ESTIMATION OF REPEATABILITY OF MILK YIELD IN NILI-RAVI BUFFALOES

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The data of the Commonwealth Livestock Farm, Rakh Ghulaman, Mianwali District were utilized for estimating the repeatability of 305 day milk yield. It consisted of 1880 lactations of 433 buffaloes kept at that farm during the years 1951 to 1967. The estimate of repeatability obtained by the method of intra-class correlation was 0.323. The repeatability estimates worked out by regression of milk yield of subsequent lactation on the preceding lactation ranged from 0.410 to 0.587. The correlation coefficients, for first second, second third and third fourth lactations ranged from 0.377 to 0.905.

INTRODUCTION

West Pakistan is inhabited by three breeds of buffaloes: *Nili*, *Ravi* and *Kundi*. Owing to a high fat content of buffalo milk (6 to 8 per cent), these animals are reared essentially as dairy stock. Out of approximately 93 million heads of domesticated buffalo in the world, 10.3 million are found in Pakistan (Haq and Masud, 1966). Repeatability is usually calculated as an intra-cow correlation within herd or a correlation between records made by the same cow in different lactations. It is a waste of genetic material to cull buffaloes without giving them a fair trial and it is equally not wise to maintain poor producers in a herd unnecessarily for a long period. The present study is designed to get information on the repeatability of milk yield in *Nili-Ravi* buffaloes.

REVIEW OF LITERATURE

Ashraf and Mason (1954) studied 754 lactation records of 338 buffaloes raised at Bahadurnagar Farm of Sahiwal District in West Pakistan during the years, 1947 to 1951. They reported repeatability of 300 day milk yield within lactations as 0.37. El-Itriby and Asker (1956) analysed the data of 1270 lactations of buffaloes in Egypt and reported the repeatability of milk production and lactation period as 0.362 and 0.187 respectively. Asker and Bedier (1961) also working on the data of 722 lactations of 328 Egyptian buffaloes during the year 1945 to 1956 developed a formula for estimating persistency. They reported the correlation coefficient of 0.726 for lactation period. Singh and Desai

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(1962) analysed records of 246 lactations of 80 Bhadawari buffaloes and reported repeatability of corrected milk yield and lactation length as 0.393 and 0.244 respectively.

The analysis of data for 1472 lactation records of Murrah and grade buffaloes at 2 military farms covering the period 1931 to 1957 was reported (Anonymous, 1964). Repeatability estimates for lactation yield, daily yield and lactation length were 0.49, 0.46 and 0.26 respectively. Malossini and Pilla (1965) studied the data on 829 lactations of 193 females recorded during year 1932 to 1964. They reported the repeatability of 200 day milk yield as 0.946 from the data corrected for the effects of age at first calving and lactations number. The repeatability estimate of uncorrected data was 0.174. Dassat *et al.* (1966) estimated the repeatability of milk yield as 0.38 from the data of 925 lactations of 442 Italian buffaloes recorded in 1956 to 1964. Sekhon and Gehlon (1966) studied the data of the first 6 lactations of 58 *Murrah* buffaloes during years 1948 to 1964, and worked out the repeatability estimates as 0.500 for lactation yield and 0.947 for lactation length. The high estimates for lactation yield and length showed a non-random selection of the sample.

MATERIALS AND METHODS

The data on 434 buffaloes comprising 1880 lactations recorded during the period 1951 to 1967 at Commonwealth Livestock Farm, Rakh Ghulaman, Mianwali District were used in this study. The buffaloes were milked twice daily. All the buffaloes which had at least two records were included. The records were standardized to 305 day milk yield using the factor described by Rice *et al.* (1957). There were 248 pairs available for the first and second lactations, 218 pairs for the second and third lactations and 259 pairs for the third and fourth lactations for working out the regression of subsequent lactations on the preceding lactations. It is reasonable to hypothesize that the jth record of an ith animal (Y_{ij}) has the following components :

$$Y_{ij}=u+g_i+e_{ij},$$

where u is the population mean, g_i is the genetic contribution of ith individual, and e_{ij} is the error associated with the jth record of ith individual and it is assumed that sum of this term over all animal and records is zero.

Thus the data were analysed by the method of analysis of variance based on the above model. The components of variance due to various sources were worked out. The error mean square was taken as an estimate of σ^2_e and the "variance associated with buffaloes" was calculated by subtracting the error mean square from "between buffalo" mean square and dividing it by the coefficient. The repeatability would be given by the intra-class Correlation

$$r=\frac{\sigma^2_b}{\sigma^2_b+\sigma^2_e}.$$

The repeatability estimates were also computed from regression and correlation coefficients using first-second, second-third and third-fourth pairs of records.

RESULTS AND DISCUSSION

The estimates of repeatability calculated by analysis of variance and the intra-class correlation technique was 0.323. The standard error of this estimate using the formula given by Swiger *et al.* (1964) was 0.025. The value of the standard error is quite small suggesting the extent to which the estimate obtained in this study can be relied upon.

The estimates of repeatability by the method of regression of subsequent lactation record on the preceding one for the first-second, second-third and third-fourth are shown in Table 1, along with their standard errors.

TABLE 1. *Showing Regression of Subsequent Lactation on the Preceding One.*

Lactations	Number of pairs available	Regression coefficient	Standard errors.
2nd on 1st	248	0.525	0.038
3rd on 2nd	218	0.410	0.068
4th on 3rd	259	0.587	0.018

The correlation coefficient between the pairs of lactations available were also calculated and are presented in Table 2, along with their 95 per cent confidence limits.

TABLE 2. *Showing Correlation between different Pairs of Lactation Records.*

Lactations	Number of pairs available	Correlation coefficient	Confidence interval	
			Lower limit	Upper limit
1st and 2nd	248	0.905	0.894	0.916
2nd and 3rd	218	0.377	0.317	0.433
3rd and 4th	259	0.522	0.475	0.567

The estimate of repeatability obtained in this study came quite close to the estimates reported in the published literature. Ashfaq and Mason (1954) reported the repeatability of 300-day milk yield as 0.37. The estimates of repeatability reported by other workers were 0.362 (El-Itriby and Asker, 1956) for Egyptian buffaloes, 0.393 (Singh and Desai, 1962) for Bhadawari buffaloes and 0.38 (Dassat *et al.*, 1966) for Italian buffaloes. The estimates obtained by Asker and Bedier (1961) who worked on the data of 722 lactations of 328 Egyptian buffaloes is quite low, *i.e.*, 0.097 which might be due to less number of records used as compared to the estimates reported under this study.

The estimates of repeatability reported (Anonymous, 1964) for the lactation yield was 0.49 for *Murrah* and grade buffaloes. Sekhon and Gehlon (1966) reported these estimates as 0.50. They further explained that the high estimates for lactation yield might be due to non-random selection of the sample studied.

The estimates of repeatability obtained in this study agreed well with most of the estimates in the published literature. The estimated value might be different in different herds kept under different situations due to the differences in temporary environmental effect. This might be the reason for the low or high estimated value reported by some of the workers reviewed in this manuscript.

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