LACTATING LENGTH AND ITS BEHAVIOUR IN NILI-RAVI BUFFALOES

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ABSTRACT

Behaviour of lactation length in Nili-Ravi buffaloes and its relationship with other economic traits was studied using 2704 lactations of 993 buffaloes. Lactations shorter than eight weeks were not included in the data set. About 59% of the lactations had length shorter than the standard lactation of 10 months. Lactation length averaged 289.5 days for an average milk yield of 1984 kg. Lactation curves were different for first and later parities with different days in milk. Year effeced ($P<0.01$) lactation length while season did not. Yet, interaction of year and season was significant ($P<0.01$). Age at calving within parity also had an effect ($P<0.01$) with first parity buffaloes having the highest average (280.4±6.25 days). The trait was 25% repeatable. Phenotypic trend in the trait was positive, with least squares means for 1970-71 (227.4±14.03 days) and 1996-97 (300.9±13.86 days) being different by about 10 weeks. Further studies should be carried out to find out causes for this positive trend.

Keywords: Lactation length, Nili-Ravi buffalo

INTRODUCTION

Lactation length is one of the major factors determining milk yield. Dairy animals are not selected for this economic trait because its increase can cause increase in calving interval, which is not an economically viable option. Milk production records are usually adjusted for lactation length. Many factors such as feed and fodder availability, managemental conditions along with seasonal variation affect it. As animals do no get equal opportunity for this trait, breeding values of animals are adjusted up or down towards a standard such as 305 days. Very high genetic correlation of lactation length with milk yield under the production set up of Pakistan (Khan, 1997; Dahlin *et al.*, 1998; Ahmad, 1999), has recently led the scientists to believe that same genes control both the traits.

Milk production of Nili-Ravi buffaloes at Livestock Experiment Station, Bahadurnagar (Okara) has shown deterioration over the years (Khan, 1998; Chaudhry, 1998). Has this deterioration been due to changes in the lactation curve or due to other factors, needs thorough investigation. As one of the most important factors determining lactation milk yield is lactation length, its behaviour can provide some clues for the reduction in milk production.

For Nili-Ravi buffaloes, Cady *et al.* (1983) reported an average lactation length of 282±0.8 days. Lactation length decreased with increase in parity and was 288±1.21, 283±1.5, 282±1.82, 279±2.2 and 276±1.7 days for first to fifth parities, respectively. Syed *et al.* (1996) however, reported lactation duration, lactation milk yield and 305 days milk as 329±5.4 days, 1671±31.4 kg and 1589±30.2 kg, respectively. It was concluded that longer lactations were associated with longer calving intervals and extended dry periods. Year of calving also has an effect on lactation duration.

For Italian buffaloes, Pilla and Moioli (1992) reported that lactation milk yield averaged 1963 kg while lactation length was 268±67 days. Rosati and Van Vleck (1998) also reported a similar average for 118,992 lactations with a range of 121 to 697 days. For Indian buffaloes, Jain and Kothari (1983) reported ($n=732$) that season and parity affected ($P<0.05$) lactation length. Average lactation length for summer (March-June), Rainy (Jul-Oct) and Winter season (November-February) was 260.67, 253.14 and 276.29 days, with milk yield of 1082, 1100 and 1199 kg, respectively. Tailor *et al.* (1992) reported mean lactation length of 261.3 days in Surti buffaloes. Lactation length was highest for buffaloes calving in summer season and lowest for those calving in Rainy season.

Khalil *et al.* (1992) performed genetic analysis of lactation traits in Egyptian buffaloes. For 2739 lactations from 696 buffaloes, average lactation length was 288 days. Effect of parity was significant ($P<0.01$). Lactation period increased linearly with increasing lactation number. Spring calvers had the longest lactation length. Merty *et al.* (1994b) used 1823 records of 316 Egyptian buffaloes from three farms. Overall lactation duration was 228±14 days. Lactation length increased from 208±18 days in first parity to 257±15 days in third and there after declined to 201±19 days in

seventh and later parity group. Farm, parity, year and season of calving, year by season interaction and age at calving influenced lactation length (P<0.01). For Iraqi, Bulgarian and other buffalo breeds, a wide variation exists in lactation duration and factors affecting it. The objective of the present study was to study the behaviour of lactation length and its relationship with other economic traits in Nili Ravi buffaloes.

MATERIALS AND METHODS

Milk yield records of 993 Nili Ravi buffaloes, maintained at Livestock Experiment Station, Bahadurnager, Okara from 1970 to 1997 were used for the present study. Weekly milk yield records were collected from 2704 lactations with lactation length of at least 8 weeks. To evaluate the effect of various environmental factors on the lactation length, a mixed effect model was used having random cow effect, year of calving (28 years from 1970-1997 pooled into 14 periods of two years each (1970-71, 1972-73, ...1996-1997), season of calving (Winter, November-April; Summer, May-October), age at calving defined within parity (35 age classes, similar to Iqbal, 1996), and lactation milk yield as a covariable along with random error associated with individual record. The repeatability of the trait was calculated as the ratio of cow variance to the cow and residual variance.

RESULTS

Frequency distribution of lactations according to lactation length (or days in milk) is given in Table 1. Out of 2704 lactations having more than 8 weeks of duration, 59.2% had shorter duration than 44 weeks. If minimum was increased from 8 to 16 weeks, it included 3.0% of all the lactations. Buffaloes with lactations of more than six months duration (>182 days) were 89.2% in the data set. It may be mentioned that lactations with lactation length (LL) of less than 8 weeks (56 days) were not included in the analysis. Such lactations were less than 5% of the recorded lactations.

Lactation length averaged 289.5 days with a standard deviation of 88.87 days. However, 59.2% buffaloes had lactation length shorter than 44 weeks averaging 266.6±15 days. The overall relationship between lactation length and milk yield was quite linear except for shorter lactation length. This is apparent in Fig. 1 for multi parity buffaloes. The lactations of shorter duration were quite different from completed lactation of 44 weeks. For first parity buffaloes, scale was different but trend was similar. Analysis of variance is presented in Table 2. Year affected (P<0.01) the trait while season did not. Yet interaction of year and season of calving was significant (P<0.01). Age at caving effect within parity affected (P<0.01) the trait. Maximum F-value (1622.44) was, however, obtained for milk yield which was used as a covariable. The regression coefficient of lactation length on milk yield was 0.062±0.0015 days suggesting that lactation length increased by 6.2 days for every 100 kg increase in milk yield. Lactation length was 25% repeatable.

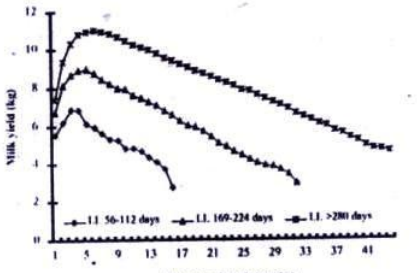

Figure 1 Relationship between lactation lengths (LL) of different duration and milk yield in multi-parious buffaloes

Lactation length increased across the years (Fig. 2) with lowest value (227.4±14.03 days) in 1970-71. Least square means for the most recent years (1996-97) was 300.9±13.86 days. Year by season interaction indicated that although, winter calvers (1976-77 onwards) generarlly had higher lactation length yet it was not ture across the years. Means for winter and summer calvers for lactation length were 267.7±1.53 and 266.8±1.38, days, respectively.

Table 1: Frequency distribution of lactations by lactation length and average (±SD) for milk yield

Lactation length (weeks)	N	%	Cumulative %	Milk yield (kg)
8-11	30	1.1	1.1	347.1 ± 14.53
12-15	51	1.9	3.0	549.1 ± 186.50
16-19	56	2.1	5.1	704.0 ± 174.89
20-23	79	2.9	8.0	858.0 ± 287.64
24-27	98	3.6	11.6	1066.3 ± 308.29
28-31	207	7.6	19.2	1326.7 ± 355.36
32-35	270	10.0	29.2	1694.6 ± 471.03
36-39	422	15.6	44.8	1954.2 ± 503.18
40-43	389	14.4	59.2	2198.2 ± 622.37
≥ 44	1102	40.8	100.0	2453.5 ± 618.78
Overall	2704	100.0	-	1984.4 ± 773.43

Table 2: F-values from analysis of variance of lactation length (days)

Source	Df	F-value
Cow (random)	992	1.78**
Year of calving group	13	12.84**
Season of calving	1	0.23 NS
Year of calving group *season of calving	13	2.65**
Age at calving within parity	34	2.36**
Milk yield	1	1622.44**
error	1649	

** = Significant (P<0.01); NS = non-significant; Repeatability estimate = 0.247±0.023

Lactation length was highest for the first parity buffaloes. For other parities (2-8) difference between the adjacent parities were not significant except for the >8th parity group where the lowest mean was observed. This probably was due to very selected lactations (few animals reach to this stage) and pooling of higher parities. Lactation length was also different for age at calving within parities. For first calvers lactation length was highest for those calving at the youngest age (289.29±9.04 days) as compared to the buffaloes that calved at a very late age for the first time (272.1±5.69 to 275.62±62.6 days). The trend that within a parity, younger buffaloes had higher lactation length, was generally true across parities.

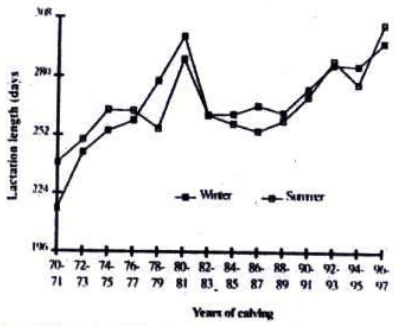

Figure 2: Phenotypic trend in lactation length for buffaloes calving in different seasons

DISCUSSION

Basic statistics on lactation length are similar to the other studies on Nili-Ravi buffaloes in Pakistan. Earliler, Cady *et al.* (1983) reported an average lactation length of 282±0.75 days for these buffaloes calving between 1951 to 1978. Shah (1990) reported a higher lactation length of 326 days in Nili-Ravi buffaloes which might be due to exclusion of records with < 180 days of length. A more recent study on Nili-Ravi buffaloes (Syed *et al.*, 1996) reported an average lactation length of 326 days at an experiment station in N.W.F.P. Higher average lactation length for Nili-Ravi (Singh *et al.*, 1987) and other breeds (Sharma and Singh, 1988) of buffaloes have been reported. Average lactation length for 33,333 lactation records of Italian buffaloes was only 268±67 days (Pilla and Moioli, 1992).

For environmental effects on lactation length, there is no general consensus but for studies conducted over an extended period of time, year and season of calving usually had a significant effect on the trait (Singh *et al.*, 1987; Gaghbhiye *et al.*, 1994; Metry *et al.*, 1994b). Parity also affected the trait in some studies (Jain and Kothari, 1983; Khalil *et al.*, 1992; Metry *et al.*, 1994 b); Dhar and Deshpande, 1995; Montiél Uurdaneta *et al.*, 1997) but in others not (Dass and Balaine, 1985; Gaghbhiye *et al.*, 1994). Calving season was also important in some studies. Aleksiev and Peeva (1988) reported that in Bulgarian Murrah, Winter calvers had the longest lactation length (273 days) while summer calvers had the shortest (265 days).

Results of the present study that first parity buffaloes had higher lactation length as compared to the later parity buffaloes, are in conformity with the study of Cady *et al.* (1983) but contrary to reports for Egyptian buffaloes (Metry *et al.*, 1994a) where first parity buffaloes had lactation length of 208±18 days as compared to 245±16 days and 257±15 days for second and third parity buffaloes. Dhar and Deshpande (1995) reported that in Murrah buffaloes, lactation length in first calvers averaged 263.0±6.0 days as comapred to 204.3±5.7 days for second and third parity buffaloes. This may be due to a different production set up or managemental conditions provided to the buffaloes of different parities. Possibility of breed difference can not be ruled out also.

Very short lactations (8-11 weeks) had average milk yield of 247.0 kg. These lactations were short mostly due to reproductive problems, mastitis, or animals had been auctioned because of poor production, old age, repeat breeding etc. Milk yield pattern in such lactations indicated that such lactations were not abandoned abruptly but animals dried gradually. Phenotypic trend in the trait was positive and least squares means for 1970-71 (227.4±14.03 days) and 1996-97 (300.9±13.86 days) were different by about 10 weeks. Has there been some selection practiced for increased lactation length or if production system has been changing: are the buffaloes being milked longer to get similar milk yield as that in the earlier years because today's buffaloes are not producing at the same level as those some 30 years back, needs further investigations. However, from the behaviour of lactations of different duration, it is clear that the extrapolation of milk records from shorter duration should not be tempted

using simple regression methods. Methods that use last test day information and average milk yield of the known lactation period (Chaudhry, 1998) would be a better choice.

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