

Influence of genetic and non-genetic factors on incidence of reproduction problems in Karan Fries cows

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In the present investigation, the effect of genetic and non-genetic groups on the incidence of reproductive problems has been studied. The effect of genetic group was found to be non-significant for all the reproduction problems in all calvers however it is significant ($P < 0.05$) for repeat breeder and anoestrous in first calvers. The effect of season of calving on repeat breeding and anoestrous was found to be significant and similar results was observed for period on pyometra in all calvers and but was not significant in first calvers. The cows suffered with anoestrous had non-significant effect on total milk yield and dry period while significant effect was found on 305-days milk yield, lactation length, calving interval and service period. However, the effect of pyometra on production and reproduction traits was non-significant. The overall incidence of repeat breeder, anoestrous and pyometra cows was 10.7, 22.5 and 1.53 % respectively for first calvers and 11.7, 18.5 and 2.30 %, respectively for all calvers.

Key words: Anoestrous, Pyometra, Repeat breeding

Reproduction problems affect the herd life, reproductive efficiency of cows and economy of dairy herds and are responsible for culling of the cows. It has been observed that crossbreds are more susceptible for the reproduction problems as compared to the indigenous breeds. Though, information on incidence and inheritance of reproduction disorders in dairy cattle in advanced temperate countries is well reported, yet such estimates are scanty for crossbred strains developed in India. Further, identification of genetic and non-genetic factors influencing reproductive disorders will facilitate developing breeding and management strategies for realizing higher intensity and increased accuracy of selection of elite cows in the herd. Therefore, the present study was undertaken with two objectives in Karan Fries cows (Holstein Friesian X Tharparkar), a strain developed at N.D.R.I, Karnal as:

- 1) To study the influence of genetic and non-genetic factors on incidence of reproduction problems
- 2) To study the effect of reproduction problems on production and reproduction performance.

MATERIALS & METHODS

The study was carried out on Karan Fries (KF) cattle maintained at this institute during the period of 2001 to 2006 comprising 1174 calving records of 553 cows and their related production and reproduction performance records. The 3 reproductive problems, viz. anoestrous, repeat breeding and pyometra were investigated for the present study. The data were classified into 3 genetic groups viz. a) F1 (HF × Tharparkar / Sahiwal), b) Interbred (KF × KF), and c) 3/4 and above (HF × KF) and non-genetic factors such as 5 parities; 3 periods – each comprising of 2 years; and 4 seasons. Influence of genetic and non-genetic factors on incidence of various reproduction problems were analyzed by using Chi-square method. Statistical analysis was performed by using least squares technique given by Harvey [3] in which the category variables 1 and 2 were assigned to the affected and unaffected cows. The model used for analysis was given as follows:

$$Y_{ij} = \mu + d_i + e_{ij}$$

Where,

Y_{ij} = jth Observation of production/reproduction performance of a cow belonging to ith class of reproduction problem

μ = Population mean

d_i = Effect of ith class of reproduction problem (i=1–Susceptible, i=2– Resistant)

e_{ij} = Random error associated with y_{ij} which is assumed to be NID (0, σ^2)

The heritability of threshold traits was estimated for first parity and second parity separately, by paternal half sib correlation method. The repeatability was obtained for the incidence of the reproduction problems in the first two lactations and, second and third lactations separately by estimating the regression of performance in one lactation on that of the previous lactation [5].

RESULTS & DISCUSSION

Influence of genetic and non-genetic factors on the incidence of reproduction problems

In the present, it has been observed study that, the incidence of different reproduction problems was higher in interbred genetic group of first calvers. However, Deshmukh and Kaikini[2] and Kulkarni and his coworker[4] reported that $\geq 3/4$ genetic group cows were more susceptible to reproductive problems as compared to other genetic groups of crossbred cows. Statistically, the effect of genetic group was significant for the reproduction problems of repeat breeder and anoestrous and non-significant for all calvers (Table 1 and Table 2). The non-significant effect of genetic group in most of the reproductive problems suggested that crossbreeding did not alter the incidence of reproduction problems. The present estimates of incidence of repeat breeder and anoestrous for first calvers were lower than those reported by Kulkarni and his coworker [4] in crossbred cows, this difference in our finding indicating better reproduction management practices at the institute herd.

The effect of season of calving on repeat breeding and anoestrous; and period on pyometra was significant in all calvers and not significant in first calvers. The remaining non-genetic factors showed the non-significant effect on all the reproduction problems in all calvers and in first calvers it is significant ($P < 0.05$) for repeat breeder and anoestrous. However, Sharma and Luktuke [6] found that the significant effect of parity order on the incidence of anoestrous in crossbred cows. Overall the effect of season indicates summer and hot-humid seasons are of critical importance for most of the reproduction problems. Chourewar and his coworker [1] reported the non-significant effect of genetic group, period and season on repeat breeding and anoestrous in crossbred cows. Difference in the present finding may be attributed because of extreme winter and summer season at the institute herd.

Genetic parameters of reproduction problems

The heritability estimates of repeat breeding (0.12 ± 0.23) during second lactation and anoestrous (0.13 ± 0.29) during first lactation were found to be low indicating that those reproduction problems are primarily governed by non-genetic factors. This suggested that the incidence of these problems can

Table 1: Incidence of reproduction problems of first calvers in Karan Fries cows

Effects	Total calving	Repeat breeder		Anoestrous		Pyometra	
		No. affected	%	No. affected	%	No. affected	%
Overall	391	42	10.7	88	22.5	6	1.53
Period	2001-02	109	7	41	37.6	1	0.92
	2003-04	132	16	23	17.4	2	1.52
	2005-06	150	19	24	16.0	3	2.00
		2.96		1.98		4.90	
Season	Winter	159	21	36	22.6	2	1.26
	Summer	104	11	27	25.9	3	2.88
	Rainy	67	2	17	25.4	1	1.49
	Autumn	61	8	8	13.1	0	0.00
-value		5.57		4.11		2.28	
Genetic group	F1	30	2	5	16.7	0	0.00
	Interbred	331	37	77	23.2	6	1.81
	= ¾	30	3	6	20.0	6	0.00
value		6.02*		8.03*		1.10	

* - Significant (P<0.05)

Table 2: Incidence of reproduction problems of all calvers in Karan Fries cows

Effects	Total calving	Repeat breeder		Anoestrous		Pyometra	
		No. affected	%	No. affected	%	No. affected	%
Overall	1174	137	11.7	217	18.5	27	2.30
1	391	42	10.7	88	22.5	6	1.53
2	261	37	14.2	58	22.2	6	2.30
3	158	19	12.0	22	13.9	3	1.90
4	112	17	15.2	14	12.	4	3.57
5 and above	252	22	8.73	35	13.9	8	3.17
²-value		5.38		1.49		2.79	
	2001-02	374	34	117	31.2	15	4.01
	2003-04	379	48	45	11.9	3	0.79
	2005-06	421	55	55	13.1	9	2.14
²-value		3.57		5.98		8.75*	
Winter	448	65	14.5	81	18.1	6	1.34
	Summer	267	32	57	21.3	7	2.62
	Rainy	277	19	56	20.2	13	4.69
	Autumn	182	21	23	12.6	1	0.55
²-value		9.75*		6.18*		1.15	
Genetic group	161	19	11.8	20	12.4	2	1.24
	Interbred	960	113	188	19.6	24	2.50
	= ¾	53	5	9	16.9	1	1.89
²-value		2.69		4.77		1.01	

* Significant (P<0.05)

be reduced only through better management rather than through genetic manipulation. The heritability estimate of repeat breeding was in conformity with the findings of Chourewar and his coworker [1] in crossbred cows. The higher heritability estimates of anoestrous (0.54 ± 0.27) during second lactation, indicating sufficient sire to sire variability in the trait. So far, no information was available regarding heritability of anoestrous in crossbred cows. Heritability of repeat breeding in first lactation and pyometra in both first and second lactation were not estimable. The repeatability estimates of anoestrous (0.07) in first two lactations and second and third lactation (0.24); and repeat breeding in second and third lactations (0.09) were low. These results indicated a limited scope of selection at an earlier age for reducing their incidence in future lactations. There is no literature available for comparison of these repeatability

estimates in crossbred cows. Repeatability of repeat breeding in first two lactations and pyometra in both first two lactations and second and third lactations were not estimable.

Effect of reproductive problems on production and reproduction traits

The present study indicated that repeat breeders had higher 305-days milk yield, total milk yield and longer lactation length accompanied with adverse effect on calving interval, service period and dry period (Table 3). Analysis showed that these effects were statistically significant. Service period, dry period and calving interval are invariably increased in cows taking more number of services to conceive. The cows suffered with anoestrous had significant effect on 305-days milk yield, lactation length, calving interval and service period and non-significant effect on total milk

Table 3. Effect of reproduction problems on production and reproduction performance traits in Karan Fries cows (Least-square mean \pm Standard error)

Condition of cows	Reproduction problems					
	Repeat breeding		Anoestrous		Pyometra	
	Unaffected (796)	Affected (119)	Unaffected (732)	Affected (183)	Unaffected (893)	Affected (22)
305 DMY (Kg.)	3585 \pm 40.3	4015 \pm 104**	3678 \pm 42.2	3490 \pm 84.5*	3648 \pm 38.3	3352 \pm 244
TMY (Kg.)	4063 \pm 78.5	5149 \pm 203**	4193 \pm 83	4249 \pm 166	4212 \pm 75.1	3885 \pm 478.9
LL (Days)	338 \pm 3.13	427 \pm 8.10**	342 \pm 3.40	380 \pm 6.80**	349 \pm 3.12	364 \pm 19.8
Calving Interval (Days)	421 \pm 5.63(406)	560 \pm 15.1(56)**	424 \pm 6.17(370)	494 \pm 12.3(92)**	437 \pm 5.73(452)	471 \pm 38.5(10)
Service Period (Days)	148 \pm 6.81(407)	290 \pm 18.2(57)**	152 \pm 7.39(372)	221 \pm 14.9(92)**	164 \pm 6.81(453)	208 \pm 43.7(11)
Dry Period (Days)	79.2 \pm 4.25(404)	116 \pm 11.4(56)**	81.9 \pm 4.5(368)	90.5 \pm 9(92)	83.5 \pm 4.07(450)	89.9 \pm 27.3(10)

* - Significant ($P < 0.05$); ** - Significant ($P < 0.01$); 305 DMY – 305 Days milk yield; TMY– Total milk yield; LL–Lactation length; Figures in parentheses indicates number of observations.

reproduction traits was non-significant.

Overall, it was observed that the high yielders are more susceptible to anoestrous and repeat breeding conditions which resulted in deterioration in reproduction performance. Such types of study were not available in the literature for comparison. Different seasons are of critical importance for most of the reproduction disorders. Overall incidence revealed a reduction in reproduction problems in latter periods/years, showing progressive improvement in management of reproduction problems over the years. It was suggested that a more extensive study on a larger number of crossbred animals with sufficiently large number of lactation records in each of the genetic groups be conducted.

CONCLUSION

The overall incidence of repeat breeder, anoestrous and pyometra cows was 10.7, 22.5 and 1.53 % respectively for first calvers and 11.7, 18.5 and 2.30 % respectively for all calvers. The genetic group effect was significant source of variation only for repeat breeding and anoestrous in first calvers. The effect of season of calving on repeat breeding and anoestrous; and period on pyometra was significant in all calvers and not significant in first calvers. The estimates of heritability and repeatability were low for all the reproduction problems except anoestrous. Repeat breeding effect was significant for all the production and reproduction traits. The effect of anoestrous was also significant for all the production and reproduction traits

except total milk yield and dry period. Pyometra had non-significant effect on all the production and reproduction traits.

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