GROWTH, PRODUCTION AND REPRODUCTION PERFORMANCE OF TELLICHERRY GOATS UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEMS OF MANAGEMENT

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ABSTRACT

A study was undertaken on the growth, productive and reproductive performance of Tellicherry goats under intensive and semi-intensive systems of management using 40 kids. The overall body weights at birth, 3, 6, 9 and 12 months of age under intensive system were 2.33 ± 0.10, 9.51 ± 0.33, 14.10 ± 0.53, 19.16 ± 0.75 and 20.13 ± 0.83 Kg, respectively. Similarly, under semi-intensive system the values were 1.96 ± 0.05, 7.65 ± 0.11, 14.15 ± 0.52, 18.46 ± 0.64 and 20.48 ± 0.46 Kg, respectively. Under intensive system, the reproductive performance namely weight at first mating, number of services per conception, weight at first kidding, litter size, gestational weight gain, lactational weight loss, service period, kidding percentage and kidding interval were 18.51 ± 0.86 kg, 1.25 ± 0.13, 22.87 ± 0.75 kg, 1.08 ± 0.08, 4.36 ± 0.33kg, 3.28 ± 0.43kg, 89.00 ± 1.85 days, 100.00, 245.01 ± 3.84 days, respectively. The same values for semi-intensive system were 18.13 ± 0.87 kg, 1.50 ± 0.23, 23.35 ± 0.98kg, 1.25 ± 0.13, 5.22 ± 0.50kg, 2.92 ± 0.72, 85.30 ± 2.12 days, 100.00, 243.39 ± 7.19 days, While there was 8.33 percentage twinning noticed in intensive system, the same was observed as 25.00 percentage in semi-intensive system.

Key words- Tellicherry goat, growth, reproductive performance

INTRODUCTION

Goats were among the first farm animals to be domesticated. In developing countries, goats make a very valuable contribution, especially to the poor people in the rural areas for generating employment, income, capital storage and improving

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household nutrition (Devendra, 1992). Tellicherry goat, originally distributed in Calicut, Cannanore and Malapuram districts of Kerala (Acharya, 1982) is also widely seen in western districts of Tamil Nadu. In the home tract, the climate is hot-wet, whereas, in Tamil Nadu these animals are mostly reared in hot-dry regions. Tellicherry goats are medium sized and highly prolific. They are also capable of producing good quality meat and milk.

The productivity of goats under the prevailing traditional production system is very low (Singh and Kumar, 2007). It is because they are maintained under the extensive system on natural vegetation on degraded common grazing lands and tree lopping. Even these degraded grazing resources are shrinking continuously. Therefore, goat rearing took a shift to intensive system from conventional systems. The aim of the present investigation was, therefore, to study the growth and reproduction performance of Tellicherry goats.

MATERIALS AND METHODS

The present study was conducted to find out the performance of Tellicherry goats under intensive and semi-intensive systems of rearing at Instructional Livestock Farm Complex, Veterinary College and Research Institute, Namakkal, Tamil Nadu from March 2013 to September 2015. A total of 40 Tellicherry kids from the age of three to four months were used under two systems of rearing. All the animals were ear tagged for their identification before the start of experiment. Twenty kids (12 female and 8 male) were kept in one group (T_1) under intensive system and other group of twenty kids (12 female and 8 male) under semi-intensive system of rearing (T_2).

Management

The kids were given an adaptation period of 15 days before the start of the experiment. The group T_2 was sent for grazing. The T_1 group was kept under stall feeding. Stall-fed kids were offered concentrate feed, Co-4 grass (Bajra X Napier hybrid variety), subabul (*Leucaena leucocephala*), sorghum (*Sorghum bicolor*) stover, ground nut haulms (*Arachis hypogaea*) at different times of the day to meet the nutrient requirement as per the nutrient requirements recommended by ICAR (2013). Subabul fodder was cut into small branches of minimum stem portion and fed fresh. Sorghum stover was also chopped and fed as dry fodder. Groundnut haulms were fed as such. Co-4 and sorghum stover were fed two times a day, whereas, subabul was fed once a day. *Ad libitum* drinking water was made available.

The kids were allowed for grazing from 9.00 a.m. to 4.30 p.m. The males were grazed separately and maintained in separate pens. The grazing land of the institution was having *Cenchrus* pasture, naturally growing grasses (*Heteropogon contortus, Cynodon dactylon*, *Deschampsia cespitosa, Echinochola colona*), Shrubs (*Agerotum houstonianum, Bambusa vulgaris, and Canna indica*) and tree fodder (*Azadirachta indica, Albizia lebbeck, Acacia leucophloea, Leucaena leucocephala, Gliricidia sepium and Ficus religiosa*).

Housing

The kids were housed in open type of housing with an asbestos roofed, earthen floor shed with partition made of chain link material. Pegs made of iron were placed in each partition. Intensive group animals were tethered individually, so that feed intake and left over from each animal could be measured accurately. Semi-intensive group of animals were tied up to the iron pegs in the morning before feeding. After recording the left over feed, they were sent for grazing.

Data collection

The following parameters namely daily feed intake, body weight at fortnightly intervals, monthly body measurements of six male kids were recorded. In females, the reproductive parameters were collected. They are weight at first mating, weight at first kidding, birth weight, weaning weight, kidding interval, litter size, number of service per conception, twinning percentage, kidding percentage and service period. The data thus collected were compiled and analyzed as per Snedecor and Cochran (1996). The data on body weight, body measurement and average daily gain (ADG) were subjected to one way analysis of variance under Completely Randomized Design. For comparisons of body weight, dry matter intake, body weight gain, feed conversion ratio and per cent feed efficiency between groups, the students "t"- test was used.

RESULTS AND DISCUSSION

Productive performance

The body weight of Tellicherry kids showed increased gains, as a result of supplementation with no significant difference between the rearing groups during the 150 days of the growth trial. In both the intensive and semi-intensive groups, the initial body weight has increased linearly as the age advanced. Initial body weight of intensively reared kids was 15.56 ± 0.75 kg for male and 13.13 ± 0.60 kg for females, respectively and in semi-intensive system it was 15.63 ± 0.75 kg and 13.17 ± 0.57 kg for male and females, respectively. The final body weight of Tellicherry kids at 150 days study period of male and female in intensive group was 25.11 ± 1.01 and 19.90 ± 0.72 kg, respectively and in semi-intensive group it was 24.10 ± 0.97 and 19.30 ± 0.49 kg, for male and female, respectively. The study on body weight of Tellicherry goats under intensive and semi-intensive systems of management revealed no significant difference in body weight of Tellicherry goats between the rearing systems. Similar finding was also reported in Barbari and Black Bengal goats of India (Saini *et al*., 1986; Chowdhury and Faruque, 2001; Sulthana *et al*., 2012). On the contrary, significant difference in body weight under intensive and semi-intensive systems of management was noticed in earlier studies in different goat breeds of India (Saini *et al.,*1988; Paramasivam *et al.,* 2002; Abdul Hakim *et al*., 2005; Elangovan *et al*., 2008; Patil *et al*., 2014; Jayanthi, 2015). The study on body weight in Tellicherry goats under two systems of management indicated that the Tellicherry goats were very well adapted

to intensive and semi-intensive systems of management.

The ADG of male kids in intensive and semi-intensive system was 51.54 ± 2.95 and 46.21 ± 3.90 g, respectively. The average daily weight gain observed in the present study was comparable to values reported by Khound *et al*. (1995) in crossbred goats of Assam. However, higher (Chellapandian and Balachandran, 2003; Jayanthi *et al*., 2014) and lower (Moniruzzaman *et al*., 2002; Thiruvenkadan *et al*., 2009; Bharanbe and Burte, 2012; Murugan and Meenalochani, 2014) than the present values were also reported by earlier workers on different goat breeds of India.

Growth performance

The birth weight of Tellicherry males (2.33kg) and females (1.96 kg) observed in the present study was comparable with values reported by earlier workers on the same breed (Thiruvenkadan *et al*.,2008; Thiruvenkadan *et al*., 2009; Ramesh Saravana Kumar *et al.,* 2011; Murali *et al*., 2014). Soundarrajan and Sivakumar (2011) and Thirupathy *et al*. (2015) observed lower than the present values in Tellicherry kids.

The weaning weight of Tellicherry male kids observed in the present study was comparable with earlier reports on the same breed (Thiruvenkadan *et al*., 2009; Meenakshisundaram *et al*., 2012; Murali *et al*., 2014). The weaning weights observed in female Tellicherry kids was comparable with reports of Thirupathy *et al*. (2015). On the contrary, the weaning weight observed was higher than the reports of Thiruvenkadan *et al*. (2009), Meenakshisundaram *et al*. (2012) and Murali *et al*. (2014).

The six(14.10) and nine months(19.16kg) body weight of Tellicherry kids observed in the present study was within the range of values reported by Verma *et al*. (2009). However, lower than the present values were reported by earlier workers in the same breed (Thiruvenkadan *et al*., 2009; Meenakshisundaram *et al*., 2012; Murali *et al*., 2014; Thirupathy *et al*., 2015). The twelve months body weight(20.13) observed was comparable with the report of Murali *et al*. (2014). On the contrary, the values observed were higher than the reports of Verma *et al*. (2009) and Meenakshisundaram *et al*. (2012) and lower than the report of Thiruvenkadan *et al*. (2009) on the same breed.

Dry matter intake

The cumulative DMI was 92.72 ± 2.97 kg for males 72.62 ± 1.38 kg for females. The higher DMI in males could be due to faster body growth observed in male kids grows during pre as well as postnatal development (Soundararajan and Sivakumar, 2011). Results of this study indicated that the male kids gained significantly ($P<0.01$) higher weights than female kids during all the stages which might be due to quantitative difference in the secretion of growth and sex hormones (Gopal Dass, 2007).

Feed conversion ratio

The present study male animals showed comparatively better FCR (11.57± 1.12) than females (12.74 ± 1.09). In Tellicherry goats, the FCR was numerically better in male animals than females. However, Singh

et al., (2010) observed better (P<0.01) FCR in male Jamunapari goats than females. The differences between sexes would be attributed to the nutritional status and the genetic potential of the animals used in the corresponding studies (Sen *et al*.,2004).

Weight at first mating

The effect of rearing system on weight at first mating is shown in (Table 1). There was no significant difference in intensive system and semi-intensive system. The present study observed the weight at first mating in intensive and semi-intensive system as 18.51 ± 0.86 kg and 18.13 ± 0.87 kg, respectively. Similarly, Faruque *et al*. (2010) reported no significant difference in weight at first mating between different systems of rearing in Black Bengal goats. On the contrary, Patel *et al.* (2005) reported significant difference between systems of management in Marwari, Parbatsari and local non-discript goats of Rajasthan. The weight at first mating observed in Tellicherry goats was comparable with the earlier report of Kutchi, Jamunapari and Mehsana goats of India (Kumar *et al*., 2006; Hassan *et al.,* 2010; Patel and Panday, 2013).

Number of services per conception

The overall mean of number of services per conception in intensive and semi-intensive was shown in (Table 1). The present study revealed that number of services per conception in intensive and semi-intensive system was 1.25 ± 0.13 and 1.50 ± 0.23, respectively. System of management did not significantly influence the services per conception. The present study closely agreed with Chowdhury *et al*. (2002) in Black Bengal goat who reported services per conception in semi-intensively reared goat was 1.45.

Weight at first kidding

The overall means for weight at first kidding were shown in (Table 1). In the present study, the values were found to be 22.87 ± 0.75 and 23.35 ± 0.98 kg in intensive and semi-intensive system, respectively. The systems of management had no significant effect on weight at first kidding. The non-significant effect of system of management was in accordance with the reports on Jamunapari and Mehsana goats (Hassan *et al*. 2010; Patel and Pandey (2013).However, Patel *et al*. (2005) and Faruque *et al.* (2010) reported significantly higher weight at first kidding in intensively reared goats compared to semi-intensively reared goats.

Litter size

The litter size observed in the present study was 1.08 ±0.08 and 1.25 ± 0.13 under intensive and semi-intensive system. The above results and the study was concurrent with Hassan *et al*. (2010) in Jamunapari goat (1.93 ± 0.06), Thiruvenkadan *et al*. (2000) in Kanni Adu goat (1.70 ± 0.60), Islam *et al*. (2009) in Black Bengal goat of Bangladesh (2.33 ± 0.33) and Gopu *et al*. (2013), in Salem Black goat (1.48 ± 0.13).

Gestational weight gain

The gestational weight gain of goats in intensive and semi-intensive system was 4.36 ± 0.33 and 5.22 ± 0.50 kg, respectively are shown in Table 1. The observed values were comparable with reports of Thiruvenkadan *et al.* (2008) in Mecheri sheep in organized farm conditions.

Lactational weight loss

The lactation weight loss in goats of intensive and semi-intensive system was 3.28 ± 0.43 and 2.92 ± 0.72 kg, respectively. The present value was comparable with Islam *et al*. (2009) in Black Bengal goat and the values are lower than the reports of Thiruvenkadan *et al*. (2008) in Mecheri sheep of Tamil Nadu under farm conditions.

Service period

The overall means of service period of goats in intensive and in semi-intensive system were 89.00 ± 1.85 and 85.30 ± 2.12 days, respectively as shown in Table 1. The observed service period was comparable with Sangamneri goat (Deokar*et al*.,2007) and Berari goat (Kranti kharkar *et al*.,2014) and shorter than other Indian goat breeds like Jamunapari (Singh and Roy 2003), Sirohi (Pathodiya *et al*., 2008), Mehsana (Patel and Pandey2013) and Ganjam (Rao *et al*., 2009).

Kidding percentage

The kidding percentage of Tellicherry goats under intensive and semi-intensive system was 100 per cent. All the kids given birth were reared under intensive and semi-intensive system of management in the present study. However, the reports of Kumar *et al*. (2006), Singh *et al*. (2009), Patel *et al*. (2005) revealed system of management significantly influenced the kidding percentage.

Twinning percentage

The twining percentage of Tellicherry goats under intensive and semi-intensive system was 8.33 and 25.00 per cent, respectively. The present values were higher than the previous reports Verma *et al. (*2009) and Muthuramalingam *et al*.(2014) on the same breed.

Kidding interval

Kidding interval in Tellicherry goat under intensive and semi-intensive system was 245.01±3.84 and 243.39 ±7.19 days, respectively (Table1). There was no significant difference observed between two rearing systems in the kidding interval. Acharya (1982) Verma *et al.*(2009) reported similar values in Tellicherry goats reared in its native tract of Kerala.

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Table 1. Mean (± S.E) of reproductive performance of Tellicherry goats under intensive and semi- intensive systems

Parameters	Intensive system (T_1)	Semi-intensive system (T_2)	T-value	P-value
Weight at first mating (kg)	18.51 ± 0.86 (12)	18.13 ± 0.87 (12)	0.306^{NS}	0.380
Number of services per conception	1.25 ± 0.13 (12)	1.50 ± 0.23 (12)	0.944^{NS}	0.179
Weight at first kidding (kg)	22.87 ± 0.75 (12)	23.35 ± 0.98(12)	0.390^{NS}	0.349
Litter size	1.08 ± 0.08(12)	1.25 ± 0.13(12)	1.076^{NS}	0.147
Birth weight (kg)				
Male	2.43 ± 0.18^{b} (7)	2.05 ± 0.05^{a} (7)	2.003^{*}	0.042
Female	2.23 ± 0.06^{b} (7)	1.86 ± 0.09^{a} (7)	3.330^{**}	0.003
Overall	**2.33 ± 0.10^{b} (14)**	**1.96 ± 0.05^{a} (14)**	**3.247^{**}**	0.002
Weaning weight (kg)				
Male	9.86 ± 0.48^{b} (7)	7.83 ± 0.17^{a} (7)	4.022^{**}	0.001
Female	9.17 ± 0.43^{b} (7)	7.46 ± 0.14^{a} (7)	3.709^{**}	0.003
Overall	**9.51 ± 0.33^{b} (14)**	**7.65 ± 0.11^{a} (14)**	**5.370^{**}**	**0.000**
Gestational weight gain (kg)	4.36 ± 0.33 (12)	5.22 ± 0.50 (12)	1.406^{NS}	0.088
Lactational weight loss (kg)	3.28 ± 0.43 (12)	2.92 ± 0.72 (12)	0.858^{NS}	0.126
Service period (days)	89.00 ± 1.85 (12)	85.30 ± 2.12 (12)	1.315^{NS}	0.103
Kidding percentage	100.00 (12)	100.00 (12)	-	-
Twinning percentage	8.33 (1)	25.00 (3)	-	-
Kidding interval (days)	245.01 ±3.84 (12)	243.39 ± 7.19 (12)	0.198^{NS}	0.422

Means bearing the different superscript within a row differ significantly , * Significant($P< 0.05$),

** Highly significant ($P< 0.01$), ^{NS} Non significant