> (42)
Attappady	1.76±0.06 <sup>a</sup> (80)	7.24±0.14 <sup>a</sup> (80)	11.77±0.29 <sup>a</sup> (980)	19.97±0.26 <sup>a</sup> (980)
<b>Sex</b>				
Male	1.89±0.09 (20)	7.51±0.20 (20)	12.23±0.40 (20)	20.41±0.36 (20)
Female	1.87±0.05 (159)	7.50±0.12 (160)	12.31±0.23 (160)	20.44±0.21 (160)
<b>Season</b>	*			
Summer (Feb to May)	1.89±0.07 <sup>ab</sup> (47)	7.59±0.16 (47)	12.49±0.33 (47)	20.63±0.29 (47)
Rainy (June to Oct)	1.97±0.08 <sup>b</sup> (39)	7.53±0.18 (39)	12.35±0.37 (39)	20.48±0.33 (39)
Winter (Nov to Jan)	1.79±0.06 <sup>a</sup> (93)	7.40±0.13 (94)	11.97±0.26 (94)	20.17±0.23 (94)
<b>Type of birth</b>	**	**	**	**
Single	2.09±0.06 <sup>a</sup> (56)	8.51±0.14 <sup>a</sup> (56)	13.02±0.29 <sup>a</sup> (56)	21.12±0.26 <sup>a</sup> (56)
Double	1.82±0.05 <sup>b</sup> (115)	7.35±0.11 <sup>b</sup> (116)	12.20±0.23 <sup>ab</sup> (116)	20.36±0.20 <sup>ab</sup> (116)
Triplet	1.73±0.13 <sup>b</sup> (8)	6.66±0.29 <sup>c</sup> (8)	11.58±0.59 <sup>b</sup> (8)	19.80±0.53 <sup>b</sup> (8)
Overall mean	1.83±0.39 (179)	7.58±0.98 (180)	12.25±1.71 (180)	20.40±1.53 (180)

Letters with different superscript within a specific source in a column differ significantly; \* and \*\* indicate significance of value at P=0.05 and P=0.01, respectively

faster growth rate from 6-9 months with over all daily gain 90 g/ day followed by pre-weaning daily gain (63.8 g) and three to six months (52 g).

From the above study it was concluded that crossbred had significantly higher body weights at birth, three, six and nine months of age than Malabari and Attappady goat breed. However, the two native breeds of Kerala (Malabari and Attappady) did not differ significantly with respect to body weight at different stages of age. Season had significant influence on birth weight. Kids born as single had significant growth rate compared to twins and triplets upto nine months of age.

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