

Study on milk composition of Mehsana goat at organized farm

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ABSTRACT

One thousand nine hundred sixty one milk samples of Mehsana goats maintained at Livestock Research Station, SDAU, Sardarkrushinagar, Gujarat, were analyzed to study the goat milk composition during the year 2006 and 2007. The data was grouped according to year, seasons and months. The overall means \pm SE for fat, SNF, protein and lactose contents were observed 2.91 ± 0.02 , 8.29 ± 0.01 , 2.82 ± 0.05 and 4.78 ± 1.53 percent, respectively. Higher milk constituents were observed in 2006 for fat ($3.05 \pm 0.32\%$), SNF ($10.89 \pm 3.01\%$), protein ($3.03 \pm 0.09\%$) and Lactose ($6.34 \pm 1.52\%$). The corresponding lower estimates for the year 2007 were: 2.89 ± 0.03 , 7.87 ± 0.01 , 2.81 ± 0.01 and 4.52 ± 0.01 percent, respectively. The milk constituents were observed higher in winter season for SNF ($9.06 \pm 0.08\%$) and lactose ($5.57 \pm 1.11\%$), whereas, in autumn season high estimates were estimated for fat ($3.53 \pm 0.12\%$) and protein contents ($3.06 \pm 0.02\%$). The goat milk constituents revealed higher means in the month of October for fat ($5.38 \pm 0.43\%$), SNF ($8.84 \pm 0.18\%$) and protein ($3.45 \pm 0.06\%$), but lactose content was high in December month ($6.76 \pm 2.38\%$). The present study revealed higher fat, SNF, protein and lactose constituents in goat milk during initial stage of lactation (autumn and winter seasons) and lower estimates in summer season (last stage of lactation).

Key words: Mehsana Goat, Milk composition, Fat, SNF, Protein and Lactose.

INTRODUCTION

The semi-arid climatic conditions of North Gujarat ensure the subsistence of the locally adapted dual purpose Mehsana goat. The importance of goat in the state is duly reflected from the increase in population (2.19%) and milk production (8.85%) during the last five years (Anonymous, 2006-07). The milk production of goats is likely to be higher than the official statistics, because of large amount of unreported home consumption and also sale of goat milk through mixing with cattle / buffalo milk under cooperative network in the villages. Economic evaluation of goat rearing in field under Network Project revealed an overall annual net profit per lactating goat of about Rs. 770/, wherein contribution from sale of milk was 44 percent (Singh, et al 2006). These findings indicate that goat is a main source of livelihood for landless labourers, small and marginal farmers in the state. No documentation is available on the milk composition of Mehsana goat. Therefore, present study was undertaken to study milk composition during different year, season and months in Mehsana goats, maintained at LRS, SDAU, Sardarkrushinagar, Gujarat.

MATERIALS AND METHODS

A flock of 232 Mehsana goats was maintained at Livestock Research Station (LRS), SDAU, Sardarkrushinagar, in the years 2006 and 2007 with the object of improvement of Mehsana goat in Semi-arid region of North Gujarat. The climatic conditions of North Gujarat is of semi-arid type with an average rainfall of 578 mm and monthly average temperature varying from 9.9°C in winter to 41.0°C in summer. True to breed Mehsana

goats were purchased from the breeding tract during the year 2006 and maintained at LRS under semi - intensive production system. Goats were allowed to graze for 6-8 hours daily and provided concentrate feeding @ 300 gm. per lactating goat daily.

The major breeding season in Mehsana goat occurred during the summer (May and June) and most of the kidding took place during autumn (October and November). A total of 961 milk samples from 114 lactating goats were collected from morning milking at weekly intervals. The milk composition viz. fat, solid not fat (SNF), protein and lactose in percent were estimated by automatic milk analyzer. The data on milk composition were grouped according to years (2006 and 2007), season and month. Each year was divided in to five seasons i.e. winter (December - January), spring (February - March), summer (April to June), rainy (July to September) and autumn (October - November). The data was analyzed by the statistical methods according to Panse and Sukhatme (1978) and the differences between means were tested by Z - test.

RESULTS AND DISCUSSION

The details of milk composition of Mehsana goats for fat, SNF, protein and lactose in percent during different years, seasons and months are presented in table 1.

Table 1. Means \pm SE for milk constituents of Mehsana goat

Variables	Milk Constituents (percent)				
		Fat	SNF	Protein	Lactose
Years	2006	3.06 \pm 0.32 ^a (0275)	10.39 \pm 3.01 (0274)	3.03 \pm 0.09 (0275)	6.34 \pm 1.52 (0275)
	2007	2.89 \pm 0.03 ^b (1679)	7.87 \pm 0.01 (1685)	2.81 \pm 0.01 (1686)	4.52 \pm 0.01 (1241)
Seasons	Winter	2.83 \pm 0.04 ^a (630)	9.06 \pm 0.08 ^a (632)	2.73 \pm 0.09 ^a (632)	5.57 \pm 1.11 ^a (374)
	Spring	2.79 \pm 0.02 ^b (470)	7.90 \pm 0.02 ^b (476)	2.76 \pm 0.01 ^a (476)	4.56 \pm 0.01 ^a (476)
	Summer	2.63 \pm 0.03 ^c (495)	7.88 \pm 0.03 ^b (490)	2.85 \pm 0.01 ^b (491)	4.46 \pm 0.02 ^a (483)
	Rainy	3.25 \pm 0.08 ^d (115)	8.06 \pm 0.06 ^b (118)	2.86 \pm 0.03 ^b (118)	4.64 \pm 0.03 ^a (118)
	Autumn	3.53 \pm 0.12 ^d (244)	8.06 \pm 0.05 ^b (244)	3.06 \pm 0.02 ^c (244)	4.60 \pm 0.08 ^a (065)
Months	January	3.05 \pm 0.08 ^a (197)	7.84 \pm 0.03 ^a (199)	2.74 \pm 0.01 ^a (199)	4.51 \pm 0.01 ^a (199)
	February	2.75 \pm 0.06 ^b (232)	7.96 \pm 0.03 ^a (238)	2.78 \pm 0.01 ^a (238)	4.59 \pm 0.02 ^a (238)
	March	2.84 \pm 0.04 ^b (238)	7.84 \pm 0.02 ^a (238)	2.74 \pm 0.01 ^a (238)	4.52 \pm 0.01 ^a (238)
	April	2.83 \pm 0.07 ^b (168)	7.77 \pm 0.08 ^b (167)	2.71 \pm 0.02 ^a (167)	4.48 \pm 0.05 ^a (168)
	May	2.49 \pm 0.07 ^c (180)	7.89 \pm 0.03 ^a (176)	2.87 \pm 0.01 ^b (177)	4.45 \pm 0.01 ^a (168)
	June	2.27 \pm 0.08 ^c (147)	7.98 \pm 0.04 ^a (147)	2.98 \pm 0.02 ^c (147)	4.47 \pm 0.02 ^a (147)
	July	3.16 \pm 0.10 ^a (096)	7.97 \pm 0.078 (099)	2.81 \pm 0.03 ^a (099)	4.61 \pm 0.03 ^a (099)
	August	3.49 \pm 0.22 (019)	8.19 \pm 0.15 ^c (019)	2.87 \pm 0.06 ^b (019)	4.71 \pm 0.088 (019)
	October	5.38 \pm 0.43 ^e (057)	8.84 \pm 0.18 ^d (179)	3.45 \pm 0.06 ^d (179)	--
	November	2.87 \pm 0.13 ^b (187)	7.67 \pm 0.04 ^b (187)	3.01 \pm 0.01 ^e (187)	4.60 \pm 0.08 ^a (065)
	December	2.83 \pm 0.07 ^b (433)	7.69 \pm 0.02 ^b (433)	3.03 \pm 0.01 ^e (433)	6.76 \pm 2.38 ^c (175)
	Overall		2.91 \pm 0.02 (1954)	8.29 \pm 0.01 (1960)	2.82 \pm 0.05 (1961)

Note: Figures in parenthesis indicate number of milk samples analyzed; Means carrying similar superscripts did not differ significantly from each other.

Fat Percent: The overall fat percent in Mehsana goat was observed to be 2.91 \pm 0.02 %, which is lower than the reports of Rohilla and Pate! (2003) in Marwari goats and Singh, *et al.* (2006) for Mehsana goat (3.27 %) in farmers flocks. Between the years, fat content was observed to be significantly higher in 2006 (3.05 \pm 0.32 %) as compared to 2007 (2.89 \pm 0.03%). The significant variation in fat content between years might be due to the change in management and feeding practices at farm, because Mehsana goats were purchased in the year 2006 from the breeding tract where goat keepers maintained under traditional extensive production system. The mean fat percent was significantly higher in autumn season (3.53 \pm 0.12 %) followed by rainy (3.25 \pm 0.08 %), winter (2.83 \pm 0.04 %), spring (2.79 \pm 0.02 %) and summer (2.63 \pm 0.03 %) seasons. These findings indicated high fat content in

goat milk during initial stage of lactation (autumn season) and lower fat percent in last stage of lactation (Summer season). Mittal (1984) reported almost similar findings in Marwari goat during summer season.

Solid not fat (SNF): The overall SNF content averaged 8.29 \pm 0.01 percent in Mehsana goat and non-significant differences were observed between the years. Among different seasons significantly high SNF content were observed in winter season (9.06 \pm 0.08%) as compared to spring (7.90 \pm 0.02%), summer (7.88 \pm 0.03 %), rainy and autumn (8.06 \pm 0.06 percent) seasons (Table 1). Present findings for SNF content fairly agreed with the report of Singh *et al.* (2006) who observed an overall SNF content of 8.64 \pm 0.03 percent in Mehsana goat. Rohilla and Patel (2003) reported SNF content ranging from 8.90 to 10.33 percent in Marwari goats. Mittal (1984) reported

a constant trend in SNF percent during different seasons and stages of lactation. However, the present findings indicated higher SNF content in winter, which steadily decreased in spring and summer seasons (last stage of lactation).

The average monthly SNF content was significantly higher in October (8.84 ± 0.18 %) and August (8.19 ± 0.15 %). Comparatively lower estimates with almost similar SNF content were observed from November (7.67 ± 0.04 %) to June (7.97 ± 0.07 %).

Protein: Table 1 reveals the overall average protein content as 2.82 ± 0.05 percent in Mehsana goat, which is comparatively lower than the Marwari goats (3.45 ± 0.21 %) (Mittal, 1984). The protein content in present study varied from 2.73 ± 0.09 percent (winter) to 3.06 ± 0.02 percent (autumn) in different seasons of the year. Comparatively high protein content (2.80 to 7.96 percent) was reported by Mittal (1984) in Marwari goats. Z-test statistics revealed significant differences for protein contents between winter, rainy and autumn seasons.

The monthly protein content was high during October to December, whereas significantly lower means were observed during the months of January to August (Table 1). However, Mittal (1984) reported a higher, but almost constant protein content during different stages of lactation in Marwari goat (ranged 3.32 ± 0.09 to 3.42 ± 0.87 percent).

Lactose: The overall means \pm SE for lactose content was 4.78 ± 1.53 percent. Mittal (1984) and Rohilla and Patel (2003) reported almost similar lactose content in Marwari goats. The year wise lactose contents were observed higher in 2006 (6.34 ± 1.52 %) as compared to 2007 (4.52 ± 0.01 %) however the differences were non-significant. Z- test analysis revealed non-significant differences in lactose content between different seasons

but observed higher lactose content in winter season (5.57 ± 1.11 %) as compared to spring (4.56 ± 0.01 %), summer (4.46 ± 0.02 %), rainy (4.64 ± 0.03 %) and autumn (4.60 ± 0.08 %) seasons. The monthly average lactose percent in Mehsana goat milk was high in December (4.78 ± 2.38 %), but lower estimates were observed during January to November months (i.e. 4.45 ± 0.01 % to 4.71 ± 0.08 %). Findings of the present study fairly agreed with the results of Mittal (1984) who reported almost similar trend and magnitude in lactose content during different stages of lactation in Marwari goat (4.29 ± 0.09 to 4.37 ± 0.07 percent).

The present study, thus, revealed higher milk constituents in Mehsana goat during autumn season (initial stage of lactation), than that of summer season (last stage of lactation).

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