

## FACTORS AFFECTING REPRODUCTION TRAITS IN HARIANA CATTLE

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### INTRODUCTION

The economy of dairy production relies on the reproductive performance of the herd. Therefore knowledge of the factors influencing reproduction is of great importance for appraising genetic and phenotypic parameters and predicting the breeding value of animals. Furthermore, it may help in devising management practices and thereof, in maximizing production. Keeping these points in view, the present study was undertaken to examine the effects of period, season of calving and parity on reproduction characters of Haryana cattle.

### MATERIALS AND METHODS

For this investigation 3 748 records pertaining to 762 cows of Haryana cattle, progeny of 68 sires maintained at Government Livestock Farm, Sector - 1, Hisar over a period of 35 years spreading from 1966 to 2000 were considered. The entire duration of 35 years was divided into 7 periods of five years each on the basis of environmental variations affecting the availability and quality of feed and fodder. Based on the atmosphere temperature and relative humidity prevailing in the area, the year was further divided into four seasons, viz., summer (April-June), rainy (July-September), autumn (October-November) and winter (December-March). The reproduction traits included were : age at first calving (AFC), service period (SP) and calving interval (CI). Animals having incomplete and abnormal lactation records due to abortion and sickness were excluded. Animals having lactation length less than 100 days were excluded from the present study. Paternal half sib correlation method was utilized for the estimation of heritability of various parameters included in the study. The statistical model included the effect of sire, period of calving, season of calving, parity and linear regression of AFC (only for SP and CI). The least – squares maximum likelihood computer programme of Harvey (1987) was used to study the effect of various factors on reproduction traits.

### RESULTS AND DISCUSSION

The analysis of variance and least – squares means for different reproduction traits are presented in table 1 and 2, respectively. Age at first calving, calving interval and service period averaged 1435.48 days, 430.64 days and 151.70 days, respectively. Similar results were also reported by Parmar *et al.* (1980), Kumar *et al.* (1997) and Lemka *et al.* (1973) for AFC, CI and SP, respectively.

Period of calving had significant effect on all the traits under study. Significant effects of period of calving on AFC, CI and SP have also been reported by Singh *et al.* (1990), Jadhav *et al.* (1991) and Singh *et al.* (1988), respectively. The age at first calving was the highest (1604.21 days) for seventh period calvers (1996 - 2000) and the lowest (1210.98 days) for the first period calvers (1966 - 1970). However, CI and SP were the highest for the seventh period calvers and lowest for the third period calvers (1976 - 1980). The least squares means of AFC

for third, sixth and seventh period did not differ significantly among themselves. Similarly, the means of CI and SP did not differ significantly among themselves for second to sixth calvers. Moreover, the means of CI and SP for cows calved during first, second, fifth, sixth and seventh period did not differ significantly among themselves. In addition to this, cows calved during first and seventh period differed significantly from those calved during third and fourth period for the means of CI and SP. However, no definite trend was observed for the means of AFC, SP and CI over the periods

**Table 1. Analysis of variance for different reproduction traits**

Source	Mean squares		
	AFC	CI	SP
Sire	49390.36 (67)	28335.07 (67)	27010.49 (67)
Period	307270.25* (6)	50136.34* (6)	63340.72* (6)
Season	135978.20* (3)	14193.96 (3)	5419.76 (3)
Parity	---	212772.43* (11)	185847.94* (11)
AFC	---	566952.29* (1)	472078.82* (1)
Error	28269.87 (685)	6975.88 (3659)	6227.69 (3659)

Within parenthesis are degree of freedom

\* ( $P < 0.01$ )

Season had significant effect only on AFC. Winter season calvers had the highest (1459.36 days) AFC which did not differ significantly from those calved during rainy and autumn season calvers but differed significantly from those calved during summer season (1403.28 days). Although, the effect of season of calving on SP and CI was non significant but winter season calvers had the lowest SP and CI while the rainy and autumn season calvers had highest SP and CI, respectively. The better performance of winter calvers (December – March) might be due to availability of green palatable and nutritious fodder to the animals in advance stage of pregnancy and early lactation.

Parity had significant effect on both the traits (CI and SP). Nivsarkar *et al.* (1992) had also reported similar results. Haryana cattle during first parity had the highest CI and SP averaged as 485.34 days and 200.67 days, respectively. Animals during mature lactation i.e. fourth parity calvers had the lowest SP and CI. However, the means of CI for first and twelfth parity did not differ significantly among themselves but differ significantly from the cows calved during rest of parities. Furthermore, the means of CI for cows calved during second, third and fourth to eleventh parity did not differ significantly among themselves. In addition to this, the means of

CI for cows calved from third to tenth parity did not differ significantly among themselves. Similarly, first, eleventh and twelfth parity calvers did not differ for SP. Moreover, cows calved during second to eleventh parity did not differ significantly among themselves for SP. A downward trend from first to fourth parity was obtained for both the traits and thereafter it started increasing. A slight decline in SP and CI was observed during twelfth parity. Abrupt increase in SP and CI after tenth lactation indicated that reproductive status of the cows start declining with the passage of time and animals started to become to unproductive if kept after tenth lactation.

**Table 2. Least - square means with standard error (SE) for different reproduction traits**

Effect	AFC (days)	CI (Days)	SP (Days)
Overall	1435.48 ± 6.56	430.64 ± 1.48	151.70 ± 1.40
<i>Period :</i>			
1966-1970	1210.98 <sup>B</sup> ± 102.45	446.22 <sup>A</sup> ± 25.90	171.14 <sup>A</sup> ± 24.48
1971-1975	1345.09 <sup>B</sup> ± 40.01	423.38 <sup>AB</sup> ± 11.44	149.96 <sup>AB</sup> ± 10.81
1976-1980	1502.66 <sup>AB</sup> ± 30.18	411.53 <sup>B</sup> ± 7.83	132.57 <sup>B</sup> ± 7.39
1981-1985	1446.59 <sup>B</sup> ± 31.05	415.19 <sup>B</sup> ± 6.43	133.26 <sup>B</sup> ± 6.08
1986-1990	1387.26 <sup>B</sup> ± 36.34	438.12 <sup>AB</sup> ± 6.00	159.84 <sup>AB</sup> ± 5.67
1991-1995	1550.01 <sup>AB</sup> ± 37.76	425.45 <sup>AB</sup> ± 6.07	143.49 <sup>AB</sup> ± 5.73
1996-2000	1604.21 <sup>A</sup> ± 45.66	455.21 <sup>A</sup> ± 7.46	168.01 <sup>A</sup> ± 7.05
<i>Season :</i>			
Summer	1403.28 <sup>B</sup> ± 22.71	432.56 ± 6.63	153.21 ± 6.26
Rainy	1421.22 <sup>AB</sup> ± 32.76	431.75 ± 6.99	154.46 ± 6.61
Autumn	1457.18 <sup>A</sup> ± 31.84	433.26 ± 7.60	154.14 ± 7.18
Winter	1459.36 <sup>A</sup> ± 20.03	425.36 ± 6.47	142.90 ± 6.11
<i>Parity :</i>			
P <sub>1</sub>	-	485.34 <sup>A</sup> ± 5.70	200.67 <sup>A</sup> ± 5.39
P <sub>2</sub>	-	432.41 <sup>B</sup> ± 5.74	150.71 <sup>B</sup> ± 5.43
P <sub>3</sub>	-	414.73 <sup>BC</sup> ± 6.11	135.71 <sup>B</sup> ± 5.77
P <sub>4</sub>	-	407.80 <sup>C</sup> ± 6.43	130.02 <sup>B</sup> ± 6.08
P <sub>5</sub>	-	412.38 <sup>BC</sup> ± 6.83	132.60 <sup>B</sup> ± 6.45
P <sub>6</sub>	-	415.26 <sup>BC</sup> ± 7.27	133.43 <sup>B</sup> ± 6.87
P <sub>7</sub>	-	422.32 <sup>BC</sup> ± 7.96	135.88 <sup>B</sup> ± 7.52
P <sub>8</sub>	-	422.78 <sup>BC</sup> ± 8.89	144.66 <sup>B</sup> ± 8.41
P <sub>9</sub>	-	425.78 <sup>BC</sup> ± 10.16	145.70 <sup>B</sup> ± 9.60
P <sub>10</sub>	-	416.72 <sup>BC</sup> ± 11.99	138.76 <sup>B</sup> ± 11.33
P <sub>11</sub>	-	440.76 <sup>B</sup> ± 16.08	166.00 <sup>AB</sup> ± 15.20
P <sub>12</sub>	-	472.48 <sup>A</sup> ± 23.81	200.02 <sup>A</sup> ± 22.49
<i>Regression :</i>			
AFC	-	0.12 ± 0.02	0.11 ± 0.02

Means superscripted by different letters differ significantly among themselves.

Age at first calving had significant effect both on CI and SP. Table 2 further revealed that regression of AFC on CI and SP was 0.12 and 0.11, indicating that an increase in AFC would result in an increase in CI and SP.

### CONCLUSION

Data must be standardized for various significant effects of period, season, parity and age at first calving for appraising genetic and phenotypic parameters and predicting the breeding value of dairy animals.

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