

## Incidence of abnormal termination of pregnancies in dairy cattle

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### ABSTRACT

Data on 3484 calving records of 811 cows (Jersey, crossbred and Hariana) were analysed for estimating the effect of genetic and non-genetic factors on abnormal termination of pregnancies. The overall incidence of abortion, stillbirth, premature birth and total abnormal calving was 1.70, 1.06, 0.85 and 3.61 % in pluriparous Jersey cows. The corresponding figures were 4.21, 1.49, 0.93 and 6.64 % in crossbred and 2.31, 0.88, 0.34 and 3.53 % in Hariana pluriparous cows. Farm and season of calving had significant effect on abnormal calving in all the genetic groups of pluriparous cows. Incidence of abortion was significantly influenced by farm in Hariana and by both farm and season in crossbred cattle. However, occurrence of stillbirth and premature birth was not affected by farm, period, season and parity in all the genetic groups except still birth in crossbred pluriparous cows. Genetic groups had significant effect on abortions and total abnormal calving. Crossbred pluriparous cows had significantly higher incidence of abortions and abnormal calving than purebreds. Maximum overall abnormal termination of pregnancy was recorded during 8th month of pregnancy and average gestation period for overall termination of pregnancies was  $231.1 \pm 16.8$ ,  $216.4 \pm 14.3$  and  $219.2 \pm 12.7$  days in Jersey, crossbred and Hariana cows, respectively. Heritability and repeatability estimates of all the traits were low to very low in all the genetic groups.

**Keywords:** Cattle, Abortion, Still birth, Premature birth and Abnormal calving

### INTRODUCTION

The abnormal calving/abnormal termination of pregnancies plays a great role in the economy of a dairy farm. A dairy owner should made efforts for reducing the abnormal calving. The higher genetic gain can be achieved by increasing the intensity of selection and replacement rate. The incidence of abnormal calving in dairy cows reduces the total number of female calves, female replacement rate and life time production. This study was planned for finding out the incidence pattern for abnormal termination of pregnancies in different genetic groups of dairy cows at different farm, period, season and stage of lactation. The inheritance pattern was also studied.

### MATERIALS AND METHOD

A total of 3484 calving records on 811 cows, maintained at Government Livestock farm Bharari Sand, Chamoli (Jersey animals 175), Hastinapur, Meerut (Jersey 58, crossbred 134, Hariana 165) and Babugarh, Ghaziabad (crossbred 119, Hariana 160, respectively) were utilized to study the effect of genetic and non-genetic factors on abnormal termination of pregnancies and its inheritance pattern. The



data were spread over a period of 18 years, from 1982 to 1999, classified into 6 periods, each comprising 3 years duration. Each year was further classified into 4 seasons depending upon the climate of the area *viz.* winter (Dec.-March), summer (April-June), rainy (July-Sept.) and autumn (Oct.-Nov.). A total number of 25, 26 and 29 sires were used in Jersey, Jersey x Hariana and Hariana cows, respectively. The analysis of variance after transformation was used (Harvey, 1966) to study the effect of genetic groups, farm, period, season and parity of calving. The heritability of various traits was estimated by paternal half-sib correlation method. The repeatability of the traits was estimated utilizing first two calving records.

## RESULTS AND DISCUSSION

The overall abnormal calving percentage was recorded to be 3.86, 7.51 and 4.62, in Jersey, Jersey x Hariana and Hariana primiparous cows, respectively (Table 1). The overall incidence percentage, considering first five calvings of abnormal parturitions including abortions, still-birth and premature birth was 3.61, 6.64 and 5.53 in Jersey, crossbred and Hariana cows, respectively (Table 2). The higher incidence of abnormal calving than these results was reported by Singh *et al.* (1997) in Sahiwal crossbred cows. However, Deshmukh and Kulkarni (1999) in Jersey x Sahiwal cows reported lower incidence of abnormal births.

The incidence of abortion in first calvers for Jersey, crossbred and Hariana cows was found to be 1.72, 3.95 and 3.08 %, respectively (Table 1). Considering first five calvings, the incidence of abortion in percent was 1.70, 4.21 and 2.31 in the corresponding genetic groups (Table 2). These results were in agreement with the report of Mukherjee *et al.*, (1993) who worked on Karan Fries crossbreds. However, Arun *et al.*, (1995) and Kulkarni *et al.*, (1998) in crossbred cattle and Shankaregowda *et al.*, (2007) in Holstein Friesian upgraded cattle reported slightly higher susceptibility to abortion than the results of this study.

The occurrence of still-birth was found to be 1.29, 2.37 and 1.23 %, respectively in primiparous cows in Jersey, crossbred and Hariana genetic groups. The percent incidence of still-birth was 1.06, 1.49 and 0.88 in Jersey, Jersey x Hariana and Hariana pluriparous cows, respectively. Mukherjee *et al.*, (1993) in Karan Fries and Arun *et al.*, (1995) in crossbred cows had observed higher incidence of still-birth than the results of this study. However, Kulkarni *et al.*, (1998) reported lower susceptibility to still-birth. The incidence of premature birth was found to be 0.86, 1.19 and 0.31 % in Jersey, crossbred and Hariana primiparous cows, respectively. The average incidence of this type of abnormal calving in corresponding genetic groups of pluriparous cows was 0.85, 0.93 and 0.34 %, respectively. These results were in agreement with the reports of Arun *et al.*, (1995) as they had also reported low susceptibility (1.00 %) to premature birth.

The incidence of premature birth was quite low and the incidence of abortion was highest in all the genetic groups among three types of abnormal calving under study. Present findings supported the report of Arun *et al.*, (1995) as they observed higher incidence of abortion than still-birth and premature birth. Mukherjee *et al.*, (1993) and Kulkarni *et al.*, (1998) had also reported higher case of abortion than still-birth. It was further observed that incidence of still-birth was more common than premature birth in all the genetic groups.

Farm had significant effect on incidence of abnormal births both in first calvers and older cows in all the genetic groups except primiparous Jersey cows. In Jersey pluriparous cows, incidence was more at Hastinapur farm than Bharari Sand farm. This could be ascribed to more heat stress because of higher ambient temperature at Hastinapur farm in comparison to Bharari Sand farm. Incidence of abnormal births was higher at Babugarh farm as compared to Hastinapur farm in Hariana and crossbred pluriparous



cows. The same trend was observed in first heifer crossbreds but it was reversed in Haryana cows. Farm did not affect the incidence of abortion, still-birth and premature birth in primiparous cows of all the genetic groups. However, considering first five calvings farm had significant effect on susceptibility to abortion in crossbred and Haryana cows, and on still-birth in crossbred cows. Crossbred cows belonging to Babugarh farm had significantly higher incidence of abortion and still-birth than Hastinapur farm. In case of Haryana cows, the incidence of abortion was more at Hastinapur farm than Babugarh farm. Farm

**Table 1.** Average incidence (%) of abnormal birth among first calvers

Effects	Total Calving	Types of calving								
		Abortion		Still-birth		Premature birth		Abnormal birth		
		1	2	1	2	1	2	1	2	
<b>JERSEY CATTLE</b>										
<b>Overall</b>	<b>233</b>	<b>4</b>	<b>1.72</b>	<b>3</b>	<b>1.29</b>	<b>2</b>	<b>0.86</b>	<b>9</b>	<b>3.86</b>	
Farm	1	175	3	1.71	2	1.14	2	1.14	7	4.00
	2	58	1	1.72	1	1.72	-	-	2	3.45
Period	1	21	1	4.76	0	0.00	0	0.00	1	4.76
	2	38	0	0.00	0	0.00	1	2.63	1	2.63
	3	40	1	2.50	1	2.50	1	2.50	3	7.50
	4	39	0	0.00	1	2.56	0	0.00	1	2.56
	5	42	1	2.38	1	2.38	0	0.00	2	4.76
	6	53	1	1.89	0	0.00	0	0.00	1	1.89
Season	1	78	1	1.28	0	0.00	0	0.00	1	1.28
	2	56	1	1.79	1	1.79	0	0.00	2	3.57
	3	57	2	3.51	1	1.75	1	1.75	4	7.01
	4	42	0	0.00	1	2.38	1	2.38	2	4.76
<b>CROSSBRED CATTLE</b>										
<b>Overall</b>	<b>253</b>	<b>10</b>	<b>3.95</b>	<b>6</b>	<b>2.37</b>	<b>3</b>	<b>1.19</b>	<b>19</b>	<b>7.51</b>	
Farm	1	134	4	2.99	1	0.75	2	1.49	7	5.22
	2	119	6	5.04	5	4.20	1	0.84	12	10.08
Period	1	46	3	6.52	0	0.00	1	2.17	4	8.69
	2	41	3	7.32	0	0.00	0	0.00	3	7.32
	3	49	2	4.08	0	0.00	1	2.04	3	6.12
	4	44	2	4.55	1	2.27	0	0.00	3	6.82
	5	38	0	0.00	4	10.53	1	2.64	5	13.16
	6	35	0	0.00	1	2.86	0	0.00	1	2.86
Season	1	79	2	2.53	1	1.27	0	0.00	3	3.79
	2	62	2	3.23	2	3.23	1	1.61	5	8.06
	3	55	4	7.27	2	3.64	1	1.81	7	12.73
	4	57	2	3.51	1	1.75	1	1.75	4	7.01
<b>HARIANA CATTLE</b>										
<b>Overall</b>	<b>325</b>	<b>10</b>	<b>3.08</b>	<b>4</b>	<b>1.23</b>	<b>1</b>	<b>0.31</b>	<b>15</b>	<b>4.62</b>	
Farm	1	165	6	3.64	2	1.21	1	0.61	9	5.45
	2	160	4	2.50	2	1.25	0	0.00	6	3.75
Period	1	57	2	3.51	1	1.75	0	0.00	3	5.26
	2	58	2	3.45	1	1.72	1	1.72	4	6.89
	3	54	1	1.85	0	0.00	0	0.00	2	3.70
	4	56	2	3.57	0	0.00	0	0.00	2	3.57
	5	54	2	3.70	1	1.85	0	0.00	2	3.70
	6	46	1	2.17	1	2.17	0	0.00	2	4.35
Season	1	101	1	0.99	1	0.99	0	0.00	2	1.98
	2	87	2	2.29	1	1.15	1	0.15	4	4.56
	3	70	5	7.14	1	1.43	0	0.00	6	8.57
	4	67	2	2.99	1	1.49	0	0.00	3	4.48

1 - Number of animals affected

2 - Percentage of animals affected



Table 2. Average incidence (%) of abnormal birth among lactating cows

Effects	Total Calving	Types of calving								
		Abortion		Still-birth		Premature birth		Abnormal birth		
		1	2	1	2	1	2	1	2	
<b>JERSEY CATTLE</b>										
<b>Overall</b>	<b>941</b>	<b>16</b>	<b>1.70</b>	<b>10</b>	<b>1.06</b>	<b>8</b>	<b>0.85</b>	<b>34</b>	<b>3.61</b>	
<b>Farm</b>	1 703	12	1.71	7	1.00	6	0.85	25	3.56	
	2 238	4	1.68	3	1.26	2	0.84	9	3.78	
<b>Period</b>	1 88	2	2.27	1	1.14	1	1.14	4	4.55	
	2 171	3	1.75	0	0.00	2	1.17	5	2.92	
	3 168	2	1.19	2	1.19	1	0.59	5	2.98	
	4 160	4	2.50	3	1.88	1	0.63	8	5.00	
	5 165	2	1.21	1	0.61	1	0.61	4	2.42	
	6 189	3	1.59	3	1.59	2	1.06	8	4.23	
<b>Season</b>	1 312	5	1.59	2	0.64	2	0.64	9	2.88	
	2 219	3	1.37	3	1.37	2	0.91	8	3.65	
	3 232	5	2.16	4	1.72	3	1.29	12	5.17	
	4 178	3	1.69	1	0.56	1	0.56	5	2.81	
<b>Lactation</b>	1 233	4	1.72	3	1.29	2	0.86	9	3.86	
	2 215	7	3.26	0	0.00	0	0.00	7	3.26	
	3 192	2	1.04	3	1.56	2	1.04	7	3.65	
	4 161	2	1.24	3	1.86	1	0.62	6	3.73	
	5 140	1	0.71	1	0.71	3	2.14	5	3.57	
<b>CROSSBRED CATTLE</b>										
<b>Overall</b>	<b>1070</b>	<b>45</b>	<b>4.21</b>	<b>16</b>	<b>1.49</b>	<b>10</b>	<b>0.93</b>	<b>71</b>	<b>6.64</b>	
<b>Farm</b>	1 566	21	3.71	6	1.06	4	0.71	31	5.48	
	2 504	24	4.76	10	1.98	6	1.19	40	7.94	
<b>Period</b>	1 185	9	4.86	1	0.54	4	2.16	14	7.57	
	2 177	10	5.64	1	0.56	0	0	11	6.21	
	3 208	8	3.85	4	1.92	3	1.44	15	7.21	
	4 194	8	4.12	4	2.06	1	0.52	13	6.70	
	5 166	5	3.01	4	2.41	2	1.20	11	6.63	
	6 140	5	3.57	2	1.43	0	0	7	5.00	
<b>Season</b>	1 345	12	3.48	4	1.16	3	0.87	19	5.51	
	2 241	9	3.73	3	1.24	2	0.83	14	5.81	
	3 232	15	6.47	6	2.59	3	1.29	24	10.3	
	4 252	9	3.57	3	1.19	2	0.79	14	5.56	
<b>Lactation</b>	1 253	10	3.95	6	2.37	3	1.19	19	7.51	
	2 232	12	5.17	1	0.43	1	0.43	14	6.03	
	3 215	8	3.72	5	2.33	2	0.93	15	6.98	
	4 191	9	4.71	2	1.05	2	1.05	13	6.81	
	5 179	6	3.35	2	1.12	2	1.12	10	5.59	
<b>HARIANA CATTLE</b>										
<b>Overall</b>	<b>1473</b>	<b>34</b>	<b>2.31</b>	<b>13</b>	<b>0.88</b>	<b>5</b>	<b>0.34</b>	<b>52</b>	<b>3.53</b>	
<b>Farm</b>	1 766	19	2.48	6	0.78	4	0.52	23	3.00	
	2 707	15	2.12	7	0.99	1	0.14	29	4.10	
<b>Period</b>	1 253	6	2.37	1	0.40	2	0.79	9	3.56	
	2 240	7	2.92	2	0.83	0	0.00	9	3.75	
	3 281	5	1.78	2	0.71	1	0.36	8	2.85	
	4 259	6	6.32	5	1.93	0	0.00	11	4.25	
	5 235	4	1.70	1	0.43	1	0.43	6	2.55	
	6 205	6	2.93	2	0.98	1	0.49	9	4.39	
<b>Season</b>	1 453	9	1.99	2	0.44	1	0.22	12	2.65	
	2 376	8	2.13	4	1.06	1	0.27	13	3.46	
	3 327	10	3.06	5	1.53	2	0.61	17	5.19	
	4 317	7	2.21	2	0.63	1	0.32	10	3.15	
<b>Lactation</b>	1 325	10	3.08	4	1.23	1	0.31	15	4.62	
	2 308	8	2.60	2	0.65	1	0.33	11	3.57	
	3 292	6	2.95	2	0.68	0	0.00	8	2.74	
	4 283	8	2.83	2	0.71	1	0.35	11	3.82	
	5 265	2	0.75	3	1.13	2	0.75	7	2.64	

1 - Number of animals affected

2 - Percentage of animals affected



**Table 3.** Incidence of abnormal calving in relation to stage of pregnancy

Stage of Pregnancy	Abortions		Stillbirth		Premature birth		Abnormal calving	
	No.	%	No.	%	No.	%	No.	%
<b>JERSEY CATTLE</b>								
Below 120 days	3	18.75					3	8.82
121-150 days	1	6.25					1	2.94
151-180 days	3	18.75					3	8.82
181-210 days	4	25.00					4	11.77
211-240 days	5	31.25			6	75.00	11	32.35
241-270 days			1	10.00	2	25.00	3	8.82
Above 270 days			9	90.00			9	26.47
<b>Average duration</b>	<b>203.8±12.3 (16)</b>		<b>279.5±8.2 (10)</b>		<b>225.2±5.8 (8)</b>		<b>231.1±16.8 (34)</b>	
<b>CROSSBRED CATTLE</b>								
Below 120 days	7	15.56					7	9.86
121-150 days	4	8.89					4	5.63
151-180 days	9	20.00					9	12.68
181-210 days	15	33.33					15	21.13
211-240 days	10	22.22			8	80.00	18	25.35
241-270 days			2	12.50	2	20.00	4	5.63
Above 270 days			14	87.50			14	19.72
<b>Average duration</b>	<b>192.4±14.6 (45)</b>		<b>272.6±7.8 (16)</b>		<b>234.3±4.2 (10)</b>		<b>216.4±14.3 (71)</b>	
<b>HARIANA CATTLE</b>								
Below 120 days	6	17.65					6	11.54
121-150 days	3	8.82					3	5.77
151-180 days	6	17.65					6	11.56
181-210 days	9	26.47					9	17.31
211-240 days	10	29.41			4	80.00	14	26.92
241-270 days			2	15.38	1	20.00	3	5.77
Above 270 days			11	84.62			11	21.15
<b>Average duration</b>	<b>195.5±9.7 (34)</b>		<b>274.2±6.4 (13)</b>		<b>237.5±4.9 (5)</b>		<b>219.2±12.7 (52)</b>	

differences might be due to the different climatic conditions and varied managerial conditions.

The effect of period was non-significant for abortion, still-birth, premature birth and total abnormal birth in both the first calvers and older cows in all the genetic groups. These results were in agreement with the report of Kulkarni *et al.*, (1998) in crossbred cows. However, Mukherjee *et al.*, (1993) in Karan Swiss cows and Singh *et al.*, (1997) in Sahiwal and crossbred cows had reported significant effect of period on abnormal birth.

The incidence of abortion, still-birth and premature birth, were not significantly affected by season of calving in both the primiparous and pluriparous cows in all the genetic groups except for the abortion in crossbred pluriparous cows. Incidence of abortion was higher in calvers of rainy season than those calving during other seasons in crossbred pluriparous cows. In case of first calvers, season of calving had non-significant effect on incidence of abnormal birth including abortion, still-birth and premature birth in all the genetic groups. The incidence of abnormal birth was significantly influenced by season of calving in pluriparous cows in all the genetic groups except Jersey. Incidence of abnormal birth was more common in rainy season calvers as compared to other seasons. Arun *et al.*, (1993) reported significant



effect of season of calving on abnormal birth in dairy cattle.

Shankaregowda *et al.*, (2007) reported that the effect of season found to be significant on incidence of abortion. The higher incidence of total abnormal birth/abortion during rainy season might be attributed to predisposing factor as a high ambient temperature, higher rain fall and relative humidity, which extensively exposed the animals to infections and also increased their susceptibility to diseases and lowered their resistance power. The incidence of abnormal birth/abortion was lower in autumn season because of decline in air temperature to a comfortable level and drastic reduction in rainfall, wind velocity and relative humidity during autumn season as compared to rainy season. The low incidence was also due to the reduction in microbial concentration in the atmosphere (Michael *et al.*, 1986) and enhanced level of immunity because of better intake of feed/fodder, both qualitatively and quantitatively leading to general improvement in health status of animals (Mc Donald *et al.*, 1995). This study suggested that probably extraneous factors like temperature, wind velocity, relative humidity and rainfall influenced the incidence of calving complications *viz.* dystocia, retained placenta, metritis and abnormal birth etc. during different season of the year.

The effect of parity on incidence of abnormal parturition *i.e.* abortion, still-birth, premature birth and total abnormal birth was non-significant in all the genetic groups. Rawal and Tomar (1996) and Singh *et al.*, (1997) had observed non-significant effect of parity on the incidence of abnormal birth. Singh and Jain (1997) had observed significantly higher incidence of abnormal birth in previous lactations than the later lactations. However, Mukherjee *et al.*, (1993) and Arun *et al.*, (1995) found significantly higher incidence of abnormal birth in older cows of later lactations. The incidence of abortion in first parity cows was 2.82 percent. This gradually increased to 3.01 % in second parity cows and then dropped gradually and reached the minimum (0.38%) by fourth and fifth parity. The incidence was significantly higher in second (3.01%) and first parity (2.82%) cows as compared to cows in later lactation. However, parity of dam found to have no influence on the incidence of abortion (Shankaregowda *et al.*, 2007).

Analysis of variance indicated that genetic group did not affect the occurrence of abnormal calving *viz.* abortion, still-birth, premature birth and total abnormal birth in primiparous cows. However, the genetic groups had significant effect on the incidence of abortion and total abnormal birth in pluriparous cows. The incidence of both abortion and total abnormal birth was more in crossbred cows than Harijana and Jersey cows, considering first five calvings (Table 1).

The heritability estimates were found to be very low for abnormal birth, abortion and premature birth in crossbred and for abortion, still-birth and premature birth in Harijana cattle. The low heritability estimates were observed for abnormal birth, abortion and premature birth in Jersey cattle, for still-birth in crossbred and for abnormal birth in Harijana cows. The heritability of still-birth was found moderate in Jersey cattle. The low genetic variability indicated very little chances of improvement through selection. The non-genetic factor played the major role in the variation. The loss due to abnormal calving *viz.*, abortion, still-birth, premature births and abnormal birth, can be reduced by adopting the better managerial practices including better health measures. Low heritability estimates were also reported by Tomar *et al.*, (1995) for abortions, Rawal and Tomar (1996) and Singh *et al.*, (1997) for abnormal birth. However, Lindhe (1967) reported considerable differences among sires and among maternal grand sire on the incidence of still-birth and observed the heritability as 0.43.

The moderate value of repeatability was observed for abortion in Jersey (0.22) and premature birth in Harijana cattle (0.25). Thus, information obtained from previous calving could be used for future improvement and to reduce the incidence of abortion in Jersey and premature birth in Harijana cattle for later lactation. Low repeatability was observed for abortion in crossbred (0.15) and Harijana cows (0.10), total abnormal birth in Jersey (0.20) and crossbred cows (0.11), and also for premature birth in crossbred



cows (0.16). Almost zero values were found for abnormal calving in terms of still-birth in Jersey and crossbred cows, premature birth in Jersey and Haryana cows, and abnormal birth in Haryana cows. It is thus not possible to predict the incidence in future lactation on the basis of their occurrence in previous lactation. Similarly, very low estimates of repeatability were also reported by Mukherjee *et al.*, (1993) for abnormal and still-birth, Rawal and Tomar (1996) for abnormal birth in dairy cattle.

It was observed that 11.16, 22.93 and 12.92 % of the total cows in the Jersey, crossbred and Haryana herd terminated pregnancies either once or more times in any one or more parturitions during their stay in the herd. Further it was noted that 8.58, 1.72 and 0.86 % of the total Jersey cows had one, two and three abnormal calving, respectively. The corresponding figures were 19.37, 1.98 and 1.58 in crossbred cows and 10.46, 1.85 and 0.62 % in Haryana cows, respectively. None of the cow terminated more than thrice.

About 56 % of the total abortions took place during 181-240 days (7-8 months) of pregnancy in all the genetic groups, whereas the maximum cases (85-90 %) of still-born calves were recorded after 270 days of pregnancy. The still-births occurred after 279.5±8.1, 272.6±7.8 and 274.2±6.4 days in Jersey, crossbred and Haryana cows respectively. More than 75% premature births were recorded during 211-240 days (8th months) of pregnancy. Maximum abnormal calvings (25.4 %) were recorded during 211-240 days (8th months) of pregnancy. As for as the stage of gestation is concerned the incidence of abortion was more at late gestation followed by mid and early pregnancy ( Shankaregowda *et al.*, 2007).

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