

YIELD AND COMPOSITION OF MILK OF TELLICHERRY DOES DURING DIFFERENT STAGES OF LACTATION

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ABSTRACT

The study was aimed at providing a complete picture of milk yield and composition during different stages of lactation in Tellicherry does. A total of 40 Tellicherry does aged between 2 – 2 ½ years in 2nd parity were selected for the study. The lactation period was divided into three stages namely early, mid and late lactation stages and data on milk yield, and milk composition such as milk fat, SNF and specific gravity of milk during lactation were collected. The milk yield did not vary with lactation stages. The total lactation milk yield was 33.29±0.45 kg and the milk yield/doe/day was 0.36±0.04 kg. The average fat, SNF and specific gravity during lactation were 3.47±0.17%, 8.74±0.11% and 1.032±0.00 respectively. The fat percentage was significantly ($P<0.01$) higher during mid (3.61±0.19%) and late lactation (4.21±0.22%) than that of early lactation (2.60±0.12%). The SNF percentage and specific gravity were found to be significantly ($P<0.01$) higher during early lactation (9.24±0.17%; 1.035±0.00) followed by mid (8.76±0.06%; 1.031±0.00) and late lactation (8.23±0.06%; 1.029±0.00).

Keywords: Lactation stages, milk composition, milk yield, Tellicherry doe

Received : 16.09.2021

Revised : 26.11.2021

Accepted : 09.12.2021

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INTRODUCTION

Goats play a significant role in providing livelihood and supplementary income to millions of resource-poor and landless farmers of rural India. Around 20 million small and marginal farmers and landless labourer's families depend on goats for their livelihood either partially or completely. India occupies the first position in goat milk production (5.75 million MT), the second position in terms of goat population (148.88 million) and goat meat production (1041.11 thousand tons) in the world (FAO,

2008; NAPG, 2018; BAHFS, 2017). The goat sector contributes Rs. 14,453 crores to the agrarian economy of the country through meat, milk, skin, etc., which accounts for around 8 per cent of the Gross Domestic Product (GDP) from the livestock sector. In addition, the goat sector also generates about 4 per cent rural employment. In the present scenario of changing agro-climatic conditions, this small ruminant has tremendous potential to be projected as the 'Future Animal' for rural and urban prosperity (NAPG, 2018).

Tellicherry goat is one of the recognized breeds of goats in India (Senthilkumar and Daisy, 2018). It is native to the Malabar region of Kerala. It has been also reared in different places of Tamil Nadu due to higher multiple birth percentages and milk yields. This study was attempted at providing a complete picture of milk yield and composition of Tellicherry does during different stages of lactation.

MATERIALS AND METHODS

Experimental location

The study was carried out at Livestock Farm Complex, Madhavaram Milk Colony, Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India, located between latitudes 12° 9' and 13° 9' N and longitudes 80° 12' and 80° 19' E with an altitude of 22 m above MSL.

Experimental design and animals

A total of 40 Tellicherry does aged between 2 – 2 ½ years in 2nd parity were selected for the study. The lactation period was divided into three stages namely early

(less than 30 days), mid (30 to 60 days) and late (60 to 90 days) lactation stages. All the does were maintained under intensive system of management with similar feeding, housing and health care conditions.

Milk yield

Milk yield per day was obtained by assessing the difference in kids body weight before and after milk feeding thrice a day at 10 am, 1.30 pm and 4 .00 pm for 10 to 15 minutes.

Milk composition

Milk samples were collected from each doe throughout the lactation period. The collected samples were stirred using a digital ultrasonic stirrer. Stirred milk samples were then placed in the Ekomilk ultra milk analyzer (Milkana KAM98-2A-CDPS Electronics, Uttarakhand, India) for analysis of milk fat, SNF and density.

Specific gravity of milk

The specific gravity of milk was calculated using the following formula with the help of the milk density value obtained from the milk analyzer.

$$\text{Specific gravity} = \frac{\text{Milk density}}{1000} + 1$$

Statistical analysis

The collected data were subjected to statistical analysis by one-way ANOVA using SPSS software. Differences were considered significant at P<0.05. If significance was determined, Turkey's HSD was performed to differentiate between stages of lactation.

RESULTS AND DISCUSSION

Milk yield during different stages of lactation

Milk yield during different stages of lactation in Tellicherry does are presented in Table 1. No significant difference in milk yield was noticed between the early, mid and late lactation stages. The total lactation milk yield was 33.29±0.45 kg and the milk yield/doe/day was 0.36±0.04 kg. Numerically higher milk yield was noticed during the mid-lactation stage followed by late and early lactation. Similarly, Gurmessa and Melaku (2012) also reported significantly higher milk yield during the mid-stage of lactation. However, they also reported significantly lower milk yield in the late stage of lactation that is contrary to the present findings. Contrary to the present findings, Sudharsan *et al.* (2021) reported higher milk yield during early lactation followed by mid and late lactation stages.

The total lactation milk yield in Tellicherry does in the present study was 33.29±0.45 kg which is lower than that reported by Sudharsan *et al.* (2021). They reported a lactation yield of 55 litre for a lactation period of 16 weeks in Malabari goats. The average milk yield/doe/day recorded in the present study (0.36±0.04 kg) is higher than that reported by Sudharsan *et al.* (2021) who observed an average yield of 341.63±14.85 ml in Malabari does. Contrary to the present findings, Verma *et al.* (2009) reported an average daily milk yield of 0.5 to 1.5 litre/day in Malabari goats that is higher than the present findings.

Milk composition during different stages of lactation

Fat percentage in milk during different stages of lactation

Fat percentages in milk during different stages of lactation in Tellicherry does

Table 1. Milk yield (mean ± S.E.) of Tellicherry does during different stages of lactation (N=40)

SI. No.	Stage of lactation	Milk yield (kg)	F value
1.	1 st month of lactation	10.56±0.49	0.46 ^{NS}
2.	2 nd month of lactation	11.56±0.58	
3.	3 rd month of lactation	11.17±0.63	
4.	Total lactation yield	33.29±0.45	
5.	Milk yield / doe/ day	0.36±0.04	

^{NS}Not significant

are presented in Table 2. Statistical analysis revealed a highly significant difference in fat percentages during different stages of lactation. The fat percentage was found to be significantly ($P<0.01$) higher during mid ($3.61\pm 0.19\%$) and late lactation ($4.21\pm 0.22\%$) compared to early lactation ($2.60\pm 0.12\%$). The average fat percentage in the entire lactation was $3.47\pm 0.17\%$.

The fat percentage was found to increase with the advancement of lactation and significantly ($P<0.01$) higher fat percentage was recorded during the late lactation ($4.21\pm 0.22\%$) stage followed by mid ($3.61\pm 0.19\%$) and early lactation stages ($2.60\pm 0.12\%$). Similar results were obtained by Mathivathani *et al.* (2020) in Malabri goats. They reported 2.07 ± 0.10 , 3.82 ± 0.09 and 4.16 ± 0.17 per cent of milk fat content during early (28-30th), middle (58-60th) and late (88-90th) stages of lactation. Kalla and Prakash (1990) also reported a significant increase in milk fat percentage in goats with advancing stage of lactation. The average fat percentage in

the entire lactation was $3.47\pm 0.17\%$ which is lower than that reported by Venkatachalapathy *et al.* (2016) (4.95%) in Tellicherry does.

SNF percentage in milk during different stages of lactation

SNF percentage in milk during different stages of lactation in Tellicherry does are presented in Table 2. Statistical analysis revealed a highly significant difference in SNF percentages during different stages of lactation. The SNF percentage was found to be significantly ($P<0.01$) higher during early lactation ($9.24\pm 0.17\%$) followed by mid ($8.76\pm 0.06\%$) and late lactation ($8.23\pm 0.06\%$). The average SNF percentage in the entire lactation was $8.74\pm 0.11\%$.

The SNF percentage was found to decline significantly with the advancement of lactation stages with the highest SNF percentage observed during the early lactation stage ($9.24\pm 0.17\%$) followed by mid ($8.76\pm 0.06\%$) and late lactation stages ($8.23\pm 0.06\%$).

Table 2. Milk composition (mean \pm S.E.) of Tellicherry does during different stages of lactation (N=40)

SI. No.	Stage of lactation	Fat (%)	SNF (%)	Specific gravity
1.	1 st month of lactation	$2.60^a\pm 0.12$	$9.24^c\pm 0.17$	$1.035^e\pm 0.00$
2.	2 nd month of lactation	$3.61^b\pm 0.19$	$8.76^b\pm 0.06$	$1.031^b\pm 0.00$
3.	3 rd month of lactation	$4.21^b\pm 0.22$	$8.23^a\pm 0.06$	$1.029^a\pm 0.00$
	F value	19.95**	21.99**	210.76**
4.	Entire lactation	3.47 ± 0.17	8.74 ± 0.11	1.032 ± 0.00

** Significant ($P<0.01$)

Means bearing different superscript in the same column differ significantly ($P<0.01$)

Contrary to the present findings Kalla and Prakash (1990) reported a significant increase in SNF percentage in goats with advancing stage of lactation. The decline in SNF with the advancement of the lactation stage might be due to negative correlations between fat and SNF percentages (Kalla and Prakash, 1990). The average SNF percentage in the entire lactation was $8.74 \pm 0.11\%$ that is equivalent to that reported by Kalla and Prakash (1990) in Jamunapari goat ($8.71 \pm 0.02\%$) but lower than that reported by Venkatachalapathy *et al.* (2016) (9.67%) in Tellicherry does.

Specific gravity of milk during different stages of lactation

The analysis of variance of specific gravity of milk during different stages of lactation in Tellicherry does are presented in Table 2. Statistical analysis revealed a highly significant difference in specific gravity during different stages of lactation. The specific gravity was found to be significantly ($P < 0.01$) higher during early lactation (1.035 ± 0.00) followed by mid (1.031 ± 0.00) and late lactation (1.029 ± 0.00). The average milk density in the entire lactation was 1.032 ± 0.00 .

The specific gravity was found to decrease with the advancement of lactation in the present study. Similar to the present findings, Guzeler *et al.* (2010) also observed a significant decrease in specific gravity during the lactation period in Saanen X Kilis goats. Further, they stated that the reduction in specific gravity due to variations in the amount of fat in milk. The mean milk density (1.032 ± 0.00) observed in the present study is similar to that reported by Venkatachalapathy *et al.* (2016) (1.034) in Tellicherry does.

CONCLUSIONS

Milk yield and composition during different stages of lactation in Tellicherry does were studied. Milk yield was almost similar during all the stages of lactation. Milk fat percentage was observed to be increasing with the advancement of lactation. Conversely, SNF and specific gravity was higher during the early lactation stage and decreased with the advancement of lactation. The early lactation milk in Tellicherry does was rich in SNF while late lactation milk was rich in fat.

ACKNOWLEDGEMENTS

The authors thank the Vice-Chancellor, TANUVAS for providing necessary facilities and financial support to carry out the research.

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