



STUDY ON NON-GENETIC FACTORS AFFECTING MORPHOMETRY OF MALABARI GOATS IN FARMERS FLOCKS IN KOZHIKODE DISTRICT

Sunitha Thomas¹, K.S. Anil², P.T. Suraj³,
Manju Sasidharan⁴ and

R. Thirupathy Venkatachalapathy⁵

Department of Livestock Production Management
College of Veterinary and Animal Sciences,
Mannuthy, Thrissur, Kerala - 680 651
Kerala Veterinary and Animal Sciences University

Received: 25.01.2019

Accepted: 06.02.2019

Abstract

A study was undertaken to assess the effect of non-genetic factors on Malabari goats in their home tract. Data on body weight of 116 Malabari goats were collected from the farmer's flocks in perambra of Kozhikode district. The significance of non-genetic factors on the morphometry of goats was analysed using least-squares mixed models. Least-squares means for body weights at birth, 3, 6, 9 and 12 month of age were 2.21 ± 0.01 , 10.14 ± 0.03 , 18.13 ± 0.05 , 24.12 ± 0.07 and 25.48 ± 0.07 kg, respectively. The average daily gain was 90g during pre-weaning period and 60.2g during post-weaning period. Sex, Type of birth, age of dam and year had significant effect on body weight of Malabari goats but the effect of season was insignificant.

Key words: Malabari goats, body weight, non-genetic factors

Kerala holds a goat population of 12.46 lakh which accounts for 0.92 per cent of total goat population of India. At present India has 34 recognized goat breeds (Reports of

NBAGR), of which two breeds, Malabari and Attappady Black are native to Kerala. Malabari goat is a breed renowned for meat production, high prolificacy (Asha and Naicy, 2012) and is well adapted to the tropical climate. The name Malabari (Telicherry) is derived from the area of origin and distribution, Telichery (Present Thalassery) in the Malabar coast of Kannur district

Malabari goats inhabit the Calicut, Kannur, Waynad and Malappuram districts of Kerala, India. They are medium to small size animals having varied coat colour ranging from white to admixtures and black. These goats are reared mainly for meat. Correction factors are to be applied for non-genetic factors like type of birth, season and year of birth, parity, age of dam and sex which mask the effect of actual genetic potential of animals, to identify the animals with higher genetic merit and to implement further improvement programmes. This study was conducted to estimate the influence of these non-genetic factors on growth traits of Malabari goats in their home tract.

1. M.V.Sc scholar, Corresponding author, email: sunithahottan@gmail.com, Mob: 9048844720

2. Professor and Head

3,4. Assistant Professors

5. Professor and Head, University Goat and Sheep Farm, Mannuthy

Materials and methods

Data on 116 Malabari goats over a period of 4 (2014- 2017) years were collected from the flocks of 23 farmers of Perambra, of Kozhikode district, functioning as field units of ICAR-All India Co-ordinated Research Project on Improvement of goats (Malabari). The average flock size (including other breeds) was 7.13. Body weight was recorded immediately after birth and thereafter in every three months till one year. Body weight gains for pre and post weaning periods were calculated. Data on non-genetic factors like type of birth, season, year of birth, age of dam and sex were also collected. The period of kidding was divided into four years viz. 2014, 2015, 2016, and 2017 and the calendar year was divided into four seasons viz. pre-monsoon (Mar-May), south-west monsoon (June-Sept), post-monsoon (Oct-Nov) and winter (Dec-Feb) (Krishnakumaret *al.*, 2009). Type of birth was classified into four, single, twins, triplets and quadruplets. Dams were grouped based on of age as 1-2 years, 2-3 years, 3-4 years and above 4 years and kids were classified as male and females.

The mean and standard error of body weight were estimated using statistical procedures suggested by Snedecor and Cochran (1994).

Analysis of data was carried out by Least-square analysis programme (Harvey, 1990) to study the effects of non-genetic factors on growth traits of Malabari goats. The following mixed model was used:

$$Y_{ijklmn} = \mu + a_i + b_j + c_k + d_l + e_m + f_n + e_{ijklmn}$$

Where, Y_{ijklmn} is the growth trait measured on $ijklmn^{\text{th}}$ animal

μ - overall mean

a_i - fixed effect associated with i^{th} Centre

b_j - fixed effect associated with j^{th} year of birth

c_k - fixed effect associated with k^{th} season of birth

d_l - fixed effect associated with l^{th} type of birth

e_m - fixed effect associated with m^{th} age of dam

f_n - fixed effect associated with n^{th} sex

e_{ijklmn} - random error.

For pair wise comparison of the least square means, Duncan's multiple range test modified by Kramer (1957) was used.

Results and Discussion

Least-squares means for body weights at birth, 3, 6, 9 and 12 month of age were 2.21 ± 0.01 , 10.14 ± 0.03 , 18.13 ± 0.05 , 24.12 ± 0.07 and 25.48 ± 0.07 kg, respectively. Mean with standard error for the effect of sex, year of birth, season of birth, type of birth and age of dam on birth weight and body weight up to one year of age are given in Tables 1.

Birth weight of Malabari kids ranged from 1.4 to 2.6 kg and increased progressively with increase in age. The final body weight at 1 year ranged from 21.94 kg to 26.73 kg. The average daily gain during the pre-weaning period was 90g and during the post- weaning period was 60.2g.

Effect of sex

The male kids were significantly heavier ($P < 0.01$) than females from birth to 12 months of age. The differences between the two sexes were evident at all ages except at birth. The birth weight of Malabari kids in the present study were in consonance with the findings of Ganesh Kumar *et al.* (2005). They reported a birth weight of 2.30 ± 0.05 kg in males and 2.24 ± 0.05 kg in females. Similar effect of sex on body weight of Malabari goats was also reported by Meenakshi Sundaram *et al.* (2012). Higher birth weight in male kids were also reported by Karna *et al.* (2001) and Afza *et al.* (2004) for Chegu and Beetal goats. The birth weight in the present study was also in agreement with the findings of Murali *et al.* (2014) and Thiruvankadan *et al.* (2009) in Malabari goats. They had observed significance of sex on weaning weight of Malabari goats with males attaining 8.88 ± 0.15 kg and females 8.27 ± 0.15 kg. Husain *et al.* (1996) also observed the significance of sex on body weights at birth, 3, 6, 9 and 12 months of age in Black Bengal goats reared under extensive system.

Effect of year of birth

Year of birth significantly ($P < 0.05$)

Table 1. Mean \pm SE for the effect of non-genetic factors on body weight of Malabari goats (n=116)

Effect	Birth	3 months	6 months	9 months	12 months
overall	2.21\pm0.01	10.14\pm0.03	18.13\pm0.05	24.12\pm0.07	25.48\pm0.07
Male	2.21 \pm 0.01	10.36 \pm 0.02 ^b	18.43 \pm 0.03 ^b	24.75 \pm 0.03 ^b	26.24 \pm 0.03 ^b
Female	2.20 \pm 0.02	9.93 \pm 0.05 ^a	17.86 \pm 0.07 ^a	23.53 \pm 0.09 ^a	24.77 \pm 0.05 ^a
Year of birth					
2014	2.23 \pm 0.02	10.18 \pm 0.04	18.21 \pm 0.05	24.27 \pm 0.01	25.68 \pm 0.12 ^b
2015	2.22 \pm 0.04	10.20 \pm 0.05	18.15 \pm 0.06	24.18 \pm 0.11	25.55 \pm 0.14 ^b
2016	2.21 \pm 0.02	10.06 \pm 0.10	18.08 \pm 0.14	24.03 \pm 0.21	25.43 \pm 0.17 ^{ab}
2017	2.15 \pm 0.02	10.09 \pm 0.06	18.06 \pm 0.08	23.87 \pm 0.11	25.06 \pm 0.14 ^a
Season of birth					
Pre-monsoon	2.22 \pm 0.02	10.16 \pm 0.05	18.16 \pm 0.05	24.15 \pm 0.10	25.56 \pm 0.12
South-west monsoon	2.19 \pm 0.03	10.14 \pm 0.04	18.16 \pm 0.05	24.16 \pm 0.10	25.48 \pm 0.13
Post-monsoon	2.22 \pm 0.03	10.07 \pm 0.18	17.92 \pm 0.26	23.84 \pm 0.37	25.25 \pm 0.27
Winter	2.18 \pm 0.02	10.13 \pm 0.05	18.21 \pm 0.07	24.19 \pm 0.12	25.51 \pm 0.13
Type of birth					
Singles	2.19 \pm 0.02 ^c	10.13 \pm 0.03 ^c	18.18 \pm 0.04 ^b	24.16 \pm 0.08 ^{ab}	25.54 \pm 0.10 ^b
Twins	2.02 \pm 0.02 ^c	10.17 \pm 0.08 ^c	18.06 \pm 0.10 ^b	24.07 \pm 0.15 ^{ab}	25.48 \pm 0.14 ^b
Triplets	1.73 \pm 0.60 ^b	9.12 \pm 0.07 ^b	17.21 \pm 0.08 ^a	24.28 \pm 0.16 ^b	25.51 \pm 0.19 ^b
Quadruplets	1.20 \pm 0.00 ^a	8.94 \pm 0.05 ^a	17.07 \pm 0.07 ^a	23.53 \pm 0.10 ^a	24.81 \pm 0.10 ^a
Age of dam					
1-2 years	1.68 \pm 0.02 ^a	9.13 \pm 0.03	18.19 \pm 0.05	24.12 \pm 0.09 ^{ab}	25.51 \pm 0.10
2-3 years	2.20 \pm 0.02 ^b	10.20 \pm 0.05	18.17 \pm 0.06	24.30 \pm 0.12 ^b	25.63 \pm 0.14
3-4 years	2.21 \pm 0.05 ^b	10.03 \pm 0.14	17.95 \pm 0.18	23.79 \pm 0.26 ^a	25.17 \pm 0.21
>4 years	2.23 \pm 0.02 ^b	10.20 \pm 0.07	18.19 \pm 0.09	24.28 \pm 0.15 ^b	25.60 \pm 0.17

($P < 0.01$), ^{abc}Mean values with different superscripts in a column differ significantly.

affected the 12th month body weight of Malabari goats. Goats born in the years 2014 and 2015 had higher body weight at 1 year when compared to 2016 and 2017. A similar result was obtained by Mavrogenis (1983) in Damascus goats and Sandeep *et al.* (2010) and in Sirohi goats. The differences in growth due to year of birth could be attributed to the variations in rainfall resulting in changes in fodder availability and also to the changes in management.

Effect of Season

Season of birth was found to have no effect on the body weight of Malabari goats. It could be inferred from the present result that, as Malabari is a native breed of Kerala, the goats are well adapted to the climatic conditions and are least affected by the variations. The minor differences could be due to the changes in quantity and quality of available fodder during

the various seasons. Similar results were obtained by Raja, (2014) in Attappady goats.

Effect of type of birth

There was significant ($P < 0.01$) difference in body weight of Malabari goats at all ages due to type of birth. Singles and twins had higher birth weight when compared to triplets and quadruplets. At birth, singles were heavier than triplets and quadruplets by 49 and 99 g, respectively. The reason could be that singles doesn't have to share the uterine environment and nutrients with littermates. The present results are in agreement with Satbir Singh *et al.* (2002) in Beetal and Black Bengal goats. Hussain *et al.* (1996) also reported persistency of effect of birth type from birth to one year age in Black Bengal goats. The carryover effect of birth weight and competition for milk makes multiples lighter than singles in all age groups.

In contrary, Ebozoje *et al.* (1995) observed non-significant effect of litter size on growth in West African Dwarf goats. They reported that artificial rearing of kids tend to remove differences in growth between singles and twins.

Effect of age of dam

Age of dam significantly affected the birth weight and 9 month body weight of goats. Kids born to younger does (1-2 years) had lower birth weight (1.68) kg. A similar result was obtained by Mavrogenis (1983) in Damascus goats. Primiparous does are still in their growing stage and compete with their offsprings for nutrition during prenatal period resulting in lower birth weight. The weight at 9 months was higher for kids born to dams of 2-3 years and above 4 years.

Conclusion

The trends in the present study revealed that sex, type of birth, year of birth and age of dam had a significant effect on birth weight and growth of goats. Climate had least effect on the growth of Malabari goats in their home tract.

References

- Afzal, M., Javed, K. and M. Shafiq.2004. Environmental Effects on birth weight in Beetal goat kids. *Pak. Vet. J.* **24**: 104-06.
- Asha, A. and Naicy, T. 2012. Role of fecundity genes in prolificacy of small ruminants.*J. Indian. Vet. Assoc., Kerala.***10**: 34-35.
- Ganesh Kumar, K., Thiruvenkadan, A.K. and Karunanithi, K. 2005. Factors affecting growth traits in Tellicherry kids in different season. *Indian J. Small Rumin.***11**: 88-91
- Harvey, W.R. 1990. Guide for LSMLMW, PC-1 Version, mixed model least squares and maximum likelihood computer programme, January 1990. Mimeograph Ohio State Univ. USA.
- Husain, S.S., Horst, P. and Islam, A.B.M.M. 1996. Study on the growth performance of Black Bengal goats in different periods. *Small Rumin. Res.***21**:165-171.
- Karna, D.K., Bisht, G.S. and Koul, G.L. 2005. Genetic and non-genetic factors affecting morphometry of cheghu goats. *Indian J. Small Rumin.* **11**: 62-64.
- Kramer, C. R. 1957. Extension of multiple range tests to group correlated means. *Biometrics.***13**: 13-18.
- Krishnakumar, K.N., Rao, G.P. and Gopakumar, C.S. 2009. Rainfall trends in twentieth century over Kerala, India. *Atmospheric environment,* **43**:1940-1944.
- Mavrogenis, A.P. 1983. Adjustment factors for growth characters of the Damascus goat. *Livest. Prod. Sci.* **10**:479-486.
- MeenakshiSundaram, S., Muthuramalingam, T., Rajkumar, J.S., Nishanth, B. and Sivakumar, T.2012. growth performance of tellicherry goats in an organized farm International J. of Diary Science Res. **3**: 9-11
- Murali, N., Raghavendran, V.B., Thiruvenkadan, A.K., Pandian, C.S. and Babu, M. 2014. Effect of non-genetic factors on body weight in tellicherry goats. *Indian J. of Small Rumin.***20**:98-100.
- Sandip, B and Jana, D. 2010. factors affecting birth weight of sirohi goat kids reared in hot and humid climate of west bengal. *World Appl. Sci. J.***9**: 1379-1382
- Satbir, Singh.,Rana, Z.S. and Dalai, D.S. 2002.Genetic and non-genetic factors affecting growth performance in Beetal and Black Bengal goats.Indian J. of Anim.Res.**36**: 12 16.
- Snedecor, G.W. and Cochran, W.G. 1994. Statistical Methods. Oxford and IBH Publ. Co., New Delhi, India.
- Thiruvenkadan, A. K., Karananithi, N., Babu, R.N. and K. Arunachalam.2009.Effect of housing system on growth performance of Tellichery goats. *Indian vet. J.* **86**:500-502