

Original Research Article

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Study of Lactation Length and Milk Yield of F₁ (Tharparkar X Holstein Friesian) Crossbred Cow During Three Consecutive Lactation

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ABSTRACT

S.K.N. College of Agriculture, Jobner dairy farm was purposively selected for the study. The selection of cows was done randomly. The data of 18 F₁ crossbred cows (Th x HF) those had completed three consecutive lactation at the college dairy farm was collected for carrying out the present study. This herd is being maintained at S.K.N. College of Agriculture, Jobner dairy farm under semi-arid condition. Data was collected from the record of college dairy farm over a period of eight years (1994-2001). The production performance of 18 F₁ crossbred cows maintained in S.K.N. College of Agriculture, Jobner was studied for total lactation milk yield during first, second and third lactation and corresponding lactation length during first, second and third lactation. To estimate the production traits in F₁ crossbred cows in least square estimation method was used for statistical analysis of data to arrive the conclusions. In general, total F₁ crossbred (Th x HF) cows are presented on the college dairy farm. The average milk yield during first, second and third lactations were 2631.91±62.83, 2562.09±59.57 and 2592.39±54.04 in liters respectively. The average lactation length during first, second and third lactations were 373.13±15.09, 363.19±32.19 and 372.50±32.91 in days respectively. The milk yield during first, second and third lactation varied among different cows. The mean values for third lactation were higher than second lactation but lower than first lactation. The first lactation was highest milk yield and lactation length. Milk yield increases with increasing lactation length. Least square analysis of variance showed that lactation length had significant influence upon lactation milk yield in all crossbred cows. The performance of the F₁ Tharparkar x HF crosses can possibly be the best during first lactation. This could be done to the influence of hybrid vigour that reflected in crossbred cows maintained in tropical climatic condition.

Keywords

Lactation length, Milk production, and Crossbred cows.

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Introduction

India is endowed with the largest livestock population in the world. Women constitute about 70% of the labor force in livestock farming. As the ownership of livestock is more evenly distributed among landless laborers and marginal farmers, the progress of these results is in a more balanced development of the rural economy. In global

context, the performance of the Indian dairy sector appears impressive in term of livestock population and total milk production but extremely poor in term of productivity. Low milk production in India is probably due to low genetic potential for milk production, poor nutrition management and adverse agro climatic condition. Indian arid zone, where

livestock rearing is generally main occupation of rural masses, consists of 12% of country's geographical area and 61% of India's arid zone is Rajasthan. Livestock also provides increased income stability to farm households. It accounts for about 57.30% of the world's buffalo population and 14.70% of the cattle population. Indian dairy industry is contributing significantly to the country's economy, besides improving the health standard by increasing the nutritional value of the food. India occupies first position in the world milk production with 17% share in milk output. India's milk production increased from 17.00 million tonnes in 1950-51 to 140.00 million tonnes during 2014-15 (NDDDB, 2015) and the demand is expected to be 180 MT by 2020. In 1970 under the aegis of NDDDB (National Dairy Development Board) Operation Flood Programmed was launched to modernize the dairy sector

The cross breeding of nondescript Indian cattle on the field scale started in 1964 with the launch of the Intensive Cattle Development Projects (ICDP) of the Government of India and by 1969 it become the official policy of the government of India for increasing milk production. The pioneering work on the large scale cross breeding in different parts of India by Bhartiya Agro-Industries Foundation (BAIF) all through the seventies, validate the positive impact of cross breeding on milk production, and unequivocal recommendation of the National Commission on Agriculture (NCA) in 1974 that cross breeding should be a major strategy for increasing milk production in India, laid all adverse criticism to rest and legitimized crossbreeding as a powerful tool to rapidly enhance milk production.

The government had no intention to crossbred pure Indian breeds of cattle. But in actual practice the spectacular increase in milk yields in the crossbred progenies generated overwhelming demand for crossbred cattle

from farming community almost all over India and necessitated the expansion of the programmed nationwide even to the home tracts of the pure Indian breeds. While most states had been totally indifferent in managing the breeding policy as prescribed and while no attempt was made by most states to produce proven half bred bulls.

Materials and Methods

This chapter describes the methodology adopted in selection of study area, collection, tabulation and analysis of the data. The study is exploratory in nature and prime aim to know the lactation length, total milk yield and effect of lactation length on total milk yield in Tharparker x HF F₁ crossbred cows maintained at dairy farm of S.K.N. College of Agriculture, Jobner (Jaipur).

Data collection

Selection of study area

College dairy farm was selected to carry out the proposed investigation. The study area was confined to college dairy farm, S.K.N. College of Agriculture, Jobner (Jaipur) where the work of crossbreeding was started in the year 1991-1992 after transferring young Tharparkar heifers from Livestock Research Station, Chandan (Jaisalmer). After attaining puberty, these heifers were inseminated with frozen semen of Holstein Friesian bulls. All F₁ crossbred cows were having 50% exotic inheritance and were maintained under semi-arid conditions. The data on total lactation milk yield and lactation length related to Tharparkar x Holstein Friesian (ThxHF) F₁ crossbred cows was maintained at college dairy farm.

Collection of data

The data of 18 F₁ (Tharparkar x Holstein Friesian) crossbred cows that had completed

three consecutive lactation at the college dairy farm, was collected for carrying out the present study. During collection of data, it was observed that out of 18 cows, the data of two cows was declared as outlier. Hence, statistical analysis of data of 16 cows was done.

Observations under taken

Data was collected from the records of college dairy farm from 1994-2001. There were 18 crossbred cows whose data on lactation performance and lactation length was available at college dairy farm. Data related to Tharparkar x Holstein Friesian F₁ crossbred cows on total lactation milk yield during first, second and third lactation and their corresponding lactation length was collected from the records of college dairy farm over a period eight years (1994-2001).

Statistical analysis

To estimate the production traits in F₁ crossbred cows, the least square estimation method was used for statistical analysis of data [1].

Results and Discussion

Milk production of F₁ crossbred cows during first, second and third lactation

In the present study, total lactation milk yield of 16 F₁ (Tharparkar x Holstein Friesian) crossbred cows was studied during first, second and third lactation. The milk yield during first, second and third lactation varied among different cows. Analysis of variance of milk production performance of F₁ (Tharparkar x Holstein Friesian) crossbred cows has been presented in table 1.

The table 2 shows that the mean values of total lactation milk yield during first, second and third lactation were 2631.91±62.83,

2562.09±59.57 and 2592.39±54.04 liters respectively. The table also reveals that mean values during first lactation were highest which reflects the effect of the heterotic superiority of the first crosses. Similar results were found by [2], [3] and [4]. F₁ animals were usually sired by highly selected progeny tested bulls. Friesian crosses had the highest milk yield during first lactation. The optimum proportion of Bos Taurus genus has been an important issue in discussion on crossbreeding for milk production in the tropics. The reports received are consistent in showing an improvement in milk production and lactation length traits up to 50% level.

[5] Also studied various group of crossbred cows and reported that significant difference ($p<0.01$) specifically on lactation milk yield lactation length and dry period. Least square analysis of variance showed that the effect of genetic group was significant for first lactation milk yield in the present study. The milk production performance of the F₁ (Tharparkar x Holstein Friesian) crosses was found highest in first lactation. Milk yield as well known, is an additively genetic traits with thousands of gene pairs interacting in its inheritance and expression. Crossbreeding between Tharparkar x Holstein Frisian breed i.e. a well-adapted breed and highly productive breed can improve overall performance in the starting phase of crossbreeding program, performance of always improved due to heterotic superiority of the first crosses. Thereafter if the program is not checked the productive advantage of recombination loss that herd breakdown of heterotic superiority in inheritant generation. This had to insufficient adaptation, which is manifested in the decline in performance. Further, parity differences were also significant on first lactation milk yield.

The data pertaining to mean lactation milk yield during second and third lactation were 2562.09±59.57 and 2592.39±54.04 liters. The

table 2 reveals that the milk production performance of F₁ crossbred cows during second and third lactation were lower than first lactation performance. Least square analysis of variance showed that parity had significant influence upon milk production during second and third lactation. The lower milk production performance of crossbred cows during second and third lactation can be difference between season of calving or certain management factors like level of

feeding general management of crossbreds and environmental factors. Total lactation milk yield was significantly affected by lactation length during second and third lactation. [6] found that milk yield in different genetic groups increased with increasing lactation length. Similar results were reported by [7] in Jersey x Haryana crossbred cows. [8] found that lactation length was positively correlated with daily milk yield and lactation milk yield in 3 different groups.

Table.1 Analysis of variance of F₁ crossbred cows during first, second and Third lactation milk yield

Source of variation	DF	Sum of square	Mean square	F- value	P-value
Lactation milk yield	2	49646.5			
Cow	15	322314.85	24823.25*	0.0326	0.0941
Error	30	342811.31	760699.7*		

Significant at the 5% level

Table.2 Milk production of F₁ crossbred cow during first, second and third lactation

Cow	Milk yield in first, second and third lactation in liters		
	I	II	III
1	3509.40	3869.02	3438.40
2	3350.80	3532.00	4231.80
3	2610.00	1565.60	1874.40
4	2061.60	2547.20	2217.40
5	3964.60	3167.40	2943.40
6	2557.60	2603.80	3814.20
7	2372.60	2676.20	2422.40
8	2472.20	2178.60	1911.18
9	5002.00	5605.40	3892.70
10	1804.60	1946.60	2359.80
11	2520.00	2730.00	2261.10
12	2942.40	3001.40	2878.20
13	3590.00	2379.00	2131.60
14	3884.60	2845.40	3610.00
15	2987.40	3207.60	3997.20
16	1744.60	2262.40	2679.20
Total	47374.40	46117.62	46662.98
Mean	2631.91	2562.09	2592.39
SEm±	62.83	59.57	54.04
CD (P = 0.05)	158.35	150.14	136.18

Table.3 Analysis of variance of lactation length in Tharparkar x Holstein Friesian F₁ crossbred cows during first, second and third lactation

Source of variance	DF	Sum of square	Mean square	F-value	Significance
Lactation	2	1017.125			
Cow	15	119316.479	7954.432*	2.469	0.01710
Error	30	96660.208	3222.007*		

Significant at the 5% level

Table.4 Lactation length in Tharparkar x Holstein Friesian F₁ crossbred cows during first, Second and third lactation

Cow	Lactation length in First, Second and Third lactation in days		
	I	II	III
1	317	332	307
2	367	345	393
3	345	374	381
4	337	345	409
5	337	359	400
6	403	292	310
7	298	368	370
8	347	359	351
9	368	321	331
10	377	498	337
11	580	365	471
12	351	294	283
13	406	351	333
14	305	316	489
15	563	498	447
16	269	392	348
Total	5970.00	5809.00	5960.00
Mean	373.13	363.06	372.50
SEm±	15.09	32.19	32.91
CD (P=0.05)	38.03	81.13	82.94

Table 2 also reveals that mean values for third lactation milk yield in crossbred cows were 2592.39±54.04 liters. The mean values for third lactation were higher than second lactation but lower than first lactation. Least square analysis of variance showed that lactation length had significant influence upon lactation milk yield. [9]

Reported that parity had no significant influence upon lactation yield or lactation in two genetic groups. It is clear from the data that milk production performance of crossbred cows improved during third lactation with lactation length this could be due to better management of feeding, adaptation in environment or body condition of crossbred cows. Lactation length was found associated with lactation milk yield in crossbred cows. Similar results were reported by [8] in Friesian x Zebu crossbred cows. [6] also declared that milk yield increased with increasing lactation length in three different genetic groups. [10] found significant correlation between lactation milk yield (305

days) and lactation length in all crosses. The performance of the F₁ (Tharparkar x Holstein Friesian) crosses was found best during first lactation. Present results were found corroborated with most of the studies as the total lactation milk yield in F₁ (Tharparkar x Holstein Friesian) crossbred was found higher than pure bred parents. This could be the effect of favorable genes which expressed in F₁ progeny during the performance of first lactation. This could be due to heterotic superiority of F₁ progeny.

Lactation length in F₁ crossbred cows during first, second and third lactation

In the present study, lactation length of 16 F₁ (Tharparkar x Holstein Friesian) crossbred cows was studied during first, second and third lactation. The lactation length during first, second and third lactation varied among different cows. Analysis of variance of lactation length in F₁ (Tharparkar x Holstein Friesian) crossbred cows has been presented in table 3.

The table 4 shows that the mean values of lactation length during first, second and third lactation were 373.13 ± 15.09 , 363.19 ± 32.19 and 372.50 ± 32.91 days respectively. The Table also reveals that mean values during first lactation were highest. This reflects that crossbred cows had superior milk secretion ability.

The data pertaining to mean lactation length during second and third lactation was 363.19 ± 32.19 and 372.50 ± 32.91 days. The table 4 reveals that the effect of lactation length on performance of crossbred cows during second and third lactation was lower than first lactation performance. Least square analysis of variance showed that parity had significant influence upon lactation length during second and third lactation. The lower milk production performance and lactation length of crossbred cows during second and third lactation can be difference between length of lactation, season of calving or certain management factors like level of feeding, management of crossbreds and some environmental factors. Table 4 reveals that mean values of lactation length for second lactation were 363.19 ± 32.19 days. Lactation length was significantly affected milk yield during second lactation.

The mean values for third lactation length in crossbred cows were 372.50 ± 32.91 days. The mean values for third lactation were slightly higher than second lactation but lower than first lactation. Least square analysis of variance showed that lactation length had significant influence upon lactation milk yield. The finding of the present study agree with those of [10] who also found significant correlation between lactation milk yield (305 days) and lactation length in all crossbreds. A significant effect of lactation length on milk yield is reported by [11]. It is clear from the data that lactation length and milk production performance of F_1 (Tharparkar x Holstein

Frisian) crossbred cows improved during third lactation. This could be due to better management of feeding adaptation in environment or body condition of crossbred cows.

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