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**SK George**

Assistant Professor & Head,  
Base Farm Kolahalamedu,  
Kerala, India

**MK Muhammad Aslam**

Assistant Professor, Base Farm,  
Kolahalamedu, Kerala, India

**MT Dipu**

Assistant Professor, College of  
Veterinary & Animal Sciences,  
Mannuthy, Kerala, India

**K Lahu**

Assistant Professor, College of  
Dairy Science and Technology,  
Trivandrum, Kerala, India

## Evaluation of morning and evening milk of crossbred cows

**SK George, MK Muhammad Aslam, MT Dipu and K Lahu**

### Abstract

A study was conducted to evaluate the variations in morning and evening milk production and composition (fat, solids not fat and total solids) of crossbred cows in an organised instructional dairy farm. The cows are cross breeds having the mixed germplasm of native breeds with exotic breeds such as Holstein Friesian, Jersey and Brown Swiss. The animals of the farm are fed concentrates twice daily and with ad libitum fodder while housed inside the shed. Generally they are left out for grazing in pasture for 7 hrs in a day from 6.30 h to 13.30 h. Forty-five animals contributed to the total milk production of the farm during the study period for one month during which the animals were milked at 5h in the morning and 15h in the evening. The milk production of the herd was higher ( $P<0.05$ ) during the morning ( $170.27\pm 5.5$ ) compared to evening ( $109.67\pm 7.66$ ). The percentage of fat and total solids were higher ( $P<0.05$ ) in the evening milk, however the content of solids not fat were similar ( $P>0.05$ ) in morning and evening milk. The study concludes that the milk yield is higher during morning compared to evening when milking intervals were 14 and 10 hours, respectively and the evening milk is superior to morning milk with regard to the content of fat and total solids.

**Keywords:** Dairy cows, high altitude, milk composition, milk yield

### Introduction

Milk is defined as the lacteal secretion, practically free from colostrums, obtained by the complete milking of one or more healthy cows, five days after and fifteen days before parturition, which contains not less than 8.5 percent solids-not-fat and not less than 3.5 percent milk fat (US Public Health Service, 1995) <sup>[1]</sup>. Food safety and standards regulations of India (2011) <sup>[2]</sup> defines milk as “the normal mammary secretion derived from complete milking of healthy milch animal, without either addition thereto or extraction therefrom, unless otherwise provided in these regulations and it shall be free from colostrum”. Milk composition is affected by lot many factors such as species, breed, stage of lactation, parity, season, feed, management practices etc <sup>[3]</sup>. Fresh milk collected from disease free animals are having a lower bacterial count however, there are chances of deterioration of milk immediately after milking due to entry of bacteria from various sources. Good quality raw milk should be free from sediments and abnormal colour, flavour and odour. Moreover, it should be of low bacterial count, free of chemicals such as antibiotics and detergents and should have normal composition and pH. Consumer acceptance of milk is dependent on organoleptic parameters such as colour/flavour and milk pricing is mostly based on composition (fat percentage and solids not fat percentage) <sup>[4]</sup>. Studies concerned with the comparison of morning and evening milk of crossbred cows with regard to yield and milk composition is very less. Considering these factors, a study was undertaken to evaluate the variations in morning and evening milk of cross bred cows in an organised dairy farm.

### Materials and Methods

The study was conducted in an instructional dairy farm at Kolahalamedu, Peerumedu Taluk of Idukki District, Kerala State. The farm is situated at an altitude of 1100 m above sea level (latitude of 9.5760° N and longitude of 77.0255° E), with an annual rainfall of 2295 mm. The total herd strength of the farm is around 140. The cows are cross breeds having the mixed germplasm of native breeds with exotic breeds such as Holstein Friesian, Jersey and Brown Swiss. The animals of the farm are usually fed concentrates twice daily as per the package of practices recommendations (2016) of Kerala Veterinary & Animal Sciences University <sup>[5]</sup> and with ad libitum fodder while housed inside the shed.

**Corresponding Author:**

**SK George**

Assistant Professor & Head,  
Base Farm Kolahalamedu,  
Kerala, India

Generally they are left out for grazing in pasture found in hilly meadows and valleys for 7 hrs in a day from 6.30 h to 13.30 h. The chief grass found in the hilly meadows and valleys includes congo signal and setaria respectively. Forty-five animals contributed to the total milk production of the farm during the study period for one month during which the animals were milked at 5h in the morning and 15h in the evening. The data regarding morning and evening milk production was recorded daily. Percentage of milk fat of morning and evening milk was determined daily according to Gerber Fat Test method and the percentage of solids-not-fat (SNF) was calculated by Richmonds formula <sup>[6]</sup>. The total

solid (TS) content was estimated by adding SNF and fat percentages. The data obtained for various parameters in the morning and evening milk were compared by independent sample 't' test in SPSS system for windows.

### Results and Discussion

The variations in the yeild and composition of morning and evening milk is given in Table 1. The milk production of the herd was higher ( $P<0.05$ ) during the morning compared to evening. The percentage of fat and total solids were higher ( $P<0.05$ ) in the evening milk, however the content of SNF were similar ( $P>0.05$ ) in morning and evening milk.

**Table 1:** The variations in the yeild and composition of morning and evening milk

Parameters	Morning milk (mean±SD)	Evening milk (mean±SD)	Level of significance
Milk production (Litre)	170.27±5.51	109.67±7.66	*
Fat (%)	3.65±0.14	4.34±0.06	*
SNF (%)	8.13±0.13	8.17±0.14	NS
TS (%)	11.78±0.22	12.52±0.18	*

\* Significant at ( $P<0.05$ ) and NS indicates non-significant.

Higher milk yeild during morning milking can be attributed to the longer time interval of 14 hours after the evening milking when compared to 10 hours between the evening and morning milking. Morning milk represented 60.82 percentage of the total milk while the evening milk contributed to 39.18 percentage. In a similar study, it was observed that the percentages of morning and evening yields in the total yield represented 59.60 and 40.40 when milking intervals were 14 and 10 hours, respectively <sup>[7]</sup>. Higher fat content was found in evening milk (4.34%) than morning milk (3.65%) and is agreeable with the findings of Rahman *et al.*, <sup>[8]</sup>. Lower milk production during evening may be a reason for higher fat content. The SNF content of the milk generally follows the same trend of the fat content. However, in this study the values (%) of SNF were similar ( $P>0.05$ ) in the morning and evening milk. These results may be indicative of variations in feed intake patterns, especially when cows are left out for grazing due to changes in weather such as rainfall, humidity and environmental temperature. Total solids in the milk collected during evening was higher compared to that of morning and this change is attributed mainly to the variations in fat content.

### Conclusion

The study concludes that the milk yeild is higher during morning compared to evening when milking intervals were 14 and 10 hours, respectively. The evening milk is superior to morning milk with regard to the content of fat and total solids.

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