GENETIC AND NON-GENETIC FACTORS AFFECTING BREEDING EFFICIENCY IN MALVI COWS

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ABSTRACT

Effects of period and season of first calving and inbreeding on breeding efficiency by Wilcox (BEW) and Tomar (BET) Methods were studied on 403 *Malvi* cows maintained at the Government Cattle Breeding Farm, Agar, District Shajapur (M.P.). The least squares means of BEW and BET were found to be 88.04±1.52 and 76.83±0.89 per cent, respectively. Both the breeding efficiency were significantly (P<0.01) affected by the period of first calving and inbreeding. The effect of season of first calving was non-significant. From the results it could be inferred that inbreeding has adverse effect on breeding efficiency as inbred cows had significantly lower breeding efficiency in comparison to non-inbred cows.

KEYWORDS: Malvi Cattle, inbreeding, breeding efficiency.

INTRODUCTION

The low breeding efficiency of dairy cows not only uneconomical but also results into longer generation interval and thus smaller annual genetic gain. Hence to increase the profitability of dairy animals, it is essential to improve their breeding efficiency. In India most of herds of cattle are small in size and hence the inbreeding in inevitable. Meagre information appears to have been published on the effect of genetic and non-genetics factors on breeding efficiency in *Malvi* cattle. Therefore, the present investigation was conducted to study the effect of inbreeding and period and season of calving on breeding efficiency in *Malvi* cows.

MATERIALS AND METHODS

The records of 403 *Malvi* cows maintained at the Government Cattle Breeding Farm, Agar, District Shajapur (M.P.) extending over a period of 48 years (1962-2009) were analysed. The breeding efficiency by two methods i.e. the one based on calving interval (Wilcox *et al.*, 1957) and the other based on calving interval and age at first calving (Tomar, 1965) was calculated. The calculated values of breeding efficiency in percentages were transformed using arcsine transformation for the purpose of analysis and the observations were arranged according to the date of first calving. The entire period of 48 years was delineated into eight periods of six years each and the year was divided into four seasons, viz. Spring (Feb – Mar), Summer (Apr – Jun), Rainy (Jul – Sept) and Winter (Oct – Jan). The inbreeding coefficient for each cow was calculated (Wright, 1922) and for each inbred cow it was found to be 0.25 as they were all produced by sire – daughter mating. Therefore, on the basis of inbreeding, the cows could be classified into two groups only, viz., non-inbred and inbred. The data were analysed by least squares technique using “Mixed Model Least Square and Maximum Likelihood Computer Programme PC-2” (Harvey, 1990). The three-way classification model was used for explaining variation in breeding efficiency by including period, season and inbreeding as fixed affects.

RESULTS AND DISCUSSION

The least squares means of BEW and BET are presented in Table 1. The cows seemed to be

good breeders on an average on the basis of BEW; they were comparatively poor breeders from the view point of BET. This is due to the fact that the BEW is based on calving interval only whereas the BET takes into account both calving interval as well as age at first calving and the results of calving interval and age at first calving in this herd have shown that the average age at first calving (1736.70 days) was far above the ideal age at first calving (1020 days) as compared to the difference between average calving interval (391.59 days) and the ideal (365 days) calving interval (Sharma, 2010). Studies on breeding efficiency of *Malvi* cows are limited. The mean breeding efficiencies observed in this study are close to those reported by Tomar and Singh (1981) in Hariana and Chaudhary *et al.* (1984) in Sahiwal cows. However the present estimates for BEW and BET are higher than the values reported by Taylor *et al.* (1978) in Malvi, Pundhir (1994) in Sahiwal and Hariana, and Barwe *et al.* (1998) and Bhadoria and Tomar (2002) in Gir cows. These differences in the mean breeding efficiency might be either due to the differences in genetic potential of different breeds / herds for this trait or it might also be a reflection of the variation in environmental conditions arsing from differences in feeding and managemental practices at different farms. Further, differential culling levels on the basis of reproductive failures in different herds might also have

Table 1. Least squares means and standards errors for breeding efficiency

Subclass Description	Number of Observations	Mean±S.E. (%)	
		BEW	BET
Overall Mean (μ)	403	88.04±1.52	76.83±0.89
Period			
P_1 (1962-67)	17	88.54 ± 4.73^{bcd}	72.34 ± 2.15^{a}
P_2 (1968-73)	32	93.31 ± 4.13^{e}	$79.43.\pm1.96^{bc}$
P_3 (1974-79)	45	86.53 ± 3.50^{bc}	71.38 ± 1.72^{a}
P_4 (1980-85)	68	90.12 ± 2.78^{cde}	79.94 ± 1.59^{bc}
P_5 (1986-91)	67	91.66 ± 2.88^{de}	83.38 ± 1.61^{c}
P_6 (1992-97)	74	89.21 ± 2.24^{cd}	79.66 ± 1.49^{bc}
P_7 (1998-2003)	82	79.40 ± 1.97^{a}	70.79 ± 1.22^{a}
P_8 (2004-2009)	18	85.57 ± 4.58^{b}	77.72 ± 2.12^{b}
Season			
S_1 (Spring)	56	88.13±4.19	76.10±1.45
S_2 (Summer)	65	90.22±3.75	75.62±1.29
S_3 (Rainy)	85	87.44±2.95	78.21±1.17
S_4 (Winter)	197	86.37±1.94	77.39±1.03
Inbreeding Level			
IL_1 (Non-inbred)	358	91.64 ± 2.91^{b}	80.59 ± 2.57^{b}
IL_2 (Inbred)	45	84.44 ± 3.87^{a}	73.07 ± 3.23^{a}

The means with at least one common alphabet as superscript do not differ significantly from each other.

played some role in exhibiting these differences in breeding efficiency of different herds.

The analysis of variance revealed that the period of first calving and inbreeding had highly significant effect (P<0.01) on both BEW and BET. For period our results are in agreement with the findings of Gandhi and Gurnani (1990) and Pundhir (1994) in Sahiwal and Barwe *et al.* (1998) and Bhadoria and Tomar (2002) in Gir cows. There was no specific trend in BEW and BET over the periods (Table 1). This reflects erratic trend in calving interval and age at first calving over the periods (Sharma, 2010). Inbred cows had significantly lower breeding efficiency as compared to non-inbred cows (Table 1). Reports on the effect of inbreeding on BEW and BET in cattle do not appear to be readily available. However, Sharma (2010) has reported significant and adverse effect of inbreeding on age at first calving and calving interval, the traits closely connected with breeding efficiency. The season of first calving had non-significant effect on BEW and BET. This is in agreement with the findings of Pundhir (1994) in Shaiwal and Barwe *et al.* (1998) and Bhadoria and Tomar (2002) in Gir cows. However, Gandhi and Gurnani (1990) in Sahiwal cows reported a significant effect of season on breeding efficiency. From the results it could be inferred that inbreeding has adverse effects on breeding efficiency in *Malvi* cows. It reflects delayed age at puberty, higher age at first calving and longer calving intervals.

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