

## **STUDY ON PRODUCTION PERFORMANCE OF GOATS UNDER FIELD CONDITION IN SOUTHERN REGION OF TAMIL NADU**

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**Abstract:** A study was carried out to document the production performances of goats in Southern agro-climatic region of Tamil Nadu. Goat farmers from Tirunelveli, Thoothukudi and Virudhunagar were selected for this study. Based on the management practices followed by goat farmers the performances in terms of body weight have been observed. Highly significant difference ( $P < 0.01$ ) was observed in 3, 9, 12 months body weight (kg) of goats in three districts. Highly significant difference ( $P < 0.01$ ) was observed between the breeds (Kanni adu, Kodi adu and non-descript goats) in their body weight (kg) at birth, 3 months and 6 months. Non - descript breeds of goats at 4 teeth, 6 teeth and full mouth stage had significant difference in body weight ( $P < 0.01$ ). Sex wise differences ( $P < 0.01$ ) for goats in body weights at birth and 3 months were observed under extensive system of management, whereas under semi-intensive system a significant difference ( $P < 0.01$ ) was observed in body weight at 3, 6, 9 and 12 months. Within the system adult males, young males and young females differed significantly ( $P < 0.05$ ) and there was a highly significant association observed between adult females ( $P < 0.01$ ) in the herds.

**Keywords:** Goat farming - Production systems - Body weight.

### **Introduction**

The developing countries of the world have about 94.50 per cent of the goats and this goat farming makes a valuable contribution to rural poor where they are kept in small pens near the house and fed on by-products and branches of trees from which they eat the leaves and barks, leaving the woody parts to be used as a domestic fuel (Orskov, 2011). Goat farming offers promising prospects to marginal and small farmers in India. Adaptation of 22 well recognised breeds of goats with a total population of 135.17 millions observed in different parts of our country (Anon, 2014). Tamil Nadu is endowed with two recognized breeds of goats viz. Kanni adu and Kodi adu which belongs to meat type. There are about 6.02 million goat population reported in Tamil Nadu and out of this 25.89 per cent of goat population is found in southern region of Tamil Nadu. Kanni and Kodi goat breeds constitute valuable sources of genetic material because of their adaptation to harsh climatic conditions, their ability to better utilize the limited and poor quality feed resources. By

valuating the essential nutritional components in the available fodders offered to the goats, it will be possible to improve nutritional constraints limiting animal productivity and health conditions.

### Materials and Methods

The study was carried out in southern agro-climatic regions viz., Tirunelveli, Thoothukudi and Virudhunagar districts of Tamil Nadu to document the production performances of goats under semi-intensive, extensive and intensive systems of management. The villages were selected in consultation with the Department of Animal Husbandry, Government of Tamil Nadu of the selected districts on the basis of goat population existing there and goat herds were selected at random. A total of 180 goat herds from 60 villages spread in thirty blocks in three districts (Tirunelveli, Thoothukudi and Virudhunagar) were selected using multi-stage random sampling technique. The details of body weight at different age groups in Kanni goats, Kodi goats and Non descripts were properly documented and statistically analysed.

### Results and Discussion

**Table 1. Least-squares means ( $\pm$ SE) of body weight (kg) of young goats in southern region of Tamil Nadu**

Age group	Sex	Breed			Level of significance (Between breeds)
		Kanni adu	Kodi adu	Non descript	
Birth	Male	2.55 <sup>a</sup> $\pm$ 0.09 (13)	2.59 <sup>a</sup> $\pm$ 0.06 (24)	2.31 <sup>b</sup> $\pm$ 0.05 (86)	*
	Female	2.31 <sup>b</sup> $\pm$ 0.08 (15)	2.49 <sup>a</sup> $\pm$ 0.07 (23)	2.25 <sup>b</sup> $\pm$ 0.05 (70)	*
	Pooled	2.41 <sup>b</sup> $\pm$ 0.06 (28)	2.54 <sup>a</sup> $\pm$ 0.05 (47)	2.28 <sup>c</sup> $\pm$ 0.04 (156)	**
	Level of significance (Between sex)	NS	NS	NS	
3 months	Male	8.13 <sup>bA</sup> $\pm$ 0.17 (48)	8.61 <sup>aA</sup> $\pm$ 0.15 (59)	7.83 <sup>cA</sup> $\pm$ 0.12 (94)	**
	Female	7.63 <sup>B</sup> $\pm$ 0.11 (35)	7.18 <sup>B</sup> $\pm$ 0.14 (41)	7.44 <sup>B</sup> $\pm$ 0.09 (117)	NS
	Pooled	7.92 <sup>a</sup> $\pm$ 0.11 (83)	8.03 <sup>a</sup> $\pm$ 0.12 (100)	7.61 <sup>b</sup> $\pm$ 0.07 (211)	**
	Level of significance (Between sex)	*	**	**	
6 months	Male	12.64 <sup>A</sup> $\pm$ 0.36 (34)	13.03 <sup>A</sup> $\pm$ 0.15 (57)	12.52 <sup>A</sup> $\pm$ 0.09 (272)	NS
	Female	13.92 <sup>aB</sup> $\pm$ 0.21 (29)	13.57 <sup>bB</sup> $\pm$ 0.17 (50)	13.02 <sup>cB</sup> $\pm$ 0.11 (167)	**
	Pooled	13.23 <sup>a</sup> $\pm$ 0.23 (63)	13.25 <sup>a</sup> $\pm$ 0.12 (107)	12.71 <sup>b</sup> $\pm$ 0.07 (439)	**
	Level of significance (Between sex)	**	*	**	

<b>9 months</b>	<b>Male</b>	16.99 ± 0.26 (41)	16.33 <sup>A</sup> ± 0.19 (65)	16.43 <sup>A</sup> ± 0.11 (212)	NS
	<b>Female</b>	16.51 ± 0.23 (31)	16.86 <sup>B</sup> ± 0.13 (65)	16.95 <sup>B</sup> ± 0.08 (263)	NS
	<b>Pooled</b>	16.78 ± 0.18 (72)	16.60 ± 0.12 (130)	16.72 ± 0.07 (475)	NS
	<b>Level of significance (Between sex)</b>	NS	*	**	
<b>12 months</b>	<b>Male</b>	19.10 <sup>bA</sup> ± 0.24 (26)	18.79 <sup>bA</sup> ± 0.23 (41)	19.73 <sup>aA</sup> ± 0.12 (203)	**
	<b>Female</b>	17.63 <sup>B</sup> ± 0.15 (28)	17.63 <sup>B</sup> ± 0.12 (76)	17.56 <sup>B</sup> ± 0.06 (313)	NS
	<b>Pooled</b>	18.33 ± 0.17 (54)	18.04 ± 0.12 (117)	18.41 ± 0.08 (516)	NS
	<b>Level of significance (Between sex)</b>	**	**	**	

Figures in parentheses indicate number of observations \* Significant ( $P < 0.05$ ) \*\* Highly significant ( $P < 0.01$ ) NS Non-significant

Values bearing any one common superscript (Small letters indicate between districts and CAPITAL letter indicate between sexes) did not differ significantly

Highly significant difference ( $P < 0.01$ ) was observed between the breeds Kanni adu, Kodi adu and non-descript goats) and body weight (kg) at birth, 3 months and 6 months (Table 1). Birth weight of Kodi adu was significantly ( $P < 0.01$ ) higher than the other breeds. Both 3 months and 6 months body weights were significantly higher in Kanni adu and Kodi adu when compared to non-descript goats. The overall body weights of Barbari goats belonging to Jalal village in Uttar Pradesh was  $2.63 \pm 0.05$ ,  $8.03 \pm 0.15$ ,  $14.90 \pm 0.36$ ,  $15.05 \pm 0.5$ ,  $18.2 \pm 0.7$ ,  $19.43 \pm 1.09$  and  $24.12 \pm 0.51$  kg at birth, 3, 6, 9, 12, 18 months and adults, respectively (Singh *et al.*, 2010). Kanni adu breed of goats had a significant ( $P < 0.05$ ) difference between sexes at 3 months and highly significant difference ( $P < 0.01$ ) between sexes at 6 month and 12 months age groups. In Kodi adu goats, male and females had highly significant ( $P < 0.05$ ) difference in body weight at 3 months and 12 months and significant difference was found between 6 months and 9 months age groups of goats. In non-descript goats, highly significant difference was observed between male and females of 3, 6, 9 and 12 months age groups of goats. In Boer x Kanni goats, Sivakumar *et al.* (2005) reported the average birth weight of new born kids as  $2.44 \pm 0.17$  kg, where the male kids ( $2.57 \pm 0.19$  kg) had higher birth weight than the females ( $2.31 \pm 0.18$  kg).

The overall mean for body weight of Kanni adu kids at first week, 3, 6 and 11 to 12 months of age as  $2.26 \pm 0.23$ ,  $10.94 \pm 0.39$ ,  $12.70 \pm 0.38$  and  $16.86 \pm 0.52$  kg, respectively (Report, 2011). In the present study, the corresponding body weights are more than the above report. Similarly, in Kodi adu goats (Report, 2012) the overall body weight of animals at birth

( $2.81 \pm 0.04$  kg), at 3 months ( $11.41 \pm 0.16$  kg), at 6 months ( $14.70 \pm 0.23$  kg), at nine months ( $16.79 \pm 0.30$  kg) and at 12 months ( $22.95 \pm 0.31$  kg). The corresponding values in the present study among Kodi adu goats were found to be lower than the above report. These variations might be due to representations of animals from different parts of the home tract, and number of observations.

Highly significant difference ( $P < 0.01$ ) was observed between the body weight at different age groups (2-teeth, 4-teeth, 6-teeth). Kodi adu breed had significantly ( $P < 0.01$ ) higher body weight at 2 teeth and 4 teeth category compared to other two breeds (Table 2). But Kanni adu had significantly ( $P < 0.01$ ) higher body weight in 6 teeth category. In full mouth goats, both Kanni adu and Kodi adu had significantly ( $P < 0.05$ ) higher body weight than Non-descript goats. Between sexes of Kanni adu goats, highly significant ( $P < 0.01$ ) difference was found in 2-teeth, 4-teeth and full mouth age groups.

A significant difference ( $P < 0.05$ ) was observed in 6 teeth age group. In Kodi adu goats body weight (kg) at 4-teeth and full mouth differed significantly ( $P < 0.01$ ). In Non-descript breeds of goats at 4-teeth, 6-teeth and full mouth had significant difference ( $P < 0.01$ ). Between sexes of Kanni adu goats highly significant ( $P < 0.01$ ) difference was found at 2 teeth, 4 teeth and full mouth age groups. A significant difference ( $P < 0.05$ ) was observed in 6 teeth age group. In Kodi adu goats body weight (kg) at 4 teeth and full mouth differed significantly ( $P < 0.01$ ). Non-descript breeds of goats at 4 teeth, 6 teeth and full mouth had significant difference ( $P < 0.01$ ). Varade *et al.* (1997) recorded the average body weight of non-descript female goats over the age of 1.5 years in field condition maintained by local farmers with semi free range system of management as  $26.34 \pm 1.27$  kg. Similarly, Verma *et al.* (2012) reported that the body weight at >15 months in Konkan Kalyan goats of Sindhurg district in Konkan region of Maharashtra was  $29.64 \pm 0.45$  kg.

**Table 2. Least-squares means ( $\pm$ SE) of body weight (kg) of adult goats in southern region of Tamil Nadu**

Age	Sex	Breed			Level of significance (Between breeds)
		Kanni adu	Kodi adu	Non-descript	
2 tooth	Male	$25.00^{aA} \pm 0.45$ (7)	$22.53^b \pm 0.73$ (12)	$22.59^b \pm 0.26$ (42)	**
	Female	$21.98^{cB} \pm 0.11$ (97)	$23.12^a \pm 0.15$ (149)	$22.38^b \pm 0.12$ (260)	**
	Pooled	$22.19^b \pm 0.13$ (104)	$23.26^a \pm 0.15$ (161)	$22.41^b \pm 0.11$ (302)	**
	Level of significance (Between sex)	**	NS	NS	
4 tooth	Male	$33.48^{aA} \pm 0.49$	$33.86^{aA} \pm 0.36$	$31.63^{cA} \pm 0.32$	**

		(9)	(21)	(76)	
	<b>Female</b>	26.59 <sup>ab</sup> ± 0.23 (127)	26.56 <sup>ab</sup> ± 0.17 (161)	25.94 <sup>bb</sup> ± 0.08 (826)	**
	<b>Pooled</b>	27.05 <sup>b</sup> ± 0.26 (136)	27.41 <sup>a</sup> ± 0.23 (182)	26.42 <sup>c</sup> ± 0.09 (902)	**
	<b>Level of significance (Between sex)</b>	**	**	**	
<b>6 tooth</b>	<b>Male</b>	35.88 <sup>A</sup> ± 0.42 (14)	34.00 ± 0.62 (9)	35.03 <sup>A</sup> ± 0.47 (45)	NS
	<b>Female</b>	33.73 <sup>ab</sup> ± 0.28 (138)	32.75 <sup>b</sup> ± 0.29 (127)	32.72 <sup>bb</sup> ± 0.12 (733)	**
	<b>Pooled</b>	33.92 <sup>a</sup> ± 0.26 (152)	32.84 <sup>b</sup> ± 0.28 (136)	32.24 <sup>b</sup> ± 0.19 (330)	**
	<b>Level of significance (Between sex)</b>	*	NS	**	
<b>Full mouth</b>	<b>Male</b>	40.68 <sup>A</sup> ± 4.43 (9)	44.87 <sup>A</sup> ± 1.37 (15)	40.94 <sup>A</sup> ± 0.96 (44)	NS
	<b>Female</b>	35.65 <sup>ab</sup> ± 0.20 (115)	35.02 <sup>bb</sup> ± 0.19 (132)	34.91 <sup>bb</sup> ± 0.13 (638)	*
	<b>Pooled</b>	36.01 <sup>a</sup> ± 0.37 (124)	36.03 <sup>a</sup> ± 0.33 (147)	35.30 <sup>b</sup> ± 0.14 (682)	*
	<b>Level of significance (Between sex)</b>	**	**	**	

Figures in parentheses indicate number of observations \* Significant ( $P < 0.05$ ) \*\* Highly significant ( $P < 0.01$ ) <sup>NS</sup> Non-significant

Values bearing any one common superscript (Small letters indicate between districts and CAPITAL letter indicate between sexes) did not differ significantly

**Table 3. Least-square means (± SE) of system wise goat production in Southern region of Tamil Nadu**

Animal category	Production system			Overall
	Extensive	Semi-intensive	Intensive	
<b>Adult males</b>	1.72 <sup>b</sup> ± 0.10(103)	1.63 <sup>b</sup> ± 0.07(186)	2.50 <sup>a</sup> ± 0.72(15)	1.69 ± 0.06(304)
<b>Adult females</b>	19.20 <sup>b</sup> ± 0.67(1182)	18.82 <sup>c</sup> ± 0.44(2146)	28.67 <sup>a</sup> ± 5.54 (172)	19.44 ± 0.41(3500)
<b>Young males</b>	6.73 <sup>c</sup> ± 0.36(404)	7.10 <sup>b</sup> ± 0.33(809)	10.67 <sup>a</sup> ± 2.87(64)	7.09 ± 0.26(1277)
<b>Young females</b>	8.37 <sup>a</sup> ± 0.49(502)	6.78 <sup>c</sup> ± 0.30 (773)	8.00 <sup>b</sup> ± 1.86 (48)	7.35 ± 0.26(1323)
<b>Total</b>	36.52 ± 1.28(2191)	34.33 ± 0.74(3914)	49.83 ± 10.27(299)	35.58 ± 0.74(6404)

Figures in parentheses indicate number of observations and values bearing small letter column wise differ significantly

**Table 4. Analysis of variance of system wise goat production in Southern region of Tamil Nadu**

Sources of variance (Between the system)	Degrees of freedom	Sum of squares	Mean sum of squares	F-value
Adult males	2	4.37	2.1841	3.33*
Adult females	2	558.02	279.0099	9.93**
Young males	2	84.39	42.1946	3.62*
Young females	2	101.50	50.7496	4.18*

The mean overall herd size maintained in the extensive, semi-intensive and intensive system of production were  $36.52 \pm 1.28$ ,  $34.33 \pm 0.74$ ,  $49.83 \pm 10.27$ , respectively (Table 3 & 4). Within the system adult males, young males and young females differed significantly ( $P < 0.05$ ) and there was a highly significant association observed between adult females ( $P < 0.01$ ) in the herds. Alam *et al.* (2008) reported that the farmers in Punjab region were practising the semi-intensive (56.06 per cent) and intensive system (43.94 per cent) for Beetal goats. Since, the goat farmers in the study area belonged to low income group, rearing of goats under intensive system needs more investment on housing and feeding. Most of the farmers preferred semi-intensive rather than extensive system for rearing of goats.

### Summary and Conclusion

Body weight of Kanni goats was significantly higher than Kodi and non-descript goats. In another comparison, 3 months and 6 months body weights of Kanni and Kodi goats were higher than the same age group of non-descript goats. Semi-intensive system of rearing is commonly followed and found better rather than extensive and intensive systems in the agrarian community in the southern agro-climatic region of Tamil Nadu. In intensive system the rate of weight gain was more at 6 months age since lack of movement favours more weight gain. But, 12 months body weight was higher in extensive system due to the chances of consuming varieties of nutritious roughages in grazing. It was concluded that the nutrient content of naturally available foliages and tree fodders play a major role for the performance of goats rearing under different systems of management. Depending on the flock size, management practices followed in different systems may also play a vital role in body weight gain of goat farming. The goat farmers are also advised to rear the recognized breeds (Kani and Kodi goats) than the non-descript in their breeding tracts to get more sale price during marketing of their goats in different age groups.

## References

- [1] Alam, S., P.K. Singh and B.U. Khan, 2008. Morphological studies and management of Beetal goats in its native tract. *Indian J. Anim. Sci.*, **78(10)**: 1127-1130.
- [2] Anon, 2014. 19<sup>th</sup> Livestock Census, 2012. Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India, New Delhi, India.
- [3] Orskov, E.R., 2011. Goat production on global basis. *Small Rumin.Res.*, **98**:9-11.
- [4] Report, 2011. A Monograph of Kanni adu goats. Tamil Nadu Veterinary and Animal Sciences University, Chennai -51.
- [5] Report, 2012. Final report on Characterization and evaluation of Kodi adu breed of goats of Tamil Nadu, India. TANUVAS and International foundation for science, Sweden.
- [6] Singh, M.K., A.K. Goel, B. Rai, A. Kumar and M.C. Sharma, 2010. Impact of breed improvement programme on goat production under farmers flock. *Indian J. Anim. Sci.*, **80(4)**: 379-381
- [7] Sivakumar, T., C. Soundararajan and R. Palanidorai, 2005. Factors affecting birth weight in Boer x Kanni kids. *Indian J. Small Rumin.*, **11(1)**: 69-71.
- [8] Varade, P.K., S.Z. Ali and P.S. Malkhede, 1997. Body measurements of local goats under field condition. *Indian Vet. J.*, **(74)**: 448-449.
- [9] Verma, N.K., R.A.K. Aggarwal, S.P. Dixit, V.S. Kawatkar, P.S. Dangi, Navneet Kaur, P. Mishra and B.K. Joshi, 2012. Konkan Kanyal - Characters and performance of a newly discovered goat germplasm of Maharashtra. *Indian J. Anim. Sci.*, **82 (9)**: 1279-1281