

Genetic studies of profit traits in Surti buffalo

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Received: 19 April 2009; Accepted: 8 September 2009

Key words: Profit traits, Surti

Economic returns from individual animals represent the integration of different performance traits. A balance is required between expected increase in production and rearing cost to maximize net return. Therefore, the study was undertaken to evaluate Surti buffalo for profit traits.

Lactation records (1437) of 325 Surti buffalo maintained at Livestock Research Station, Vallabhnagar, between 1976–2000, were used for calculation of various profit traits. Income and expenses were calculated by multiplying the actual requirements of various commodities with unit price.

Total income = (Milk yield (kg) × price per kg) + calf value + dung value

Total expenses = Feed cost + breeding cost + labour cost + supervision cost + veterinary cost + miscellaneous cost + Interest on fixed capital + interest on animal value

Requirements of various inputs were calculated on the basis of average feeding schedule followed during last 3 years at the farm. The average quantities of green and dry fodders fed to adult animal per day were 10.8 and 5.41 kg respectively. The concentrate feeding schedule was 1 kg per 2 kg milk production and 2 kg for last 3 months of pregnancy in addition to 1 kg per head per day as maintenance ration.

Profit traits were computed from the performance traits of buffalo and were estimated as a function of income and expenses associated with maintenance, reproduction and production for each buffalo for each lactation separately as well as pooled over herd life i.e. till auction/death or lactation completed up to May 2000.

The data being non-orthogonal were analyzed by mixed model least squares and maximum likelihood computer programme (Harvey 1987). The period and season of calving (fixed) and sire (random) were considered as factor affecting various profit traits.

The heritability and genetic correlation were computed through paternal half-sib correlation method.

The averages for first lactation and herd life profit traits in Surti buffaloes were higher to those reported by Yadav (1992) in Murrah buffalo (Table 1). The variation in terms of CV was higher in first lactation profit traits as compared to herd life profit traits, indicating considerable scope of improvement through selection. The effect of sire, period and season of calving was found to be significant on all the first lactation profit traits while its effects on all the herd life profit traits were nonsignificant. Summer and rainy calvers gave significantly higher profit during first lactation than winter calvers. The profit increased over periods.

Table 1. Mean, standard deviation, standard error and coefficient of variation for first lactation profit traits

Traits	Means (Rs)	SD	SE	CV (%)
Profit in first lactation (PLF)	363.75	3908.73	217.15	1074.56
Average profit per day in first lactation (APDF)	1.51	7.16	0.40	474.17
Profit per unit of investment in first lactation (PPIF)	0.33	0.22	0.01	67.27
Cost per unit of production in first lactation (CPPF)	15.77	4.04	0.22	25.62
Profit in herd life (PLH)	16143.59	18617.96	1034.33	115.33
Average profit per day in herd life (APDH)	6.83	6.77	0.38	99.12
Profit per unit of investment in herd life (PPIH)	0.19	0.19	0.01	99.48
Cost per unit of production in herd life (CPPH)	13.28	2.43	0.13	18.30

All means are based on 325 observations.

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The heritability for the first lactation profit was on higher side while the estimates for herd life profit traits were low (Table 2). Low estimates of heritability for herd life profit

Table 2. Heritability (diagonal), genetic (above diagonal) and environmental (below diagonal) correlations among first lactation and herd life profit traits

Traits	PLF	APDF	PPIF	CPPF	PLH	APDH	PPIH	CPPH
PLF	0.582±0.21	0.998±0.01	0.926±0.01	-0.996±0.40	NE	0.960±0.45	0.986±0.34	-0.972±0.62
APDH	0.930	0.617±0.21	0.996±0.01	-0.993±0.39	NE	0.954±0.45	0.976±0.34	-0.945±0.60
PPIF	0.957	0.991	0.634±0.22	-0.996±0.039	NE	0.975±0.46	0.968±0.34	-0.969±0.61
CPPF	-0.901	-0.826	-0.890	0.554±0.21	NE	-0.990±1.06	-0.965±0.89	-0.976±0.20
PLH	NE	NE	NE	NE	NE	NE	NE	NE
APDH	0.560	0.576	0.578	-0.496	NE	0.093±0.13	0.994±0.01	-0.967±1.83
PPIH	0.540	0.548	0.552	-0.488	NE	0.997	0.117±0.14	-0.936±1.60
CPPH	-0.596	-0.576	-0.473	0.474	NE	-0.947	-0.961	0.186±0.15

NE, Not estimate.

Table 3. Phenotypic correlations among first lactation and herd life profit traits

Traits	APDF	PPIF	CPPF	PLH	APDH	PPIH	CPPH
PLF	0.971±0.01**	0.982±0.01**	-0.995±0.01**	0.478±0.05**	0.592±0.05**	0.597±0.05**	0.624±0.04**
APDH	—	0.996±0.01**	-0.922±0.02**	0.474±0.05**	0.593±0.05**	0.592±0.05**	0.601±0.04**
PPIF	—	—	-0.950±0.02**	0.472±0.05**	0.595±0.05**	0.597±0.05**	0.605±0.04**
CPPF	—	—	—	-0.428±0.05**	-0.564±0.05**	-0.578±0.05**	0.198±0.06**
PLH	—	—	—	—	0.868±0.03**	0.858±0.03**	-0.778±0.04**
APDH	—	—	—	—	—	0.997±0.01**	-0.947±0.02**
PPIH	—	—	—	—	—	—	-0.968±0.01**

**P<0.01.

traits in Murrah buffaloes were also reported by Kumar (1998). The results showed that additive genetic variability in first lactation profit traits were higher than profit traits of herd life. Such large genetic variability in first lactation profit traits offers ample scope for further improvement through mass selection.

The coefficients of genetic (Table 2) and phenotypic correlations (Table 3) among PLF, APDF, PPIF, APDH and PPIH were positive and significant. The genetic and phenotypic associations of CPPF with PLF, APDH and PPIF and CPPH with PLH, APDH and PPIH were negative and significant. The results suggested that merit of buffaloes for higher profit during herd life could be assessed effectively on the basis first lactation profit traits. Further it is reasonably concluded that either one of the first lactation profit (PLF), average profit per day of first lactation (APDF) and average profit per unit of investment (PPIF) can be used as selection criteria for higher life time profit in Surti buffaloes.

The environmental correlations were also positive and high among PLF, APDF, PPIF, APDH and PPIH. The negative and high environmental associations were observed between above profit traits and CPPF and CPPH. The results suggested existence of non-additive genetic component as

well as common environmental trends among these traits.

SUMMARY

The profit per lactation, average profit per day and profit per unit of investment were Rs 363.75 ± 217.15, 1.51 ± 0.40 and 0.33 ± 0.01 for first lactation and Rs 16143.59±1034.33, 6.83±0.38 and 0.19±0.01 for herd life profit respectively. The heritability estimates for profit traits of first lactation were high while low for herd profit traits. The genetic and phenotypic associations among above traits were high and positive while were negative and high with cost per unit of production.

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