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Selection indices in Gir cattle

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The overall productivity and economy of dairy herd depends on several economic traits displayed by dairy animal during its life. Breeder is concerned with the methods for changing genetic specifications of animals to make them more useful to men. The maximum genetic gain within a limited period of time could be possible through precise and viable index incorporating important economic traits when the breeding goal is to improve multi-economic traits. The scanty information on index selection for maximising genetic gain in Gir breed lad to conduct the present study.

The data on different economic traits on 301 Gir cows spread over a period of 38 years (1960-97) were collected from Kasturba Gandhi Memorial National Trust Dairy Farm, Kasturbagram, Indore. The data were analysed by least squares technique of fitting constants (Harvey 1979). After correcting the data for significant non-genetic factors, the genetic and phenotypic variances were constructed using variance-covariance matrices and weighing coefficients (b values) for each trait (Hazel 1943). Three different selection indices were constructed using different combinations of first lactation milk yield, first lactation period, first dry period and first service period. The major difficulty in constructing selection index lies in establishing the relative economic value of each trait to be included in the index. However, in view of several reports (Smith 1983, Akhtar *et al.* 1987) that relative economic value was least important factor to affect correlation (r_{IH}) between aggregate breeding value (H) and index (I), equal relative economic weight of 1 was given to each trait.

Since increase in dry period and service period is not desirable from the economic point of view. The relative economic value of these 2 traits was assigned negative sign (-1). The relative economic value of lactation yield and lactation period was assigned positive sign (+1) as increase in these two traits increases the net value of the cow. The r_{III} value was calculated as per Kempthorne and Nordskog (1959).

Three selection indices were developed by incorporating 4 first lactation traits, viz. lactation yield, lactation period , dry period and service period (Table 1). The r_{III} values of indices were moderate in magnitude except index number 3 (I_3) which had very low r_{III} value.

The index involving all the 4 traits (I_1) was most efficient and had highest r_{III} value (0.54). Dropping of first service period (I_2) from 4-variate index (I_1) caused slight decline in efficiency as revealed by slight reduction in correlation between aggregate genetic worth and index value (r_{IH}=0.51). However, significant and worth noting decline in magnitude of r_{III} (0.08) was observed when first dry period was also dropped with first service period from the index (I_3). The finding further revealed that efficiency of index increased with the increase in the number of varieties. The results indicated that to maximise the geneic gain in this herd selection index incorporating lactation yield, lactation period and dry period should be used as the increase in r_{III} value by incorporating service period (I_1) will not commensurate with increase in labour and expense incurred. The reports on selection indices in Gir breed of cattle do not appear to be

Table 1. Correlation between aggregate genetic merit and index (r_{III} values) for different selection indices in Gir cattle

Index	Traits included in the index				r_{III} value
	1	2	3	4	
I	First lactation yield	First lactation period	First period	First service period	0.54
I	First lactation yield	First lactation period	First period	-	0.51
I	First lactation yield	First lactation period	-	-	0.08

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readily available. However. The selection indices constructed by Gandhi and Gurnani (1991), Gaur *et al.* (1995) and Sethi *et al.* (1995) in Sahiwal cattle involving various economic traits revealed varying degree of efficiency and r_{IH} value depending upon the traits used and number of traits involved as observed in this study. Further, earlier also lactation yield (Gandhi and Gurnani 1991, Sethi *et al.* 1995) and lactation length (Sethi *et al.* 1995) have been proposed to be incorporated in the most efficient selection indices to achieve maximum genetic gain. The elimination of unimportant traits (service period in this study) did not materially change the r_{IH} value, which is in agreement with the findings of Kumar and Bhatnagar (1990) in Karan Swiss cattle.

It could be concluded form this study that selection index I_2 may be utilised to improve the overall performance of the herd.

SUMMARY

Three selection indices were developed by incorporating 4 economically important traits in different combinations viz., first lactation yield, first lactation period, first dry period and first service period in Gir herd. The r_{IH} values of I_1 incorporating all the 4 traits, I_2 incorporating lactation yield, lactation period and dry period and I_3 involving lactation yield and lactation period were 0.54, 0.51 and 0.08 respectively. It could be concluded that selection index I_2 may be utilised to improve upon the overall performance of Gir herd.

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