

OVARIAN ACTIVITY AND OVULATORY CYCLE IN POSTPARTUM PRIMIPAROUS EGYPTIAN BUFFALOES

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ABSTRACT

A total of 133 ovulatory cycles were studied on fifteen primiparous Egyptian buffaloes during the period from July 2001 to April 2003. The animals had 3.75 years of age with an average weight 423.47 ± 5.36 kg. All buffaloes were left without services for one year (12 months) to study the ovulation pattern and regular ovulatory cycle. The average lengths of the ovulatory cycle, postpartum interval to first ovulation and postpartum interval to first ovulatory estrus was 23.41 ± 3.647 , 128.87 ± 80.761 and 187.85 ± 83.100 days, respectively. During the study 146 ovulations were recorded, the average number of ovulations and quiet ovulations per buffalo cow were 9.73 and 5.07, respectively. The highest percentage of quiet ovulation and ovulatory estrus were recorded during October. On conclusion, the distribution of ovulation on monthly basis revealed that the Egyptian buffalo cows could ovulate around the year, however, cows show some fluctuation in monthly percentages with a peak value during October and drop during April and May.

Keywords: Ovarian activity , Ovulatory cycle , Postpartum , Egyptian buffaloes.

INTRODUCTION

Buffaloe population is continuously increasing in the world and estimated to be more than 160 million (FAO, 2003). Buffaloes are well known as sources of high grace milk, meat and draft power, while the reproductive potential of buffaloes has not yet been fully utilized because of inadequate knowledge about the changes in the ovarian function. Poor reproductive performance of buffalo herds may be due to functional disorders and/or managerial defects (El-Sheikh and El-Fouly, 1971). The average of ovulations/buffaloe is greater than the average of estrus per buffaloe in same periods particularly in those calving during the hot period of the year (Khattab *et al.*, 1990). Determination of post-partum interval of first ovulatory and ovarian changes varied with the method of diagnosing luteal activity (rectal palpation, laparoscopy and hormonal diagnosis of CL) function (Jainudeen, 1984).

The present work was intimated to investigate the ovarian pattern and cycle in a herd of primiparous buffalo to correlate the ovarian changes with their external sexual performance.

MATERIALS AND METHODS

1- Animals and housing:

Fifteen primiparous buffalo cows were selected randomly from the buffalo heard of the Faculty of Agriculture, Ain-Shams University and used in

the present study during the period from July 2001 to April 2003. The animals had 3.75 years of age with an average weight 423.47 ± 5.36 kg. All buffaloes were left without services for one year after parturition (12 months) to study the estrus behavior. Buffaloes were allowed to suckle their calves twice daily at 7 a.m. and 2 p.m. up to weaning (100 kg). The animals were kept tied in a semi-sheltered sheds. Their roof was made of asbestos and based on concrete stands. Floor of shed was made of concrete and it was covered with rice straw. The litter was change daily. Animals were tied all the time under the shed and were loosened at times of watering, milking and blood sampling. Buffaloes checked for heat symptoms two times daily at 8 a.m. and at 3 p.m. by using a fertile buffalo bull.

2- Feeding and watering:

Animals were fed according to their live body weight and milk production using the requirements adopted by the Animal Production Department of this Faculty. Rations included a concentrate mixture, rice straw and berseem (*Trifolium alexandrinum*) during winter and spring season or berseem hay (*Trifolium alexandrinum*) during summer and autumn seasons. Fresh drinking water was available *ad lib.* three times daily.

3- Blood sampling and progesterone assay:

Jugular blood samples (8 ml) were collected three times weekly in EDTA. Na₂ supplemented tubes of 07.00 to 08.00 h. month before calving till next pregnancy. The blood samples were centrifuged at 4000 rpm for ten minutes within half an hour after blood collection. The plasma was stored at -20°C till progesterone analysis.

Blood plasma progesterone (P₄) was detected by a direct radioimmunoassay procedure adopted for standers (0.2-28 ng/ml) prepared in blood plasma of estrus buffaloes. ¹²⁵I-progesterone (100 µl) and antiprogesterone serum (100 µl) were added (tube for non specific binding received no antiserum). The mean inter-assay coefficient of variation was 8.4% (n=30) with inter-assay coefficients of variation of 11.8% (n=13), 8.2% (n=13) and 5.1% (n=13) at low (0.60 µg/ml), medium (3.02 µg/ml) and high (6.49 µg/ml). The mean value for recovery was 98.5% with a range of 92-106% for different increments of progesterone standard added to plasma sample with, medium and high including analysis of variance, correlation coefficients and progesterone level.

The binding percentage was calculated by dividing the net counts per minute of assay tube by average net counts per minute of zero standard times 100. Logit-Log paper was used to plot the standard curve and to determine progesterone concentrations of unknown samples.

4- Rational for studying reproductive patterns:

Two methods were used for monitoring reproductive pattern in the investigated herd, these were: plasma progesterone profile, a direct measure for ovarian function and estrus activity implying information of animals reproductive cyclicity. On matching data of both techniques, the following definitions and terms were used:

- 1- Ovulation : Ovulation was considered to occur at the lowest progesterone value immediately preceding a regular progesterone ovulatory cycle. It is well established that during estrus and ovulation progesterone concentration is minimal.
- 2- Quiet ovulation : Ovulation without detectable signs of estrus.
- 3- Ovulatory estrus: Estrus associated with ovulation.
- 4- Post-partum interval to first ovulation: The first recorded ovulation after calving.
- 5- Regular ovulatory or progesterone cycle: Interval between two successive ovulations including known changes in progesterone pattern of the estrus cycle phases of formation, maintenance and regression.

5- Statistical procedures:

Statistical analysis of the data were carried out according to SAS (1993). For statistical purposes, non-detectable progesterone values were considered equal to zero.

RESULTS AND DISCUSSION

1- Post-partum interval to first ovulation (PO)

The overall length of post-partum interval to first ovulation (PO) was 128.87 ± 80.761 days (ranged from 35 to 314 days). The PO obtained is longer than those reported in India (Singh *et al.*, 1979) 38 ± 2 days and Egyptian buffaloes 69 ± 2 days (El-Fouly *et al.*, 1976), 41.4 ± 2.3 days (El-Keraby *et al.*, 1981) and 49.8 ± 4.9 days (Aboul-Ela *et al.*, 1987) and 50.1 ± 11.3 days (Youssef, 1992).

Table (1) showed that the majority of buffaloes (66.67%) had PO longer than 80 days. Hussein (2000) found that the suckled buffaloes, which ovulated for the first time after 80 days post partum was 58.82%. Whereas, Youssef (1992) reported that 60% of the investigated buffaloes exhibited PO between days 20-40. The difference between these results may be due to the buffaloes in this study were primiparous and suckled their calves for about 100 days.

Table (1): The frequency distribution of post-partum intervals to first ovulation.

Class interval (days)	No of buffaloes	%
20-40	1	6.67
41-60	2	13.33
61-80	2	13.33
81-100	4	26.67
101 or more	6	40.00
Total	15	100

2- Post-partum interval to first ovulatory estrus (PE)

The overall length of post-partum interval to first ovulatory estrus (PE) was 187.85 ± 83.1 days and ranged between 83 and 350 days. This mean was lower than Qureshi *et al.*, (2004) who reported that postpartum

estrus interval (PE) was 249±104 days for Nili-Ravi buffaloes in Pakistan and slightly longer than those reported by El-Sheikh (1967) 136.3±2.5 days, El-Fouly *et al.* (1976) 131.5±4.9 for suckled buffaloes and Ahmed *et al.* (1983) 128.7 days. More than 50% of the experimental buffaloes showed PE after 80 to 150 days and 40% of the other ones had PE from 200 to 350 days. Referring to progesterone profiles of the fifteen buffalo cows, it appears evidence that the third of animals which had active ovaries during the eight days post-partum (Table1). but the estrus was not detected till the (ranged between 83 to 350 days) manifestation of the first post-partum heat. Also, hundred the first ovulations were without estrus (Table 2), however 35.71 and 78.57% of the second and third ovulations, respectively, were coupled with estrus.

Table (2): Percentages of silent or quiet ovulation noticed at first, second, third and fourth or more post-partum ovulation.

Parameter	Ovulation			
	First	Second	Third	Forth or more
No of ovulation	15	14	14	101
No. of quiet ovulation	15	5	11	49
% of quiet ovulation	100	35.71	78.57	48.51

3- Regular ovulatory or progesterone cycles (Ro cycles):

During this study a total of 133 Ro cycles were accounted. The overall average of Ro cycles length was 23.41±3.647 days and ranged between 16 to 49 days. Figures (1, 2 and 3) showed an example for two cyclated animals during the year of study. The overall average peak progesterone concentration of Ro cycles was 4.60±0.23 ng/ml, which ranged from 3.2 to 5.53 ng/ml. Usmani *et al.* (1985) reported that regular progesterone cycle was not established until the first estrus and the interval from the end of one luteal phase to the next luteal phase was as long as 3 weeks. Barkawi *et al.* (1996) reported that overall mean length of Ro cycle were 24.7±0.9 days, he also found that the overall average of its peak progesterone concentration was 4.3±0.2 ng/ml. Hussein (2000) found that the average length of Ro cycle was 24.15±1.06 days and its average peak progesterone concentration was 3.6±0.18 ng/ml for suckled buffaloes.

It could be noticed that, the majority of the cycles which had the length from 21 to 28 days represented 71.43%, then 15.07% for both of the cycles which had lengths from 16 to 20 days, however 13.53% of the cycle had 30 days or more (Table 3).

Table (3): The number, length and percentages or regular ovulatory (RO) cycles.

Length (days)	Number	%
16-20	20	15.04
21-28	95	71.43
30 or more	18	13.53
Total	133	100

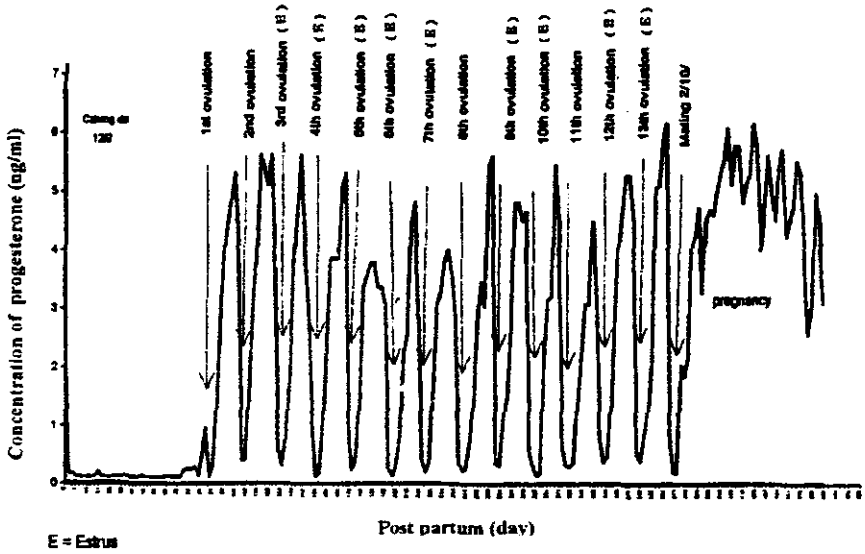


Fig.(1):Progesterone levels after calving indicate ovarian cyclicity

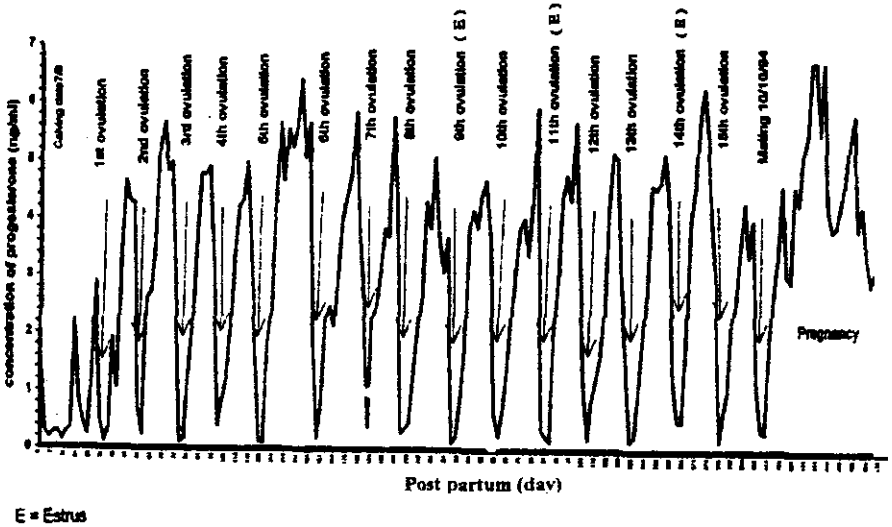


Fig.(2):Progesterone levels after calving indicate ovarian cyclicity

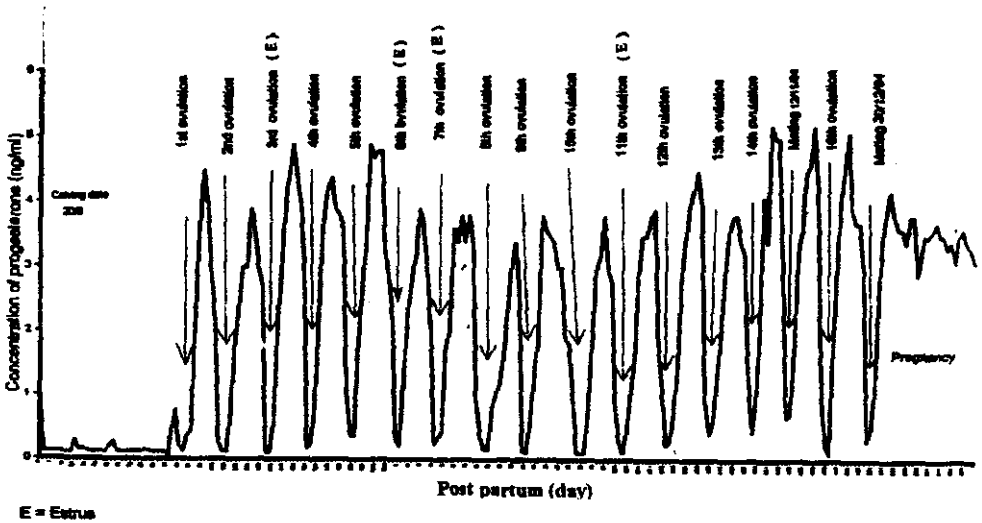


Fig.(3):Progesterone levels after calving indicate ovarian cyclicity

Also, from the progesterone profiles of those cycles noticed that the progestational phase and its peak of the cycle had increased by the increasing cycle length. The average progestational phase accounted 75% of the Ro cycles length.

4- Ovulation performance during the investigated period.

Table (4) showed that the total of ovulations during this study were 146. The average number of ovulation per buffaloe cows was 11.08. The distribution of the ovulation indicated that buffaloes could ovulated round the year but in fluctuation pattern. The high percentages of ovulation were recorded during October (12.33%), December (10.28%) and August (10.28%) and dropped during April and May. This may be referred to the animals feeding on the green fodder during winter and spring seasons, however, feeding on the dry ration during summer and autumn seasons. The high percentages of ovulatory estrus were obtained during October (13.12%) then April and August (13.11%).

The high percentages of quiet ovulations were observed during October (11.75%) then September (10.59%) but no quiet ovulations were observed during April. Also, the overall percentages of quiet ovulation during the study was 56.76%. This result was higher than those which reported by Youssef (1992) 54.2% and El-Sheikh and El-Fouly (1971) 42.1%. The overall mean number of quiet ovulations or ovulatory estrus per buffalo cow was 5.067 and 4.384, respectively. Youssef (1992) reported that the highest percentages of quiet ovulation were detected during February (17.3%) and

March (11.5%). Also, the number of quiet ovulation per buffalo cow was 5.75 ovulation.

Table (4): Monthly distribution of ovulation, quiet ovulation and ovulatory estruses.

Months	No of ovulation (a)	No of quiet ovulation (b)	No. of ovulatory Estrus (c)	a/D * x 100	c/F** x 100	b/a*** x 100	b/E**** x 100
Oct.	18	10	8	12.33	13.12	55.56	11.75
Nov.	11	8	3	7.53	4.93	72.73	9.41
Dec.	15	12	3	10.28	4.93	80.00	14.12
Jan.	12	7	5	8.22	8.19	58.33	8.24
Feb.	11	5	6	7.53	9.85	45.45	5.88
March	11	7	4	7.53	6.55	63.64	8.24
April	8	0	8	5.48	13.11	0	0
May	9	7	2	6.16	3.28	77.78	8.24
June	10	5	5	6.85	8.19	50.00	5.88
July	12	8	4	8.22	6.55	66.67	9.41
August	15	7	8	10.28	13.11	46.67	8.24
Sept.	14	9	5	9.59	8.19	64.29	10.59
Total	146 D	85 E	61 F				

* Monthly distribution of percentages of ovulation.

** Monthly distribution of percentages of ovulatory estrus.

*** Monthly distribution of quite ovulation as percentages of monthly ovulation.

**** Monthly distribution of quite ovulation as percentages of monthly ovulation total ovulation of the study.

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النشاط المبيضي ودورة التبويض بعد الولادة لعجلات الجاموس المصري
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درست ١٢٢ دوره تبويض لخمسة عشر جاموسه بعد الولاده الاولى بمتوسط عمر ٣,٧٥ سنة و متوسط وزن ٤٢٣,٤٧ ± ٥,٢٦ كج واستمرت التجربة من شهر يوليو ٢٠٠١ و حتى أبريل ٢٠٠٣. ظلت انعجلات بدون تلقيح لمدة عام بعد الولادة الاولى لدراسة النشاط المبيضي ودورات التبويض المنتظمة. كان متوسط طول دورة التبويض والفترة اللازمة للتبويض الاول بعد الولادة والفترة اللازمة للتبويض الاول المصحوب بشياع بعد الولادة ٢٣,٤١ ± ٣,٦٥ و ١٢٨,٨٧ ± ٨٠,٧٦ و ١٨٧,٨٥ ± ٨٣,١ يوما على التوالي. تم تسجيل عدد ١٤٦ تبويض طول فترة الدراسة وكات متوسط عدد التبويضات والتبويضات الصامتة للعجلة الواحدة ٩,٧٣ و ٥,٠٧ تبويض على التوالي و كانت اعلى نسب للتبويض الصامت او التبويض المصحوب بشياع خلال شهر اكتوبر. خلصت دراسة توزيع التبويضات على شهور السنة الى ان عجلات الجاموس المصري تستطيع التبويض على مدار العام مع وجود بعض الاختلافات فى نسب التبويض وكانت اعلى نسبة اثناء شهر اكتوبر و اقل نسبة اثناء شهرى ابريل ومايو.