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INFLUENCE OF CALVING SEASON ON MILK YIELD AND PERSISTENCY IN HOLSTEIN FRIESIAN X SAHIWAL COWS

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ABSTRACT

Data on 98 lactations of F_1 Holstein – Friesian x Sahiwal cows kept at the University of Agriculture, Faisalabad were analysed for the magnitude of seasonal variation in various lactation parameters. Peak daily milk yield averaged 16.39 ± 0.41 kg, attained at 31.2 ± 2.9 days after calving. Initial 60 day milk yield and 305-day milk yield averaged 805.8 ± 24 0 and 3056.3 ± 106.5 kg, respectively. The cows calving in winter had the highest peak yield (17.85 kg), initial yield (889.6 kg) and 305-day milk yield (3398.6 kg). The spring calvers attained the peak earlier (22.0 days) but milk yield was 28 per cent less than the winter calvers. The peak and initial yields were the lowest in summer calvers. Further analyses indicated that variation in these traits due to calving season was non-significant. Persistency averaged 93.21 ± 0.79 per cent and it was significantly affected by the season of calving The cows calving in spring season were the least persistent.

INTRODUCTION

A massive programme of upgrading local non descript cattle with the Bos taurus semen is underway in Pakistan since 1975. Majority of cattle population in areas where artificial insemination facilities exist contain some degree of exotic inheritance. The crossbred animals have been widely commended for high milk production and early maturity. A wide variation exists in the economic traits of these crossbreds which could be attributed to numerous genetic and environmental factors. The season of calving deserves attention because the crosbred cows are greatly inconvenienced by climatic stress during summer months. Milk production and allied traits viz. peak yield, initial yield, persis-

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tency have been reported to be significantly affected by the season of calving (Ram and Chaudhary, 1976; Singh *et al.*, 1980; Mahto *et al.*, Moon *et al* , 1982). Several other workers did not find any effect of calving seasons on these traits (Kashmiri, 1977; Raheja, 1982; Singh and Gopal, 1982). The present study was made to estimate the extent of variation due to calving season in some lactation parameters of cows obtained by Holstein-Friesian x Sahiwal crossing.

MATERIALS AND METHODS

The data on 98 lactations of 27 F_1 Holstein-Fricsian x Sahiwal cows kept at the University of Agriculture, Faisalabad during 1975-84 were used. Normal lactations of 200 days and above were used in analyses. Information for each lactation about the days to attain peak yield, peak daily milk yield, initial yield in first 60 days and 305-day milk yield was collected. The lactation period was divided into 10 periods of 30 days each and persistency worked out by using the formula derived by Ludwick and Petersen (1943) and expressed in per cent.

The year was arbitrarily divided into five seasons : Winter (November-February), Spring (February-April), hot-dry Summer (May-July), Rainy season July-September), and Autumn (September-November). The data on all lactations and for the five parameters were grouped according to the season of calving. Analysis of variance was carried out for between and within seasons variations. Significance of differences between means of various traits in different seasons was tested by the Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Peak daily milk yield averaged 16.39 $\pm$ 0 41 kg and it was attained at 31.2 $\pm$ 2.9 days after calving. Initial milk yield in the first 60 days was 805.8 $\pm$ 24 0 kg. The milk yield in 305 days averaged 3056.3 $\pm$ 106.5 kg. Mean persistency index was 93.21 $\pm$ 0.97 per cent.

1. *Effectof calving season on peak yield and days of attaining peak* : The highest peak yield of 17.85 kg was observed in cows calving in winter

season (Table 1). The spring calves were very close to winter calvers in peak yield (17.54 kg). The lowest peak (15 10 kg) was in cows calving in rainy season and the mean values for the cows calving in the other two seasons were close to it. The spring calvers attained the peak earlier than those calving in other seasons (22.0 days). The cows calving in rainy season attained peak at a later period (36.3 days). Autumn and winter calvers attained peak at about one month after calving. Analysis of variance showed that variation in peak yield and days of attaining peak yield due to calving season was non-significant (Table 2).

Table 1. *Means for some lactation parameters of cows calving in different seasons*

Season of calving	No. of observ.	Days of attaining peak yield	Peak yield (kg)	Initial yield (kg)	305-day milk yield (kg)	Persistency (%)
Winter	25	31.8	17.85	899.6	3398.6	94.37
Spring	19	22.0	17.54	827.0	2656 1	88.13
Hot-dry	9	38 3	15.25	743.4	3180.2	96 18
Rainy	15	39.3	15 10	744.6	3069 6	92.75
Autumn	30	30.4	15.45	776.1	3023.6	94.35
Overall	98	31.2 ± 2.9	16.39 ± 0.41	805.8 ± 24.0	3056.3 ± 106.5	93.21 0.79

A non-significant effect of calving season on peak yield was also observed by Singh and Gapal (1982) in non-descript cows. However, it was reported by Chauhan *et al.* (1976), Ram and Chaudhary (1976) and Moon *et al.* (1982) that peak yield was signifiicantly affected by the season of calving and the highest peak was in those cows calving in cold season. Raheja (1982) also reported that in Haryana and its crossbreds either from Brown Swiss, Friesian or Jersey the sire, season, year, age and weight at first calving had no significant effect on the number of days to attain peak yield. Similar results were obtained by Kashmiri (1977) in the crossbred cows. Relatively higher peaks in winter/ spring season may be due to good quality fodder and moderately cold climate.

2. *Variation in initial yield due to calving season*: Initial milk yield varied from 743.4 to 889.6 kg amongst the cows calving in different seasons (Table 1).

The highest and the lowest yields were for the winter and summer (hot-day) calvers, respectively. The cows calving in rainy season were similar to those calving in hot-dry season. Next, in the descending order were cows calving in spring season. The differences in initial milk yield due to calving season were non-significant (Trble 2).

Table 2. *Analysis of variance of some lactation parameters*

Lactation parameters	Source of variation	d.f.	Mean squares	F. ratio
Days of attaining peak yield	Between seasons	4	775.97	0.933 NS
	Residual	93	831.29	
Peak yield	Between seasons	4	34.67	2.219 NS
	Residual	93	15.62	
Initial yield	Between seasons	4	77760.30	1.399 NS
	Residual	93	55574.05	
305-day milk yield	Between seasons	4	1241131.37	1.306 NS
	Residual	80	950489.41	
Persistency	Between seasons	4	178.93	3.743**
	Residual	81	47.82	

NS = Non-significant.

** = Significant at 1 per cent.

3. *Milk yield as affected by calving season* : The 305-day milk yield was the highest (3398.6 kg) amongst the cows calving in winter season. The poorest performance (2656.1 kg) was recorded in cows calving in spring season. The winter calvers, thus, produced 28.0 per cent more milk than the spring calvers. Milk yield among the cows calving in the hot-dry, rainy and autumn seasons ranged between 3022.6 and 3180 2 kg (Table 1). The overall differences in milk yield due to season of calving were non-significant (Table 2). Kashmiri (1977) also observed non-significant effect of sire, season, age and weight at first calving on lactation milk yield in Haryana purebred and their F_1 crossbreds with Brown Swiss, Friesian, Jersey and Danish Red. On the other hand, Rakes *et al.* (1963), Ahmad *et al.* (1978b) and Rao and Sundaresan (1979) reported significant effect of season and year of calving on lactation milk yield.

Higher milk yield amongst the cows calving in winter season seemed to be due to availability of good quality fodder in late winter and spring seasons. Also the atmospheric temperature was low and within the comfort zone which resulted in higher milk yields in cows calving in winter season. The lowest yield amongst spring calvers seemed to be due to the depressing effects of the forthcoming summer months. Thus, to have maximum production from crossbred cows, the breeding should be so synchronized that maximum calvings occur during winter season.

4. *Seasonal variation in persistency* : Mean persistency values varied from 88 13 to 96.18 per cent (Table 1). The highest persistency was in cows calving in hot-dry season and the lowest index was for the spring calvers. The cows calving in other three seasons had persistency values between 92.75 and 94.37 per cent. Differences in the persistency indices of cows calving in different seasons were significant (Table 2). Duncan's Multiple Range Test revealed that mean values of persistency for cows calving in hot-dry summer months significantly differed from those calving in spring, rainy or autumn seasons. All other comparisons between the means showed non-significant differences.

The persistency of lactation was also reported to be influenced by year and season of calving (Ahmad *et al.*, 1978a; Rao and Sundaresan, 1979; Mahto *et al.*, 1981). Ahmad *et al.* (1978a) reported that in Sahiwal cows, the highest persistency was in cows calving in spring and the loweat in winter calvers.

The persistency had high positive correlation (0 82) with lactation period. Mean lactation period was 394.5 $\pm$ I5.4 days in this herd which is well above the standard 305-day used in estimating persistency indices. This factor resulted in relatively higher estimates of persistency in this herd. Relatively lower estimates amongst the spring calvers were probably due to relatively shorter lactation lengths (340.6 days) than in cows calving in other seasons.

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