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Individual Factors Affecting the Interval between Calving to First Service in Egyptian Buffaloes

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REPRODUCTIVE records from 3 Egyptian buffalo herds in different localities were examined to determine the individual factors affecting the calving to first service interval. The average length of the post-partum service period (PPS), was 175.07 ± 19.82 days. Geographic distribution of the animals had a significant effect on the occurrence of oestrus after calving. Gestation period of more than 330 days was accompanied by a significant long PPS. A linear relationship between lactation period and the onset of oestrus cycles after calving was found. An increase of one day in lactation period was associated with an increase of 0.3 day in the interval to first service.

The onset of ovarian cyclic activity monitored by the first visual oestrus may be the one most important event to the animal's ability to regain its maximum potential breeding following parturition. Moreover, the post-partum service period (PPS) is a factor of considerable importance since its influence on the economy of buffalo production. In Egyptian buffaloes, the parturient dams remain acyclic for a longer period, which is considered as a major problem in the fertility of this species. Serur, Farrag and Gomaa (1982) recorded that prevalence of anoestrus was higher in buffaloes. (74% of buffaloes, 89% of heifers) than in cattle (50% of cows and 54% of heifers). Efforts for enhancing return of buffaloes to cyclic activity are not so important as the need to identify those etiological factors that may result in abnormal prolongation of this period in buffaloes.

It is of interest to explore individual and seasonal factors that may result in abnormal delay in return of buffalo dams to normal visual cyclic activitiy.

Material and Methods

Source of data

The data used in this study included a total number of 2119 lactation records of 1369 Egyptian buffalo cows covering the period of 33 years. The records were obtained from three experimental stations belonging to the Animal Production Research Institute, Ministry of Agricultures. These farms are : Mehallet Mousa in the Northern part of Delta, Sids in Upper Egypt and Gimmeza in the Middle of Delta.

Analysis procedure

The least squares procedure were carried out according to Harvey (1960), to study the effect of farm, season, parity, gestation period, daily milk yield (during the first 70 days post-partum), and lactation period, on the post-partum service interval.

The following linear model was adopted :

$$Y_{ijklmn} = U + f_i + S_j + P_k + G_m + d_l + b\,X_{ijklmn} + e_{ijklmn}$$

where :

Y_{ijklmn} is the *nth* observation of the ijklmn subclass ;

U is the overall mean ;

F_i is the effect due to the *ith* farm, = 1, 2, 3; where 1 = Mehallet Mousa, 2 = Sids and 3 = Gimmeza ;

S_j is the effect due to the *jth* season of calving, j = 1, 2, 3, 4, where 1 = winter (Dec.-Feb.), 2 = spring (March-May), 3 = summer (June-Aug.), 4 = autumn — (Sept.-Nov.) ;

P_k is the effect due to k*th* sequence of post-partum service interval, k = 1, 2, 3, ... 9 ; where 1 = 1*st* parity, 2 = 2*nd* parity .... 9 = from 9*th* to 17*th* parity ;

G_m is the effect due to m*th* gestation period length group, m = 1, 2, 3, 4, 5 ; where 1 = less than 304 days, 2 = from 300 to 308, 3 = from 309 to 318, 4 = from 319 to 329 and 5 = more than 329 days;

d_j is the effect due to $1th$ daily milk yield in the first 70 days production, 1 = 1, 2, 3 ; where 1 = low daily milk yield (less than 5 kg), 2 = moderated daily milk yield (5-7 kg), 3 = high daily milk production (more than 7 kg) ;

b is the linear regression coefficient of post-partum service period (day) on lactation period length (day) ;

X_{ijklmn} is the deviation of the length of lactation period of individual from the average of lactation period length ; and

E_{ijklmn} is the random error particular to each observation with $e \sim N(0, 0^2)$. This element includes all other environmental and genetic effect not specified in the model.

Results and Discussion

The average post-partum service interval was found to be 175.07 ± 19.82 days with range between 144 to 217 days (Table 1). This finding is nearly similar to that obtained by Mikhail (1979) in Egyptian buffaloes who found it to be 196.32 days. El-Sheikh and Mohamed (1965), El-Wishy and El-Sawaf (1971) and Mohamed (1974) recorded that the mean interval varied from 136-146 days. Shorter periods have been reported by El-Itriby (1964) as 81 days, El-Fadaly (1978) as 85 days, Khattab (1980) as 44 days and El-Azab *et al.* (1984) as 92 days. The difference of the present finding from the majority of that reported by several authors may be attributed to the difference of managerial procedures. The problem of silent heat or quiet ovulation in buffaloes is much more prevelent than in cattle and is considered one of the causes that are lengthen the post-partum service interval in this species. El-Azab *et al.* (1984) recorded that the first post-partum oestrus was silent in 17 out of 21 examined buffaloes. Many authors reported that a higher incidence of silent heats occur particularly shortly after calving (Graves, *et al.*, 1968, Morrow, 1969 and Roberts, 1982).

The geographic distribution of animals showed a significant effect of localities on the post-partum service period (Tables 1 and

2). The analysis of variance indicated this effect ($P < 0.05$). Duncan's multiple range test (Table 1) revealed that animals located in Sids (Upper Egypt) have a shorter PPS than those at Mehallet Mousa and Gimmeza farms. Nutritional factor play an important role in determining the length of acyclic period after calving (in buffaloes Kaur and Arora, 1981 and 1982 ; in cows Kroker and Cummins, 1979, Echterukamp, *et al.*, 1982, Graham, 1982, Peters and Riley, 1982 and Post and Morrish, 1982). In the field trial by selenium injection in last stage of pregnancy in buffaloe at Mehallet Mousa station, the post-partum service interval decreased from 252.81 ± 22.635 to 135.86 ± 7.799 days (Awad *et al.*, 1983). Therefore, more attention must be directed to the supplementation of endemic deficiencies of minerals and trace elements with increased dietary energy intake during the last month of gestation and in post-partum period.

Effect of different seasons in this study, recorded that the autumn and winter calvers have a shorter PPS than those calved in spring and summer, yet this effect was insignificant, and supported by the analysis of variance in Table 2. Similar results were obtained by El-Sobhy (1975) and El-Sheikh and Mohamed (1977). The obtained results indicated that Egyptian buffaloes are not seasonal breeders. On contrary to Hafez (1955) and Shalash and Salama (1961), reported that Egyptian buffaloes remain in anoestrus during hot weather (April to July) and return to sexual activity with onset of autumn and the ovaries reached their optimum activity during winter. Significant effect of calving season was also reported by Mohamed (1974), El-Fouly *et al.* (1977) and Khattab (1980) in Egyptian buffaloes and Shukla, *et al.* (1973), Gudi and Deshpande (1977) and Shrivastava, *et al.* (1982) in Murrah buffaloes.

Parity had insignificant effect on the post-partum service period as indicated by Analysis of Variance (Table 2), while Duncan's multiple range test (Table 1) showed a significant variation between the first and third calving ($P < 0.05$). Nutritional status of the animals confined, while they were of young age (1*st* and 2*nd* calving) is considered a factor that lengthened this interval as stated by Awad *et al.* (1983). On the contrary, Roberts (1982) mentioned that older cows, over 5 years of age, tended to show longer intervals between parturation and estrum than did the younger cows.

Table 1 - Least squares means, and standard errors (S.E) of post-partum service interval.

Classification	No.	$\bar{x}$ or b ± SE (days)	DT*
Overall mean	2119	175.07±19.82	
Farm localities:			
Mehallet Mousa	1375	193.48±18.93	a
Sids	609	145.44±21.00	b
Gimmeza	135	186.30±33.43	ab
Seasons of calving			
Winter	690	172.87±22.41	a
Spring	412	182.39±24.68	a
Summer	366	179.73±25.35	a
Autumn	651	165.29±22.39	a
Parity:			
1st calving	662	217.98±20.81	a
2nd "	488	212.75±23.19	ab
3nd "	314	169.78±25.75	b
4th "	208	181.50±29.13	ab
5th "	141	168.41±33.22	ab
6th "	95	162.40±38.27	ab
7th "	71	154.20±42.48	ab
8th "	58	164.36±45.84	ab
9th "	41	144.28±53.91	ab
Gestation period (days)			
< 300	32	225.86±60.08	ab
300 - 309	161	145.71±29.15	ab
310 - 319	1193	155.87±16.81	a
320 - 329	653	137.21±18.52	a
≥ 329	80	230.71±39.24	b
Daily milk yield (kg)			
< 5	256	186.16±28.00	a
5-7	521	173.78±23.42	a
≥ 7	1342	165.28±19.22	a
Linear reg. on lactation period	2119	0.298 ±0.0852 **	

** $P < 0.01$ DT = Duncan's multiple range test

* Within each classification means having the same letter differ non-significantly from each other, otherwise they differ significantly at $P < 0.05$.

Buffaloes with a gestation period within 310-329 days had a significant short PPS than that of more than 330 days (Table 1). The causes of the abnormal long gestation period may affect the occurrence of visual oetsrus after calving-Agasti, *et al.* (1977) recorded that gestation length did not influence the involution time of the uterus.

Table (2) : Least squares analysis of variance of post-partum service interval.

Source of variation	d.f.	M.S.
Farm localities	2	458153.62 *
Season of calving	8	29853.37
Parity	3	143670.66
Gestation period	2	225601.63
Daily milk yield	4	44109.56
Linear reg. on lactation period	1	1400375.41 **
Residual	2098	109221.57

* $P < 0.05$
** $P < 0.01$

The effect of daily milk yield during the first 70-days post-partum on the occurrence of oestrus was insignificant as shown in Tables 1 and 2. The shortest PPS was accompanied with the highest daily milk production (165.28 ± 19.22 vs. 186.16 ± 28.00 days). Roberts (1982) reported that cows with higher production of milk may not have oestrus cycles for 3 to 4 months or more following parturition due to a negative energy balance.

Tables 1 and 2 showed a marked significant influence of lactation length on PPS. A linear relationship between lactation period and days to first service was indicated. An increase of one day in lactation period was associated with an increase of 0.3 day of PPS (Table 1). Analysis of variance proved the same significant effect ($P < 0.01$, Table 2). This relationship was studied by Wiltbank and Cook (1958) and they stated that suckling reduced the supply or the release of gonadotrophic hormones. Wagner and Hansel's report (1969) indicated that sufficient FSH

was present but LH was apparently deficient, while, El-Fouly *et al.* (1977) recorded that the effect of lactation period on PPS was non-significant on Egyptian buffaloes.

From the afore-mentioned results, the following recommendation must be taken in our consideration for shortening the post-partum service interval :

a) improvement of the managerial procedures.

b) a nation-wide survey for the estimation of trace elements and minerals to be compensated during the late pregnancy or immediately after delivery.

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العوامل الفردية التى تؤثر على الفترة بين الولادة وحـدوث الشبق الاول فى الجاموس المصرى

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بكفر الشيخ ـ جامعة طنطا

من واقع سجلات محطات تربية الجاموس فى اماكن متفرقة على مستوى الجمهورية ، وجد ان متوسط الفترة بين الولادة لحدوث الشبق الاول لعدد ١٣٦٩ جاموسة كان ١٧٥ر٠٧ + ١٩ر٨٢ يوما . وقد وجد ان التوزيع الجغرافى للحيوان له تأثير معنوى على حدوث الشبق بعد الولادة ، كما ان فترة الحمل التى تزيد على ٣٣٠ يوما لها تأثير معنوى ايضا . وقد اتضح ايضا ان هناك علاقة خطية بين فترة الحليب وحدوث الشبق الاول بعد الولادة ، فبزيادة هذه الفترة يوما واحدا نجد ان الفترة لحـدوث الشبق تزيد بمعدل ٣ر٠ يوما .