REPEATABILITY ESTIMATES OF SOME REPRODUCTIVE TRAITS IN NILI-RAVI BUFFALOES

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Data on the performance records of 582 Nili-Ravi buffaloes kept at the Livestock Experiment Station, Bahadurnagar, Okara for the years 1934-85 were analysed to estimate repeatability of some reproductive traits. Based on 2797 records of 582 buffaloes, the average postpartum oestrous interval (PPOI) was 176.73 ± 2.71 days. The insemination period (IP), service period (SP) and calving interval (CI) averaged 37.75 ± 1.98, 216.94 ± 3.17 and 520.26 ± 3.93 days, respectively. The repeatability of PPOI was estimated to be 0.05 ± 0.02. The repeatability estimates for IP, SP and CI were 0.08 ± 0.02, 0.10 ± 0.02 and 0.12 ± 0.02, respectively. The low estimates or repeatability for these reproductive traits suggested that most of the observed variation in these traits was mainly due to temporary environmental conditions. Thus, the use of multiple records is emphasized in the selection of dairy animals for these traits.

INTRODUCTION

The buffalo occupies an important place in Pakistan's livestock economy. It contributes about 72% of the milk and 27% of the red meat produced in the country. The Nili-Ravi buffaloes are considered to be the best dairy buffaloes in world. However, late age at first calving and long calving intervals of these animals result in reduced reproductive efficiency, calf crop and milk yield on life time basis. The factors influencing age at first calving, return to oestrus after calving, silent heat and calving interval require detailed study in order to improve the productivity of this species. The knowledge of exact role of heredity in influencing these reproductive traits is needed for the formulation of suitable and effective breeding plans to improve production performance of these animals.

The present study was, thus, designed to estimate the repeatability of some important reproductive traits such as postpartum oestrous interval, insemination period, service period and calving interval in Nili-Ravi buffaloes.

MATERIALS AND METHODS

The performance records of Nili-Ravi buffaloes maintained at the Livestock Experiment Station. Bahadurnagar, Okara during the period 1934-85 were utilized for the present investigation. Only normal and complete records of the buffaloes were included in the analyses. All the buffaloes which had at least two records were included in the study. The records of postpartum oestrous interval, insemination period, service period and calving interval were deviated from the respective year season means to remove the possible effects of these factors. For this purpose, the year was divided into the following five seasons: winter = November 15 to February 15; spring = February 16 to April 30; hot-dry = May 1 to June 30; hot-humid = July 1 to September 15; autumn = September 16 to November 14.

The repeatability of the following traits was worked out according to the computational procedures outlined by Becker (1984): postpartum oestrous interval, insemination period, service period and calving interval. Standard error of repeatability estimates was worked out by the formula suggested by Swiger *et al.* (1964).

Table 1. Mean values and repeatability estimates of various reproductive traits in buffaloes

Traits	Mean ± Standard error	Repeatability ± Standard error
Postpartum oestrous interval (days)	176.73 ± 2.71	0.05 ± 0.02
Insemination period (days)	37.75 ± 1.98	0.08 ± 0.02
Service peroid (days)	216.94 ± 3.17	0.10 ± 0.02
Calving interval (days)	520.26 ± 3.93	0.12 ± 0.02

RESULTS AND DISCUSSION

The statistical analysis of 2797 records of 582 Nili-Ravi buffaloes revealed that postpartum oestrous interval averaged 176.73 ± days. The insemination period averaged 37.75 ± 1.98 days. The service period and calving interval averaged 216.94 ± 3.17 and 520.26 ± 3.93 days, respectively (Table 1). The repeatability estimates of various reproductive traits have been presented in Table 1 and discussed under separate headings.

Postpartum oestrous interval (PPOI): The repeatability estimate of PPOI was 0.05 ± 0.02 (Table 2). The estimate is based on 2064 lactations of 582 buffaloes. The estimate of repeatability for PPOI in the present study is substantiated by Carman (1955) who reported that reputability of PPOI in one of the herds of American cattle was 0.02. The repeatability estimate for PPOI was 0.03 in Egyptian buffaloes. A much higher estimate of repeatability (0.47) was reported by Rognoni and Betta (1960) in Friesian cows which is not in line with the estimate of repeatability as obtained in the present study.

Insemination period (IP): The reapeatability estimate of IP was 0.08 ± 0.02 (Table 2). The present estimate of repeatability for IP is much lower than the estimate of repeatability given by some other workers who reported the estimate of repeatability of insemination period as 0.21.

Service period (SP): The repeatability estimate of SP based on 2068 records of 582 buffaloes was 0.10 ± 0.02 (Table 3).

The findings of various workers are also in partial agreement with that of the present study as the estimate of repeatability ranged from 0.02 to 0.06 (Carman, 1955 and Rognoni and Betta, 1960). Relatively much higher estimate of repeatability (0.32) has been reported for Egyptian buffaloes by Ragab *et al.* (1956) which was not in line with the estimate of present study.

Calving Interval: The repeatability estimate based on 2064 calving intervals of 582 buffaloes by intra-class correlation technique was 0.12 ± 0.02 (Table 3). Various workers reported repeatability estimates which ranged from 0.15 to 0.19 (Khan, 1986; Tonhati *et al.*, 1988). The low estimate of

Table 2. Analysis of variance of postpartum oestrous interval and insemination period for repeatability

Source of variation	df	Postpartum oestrous interval		Insemination period	
		Mean squares	Expected mean squares	Mean sqaures	Expected mean squares
Between buffaloes	582	17610.98	$\sigma_E^2 + 354\ \sigma_B^2$	10855.93	$\sigma_E^2 + 3.54\ \sigma_B^2$
Within buffaloes	1481	14981.21	σ_E^2	8306.85	σ_E^2

Table 3. Analysis of variance of service period and calving interval for repeatability estimation

Source of variation	Service period			Calving interval		
	df	Mean sqaures	Expected mean sqaures	df	Mean squares	Expected mean squares
Between buffaloes	582	27541.62	$\sigma_E^2 + 3.54\ \sigma_B^2$	581	30363.34	$\sigma_E^2 + 3.54\ \sigma_B^2$
Within buffaloes	1485	20046.04	σ_E^2	1481	20376.44	σ_E^2

repeatability for these reproductive traits as obtained in the present study might be due to temporary environmental conditions. The low repeatability estimates indicated that these traits were almost entirely under the control of management. Thus in any selection programme for reduced PPOI, IP, SP and CI emphasis must be given to the repeated records of the individuals rather than a single record.

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