INHERITANCE OF SOME ECONOMIC TRAITS IN MURRAH BUFFALOES*

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ABSTRACT

415 first lactation records of Murrah buffaloes sired by 79 bulls were analysed to estimate heritability, genetic and phenotypic correlation among various economic traits. The heritability estimates of age at first calving, first lactation peak yield, first lactation 305 days yield, first lactation total yield, first lactation length, first dry period and first calving interval were 0.42 ± 0.19, 0.48 ± 0.19, 0.38 ± 0.18, 0.35 ± 0.18, 0.05 ± 0.13, 0.00 ± 0.19 and 0.13 ± 0.28, respectively. The genetic correlations among traits were generally either on negative side or more than unity. The phenotypic correlations were calculated to be low to medium.

INTRODUCTION

Knowledge of genetic and phenotypic parameters of economic traits is indispensable in formulating cattle and buffalo improvement programme. The magnitude of heritability provides an idea about the scope for effective genetic improvement through selection while genetic correlation determines its direction and relative magnitude of change in other traits. This study was, therefore, carried out to estimate the heritability, genetic and phenotypic correlations of first lactation economic traits in Murrah buffaloes.

MATERIAL AND METHODS

The first lactation records of 415 Murrah buffaloes sired by 79 bulls, spread over a period of 11 years (1981-91) constituted the material for this study. The buffaloes were maintained at National Dairy Research Institute, Karnal. The records with less than 100 days lactation length were excluded from study. The first lactation traits studied were age at first calving (AFC), first lactation peak yield (FPY), first lactation 305 days yield (F305MY), first lactation complete yield (FLY), first lactation length (FLL), first dry period (FDP) and first calving interval (FCI).

The heritability of different characters was estimated after adjusting the data for significant environmental effects (period of calving and season of calving) by paternal half sib correlation method. Data on progeny groups with five or more daughters per sire were considered for the estimates. The heritabilities were calculated as per following model (Becker, 1975):

\[ Y_{ij} = \mu + S_i + e_{ij} \]

Where,

- \( Y_{ij} \) = is the performance of \( j \)th progeny of \( i \)th sire
- \( \mu \) = is the overall mean
- \( S_i \) = is the effect of \( i \)th sire
- \( e_{ij} \) = is the random error \( Is2 \)

The genetic and phenotypic correlations among different first lactation traits were calculated from the analysis of variance and covariance among sire groups (Becker, 1975).

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RESULTS AND DISCUSSION

The estimates of heritability and genetic and phenotypic correlation between and among various first lactation traits of Murrah buffaloes are presented in Table 1.

The estimate of heritability of age at first calving was calculated to be 0.42 ± 0.19. The present estimate is in line with the estimates by Prakash (1984) and Singh and Basu (1988). The present estimate indicated adequate additive genetic variability in AFC for improvement through mass selection.

The heritability of first lactation peak yield was calculated to be 0.48 ± 0.19. This value is in close agreement with the report of Dhinsa (1963). The h² estimate of peak yield showed the suitability of individual selection for further improvement of the buffaloes.

The heritability estimate for first lactation 305 days yield and complete lactation yield were calculated to be 0.38 ± 0.18 and 0.35 ± 0.18, respectively. These estimates indicated scope for further improvement through proper selection programme. These h² estimates are closer to those reported by Gajbhiye (1987), Hatwar and Chawla (1987) and Sahana (1993).

The heritability estimate of first lactation length was as low as 0.05 ± 0.13. The report closer to this estimate were claimed by Singh (1987) and Gajbhiye and Tripathi (1991). This low estimate of h² may be due to higher component of environmental variance.

The heritability estimate of first lactation dry period was calculated to be 0.00 ± 0.19. The similar estimate of h² for FDP was also reported by Hatwar and Chawla (1987) and Sahana (1993).
The estimate of heritability for first calving interval was observed to be 0.13 ± 0.28. This estimate is close to that reported by Hatwar and Chawla (1987).

The phenotypic correlations were found to be positive and significant in almost all the cases. Positive and non significant correlations were observed to be between AFC and FPY and between FPY and FCI. The relationship between FCI and FDP was negative and non significant. Gajbhiye (1987) and Sahana (1993) have also reported a positive and significant correlations between and among AFC, F305MY, FLY, FDP and FCI.

The genetic correlations between the traits were estimated to be high. Age at first calving showed high and negative correlation with FPY, F305MY, FLY, FDP and FCI. The positive and high magnitude of genetic correlation indicated the pleiotropic effect of the genes. In consonance to the findings of this study E1-Arian (1986) reported a high and negative relationship of age at first calving with F305MY and FLY. He also worked out a positive and high correlation of AFC with first dry period and first calving interval. Sahana (1993) found positive and low magnitude of relationship of AFC with FPY and FLY. The genetic correlation of FDP and FCI with other traits were observed to be erratic which might be due to more influence of environmental factors on these traits as $h^2$ estimates are low. The findings are consonance with the report of E1-Arian (1986) and Sahana (1993).

From this study it may be concluded that genetic improvement in age at first calving, first lactation peak yield, 305 day and complete lactation yield can be brought about through individual selection. The low estimates of heritability for first lactation length and first calving interval indicate the major contribution of non genetic factors in the phenotypic values of these characters. Therefore, the improvement may be brought about by improving managemental practices and selection of animals through progeny testing.

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REFERENCES