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### Studies on First Lactation Reproduction Traits of Phule Triveni Crossbred Cattle

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**Abstract:** The overall least squares means of age at first calving, first service period and first calving interval in Phule triveni were  $975.13 \pm 12.83$ ,  $169.95 \pm 9.02$  and  $453.91 \pm 9.05$  days, respectively. The analysis of variance revealed that period of birth and generation had significant effect and season of birth exerted non-significant effect on AFC in Phule Triveni crossbred cattle. The period of calving had significant effect while season of calving, peak milk yield and generation exerted non-significant effect on first service period and first calving interval in Phule Triveni crossbred cattle. As period advances the age at first calving, first service period and first calving interval increased gradually. This might be due to the variations in management. From the results it is concluded that improvement in feeding and management will improve the first lactation reproductive performance of Phule Triveni crossbred cattle.

**Key words:** Crossbred cattle, First lactation, Reproductive traits, Phule Triveni.

#### INTRODUCTION

Although exotic cattle and their crosses are being used increasingly to raise milk production in hot climate of Indian sub-continent, it is extremely difficult to predict which breed, cross or generation will give highest economic returns over investment, because of the wide variation in performance of crossbreds due to differences of exotic donor breed and adaptability of the crossbred to the divergent

climatic conditions of the tropics. Hence, identification and stabilization of optimum level of exotic inheritance is still moot point in cross breeding programme.

The economics of dairy industry is based on productivity of animals which is governed by several genetic and non-genetic factors. To exploit the genetic potential of animals it is essential to know the contribution of non-genetic factors to enable

them for exploitation. Therefore, present investigation was undertaken to evaluate the non-genetic parameter which affect production and reproduction traits in Phule Triveni crossbred cattle.

## MATERIAL AND METHODS

The present investigation was undertaken by utilizing the data of Phule Triveni crossbred cattle maintained at RCDP on Cattle, M.P.K.V., Rahuri. The data for a period of 37 years (1972 to 2008) were collected and classified according to period of birth/calving, season of birth/calving, peak milk yield and generation and analyzed by least squares analysis method by Harvey [4]. Whenever the effects were significant the differences between means were tested for significance by Duncun's Multiple Range Test (DMRT) as modified by Kramer[7]. Genetic correlation, phenotypic correlation between traits was computed and heritability of traits was estimated by paternal half-sib correlation method.

## RESULTS AND DISCUSSION

### First Lactation Reproductive Traits

The overall age at first calving, first service period and first calving interval of Phule Triveni recorded at farm was  $975.13 \pm 12.83$ ,  $169.95 \pm 9.02$  and  $453.91 \pm 9.05$  days, respectively (Table 2). The observed

age at first calving was in close agreement with the AFC ( $993.47 \pm 13.18$ ) reported in FH halfbreds by Narula [9]. However, higher values of AFC were noticed in HF  $\times$  D halfbreds ( $1050.30 \pm 5.30$ ) by Thombre [12], in BH ( $1022.69 \pm 21.85$ ) by Singh [11], in FH halfbreds ( $1101.04 \pm 22.34$ ) by Dahiya [2] and in FG halfbreds ( $1054.67 \pm 12.63$ ) by Bhagat [1].

The observed first service period was resembled with the findings of Dahiya [2] in JH ( $135.46 \pm 9.54$  days), Singh [11] in IFBH ( $139.00 \pm 3.40$  days) groups. However, Thombare [12] and Narula [9] in different halfbreds and triple crosses reported longer service period.

The longer calving interval than the obtained results was reported by Thombare [12] in HF  $\times$  Deoni crossbreds ( $457.12 \pm 4.97$ ) and Narula [9] in FH crossbreds ( $450.73 \pm 9.47$ ). However, shorter calving interval was reported by Deokar [3] in HF  $\times$  Gir and Jersey  $\times$  Gir halfbreds ( $401.03 \pm 15.20$  days).

### Effect of Period of Birth/Calving

The analysis of variance revealed that period of birth/calving significantly affected age at first calving ( $P < 0.01$ ), first service period ( $P < 0.05$ ) and first calving interval ( $P < 0.05$ ) in Phule Triveni cow (Table 1). Significant effect of period of birth on AFC was reported in various crossbreds [5,2,14].

**Table 1**  
Analysis of variance for first lactation reproduction traits in Phule Triveni cows

Source of variation	Age at first calving (days)		First service period (days)		First calving interval (days)	
	d.f.	MSS	d.f.	MSS	d.f.	MSS
Period of Birth/Calving	6	334293.74**	4	27419.196*	4	30908.113*
Season of Birth/Calving	2	12908.90	2	4388.203	2	7846.949
Peak milk yield			2	19803.174	2	15594.956
Error	287	17631.416	346	10908.212	346	10985.215
Generation	6	143845.112*	6	7390.227	6	7660.712
Error	289	17509.39	348	10718.102	348	10790.001

\*\*  $P < 0.01$  \* $P < 0.05$

**Table 2**  
Least squares means for first lactation reproduction traits in Phule Triveni cows

Effect	Age at first calving (days)			First service period (days)			First calving interval (days)		
	N	Mean	SE	n	Mean	SE	n	Mean	SE
$\mu$	296	975.13	12.84	355	169.95	9.02	355	453.91	9.05
<i>Period of birth/calving</i>									
$P_1$	66	802.22 <sup>c</sup>	16.42	135	149.93 <sup>ab</sup>	9.22	135	433.39 <sup>ab</sup>	9.25
$P_2$	79	902.82 <sup>b</sup>	14.95	93	133.59 <sup>b</sup>	11.06	93	414.56 <sup>b</sup>	11.10
$P_3$	65	903.01 <sup>b</sup>	16.61	81	174.65 <sup>a</sup>	11.99	81	457.96 <sup>a</sup>	12.04
$P_4$	38	950.74 <sup>b</sup>	21.70	38	167.26 <sup>ab</sup>	17.40	38	453.68 <sup>ab</sup>	17.46
$P_5$	34	1054.32 <sup>a</sup>	22.94	8	224.32 <sup>a</sup>	37.20	8	509.96 <sup>a</sup>	37.33
$P_6$	10	1076.58 <sup>a</sup>	42.09						
$P_7$	4	1136.21 <sup>a</sup>	66.64						
<i>Season of birth/calving</i>									
$S_1$	89	984.05	17.85	109	167.17	12.53	109	452.19	12.57
$S_2$	124	980.24	15.42	131	165.61	11.15	131	446.72	11.19
$S_3$	83	961.09	17.71	115	177.06	12.33	115	462.83	12.38
<i>Peak milk yield</i>									
$Y_1$				115	162.48	11.76	115	448.06	11.80
$Y_2$				109	161.95	12.74	109	446.11	12.79
$Y_3$				131	185.43	12.20	131	467.57	12.24

Means with different superscripts differ significantly from each other.

Significant effect of period of calving on first service period were also reported by Thombare [12] in HF × Deoni halfbreds, Dahiya [2] in Haryana halfbreds and triple crosses, Kamble [6] in Gir crossbreds and Jadhav [5] in HFX Gir halfbreds. The non-significant effect of period of calving on service period was reported by Deokar [3] in Gir crossbreds, Zol [14] in Phule Triveni and Narula [9] in Haryana crossbred.

The significant effect of period of calving on calving interval was reported by Singh [11] in Haryana crossbred cows and Dahiya [2] in Haryana crossbreds. On the contrary non-significant effect of period of calving on CI was supported by Bhagat [1] in crossbreds of HF, Jersey and Brown Swiss with Gir cows.

The AFC, FSP and FCI of heifers and cows born and calved during different periods differed significantly from each other. The DMRT indicated that the AFC of Phule Triveni heifers born during  $P_1$  were significantly lower than heifers born in rest of the periods. The heifers born in period  $P_2, P_3$  and  $P_4$  and  $P_5, P_6$  and  $P_7$  were performed at par with each other. The cows calved during period  $P_2$  were significantly differed from rest of the period calved cows for FSP and FCI. This might be due to the variations in managerial conditions and also genetic inheritance of parents.

### Effect of Season of Birth/Calving

The effect of season of birth/calving on age at first calving, first service period and first calving interval

was non-significant (Table 1). The non-significant effect of period of birth were in close agreement with Dahiya [2], Zol [14] and Jadhav [5], whereas contradictory results were reported by Varade [13] and Kumar and Kumar [8].

The non-significant effect of season of calving on first service period were reported by Kamble [6] in Gir crossbreds, Narula [9] in Haryana crossbreds and Zol [14] in 'Phule Triveni' cows. However, contradictory results were reported by Dahiya [2] in Haryana crossbreds.

The non-significant effect of season of calving on first calving interval were in agreement with Zol [14] in 'Phule Triveni' cows and Sawant [10] in Khillar cows. While the significant results were reported by Singh [11] and Jadhav [5].

### Effect of Peak Milk Yield

There was non-significant effect of peak milk yield on first service period and first calving interval in Phule Triveni crossbred cattle (Table 1). The results

indicated that irrespective of statistical significance the cows having high peak yield showed greater first service period and first calving interval which might be due to feeding regimes applied after parturition.

### Effect of Generation

The analysis of variance indicated that the generation had significant effect on AFC ( $P < 0.05$ ) while non-significant effect on first service period and first calving interval in Phule Triveni (Table 1). The overall AFC, FSP and FCI as affected by generation were  $991.07 \pm 9.54$ ,  $169.67 \pm 7.40$  and  $454.37 \pm 7.42$  days, respectively in Phule Triveni (Table 3). The significant effect of generation on AFC, FSP and FCI were supported by Singh [11] and Dahiya [2] in Haryana crossbreds and Bhagat [1] in Gir crossbreds.

The DMRT revealed that in Phule Triveni cows the age at first calving observed in  $G_6$  ( $1033.05 + 37.05$  days) and  $G_2$  ( $1014.36 + 14.57$ ) was significantly higher than  $G_1$ ,  $G_3$ ,  $G_4$ ,  $G_5$  and  $G_7$  groups which were at par with each other.

**Table 3**  
Least squares means for first lactation reproduction traits in Phule Triveni cow as affected by generation

Effect	Age at first calving (days)			First service period (days)			First calving interval (days)		
	N	Mean	SE	n	Mean	SE	n	Mean	SE
$\mu$	296	991.07	9.54	355	169.67	7.40	355	454.37	7.42
<i>Generations</i>									
$G_1$	66	947.77 <sup>b</sup>	14.24	88	163.73	11.03	88	448.41	11.07
$G_2$	79	1014.36 <sup>a</sup>	14.57	84	176.59	11.29	84	458.04	11.33
$G_3$	65	983.33 <sup>ab</sup>	15.96	70	161.64	12.37	70	446.68	12.41
$G_4$	38	981.30 <sup>ab</sup>	19.69	46	169.47	15.26	46	454.28	15.31
$G_5$	34	995.31 <sup>ab</sup>	20.37	43	184.59	15.78	43	467.42	15.84
$G_6$	10	1033.05 <sup>a</sup>	37.05	13	196.97	28.71	13	488.51	28.81
$G_7$	4	982.36 <sup>ab</sup>	40.27	11	134.68	31.21	11	417.24	31.31

Means with different superscripts differ significantly from each other.

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