PRODUCTION PERFORMANCE AND MILK PRODUCING EFFICIENCY IN DIFFERENT FILIAL GROUPS OF H. FRIESIAN × SAHIWAL HALFBREDS

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Summary

Six heifers each of F_1, F_2, F_3, F_4 H. Friesian × Sahiwal halfbreds and pure Sahiwal with overall average initial age and live weight of 315.6 ± 134.8 days and 143.8 ± 48.5 kg, respectively were used for this study. The under trial animals were fed according to N.R.C. (1978). The overall average age at maturity, first conception and first calving was 563.8 ± 116.8, 675.8 ± 135.6 and 956.8 ± 149.8 days with live weights as 302.2 ± 58.6, 342.6 ± 41.5 and 433.9 ± 38.1 kg, respectively. The overall 305 days and total milk yield for 1st lactation was 2,729.0 ± 669.3 and 2,992.7 ± 377.5 litre while the FCM (at 4%) was 2,934.2 ± 410.8 litre. The lactation length was 336.6 ± 69.6 days. The fat and solids not fat contents were 4.5 ± 0.2 and 8.2 ± 0.3 per cent, respectively. The milk production in Sahiwal cows was significantly lower than crossbred cows. The services per conception were 2.5 ± 1.3. The overall per head per day consumption of DM, TCP and ME was 10.9 + 1.2 kg, 1,399 ± 199 gm and 22.6 + 2.4 M.Cal., respectively. The overall milk producing efficiency for the production of one litre of FCM was 1.12 ± 0.15 kg of DM, 142.2 + 17.76 gm of TCP and 2.31 + 0.27 M.Cal. of energy while the feeding cost was Rs. 1.46 ± 0.22 per litre of FCM produced. The feeding cost per litre FCM was significantly higher in Sahiwal and F_4 than in other genetic groups.
(**Key Words**: Crossbred Dairy Cattle, Different Filial Groups, Production and Reproduction Performance)

Introduction

The cattle crossbreeding program was initiated in Punjab Province in 1973 and the population of crossbred cattle is increasing very rapidly. This study was conducted to compare the production performance and milk producing efficiency of different filial groups of halfbred H. Friesian × Sahiwal and pure Sahiwal cows.

Materials and Methods

Four genetic groups of Holstein Friesian × Sahiwal (HS) halfbred heifers (F_1, F_2, F_3 and F_4) alongwith a group of Sahiwal as control group comprising of six heifers in each group were randomly selected for this study. The average initial age and live weight in the various groups was 315.6 ± 134.8 days and 143.8 ± 48.5 kg, respectively; the differences among means being non-significant. These animals were fed individually after calving.

These animals were fed according to the N.R.C. (1978). The data on concentrate feeding was recorded daily while the data on fodder consumption was recorded for five consective days in a fortnight. The proximate analysis of the fodder and concentrate ration fed to these animals was carried out at fortnightly intervals. The fat and solids not fat (SNF) contents were determined at monthly intervals.

The concentrate ration on average contained 85.29 ± 4.10 per cent dry matter (DM), 15.6 ± 1.30 per cent total crude protein (TCP) and 2.15 ± 0.35 M.Cal. of metabolizable energy (ME) per kg. The overall average consumption of DM, TCP and ME from concentrate ration was 40.89, 57.60 and 43.89, per cent respectively before calving and 39.20, 56.08 and 47.66 per cent, respectively during the lactation period.

Results and Discussion

Productive and reproductive performance

All the heifers matured and conceived successfully: but only 4, 3, 6, 4 and 4 heifers each of F_1, F_2, F_3, F_4 and Sahiwal successfully calved and completed their first lactation. The productive and reproductive performance of different genetic groups is pressented in table 1. The differences in the age and weight at maturity between different genetic groups were non-significant. The difference in age

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at fruitful service between the means of groups was significant ($p < 0.05$), being lowest (528.8 ± 88.9 days) in F_1 and highest (855.5 + 165.2 days) in Sahiwal. The difference between the means of live weight at fruitful service was non-significant. The age at first calving differed significantly ($p < 0.05$) between groups; it was lowest (777.8 + 93.3 days) in F_1 and highest (1,145.8 ± 167.2 days) in Sahiwal but there was non-significant difference between these groups for live weight at first calving (table 1).

The overal 305 days and total milk yield for first lactation was 2,729.0 ± 669.3 and 2,992.7 ± 377.5 litre: it was significantly lowest in Sahiwal as compared to crossbred groups and highest in F_1 and F_2 crossbreds. The fat corrected milk (FCM) at 4 per cent upto 305 days lactation was also significantly lowest in Sahiwal. The overal average days in milk and services per conception for these groups were 336.6 ± 69.6 and 2.5 ± 1.3. The fat and SNF contents were 4.5 ± 0.2 and 8.2 ± 0.3 per cent, respectively. The difference in the means for services per conception was significant between genetic groups while the differences between the means for days in milk, fat and SNF contents between genetic groups were non-significant (table 1).

The age at maturity in the present study was lower than that observed by Singh and Mishra (1980) and Kaushik (1979) but higher than that observed by Mason (1974). The age at first calving in crossbred and local cows is lower than that

TABLE 1. PRODUCTION PERFORMANCE OF DIFFERENT FILIAL GROUPS FOR FIRST LACTATION

Traits	F_1	F_2	F_3	F_4	Sahiwal	Overall
Age at maturity (days)	463.6[a] ±115.1	554.4[a] ±115.7	593.3[a] ±51.6	606.4[a] ±92.7	595.4[a] ±170.9	563.8 ±116.8
Age at first fruitful service (days)	528.8[c] ±88.9	676.3[b] ±61.6	655.8[bc] ±43.2	702.6[a] ±106.9	855.5[a] ±165.2	675.8 +135.6
Age at first calving (days)	777.8[c] ±93.3	902.7[bc] ±37.3	947.5[b] ±41.0	996.3[ab] ±116.9	1,145.8[a] ±167.2	956.8 ±149.8
Weight at maturity (kg)	291.8[a] ±65.3	263.6[a] ±63.3	323.2[a] ±34.0	348.2[a] ±48.7	280.2[a] ±58.6	302.2 ±58.6
Weight at first fruitful service (kg)	327.4[a] ±39.3	323.0[a] ±43.9	341.2[a] ±39.4	364.6[a] ±57.0	368.3[a] ±17.3	342.6 ±41.5
Weight at first calving (kg)	425.0[a] ±17.8	425.3[a] ±49.4	429.7[a] ±27.5	447.5[a] +63.4	442.3[a] +43.7	433.9 ±38.1
305 days milk yield (litre)	3,209.3[a] ±596.4	2,436.3[bc] ±593.8	2,773.5[a] ±464.4	3,252.3[a] ±274.8	1,915.8[c] ±491.1	2,729.0 ±669.3
305 days FCM (litre)	3,423.4[a] ±593.9	2,635.3[ab] ±736.2	2,990.1[a] ±480.1	3,464.8[a] +460.9	2,054.4[b] +531.4	2,934.2 ±410.8
Total milk yield (litre)	3,627.0[a] ±1,178.2	2,566.3[ab] +810.1	3,007.8[ab] ±656.3	3,676.5[a] ±391.7	1,971.5[b] ±586.5	2,992.7 ±377.5
Days in milk (litre)	362.0[a] ±85.4	312.0[a] ±44.6	350.2[a] ±50.4	383.8[a] ±40.4	262.0[a] ±75.0	336.6 ±69.6
Services per first conception	1.6[b] ±0.6	2.2[b] +1.3	2.2[b] ±1.0	2.5[b] ±1.2	4.5[a] ±1.0	2.5 ±1.3
Fat content (%)	4.5[a] ±0.4	4.5[a] ±0.3	4.5[a] ±0.1	4.4[a] ±0.3	4.5[a] ±0.2	4.5 ±0.2
S.N.F. contents (%)	8.1[a] ±0.1	8.2[a] +0.2	8.2[a] ±0.4	8.4[a] ±0.1	8.3[a] ±10.3	8.2 +0.3

Means with similar superscripts are statistically non-significant from each other.

reported by McDowell (1985), Cunningham and Syrstad (1987), Pyne et al. (1986), Raheja and Bhat (1982) and Ahmed et al. (1986), however, the age at 1st calving was higher than that reported by Nagarcenkar and Rao (1982). The weight at first calving was higher than that recorded by Raheja and Bhat (1982) and Nagarcenkar and Rao (1982). The milk yield recorded in this study is higher than reported earlier by Branton et al. (1966), Shafiq (1987), Pyne et al. (1986), Ahmed et al. (1986), Nagarcenkar and Rao (1982) and Biswas et al. (1982).

There was a decrease of 29.24 per cent in total milk yield from F_1 to F_2 crossbreds but there was appreciable improvement in milk yield in F_3 and F_4 crossbreds over F_2 crossbreds. Rao and Nagar-

TABLE 2. FEED CONSUMPTION AND MILK PRODUCING EFFICIENCY IN DIFFERENT FILIAL GROUPS

Traits	F_1	F_2	F_3	F_4	Sahiwal	Overall
Daily per head feed requirements						
DM (kg)	10.5 ± 0.31	10.5 ± 0.57	10.3 ± 0.26	10.2 ± 0.48	10.2 ± 0.49	10.4 ± 0.4
TCP (gm)	1,390 ±160	1,197 ±135	1,283 ±127	1,375 ± 88	1,157 ± 71	1,285 ±141
ME (M.Cal.)	28.0 ± 2.1	25.2 ± 2.4	26.3 ± 1.9	27.4 ± 1.5	24.7 ± 1.3	26.4 ± 2.0
Daily per head feed consumption						
Fodder (kg)	29.3[a] ± 1.8	29.4[a] ± 4.0	28.8[a] ± 2.7	27.7[a] ± 2.8	26.7[a] ± 2.8	28.4 ± 2.7
Concentrate (kg)	5.67[a] ± 0.83	4.23[c] ± 0.37	5.06[b] ± 0.89	5.82[a] ± 0.83	4.03[c] ± 0.42	5.01 ± 0.97
DM (kg)	11.8[a] ± 1.4	11.2[a] ± 1.1	11.0[a] ± 1.0	11.3[a] ± 0.5	9.2[b] ± 0.6	10.9 ± 1.2
TCP (gm)	1,488[a] ±177	1,240[a] ±166	1,427[a] ± 228	1,543[a] ±157	1,241[a] ± 74	1,399 ±199
ME (M.Cal.)	24.2[a] ± 2.6	22.8[a] ± 2.3	22.9[a] ± 2.2	23.6[a] ± 1.1	19.5[b] ± 1.1	22.6 ± 2.4
Daily FCM (Litre)	11.23[a] ± 1.95	8.64[ab] ± 2.41	9.80[a] ± 1.57	11.36[a] ± 1.33	6.74[b] ± 1.75	9.58 ± 2.31
Milk producing efficiency						
Fodder (kg)	2.67[b] ± 0.42	3.36[a] ± 0.37	2.94[ab] ± 0.38	2.47[b] ± 0.37	3.28[a] ± 0.31	2.92 ± 0.47
Concentrate (kg)	0.51[a] ± 0.05	0.48[a] ± 0.04	0.51[a] ± 0.04	0.52[a] ± 0.06	0.50[a] ± 0.06	0.50 ± 0.05
DM (kg)	1.11[a] ± 0.17	1.27[a] ± 0.17	1.13[a] ± 0.12	1.00[a] ± 0.10	1.13[a] ± 0.16	1.12 ± 0.15
TCP (gm)	134.4[a] ± 17.6	140.3[a] ± 14.2	144.0[a] ± 10.5	137.1[a] ± 20.2	153.6[a] ± 25.4	142.2 ± 17.76
ME (M.Cal.)	2.18[a] ± 0.20	2.60[a] ± 0.36	2.33[a] ± 0.20	2.09[a] ± 0.20	2.40[a] ± 0.28	2.31 ± 0.27
Feed cost per litre FCM produced (Rs.)	1.36[a] ± 0.13	1.45[b] ± 0.15	1.41[a] ± 0.10	1.37[a] ± 0.11	1.74[b] ± 0.35	1.46 ± 0.22

Means carrying same superscript did not differ significantly from one another within a classification.

cenkar (1979) and Bhatnagar et al. (1980) also reported a setback of approximately 700 kg of milk from F_1 to F_2 crossbreds: the latter study, however, suggested a slight improvement in the milk yield of F_3 which is in agreement with the present findings. The decline in milk yield from F_1 to F_2 was also evident in the data of Wijeratne (1970), Buvanendran (1977) and Lobo et al. (1984). In theory, offspring from matings among firstcross progeny (F_2) would be expected to average 16-20 per cent below first cross parents in milk yield, less 6 per cent for heterosis, coupled with minus 10-15 per cent because of less opportunity for selection of parent.

Feed consumption and milk producing efficiency

According to N. R. C., (1978) the overall per head per day requirements of DM, TCP and ME were 10.4 ± 0.4 kg, 1,285 ± 141 gm and 26.4 ± 2.0 M.Cal., respectively. The consumption of feed during this study was very close to their feed requirements. The overall average per head per day consumption of DM, TCP and ME was 10.9 + 1.2 kg, 1,399 + 199 gm and 22.6 + 2.4 M.Cal., respectively. The Sahiwal cows consumed significantly less DM and ME than the crossbreds; difference between the means for these traits among genetic groups of crossbred cows were non-significant (table 2).

The overall per head per day average production of FCM for 305 days of lactation was 9.58 ± 2.31 litre; the Sahiwal cows produced significantly less milk (6.74 ± 1.75 litre) than the crossbreds; within crossbred groups F_2 produced significantly less FCM. The overall milk producing efficiency for one litre of FCM on the basis of DM, TCP and ME was 1.12 ± 0.15 kg, 142.2 ± 17.76 gm and 2.31 ± 0.27 M.Cal., respectively. There was non significant difference in the means of these traits of milk producing efficiency among genetic groups. The overall average feeding cost per litre of FCM produced during 305 days of lactation was Rs. 1.46 ± 0.22; it was significantly higher in Sahiwal and F_2 than other genetic groups (table 2). These results indicated that the crossbred cows produced significantly more milk than the Sahiwal by consuming the same amount of feed per litre of milk produced.

In a similar study Chaudhry and Shah (1989) found that the crossbreds (1/2, 3/4 and 5/8 HS) consumed significantly larger quantities of concentrate and dry matter than the Sahiwal but their feed efficiency per kg FCM produced was significantly better than Sahiwal; among the crossbred groups the differences for feed consumption and feed efficiency were non-significant. Wagen (1971) also observed that in the crossbred cows the feed efficiency for milk production was 23.18 + 1.02 per cent as compared to 17.53 ± 0.90 per cent in Sahiwal cows under high roughage feeding system. Ram et al. (1979) concluded that various types of crossbreds produced a litre of milk at relatively cheaper cost and required almost only half of the replacement costs than those of exotic and zebu cows. The study of Kumar and Gupta (1968) revealed that the per litre cost of milk production was lowest in the crossbred cows on account of its highest milk yield versus buffaloes and indigenous cattle.

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