The Indian Journal of Animal Reproduction; 29(2):144-148; December 2008 **Research Article**

Quantification of Reproductive Disorders in Jersey, Hariana and Crossbred Dairy Cattle*

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ABSTRACT

On the basis of 3484 calving records of 811 Jersey, Hariana and crossbred cows, it was observed that the per cent incidence of reproductive disorders among the progeny of different sires did not fall within the normal range of 30-70%. Susceptibility of prolapse, dystokia, retained placenta, metritis and abnormal birth was 2.6, 3.0, 3.4, 3.0 and 3.6% in Jersey cows; 4.4, 5.7, 5.8, 5.6 and 6.6% in crossbred and 2.4, 3.1, 3.8, 2.9 and 3.5% in Hariana cows, respectively. Crossbred cattle were more susceptible to these disorders than Hariana and Jersey cattle. These disorders were significantly associated with each other. The skewness and kurtosis were absent for all the disorders in all the genetic groups except for prolapse and abnormal birth in Jersey cattle population.

Key words: Cattle, Reproductive disorders, Association, Normality test, Chi-square, Kurtosis and skewness

INTRODUCTION

Threshold traits are a special class of characters which are qualitative on a phenotypic scale dividing the population in to discrete phenotypic classes but they are, on the contrary, controlled by polygene and affected by the environmental variations in which the animals are exposed. Characters like disease resistance and type of birth divide the population in two groups i.e. affected vs not affected and normal vs abnormal birth. Information are lacking for such characters confirming their normal distribution among the individuals in dairy cattle population. Though, few reports are available (Sethi and Balaine, 1978; Arun Kumar Chaudhary *et al.* 1995 and Mukherjee and Tomar, 1999). The present study was carried out in Hariana, Jersey and crossbred cattle population to test the normality of the distribution of reproductive disorders.

MATERIALS AND METHODS

The incidence of various reproductive disorders was analyzed utilizing the 3484 calving records, spread over a period of 20 years from 1982 to 1999, maintained at Government Livestock Farm, Bharari Sand, Chamoli (Jersey calvings 703), Hastinapur, Meerut (Jersey 238, crossbred 566, Hariana 766 and total 1570) and Babugarh, Ghaziabad (crossbred 493, Hariana 690 and total 1183). All the animals were maintained under uniform managemental conditions. A total number of 26, 29 and 25 sires were used in Jersey, Jersey x Hariana and Hariana, respectively. The value 1 was assigned to the susceptible animals and 0 to the resistant. The numbers of cows susceptible during first five calvings were counted sire-wise and per cent incidence of these disorders for different sires was calculated. The per cent values were transformed into arc sin values. The frequency distribution of sires falling in different class intervals was obtained and taken them as observed frequency (Sethi and Balaine, 1978). To test to normality of data for observed frequency of sires in different classes, the test of chi-square, kurtosis and skewness were applied according to Snedecor and Cochran (1967). Association among various diseases was also estimated.

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RESULTS AND DISCUSSION

The incidence of utero-vaginal prolapse, dystocia, retention of placenta, metritis and abnormal births were as 2.6, 3.0, 3.4, 3.0 and 3.6 per cent, respectively in Jersey cows. The corresponding figures were as 4.4, 5.7, 5.8, 5.6 and 6.6 per cent in crossbred and 2.4, 3.1, 3.8, 2.9 and 3.5 per cent in Hariana cows, respectively. These findings were in agreement for prevalence of metritis by Singh *et al.* (1997 and 2007a). However, comparatively lower incidence for prolapse and higher incidence for retained placenta in Sahiwal and their crossbred cattle were reported by Singh *et al.* (1997). The incidence of all the reproductive disorders and abnormal births were more common in crossbred cows than Jersey and Hariana purebred cows. These results were agreed with the report of Singh *et al.* (1997) and Deshmukh and Kulkarni (1999) for reproductive disorders.

It was observed that the incidences of various disorders according to their sires were ranged between 9.5 to 66.7% in Jersey, 7.7 to 61.5% in crossbred and 6.3 to 38.5% in Hariana cows. The Hariana cattle showed comparatively narrow range of incidence among the progeny of different sires (Table 1). The data showed that the 57.7, 53.9, 57.7, 73.1 and 69.2 per cent daughter of Jersey sires were found susceptible to prolapse, dystokia, retained placenta, metritis and abnormal birth, respectively. The corresponding percentage of sires whose progenies affected with above disorders were 65.5, 55.2, 72.4, 68.9 and 82.8 per cent in crossbred and 60.0, 56.0, 52.0, 60.0 and 92.0 per cent in Hariana cattle population, respectively. Shukla *et al.* (2007) reported prolapse of uterus, dystocia, anoestrus and repeat breeding as major problems. Among all disease, metritis and retention of placenta had maximum prevalence and affect the dairy economy by low milk production, lower conception rate, poor reproduction performance, treatment and labour cost, increase culling and mortality rate (Singh *et al.* 2007b).

It was observed that the average incidences of reproductive disorders among the progeny of different sires were transformed into arc sin and test for normality were applied (Table 1) which revealed non significant differences between the sires. These results were in agreement with the findings of Sethi and Balaine (1978) for retained placenta, Tomar and Tripathi (1983) for utero-vaginal disorders, Arun Kumar Chaudhary *et al.* (1995) and Mukherjee and Tomar (1999) for abnormal births.

The coefficient of skewness for all the disorders obtained for the sires were found to be non-significant (indicating absence of skewness) in each herd/cattle population except for the prolapse and abnormal births in Jersey cattle which were similar as observed by Tomar and Tripathi (1983) for utero-vaginal disorders, Arun Kumar Chaudhary *et al.* (1995) and Mukherjee and Tomar (1999) for abnormal births.

The observed frequency distribution curve for the prolapse and abnormal birth in Jersey cattle were not symmetrical i.e. more elongated to the right side, which indicated positive skewness for both traits. However, Sethi and Balaine (1978) reported negative skewness for retained placenta. The skewness might be due to the less number of observations (small sample size), which resulted chance fluctuations in some classes. The interaction effect of genes and the different environmental factors also caused skewness. Sickness, low nutrition and low managemental factors affecting some of the individuals of a population forced to take extreme values.

The coefficients of kurtosis were not significant for all the disorders in Jersey, Hariana and Jersey x Hariana population under study (Table 1) indicating the absence of kurtosis. Similar findings were also observed by Tomar and Tripathi (1983) for utero-vaginal disorders, Arun Kumar Chaudhary *et al.* (1995) and Mukherjee and Tomar (1999) for abnormal births. Contrary to the present results, Sethi and Balaine (1978) for retained placenta reported positive kurtosis.

The abnormal births had positive and significant association with prolapse, dystocia, retention of placenta and metritis in all the genetic groups. The incidence of prolapse, dystokia, retention of placenta and metritis had positive and significant association among themselves (Table 2). Results indicated that cows with one disorder were at increased risk for other reproductive disorders. These results were in agreement with the report of Mukherjee *et al.* (1993). Correa *et al.* (1993) also observed that dystocia was related to an increase in the possibility of retained placenta. Post-partum period with dystocia or retained placenta ascribed to in the possibility of occurrence of metritis. Sidhu *et al.* (2007) mentioned that among peri-parturient reproductive disorders,

Table 1: Test of chi-square, skewness and kurtosis to test normality in reproductive disorders

Trait/ Disease	No. of sires whose progeny		No. of progenies		Incidence	Range of incidence percent among progeny of different sires		Chi-square	Skew-ness	Kurtosis
	Resistant	Suscept	Resistant	Suscept		Min.	Max.			
JERSEY CATTLE										
Prolapse	11	15 (57.7)	220	13 (5.57)	2.55	9.54	57.14	2.199**	0.640	2.199**
Dystokia	12	14 (53.9)	211	22 (9.44)	2.97	13.81	57.47	0.588	3.118	0.588
ROP	11	15 (57.7)	208	20 (8.58)	3.39	5.88	66.67	0.563	3.327	0.563
Metritis	7	19 (73.1)	213	20 (8.58)	2.97	9.54	66.67	0.548	2.766	0.548
Abnormal birth	8	!8 (69.2)	205	28 (12.0)	3.61	9.54	66.67	0.796	2.035**	3.138
CROSSBRED CATTLE										
Prolapse	10	19 (65.5)	217	36 (14.23)	4.39	9.09	50.00	0.889	0.567	-0.008
Dystokia	13	16 (55.2)	202	51 (20.16)	5.70	7.69	50.00	0.962	0.626	0.301
ROP	8	21 (72.4)	208	45 (17.79)	5.79	14.28	42.86	0.951	-0.318	-0.452
Metritis	9	20 (68.9)	206	47 (18.58)	5.60	11.11	57.14	0.946	0.385	0.027
Abnormal birth	5	24 (82.8)	194	59 (23.3)	6.64	15.38	61.54	0.933	-0.025	0.107
HARIANA CATTLE										
Prolapse	10	15 (60.0)	304	21 (6.46)	2.38	10.3	25.00	0.905	0.217	-0.142
Dystokia	8	17 (68.0)	291	34 (10.46)	3.05	7.69	28.57	0.954	0.066	-0.163
ROP	9	16 (64.0)	280	45 (13.85)	3.80	7.69	35.71	0.967	0.152	-0.680
Metritis	6	19 (76.0)	295	30 (9.23)	2.85	6.25	38.46	0.898	0.562	0.525
Abnormal birth	1	24 (96.0)	282	43 (13.23)	3.53	7.14	33.33	0.913	0.643	-0.334

Within parenthesis values are in percentage, $*p<0.05$, $**p<0.01$

retained placenta was found to be the major predictor of metritis that increased the risk of mastitis post calving. Prolapse of uterus may result from dystocia or pathogenic retention of placenta which in turn is associated with dystokia and abortions (Hafez, 1974). However, Singh *et al.* (1997) reported significant negative association of prolapse with dystokia and retained placenta.

The frequency curve for all these disorders were normally distributed in these

Table 2: Association among various utero-vaginal disorders from first to fifth lactations

Diseases (1)	Diseases (2)	No. of animals resistant to both Diseases	No. of animals susceptible to: Both disease	Only to disease (1)	Only to disease (2)	χ^2 value
JERSEY CATTLE						
Prolapse	Dystocia	892	3	21	25	7.73**
"	ROP	889	4	20	28	13.19**
"	Metritis	895	6	18	22	41.38**
"	Abn.Birth	887	4	20	30	12.05**
Dystocia	ROP	897	16	12	16	253.73**
"	Metritis	897	12	16	16	158.99**
"	Abn.Birth	890	11	17	23	105.45**
ROP	Metritis	896	15	17	13	221.13**
"	Abn.Birth	889	14	18	20	153.23**
Metritis	Abn.Birth	887	8	20	26	51.62**
CROSS-BRED CATTLE						
Prolapse	Dystocia	973	11	36	50	28.66**
"	ROP	969	8	39	54	11.35**
"	Metritis	968	6	41	54	4.56*
"	Abn.Birth	961	9	38	62	12.43**
Dystocia	ROP	956	9	52	53	9.52**
"	Metritis	956	7	54	53	4.21*
"	Abn.Birth	949	11	50	60	13.56**
ROP	Metritis	962	14	48	46	35.82**
"	Abn.Birth	953	16	46	55	39.04**
Metritis	Abn.Birth	957	18	42	53	56.01**
HARIANA CATTLE						
Prolapse	Dystocia	1401	8	27	37	47.47**
"	ROP	1391	9	26	47	47.07**
"	Metritis	1402	6	29	36	26.44**
"	Abn.Birth	1391	5	30	47	12.18**
Dystocia	ROP	1385	13	32	43	79.88**
"	Metritis	1397	11	34	31	78.13**
"	Abn.Birth	1392	16	29	36	139.79**
ROP	Metritis	1389	14	42	28	103.09**
"	Abn.Birth	1377	12	44	40	54.76**
Metritis	Abn.Birth	1390	11	31	41	65.19**

* $P < 0.05$, ** $P < 0.01$

populations and gave an evidence of polygenic inheritance. The appearance of such disorders was determined by the minor genes with small quantitative effect. Therefore, the genetic analysis of susceptibility should be done considering it as a threshold trait.

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