EFFECTS OF MONTH AND YEAR OF CALVING ON 305-DAY MILK YIELD IN HOLSTEIN-FRIESIAN CATTLE IN NWFP, PAKISTAN

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ABSTRACT

Data on production performance of 90 imported Dutch Holstein-Friesian cattle and their 127 Pakistani-born progeny from 1982 to 1991 were analyzed. The mean first lactation 305-day milk yield for imported and Pakistani-born cows was 3196.7 ± 66.36 and 2418.3 ± 104.65 litres, respectively (P<0.05). The overall 305-milk yield for the two groups was 3356.53 ± 244.25 and 2493.51 ± 106.89 litres, respectively. The effect of year of calving was non-significant on first lactation (305-day) milk yield, while it was significant (P<0.05) for 305-day overall average milk yield. For all lactations the cows calved in 1988 gave maximum (3370.0 ± 306.9 litres) average 305-day milk yield and 1984-calvers gave the minimum (2713.0 ± 67.35 litres) overall lactation milk yield. Month of calving had significant effect on first lactation 305-day milk yield and overall 305-day milk yield. Maximum first lactation milk yield was obtained from cows calved in April (4073.0 ± 181.31 litres) and minimum for cows calved in February (2259.9 ± 126.69 litres) in first lactation. On overall basis, cows calved in October yielded maximum (3397.4 ± 37.17 litres) milk and those calved in June gave the minimum (2472.2 ± 61.35 litres) milk yield.

Key Words: Year and month of calving, 305-day milk yield, Holstein Friesian cows

INTRODUCTION

Besides genetics, numerous non-genetic factors affect the production performance of dairy animals. For a particular breed, wide variation in a certain trait may be due to individuality and differences in environments. Such variations can be controlled, to some extent, by efficient management. Good management can regulate the months of calving, dry period and calving interval (Khan, 1994). The lifetime profitability of a cow is a function of its production per lactation, length of productive life and calving interval. Hence, the present study was undertaken to investigate the effects of month and year of calving on first lactation 305 days milk yield as well as on overall 305 day milk yield, in imported and Pakistani born Holstein Friesian cows maintained at the Harichand Farm, NWFP.

MATERIALS AND METHODS

Purebred Dutch Holstein-Friesian cows and their Pakistani-born daughters kept at the Harichand farm from 1982 through 1991 were categorized into two groups i.e. imported and their Pakistani-born progeny. Records on actual lactation milk yield on 90 imported (340 lactations) and 127 Pakistani born cows (332 lactations) were utilized in the present study.

Actual lactation milk records were taken for all lactations of the imported and farm-born cows and were adjusted for 305 days milk yield, using correction factors for lactation length and age of the animal, as mentioned by Warwick and Leagates (1979).

The milk production data were analyzed, using General Linear Model (GLM) procedure in SAS (SAS, 1988). The standardized milk records were analyzed by fitting least square analysis. Performance of the two groups was assessed and compared.

The effects of group, month of calving and year of calving were modeled as follows:

$$Y_{ijkl} = \mu + G_i + M_j + X_k + e_{ijkl}$$

where

Y_{ijkl} = milk yield
μ = population constant common to all records;
G_i = effects of i^{th} genetic group
M_j = effects of j^{th} month of calving
X_k = effects of k^{th} year of calving;
e_{ijkl} = random error associated with observation Y_{ijkl}

RESULTS AND DISCUSSION

The effects of group on first lactation and overall 305-day milk yield were significant (P<0.01). The mean first lactation 305-day milk yield for imported and Pakistani-born cows was 3196.7 ± 66.36 and 2418.3 ± 104.65 litres, respectively. The overall 305-milk yield for the two groups was 3356.53 ± 244.25 and 2493.51 ± 106.89 litres, respectively.

The mean first lactation and overall lactations 305-day milk yield in different years is presented in Table 1. The effects of year of calving on first lactation 305-day milk yield was non-significant while in case of overall 305-day lactation milk yield, it was significant ($P<0.05$). Cows calving in 1988 gave maximum milk yield (3370.0 ± 306.9 litres), followed by those calved in 1986 (3125.6 ± 318.1 liters) and the lowest overall milk yield was of the cows calved in 1984 (2713.0 ± 67.35 liters).

The differences in overall milk yield in various years might be due to variation in environmental conditions like temperature, humidity, fodder supply, fodder quality, diseases, various stresses and general management practices from year to year.

Month of calving also had significant ($P<0.01$) effects on 305-day first lactation milk yield. The mean first lactation 305-day milk yield for cows calved in different months of the year, is presented in Table 2. The data revealed that for first lactation, the cows calved in April yielded maximum milk i.e. 4073 ± 181.31 liters, followed by those calving in November (3212.3 ± 139.29 litres). The minimum first lactation milk yield (2259.9 liters) was recorded for cows calved in February.

The first lactation 305-day milk yield of cows calved in April was significantly ($P<0.05$) different from the yield obtained from the cows calved in the remaining months except those calved in July and November (Table 2).

In April calvers, maximum milk yield was obtained, probably because enough fodder was available to dams, during pre-partum months of February and March and during the month of calving i.e. April. In February calvers minimum milk yield was obtained, which can be due to scarcity of fodder during winter months leading to small total lactation yield. Arora and Sharma (1984) observed that first lactation milk yield was significantly affected by season of calving in India as observed in the present study.

The mean overall lactations milk yield for Holstein-Friesian cows calved in various months of the year is also presented in Table 2. Cows calving in October, November and July had the highest milk yield of 3397.4 ± 37.17, 3317.0 ± 30.83 and 3295.0 ± 79.29 liters, respectively, while those calved in June had the lowest milk yield (2472.2 ± 61.35 liters). Overall 305-day milk yield of cows calved in June and July was significantly ($P<0.05$) different from each other. However, the average yield per 305-day of cows calved in these months was not different from cows calved in January, February, March, April, May, August, September and December. Cows calved in July, October and November produced similar quantities of milk per 305-day, however, these yields were significantly ($P<0.05$) higher than the yield of cows calved in June. McDowell *et al.* (1976), Das and Balaine (1980), Tahir and Khan (1980), Arora and Sharma (1984), Nobre *et al.* (1985) and Ray *et al.* (1992) reported significant effect of season of calving on mean 305-day milk yield. Ray *et al.* (1992) further reported that the cows calved in January through March had the poor performance. This could be because of scarcity of fodder and unfavorable weather conditions during this period of the year.

The differences in milk yield in different months of the year might be due to variation in environmental conditions from month to month. For example, temperature, humidity, fodder supply, fodder quality, diseases, various stresses and general management practices might be different from month to month and thus might have affected milk yield accordingly.

Table 1. First lactation and overall 305-day milk yield in relation to year of calving in Holstein-Friesian cows at Harichand Farm.

Year	No. of observations	1st lactation 305-day milk yield ± S.E.	No. of observations	Overall 305-day milk yield ± S.E.
1983	63	3314.4_a ± 76.33	88	2724.6_d ± 68.70
1984	42	2752.6_a ± 115.45	72	2713.0_d ± 67.35
1985	-	-	71	2952.0_c ± 118.2
1986	-	-	73	3125.6_b ± 318.1
1987	-	-	-	-
1988	-	-	93	3370.0_a ± 306.9
1989	39	2568.7_a ± 147.76	110	2803.8_{cd} ± 64.03
1990	45	2225.2_a ± 139.21	126	2840.4_{cd} ± 65.25
1991	8	3548.0_a ± 292.99	39	2898.3_c ± 61.68
Mean	197	2807.5 ± 57.08	672	2925.0 ± 16.73

-The data during these years were not available

Means with the different subscripts within a column are statistically different ($P<0.05$).

Table 2. Comparison of mean 305-day first and overall lactation milk yield in relation to month of calving of Holstein-Friesian cows at Harichand Farm.

Month of calving	No. of Observations	First lactation yield (litre)	No. of Observations	Overall lactations yield (litre)
January	30	$2378.2_{b} \pm 173.26$	80	$2964.3_{ab} \pm 64.97$
February	31	$2259.9_{b} \pm 126.69$	72	$2692.1_{ab} \pm 54.55$
March	16	$2415.0_{b} \pm 180.22$	56	$2732.6_{ab} \pm 51.49$
April	15	$4073.0_{a} \pm 181.307$	34	$2860.8_{ab} \pm 79.99$
May	6	$2344.0_{b} \pm 214.752$	9	$2678.3_{ab} \pm 143.17$
June	8	$2449.5_{b} \pm 92.02$	12	$2472.2_{b} \pm 61.35$
July	6	$3237.3_{ab} \pm 211.43$	16	$3295.0_{a} \pm 79.29$
August	9	$2662.7_{b} \pm 192.44$	20	$2621.4_{ab} \pm 86.60$
September	15	$2563.7_{b} \pm 256.58$	59	$2773.7_{ab} \pm 65.23$
October	10	$3039.0_{b} \pm 345.67$	93	$3397.4_{a} \pm 37.17$
November	27	$3212.3_{ab} \pm 139.29$	122	$3317.0_{a} \pm 30.83$
December	24	$3055.5_{b} \pm 166.38$	99	$3165.6_{ab} \pm 40.33$
Mean	197	2807.51 ± 57.08	672	2925.02 ± 16.73

Means with the different subscripts within a column are statistically different (P<0.05).

The performance difference between Pakistani-born and imported Holstein Friesian cows indicates the presence of genotype × environment interaction which allows to monitor better performers in different sets of environments i.e. better performers under Pakistani conditions should be selected for future breeding.

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