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## Age at First Calving in Nili Ravi Buffalo

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## Abstract

Age at first calving was studied in 630 buffaloes maintained at six dairy farms in Pakistan. The mean age at first calving in overall data was  $1291.31 \pm 8.68$  days. It was  $1376.17 \pm 54.12$ ,  $1290.7 \pm 26.17$ ,  $1304.97 \pm 21.32$ ,  $1266.19 \pm 12.71$ ,  $1301.77 \pm 16.26$  and  $1268.31 \pm 33.73$  days at MDF Peshawar, MDF Nowshera, MDF Rawalpindi, MDF Khyber Okara, MDF Punjnad and LRS, NARC, Islamabad, respectively. There was no significant difference between age at first calving at various farms. Age at first calving was studied in early and late maturing groups of buffalo and it was found  $1282.75 \pm 10.14$  days in early maturing group (age at maturity:  $957.93 \pm 10.68$  days) and  $1308.78 \pm 16.44$  days in late maturing group (age at maturity:  $1015.26 \pm 17.39$  days). Correlation between age at first calving and first lactation performance traits was studied. Non-significant negative relationship was observed between age at first calving and birth weight of male and female calves, lactation length, dry period and service period. Age at maturity showed significant positive correlation with age at first calving.

## Introduction

The age at first calving is an important parameter of reproductive efficiency. The shorter the age at first calving the longer will be the productive life. The losses due to late age at first calving in Pakistani buffaloes is estimated as 24.27 billion rupees (Usmani, *et al.*, 1987).

The age at first calving as reported in the literature are presented in Table 1.

The economics of buffalo milk production was studied by Pradeep, *et al.* (1992) in house hold landless labourers, small, lower medium, upper medium and large farmers in Muzafarnagar district, India. The age at first calving ranged from 39 months in landless labourer to 36 months in upper medium farmers.

The heritability ( $h^2$ ) for age at first calving for Egyptian buffalo  $0.61 \pm 0.12$  and for Indian buffaloes is reported in the literature as  $-0.91 \pm 0.94$  (Dahiya, *et al.*, 1990),  $0.23 \pm 0.06$  (Singh and Yadav, 1989),  $0.43 \pm 0.14$  (Singh and Basu, 1988).

Several restricted selection indices, using combinations of nine dairy performance traits, were calculated from the first lactation records of Murrah buffaloes maintained at the National Dairy Research Institute, Karnal, India by Gajbhiye and Tripathi (1991). The reduction in genetic gain was seen when restriction was imposed on highly heritable and economically important traits such as age at first calving. A restricted selection index combining age at first calving, first lactation length, first dry period, first service period and milk yield per day of the first lactation was recommended for the Murrah herd at Karnal.

Selection indices constructed for the improvement in genetic merit of buffaloes include age at first calving as an important parameter (Chakravarty and Rathi, 1990 and Chakravarty, *et al.*, 1990).

The present study was planned to investigate the age at first calving and its effect on other traits of economic

importance in Nili Ravi buffalo maintained at various farms in Pakistan.

## Materials and Methods

The study was based on 630 buffaloes maintained at following farms during the period 1978 to 1994.

Military Dairy Farm (MDF) Peshawar	28 buffaloes
Military Dairy Farm (MDF) Nowshera	84 buffaloes
Military Dairy Farm (MDF) Rawalpindi	95 buffaloes
Military Dairy Farm (MDF) Khyber Okara	174 buffaloes
Military Dairy Farm (MDF) Punjnad	206 buffaloes
Livestock Research Station (LRS), NARC, Islamabad	43 buffaloes
Total:	630 buffaloes

Green fodder was available throughout the year in the canal irrigated area of interior Punjab and LRS, NARC, Islamabad during the period under study. At MDFs Peshawar, Nowshera and Rawalpindi there was shortage of green fodder in the months of November, December, May and June. During these months the animals were generally fed on some silage and wheat straw. At all the farms animals were fed concentrate ration according to their body requirements based on their production status alongwith green fodder and roughages. Usually six kilograms/day of concentrate ration was offered to milking buffaloes, two kilograms/day to pregnant and one kilogram/day to dry animals. The concentrate ration offered to the animals maintained at MDFs. Peshawar, Nowshera and Rawalpindi were conventional concentrates like oilseed cake + wheat or rice bran mixed with straw. Whereas, balanced feed containing 16 to 18 per cent protein, 70 to 72 per cent total digestible nutrients and 2.5 percent minerals were offered at LRS, NARC, Islamabad and MDFs Khyber Okara and Punjnad. The ingredients of the feed and their

## Naqvi and Shami: Nili Ravi Buffalo, calving, age, correlation maturity

placements according to availability and economics are as following:

Cotton seed cake and Rapseed cake or Maize oil cake	10-25%
Rice polish and Rice bran or wheat bran	25-60%
Corn gluten feed	20%
Molasses	15-20%
Di-calcium phosphate or bone meal	
Sodium chloride and Lime stone	2.5%

buffaloes were kept in loose housing system with adequate supply of water at all the farms. In summer and autumn, in morning times the buffaloes were taken out for grazing in the pastures for 2 to 3 hours.

These farms mean age at maturity was earlier at MDF Khyber Okara, MDF Punjnad and LRS, NARC compared to MDF Peshawar, Nowshera and Rawalpindi. The farms were thus, divided into two groups. Group I, early maturing (EM) and Group II, late maturing (LM). Age at first calving was studied in both early and late maturing groups. Statistical analysis of the data involved the application of tests of significance, t-test, F-test and correlation and regression analysis following Sokal and Rohlf (1969).

### Results

Age at first calving in buffaloes maintained at various farms is given in Table 1. The mean age at first calving in all data was 1291.31±8.68 days. It is 1282.75±10.14, 1290.7±26.71, 1304.77±16.26, 1301.77±16.26, 1268.31±33.73 days at MDF Peshawar, MDF Nowshera, MDF Rawalpindi, MDF Khyber Okara, MDF Punjnad and LRS, NARC, Islamabad, respectively. The difference in mean age at first calving in the farms was non-significant.

Table 1: Age at first calving in Nili-Ravi Buffaloes at various farms

Location of Farm	N	Age at first calving
MDF Peshawar	28	1376.178±54.12
MDF Nowshera	84	1290.7±26.71
MDF Rawalpindi	95	1304.7±26.71
MDF Khyber Okara and Khyber	174	1266.19±12.71
MDF Punjab	206	1301.77±16.26
MDF and NARC Islamabad	43	1268.31±33.73
MDF LRS	630	1291.31±8.68

mean age at first calving in Group I (early maturing) was 1282.75±10.14 days and in Group II (late maturing) was 1308.78±16.44 days (Table 2). The difference between the two Groups was, however, non-significant

( $t_{(628)} = 1.34; P > 0.10$ ).

Table 3 shows correlations between age at first calving and first lactation performance traits in buffaloes from six buffalo dairy farms.

Table 2: Age at first calving in early (I) and late (II) maturity groups in Nili-Ravi Buffaloes

	Age at maturity (days)	Age at 1st calving (days)
Group I	957.93±10.68	1282.75±10.14
Group II	1015.26±17.39	1308.78±16.44
Significance	$t_{(659)} = 2.81; P < 0.01$	$t_{(628)} = 1.35; P > 0.2$

Non-significant negative relationship was observed between age at first calving and various traits except in a few cases. The only significant correlations were seen for dry period and service period at MDF Peshawar. Age at maturity at all the buffalo farms showed significant positive correlations with age at first calving (Table 3).

### Discussion

The mean age at first calving of buffaloes in this study ranges from 1266.19±12.71 (MDF Khyber Okara) to 1376.17±54.12 (MDF Peshawar). The age at first calving reported from other authors is on the higher side. The age at first calving reported in India is 51.5±1.1 months for Kujang buffaloes (Dash and Mishra, 1990); 62.17±0.77 months for swamp buffaloes of Assam (Gogi *et al.*, 1996); 1575.64±21.69 days for Mehsana and Surti buffaloes (Tailor and Jain, 1988); 52.5±1.2 months for daughters of Surti bulls (Govindaish and Rai, 1987). Swamp buffaloes of Thailand take 4 to 8 years for first calving (Konanta, 1992). Bangladeshi buffaloes take 1735.4±42.33 days (Alam *et al.*, 1993); Philippine Carabao take 5.3±1.2 years, Carabao X Murrah crossbred in Philippine take 4.3±0.9 years for first calving (Momongan *et al.*, 1991). Shresta and Yazman (1990) reported the age at first calving in Murrah and Murrah X Nepalese crossbreds in Brazil as 52.3 and 48.3 months, respectively. This is higher than that investigated in the present study.

The age at first calving less than that observed in the present study has also been reported. In Italian buffalo, Pilla and Moiloi (1992) reported age at first calving as 20 to 26 months. Buffaloes at Parana State, Brazil calve at the age of 1000 to 1200 days (Silva and Schorr, 1990). The age at first calving at MDF Khyber Okara (1266.19±12.71) and LRS, NARC, Islamabad (1268.31±33.73 days) in the present study is comparable to age at first calving in Indian Nili-Ravi buffalo, 1259.72±12.66 days (Eswara Reddy and Taneja, 1970). 41.6 months (Amble *et al.*, 1970); and 40.8 months (Singh and Singh, 1977).

The age at first calving at MDF Peshawar (1376.17±54.12 days) is comparable to Nepalese buffalo, 44.5 months (Shrestha and Yazman, 1990).

Chaudhry *et al.* (1983) reported the effect of feeding on growth rate, age and weight at maturity and age at first

Table 3: Correlation of age at first calving (days) with first lactation performance traits

	Age at	Birth weight (kg)		Total milk yield (lit.)	Lactation Length (Days)	Daily milk yield (lit.)	Dry period (Days)	Service Period (Days)
	Maturity (Days)	M	F					
MDF Nowshera	0.991** (84)	-0.026 (51)	-0.126 (22)	0.073 (77)	-0.019 (77)	0.018 (77)	-0.076 (84)	-0.068 (84)
MDF Peshawar	0.992** (28)	0.24 (15)	0.565 (9)	-0.319 (26)	-0.309 (26)	-0.094 (26)	-0.478* (27)	-0.471 (27)
MDF Rawalpindi	0.997** (95)	-0.164 (49)	-0.067 (41)	0.261 (92)	0.181 (92)	0.109 (92)	-0.022 (90)	0.004 (89)
MDF Okara & Khyber	0.995** (174)	0.141 (115)	-0.082 (112)	0.191 (219)	0.001 (219)	0.212 (219)	0.030 (202)	0.093 (148)
MDF Punjnad	0.996** (206)	-0.224 (112)	-0.129 (105)	0.017 (218)	0.030 (218)	0.021 (218)	-0.015 (191)	-0.036 (1778)
LRS & NARC, Islamabad	0.646 (43)	-0.121 (24)	-0.124 (16)	0.078 (40)	-0.003 (40)	0.090 (40)	-0.022 (37)	-0.011 (39)
Overall	0.966** (652)	-0.121 (366)	-0.124 (305)	0.078 (672)	-0.003 (672)	0.090 (672)	-0.022 (631)	-0.011 (631)

calving in Sahiwal, Friesian X Sahiwal crossbred cattle and Nili-Ravi buffaloes. Each type of animals was divided into two groups. The one which was offered concentrate mixture (1 percent of live weight bases) alongwith green fodder ad-libitum and the other group which was offered green fodder alone. The information reveals that the animals which were offered concentrate mixture + green fodder had a higher daily growth rate, lower age at maturity and lower age at first calving compared to the other group. Chaudhry *et al.* (1991) reported that green fodder + concentrate and mineral supplement reduce the age at first calving (1045 days) in Nili-Ravi buffaloes as compared to green fodder + concentrate (1053 days) and green fodder (1472 days).

The influence of feed has been observed in this study as well. In MDFs Peshawar, Nowshera and Rawalpindi the animals were fed on oil seed cake wheat or rice bran mixed with straw. In these three farms the age at first calving ranges from 1290.7 ± 26.71 to 1376.18 ± 54.12 days. In MDF Khyber Okara, MDF Punjnad and LRS, NARC, Islamabad a balanced feed is offered containing 16-18 per cent protein, 70 to 72 per cent total digestible nutrients and 2.5 per cent of minerals. Moreover, green fodder was available *ad libitum*. In these farms the age at first calving ranges from 1266.19 ± 12.71 to 1301.77 ± 16.26 days. Correlations between age at first calving and first lactation performance traits were studied in all the six farms. Age at first calving is positively correlated with age at maturity. All other traits show negative trends in terms of first lactation performance in relation to age at first calving except in a few cases where negligible positive trends were seen (Table 3). This shows, as the age of the buffaloes advances, there is negative trend in birth weight (male and female calves), lactation length, dry period and service period. Correlations of age at first calving and these traits can be readily located in the literature for instance Dahania *et al.* (1991), Type and Nagarcenkar (1992), Tien and Tripathi (1991), Dahama *et*

*al.* (1990), Khan *et al.* (1990), Datt and Yadav (1988) and Mohammed *et al.* (1991).

Eswara Reddy and Taneja (1982) reported the age at first calving as 42 months in Nili-Ravi buffalo maintained at Ferozepur Military Dairy Farm, India. They reported significant (P<0.05) effect of age at first calving for weights at first calving, first lactation yield, average first lactation yield per day of first lactation length and average first lactation yield per day of first calving interval. The regression co-efficients were 0.049, 0.287, 0.008 and 0.006 kg, respectively, suggesting that these traits would increase with increase in age at first calving.

However, it is worth mentioning that correlation/ regression of age at first calving and these traits only explain the linear part of the relationship.

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