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Service Period Length in a Herd of Experimental Buffaloes

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Eighty six Egyptian buffalo cows were used in the present work to investigate possible factors affecting service period length. Reproductive organs of buffaloes were palpated per rectum at weekly intervals. The average service period length for the investigated herd was 141.6 ± 7.5 days. Primiparous buffaloes have a significantly ($P < 0.01$) longer postparturient interval to conception (180.7 ± 14.4 days) as when compared with pluripara (125.6±7.9 days). Buffaloes weighing 400.0 kg or less after calving have the longest service period length (178.3 ± 16.4 days). A lactation period length of 120 days or less was associated with significantly shorter service period length (114.4 ± 13.0 days).

The faster the speed of uterine involution the shorter was the service period length (r = 0.23 ± 0.1). The average interval from parturition to the first service was 125.5 ± 7.6 days. The correlation coefficient between post- partum service interval and service period length was 0.87 ± 0.02. Season of calving was shown to affect the postparturient interval to first ovulation, first heat and conception. Season, however, did not affect the speed of uterine and cervical involution or number of services per conception

In dairy cattle, it is understood that early post-partum conception; associated with no visible side effects or after effects, is a favourable reproductive character. For this reason, dairy cattle breeders spend continuous efforts to keep average service period length very close to 90 days. Egyptian buffaloes are known to be very inferior with regard to this reproductive trait. They conceive after an obviously long postparturient interval of not less than 4.1 months (El-Wishy *et al.*, 1971). Sometimes estimates of service period length came to 8 months or even more (Alim and Ahmed, 1954 and El-Wishy, 1965). Trials, however, are in progress to keep this interval very close to 100 days. Such trials will not be successful unless factors contributing to the variation in service period length are identified with certainty. The purpose of this work, therefore, was to investigate the influence of some maternal and environmental factors on the length of the postparturient interval to conception.

Material and Methods

A random sample of Egyptian buffaloes was made available from one of the experimental herds belonging to the Animal Production Research Institute of Ministry of Agriculture. The herd was stationed at Mahellet Mousa and was subjected to the general managerial procedures suggested by the Academic Staff of the Institute. A total of 86 post-partum buffaloe

ranged in age between 2.2 and 9.7 years was used. Animals were weighed at the first postpartum day and were allowed to nurse their own calves for a period of 7 days. Thereafter, they were hand milked twice daily at 8.0 am and 4.0 pm. In summer and autumn buffaloes were tied under semi-open sheds and were fed on concentrate mixture along with wheat or rice straw and limited amount of berseem hay, when available. During winter and spring, animals were left free to graze Egyptian clover (*Trifolium alexandrinum*).

Reproductive organs of buffaloes were examined per rectum 7 to 14 days to term. Thenceforth, rectal palpation was practiced regularly at weekly intervals. Palpation techniques were those described by Kidder *et al.* (1952) and Buch *et al.* (1955). Ovarian size was indicated by three measurements length, width and thickness. Ovarian structures that could be detected were recorded. Diametre of horns at the external bifurcation, their tone and location were estimated. Diametre of the cervix at a dorsal median point was also taken. Involution of uterus and cervix was judged to be complete whenever further changes in their diametre were not detected by palpation. Moreover, their tone and location became similar to those of non-pregnant buffaloes.

Buffaloes were checked for heat symptoms three times daily at 7.30 a.m., 12.00 noon and 3.30 pm. Animals detected in heat were hand mated to fertile bulls. Mating was postponed in buffaloes that were still in their post-partum refreshment period (6 weeks to term). Animals became pregnant were not palpated no more. The interval from parturition to the fertile service was referred to as service period length (SPL). Statistical analysis of the data was carried out according to Snedecor and Cochran (1967).

Results

Some maternal factors associated with SPL

Average service period length for the investigated herd was 141.6 ± 7.5 days. The coefficient of variability (C.V. %) was 49.0 and the range was between 41.0 and 201.0 days. After calving, a markedly higher pecentage of buffaloes (39.6) required more than 5 months to conceive (Table 1). Parity of calving was shown to affect SPL significantly ($P<0.01$). Primiparous buffaloes have a markedly longer SPL (180.7 ± 14.4 days) than pluripara (125.6 ± 7.9 days), (Table 2). The correlation coefficient between the two paramters was significant ($r = -0.36 \pm 0.1$). Age and weight of the buffalo cow after calving were proved to affect the subsequent SPL. Results appear in Table 3 give evidence that calvers of less than 4 years old have a significantly ($P < 0.05$) longer SPL (176.3 ± 14.0 days). Age, thenafter, was shown to be without significant effect on the length of the trait. The correlation coefficient between age of buffalo at calving and the subsequent SPL was -0.31 ± 0.1.

Whenever weight after calving was 400.0 kg or less, the subsequent SPL was significantly ($P<0.01$) long (178.3 ± 16.4 days). Post-partum body weight of more than 400.0 kg was without significant influence on SPL (Table 4). The correlation coefficient between the two traits was negative and markedly high ($r = -0.99 \pm 0.01$). Buffaloes that were dried off before 120 day

post artum; because of their very poor productivity, conceived after a significantly ($P<0.05$) shorter post-partum interval (114.4±13.0 days) as when compared with buffaloes continued lactating beyond 120 days (Table 5).

TABLE 1. Frequency distribution of service period length (day).

Postparturient interval (mean)	Number	Percentage
90 or less (69.3)	26	30.2
91 - 150 (119.6)	26	30.2
151 - 210 (174·2)	17	19.8
211 or more (253.3)	17	19·8
Overall mean (141.6)	86	100.0

TABLE 2. Effect of parity of calving on service period length (day).

Parity	Number (%)	MeanSPL± S.E	C.V %
Primipara	25 (29.1)	180.7 ± 14.4	39.8
Pluripara	61 (70.9)	125.6 ± 7.9	49.4
All Parities	86 (100.0)	141.6 ± 7.5	49.0

TABLE 3. Effect of age of buffalo at calving on the subsequent service period length (day).

Age group (month)	Number (%)	MeanSPL±S.E	C.V %
48 or less	24 (27.9)	176.3±14.0	38.8
49-73	42 (48.8)	130.5±10.7	52.3
74 or more	20 (23.2)	123.4±13.0	47.2

TABLT 4. Effect of body weight after calving on the subsequent service period length (day).

Weight group (kg)	Number (%)	MeanSPL±S.E	C.V %
400 or less	19 (22·1)	178.3±16.4	40.1
401-500	45 (52.3)	135.5±10.6	52.4
501 or more	22 (25.6)	122.4±11.8	45.2

TABLE 5. Effect of lactation period length on service period length (day).

Lactation period length (day)	Number (%)	MsanSPL±S.E	C.V %
120 or less	9 (10.5)	114.4±13.0	34.1
121 or more	77 (89.5)	144.8±10.8	46.2

Reproductive parametres associated with SPL

Uteri of experimental buffaloes completed involution after a post-partum interval of 46.8±1.9 days. The influence of the speed of post-partum uterine involution on the subsequent SPL is shown in Table 6. The faster the involution, the shorter was the SPL. The effect was statistically significant ($P<0.05$). The correlation coefficient between the two parametres was 0.23±0.1. Average post-partum interval to complete cervical involution was 36.0 ± 1.3 days. The speed of cervical involution was shown to affect SPL in a similar pattern reported for uterine involution (Table 7). The correlation coefficient between the two parametres was low and non-significant ($r = 0.17\pm0.1$). Average interval to the first post-partum ovulation was 42.0±3.5 days. Delayed post-partum ovulation was followed by a delay in post-partum conception (Table 8). The relationship was persistent and significant ($r = 0.33 \pm 0.1$).

Long postparturient intervals to the first service were associated with long SPL (Table 8). The two traits were highly correlated ($r=0.87\pm0.02$). A very low percentage of tested buffaloes (17.4%) was first mated two months to term. Meanwhile, 33.7% was first bred 61 to 100 days after calving. Percentage of buffaloes served for the first time 101 to 140 days post-partum was 12.8. More than one third of the investigated herd (36.0%) had an obvioulsy long post-partum service interval of more than 141 days (Table 9). The overall average

TABLE 6 . Effect of the speed of uterine involution on service period length (day).

Postparturient interval to complete involution(day)	Number(%)	Mean SPL±S.E	C.V %
40 or less	25 (29.1)	114.2±13.3	58.4
41 — 50	36 (41.9)	146.6±10.0	40.9
51 or more	35 (29.1)	162.0±15.5	48.0

TABLE 7 . Effect of the speed of servical involution on service period length (day).

Postparturient interval to complete involution(day)	Number(%)	MeanSPL±S.E.	C.V%
30 or less	26(30.2)	128.9±13.0	51.1
31 — 40	37(43.0)	141.7±11.1	47.5
41 or more	23(26.7)	155.8±15.9	48.8

TABLE 8 . Effect of post-partum ovulation interval on service period length (day).

Postparturient interval to first ovulation (day)	Number(%)	MeanSPL±S.E.	C.V %
40 or less	59 (68.6)	126.5±8.5	51.7
41 — 80	18 (20.9)	165.8±16.1	41.1
81 or more	9 (10.5)	192.4±21.8	34.1

length for post-partum service interval was 125.5±7.6 days and the coefficient of variability was 56.4. SPL increased *pari passu* with the increase in number of services per conception (Table 10). ANOVA revealed that the effect was not significant. Moreover, the correlation coefficient between the two traits was very low (r =0.21±0.1). The overall mean of number of services per conception was 1.3±0.1, the range was between one to three services and the coefficient of variability (C.V%) was 40.8.

TABLE 9. Effect of post-partum service interval on service period length (day) .

postparturient interval to first service (day)	Number (%)	MeanSPL±S.E	C.V. %
60 or less . .	15 (17.4)	78.3 ±9.4	46.7
61 — 100	29 (33.7)	105.9 ±9.1	46.1
101 — 140	11 (12.8)	125.9 ±6.8	17.9
141 or more . .	31 (36.0)	211.3 ±8.5	22.4

TABLE 10. Effect of number of services per conception on service period length (day).

Number of services per conception	Number (%)	MeanSPL±S.E	C.V. %
One	66 (76.7)	134.0 ± 8.8	53.3
Two	17 (19.8)	163.5 ±12.4	31.3
Three.	3 (3.5)	184.3 ±53.1	49.8

TABLE 11. Effect of season of calving on service period length and speed of post-partum uterine and cervical involution.

Season of calving	Number(%)	Service period length (days)		Speed of uterine involution (day)		Speed of cervical involution (day)	
		Mean±S.E.	C.V.%	Mean±S.E.	C.V %	Mean±S.E.	C.V.%
Spring . . .	3 (3.5)	221.0±10.0	7.8	54.7±5.4	17.0	38.3±3.2	14.4
Summer . . .	12 (13.9)	182.3±18.1	34.3	47.7±1.8	13.3	36.6±2.4	22.8
Autumn . . .	24 (27.9)	126.5± 5.0	19.5	47.4±2.4	24.7	37.2±1.9	24.5
Winter. . . .	47 (56.6)	133.9± 7.6	37.2	45.7±3.2	47.6	35.1±2.2	43.7
All seasons .	86 (100.0)	141.6±7.5	49.0	46.8±1.9	37.0	36.0±1.3	33.2

Seasonal influence on SPL and some of it's related parametres

As shown in Table 11, the longest SPL was reported for buffaloes calved in spring and summer. The shortest estimates were that for buffaloes terminated their pregnancy in winter and autumn. ANOVA revealed that differences among season groups with regard to SPL were significant ($P<0.05$). Data of Table 11 show that the speed of uterine and cervical involution was not significantly changed by season. This was in contrast with the effect of calving season on post-partum ovulation interval and post-partum service interval where the influence was significant ($P<0.01$). Post-partum ovulation was obviously delayed in summer calvers (75.7 ± 14.7. days) as when compared with calvers of otner seasons of the year (Table 12). Spring (221.0 ± 10 days) and summer (169.7 ± 17.7 days) calvers were shown to have the longest postparturient interval tothe first service. Meanwhile, calving in winter (118.2 ± 10.6 days) and autumn (105.9 ± 11.9 days) was associated with the shortest post-partum service interval. Number of services per conception for buffaloes during different seasons of the year is given in Table 12. Season was without significant effect on this reproductive trait.

TABLE 12. **Effect of calving season on post-partum ovulation, post-partum service and number of services per conception.**

Season of calving	Number (%)	Post-partum ovulation interval (day)		Post-partum interval(day)		Number of service per conception	
		Mean±S.E.	C.V %	Mean ± S.E.	C.V.%	Mean ± S.E.	C.V.%
Spring . . .	3 (3.5)	30.7±9.3	52.7	221.0±10.0	7.8	1.0±0.0	0.0
Summer . . .	12 (13.9)	75.7±14.7	67.4	169.7±17.7	36.1	1.3±0.1	37.0
Autumn . . .	24 (27.9)	38.4±3.8	49.1	105.9±11.9	54.5	1.4±0.1	41.7
Winter. . . .	47 (54.6)	35.9±4.1	79.0	118.2±10.6	61.5	1.2±0.1	42.0
All seasons .	86 (100.0)	42.0±3.5	77.7	125.5±7.6	56.4	1.3±0.1	40.8

Discussion

The present investigated value for SPL, however, is shorter than several estimates given in Table 13, nevertheless, is considerably longer than the one hundred days suggested as a standard SPL. On theoritical backgrounds, several factors could be suggested to explain the phenomenon of delayed postpartum conception in Egyptian buffaloes. Discussion, however will be confined to factors studied herein.

TABLE 13. **Reviewed estimates on service period length in Egyptian buffaloes.**

Authority	Year	Number of observations	Mean SPL± S.E. (day)
Alim and Ahmed . . .	1954	120	283.0±16.0
Ragab *et al.*	1956	268	177.0
Ahmed and Tantawy .	1959	523	168.6
Afifi	1961	181	204.0±146.7
El-Sawaf *et al.*	1964	24	150.0
Gharib *et al.*	1964	145	157.0
El-Sheikh and Mohamed	1965	1085	165.3± 3.2
El-Wishy.	1965	522	264.4
El-Wishy and El-Sawaf .	1971	521	126.6

Effect of some maternal factors

SPL in primiparous buffaloes (180.7±14.4 days) was significantly ($P < 0.01$) longer than in pluripara. A similar conclusion was reached by El-Sheikh and Mohamed (1965). The question that arise why conception was retarded in primiparous buffaloes despite the fact that they were exposed to the same external environment of their multiparous counterparts. Most likely reasons for that exist in their internal environment. As mentioned earlier, weight of the buffalo cow after calving was highly correlatd with SPL ($r = -0.99 \pm 0.1$) and dams weighing 400 kg or less were shown to have the longest SPL (178.3 ±16.4 days). The vast majority of primiparous buffaloes included in this work (73.7%) have a post-partum body weight of 400 kg or less. Thus, it could be suggested that for earlier post-partum conception, heifers should be bred to calve whenever their body weight is more than 400 kg. This point will be further discussed in a separate article.

The puzzling finding is that of age. Buffaloes four years old or less have the longest SPL (Table 3). This is in contrast with older buffaloes which have a significantly shorter SPL. All buffaloes included in the younger age group calved only once. It could not be advised, however, to delay first calving in order to have primiparous buffaloes of more than four years old. This is certainly against the reproductive performance of the animal. What is thoughtful is whether age effect on SPL is the function of weight or not. Most likely it is, but this requires to be elaborated.

Reproductive traits affecting SPL

Two major reproductive parameters affecting SPL were considered in this work. These are: 1) speed of post-partum uterine and cervical involution and 2) time required for the restoration of post-partum ovarian activity. Results obtained show that the speed of uterine and cervical involution was not much involved in delaying post-partum conception. The complete involution of these organs was reached at a relatively early stage after calving and independent of season effect (Table 11).

The occurrence of ovulation associated with detectable heat indicates that the ovary has restored its complete post-partum activity. Only at that time breeding is possible. In this study post-partum buffaloes were first mated after an average interval of 125.5 $\pm$ 7.6 days. When considering that heat was checked regularly by efficient herd attendants and breeding of estrus buffaloes was allowed 6 weeks to term, it could be concluded that the average buffalo cow restored ovarian activity after a markedly long post-partum period. This conclusion is correct even when considering that 25.6% of tested buffaloes came into heat 6 weeks or less after calving. The relatively short post-partum ovulation interval (42.0 $\pm$ 3.5 days) does not affect the conclusion reached earlier. Simply because, post-partum ovulation is nothing more or less than being a partial index on the restoration of ovarian activity.

Of interest is the effect of season on the length of post-partum ovulation and service intervals (Table 12). Buffaloes calving during summer have a significantly ($P<0.01$) longer postparturient ovulation interval than their counterparts calving during the rest of the year. Calving during spring and summer was associated with a significantly long post-partum service interval. These findings indicate that there is a seasonal influence on post-partum ovarian activity in Egyptian buffaloes. This conclusion is in a full agreement with that reached by El-Fouly *et al.* (1976). They showed that Egyptian buffaloes, however, are continuous breeders, nevertheless, they manifest seasonal variation in ovarian activity. Ovarian activity was high during the period from October to March and markedly low during the rest of the year. For this reason buffaloes did not become pregnant during the period of high ovarian activity, they were less probable to conceive during the season of ovarian hypoactivity. Thus, their post-partum ovulation, service and conception intervals would be rather long (Table 12).

Less important is the effect of repeat breeding on SPL ($r=0.21\pm0.1$). The average number of services per conception was very low (1.27 ± 0.1). Once buffaloes are detected in heat and bred at the proper time there is a good likelihood for the vast majority (76.7%) to conceive from this particular service. Early embryonic mortality rate; estimated 34 days *post coitum* was reported to be very low and was not much involved in delaying post-partum conception (El-Fouly, 1966).

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طول الفترة من الوضع حتى التلقيح المخصب فى قطيع من الجاموس التجريبى •

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كلية الزراعة ــ جامعة عين شمس ومعهد بحوث الانتاج الحيوانى

أجرى البحث على ٨٦ جاموسة حديثة الوضع تابعة لقطيع الجاموس بمحلة موسى ، كانت الأعضاء التناسلية للحيوانات تفحص عن طريق المستقيم مرة أسبوعيا . هدفت الدراسة معرفة العوامل التى تؤثر فى طول الفترة من الوضع حتى التلقيح المخصب . تتلخص النتائج المتحصل عليها فى الآتى :

ــ كان متوسط طول الفترة من الوضع حتى التلقيح المخصب للقطيع التجريبى هو ١٤١ر٦ ± ٧ر٥ يوما . الجاموس الذى وضع مرة واحدة حمل متأخرا (١٨٠ر٧ ± ١٤ر٤ يوما) عن ذلك الذى وضع عدة مرات (١٢٥ر٦ ± ٧ر٩ يوما) •

ــ الجاموس الذى كان متوسط وزنه عند الوضع ٤٠٠ كيلو جرام أو أقل تأخر فى الحمل (١٧٨ر٣ ± ١٦ر٤ يوما) عن ذلك الذى كان وزنه عند الوضع أعلى من ٤٠٠ كيلو جرام •

ــ الجاموس الذى جفف بعد ١٢٠ يوما أو أقل من الوضع بسبب انخفاض الانتاج ــ حمل مبكرا (١١٤ر٤ ± ــ ر ١٣ يوما) عن ذلك الذى كان يحلب لفترة أطول من ١٢٠ يوما (١٤٤ر٨ ± ١٠ر٨ يوما) •

ــ هناك ارتباطا موجب له دلالة احصائية عالية بين طول الفترة من الوضع حتى التلقيح الأول وطول الفترة من الوضع حتى التلقيح المخصب (ر = + ٨٧ر٠ ± ٠٢ر٠ ــ) •

ــ لم يؤثر فصل السنة تأثيرا واضحا على طول الفترة اللازمة لانكماش الرحم وعنق الرحم ولكن كان له تأثيرا معنويا على الفترة من الوضع حتى حدوث التبويض والشبق الأول •

ــ ظاهرة تكرر التلقيح ليس لها دخل كبير بطول الفترة من الوضع حتى الحمل •