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ENVIRONMENTL FACTORS AFFECTING SOME REPRODUCTIVE TRAITS IN NILI RAVI BUFFALOES

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ABSTRACT

Data on 451 records for service period and 405 records for services per conception of Nili-Ravi buffaloes maintained at Livestock Experiment Station, Bahadurnagar, Okara spanned over a period from 1997 to 2006 were analyzed to examine the effect of year, season of calving and parity number. The overall least squares mean for service period and services per conception were 249±15.36 days and 1.99±0.13 numbers, respectively. The longest service period was 353 ±43.86 days in the year 1997 and the shortest service period was 151±27.70 days in the year 2006. When the data set was analyzed to examine the seasonal effect, the maximum least squares mean for service period (297±22.22) was observed days in winter season and minimum in spring season (216±33.01 days). Maximum calving (46.34%) were noted in humid hot season. Animals in first parity took longer period (316±13.58 days) for conception and short service period (221±57.80 days) was in animals having sixth parity number. Statistical analysis showed the highly significant effect of parity on service period ($P<0.01$). In case of services per conception, the maximum and minimum least squares mean were as 2.29±0.33 numbers in the year 1997 and 1.21±0.24 numbers in the year 2006, respectively. During the hot humid season, animals availed maximum services per conception (2.24±0.16) and minimum number 1.62±0.22 in spring season. Maximum services per conception (2.36±0.31) were recorded in animals when calved fifth time and minimum services per conception (1.69±0.51) after calving sixth time. Years of calving, seasons of calving and parity number had no significant effect on services per conception.

Key words: Nili-Ravi Buffalo, service period, services per conception.

INTODUCTION

Nili-Ravi buffaloes are well known as the finest milch breed of the world. The buffalo population was 20.3 million in 1996, which increased to 31.7 million in 2011, reflecting an increase of 3.7 percent annually in Pakistan (Government of Pakistan, 2011). The largest population of buffaloes (about 65 percent) is found in the Punjab province. Reproductive efficiency in dairy animals has great value that affects the profitability of a dairy farm and it has a significant relationship with the milk production. Amongst the reproductive traits, fertility traits like service period and services per conception play a significant role because these traits are responsible for longer or shorter calving interval. The long service period and more services per conception increases the cost of rearing the animals, whereas the short service period and less number of services per conception increases the number of calf crops and productive life of an animal. Present investigation was made to study the reproductive performance of Nili-Ravi buffaloes in terms of fertility traits like service period and services per conception.

MATERIALS AND METHODS

Data on 451 records of service period and 405 records of services per conception of Nili-Ravi buffaloes maintained at Livestock Experiment Station, Bahadurngar, Okara for a period of ten years (1997 to 2006) were used in the present study. Those buffaloes were included in the study who had at least one service period. Keeping in view the environmental conditions, the year was divided into five seasons (Rehman *et al*., 2006), i.e. Winter (November to January), Spring (February to April), Hot dry (May to June), Hot humid (July to August), Autumn (September to October). The effect of year, season of calving, and parity number on service period and services per conception were worked out by least squares analysis of variance (ANOVA) method using HARVEY-1990 computer software package assuming the following mathematical model:

$y_{ijkl} = \mu + Y_i + S_j + P_k + e_{ijkl}$

Where:

y_{ijkl} = Observation of any traits
μ = Overall population means
y_i = Effect of ith year of calving.
s_j = Effect of jth season of calving.
p_k = Effect of parity number.
e_{ijkl} = Random error

RESULTS AND DISCUSSION

The overall least squares mean for service period was observed as 249±15.36 days (Table-1) which is some what higher than reported by Naqvi (2000), who observed a service period of 237.57±4.5 days in Nili Ravi buffaloes maintained at six farms in different environmental conditions in Pakistan. Statistically, differences among least squares means were highly significant (P<0.01), as shown in Table-2. A service period of about 60-80 days is considered highly desirable. Service period in present study is obviously higher and can be brought down to a desirable value if better management, balanced nutrition and proper heat detection with timely insemination and post partum ailments like retention of placenta and endometritis taken care of.

The maximum least squares mean for service period in the present study was recorded as 297±22.22 days for the buffaloes calved during winter season, while it was found to be minimum (216±33.06 days) in animals calved during spring season (Table-1). Season of calving had highly significant (p<0.01) effect on service period (Table-2). The service period in buffaloes is generally reported to be very long because of silent heat and ovarian inactivity during some seasons of the year. The results of the present study showed that maximum calving were noted in hot humid season (46.34%) followed by autumn season (21.51%). However, buffaloes calved round the year with minimum percentage rate in rest of the seasons i.e. winter season (17.52%), hot dry (08.65%) and spring season (5.98%). The buffaloes calved during late winter and early spring usually take more time to be conceived due to less ovarian activity during May-June when the temperature rises with increasing day length. Whereas the buffaloes calved during July-August usually breed and conceive during. Autumn and early winter when temperature is mild and decreasing day length.

The higher least squares mean for service period in Nili-Ravi buffaloes was noted as 316±13.58 days based on 166 records when calved for the first time, whereas, the lower least squares mean for the service period was recorded as 221±57.80 days in sixth parity (Table-1). There was an over all trend of reduction in the length of service period with the increase in parity number. It has been observed that post partum uterine involution in buffaloes occurs sooner with increasing parity which probably leads to better fertility. The least squares analysis of variance (Table-2) indicated that year, season of calving and parity number affect the trait significantly (p<0.05).

Present findings are in agreement with the results of most of the other studies on Nili Ravi buffaloes. Naqvi (2000) also reported that there was an overall trend of reduction in the length of service period with the increase in parity in Nili Ravi buffaloes. The highest service period (287.54±6.89 days) was reported in parity number one and lowest (107.95±19.72 days) in parity number eight. Comparable results were also reported by Chaudhry *et al.,* (1988) who reported that service period for 373 buffaloes averaged 243.81±5.17 days. Year of calving, but not season, significantly affected service period. Service period ranged from 290.83±12.5 days in the 4th parity to 263.28±10.93 in the 1st (P<0.05). Ahmed *et al*., (1983) analyzed the data on 491 females at an Experiment Station and reported average service period 221.53±4.57 days, which is close to the present study, while the first service period was significantly longer than others. The effect of parity on the service period was significant. The results are in line with the present study.

Contradictory findings have also been reported by some research workers (Shafique and Usman, 1996 and Hussain *et al.,* 2006). Shafique and Usman (1996) reported from 383 calving records of a herd of Nili-Ravi buffaloes maintained at LES, Islamabad (rain-fed area) over a period of 18 years (1976-94). The overall least squares mean for service period was 176.6±6.4 days. The service period was not affected by season of calving and parity numbers, which differs with the results of present study. Hussain *et al.,* (2006) utilized 376 performance records of 109 Nili Ravi buffaloes and reported that the least squares mean for service period was 208.35±24.03 days. They further reported that a non-significant effect of season, year of calving and parity number was observed. Quereshi *et al.,* (1999) collected the data on production and reproduction traits for 300 buffaloes from farms in 3 rural areas of Dir District, Pakistan and reported mean value for service period 162.0 days. They also further reported that the trait was longest in the summer and shortest in the autumn (P<0.01). The mean value of service period for buffaloes treated with recombinant bovine somatotropin hormone was 164 days, whereas the corresponding value for the control group was 135 days (Usmani and Athar, 1997). Data on 344 buffaloes maintained at 2 farms was analyzed and reported that service period averaged 304±9 days and it was also affected by parity (Kotby *et al.,* 1989). Kotby *et al.,* (1987) also reported that service period averaged 304.07±9.23 days and it was affected by year and season of calving (p<0.01). Data on 291 buffaloes recorded during 1978-1985 was analyzed and reported that service period was 169.3 days (Tiwana *et al.,* 1986).

Calving records of 13 Murrah buffaloes collected from 1970-80 were analyzed and reported that the average service period was 163.6 days. The proportion of buffaloes calving in spring, summer, the rainy season, autumn and winter were 0.7, 11.6, 61.6, 16.7 and 9.4%, respectively. The effect of season was significant in buffaloes. In buffaloes, service period ranged from 110 days, in rainy season to 215 days in winter (Tewari *et al.,* 1982).

Table-1 Least Squares Means for Service Period and Services Per Conception

Service Period			Services Per Conception		
Effect	**Nos. of Observation**	**Means ± S.E. (days)**	**Effect**	**Nos. of Observation**	**Means ± S.E. (days)**
Overall mean	451	249 ± 15.36	Overall mean	405	1.90 ± 0.13
Year of Calving			**Year of Calving**		
1997	15	353 ± 43.86	1997	20	2.29 ± 0.33
1998	20	219 ± 38.99	1998	18	1.95 ± 0.34
1999	32	259 ± 32.15	1999	28	1.84 ± 0.28
2000	39	188 ± 28.74	2000	38	2.20 ± 0.25
2001	48	219 ± 27.49	2001	42	2.13 ± 0.23
2002	74	299 ± 21.89	2002	66	2.05 ± 0.20
2003	64	317 ± 23.20	2003	62	1.97 ± 0.20
2004	54	211 ± 24.04	2004	42	1.73 ± 0.22
2005	66	276 ± 21.73	2005	59	1.62 ± 0.19
2006	39	151 ± 27.70	2006	30	1.21 ± 0.24
Seasons of Calving			**Seasons of Calving**		
Winter (17.52 %)	79	297 ± 22.22	Winter (25.43 %)	103	1.95 ± 0.16
Spring (05.98 %)	27	216 ± 33.06	Spring (12.50 %)	51	1.62 ± 0.22
Hot dry (08.65 %)	39	235 ± 29.20	Hot dry (08.64 %)	35	1.72 ± 0.25
Hot Humid (46.34 %)	209	234 ± 15.34	Hot Humid 28.15 %)	114	2.24 ± 0.16
Autumn (21.51 %)	97	265 ± 19.07	Autumn (25.19 %)	102	1.96 ± 0.16
Parity Nos.			**Parity Nos**.		
1	156	316 ± 13.58	1	126	1.88 ± 0.12
2	117	254 ± 16.78	2	114	1.83 ± 0.13
3	84	229 ± 19.33	3	81	1.75 ± 0.16
4	54	238 ± 23.76	4	46	1.90 ± 0.21
5	22	238 ± 35.57	5	21	2.36 ± 0.31
6	18	221 ± 57.80	6	17	1.69 ± 0.51

Table-2: Least Squares Analysis of Variance for Service Period.

Source of Variation	Service Period			Services Per Conception		
	d.f.	**M.S.**	**F**	**d.f.**	**M.S.**	**F**
Year of Calving (Y)	9	148162.663	5.975^{**}	9	2.648	1.591^{ns}
Season of Calving (S)	4	70145.473	2.829^{*}	4	3.881	2.332^{ns}
Parity Number (P)	5	111035.297	4.478^{**}	5	1.258	0.756^{ns}
Random Error	432	24798.133		386	1.664	

*Significant ($p<0.05$), ** = Highly significant ($P< 0.01$) , ns = non significant

Services per Conception: The overall least squares mean for services per conception was recorded as 1.9±0.13 numbers as shown in Table-1. The least squares analysis of variance showed the non-significant effect in respect of years, seasons of calving and parity numbers on services per conception (Table-2).

The least squares mean for services per conception (Table-1) indicated that the maximum least squares mean for services per conception were attained as 2.29±0.33 number, who calved during the year 1997, while the smaller least squares mean of services per conception was recorded as 1.21±0.24 during the year, 2006. Statistically, differences among least squares means were non-significant (Table-2).

The least squares means for services per conception of buffaloes calved in different seasons are indicated in Table-2. The maximum least square mean for services per conception was 2.24±0.16 numbers in hot humid season, while the smaller least squares mean of services per conception was 1.62±0.22 in those buffaloes who calved in spring season. The results indicated that maximum number of services per conception recorded in hot humid season (28.15%) followed by winter season (25.43%), autumn season (25.19%), and spring season (12.59%) and hot dry (8.64%). However, statistically differences among least squares means were non-significant.

The maximum number of services per conception in Nili-Ravi buffaloes was noted as 2.36±0.31 when calved for the fifth time, whereas the smaller least squares mean for the services per conception was recorded as 1.69±0.51 numbers in sixth parity. The effect of parity on number of services per conception was non-significant.

The findings of the present study were in agreement with the results of Shafique and Usman (1996). They used 383 calving records collected from a herd of Nili-Ravi buffaloes maintained at LES, Islamabad

(rain-fed area) over a period of 18 years (1976-94) for analysis. The mean value for services per conception was reported as 1.30±0.01. The number of services per conception was not affected by season of calving and parity numbers.

Contradictory findings have also been reported by some research workers. Ahmed *et al.,* (1983) analysed the data on 491 females at an Experiment Station during 1965-78 and reported average inseminations per conception 2.15±0.04, which is more to the present study. The numbers of inseminations was significantly lower for the first then subsequent conception. The effect of parity on the number of inseminations per conception was significant. The mean values of services per conception for the two groups were 1.70 and 1.87 as reported by Usmani and Athar, 1997.

Quereshi *et al,* (1999) collected data on production and reproduction traits for 300 buffaloes from 3 rural areas of Dir District, Pakistan and reported mean values for services per conception as 2.0. They further reported that the mean value for the said trait was highest in the summer and lowest in the winter ($P<0.05$).

From 344 buffaloes at 2 farms Kotby *et al*, (1987) reported that services per conception were 1.87±0.07 and it was affected by year and season of calving ($p<0.01$). For 291 buffaloes recorded in 1978-1985 services per conception was 2.1 (Tiwana *et al.,* 1986). Their findings were also not in accordance with the results of present study.

Conclusion: The difference amongst least square means and the effect of environmental factors on the performance traits suggested that improvements in these traits can be carried out near the ideal level if better management, balanced nutrition and proper heat detection with timely insemination and post partum ailments like retention of placenta and endometritis taken care of.

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