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REPEATABILITY ESTIMATES OF SOME PERFORMANCE CHARACTERISTICS IN NILI-RAVI BUFFALOES

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!Jal11Oil4lX lactation records of 130 Nili-Ravi buffaloes maintained during 1978-93 at the Livestock Experiment Station. University 01 Agriculture. Faisulabad were analysed to estimate rcpeatahility 01 some productive and reproductive traits. Lactation lenuth averaged .127.945 ± 3.335 days, 305-day milk yield 1773090 ± 20.167 kg. total milk yield 190fdl53 ± 24.557 kg. peak yi~ld 244.018 ± 2.545 kg and dry period 164.237 ± 4.886 days. Repeatabilitics of these 5 traits were calculated as 0.322 ± 0.054, 0303 ± 0.054.0.344 ± 0.053. 0.303 ± 0.054 and 0.106 ± 0.062 respectivelv.

Key **words:** Nili-Ravi buffaloes. performance. repeatability estimates.

INTRODUCTION

The buffaloes arc very important animals for milk and red meat production in Pakistan. They contribute about 72 % of milk and 2/'X of red meal produced in the country. Various measures C111he al!<lpted to improve their productive performance. The Slud\ tlf different gcnetic and non-genetic sources of variation 01 v,uiou-; productive and reproductive traits would help in devc:!opiilg';ollle measures for increasing the efficiency of milk I'I,Jdul'l ion 01 dairy animals. The repeatabiliry of a trait measures the average degree to which a buffalo will perform in her next lactation as much above or below the average of the herd IIS she did in the previous lac talion. It is usually calculated as an inrr,ibuftalo correlation within the herd or as correlation bet wccn records made by the same buffalo in different lact.uious . The present study was designed to estimate the rcpcatability 01 lactation length. 305-day milk yield. total milk yield, peak yield and dry period in Nili-Ravi buffaloes.

I\IATERIALS AND METHODS

The pedigree and performance records of Nili-Ravi buffaloes maintained during 197R-93 at the Livestock Experiment Station, University of Agriculture, Faisalabad were utilized for the present study. Normal and complete records of buffaloes wen: included in the study. Incomplete records due to various recorded reasons were excluded from the analysis. The breeding records of buffaloes having lactation less than 180 days duration were also excluded from the analysis. All the buftaloes that had at least two carvings were included for the computation of rcpcatability.

Date 01 calving, 305-day milk yield, total milk yield. peak yiL'id, and d;l/c of dryin,g wen: taken from the history sheers of tiJl' buffaloes. The rcpcatabilitv values of lactation length, 305-day nulk yield, total milk yield. peak yield, and dry period were calculated by inrraclass correlation method assuming the Iollowing statistical model:

$$y_{ij} = \mu + b_i + e_{ij}$$

Where.

i = 1,2, ... n (number of huffaloex),

j = 1,2, ... mi (number of records of irh buffalo).

l'" = is the jrh record of tile ith buffalo,

,, = is the population mean,

b, = is the effect of the ith buffalo. and

e,; = is the random error associated with jth record of the ith buffalo. It was further assumed that e_{ij} - NID (0, o^2).

The analysis of variance for the estimation of repeatability of different traits has been presented as follows:

Model analysis of variance for the estimation 01 repeatability

Source of variation	d.f	Sum of square	Mean square	Expected mean square
Between buffaloes	n-l	SSb	MSh	o^2_e + Ko'" ,
Within buffaloes (between records)	m-I	SSe	MSc	o^2_e

Where,

n = is the number of buffaloes included in the analysis.

m = is the number of observations available on all buffaloes, ami

K = is the average number of records per buffalo. The coefficient K was calculated by the following formula:

$$K = \frac{1}{n-1}\left[m - \frac{\sum mi^2}{m}\right]$$

Repcatability (I') was estimated by intraclass correlation.

$$r = \frac{\sigma^2 b}{\sigma^2 e + \sigma^2 b}$$

To find out the extent of confidence that can be placed on the estimate 01 rcpcatability. standard error was calculated. The standard error of repcatability estimate was worked out by the

formula described by Swiger *et al.* (1964) as given below:

$$SE.(fl \quad \sqrt{\frac{2(N \quad 1)(1 \quad dlll(K \quad I)d}{KC(N \quad h)(h \quad I)}}$$

Where.

N = is the total number of records.

h = is the number of buffaloes used in the study.

K = is the average number of records available per buffalo. and

r = is repeatability estimate for which standard error is being calculated.

RESUL TS AND DISCUSSION

The average values for different traits of Nili-Ravi buffaloes have been summarized in Table I. whereas the repeatability estimates of various performance traits have been presented in Table .2and discussed under separate subtitles in the following paragraphs:

Table I. Mean values of various performance traits in Nili-Ravi buffaloes

Traits	No, of observations	Mean± standard error
Lactation length (days)	418	327.945±3.335
3U5-day milk yield (kg)	418	1773.090±20.167
Total milk yield (kg)	418	1906.053±24.557
Peak yield (kg)	418	244.018 ± 2.545
Dry period (days)	319	164.237± 4.886

Table 2. Repeatability estimates of various performance traits in Nili-Ravi buffaloes

Traits	No. of Observations	Repeatability ± standard error
Lactation length	418	0.322 ± 0.054
305-day milk yield	418	0.303 ± 0.054
Total milk yield	418	0.344 ± 0.053
Peak yield	418	0.303 ± 0.054
Dry period	319	0.106 ± 0.062

a) Lactation Length: The data on 418 lactation records of 130 buffaloes were analysed for the estimation of repeatability of lactation length. Analysis of variance for repeatability estimation is given in Table 3 which shows a repeatability estimate of 0.322 ± 0.054. The estimate of repeatability for lactation length in the present study was close to the findings of Alim and Ahmad (1954) and Khishin *et al.* (1968) who reported the repeatability of lactation length in Egyptian buffaloes in the range of 0.16 to 0.32. However. Saxena and Tomar (1988) reported that repeatability of lactation length was 0.232 ± 0.032 which is less than the

estimate of repeatability obtained in the present study.

b) 305-Day Milk Yield: The repeatability estimate for 305-day mature equivalent milk production based on 418 lactations of 130 buffaloes by the method of intraclass correlation was in the medium to high range (0.30} ± 0.054). Table 3 presents the analysis of variance for between and within components of variance for the estimation of repeatability. Saxena and Tomar (1988) reported the repeatability of 300-day milk yield as 0.321 ± 0.032. The estimates of repeatability reported for Egyptian buffaloes were 0.36 (El-Itriby and Asker, 1956) and 0.39 (Asker *et al.,* 1963). The estimate obtained by Juma and AI-Samarai (1985) was somewhat higher that is 0.40 as compared to the findings of present study. The estimates of repeatability obtained in this study substantiate that selection of dairy buffaloes based on their first lactation performance is satisfactory for ascertaining its performance in future. High repeatability value also helps in early selection and improving the overall productivity of the herd.

c) Total Milk Yield: The repeatability estimate of total milk yield based on 418 lactations of 130 buffaloes was calculated to be 0.344 ± 0.053 (Table 3). The present repeatability estimate for total milk yield is low as compared to the findings of Ashmawy (1991), who reported the repeatability estimate of this trait as 0.48. This deviation may be attributed to differences in breeds used and environmental conditions. The results of the present study about the repeatability estimates of 305-day milk yield and total milk yield are almost the same. The main reason was that the average lactation length in the present study was 327 days which was close to 305 days.

d) Peak Yield: The repeatability estimate of peak yield was 0.303 ± 0.054 (Table 3). The repeatability of peak daily yield worked out by Saxena and Tomar (1988) in Murrah buffalo was 0.355 ± 0.031, which was in line with the findings of the present study.

e) Dry Period: The repeatability estimate of dry period was 0.106 ± 0.062. This estimate was based on 3191actations of 113 buffaloes (Table 3). The present estimate of repeatability for dry period was in agreement with the findings of Gurnani *et al.(1976)* who reported repeatability of dry period in Murrah buffaloes as 0.10 ± 0.05. Basu and Gai (1981) and Juma and AI-Samarai (1985) observed much lower estimates (0.08 and 0.03 respectively) of dry period in Murrah buffaloes than the present estimate. Repeatability estimate made by Ashmawy (1991) was 0.26, which was higher than the present findings. Low estimates of repeatability of dry period indicated that temporary environmental conditions could play important role in influencing this trait and improvement in this trait within a herd would come from proper attention to environmental factors such as nutrition, management, and disease control.

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