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Research Paper

EFFECT OF SEASON YEAR AND PARITY ON PRODUCTION TRAITS OF CROSS-BREDS

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Present study was under taken on production traits from 458 normal lactation records of first three lactation from 158 cows; which are progenies of 30 sire maintained at dairy of Sadguru Seva Sangh trust, Jankikund, Chitrakoot, Satna (MP) The Cows have complete their three lactation records between 1977 to 1996. The performance records envisaged LMY, LP, DP, PY and MPEP. In order to account for the genetic (genetic group and parity) and non-genetic factors (year and season of calving) affecting the performance traits, least-square were carried out. The overall least-square means of LMY, LP, DP, PY, and MPEP were observed as 2746.10 ± 27.29 kg, 331.52 ± 2.49 days, 80.80 ± 1.21 days, 13.47 ± 0.10 kg and 8.33 ± 0.07 kg respectively. Season, year and parity had significant effect on lactation period, peak yield and milk production efficiency per day of lactation period. During the early lactations, production and growth process lead to drain of energy reserve, so maximum yield is expected when grown fully at about 3rd to 4th lactation. Thus, from above results it may safely concluded that for getting maximum milk (peak yield), cross-breds managed so that they must be calved in winter season and reared by farmer's up to 3rd to 4th lactation. The study also showed the adaptability and producing ability of cross-breds under Chitrakoot area.

Keywords: Lactation Milk Yield (LMY), Lactation Period (LP), Dry Period (DP), Peak Yield (PY), Milk Production Efficiency per day of lactation Period (MPEP)

INTRODUCTION

India is endowed with abundant animal resources. This is evident from the livestock population and production in India at the beginning of this millennium; India possesses 198.8 million cattle (FAO, 2010). Dairy plays an important role in the national economy and in livelihood of the rural population. Today, India is the top milk producer in the world having 124 million tones of milk. Livestock enterprises are emerging as a dynamic tool for socio-economic change. Milk and milk products are being accepted in the diet in India as item of priority. With the increase in population and changing patterns of life along with urge of

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for urbanization the demand for milk and its products shall so high. It is hoped that "White revolution" and crossbreeding by adopting various schemes and programme shall prove a trend setter. In spite of massive efforts made the gap between supply and demand of milk is wide. Apparently superior cows in production as a consequence to challenge feeding, may get selected whereas the real good producers may be left out as inferior ones because of their starvation and neglect such a selection will not produce better progeny. Age at first calving, calving time and other factors are indispensable as they start influencing from the time of conception till death. An environment comprising seasonal change, temperature changes, humidity, air movement, solar radiation, atmospheric pressure and ionization extent influences directly on milch animals. Extreme fluctuations in environment have been found to influence the productive performances. Production is the basic economic value of dairy cattle is an inherited character. Milk production in dairy cows is primarily dependent on breed (Bhatt *et al*., 2010). parity and lactation period. Thus present investigation was initiated with objectives to estimate the least-square means of production traits and to study the effect of genetic groups, season, year, and parity of production traits.

MATERIALS AND METHOD

Present study was under taken on the data collected from history-sheet of ½ Jersey x ½ Local and ½ Holstein Friesian x ½ Local cross breds, maintained at dairy of "Sadguru Seva Sangh trust, Jankikund, Chitrakoot, Satna (MP)". The data on 158 progenies from 30 sires of two breeds namely Jersey and Holstein who have the data on production traits of both genetic groups were available for a period of 20 years (1977 to 1996), were analyzed. The management and feeding regimes of these animals were almost same. The records of cows which were abnormal due to sickness, reproductive disorder or other reasons were not included in this study. The genetic group and sire wise distribution of records are given in Table 1:

Table 1

S. No.	Genetic Group	No. of Records	No. of Sires
1	½ Jersey x ½ Local cross breds	46	10
2	½ Holstein Friesian x ½ Local cross breds	112	20

In this study, year was divided into three seasons, according to average rainfall, humidity and temperature.The quantitative traits of production were included are as:

1. Lactation Milk Yield (LMY), 2. Lactation Period (LP), 3. Dry Period (DP), 4. Peak Yield (PY), 5. Milk production efficiency per day of lactation period (MPEP). The Least Square Analysis and Least Square Analysis of variance was analysed as per (Harvey, 1979).

RESULT AND DISCUSSION

Means: Least Square mean and their standard error for five production traits of two genetic groups (½ Jersey x ½ Local and ½ Holstein Friesian x ½ Local) are presented in Table 2.

Lactation Milk Yield (LMY): Least Square mean of LMY was observed as 2420.32 ± 45.33 kg in ½ Jersey and ½ Local cross-bred. Results clearly indicate that Friesian cross-breds exhibit higher milk yield per lactation and also showed the adaptability and producing ability of cross-breds under Indian conditions, which needs further investigation but in general, amongst various

Table 2: Genetic Group Wise Least Square Means ± S.E. for Production Traits

Factor	LMY (Kg)	LP (Days)	DP (Days)	PY (Kg)	MPEP (Kg/Day)
μ	2746.10 ± 27.29	331.52 ± 2.49	80.80 ± 1.21	13.470 ± 0.10	8.33 ± 0.07
1/2 H/F x 1/2 Local	3071.89 ± 28.97	335.10 ± 2.65	77.64 ± 1.29	14.46 ± 0.11	9.24 ± 0.07
1/2 J x 1/2 Local	2420.32 ± 45.33	327.93 ± 4.15	83.97 ± 2.02	12.49 ± 0.17	7.43 ± 0.12

Table 3: Year Wise Least Square Means ± S.E. for Production Traits

Factor	LMY (Kg)	LP (Days)	DP (Days)	PY (Kg)	MPEP (Kg/Day)
μ	2746.10 ± 27.29	331.52 ± 2.49	80.80 ± 1.21	13.470± 0.10	8.33 ± 0.07
1977	2950.27 ± 135.35	325.96 ± 12.40	81.71 ± 6.03	14.72 ± 0.52	9.11± 0.36
1978	2924.25 ± 105.66	322.12 ± 9.68	81.74 ± 7.71	14.54 ± 0.41	9.04 ± 0.28
1979	2890.84 ± 98.95	319.36 ± 9.07	84.35 ± 4.41	14.48 ± 0.38	9.06 ± 0.27
1980	2763.74 ± 12017	325.30 ± 9.36	78.87 ± 4.55	13.48 ± 0.39	8.52 ± 0.27
1981	2751.39 ± 117.92	322.89 ± 10.81	88.69 ± 5.25	14.15 ± 0.46	8.61 ± 0.32
1982	2947.60 ± 116.35	339.85 ± 10.6	80.70 ± 5.18	14.20 ± 0.45	8.67 ± 0.31
1983	2687.14 ± 125.04	317.70 ± 11.46	83.63 ± 5.57	13.32 ± 0.48	8.43 ± 0.34
1984	2659.09 ± 111.71	325.86 ± 10.24	81.07 ± 4.98	13.59 ± 0.43	8.17 ± 0.30
1985	2587.75 ± 103.17	324.52 ± 9.45	80.75 ± 4.59	13.26 ± 0.40	7.98 ± 0.28
1986	2665.47 ± 96.01	331.92 ± 8.80	76.77 ± 4.28	13.37 ± 0.37	8.01 ± 0.26
1987	2548.21 ± 88.58	318.42 ± 8.12	78.32 ± 3.94	13.39 ± 0.34	8.17 ± 0.24
1988	2440.54 ± 98.49	324.21 ± 9.03	77.73 ± 4.39	12.68 ± 0.38	7.64 ± 0.26
1989	2485.71 ± 98.97	322.83 ± 9.07	78.32 ± 4.41	12.83 ± 0.38	7.75 ± 0.27
1990	2676.55 ± 102.82	333.90 ± 9.42	83.49 ± 4.58	12.33 ± 0.40	8.15 ± 0.28
1991	2814.37 ± 109.16	345.02 ± 10.00	69.75 ± 4.86	13.49 ± 0.42	8.13 ± 0.29
1992	2805.04 ± 102.14	345.70 ± 9.36	76.22 ± 4.55	13.04 ± 0.39	8.17 ± 0.27
1993	2970.35 ± 105.23	369.60 ± 9.64	75.58 ± 4.69	12.78 ± 0.41	8.00 ± 0.28
1994	2729.68 ± 114.3	337.87 ± 10.48	78.86 ± 5.09	13.56 ± 0.44	8.14 ± 0.31
1995	2739.09 ± 124.45	333.82 ± 11.40	93.49 ± 5.54	13.30 ± 0.48	8.45 ± 0.34
1996	2885.53 ± 128.29	343.51 ± 11.76	86.06 ± 5.71	12.98 ± 0.50	8.45 ± 0.35

combination 50% Holstein Friesian with 50% indigenous breed produce more than any combination of cross-bred. The overall least-square mean of LMY was observed as 2746.10 ± 27.29 kg.

Lactation Period and Dry Period (LP and DP): The overall mean of LP was observed as 331.52 ± 2.49 days (Table 2), and means LP in Jersey and Friesian crosses respectively were 327.93 ± 4.15 and 335.10 ± 2.65 days. These findings

Table 4: Season Wise Least Square Means ± S.E. for Production Traits

Factor	LMY (Kg)	LP (Days)	DP (Days)	PY (Kg)	MPEP (Kg/Day)
μ	2746.10 ± 27.21	331.52 ± 2.49	80.80 ± 1.21	13.47 ± 0.10	8.33 ± 0.07
Summer	2719.74 ±45.84	325.99 ± 4.20	81.55 ± 2.04	13.59 ± 0.17	8.42 ± 0.12
Rainy	2679.21 ± 48.99	341.91 ± 4.49	79.64 ± 2.81	12.82 ± 0.19	7.89 ± 0.13
Winter	2839.37 ± 38.49	326.66 ± 3.52	81.22 ± 1.71	14.01 ± 0.15	8.70 ± 0.10

Table 5: Parity Wise Lease Square Means ± S.E for Production Traits

Factor	LMY (Kg)	LP (Days)	DP (Days)	PY (Kg)	MPEP (Kg/Day)
	2746.10 ± 27.29	331.52 ± 2.49	80.80 ± 1.21	13.47 ± 0.10	8.33 ± 0.07
Parity 1	2683.30 ± 43.21	341.24 ± 3.96	75.39 ± 1.92	12.63 ± 0.16	7.92 ± 0.11
Parity 2	2760.79 ± 44.59	326.52 ± 4.08	85.23 ± 1.98	13.91 ± 0.17	8.50 ± 0.12
Parity 3	2794.22 ± 44.78	326.79 ± 4.10	81.79 ± 1.99	13.88 ± 0.17	8.59 ± 0.12

Table 6: Leaset-Square Analysis of Variance for Production Traits in Cross Breds (M.S.)

Source of Variation	DF	Mean Sum of Square				
		LMY	LP	DP	PY	MPEP
Genetic Group	1	38748882.14	4691.41	3650.02**	355.42**	297.42**
Year	19	579745.01	3732.52*	525.34	9.23**	3.91**
Season	2	1015359.16	10300.08**	131.93	46.29**	22.84**
Parity	2	452818.14	10020.59**	3562.03**	76.04**	18.55**
Error	432	257103.5	2161.08	511	3.93	1.92

clearly indicate that in Jersey cross-breds lactation period is slightly shorter than Holstein Friesian cross-breds. Present result of mean LP agreed full with Nagare and Patel (1997), who reported mean LP between 325-335 days. Many workers had reported it between 248-365 days. Whereas, mean DP in ½ J and ½ L and ½ H.F. ½ L respectively were 83.97 ± 2.02 and 77.64 ± 1.29 days. These findings clearly indicate that Friesian cross-bred, dry for a shorter span of time than Jersey cross-breds. It may be said that from economic point of view dry period may not be allowed to extend beyond 90 days.

Peak Yield (PY): The overall mean of PY in ½ J x ½ L and ½ HF x ½ L respectively were 12.49 ± 0.17 and 14.4 ± 0.11 kg (T-1). Thus, Frisian cross-bred exhibit higher peak yield than Jersey. Result of mean PY in Jersey was in closely agreed with Chaudhary (1995). The Friesian half bred thus exhibit higher peak yield because at this time metabolism of the animal is at peak and maximum attention being paid to milk synthesis instead of diversion of energy toward replacement of tissue.

Milk Production Efficiency per Day of Lactation Period (MPEP): Least-Square mean

of MPEP estimated as 7.43 ± 0.12 and 9.24 ± 0.07 kg/day in ½ Jersey x ½ Local and ½ Holstein Friesian x ½ Local respectively were cited in Table 2. Means of MPEP in ½ Jersey x ½ Local cross-breds was lower than overall mean (8.33 ± 0.07), While for ½ Holstein Friesian x ½ Local cross-breds MPEP was higher than overall mean Roy *et al*. (1987).

Factors Affecting Production Traits in Cross Breds

In order to find out the effect of genetic group, year, season and parity on production traits, least-square analysis of variance was carried out and the results are presented in Table 6, and least-square means for genetic groups, year, season and parity respectively were tabulated in T-1.

Genetic Group Effect: Least square analysis of variance revealed significant effect of genetic group on dry period (DP), peak yield (PY), milk production efficiency per day of productive life (MPEP) while non-significant effect on lactation milk yield (LMY) and lactation period (LP). Dutt and Joshi (1992) reported non significant effect of genetic group on total lactation milk yield also support present findings. The results also showed the adaptability and producing ability of cross-bred in Indian condition.

Year Effect: Effect of year on Lactation period (LP), dry period (DP), peak yield (PY), milk production efficiency per day of productive life (MPEP); was observed to be significant; while non-significant effect of year was found on other production traits. The report of Panda and Sadhu (1983) support presents finding; who reported non significant effect of year on all the production traits for cross-breds. Year wise least square mean reveals that year 1993 had highest lactation yield (2970.35 ± 105.23 kg) and longest lactation period 369.60 ± 9.64 days.

Season Effect: Table 6 reveals significant effect of season of calving on Lactation period (LP), dry period (DP), peak yield (PY), milk production efficiency per day of productive life (MPEP); while T- 3 shows that winter calvers produce more milk (2839.37 ± 38.47 kg) followed by summer (2719.74 ± 5.88 kg) and rainy (2679.21 ± 48.99 kg). This variation was observed in almost both the genetic groups; but analysis of variance shows non-significant effect of season on LMY. Winter calvers also produces maximum peak yield (14.01 ± 0.015 kg) followed by summer and Rainy.

Parity Effect: The analysis of variance (T- 5) revealed significant effect of parity on lactation period (LP), dry period (DP), peak yield (PY) and MPEP and non-significant effect on other production traits. Lactation milk yield (LMY) was non-significant on analysis of variance but least-square mean shows that the average yield gradually increased from 1st to 3rd lactation and maximum LMY was observed in 3rd lactation in both genetic groups. The result was supported by Mudgal *et al.* (1991).

SUMMARY AND CONCLUSION

The least-square analysis of variance shows that Genetic group, season of calving, year and parity had significant effect on lactation period, dry period, peak yield and milk production efficiency per day of lactation period. During the early lactations, production and growth process lead to drain of energy reserve, so maximum yield is expected when grown fully at about 3rd to 4th lactation. Thus, from above results it may safely concluded that for getting maximum milk (peak yield), cross-breds managed so that they must be calved in winter season and reared up to 3rd to 4th lactation.

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