

Effect of service sire on the mates performance
in ensuing lactation

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Introduction

Presently various sire evaluation methods are being used in India for efficient progeny testing programmes for buffaloes. All these methods assume that service sire has no significant influence of any magnitude on the performance of its mate. However, recent investigations by Skjervold and Finland, 1975; Adkinson *et al.*, 1977; Taylor *et al.*, 1978 ; Tomar, 1981 in cattle and by Basu and Tomar, 1981 in murrh buffaloes have revealed that such influence does exist. Under such a situation all methods of sire evaluation are likely to be biased unless corrected or adjusted for the effect of service sire, if present. VanVlack, 1978 has proposed a genetic model for this influence where hormones produced by foetal placental units seem to be implicated. Therefore, the present investigation was undertaken to examine the effect of dam's sire, service sire, breeding value of service sire and sex of the calf on the maternal performance in ensuing lactation of Nili breed of buffaloes.

Material and Methods

The material for the present study consisted of 376 lactation records of Nili buffaloes born and reared at military farm, Ferozepur(India). All the animals were reared under uniform conditions with respect to nutritional regime

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and climatological conditions. The data which spread over 1967 through 1978 were analysed to examine the effects of service sire, its breeding value, dam's sire, sex of calf, period, season and parity of calving on the dam's 300 days' milk yield, lactation length and service period. The dams were mated to eleven service sires whose breeding values were classified as high and low. Out of eleven service sires, six had breeding value higher and five lower than the herd averages. The breeding values of service sires were estimated on their daughters' 300-day, mature equivalent milk yield. The data were defined by the following mathematical proposition.

$$Y_{ijklmno} \bar{x} = u + a_i + b_j + c_k + d_l + e_m + f_n + \xi_o + e_{ijklmno}$$

Where, $Y_{ijklmno}$ = observed 300-days' milk yield/lactation length/service period of dam.

- u = population mean
- a_i = the effect of i th parity ($i = 1-8$)
- b_j = the effect of j th period ($j = 1-3$)
- c_k = the effect of k th season ($k = 1-4$)
- d_l = the effect of l th sex of calf ($l = 1, 2$)
- e_m = the effect of m th service sire ($m = 1-11$)
- f_n = the effect of n th dam's sire ($n = 1-10$)
- ξ_o = the effect of o th level of breeding value of service sire ($o = \text{high, low}$)
- $e_{ijklmno}$ = the random error

Results and Discussion

The effects of various factors viz. service sire and its breeding value, season, period and parity of calving, birth weight and sex of calf, on the mates performance in terms of 300-days' milk yield, lactation length and service period, have been studied through the least squares analysis of variance and the results have been presented in Table 1.

The effect of period was not significant on milk production and service period whereas the lactation length differed slightly among periods. This is in agreement with the views of Basu and Tomar(1981) for Murrah buffaloes that the differences between years were not significant. The effect of season of calving on milk yield was significant with summer calvers yielding the maximum milk yield which was also observed by Goswami and Nair(1965) but is contrary to the findings of Basu and Tomer(1981). Season of calving had also significant effect on lactation length and service period. The summer calvers had longer service period but lower lactation length as compared to those calving in other seasons and this agreed with the results of Basu et al.(1978) and Basu and Tomer(1981). The effect of age in terms of parity order was highly significant on milk yield but the other two traits viz. lactation length and service period did not differ significantly due to age of the animal. The first calvers had lowest milk yield which thereafter started increasing and reached maximum in fourth lactation afterwhich decreased linearly with the increase in parity of calving. This is a well known phenomenon in dairy animals(Basu and Tomar, 1981).

Dams' production and reproduction performance was not affected significantly by the sex of the calf. This supported the findings of Tomar(1976) and Basu and Tomar(1981). But Tomar and Ardeja(1972) ~~observing~~ observed significantly longer service period for the cows delivering male calves than those delivering females. Higher milk yield following the birth of a male calf than after that of a female calf had been reported in cattle by Khan(1964) and Stonaker & Knapp(1974).

The results indicated that service sires had a highly significant effect on their mates' subsequent milk yield and lactation length but the service period was not influenced. Sire's breeding value, however, did not affect the mates' production and reproduction. The fraction of total sum of squares(R^2) due to the service sire accounted for 5.7 percent variation in milk yield, 5.4 percent in lactation length and 3.2 percent in service period. The contribution of animals' own sire was comparatively lower (about half) than service sire. This indicated that the service sire is comparatively more important than the animals' (mate) own sire in contributing the variation in mates' production performance. The significant effect of service sires on their mates' subsequent milk production agreed with the findings of Skjervold and Finland(1975), Adkinson et al. (1977), Tomar (1981) and Basu & Tomar(1981). Sire of the foetus (i.e. service sire) accounted for 8.2 and 11.8% of the total variability in mature equivalent milk yield, 9.8 and 14.3% in fat yield, and only 1.9 to 3.27% days open in Holstein and Jersey respectively (Adkinson et al. 1977).

In contrary to the present work, Taylor et al.(1978) reported no significant differences between bulls within breed and within high - low groupings of service sires based on their breeding values for milk yield in subsequent lactations of their mates; heifers/cows mated to bulls of high and low breeding values showed significant differences in their milk yield in Friesian breed. They reported that the bulls with high breeding values tended to depress their mates' milk yield in subsequent lactation and the bulls with low breeding values tended to increase it. However, in Jersey, the trend was same but the high - low difference was not significant.

The service sires(foetal sire) are known to influence the birth weight at calves(Johari,1976) and the placental weight(Tomar et al.,1974 and Tomar & Mahajan,1980) and also it has been reported that there is a positive association between birth weight of calf and weight of the placenta. (Tomar, et al.1974 and Tomar & Mahajan,1980). It may, therefore, be possible that variation in foetal weight is associated with variation in hormonal activity and variation in both traits has a genetic component(Adkinson et al.,1977; Taylor et al.,1978 and Skjervold,1979). This, the genotype of the fetus may influence the output of the hormones through the foetal placental unit owing variation in placental weight due to different foetal genotype. Differences between ~~foetuses~~ foetuses in hormone secretion could give differences in mammary growth and development and thus in turn may influence the milk production of dams in ensuing lactation.

Table 1: Least squares analysis of variance (mean squares only)

Source of variation	d.f.	Milk yield	Lactation length	Service period
Parity	7	678288.02**	3316.41	21073.27
Period	2	64241.14	12679.28*	32689.21
Season	3	6631.69*	14342.11**	62898.74**
Sex	1	108187.72	185.43	16652.40
Dams' sire	9	535238.87**	5239.17	14193.82
Service sire 10		855391.46**	6337.44*	14356.64
Breeding value 1 of service sire		92790.20	179.56	5556.56
Error	336	189789.84	2880.43	11048.49

* Significant at $P \geq 5$

** Significant at $P \geq 1$

Summary

The effects of eleven service sires of Nili buffaloes on their mates' performance in subsequent lactations was studied on the basis of 376 lactation records. The least squares analysis revealed significant influence of service sire on milk yield and lactation length whereas service period remained unaffected. Neither sex of the calf nor the breeding value of service sire had any significant effect on any of the traits studied. However, high seasonal variation was observed in all the traits. Parity and period effects were important only for milk yield and lactation length respectively. The contribution of animal's own sire was comparatively lower than service period in all the traits which suggest that all methods of sire evaluation programme are likely to be biased when such effect exists.

R E S U M E N

Los efectos de 11 servicios de sementales búfalo Nili sobre ~~su~~ el rendimiento de su descendencia en lactaciones subsiguientes se estudió sobre la base de 376 controles de lactación. El Análisis cuadrático reveló influencia significativa del padre sobre la producción lechera y la longitud de la lactación, mientras que el periodo de servicio no quedó afectado. Ni el sexo del ternero ni el valor genético del padre respectivo tienen efecto significativo sobre ninguno de los caracteres estudiados. Sin embargo, se observó una alta variación estacional en todos los caracteres. Los efectos de paridad y de periodo fueron importantes sólo para la producción lechera y la longitud de lactación respectivamente. La contribución del padre de cada animal fue comparativamente menor en todos los caracteres, lo que sugiere que los métodos de valoración de los padres deben observarse con más profundidad cuando tal efecto existe.

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