

GENETIC STUDIES ON LIFETIME PERFORMANCE IN SURTI BUFFALO

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SUMMARY

The data consisting of 1274 records on 441 Surti buffaloes, spread over a period of eighteen years (1972 to 1989), maintained at Central Cattle Breeding Farm, Dhamrod, (Gujarat) India, was analysed for the present study. The averages of various lifetime traits were 4271.64±81.80 & 5943.24±144.36 kg for LTP-1 and LTP-2, respectively; 1442.61±22.74 & 1939.40±33.25 days for PL-1 and PL-2, respectively; and 3.04 ± 0.06 & 3.11±0.07 kg for MY/PL-1 and MY/PL-2, respectively. The heritability for lifetime production traits was moderate to high. In most of the cases, high coefficients of genetic and phenotypic correlation were observed among various lifetime production traits in the present study.

Key words: Lifetime production, heritability, genetic and phenotypic correlations, Surti buffalo.

INTRODUCTION

Lifetime performance is the final trait among all economic traits which estimate the overall economic efficiency of an animal, therefore, the ultimate aim of a breeder is to bring an improvement in lifetime performance of an animal in order to get maximum overall lifetime profit. Calculation of milk production for total lifetime is not possible in practice, since many of the buffaloes are not kept in the herd till their natural death. Hence, the production in the first four lactations can be considered as an ideal scale for estimation of lifetime milk production. Keeping this in view, the present investigations were conducted in Surti buffalo, which is a native breed of Gujarat state of India.

MATERIALS AND METHODS

Data for the present study comprised of 1274 lactation records of 441 Surti buffaloes from the first to seventh lactation, extended over a period of 18 years (1972 to 1989) of Central Cattle Breeding Farm (CCBF), Dhamrod (Gujarat), India. The lifetime performance traits viz., total milk production up to third lactation (LTP-1) and up to fourth lactation (LTP-2); total productive life at the end of third lactation (PL-1) and at the end of fourth lactation (PL-2); ratio traits such as milk yield per day of PL-1 (MY/PL-1) and PL-2 (MY/PL-2) were studied to assess the performance of Surti buffaloes.

The heritability estimates, genetic and phenotypic correlation coefficient were calculated using unadjusted data by the paternal half-sib correlation method (Becker 1986). The standard error of heritability and genetic correlation coefficients were estimated as per Swiger *et al.* (1964) and Robertson (1959), respectively.

RESULTS AND DISCUSSION

Average performances. The averages for various lifetime production traits are presented in Table 1. The averages for lifetime milk production up to 3rd and 4th lactation were 4271.64 ± 81.80 and 5943.24 ± 144.36 kg respectively. The average productive life was observed to be 1442.61 ± 22.74 and 1939.40 ± 33.25 days, at the end of third and fourth lactation. Milk yield per day of productive life up to third and fourth lactation (MY/PL-1 and MY/PL-2) averaged 3.04 ± 0.06 and 3.11 ± 0.07 kg, respectively.

Table 1. Averages of various lifetime traits

Traits	No. of observation	Mean \pm S.E.	C.V. (%)
LTP-1 (kg)	202	4271.64 ± 81.80	27.22
LTP-2 (kg)	114	5943.24 ± 144.36	25.93
PL-1 (days)	202	1442.61 ± 22.74	22.40
PL-2 (days)	114	1939.40 ± 33.25	18.30
MY/PL-1 (days)	202	3.04 ± 0.06	28.10
MY/PL-2 (days)	114	3.11 ± 0.07	26.41

Heritability estimates. Heritability estimates of various lifetime traits are presented in Table 2. The heritability estimates of lifetime production traits at the end of fourth lactation (LTP-2, PL-2 and MY/PL-2) were found to be higher, 0.529 ± 0.51 , 0.668 ± 0.55 and 0.913 ± 0.63 , than those at the end of third lactation (LTP-1, PL-1 and MY/PL-1), which were 0.298 ± 0.26 , 0.166 ± 0.23 and 0.645 ± 0.35 , respectively. Murdia and Tripathi (1993) also estimated higher heritability of lifetime milk production based on data up to 5th lactation (0.92 ± 0.60) than those based on 4th and 3rd lactation (0.55 ± 0.37 and 0.72 ± 0.27 , respectively). However, Kalsi and Dhillon (1984) reported low heritability estimates for lifetime milk production, productive life and milk yield per day of productive life (0.13 ± 0.10 ; 0.16 ± 0.11 and 0.26 ± 0.12 , respectively) in Murrah buffaloes.

High heritability estimates of lifetime production traits at the end of fourth lactation in comparison to the estimates at the end of 3rd lactation showed high additive genetic variance for the former traits in comparison to the latter traits.

Correlation coefficients. The genetic and phenotypic correlation coefficients among various lifetime traits are presented in Table 2. The genetic correlations of lifetime production (LTP-1 and LTP-2) were high and negative with PL-1 and high and positive with MY/PL-2. The productive life at the end of third and fourth lactations (PL-1 and PL-2) was high and negatively genetically correlated with MY/PL-1 and MY/PL-2. Whereas, the genetic correlations between LTP-1 and LTP-2; PL-1 and PL-2 and MY/PL-1 and MY/PL-2 were unrealistic (> 1.0). Kalsi and Dhillon (1984) have reported negative genetic correlation between lifetime production and productive life. The findings of the present study also corroborated the positive genetic correlations between LTP and MY/PL reported by Kalsi and Dhillon (1984) and Umrikar and Deshpande (1985).

LTP-1 was significantly ($P < 0.01$) phenotypically correlated with LTP-2, PL-1, MY/PL-1 and MY/PL-2, while LTP-2 was significantly correlated with MY/PL-1 and MY/PL-2. The PL-1 and PL-2 had significantly phenotypic correlation with MY/PL-1 and MY /PL-2. Significant positive correlation coefficient between MY/PL-1 and MY/PL-2 was also observed. Similar type of phenotypic correlation among lifetime traits has also been reported by Kalsi and Dhillon (1984) and Umrikar and Deshpande (1985).

Table 2. Estimates of heritability, phenotypic and genetic correlations among various lifetime traits

Traits	LPT-1	LPT-2	PL- 1	PL-2	MY/PL-1	MY/PL-2
LTP-1	0.298	0.900**	0.258**	0.182	0.737**	0.640**
	± 0.26	± 0.06	± 0.08	± 0.13	± 0.06	± 0.99
LTP-2	1.080	0.529	0.042	0.155	0.759**	0.775**
		± 0.51	± 0.13	± 0.13	± 0.08	± 0.08
PL-1	-0.955	-0.521	0.166	0.879**	-0.436**	-0.513**
	± 0.07	± 0.51	± 0.23	± 0.06	± 0.08	± 0.11
PL-2	-0.180	-0.339	1.070	0.668	-0.440**	-0.478**
	± 0.75	± 0.56		± 0.55	± 0.11	± 0.11
MY/PL-1	1.031	0.851	-0.935	-0.829	0.645	0.944**
		± 0.17	± 0.08	± 0.18	± 0.35	± 0.42
MY/PL-2	0.793	0.821	-0.978	-0.819	1.028	0.913
	± 0.26	± 0.19	± 0.03	± 0.17		± 0.63

Diagonal values are heritability, above diagonal and below diagonal values are phenotypic and genetic correlations, respectively.

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

The results of the present study indicate that lifetime milk production and productive life of Surti buffaloes, can be improved through selective breeding as both of these traits have a high amount of additive genetic variance.

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