International Journal of Food, Agriculture and Veterinary Sciences ISSN: 2277-209X (Online)
An Online International Journal Available at http://www.cibtech.org/jfav.htm
2013 Vol. 3 (1) January-April, pp. 229-233/Sudhakar et al.
Research Article

FACTORS EFFECTING MILK COMPOSITION OF CROSSBRED DAIRY CATTLE IN SOUTHERN INDIA

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ABSTRACT
Milk samples from 101crossbred cattle that were in different parity and stage of lactation were collected from six farms in Tamil Nadu and Kerala across southern India were analysed for investigating the effect of non genetic factors on milk constituents. The fat, SNF, protein and lactose content in Jersey crossbreds were 4.50±0.35, 8.92±0.17, 3.25±0.06 and 4.88±0.089 per cent respectively. The corresponding values for Holstein crossbreds were 3.81±0.34, 9.13±0.16, 3.33±0.06 and 5.06±0.09. All the differences for these traits between the breeds were statistically not significant. The effect of farm was highly significant on all the milk contents and their yields. Order of lactation showed significant effect on SNF and protein yields. Stage of lactation did not influence any of the traits studied.

Key Words: *Crossbred Cattle, Milk Fat, SNF, Protein, Lactose*

INTRODUCTION
Milk pricing system has shifted from mere quantity to its composition also, affecting the farm income directly. Many farmers have complaints regarding low fat and SNF in dairy cow's milk and addressing this issue is need of the hour. Changing attitude of the general public towards milk composition, favoring low-fat high-protein diets cannot be overlooked. Development of breeding programs for changing the composition of milk requires knowledge of the relative influence of genetic and enviromental factors affecting milk constituents. Different factors influence the composition of milk (Johnson *et al.*, 1961; Sharma *et al*., 1983 and Lindmark-Mansson *et al*., 2000) Augmenting lactation milk yield has been emphasized for increasing the productivity of dairy animals however, milk constituents such as fat, protein, SNF, lactose and lactose percentages have so far received little attention. The information of milk composition and genetic and non-genetic factors influencing milk constituents in Indian dairy animals is scanty. The present study was undertaken to assess the effect of non-genetic factors on major constituents of milk of crossbred dairy cattle.

MATERIALS AND METHODS
Milk samples from 101crossbred cattle that were in different parity and stage of lactation were collected from six farms in Tamil Nadu and Kerala across southern India. The milk samples were collected in aseptic conditions randomly without any known bias. The milk samples were analysed for fat, SNF, protein and lactose content by Lactoscan SL 30, MB Ver.60. Fat, SNF, protein and lactose yields were calculated upon their respective lactation milk yield. The stage of lactation is recorded and was grouped into early, mid and late lactations.

Table 1: Least-squares mean (± S.E) of milk constituents for various effects crossbred cattle

Source	n	Fat %	Fat yield	SNF %	SNF yield	Protein %	Protein yield	Lactose %	Lactose Yield
Breed									
Jersey crossbred	55	4.50±0.35	94.93±9.77	8.92±0.17	181.52±9.43	3.25±0.06	66.06±3.46	4.88±0.089	99.31±5.16
HF crossbred	46	3.81±0.34	86.07±9.37	9.13±0.16	208.55±9.04	3.33±0.06	75.92±3.32	5.06±0.09	115.62±4.95
Farm		**							
1	13	1.69±0.56	21.652±1.56	8.15±0.26	139.46±15.09	2.98±0.09	51.06±5.54	4.51±0.14	77.50±8.26
2	26	5.08±0.39	146.85±10.95	9.21±0.18	266.64±10.57	3.37±0.06	97.59±3.88	5.06±0.10	146.58±5.78
3	22	4.24±0.41	105.14±11.55	9.48±0.19	235.03±11.15	3.46±0.07	85.97±4.09	5.31±0.10	131.75±6.10
4	14	4.65±0.58	64.81±16.38	9.92±0.28	141.54±15.81	3.62±0.10	51.72±5.81	5.45±0.14	77.93±8.65
5	17	4.23±0.55	73.93±15.52	9.06±0.26	171.48±14.98	3.30±0.09	62.58±5.50	5.03±0.14	95.74±8.20
6	9	5.01±0.67	130.64±18.84	8.31±0.32	216.04±18.18	2.95±0.11	77.03±6.68	4.42±0.17	115.30±9.95
Parity									
1	11	3.54±0.60	64.80±16.61	8.89±0.28	171.82±16.03	3.22±0.10	62.18±5.89	5.01±0.15	97.92±8.77
2	25	4.53±0.39	97.85±10.90	9.04±0.19	188.99±10.52	3.31±0.07	69.17±3.86	4.95±0.10	103.36±5.76
3	27	3.95±0.39	94.86±10.85	9.13±0.19	219.75±10.47	3.32±0.07	79.88±3.85	4.98±0.10	119.80±5.73
4 and above	38	4.59±0.33	104.49±9.20	9.05±0.16	199.58±8.88	3.30±0.06	72.74±3.26	4.93±0.08	108.78±4.86
Stage of lactation									
Early (5 to 90 days)	29	3.61±0.39	78.52±10.80	9.07±0.18	201.19±10.42	3.31±0.07	73.37±3.83	4.99±0.10	110.69±5.70
Mid (91 to 180 days)	35	4.55±0.36	10.424±9.90	8.99±0.17	200.38±9.56	3.28±0.06	73.02±3.51	4.99±0.09	111.32±5.23
Late (above 181 days)	37	4.30±0.32	88.74±9.00	9.02±0.15	183.54±8.68	3.27±0.06	66.58±3.19	4.93±0.08	100.38±4.75

Means with at least one common superscript within classes do not differ significantly (P> 0.05), ** Significant (P< 0.01)

Parity on the test day (i.e. order of lactation) was also considered as one of the factors influencing milk composition. The data on milk constituents is subjected to multivariate analysis of GLM procedures by SPSS 17.

RESULTS AND DISCUSSION

The least-squares mean for test day milk constituents of crossbred cattle are given in Table1. The fat content (4.50 ± 0.35 %) was observed to be more in Jersey crossbreds. Holstein Friesian crossbred showed high milk SNF, protein and lactose. All the differences for these traits between the breeds were statistically not significant (P>0.05). The respective yields were observed to be following a similar trend. However, the yields of SNF and lactose differed significantly (P<0.05) among the breeds. The present finding of non significant differences for SNF between the breeds is in agreement Suman (2009a). Whereas, Bhoite and Padekar (2002) and Hossen *et al.,* (2012) reported significant higher fat and SNF content in Jersey crossbreds compared to the Friesian crossbred. The milk protein and lactose content of Friesian crossbreds in the present investigation were less than those reported by Srakar *et al.,* (2006). Singh *et al.,* (2003) reported higher fat yield in crosses involving Holstein Friesian.

The effect of farm was highly significant (P<0.05) on all the milk contents and their yields which could be due to the difference in the geographical location of the farms and or the husbandry practices followed. In the present study fat per cent, fat yield, SNF per cent, SNF yield, protein per cent, protein yield, lactose per cent and lactose yield ranging between 1.69±0.56 to 5.08±0.39, 21.652±1.56 to 146±10.95, 8.15±0.26 to 9.92±0.28, 139.46±15.09 to 266.64±10.57, 2.95±0.11 to 3.62±0.10, 51.06±5.54 to 97.59±3.88, 4.42±0.17 to 5.45±0.14, 77.50±8.26 to 146.58±5.78 respectively. Farms following intensive management and those located on high altitudes showed higher values for all the traits under study. A similar observation of farm effect was reported by Radhika *et al.,* (2012).

The differences observed for the milk contents, fat and lactose yield between different lactations were not significant (P>0.05). However, the SNF and protein yields differed (P<0.05) significantly which could be due the correlation of the traits with the fat content. Radhika *et al.,* (2012) and Sarkar *et al.,* (2006) reported a similar non significant effect of parity. Contrarily to the present findings Suman (2009a) and Suman (2009b) observed significant effect of parity on SNF and protein content respectively.

No influence of stage of lactation was observed on any of the milk constituent traits and their yields. Bhoite and Padekar (2002) reported a non significant effect of stage of lactation for fat in Holstein crosses but a significant effect in crosses involving Jersey. A reversal of this was reported by same authors for the effects on SNF. Whereas, Srakar *et al.,* (2006) reported that lactation stage had no influence on fat content but a significant effect on protein, SNF and lactose content. A Signifcant effect of this factor has also been reported by Suman (2009a) and Suman (200b).

ACKNOWLEGEMENT

The authors are thankful to the Tamil Nadu University of Veterinary and Animal Science, Chennai, Tamil Nadu Agricultural University, Coimbatore, Vishwas Dairy Farms, Madhurai and Kerala Veterinary and Animal Sciences University, Pookode.

REFERENCES

Bhoite UY and Padekar RN (2002). Factors affecting milk yield and composition. *Indian Journal of Animal Research* **36** 67-69.

Hossen MS, Hossain SS, Bhuiyan AKFH, Hoque MA and Talukder MAS (2012). Comparison of some important dairy traits of crossbred cows at Baghabarighat milk shed area of Bangladesh. *Bangladesh Journal of Animal Science* **41** 13-18.

Jadhav BS and Patange DD (2009). Effect of lactation order and stage of lactation on fat, its and SNF content of milk of phule triveni cow. *Indian Journal of Animal Research* **43** 203-205.

Johnson KR, Fourt DL, Hibbs RA and Ross RH (1961). Effect of some environmental factors on the milk fat and solids-not-fat content of cow's milk. *Journal of Dairy Science* **44** 658.

Lindmark-Mansson H, Svensson U, Paulsson M, Alden G, Frank B and Johnsson G (2000). Influence of milk components, somatic cells and supplemental zinc on milk processability. *International Dairy Journal* **10** 423-433.

Radhika G, Ajithkumar S, Rani A, Sathian CT, Anilkumar K, Usha AP and Dinesh CN (2012). Milk yield and composition of crossbred cows in the hilly Wayanad district of Kerala, India. *Indian Journal of Animal Sciences* **82** 1251-1254.

Sarkar U, Gupta AK, Sarkar V, Mohanty TK, Raina VS and Prasad S (2006). Factors affecting test day milk yield and milk composition in dairy animals. *Journal of Dairying, Foods and Home Science* **25** 129-132.

Sharma KNS, Jain DK, Bhatnagar DS and Sharma RC (1983). Estimation of milk fat, solids-not-fat and total solids production in Zebu and their Brown Swiss crosses. *Animal Science* **36** 383-387.

Singh D, Yadav AS and Dhaka SS (2003). Genetic and Phenotypic Evaluation of Milk and Fat Production Traits and Their Interrelationship in (Zebu×European) Crossbred Cattle Using Parent Group Mixed Model. *Asian Australian Journal of Animal Science* **16** 1242-1246.

Suman CL (2009a). Lactation trend of milk solid-not-fat in two-breed crosses of cattle at an organized farm. *Indian Journal of Animal Research* **43** 12-16.

Suman CL (2009b). Algebric functions describing lactation trend of milk Protein in two-breed crosses of cattle. *Indian Journal of Animal Research* **43** 62-66.