

# Study on milk yield and composition in Mehsana goat

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## ABSTRACT

Present study was carried out on 417 monthly milk records to evaluate milk production performance and colostrums and milk composition in Mehsana goat maintained at Sheep and Goat Research Station of Sardarkrushinagar Agricultural University, Gujarat, during the year 2007-08. The total lactation milk yield in Mehsana goat was  $76.35 \pm 1.67$  kg. The highest monthly milk yield was observed in the month of August ( $16.69 \pm 1.74$  kg) and lowest in December ( $8.16 \pm 1.14$  kg). The overall means  $\pm$  SE for fat, SNF and protein in colostrum were  $5.74 \pm 0.41$ ,  $12.72 \pm 0.59$  and  $5.09 \pm 0.41$  percent, respectively. The corresponding estimates in milk were  $3.23 \pm 0.07$ ,  $8.07 \pm 0.04$  and  $3.15 \pm 0.02$  percent, respectively. High SNF percent in milk was found during early and late stages of lactation, while high fat content was observed during summer months.

**Key words:** Mehsana goat, milk yield, fat, SNF, Protein.

## INTRODUCTION

Goats provide nutritional and economic sustenance to the weaker sections and landless labourers in the country. Goats mainly contribute nutritional products such as milk and meat for the most vulnerable section of the society. Goat milk has medicinal value, especially in digestive disorders, coronary diseases, respiratory problems, immune modulation and antioxidant properties (Greenberger and Skillman, 1969). The small size of fat globules and higher contents of short and medium chain fatty acids (Jannes, 1980 and Chandan et. al. 1992) increase intestinal absorption. This has created interest among scientists to use goat milk as food for infant babies or as an alternative to cow milk. Keeping in view the significance of goat in rural economy and value of goat milk, S. D. Agricultural University initiated two projects: "Utilization of goat milk for the preparation of value added indigenous milk products" and 'Improvement of Mehsana Goat in Gujarat' in 2006. In the present study milk production performance and milk composition of Mehsana goats maintained at Sheep and Goat Research Station, SDAU, Sardarkrushinaga, Gujarat has been evaluated.

## MATERIALS AND METHODS

Data on 417 records of monthly milk yield and 496 samples of colostrums/milk of Mehsana goats maintained at sheep and goat research station, SDAU, Sardarkrushinagar, Gujarat was analyzed to study milk performance and composition during various stages of lactation. The data pertained to 62 goats. The goats were maintained under semi-intensive production system and led daily to pasture from 8.00 to 16.00 hours and provided additional concentrate supplement @ 300 gm / doe / day. The data on daily milk yield was recorded during morning and evening. Colostrum samples were collected within 24 hours after kidding and milk samples at monthly interval after parturition for evaluation of composition. Milk fat, solids not fat (SNF) and

protein contents were estimated using automatic eko-milk analyzer. The data on milk yield was clustered according to the months and seasons, whereas, milk constituents data was grouped according to the months of lactation. Data on monthly milk yield and milk constituents were analyzed according to Snedecor and Cochran (1994).

## RESULTS AND DISCUSSION

The mean  $\pm$  SE of monthly milk production during different stages of lactation and season are provided in Table 1 and on colostrum and milk constituents in Table 2.

*Milk yield:* The total lactation milk yield evaluated in 265 Mehsana goats was  $76.35 \pm 1.67$  Kg. Present finding of total lactation milk yield is in agreement with those reported by Mishra et al. (1983) in Sirohi goats and Sindhe et al. (2004) in Marwari goats. However, Arun et al. (2004) reported higher estimate for total lactation milk yield in Kutchi goats ( $112.56 \pm 5.65$  Kg.). The monthly milk yield was higher during summer months (March to June) and lower in winter (December) (Table 1). Season-wise highest milk production was reported in summer as compared to winter, autumn and rainy seasons. The present finding on monthly milk production in Mehsana goat clearly indicates significant reduction in milk production during winter season which might be due to variations in climatic conditions. The findings of this study on milk production in Mehsana goat agree with that reported by Singh et al. (2006). In the present study milk yield was not recorded during kidding to 3 months, as the kids were allowed for suckling ad-libitum up to weaning.

Table 1: Means  $\pm$  SE for monthly milk yield (kg.) in Mehsana goat.

| Sr. No. | Months   | No. of Animals | Mean $\pm$ SE    |
|---------|----------|----------------|------------------|
| 1       | January  | 43             | $14.32 \pm 0.59$ |
| 2       | February | 52             | $13.69 \pm 0.58$ |

|    |           |     |              |
|----|-----------|-----|--------------|
| 3  | March     | 60  | 16.39 ± 0.69 |
| 4  | April     | 55  | 15.32 ± 0.53 |
| 5  | May       | 53  | 16.48 ± 0.61 |
| 6  | June      | 66  | 15.92 ± 0.50 |
| 7  | July      | 40  | 13.97 ± 0.80 |
| 8  | August    | 14  | 16.69 ± 1.74 |
| 9  | September | 10  | 13.91 ± 1.17 |
| 10 | October   | 10  | 15.51 ± 1.20 |
| 11 | November  | 09  | 13.32 ± 1.40 |
| 12 | December  | 05  | 08.16 ± 1.14 |
| 13 | Winter    | 100 | 13.69 ± 0.40 |
| 14 | Summer    | 234 | 16.03 ± 0.29 |
| 15 | Rainy     | 64  | 14.55 ± 0.58 |
| 16 | Autumn    | 19  | 14.47 ± 0.91 |
| 17 | Overall   | 417 | 15.17 ± 0.21 |

*Milk Constituents:* The details on colostrums and milk composition in Mehsana goats for Fat, SNF and protein constituents during different stages of lactation are presented in Table 2.

*Colostrum:* Colostrum is the first milk obtained within 24 hrs of kidding. It contains high amount of immunoglobulin which provide passive immunity against pathogens to new born kids. The composition of colostrums and milk in terms of fat, SNF and protein contents were widely different (Table 2). The Fat, SNF and protein contents in colostrum were 5.74 ± 0.41, 12.72 ± 0.59 and 5.09 ± 0.41 percent which were higher than those estimated in the milk obtained after 24 hrs of kidding.

Table 2: Means ± SE of Mehsana goat milk constituents.

| Colostrums / milk | Months / Stage of lactation | Fat                  | SNF                  | Protein              |
|-------------------|-----------------------------|----------------------|----------------------|----------------------|
| 1. Colostrums     | Within 24 Hrs.              | 5.74 ± 0.41<br>(43)  | 12.72 ± 0.59<br>(44) | 5.09 ± 0.41<br>(44)  |
| 2. Milk           | I. month                    | 5.38 ± 0.43<br>(57)  | 8.84 ± 0.18<br>(57)  | 3.45 ± 0.06<br>(57)  |
| -do -             | II. Month                   | 2.56 ± 0.18<br>(62)  | 7.76 ± 0.04<br>(62)  | 3.02 ± 0.02<br>(62)  |
| -do -             | III. Month                  | 2.82 ± 0.12<br>(62)  | 7.73 ± 0.05<br>(62)  | 3.03 ± 0.02<br>(62)  |
| -do -             | IV. Month                   | 2.51 ± 0.11<br>(56)  | 7.82 ± 0.04<br>(56)  | 3.06 ± 0.02<br>(56)  |
| -do -             | V. Month                    | 3.09 ± 0.11<br>(54)  | 8.14 ± 0.04<br>(54)  | 3.21 ± 0.18<br>(54)  |
| -do -             | VI. Month                   | 2.64 ± 0.13<br>(47)  | 7.74 ± 0.05<br>(47)  | 3.03 ± 0.2<br>(47)   |
| -do -             | VII. Month                  | 3.07 ± 0.09<br>(46)  | 8.87 ± 0.11<br>(46)  | 3.44 ± 0.04<br>(46)  |
| -do -             | VIII. Month                 | 3.51 ± 0.15<br>(38)  | 7.39 ± 0.06<br>(38)  | 2.93 ± 0.02<br>(38)  |
| -do -             | IX. Month                   | 3.29 ± 0.23<br>(19)  | 7.49 ± 0.25<br>(19)  | 2.81 ± 0.11<br>(19)  |
| -do -             | X. month                    | 4.81 ± 0.38<br>(11)  | 9.29 ± 0.20<br>(11)  | 3.70 ± 0.10<br>(11)  |
| Milk              | Overall                     | 3.23 ± 0.07<br>(452) | 8.07 ± 0.04<br>(452) | 3.15 ± 0.02<br>(452) |

*Fat percent:* The overall fat percent in Mehsana goat milk was  $3.23 \pm 0.07$  percent. The fat content obtained in the present study was higher than that reported by Singh et al. (2009) in Mehsana goats maintained at organized farm but similar to estimated in goats maintained at farmer's flock (Singh et al. 2006). Rohilla and Patel (2003) reported higher fat percentage (ranged from 4.10 to  $4.15 \pm 0.207$ ) in Marwari goats. Sindhe et al. (2004) also reported higher percentages of total fat ( $4.41 \pm 0.533$ ) in Marwari goats managed under semi intensive production system. According to the stage of lactation, fat percent was higher in the first month of lactation ( $5.38 \pm 0.41$ ). Singh et al. (2009) also reported that the fat percent was higher during first month of lactation. The fat percent decreased from 2nd to 6th month of lactation but was higher during summer months as compared to other seasons. Mittal (1984), however, reported lower fat percent during summer season.

*SNF percent:* The overall SNF content in milk of Mehsana goats was  $8.07 \pm 0.04$  percent. The present finding is fairly in agreement with the reports of Singh et al. (2006) and Singh et al (2009) as  $8.64 \pm 0.03$  and  $8.29 \pm 0.01$  percent respectively in Mehsana goat maintained at organized farms. Similarly total SNF percent ( $8.61 \pm 0.22$ ) in Marwari goat managed under semi intensive production system was reported by Sindhe et al. (2004). Rohilla and Patel (2003) reported average SNF content ranging from 8.90 to 10.33 percent in Marwari goat which was higher than that obtained in the present study. Stage of lactation influenced the milk SNF content. It was higher in early as well as last stages of lactation compared with middle months. Similar trend has also been reported by Singh et al (2009) in Mehsana goat. Mittal (1984) also observed lower milk SNF content during last stages of lactation in Marwadi goat.

*Protein Percent:* The overall protein percent in Mehsana goat milk was  $3.15 \pm 0.02$ , which was higher than that reported by Singh et al (2009) in Mehsana goat. However, Mittal (1984) found comparatively lower milk protein ( $3.45 \pm 0.21$  percent) in Marwari goat than the present study. Similarly, Sindhe et al. (2004) also reported higher estimate of protein percent in marwari goats ( $3.80 \pm 0.15$  percent) managed under semi intensive production system. The protein percentage was higher during early as well as last stages of lactation as compared to middle stage. Mittal (1984), however, reported higher and almost constant protein content during different stages of lactation in Marwari goats.

The study thus provides the trends of milk production and composition of Marwari goats managed under intensive system. The breed has potential for milk production which can further be improved using intensive selection and improved managerial conditions.

## REFERENCES

- Kumar Arun, Tomar AKS and Mehta BS. 2004. Gestation performance of Kutchi goats under semi arid conditions of Rajasthan. *Indian Journal of Dairy Science* 57: 255–257.
- Chandan RC, Attaie R and Shahani KM 1992. Nutritional aspects of goat milk and its products. In: Proc. V international goat conference, New Delhi (India), 1992, vol. IV (II): 399-420.
- Greenberger NJ and Skillman TG. 1969. Medium chain triglycerides. Physiological considerations and clinical implications. *New England Journal of Medicine* 280: 1045-1058.
- Jannes, R. (1980). Composition and characteristics of goat milk: review 1968-1979. *Journal of Dairy Science* 63: 1605-1630.
- Mishra RK, Gaur, D and Singh D. 1983. Season of breeding in relation to reproductive and productive performance in Sirohi does. *Indian Journal of Animal Science* 53:567–569.
- Mittal JP. 1984. Summer institute of livestock production under arid conditions CAZRI, Jodhpur, Rajasthan.
- Rohilla PP and Patel AK. 2003. Marwari goat breed of Rajasthan. *Indian Journal of Animal Science* 73:705-709.
- Sindhe AK, Singh NP and Verma DL. 2004. Milk yield and composition of Marwari goats maintained under different production systems. *Indian Journal of Animal Science* 74: 333-335.
- Singh KP, Tajane KR, Pandey DP, Bhramhkshtri BP, Satpal D, Singh PK, Singh Gurmej, Ahlawat SPS and Aggarwal RAK. (2006). Goat genetic resources of India - Mehsana. Monograph published by ICAR–NBAGR, Karnal and S.D.A.U., Sardarkrushinagar, Gujarat, pp.60 + I to IX.
- Singh KP, Patel JB, Panchasara HH, Shah RR and Patel SM. 2009. Study on milk composition of Mehsana goat at organised farm. *Journal of Livestock Biodiversity* 1(1:25 -27)
- Snedecor GW and Cochran WG. 1994. Statistical methods, 8th Ed, Iowa State University Press, Ames, Iowa, USA.