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POST-PARTUM REPRODUCTIVE PATTERN OF SUCKLING AND NON-SUCKLING EGYPTIAN BUFFALOES

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SUMMARY

Twenty Egyptian buffalo cows which gave birth to their calves during the cold months of the year were used in this study for a period of 90 days. The cows were divided randomly into 2 groups, G1 and G2. Cows of G1 were allowed to nurse their calves, while those of G2 were hand milked twice daily during the experiment.

Oestrous behaviour was checked 2 times daily using 2 fertile bulls to detect day of oestrus, while animals were weekly palpated to detect the time of uterine involution. Regular blood samples were collected at 3 - 4 day intervals for progesterone determination to detect ovarian activity. Ovulation was considered to have occurred when the level of progesterone increased to reach $\geq$ 1.0 ng/ml and continued at that level, at least, for 2 consecutive samples. If progesterone reached $\geq$ 1.0 ng/ml without being preceded with oestrous behavioral signs through the previous 7 days it was considered as silent oestrus. In the case of silent oestrus, date of ovulation was determined by subtracting 3 days from the time. In the case of ovulatory oestrus, date of ovulation was considered as day of oestrus provided that it was followed by an increase in progesterone concentration.

Averages of uterine involution period, post-partum ovulation interval and post-partum estrus interval were 34.5 $\pm$ 1.4, 55.7 $\pm$ 8.9 and 63.0 $\pm$ 7.2 days vs 33.2 $\pm$ 1.3, 39.5 $\pm$ 5.8 and 58.8 $\pm$ 7.5 days for G1 and G2, respectively. Averages of ovulations and oestrus/cow

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were 0.9 and 0.3 for G1 and 1.6 and 1.3 for G2, respectively. Occurrence of slient oestrus was higher in G1 (66.6%) than in G2 (18.8%). Ovarian abnormalities occurred in 80% of G1 and 60% of G2. In G1 40% of cows showed sustained anestrus during the experiment vs 10% in G2.

Keywords: Buffalo, estrous behavior and post-partum

INTRODUCTION

Previous research works indicated that suckling buffalo cows have a long calving interval (604.2 days, Farghaly, 1992) comparable to milking (non-suckling) ones (452.2 days, Mostageer et al. 1981). This phenomenon is due, mainly, to the delay in resumption of ovarian activity of suckling cows as compared to milking cows (El-Fouly et al. 1976 b and El-Fadaly, 1980) as investigated by rectal palpation and considered as post-partum ovulation interval length.

During the last decade, patterns of ovarian activity throughout the 90 day post-partum period, based on progesterone profiles were widely studied in milking buffalo cows (Barkawi et al. 1986, Khattab, 1986 and Aboul-Ela et al. 1988). On the other hand, no research work was done to describe the patterns of ovarian activity in suckling buffaloes.

At the small holding level, where suckling for a period of 6 to 16 weeks is the common practice, calving interval was reported to be 416 days(Nigm et al. 1986) which was shorter than that reported for milking buffalo cows under intensive management regimes. If this farmers' information is true it means that buffalo cow could resume her ovarian activity and conceive within the 90 days post-partum.

The present work aims at finding out the effect of suckling on ovarian and oestrous activity, using progesterone concentration, for a period similar to that expected for the buffalo cow to get in calf at the small holdings.

MATERIALS AND METHODS

A. Animals and management

Twenty Egyptian buffalo cows between the 3 rd and

the 8 th parity were used in this study for a period of 90 days. The cows calved during the cold period of the year (October through February). Animals were kept free in a semi shaded yard and were fed on concentrate mixture, berseem (Trifolium alexandrinum) and rice straw according to their live body weight and level of milk production. Milk production of the experimental animals was checked once weekly. The cows were divided randomly into two groups, cows of the first group (G1) were allowed to nurse their calves, while those of the second group (G2) were hand milked twice daily (7:30 am and 2:00 pm). Calves of G1 were introduced to their dams for suckling twice daily at the times of milking of G2. Calves of G2 suckled only during the first 7 days post-partum before removing them from their dams.

B. Experimental procedure

1- Oestrus detection

Buffalo cows were checked for oestrus behaviour 2 times daily at 8:00 am and 4:00 pm using two fertile bulls; each one was allowed to run with the females in the yard for 20 minutes in each check. Cows were considered on true heat (ovulatory heat) when showing standing behaviour and/or other symptoms (bellowing and vaginal mucus discharge) providing that it was accompanied by ovulation as detected by progesterone level in blood serum.

2- Rectal palpation

Animals were subjected to weekly rectal palpation according to the procedure outlined by Kidder et al., (1952) to detect the time of uterine involution. Uterus was considered completely involuted when the uterine horns and cervix had returned to their normal size, tone and position. Date of uterine involution was calculated by subtracting 3 days from the time of rectal palpation at which the uterus was completely involuted.

Ovarian activity was detected through the progesterone concentration of the peripheral blood serum. Ovulation was considered to have occurred when the level of progesterone increased to $\geq$ 1.0 ng/ml and continued at that level, at least, for 2 consecutive samples. In the case of silent ovulation, the date of ovulation was determined by subtracting 3 days from the

time at which progesterone reached ≥ 1.0 ng/ml without being preceded by oestrous behaviour signs through the previous 7 days. In the case of ovulatory oestrus, date of ovulation was considered as day of oestrus provided that it was followed by an increase in progesterone concentration.

3- Blood sampling and progesterone assay

Blood samples were collected from the jugular vein at 3 to 4 day intervals starting 7 days post-partum. Blood samples were collected in tubes free from any anticoagulant materials. Samples were kept in ice box for 15-30 minutes before serum separation. Samples were centrifuged at 3000 rpm for 15 minutes, thereafter, serum was stored at -18° C until the time of assay.

Serum progesterone concentration of all the experimental animals was determined by RIA technique. Ready coated tube kits (produced by Diagnostic Products Corporation, Los Angeles, USA) were used following the procedure outlined by the manufacturer. According to the manufacturer's information the cross reaction of the antiserum, at approximately 50% displacement, has values of 100% with progesterone, 2.4% with 11-deoxycortisol, 2.0% with 20 α- dihydroprogesterone, 1.3% with 5 ß pregnane-3,20 dione and less than 1% with any of the other steroids.

Progesterone concentration in the standard curve ranged between 0.0 and 40.0 ng/ml. Sensitivity value when assaying 0.1 ml aliquot was found to be 0.07 ng/ml. The inter and intra assay coefficients of variation were 9.5 and 6.3 %, respectively.

4- Determination of reproductive parameters

The interval from parturition to the date of uterine involution was considered as uterine involution period (UIP). The intervals from parturition to date of first ovulation and first oestrus were considered as post-partum ovulation interval (PPOI) and post-partum oestrus interval (PPEI), respectively. The interval between two consecutive ovulations was considered as ovulation cycle. Ovulation cycles were categorized into short (<17 days), normal (18-24 days) and long (> 24 days).

A cow was considered normal if she showed her first ovulation during the first 60 days post-partum

followed by regular ovarian cycles.(El- Fouly, 1983 and Barkawi et al., 1986 found that the average period for resuming ovarian activity in normal Egyptian buffaloes is about 2 months). Cows were considered having abnormal ovarian function if they showed sustained anestrus (90 days), persistency of corpus luteum, long lapse of anestrus and irregular ovarian function. Irregularities of ovarian function were denoted if the ovarian cycles were interrupted or followed by a period of anestrus.

A cow was considered anestrous when progesterone levels remained at a level < 1.0 ng/ml for 3 consecutive weeks or more, while it was considered having persistent CL when progesterone levels continued ≥ 1.0 ng/ml for at least 3 weeks, provided that it was not preceded by insemination.

RESULTS

1- Post-partum reproductive performance

Throughout the 90 days post-partum, cows of G2 (milking cows) showed shorter periods of UIP, PPOI and PPEI than cow of G1 (suckling) as shown in table 1. Average number of ovulations and oestrous'/ cow in G2 were one and half and four times more than in G1. Incidence of quiet ovulation of the first ovulation was more pronounced in G1 (66.6%) than G2 (33.3%). Moreover, out of the total ovulations during the experimental period, cows of G1 showed higher percentage of quiet ovulations (66.6%, 6 out of 9) than of G2 (18.8%, 3 out of 16).

Table 2 shows the percentages of normal and abnormal ovarian function. The interesting point to be noted in this work is that 90% of cows in G2 would resume their ovarian activity throughout the experimental period while this percentage was reduced to 60% in G1. Furthermore, types of abnormalities were observed in 80% of cows in G1 vs 60% in G2.

2- Characteristics of ovulatory cycles

Due to the high incidence of abnormalities in G1, no enough data were available to describe the characteristics of the first ovulatory cycle. Only two cows showed cycles with a length of 21 and 31 days, respectively. In G2, six cases of 1st cycle ranged from 15 to 31 days with an average of 21.9 ± 2.4 days were

detected. Two cycles out of six were short (15 to 17 days) and two were long (30 and 31 days).

Table 1: Ovarian and oestrous characteristics of suckling and milking (non-suckling) buffalo cows throughout the 90 days post-partum.

Parameters	Suckling	Milking
Uterine involution period (days)		
Number	10	10
Range	25 - 40	25 - 34
Mean ± S.E	34.5±1.4	33.2±1.3
Post-partum ovulation interval (days)		
Number	6	9
Range	18 - 84	19 - 73
Mean ± S.E	55.7±8.9	39.5±5.8
Post-partum oestrous interval (days)		
Number	3	10
Range	53 - 77	21 - 84
Mean ± S.E	63.0±7.2	58.8±7.5
Total number of ovulations	9	16
Ovulations / cow		
Range	0.0 - 2.0	0.0 - 3.0
Mean ± S.E	0.9±0.3	1.6±0.2
Total number of oestrou's	3	13
Oestrus'/ cow		
Range	0.0 - 1.0	1.0 - 2.0
Mean ± S.E	0.3±0.2	1.3±0.3
Oestrous / ovulation		
Number	3/9	13/16
Percentage	33.0	78.0

UIP = The interval from parturition to the date of uterine involution.

PPOI= The interval from parturition to the date of first ovulation.

PPEI= The interval from parturition to the date of first oestrous.

3- Progesterone profile

Progesterone profiles of 8 cows out of 20 representing the different types of ovarian activities are shown in figure 1. In cases of sustained anestrus (cows no. 1 and 5) as well as those of long lapse of anoestrous period (> 60 days, cows no. 3,6 & 8) progesterone concentration was below 0.8 ng/ml. Some temporary short-lasting progesterone spikes with values of > 1.0 ng/ml were observed (ranged from 1.1 to 1.6) as shown in cows no.1 and 3. A similar pattern of progesterone was observed in cow no. 2 (case of irregular ovarian activity) as it showed a period of anestrous (3 weeks) after its first ovulation. In this case CL showed normal life span (2 weeks) before its complete regression.

In case of cow no. 8, progesterone level increased to more than 2.0 ng/ml for a period of 21 days. The pattern of progesterone in this case indicated that CL showed persistency after the first ovulation. One case of false oestrous was observed in cow no. 5 although progesterone was not increased to $\geq$ 1.0 ng/ml through the following 7 days post oestrus.

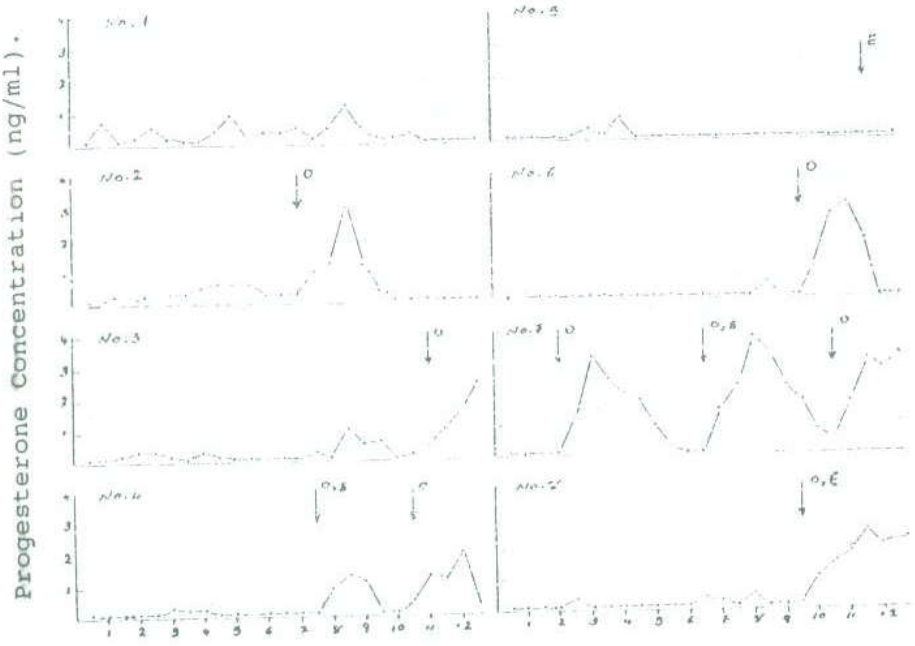
DISCUSSION

The uterine involution period (UIP) obtained in this work for suckling buffalo cows (34.5 days) and milking cows (33.2 days) are less than that reported previously by El-Fouly et al.,(1976a) and Farghaly (1992) (38.8 and 36.0 days, respectively) for suckling cows and by El-Fouly et al.,(1976a) and El-Sheikh and Mohamed (1977) averaging 36.9 and 40.7 days for milking ones.

Post-partum ovulation interval was found to be shorter in milking (El-Fouly et al.,1976 b; Aboul-Ela et al.,1987 and El-Wardani, 1990, ranged from 51.6 and 56.4 days) than in suckling (El-Fouly et al., 1976b and Farghaly, 1992, averaging 87.0 and 90.2 days) buffalo cows. A similar pattern was observed previously for post-partum oestrus interval with averages ranging from 63.5 to 163.0 days for milking (El-Wishy and El-Sawaf, 1970; El-Fouly et al.,1976b; El-Sheikh and Mohamed,1977; Aboul-Ela et al.,1988 and El-Wardani, 1990) than of suckling ranged from 87.0 to 131.5 days (El-Fouly et al.,1976 b; El-Fadaly, 1980 and Farghaly, 1992).

Table 2: Percentages of normal and abnormal ovarian function in suckling and milking (non-suckling) Egyptian buffalo cows throughout the 90 days post-partum.

Parameters	Sucking	Milking
Normal activity	20	40
Types of abnormalities		
1- Sustained anoestrus	40	10
2- Long post-partum ovulation interval	20	50
3- Anoestrous after first ovulation	20	-



(a) (b)

Post-partum period by weeks.

Fig. 1. Progesterone profile for some of suckling (a) and milking (b) buffalo cows throughout the 90 days post-partum. Arrows point to the time of ovulation (O) and oestrus (E).

In the present study a similar trend with shorter intervals was found (39.5 vs 55.7 days for PPOI and 58.8 vs 63.0 days for PPEI). The reported short period in the present work, particularly of suckling cows, most probably due to that those averages were calculated from the cases which showed their first ovulation (n=6) and first oestrus (n=3) throughout the experimental period, while the duration of the previous works extended, in many studies, to periods more than 90 days. These finding support the results of Mostageer et al. (1981) and Farghaly (1992) indicated that suckling prolongs the calving interval comparable to milking.

Percentage of sustained anestrus obtained in the present study of G2 (10%) is close to that reported by Barkawi et al. (1986) (13.6%) but less than that found by Khattab (1986) and Aboul-Ela et al. (1988). On the contrast, percentage of sustained anestrous of G1 is higher than the finding of Farghaly (1992) (30%) for 90 days.

Occurrence of sustained anestrus,within 90 days post-partum, may be due to the low level of released LH. Batra and Pandey (1983) found that the level of LH in anestrous cases of buffaloes in post-partum was lower than that of those which resumed their ovarian activity.

Delay of first ovulation incidence in suckling than in milking buffalo cows may be due to the inhibitory effect of suckling on pituitary function (Gillian et al.,1981) which leads to decrease of LH output (Short et al., 1972), particularly during the first 30 days post-partum (Radford et al., 1978). Peters and Lamming, 1984 stated that the response of pituitary to GnRH in suckler cows is not started before 30 days post-partum .

The finding that many of the first ovulation was not accompanied by signs of heat in suckling cows (33 %) agrees with the finding of El-Wishy and El-Sawaf (1970), they reported that only 30% of buffaloes could show oestrous behavioral signs throughout the 90 days post-partum. On the contrary, the non-suckling cows was highly successful in this concern, 78 % of ovulations were accompanied by oestrous.

Present data indicated that suckling causes increase of ovarian function disorders throughout the 3 months post-partum. Therefor, the value of calving interval (416 day) obtained by Nigm et al. (1986) at the

small holdings may be verified by the present study on several managerial approaches executed by the farmers, 1) The continuous selection of buffaloes as the farmer culls the animals which show reproductive disorders, 2) The high level of feeding, 3) Close observation of heat symptoms, by the ever watching family members, enables the farmer of mating the cow in the proper time. El-Sheikh and El- Fouly (1971) and Khattab et al. (1988) stated that increase the periods and frequency of heat detection decreased the percentage of reported silent ovulation and 4) Usually the born male calf is slaughtered within 40 days, for veal meat, thus half of the cows is turned out to be non-suckling.

In state farms, all through the experiments, oestrous detection period not exceeded 8-12 hours which miss lots of short heat periods.

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النمط التناسلى بعد الولادة لاناث الجاموس المرضعه وغير المرضعه

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استخدم فى هذه الدراسة ٢٠ جاموسة تمت ولادتها خلال الاشهر الباردة من السنة ، واستمرت التجربة لمدة ٩٠ يوما قسمت الاناث عشوائيا الى مجموعتين متساويتين: الاولى كانت ترضع نتاجها طبيعيا أما المجموعة الثانية فكانت تحلب يدويا مرتين فى اليوم . تم الكشف عن السلوك الشبقى مرتين يوميا باستخدام عدد ٢ طلوقة جاموس مخصب وذلك لتحديد يوم حدوث الشبق ، بينما كانت تجس الحيوانات مرة اسبوعيا لتحديد ميعاد عودة الرحم لوضعه الطبيعى قبل الولادة .

جمعت عينات الدم بانتظام كل ٣-٤ يوم لتحديد مستوى هرمون البروجسترون . أعتبر أن التبويض قد حدث عندما وصل تركيز هرمون البروجسترون الى واحد نانوجرام / مل أوأكثر واستمر على نفس المستوى فى عينتين دم متتاليتن على الاقل . ولقد اعتبر الشبق صامتا عندما وصل مستوى هرمون البروجسترون الى واحد نانوجرام / مل أو أكثر مع عدم ظهور أى علامات للشبق قبلها باسبوع ، وفى هذه الحالة تم حساب تاريخ حدوث التبويض بطرح ثلاثة أيام من وقت تحديد مستوى هرمون البروجسترون ، أما فى حالة الشبق المصحوب بحدوث التبويض ، فلقد اعتبر يوم حدوث الشبق هو تاريخ حدوث التبويض.

ولقد أظهرت النتائج بالنسبة للاناث التى ترضع نتاجها أن متوسط فترة عودة الرحم الى وضعه الطبيعى، فترة حدوث التبويض بعد الوضع ، وفترة ظهور الشبق بعد الوضع هى ٣٤,٥ ، ٥٥,٧ ، ٦٣ يوما على التوالى بينما بالنسبة للاناث التى حلبت يدويا ولم ترضع نتاجها فكانت ٣٣,٢ ، ٣٩,٥، ٥٨,٨ على التوالى .

ولقد كان متوسط عدد مرات التبويض والشبق لكل أنثى هو ٩. ، ٣. للمجموعة الاولى بينما كان ١,٦ ، ١,٣ على التوالى للمجموعة الثانية .

ولقد حدث الشبق الصامت بنسبة أعلى فى المجموعة الاولى عنه فى المجموعة الثانية (٦٦,٦٪ مقابل ١٨,٨ ٪ على الترتيب) ، كما حدثت الشواذ المبيضية بنسبة ٨٠٪ من الحالات بالمجموعة الاولى بينما حدثت فى ١٠٪ فقط بالمجموعة الثانية وأظهرت ٤٠٪ من أناث المجموعة الاولى نوعا من السكون الجنسى المتواصل بينما كانت نسبته ١٠ ٪ فقط بالمجموعة الثانية .