EVALUATION OF HOLSTEIN CROSSBRED BULLS ON THE BASIS OF MILK FAT CONTENT OF DAUGHTERS*

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Spectacular changes have occurred in the milk production sector of Kerala state, during the last few decades due to crossbreeding of native cows with exotic bulls. Crossbred bulls and cows should be evaluated for their genetic worth and selective breeding done for getting genetic improvement. Quantity of fluid milk has been the main character receiving attention in the breeding programmes. But, composition of milk demands equal importance. Though a couple of decades have passed, since half of the cattle population of Kerala have been transformed to crossbreds, studies on milk composition of crossbred cattle are seriously lacking. In the present study an attempt was made to evaluate the sires under village and farm conditions on the basis of milk fat percentage of progenies.

Materials and Methods

The work was conducted as a part of the Indian Council of Agricultural Research (ICAR) Field Progeny Testing Project which envisaged the progeny testing of crossbred bulls. Milk samples (1284 Nos.) belonging to 222 animals (103 progenies of Holstein crossbred bulls and 119 crossbred contemporaries) calved during the period 1995-96, formed the material for study.

The first lactation daughters belonged to farmers in the area of six Artificial Insemination (AI) centres around Thrissur and three University Livestock Farms. Milk samples were collected during early, middle and late lactation both in morning and evening. Milk fat percentage was estimated by Electronic Milk Tester with frequent standardization by Gerber's method.

The statistical analysis was done as per standard procedures. The data were obtained from animals calved during 1995-96 and this was considered as a single period. The lactation period was divided into three stages – early, middle and late, each of 100, 100 and 105 days duration respectively. Season of calving and recordings were defined by grouping the months as (1) summer (March-June), (2) rainy (July-October) and (3) winter (November-February). Locations were classified into nine - six AI centres and three University farms. Least squares technique was employed to find out the effects of sires, centres and seasons. The standard programme, LSML Harvey (1986) was used for computation. Paternal half sib method was used to estimate the heritability of milk fat percentage. Sires were evaluated on the basis of milk fat percentage of the progenies using Simple Daughters Average(DA), Contemporary comparison(CC) and Least Squares Mean(LSM). The minimum number of progeny per sire was six. Contemporary cows were selected as those which calved during the same season, in the same centre.

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Results and Discussion

The overall mean fat percentage for morning and evening milk was estimated as 3.461 ± 0.038 and 4.239 ± 0.056 for early lactation, 3.650 ± 0.035 and 4.460 ± 0.052 for middle lactation and 3.967 ± 0.042 and 4.932 ± 0.059 for late lactation. The heritability estimate for fat percentage was 0.326 ± 0.234 for early lactation morning milk. Ranking of sires on the basis of milk fat percentage is given in Table (1). The fat percentage for morning milk in early lactation ranged from 2.90 to 3.90 in different methods. Sire No.7, Gorakh was ranked first by all the three methods and Sire No.5 Dilbaugh was ranked last by all three methods. Also there were slight differences in the ranking of other sires by these methods. The rank correlation between indices 1 & 2, 1 & 3 and 2 & 3 were 0.879, 0.794 and 0.867, respectively. Kennedy and Moxley (1997) evaluated sires for fat per cent by four methods – daughters average, contemporary comparison, sire comparison

Table 1. Evaluation of sires on the basis of milk fat percentage by daughter's average, contemporary comparison and least squares means

Sire Code No.	Name	No. of daughters	DA	CC	LSM
1.	Admiral	11	3.554^{IV} ± 0.134	3.4^{V}	3.39^{VII} ±0.168
2.	Dany	17	3.512^{VI} ±0.102	3.6^{II}	3.55^{III} ±0.139
3.	Dara	6	3.316^{VIII} ± 0.127	3.3^{VIII}	3.18^{IX} ± 0.232
4.	Dayal	10	3.6^{III} ± 0.269	3.4^{IV}	3.63^{II} ± 0.201
5.	Dilbaugh	9	2.9^{X} ± 0.115	3.0^{X}	2.92^{X} ± 0.199
6.	Gopal	11	3.545^{V} ± 0.123	3.4^{VI}	3.47^{V} ± 0.189
7.	Gorakh	8	3.775^{I} ± 0.107	3.7^{I}	3.44^{I} ± 0.203
8.	Hemanth	7	3.242^{IX} ± 0.124	3.3^{IX}	3.44^{VI} ± 0.253
9.	Horror	16	3.468^{VII} ± 0.127	3.4^{VII}	3.31^{VIII} ± 0.149
10.	Ideal	8	3.725^{II} ± 0.193	3.5^{III}	3.50^{IV} ± 0.196

Superscripts indicate the ranks

Table 2. Least square analysis of variance for fat percentage of milk

Source	D.F.	Mean squares F	Prob.
Total	199	-	--
Total reduction	22	0.739225	2.9140.0000
Mu-Ym	1	000006	0.0000.9961
Sire	10	0.410968	1.620.1042
Centre	8	1.005684	5.1460.0000
Season	2	0.095970	0.3780.6856
Remainder	177	0.253715	--

Mean = 3.432, *Error standard deviation = 0.5037*

CV = 14.68 *R squared = 0.266, R = 0.516*

Table 3. Percentage of cows with FAT percentage below PFA standards in field and farm

	Early lactation		Middle lactation		Late lactation	
	No.	Percentage	No.	Percentage	No.	Percentage
Field						
Morning	98 (147)	66.67	59 (147)	40.14	30 (142)	21.13
Evening	32 (147)	21.77	15 (147)	10.20	4 (142)	2.81
Farm						
Morning	21 (74)	28.38	9 (74)	12.16	4 (58)	6.89
Evening	2 (74)	2.70	0 (74)	0	0 (58)	0

Number in parenthesis denotes the number of observations

(BLUP) and indirectly from BLUP evaluation for fat and milk yield. The last three methods gave similar results. According to Godara *et al.* (1988) ranking of sires on the basis of milk fat percentage were very similar by different methods and Khalil *et al.* (1995) while comparing four methods of sire evaluation staged that there were difference between sires in fat yield.

Least squares analysis revealed that the effect of sire on milk fat percentage was non-significant Table (2). Reason for this could probably be the limited number of daughters. But centre had a very significant effect on fat content of milk.

As the daily milk yield decreased constantly from early to late lactation, there was a simultaneous increase in fat percentage. These findings concur with the results of Singh *et al.* (1961), Ghosh and Anantakrishnan (1964),Prasad and Subramanyan (1986), Iype *et al.* (1994) and Venkatachalapathy and Iype (1998). The evening milk fat percentage is uniformly higher during all stages of lactation than morning milk fat percentage. This was also in agreement with the reports made by Prasad and Subramanyan (1986), Iype *et al.* (1994) and Venkatachalapathy and Iype (1998).The higher milk fat in evening milk may be due to the difference between milking intervals. The larger the interval, the greater the quantity of milk and lower the fat tests.

Season-wise averages showed no definite trend. Least squares analysis revealed that season had no significant effect on fat percentage of milk.

An attempt was made to sort out the percentage of cows with fat content below the PFA standards of 3.5 under field and farm conditions. Results are given in Table (3). The percentage was remarkably high in early lactation morning milk (66.67%) and middle lactation morning milk (40.14%) of field samples. But even with adequate roughage and weaning practice in organized farms, 28.38% of cows in early lactation had their morning milk fat below 3.5%. The relatively more number of cows with low fat percentage in the field, may be due to inadequacy of roughage and the absence of weaning practice under field conditions. The results from organized farms indicate the genetic status of the crossbred cows with regard to milk fat percentage. Though the sire differences were not statistically significant it showed wide ranges in all the three indices.

Summary

Ten Holstein-Friesian crossbred bulls, ranging in exotic inheritance from 50-75% were evaluated for milk fat content using Simple Daughters Average, Contemporary Compa rison and Least Squares Means. The data on milk fat content of 103 progenies in their first lactation and 119 contemporary cows, under rural conditions and organized farms of Kerala, calved during 1995-96, formed the material for study. The sire-wise

average fat content ranged from 2.90 to 3.90 for early lactation morning milk. Least squares analysis revealed that locations had highly significant effect on fat content of milk, while the effect of season and sire on fat percentage were insignificant. Milk fat percentage showed an increasing trend with the progress of lactation and was higher for evening milk. Two-third of cows in the early stage of lactation, recorded morning milk fat percentage, below the legal standards of 3.5, under field condition. But, even under organized farms with optimum managemental conditions, 28.38% of cows in early lactation had their morning milk fat below 3.5%. This emphasizes and need for selection of bulls on the basis of milk fat percentage also, for genetic improvement of cattle of the state.

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