REPEATABILITY OF LACTATION YIELD, PEAK MILK YIELD AND DAYS IN MILK IN THARPARKAR COWS

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Repeatability estimates for lactation yield, peak milk yield, and days in milk were derived from 506 lactation records of 120 Tharparkar cows kept at the Livestock Experiment Station, Rakh Ghulaman, district Bhakkar, during the period 1965-1978. The repeatability estimates for lactation yield, peak milk yield and days in milk were 0.305 ± 0.03, 0.0329 ± 0.05 and 0.219 ± 0.05, respectively. The low repeatability estimates for the three traits suggested considerable effects of environment, therefore, the use of multiple lactation records was emphasized for selection of dairy animals.

INTRODUCTION

The repeatability is defined as the expression of the same trait several times during the life span of an individual. The repeatability sets an upper limit for the heritability. In other words, repeatability is the fraction of variance that is attributable to permanent differences between individuals. With reference to dairy animals, the knowledge of repeatability helps in predicting the future production of a cow as compared with the herd average. The repeatability estimate is also used in determining the amount of culling that can be safely done on the basis of one record. A high estimate of repeatability provides enough evidence for selection or rejection of the individual based on single available record, whereas the low estimate of repeatability justifies accumulation of further records. The knowledge of repeatability estimates helps in deciding various breeding plans and also in estimating real producing ability of dairy cows. The present study was conducted to estimate the repeatability of lactation yield, peak yield and days in milk for Tharparkar cows.

MATERIALS AND METHODS

Source of data: The data on 506 lactation records of 120 Tharparkar cows kept at the Livestock Experiment Station, Rakh Ghulaman, district Bhakkar, during the period 1965-78 were used. Lactation records of less than five months duration, interrupted lactation due to disease or other reasons, were excluded from the analysis. To estimate repeatability of lactation yield, peak milk yield and days in milk, only the cows having at least two records were considered. The peak milk yield was defined as maximum milk production in a 30-day period. The repeatability was worked out by interclass correlation technique (Becker, 1984).

RESULTS AND DISCUSSION

The mean, range and coefficient of variation for lactation yield were 1338.69 ± 18.70 kg, 488.18 to 3101.31 kg and 31.42%, respectively. Corresponding values for peak milk yield and days in milk were 236.34 ± 2.91 kg and 250.18 ± 2.38 days; 92.73 to 665.45 kg and 155 to 378 days; and 27.69%

and 21.42%, respectively (Table 1). Large differences among individuals were reflected by the range and coefficient of variation for the traits under study. The analysis of variance confirmed that significant differences between cows existed for lactation yield, peak milk yield and days in milk (Table 2). Shah (1990) analysed data on Nili-Ravi buffaloes kept at the Livestock Production Research Institute, Bahadurnagar (Okara) and reported that milk yield and length of lactation varied significantly among the individual buffaloes. This variability was attributed to varying managemental practices over the 13 years period. Similar argument was also put forward by Ahmad and Ahmad (1972) who studied the repeatability of various economic traits in Sahiwal cows.

study (Table 3). The repeatabilities thus estimated were: 0.305 ± 0.03, 0.329 ± 0.05 and 0.219 ± 0.05 for lactation yield, peak milk yield and days in milk, respectively. The repeatability estimates for lactation yield and days in milk were in close agreement with those reported by Ahmad and Ahmad (1972), Chand and Narain (1983) and Shah *et al.* (1984). The repeatability estimates reported by these workers ranged from 0.30 to 0.50 for lactation yield and from 0.00 to 0.29 for days in milk. The repeatability estimates for peak milk yield (0.329 ± 0.05) derived in the present study were also about the same. Some workers have reported even higher estimates of repeatability than those from the present study (Barhat and Chaudhry, 1980; Khan, 1985). Their estimates were of

Table 1. Mean, standard error, range and coefficient of variation of economic traits in Tharparkar cows

Parameters	Mean ± SD	Range	Coefficient of variation (%)
Lactation yield (kg)	1338.69 ± 18.70	488.18 - 3101.31	31.42
Peak milk yield (kg)	236.34 ± 2.91	92.73 - 665.45	27.69
Days in milk	250.18 ± 2.38	155 - 378	21.42

Table 2. Analysis of variance for traits of economic importance in Tharparkar cows

Source of variation	D.F.	Mean squares		
		Lactation yield	Peak milk yield	Days in milk
Between cows	119	772540.45**	19422.60**	2227.47**
Within cows	386	270935.42	6346.46	1021.70

** P<0.01.

Variance components due to individual and multiple measurements were derived to estimate the repeatability of the traits under the order 0.50-0.84 for lactation yield and 0.71-0.78 for days in milk.

Table 3. Components of variance and repeatability estimates for various traits in Tharparkar cows

Parameters	Individual variance	Variance due to multiple measurements	Repeatability (± SE)
Lactation yield	119146.09	270935.42	0.305 ± 0.03
Peak milk yield	3105.98	6346.46	0.329 ± 0.05
Days in milk	286.40	1021.70	0.219 ± 0.05

Generally, the repeatability estimates obtained in this study for lactation yield, peak milk yield and days in milk were considered low. The low repeatability for lactation traits would suggest considerable influence of temporary environmental conditions. Thus, while selecting cows for improved lactation performance, the use of repeated records of the individuals should be emphasized.

REFERENCES

Ahmad, Z. and M.D. Ahmad. 1972. Repeatability of some economic traits in Sahiwal cows. J. Agri. Res. (Punjab). 10 (3): 191-196.

Barhat, N.K. and M.S. Chaudhry. 1980. A study on production and reproduction traits of Naguri cattle. Indian Vet. J. 57 (II): 909-912.

Becker, W.A. 1984. Manual of Quantitative Genetics. Academic Enterprises, Pullman, Washington D.C., USA.

Chand, L. and P. Narain. 1983. Lactation performance indices in dairy cattle. Indian J. Dairy Sci. 35 (3): 25-26.

Khan, U.N. 1985. The adaptability of crossbred dairy cattle to environmental conditions in Pakistan. Ph.D. Dissertation, Univ. of Georgia, Athens, Georgia, USA.

Shah, S.K., U.N. Khan and M.A. Mirza. 1984. Crossbreeding of Australian Illawara Shorthorn with Sahiwal breed and comparative studies on production performance and adaptability of the progeny. Final Res. Report., Anim. Sci. Inst., Natl. Agri. Res. Centre, Islamabad.

Shah, S.S.A. 1990. Studies on the persistency of lactation in Nili-Ravi buffaloes. M.Sc. Thesis, Univ. of Agri., Faisalabad.