# Effect of Parity and Season of Calving on Service Period in Nili Ravi Buffalo in Pakistan[a]

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**ABSTRACT** : The study was based on 1921 service period records of Nili Ravi buffaloes maintained at six dairy farms in Pakistan during the period 1978 to 1994. The mean service period was 237.57±4.5 days in the over all data. The highest mean service period (393.59±16.18 days) was at MDF Rawalpindi and the lowest (199.15±14.35 days) was at MDF Peshawar. The difference was significant $p<0.001$. Late maturing buffaloes showed significantly longer service period as compared to early maturing buffaloes. Parity and seasonal effects on Service Period were studied. There was an overall trend of reduction in the length of service period with the increase in parity. The mean (287.54±6.89 days) service period was (highest) in parity number one and lowest in parity number eight (107.95±19.72 days). The difference was highly significant. In overall data significantly lower service periods were seen in buffaloes calving in spring+winter as compared to summer+fall. (*Asian-Aus. J. Anim. Sci. 2000. Vol. 13, No. 3 : 287-291*)

Key Words : Parity, Season, Service Period, Nili Ravi Buffalo

## INTRODUCTION

Service period is the time taken from calving to next successful insemination (Khan, 1985). Service period plus gestation period is generation gap (calving interval). The gestation period is almost fixed with a small variation, so, longer the service period, longer is the calving interval and higher is the cost of milk production (Wahid, 1976).

Mean service period reported for Surti and Murrah buffaloes is as 237.3±11.5 and 231.6±9.7 days (Neog et al., 1991), for Philippine Carabao and Philippine Carabao×Murrah as 423±223 and 330±174 days (Momongan et al., 1991). Mean service period found for Murrah in two different studies is 237.3±11.5 days (Neog et al., 1991) and 133.9±12.6 days (Parkash et al., 1989). Wahid (1976) reports that service period of about 60-80 days or less is desirable for Nili-Ravi buffaloes. He reports 31% of the records within the range (with an average of 59±18 days). Majority of the animals (70%) have a service period ranging between 101-104 days. The mean service period for artificially inseminated and naturally bred buffaloes is 223.36±3.92 and 264.11±5.47 days, respectively (Samad et al., 1994). Service period for cattle, Murrah and Purnathadi buffalo is 202, 118 and 166 days (Kukde and Gire, 1992). Seasonal effect is seen on service period in buffalo (Singh and Lal, 1992; Eswara Reddy and Taneja, 1984; Chaudhry et al., 1989). Shafiq and Usmani (1996) report that season of calving and perity have no significant effect on service period.

Effect of season of calving on service period is also reported by Dutt and Yadav (1988). Service period is incorporated in the selection indices constructed for the genetic improvement of buffalo by Chakravarty et al. (1991), Gajbhiye and Tripathi (1991) and Gupta et al. (1991). There is an interaction ($p<0.05$) of season of calving with weaning type for service period in Murrah buffalo; there is no seasonal effect on service period in females whose calves are weaned normally, but in females whose calves are weaned at birth, service period is shorter in winter calving than calvings in summer and in rainy seasons (Rao et al., 1999).

Service period is significantly lower in the weaned calves buffaloes then in suckled group (Noordin and Jainuddeen, 1991). Sethi and Nagarcenkar (1992) report significant effect of parity on service period. Genetical correlation of service period with calving interval is significant; 0.82±0.01 (Dahma et al., 1990), 0.55±0.10 (Verma and Yadav, 1989). The present study focuses on factors affecting service period in Nili-Ravi buffalo at various farms in Pakistan.

## MATERIALS AND METHODS

The study was based on 1921 service period records of buffaloes maintained during the period 1978 to 1994 at Military Dairy Farms (MDFs) Peshawar, Rawalpindi, Khyber Okara, Punjnad and Livestock Research Station (LRS), National Agricultural Research Centre (NARC), Islamabad, Pakistan. Animals were kept in loose housing system with adequate supplyof water at all the farms. The buffaloes were taken out

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**Table 1.** Service period (days) in Nili-Ravi buffalo

| MDF Peshawar | MDF Nowshera | MDF Rawalpindi | MDF Khyber, Okara | MDF Punjnad | LRS, NASC Islamabad | Overall |
|---|---|---|---|---|---|---|
| 199.15 ± 14.35 (104) | 220.7 ± 11.41 (285) | 393.59 ± 16.18 (228) | 242.21 ± 9.16 (415) | 203.35 ± 6.88 (642) | 210.37 ± 10.85 (247) | 237.57 ± 4.5 (1921) |

F=37.049; p<0.001.

for grazzing to the pastures for 2-3 hours a day. Green fodder was available through out the year in the interior Punjab and 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 usually fed on some silage and wheat straw. At all the farms along with green fodder and roughages the animals were fed concentrate ration according to their body requirements based on their production status. At all the farms teaser bulls were used for heat detection. The activity of the teaser bulls was observed by the stock men. Natural service and artificial insemination both were practiced at all the farms. Service period was studies for the overall data as well as for individual farms. The effect of parity and season of calving on service period was studied.

To see the effect of season of calving the division of the year into four seasons (Winter, December to February; Spring, March to May; Summer, June to August and Autumn, September to November) was followed after Shah and Shah (1968). The service period was also studied in early maturing (Group 1; EM) and late maturing (Group 2; LM) buffaloes.

Statistical analysis of the data involved the tests of significance, correction and regression analysis following Sokal & Rahlf (1969).

## RESULTS

There were 1,921 records for service period in all the buffaloes maintained at six dairy farms. The mean service period was 237.57 ± 4.5 days in the over all data. The highest mean service period (393.59 ± 16.18 days) was at MDF Rawalpindi and the lowest (199.15 ± 14.35 days) was at MDF Peshawar (table 1). The buffaloes maintained at MDF Rawalpindi had significantly longer service period compared to MDF Peshawar (p<0.001).

Mean service period in Group-1 (early maturing) was 217.05 ± 4.95 days and in Group-2 (late maturing) 280.96 ± 9.32 days (table 2). Late maturing buffaloes showed significantly longer service period compared to early maturing buffaloes (p<0.001).

### Effect of parity

In over all data service period decreased significantly as parity increased (p<0.01). The mean service period was highest in one parity (287.54 ± 6.89 days). The service period showed negative trend as parity increased. The lowest mean service period was seen in parity number eight (107.95 ± 19.72 days) (table 3). The decrease in service period in parity number eight was highly significant (p<0.001) compared to that in parity number one.

**Table 2.** Service period (days) in early (1) and late (2) maturity groups in Nili-Ravi buffalo

| | Group 1 | Group 2 | Significance |
|---|---|---|---|
| Age at maturity (days) | 975.93 ± 10.68 (447) | 1,015.26 ± 17.39 (214) | $t_{(659)}$= 2.81* |
| Service period (days) | 217.05 ± 4.95 (1304) | 280.96 ± 9.32 (617) | $t_{(1919)}$= 6.06** |

* p<0.01; ** p<0.001.

There was an over all trend of reduction in the length of service period with the increase in parity number in all the dairy farms except MDF Rawalpindi (table 4), where non-significant increase in service period with the increase in parity number was observed. A significant decrease in service period was seen at MDF Nowshera (p<0.05) and MDF Punjnad (p<0.01) and non-significant decrease in service period was observed at MDF Peshawar, MDF Khyber, Okara and LRS, NARC, Islamabad. In Group-1 (early maturing) there was significant decrease in length of service period (p<0.05) as parity increase. The decrease in service period was non-significant in Group-2 (late maturing).

### Effect of season of calving

Seasonal variation in service period are given in tables 5 and 6. The longest service periods were seen in buffaloes calving in spring and winter at MDF Rawalpindi. Shortest service period was observed in buffaloes calving in summer at MDF Punjnad. Significantly longer mean service periods were seen in spring+winter as compared to summer+fall in overall data (p<0.001). Similar trends were also seen at MDF Rawalpindi, MDF Khyber Okara (p<0.05); and LRS, NARC, Islamabad (p<0.01). At MDFs Nowshera and Peshawar buffaloes calving during summer+fall had

Table 3. Effect of parity on service period (days)

| Parity No. | MDF Peshawar | MDF Nowshera | MDF Rawalpindi | MDF Khyber, Okara | MDF Punjnad | LRS, NARC, Islamabad | Overall |
|---|---|---|---|---|---|---|---|
| 1 | 217.39+27.26 (28) | 264.62±21.89 (94) | 392.89±23.37 (92) | 296.61±16.84 (160) | 264.93±13.62 (185) | 240.08±22.07 (71) | 287.54±06.89 (630) |
| 2 | 250.30+38.53 (23) | 249.63±22.85 (81) | 435.03±30.13 (58) | 222.05±12.45 (155) | 211.63±14.97 (154) | 187.89±17.06 (70) | 241.68±08.29 (541) |
| 3 | 146.50+26.68 (16) | 172.83±22.79 (54) | 383.53±50.55 (30) | 188.47±20.43 (60) | 171.22±14.44 (116) | 212.21±30.23 (43) | 198.99±10.41 (319) |
| 4 | 206.33+33.66 (15) | 181.33±26.58 (27) | 263.44±46.65 (25) | 188.65±43.20 (23) | 188.45±21.73 (66) | 232.66±34.85 (28) | 204.84±13.44 (184) |
| 5 | 090.36+24.09 (11) | 174.00±39.07 (17) | 458.27±126.15 (15) | 186.88±31.31* (17) | 131.80±14.57 (44) | 188.11±34.33 (19) | 190.99±22.00 (112) |
| 6 | 221.36±41.85* (11) | 103.33±10.23* (12) | 424.25±97.79* (8) | | 184.19±25.24 (32) | 159.0±29.95* (16) | 202.49±20.40 (65) |
| 7 | | | | | 089.48±16.04 (21) | | 122.27±20.01 (37) |
| 8 | | | | | 106.08±19.21* (24) | | 107.95±19.72 (20) |
| 9 | | | | | | | 159.38±39.84* (13) |
| 10 | | | | | | | |
| Over-all | 199.15+14.35 (104) | 220.70±11.41 (285) | 393.59±16.18 (228) | 242.21±09.16 (415) | 203.35±06.88 (642) | 174.88±12.03 (247) | 237.57±04.45 (1921) |

* Values at asterisk onward were combined.

Table 4. Correlation and regression co-efficients for number of parity on service period (days)

| | MDF Nowshera | MDF Peshawar | MDF Rawalpindi | MDF Khyber, Okara | MDF Punjnad | LRS, NARC, Islamabad | Overall |
|---|---|---|---|---|---|---|---|
| r | -0.9119** | -0.36 | 0.0823 | -0.8515* | -0.8797** | -0.6682 | -0.8751*** |
| b | -28.424* | -11.43 | 3.0408 | -26.086 | -20.7195** | -10.9797 | -17.83** |

* p<0.05; ** p<0.01; ***p<0.001.

Table 5. Service period (days) in Winter+Spring and Summer+Fall

| Farm | Winter+Spring | Summer+Fall | t |
|---|---|---|---|
| MDF Peshawar | 236.41±29.65 (29) | 369.36±22.31 (75) | 3.58** |
| MDF Nowshera | 202.79±19.49 (79) | 227.68±13.36 (206) | 1.053 |
| MDF Rawalpindi | 442.04±26.69 (76) | 369.36±22.31 (152) | 2.089* |
| MDF Khyber Okara | 268.87±15.62 (149) | 226.13±11.29 (266) | 2.217* |
| MDF Punjnad | 219.21±12.14 (185) | 196.93±08.33 (457) | 1.153 |
| LRS, NARC, Islamabad | 254.82±21.23 (74) | 191.18±12.33 (173) | 2.592** |
| Overall | 263.39±8.12 (592) | 226.05±5.46 (1329) | 3.81*** |

* p<0.05; ** p<0.01; *** p<0.001.

longer service period than those calving during winter+spring. Significant difference in service period was, however, observed at MDF Peshawar (p<0.001).

Buffaloes calving during winter+spring had significantly longer service period in Group-1 (p<0.001) but a non-significant similar trend was seen Group-2.

## DISCUSSION

The overall mean service period in the study is 237.57±4.5 days. The mean ranges from 199.15± 14.35 days (MDF Peshawar) to 393.59±16.18 days (MDF Pawalpindi). This is much longer than the desirable service period 60-80 days for Nili-Ravi (Wahid, 1976). The service period reported by differnet authors for buffaloes is comparable to that analyzed in this study. Mean service period is 237.3± 11.5 and 231.6±9.7 days for Surti and Murrah

**Table 6.** Effect of season of calving on service period (days) in early (1) and late (2) maturing groups

| Group-I | | | Group-II | | |
|---|---|---|---|---|---|
| Winter+Spring | Summer+Fall | t | Winter+Spring | Summer+Fall | t |
| 243.80 ± 8.86 (408) | 204.49 ± 5.93 (896) | 3.69* | 306.91 ± 16.80 (184) | 269.98 ± 11.20 (433) | 1.83 |

* $p<0.001$.

buffaloes, respectively (Neog et al., 1991) and for Murrah this is 133.9 ± 12.6 days (Parkash et al., 1989). In Carabao × Murrah crossbred it is reported as 330 ± 1.74 days (Momongan et al., 1991).

However, the mean service period in Philippine Carabao is 423 ± 223 days (Momongan et al., 1991). This is longer than the service period examined in this study.

The mean service period reported for Murrah is 305.8 days (Sethi and Nagarcenkar, 1992). This is shorter than MDF Rawalpindi (393.59 ± 16.18 days) and longer than all other farms under study. The service period of MDF Rawalpindi is longer that other farms. The repeatability estimates for service period at MDF Rawalpindi is calculated as 0.47 ± 0.08 (upper limit of heritable part of the trait) which shows that more than 53% of the trait can be improved by improving management of reproductive practices at the farm.

Service period recorded in the three groups of Malaysian swamp buffaloes by Noordin and Jainudeen (1991) (unrestricted suckling, 89 ± 17; suckling restricted to once a day, 92 ± 26 and calves weaned, 58 ± 17 days) are shorter than the results of present study.

**Parity effects**

In overall data the service period decreases significantly as the parity increases ($p<0.01$). The same trend is observed at all the dairy farms except MDF Rawalpindi, where non-significant increase in service period is observed as parity increases. It has been observed in buffaloes that post partum utrine involution occurs sooners with increasing parity which probably leads to better fertility. Similar decreasing trend of service period with the increase in parity has been reported in cattle (Chaudhry et al., 1989) and buffalo (Gogoi et al., 1996). However, Shafiq and Usmani (1996) reported no significant effects of parity on service period in Nili-Ravi buffaloes. Chhikara et al. (1995) also reported non-significant effects of parity on service period in Murrah buffalo.

**Seasonal effects**

Significantly longer mean service periods are seen in spring+winter as compared to summer+fall in the over all data ($p<0.001$) as well as at MDF Rawalpindi, MDF Khyber Okara and LRs, NARC, Islamabad. Similar effects of season of calving are reported by Chhikara et al. (1995) in Murrah buffalo and Singh and Lal (1992) in village buffaloes. Eswara Reddy and Taneja (1984) also reported that first service period is lower in June to November (summer+fall) calvers than those from December to May (winter+spring).

However, at MDF Peshawar and MDF Nowshera, the calving during summer+fall have longer service period than those calving during winter and spring. Rao et al. (1990) report an interaction ($p<0.05$) of season of calving with weaning type for service period. They report no seasonal effect on service period in females whose calves are weaned normally, but in females whose calves are weaned at birth service period is shorter after winter calvings than after calvings in summer and in rainy season. The service period in winter and spring calvers was low at MDF Peshawar and MDF Nowshera. This meaned that the buffaloes calving in winter and spring showed first post partum oestrus within these seasons and they were inseminated, whereas, at other farms the buffaloes calving in winter and spring either did not show their first post partum oestrus within these seasons or they could not be inseminated, hence entering into the summer season. The buffaloes oestrus frequency in summer is minimal. Therefore, summer anoestrus contributed considerably to the interval, parturition to successful service in buffaloes calving in winter and spring seasons at other farms. Applications of oestrus induction and oestrus synchronization in the open buffaloes of winter and spring would be a useful managemental tool for improvement of herds' fertility.

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