EFFECT OF SOME GENETIC AND NONGENETIC FACTORS ON DRY PERIOD IN *GIR* COWS

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ABSTRACT

A total of 599 records of dry period on 191 *Gir* cows maintained at Kasturba Gandhi Memorial Trust, Dairy Farm, Kasturbagram Indore (M.P.) over a period of 36 years from 1974 to 2009 were analyzed by least squares technique using mixed model maximum likely hood computer programme to estimate the effect of sire, period and season of calving, parity and level of inbreeding. The overall least squares means of dry period was estimated to be 158.13±8.56 days. The results indicated that sire ($p<0.01$), parity ($p<0.01$) and level of inbreeding ($p<0.01$) had significant effect on dry period while the effects period of calving and season of calving were non- significant. Inbreeding had deteriorating effect as evidenced by significantly longer dry period in inbred cows as compared to non-inbred cows. Hence proper breeding plan should be evolved to avoid inbreeding in the present herd.

KEY WORDS: Dry period, *Gir* cows, inbreeding

INTRODUCTION

Gir cattle are being maintained in our country to produce high genetic potential young bulls for improving production under different climatic conditions. Dry period is an important trait in measuring the production efficiency of dairy animals as it essentially influences the lactation yield during subsequent lactation. Hence, from the profitability point of view, it is an important trait which is to be given sufficient attention. Unfortunately, being an unproductive phase, dry period generally receives less attention by the breeders. As a matter of fact, for a successful lactation cycle of a cow, the dry period should be optimum. In India, cattle herd being smaller in size leads to inbreeding and ill effects of it invariably creeps in. Hence, present study was planned to assess the effect of inbreeding and other non-genetic factors on dry period in *Gir* cows.

MATERIALS AND METHODS

The data utilized for the present investigation pertained to 599 records of dry period on 191 *Gir* cows maintained at the Kasturba Gandhi National Memorial Trust Dairy Farm, Kasturbagram, Indore (M.P.) covering a period of 36 years (1974 to 2009). The inbreeding coefficient for each animal was calculated using path coefficient method. Since only source of inbreeding in the herd during the period under study was found to be daughter x sire mating, each inbred animal was having an inbreeding coefficient of 0.25 (Tomar, et. al, 2013). Therefore on the basis of level of inbreeding the animals could be classified into two groups only viz., non-inbred (IL_1) and inbred (IL_2). The entire duration of 36 years was divided into six periods of six years each to overcome the differences in managemental practices while year was divided into four seasons viz., spring (February – March), summer (April – June), rainy (July – September) and winter (October – January) depending upon the climatic conditions prevailing in the region. To determine the effect of order of lactation on dry period, five consecutive parities were taken and denoted as Pt1, Pt2, Pt3, Pt4 and Pt5. To study the effect of genetic and non-genetic factors the data were analyzed by least squares technique of fitting constants using “Mixed Model Least Squares and Maximum Likelihood Computer

Programme PC-2" employing the statistical model which included the effects of sire, period of calving, season of calving, parity and the level of inbreeding (Harvey**,** 1990).

RESULTS AND DISCUSSION

The overall least squares mean of dry period was found to be 158.13±5.56 days (Table 1). Our mean value is close to the estimates reported by Nanavati *et al*. (1996) and Bhadoria *et al*. (2003) in *Gir* and Dangi *et.al* (2013) in *Rathi* cows. The least squares analysis of variance revealed significant effect of sire (P<0.01) on dry period (Table 2). There appears no report on the effect of sire on dry period in *Gir* cows. However, in *Malvi* cows Sharma (2010) has reported non- significant effect of sire on this trait.

Table1: Least squares means and standard errors for dry period in *Gir* cows

Effect	**No. of obse-rvat-ions**	**Mean±S.E. (days)**	**Effect**	**No. of obser-vations**	**Mean±S.E. (days)**
Overall mean (μ)	**599**	**158.13 ± 5.56**	**Period**		
Sire			P1 (1974-1979)	78	146.78 ± 11.30
S1	79	166.78cd ± 8.57	P2 (1980-1985)	95	159.36 ± 9.76
S2	50	157.99bc± 10.14	P3 (1986-1991)	126	161.24 ± 9.19
S3	37	185.58de± 11.65	P4 (1992-1997)	76	153.61 ± 9.42
S4	110	185.32de± 7.68	P5 (1998-2003)	85	157.75 ± 8,90
S5	106	165.00bcd± 7.86	P6 (2004-2009)	139	170.05 ±6.43
S6	32	164.66bcd± 12.05	Parity		
S7	27	209.99e± 13.47	Pt1	191	186.51c ± 5.77
S8	38	170.68cd± 11.48	Pt2	156	165.80b ± 6.43
S9	24	155.60abc± 14.73	Pt3	129	151.16ab ± 7.36
S10	36	142.63abc±12.00	Pt4	77	140.10a ± 9.38
S11	13	129.04ab± 20.00	Pt5	46	147.09ab± 11.37
S12	25	132.87ab ± 15.84	Season		
S13	11	135.21abc ± 21.94	Spring	147	159.28 ± 7.26
S14	11	112.48a ± 21.29	Summer	113	157.82 ± 7.87
Inbreeding			Rainy	102	166.53 ± 8.25
IL1 (Non-inbred)	477	143.32a ± 5.02	Winter	237	148.90 ± 6.38
IL2 (Inbred)	122	172.94b ± 8.16			

a, b, c d, e: Least squares means for a particular class with at least one common alphabet as superscript do not differ significantly with each other

Table 2: Least squares analysis of variance for dry period in Gir cows

Source of variation	d.f.	S.S.	M.S.	F
Sire	13	172573.74	13274.90	3.22**
Period	5	17734.89	3546.97	0.86
Season	3	233559.82	7786.60	1.88
Parity	4	143540.65	35885.16	8.70**
Inbreeding	1	60430.02	60430.02	14.66**
Error	572	2357890.24	4122.18	

** Significant at P< 0.01

Least squares analysis of variance indicated that the period of calving had non-significant effect on dry period. This is in agreement with the findings of Bhadoria *et al.* (2003) in *Gir* and Dangi *et. al* (2013) in *Rathi* cattle. However, Sharma (2010) in *Malvi* and M'hamdi *et al*. (2012) in Tunisian Holstein cows have reported a significant effect of period of calving on dry period. The non-significant effect of season of calving on dry period observed in present study is corroboratory to the findings of Bhadoria *et al.* (2003) in *Gir*, Gatchearle *et. al* (2010) in HF X Deoni crosses and M'hamdi *et al*. (2012) in Tunisian Holstein cows. This is indicative of uniformity in feeding and management practices over the seasons in this herd. However, contrary to present finding, Sharma (2010) in *Malvi* and Dangi *et. al* (2013) in *Rathi* cows have reported significant effect of season of calving on dry period.

Least squares analysis of variance revealed significant (P<0.01) effect of parity on dry period. The dry period in first lactation was significantly longer as compared to other parities. In general, the mean dry period tended to decrease with increase in the order of parity. Significant effect of parity on dry period has also been reported by Sharma (2010) in *Malvi* and M'hamdi *et al*. (2012) in Tunisian Holstein cows. However, Bhadoria *et al.* (2003) in *Gir* and Dangi *et.* al (2013) in *Rathi* cattle reported non- significant effect of parity on dry period.

The level of inbreeding had highly significant (P<0.01) effect on dry period. This is in close agreement with the findings of Odedra *et al.* (1979) in *Gir*, Reddy and Nagarcenkar (1990) in *Sahiwal* and Sharma (2010) in *Malvi* cows. These workers have also reported significant effect of inbreeding on the dry period. However, non significant effect of level of inbreeding on this trait was reported by Bhagat *et al.* (2007) in Friesian x *Gir* crosses.

With inbreeding there is increase in homozygosity which is usually accompanied by deterioration in performance (inbreeding depression). In close herd if sires are not replaced regularly, there are chances of production of inbred animals. The adverse effect of inbreeding revealed in the present study as indicated by significantly longer mean dry period in inbred cows as compared to non-inbred cows warrants avoidance or minimization of inbreeding. Therefore breeding bulls should be procured from the other pure bred herds of *Gir* and be replaced every one or two years so that daughter sire mating could be avoided.

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