INHERITANCE OF SOME REPRODUCTIVE TRAITS IN NILI-RAVI BUFFALOES

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ABSTRACT

The pedigree and performance records of Nili-Ravi buffaloes collected during 1934-86 at the Livestock Experiment Station, Bahadarnagar, Okara, were utilized in this study. Using the deviated records of post-partum oestrus interval, first service period, first calving interval, and breeding efficiency, the heritability estimates of each trait were worked out by the method of half sib correlation. The mean post-partum oestrus interval was 171.79 ± 4.01 days. The mean values for first service period and first calving interval were 215.12 ± 4.99 and 520.27 ± 2.58 days, respectively. The overall breeding efficiency was 70.27 ± 0.12 percent. The heritability estimates of post-partum oestrus interval, first service period, first calving interval and breeding efficiency were 0.045 ± 0.048, 0.0138 ± 0.071, -0.016 ± 0.032 and 0.012 ± 0.042, respectively.

INTRODUCTION

The low reproductive efficiency of buffaloes has long been recognised as a cause serious economic loss to dairy farmers. Reproductive efficiency in dairy animals can be measured by a number of parameters, such as post-partum oestrus interval, service period, and calving interval. Some measures of reproductive efficiency are known to be wholly environmental, but there may be other determined by genes. If dairy breeders are to select for high reproductive efficiency in addition to selecting for milk production, it is important to know how effective selection for different measures of reproductive efficiency can be, what the best selection procedures are, and what emphasis should be placed on these measures of reproductive efficiency.

Rognoni and Betta (1960) and Kumar (1982) reports very low estimates of heritability (0.06) for post-partum oestrus interval in different breeds of cattle. Similarly, the estimates heritability of service period and calving interval in buffaloes have been reported to range from 0.01 ± 0.06 to 0.18 ± 0.11 (Mohan 1977; Chourasia et al., 1983). Javaid and Ahmad (1969) analysed data on Nali-Ravi buffalo in Pakistan and reported that the heritability of calving interval computed by the methods of half sib correlation and intra-sire regression of daughter on dam was -0.08 ± 0.14 and -0.16 ± 0.21, respectively. Khan (1986) reported the heritability of calving interval of Nili-Ravi buffaloes as -0.15 ± 0.09. Sharma and Chaudhry (1986) reported heritability of breeding efficiency in Murrah buffaloes as 0.04 ± 0.47. Youssef and Asker (1959) reported a heritability estimate of breeding efficiency on Egyptian buffaloes as 0.05.

Information on genetic sources of variation in reproductive traits of buffaloes is scanty in Pakistan and elsewhere. The present study was, thus, undertaken to estimate the heritability of post-partum oestrus interval, first service period, first calving interval, and breeding efficiency of Nili-Ravi buffaloes. It was envisaged that this estimates would be helpful in developing breeding plans for the genetic improvement of buffaloes in that country.

MATERIALS AND METHODS

The pedigree and performance records of Nili-Ravi buffaloes kept at the Livestock Experiment Station, Bahadarnagar, Okara, during 1934-86 were utilized in this study. Only the normal and complete records of buffaloes were included in the analysis. The mean values of post-partum oestrus interval, first service period, and first calving interval during different years and seasons were calculated. The breeding efficiency of each buffalo was also worked out according to the formula of Sharma et al. (1980).

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Rehman (1986), using the same data on buffaloes, reported that the effect of year and season of calving on post-partum oestrus interval, service period, and calving interval was significant ($P < 0.01$). The records of post-partum oestrus interval, service period, and calving interval of each buffalo were deviated from the mean of respective year and season of calving to minimize the influence of these sources of variation.

The records of breeding efficiency were adjusted by deviating them from the means of respective year of birth of buffaloes, as breeding efficiency was found to be significantly influenced by year of birth (Rehman, 1989).

The heritability estimates of these reproductive traits were worked out by the method of half sib correlation according to the computational procedures outlined by Kempthorne (1957). The standard error of heritability estimate of each trait was calculated according to the formula developed by Swiger et al.(1964).

RESULTS AND DISCUSSION

The mean values of different reproductive traits computed from the data on Nili-Ravi buffaloes have been summarized in Table 1. The heritability of each trait is discussed in the following paragraphs.

1.Post-partum oestrus interval

Data on 883 halfsibs of 31 sires were available for the estimation of heritability of post-partum oestrus interval. The estimate of heritability calculated by analysis of variance and intraclass correlation technique was 0.044 ± 0.048 (Table 2).

The results of the present investigation were in agreement with those of Rognoni and Betta 1960 and Kumar 1982. Regnoni and Betta (1960) reported the heritability of post-partum oestrus interval in Holstein Friesian cows as 0.06. Kumar (1982) reported the heritability of post-partum oestrus interval in Tharparkar and Hariana cows as very low. The heritability estimate of post-partum oestrus interval as reported by Singh et al. (1965) was 0.13 in Tharparkar cows, which was higher than the present estimate. However, the heritability estimate of post-partum oestrus interval in Kankrej cows at two different farms in India was reported to be 0.56 ± 0.24 (Raja and Patel, 1972), which was much higher than that of the present estimate and may be due to confounding effects.

2. Service period

The first service period based on 939 records averaged 215.12 ± 4.99 days (Table 1). The data on 861 halfsibs of 30 sires were available for the estimate of heritability calculated by analysis of variance and intraclass correlation technique was 0.13 ± 0.70 (Table 3).

The findings of the present investigation were in agreement with those of Mohan (1977) and Chourasia et al.(1983), who reported that the estimates of heritability ranged from 0.10 to 0.19 in different breeds of buffaloes. However, Johari and Bhat (1979) reported a very low estimate of heritability for service period in buffaloes which was not in agreement with that obtained in the present investigation.

3. Calving interval

The first calving interval averaged 520.27 ± 2.58 days (Table 1). Data on 893 halfsibs of 30 sires were available for the estimation of heritability of calving interval. The estimate of heritability calculated by analysis of variance and intraclass correlation technique was -0.017 ± 0.032 (Table 4).

The estimate of heritability for calving interval as obtained in the present study was in agreement with the estimates of Javaid and Ahmad (1969) and Khan (1986). Javaid and Ahmad (1969) analysed data on Nili-Ravi buffaloes and reported that the heritability estimates computed by paternal half-sib correlation and intra-sire regression of daughters on dams were -0.08 ± 0.14 and -0.16 ± 0.21, respectively. Khan (1986) computed the heritabi-lity estimate for calving interval in Nili-Ravi buffaloes by the method of intra-sire regression of daughters on dam as -0.15 ± 0.09.

The findings of the present study were not in agreement with those of other workers, who reported heritabilities of calving interval in different breeds of buffaloes ranging from 0.09 to 0.64 (Mohan 1977; Gurnani et al., 1973). These estimates were much higher than that obtained in the present investigation.

4. Breeding efficiency

Data on 800 halfsibs of 28 sires were available

for the estimation of heritability of breeding efficiency. The estimate of heritability calculated by analysis of variance and intraclass correlation technique was 0.012 ± 0.042 (Table 5).

The estimate of heritability for breeding efficiency in the present study was in agreement with Youssef and Asker (1959) and Sharma and Choudhary (1986), whose estimate ranged from 0.04 to 0.09. However, Khire et al. (1977) reported the estimate of heritability for breeding efficiency as 0.38 ± 0.36, which was much higher than the present estimate.

The low estimates of heritability for post-partum oestrus interval, first service period, and breeding efficiency and the negative estimate of heritability for first calving interval indicated that there was little genetic varitability in the traits measured in the herd. The fact that some of the estimates were negative and other positive but very low, indicated that the true values lay near zero, and thus the observed variations in these traits were mostly due to environmental influences.

A great reduction in calving interval can be brought about by improving environmental conditions. Ashfaq and Mason (1954) observed that calving interval was reduced from 20 months to less than 13 months in a four-year period as a result of improvement in the management of Nili-Ravi buffaloes at the Bahadarnagar farm during 1947-51. Most variation in service period can be attributed to non-genetic factors related to feeding, management, climate, and intensity of breeding operations (Rehman,1986). The initiation of breeding at 45 to 50 days post calving coupled with an intensive programme of heat detection and efficient practices of insemination will significantly shorten the calving interval.

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Table 1. Mean values of different reproductive traits in Nili-Ravi buffaloes

Traits	No.of observation.	Mean values ±S.E.
1. Post-partum oestrus interval	(days) 960	171.76 ± 4.01
2. First service period	(day) 939	215.12 ± 4.99
3. First calving interval	(day) 973	520.27 ± 2.58
4. Breeding efficiency	(percent) 1010	70.37 ± 0.12

Table 2. Analysis of variance of post-partum oestrus interval in Nili-Ravi buffaloes for heritability estimation

Source of variation	d.f.	Mean squares	Expected mean squares
Between sires	30	21645.3033	$^2\sigma_w + 28.02\ ^2\sigma_s$
Within sires	852	16456.7216	$^2\sigma_w$

$^2\sigma_s = 185.168$
$h^2 = 0.044 \pm 0.048$

Table 3. Analysis of variation of first service period of Nili-Ravi buffaloes for heritability estimation

Source of variation	d.f.	Mean squares	Expected mean squares
Between sires	29	50085.7448	$^2\sigma_w + 28.25\ ^2\sigma_s$
Within sires	831	24937.3170	$^2\sigma_w$

$^2\sigma_s = 890.149$
$h^2 = 0.137 \pm 0.070$

Table 4. Analysis of variance of first calving interval in Nili-Ravi buffaloes for heritability estimation

Source of variation	d.f.	Mean squares	Expected mean squares
Between sires	29	62496.7896	$^2\sigma_w + 29.29\ ^2\sigma_s$
Within sires	863	71387.3737	$^2\sigma_w$

$^2\sigma_s = -303.435$
$h^2 = -0.017 \pm 0.032$

Table 5. Analysis of variance of breeding efficiency in Nili-Ravi buffaloes for heritability estimation

Source of variation	d.f.	Mean squares	Expected mean squares
Between sires	27	101.5394	$^2\sigma_w + 28.10\ ^2\sigma_s$
Within sires	772	93.7598	$^2\sigma_w$

$^2\sigma_s = 0.276$
$h^2 = 0.012 \pm 0.042$

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