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EFFECT OF TYPE OF FEEDING ON THE PRODUCTIVE, POSTPARTUM REPRODUCTIVE PERFORMANCE AND THE CONCENTRATION OF SOME BLOOD PLASMA MINERALS OF EGYPTIAN LACTATING BUFFALOES

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SUMMARY

Sixteen of lactating female buffaloes were distributed into four experimental groups (from G_1 to G_4) to study the effect of type of feeding in summer (dry) or winter (dry + green) on some productive and reproductive traits in Egyptian lactating buffaloes and the concentration of some minerals in their blood plasma. G_1 and G_2 were fed concentrate feed mixture plus rice straw while G_3 and G_4 were fed concentrate feed mixture plus green barseem (Egyptian clover) according to El-Ashry allowances 1980. G_1 and G_3 were featured previously as short days open animals while G_2 and G_4 were featured as long days open animals.

Results indicated that the days-open interval and concentration of some blood plasma metabolites investigated (zinc, copper and progesterone) were significantly ($P<0.05$) affected by type of feeding. Total dry matter intake (DMI) was also affected ($P<0.05$) but feeds consumed/kg metabolic body size was not. Efficiency expressed as kg milk produced/kg DMI or kg fat corrected milk produced / kg DMI were affected ($P<0.05$). Results tended to indicate that the concentration of some metabolites in plasma (Zn and Cu) could be used as indicators to recognize short or long days-open interval buffaloes.

***Key words:** Buffaloes, days-open interval, type of feeding, blood plasma metabolites.*

INTRODUCTION

Buffaloes, the main dairy animal in Egypt was known as a late maturing. Till sixties, most literatures indicated that average age at first calving was about 40 months (Ragab and Askar, 1968). A major economic importance in buffalo reproduction is the calving interval. The delay of first postpartum ovulation and oestrus is considered the major factor leading to a long calving to conception period in Egyptian buffaloes (EL-Fouly, 1983). During the last two decades, very intensive works have been done concerning the effect of plane of nutrition on calving (Butler, 1998; Garcia et al, 1998 and Lobato *et al.*, 1998). In addition, variations in some blood metabolites concentration in buffaloes during different reproductive periods have been shown to affect the proper function of the reproductive organs (Rowlands *et al.*, 1977). The objective of this study is to investigate the influence of type of feeding (in winter or in summer) on some productive and reproductive traits including days-open interval in Egyptian lactating buffaloes and the concentration of some blood plasma metabolites in such females.

MATERIALS AND METHODS:

This study was carried out in milk replacer research center experimental station, Fac. of Agric., Ain Shams University, Egypt.

Sixteen lactating female buffaloes were distributed just after parturition into four experimental groups (G1, G2, G3 and G4) where four animals were assigned per each group. Two groups of them (G1 and G3) were featured from their history as short days-open interval groups (less than 90 days) while the other two groups (G2 and G4) were featured as long days-open interval groups (more than 90 days). All animals were selected in different parturition sequence (from after the first parturition to the fourth). Animals were fed 100% of their starch equivalent allowances according to El-Ashry (1980). The average initial body weight of the experimental groups were 503, 504, 561 and 614 kg for G1 up to G4 orderly. Requirements given to the experimental groups were shown in Table (1) . A total of 70% of ration DM was covered from the concentrate portion while the other 30% was covered from the roughage source. Animals in G1 and G2 which delivered in summer were fed dry feeds representing summer season feeds while animals in G3 and G4 which delivered in winter were fed green and dry feeds representing winter season feeds.

The basal roughage ingredient during winter season (October to April) was green barseem (Egyptian clover) in addition to one kg rice straw only per each animal while in summer (May to September) was rice straw alone. The concentrate portion used in both seasons was formulated as 30% decorticated cottonseed cake, 25% corn grain, 30% wheat bran, 8% rice bran, 4% molasses, 2% limestone and 1% salt. Chemical composition of ration ingredients and their nutritive values were shown in Table (2)

All groups were fed the experimental rations during the postpartum period till conception. The female of the different experimental groups was served when they showed the first estrus after the first 40 days post-partum. The animals were fed individually by offering the roughage source in two equal portions at 8.00 a.m. and 3.00 p.m. while the CFM were also offered in two equal portions at milking in 5.00 a.m. and 5.00 p.m.. Animals were provided fresh tap-water ad-lib four times daily (4.00 a.m., 11.00 a.m., 2.00 p.m. and 12.00 p.m.).

Blood samples were taken from the jugular vein three times a week between 7.00 and 8.30 a.m. for determining blood plasma progesterone while for determination of zinc, copper and ferrous concentration in blood plasma samples were taken twice a month.

Plasma was introduced into clean dried glass vial and stored to be freezed (-20°C) until analysis. Copper, zinc and ferrous concentrations were measured by atomic spectro- photometer applying wet digestion by the method of Oser (1965). Analysis of feeds was determined according to A.O.A.C, 1990. Blood plasma progesterone (P_4) was detected by a direct radioimmunoassay procedure adapted for buffaloes. The concentration of P_4 was determined using 25 ul of unextracted plasma against standards prepared in blood plasma of estrus buffaloes. I^{125} progesterone (100 μl) and antiprogesterone serum (100 μl) were added. The mean variations were 11.8 % (n=13) , 8.2 % (n=13) and 5.1 (n=13) at low (0.6 ng/ml) medium (3.02 ng/ml) and high (6.49 ng/m) . The mean value for recovery was 98.5% with a range of 92-106%, for different increments of P_4 standard added to plasma with low, medium and high P_4 level.

The ovulation occurred when the blood plasma progesterone reached one ng/ml or more during 3 consecutive samples. The ovulation date was estimated by substracting 3 days from the first day at which plasma progesterone reached 1.0 ng / ml or more. If the

Table (1) : Allowances given to the experimental groups according to El-Ashry, 1980.

Requirements	Starch equivalent (kg) (SE)	Digestible Protein (g) (DP)
Maintenance		
1st 450 kg LBW	2.75	275
Each ± 50 kg LBW	± 0.2	+ 30
Production		
Each 1 kg milk 7% fat	0.5	100

Table (2) : Chemical composition % and the nutritive values of the ingredients and the experimental rations (DM basis)

Composition	Ingredients			Rations 5			
	Concentrate feed mixture (CFM)	Barseem	Rice Straw	G1 1,3	G2 1,4	G3 2,3	G4 2,4
DM	91.4	20.2	91.9	91.6	91.6	70..0	70.0
CP	15.1	13.5	2.1	11.2	11.2	14.6	14.6
CF	12.4	33.0	36.3	19.6	19.6	18.6	18.6
EE	2.5	1.5	0.3	1.9	1.9	2.2	2.2
ASH	10.1	12.9	14.8	11.5	11.5	10.9	10.9
NFE	59.9	39.1	46.5	55.9	55.9	53.6	53.6
SE[5]	56.0	33.0	22.0	45.8	45.8	49.1	49.1
DP[5]	9.3	7.5	0.0	6.5	6.5	8.8	8.8
Cu (ppm)[6]	80	16	10	59	59	61	61
Zn (ppm)[6]	19	21	11	17	17	20	20
Iron (ppm)[6]	120	220	60	102	102	150	150

1- Summer feeds (70% CFM + 30% rice straw).
2- Winter feeds (70% CFM + 30% Green Barseem)
3- Short – days open (less than 90 days)
4- Long – days open (more than 90 days)
5- Calculated
6- From Salem, 1991

ovulation was accompanied with estrus activity, the date of estrus considered as the date of ovulation. The buffalo cows were mated at the first estrus around the day forty post-partum. The data were analysed according to SAS user's Guide, 1982. The significancy among means was tested by Duncan's Multiple range test (1955). when the differences were significant.

RESULTS AND DISCUSSION

DM intake and milk yield

DM intake recorded for animals in G4 (Table 3) were significantly ($P< 0.05$) higher than those recorded for groups 1, 2 and 3. There were no significant differences ($P>0.05$) among the four groups in DM consumed in grams / $kg^{0.75}$. The differences in DM intakes were then attributed to the variation in LBW of the animals.

The total milk yield increased gradually from the third week of lactation to reach the maximum value at 26 weeks of lactation (Table 3). Generally, G3 produced 26.6, 47.3 and 16.6 % more milk as compared to G1, G2 and G4, respectively. Also G4 was higher in its milk yield by 8.2 and 26.3% as compared to G1 and G2 respectively. In consequence, a variation in milk yield was detected among groups ($P<0.05$). The higher producing group was that fed during winter season with short-days open (G3) followed by those buffaloes fed during winter season with long-days open (G4). In general, it is of interest to notice that differences in milk yield, 4% FCM and fat yield (Table 3) were significantly higher ($P< 0.01$) in winter season groups than those in summer season groups. Moreover, efficiency of feed utilization (kg milk/kg DM intake and kg FCM / kg DM intake) were significantly ($P<0.05$) higher for G3 than the other groups. Results then showed that buffaloes calving in winter season with short or long-days open produced more milk than those calving in summer season. The present results are in agreement with observations of Kassab *et al.*, (1976) and Rako and Karadjdi, (1984) From these results data indicated that type of feeding influences positively milk yield and feed efficiency expressed as kg milk produced/kg DM consumed. There were effects of type of feeding on the animals differ in the length of days-open interval since the amount of milk produced and the efficiency of producing milk/kg DM consumed were better in short-days open interval animals than the others but the performance in winter season was superior than in summer season (Table 3).

Increased nutritive value of G3 and G4 groups rations (Table 2) along with increased intake as a result of the increase in live weight and animal production might be the reasons of such results obtained in our study (see Table 2 with values of DM intake in Table 3).

Another reason for this variation may be to the increase in prolactin hormone secretion during winter season which resulted in an increase in milk yield (Romcevic *et al.*, 1984). These differences may be also attributed to the differences in both maximum environmental temperature and daily photo period length, which alternate the neuro – endocrine system and affect the productivity (Schams *et al.*, 1980).

Plasma mineral concentration

Data of Table (4) showed significant higher plasma concentration ($P<0.05$) of Zn (ug%) in short days-open groups G1 & G3 by 84.6% than the values of long days open (G2 & G4). It was also noticed that plasma Zn concentration in summer feeds were insignificant ($P>0.05$) but higher than that of winter feeds. Nedyjikov and Krustev (1969) reported that high conception rate is associated

Table (3) Effect of type of feeding on productive performance of lactating buffaloes during 26 weeks of lactation period

Items	Summer feeding		Winter feeding		± SE
	Short days open G1	Long days open G2	Short days open G3	Long days open G4	
No. of animals	4	4	4	4	--
Live body weight (kg)	503	504	561	614	23
Dry matter intake(D M I)					
Total(kg/d/h)	14.50^b	14.67^b	15.00^b	16.45^a	0.45
From CFM	9.85	9.72^b	10.52^{ab}	11.54^a	0.52
From Barseem	0.0	0.0	4.48	4.91	-
From rice straw	4.65	4.95	0.0	0.0	-
Grams/kg $W^{0.75}$	136.53	137.91	130.13	133.36	1.04
Yield (kg)					
Milk yield (3wk)	153.12^b	131.21^c	193.31^a	165.66^b	11.22
Milk yield (9wk)	410.06^b	356.00^c	503.21^a	462.13^a	27.62
Milk yield (13wk)	641.81^b	556.30^c	710.20^a	676.86^{ab}	73.00
Milk yield (26wk)	1163.90^b	1086.12^b	1471.25^a	1333.22	112.20
Average milk yield(kg/day)	6.40^c	5.97^c	8.08^A	7.33^B	0.41
Average FCM (kg /day)	8.91^c	8.58^c	11.44^A	10.64^B	0.59
Average fat (kg /day)	0.42^b	0.41^b	0.55^a	0.51^a	0.03
Gross feed efficiency					
Kg milk / kg DMI	0.44^b	0.41^b	0.54^a	0.45^b	0.02
Kg FCM / kg DMI	0.61^b	0.58^c	0.76^a	0.65^b	0.03

Means bearing different superscript at the same raw are significant ($p<0.05$)

± SE = Standard error

CFM = concentrate feed mixture.

Table (4). Effect of type of feeding on plasma zinc concentration (µg%) in lactating buffaloes featured by short or long days open

Period	Summer Feeding		Winter Feeding		Average
	Short G1	Long G2	Short G3	Long G4	
1	122±0.04	65±0.02	119±0.03	63±0.02	92.25^a±0.03
2	136±0.03	67±0.02	123±0.04	65±0.02	97.75^a±0.03
3	-	73±0.02	128±0.03	65±0.02	88.66^{ab}±0.02
4	-	66±0.02	-	73±0.02	69.50^b±0.02
5	-	71±0.02	-	73±0.02	72.00^b±0.02
6	-	65±0.02	-	65±0.03	65.00^b±0.03
7	-	68±0.03	-	71±0.03	69.50^b±0.03
8	-	73±0.05	-	71±0.02	72.00^b±0.04
9	-	-	-	66±0.03	66.00^b±0.03
Average	$129±0.03^a$	$68.5+0.4^b$	$123±6.03^a$	$68±0.02^b$	97.13±0.03

A, b Means bearing different superscripts in the same raw are significant ($p<0.05$) and for periods, refer to the last column. Type of feeding average values were 98.8 and 95.5 ug% for summer and winter feeding orderly with an increase of about 3.4% by summer feeding while days open average values were 126 and 68.3ug% for short and long period orderly with an increase by about 84.6% by short days open.

with high level of Zn and discontinuation of supplementation lowered fertility.

Parashad *et al.*, (1978) reported that the advancement in pregnancy was accompanied by zinc deficiency. This deficiency may be a factor in lowering fertility and the susceptibility of animal to conceive. Also in a study by EL-Tohamy et al., (1989), they found a reduction in Zn concentration in the serum in repeat breeder buffaloes. Abgar and Fitagerald (1985) emphasized that there was a sudden large demand for zinc during pregnancy and this may make the animals susceptible to zinc deficiency. Bunce *et al.*, (1983) suggested that zinc is associated with parturition parameters as zinc is required for ovarian mechanisms involved in parturition. Change in zinc level in the ration may be one of the causes of lowering fertility in buffaloes as Nedyjikov and Krustev (1969) reported. Song and Adham (1978) emphasized that one of the causes of changing zinc level for parturition is the sudden increase in prostaglandins, which is associated with parturition and binding zinc facilitating its transport. It might be of most importance to indicate that level of zinc tended to reduce significantly among periods ($P<0.05$). Although it was not the case regularly, but the remark of Dufty et al., (1977) may prove importance where they reported that during lactation the animals become severely deficient and the depletion of zinc stores may have contributed to the reproductive problem in most post-partum.

Data in Table (5) showed a significancy ($P<0.05$) among groups and among periods in plasma cupper (Cu) concentration. It also showed a significant increase by 51.81 unit in plasma Cu concentration in short days-open (G1 & G3) type of feeding if compared with long days open (G2 & G4). Regarding to type of feeding plasma Cu concentration was insignificantly higher ($P>0.05$) during winter than during summer feeds (% of increase was 6.6 %). No significant differences were observed in plasma Cu concentration between period 1 to period 4, although during these periods the Cu concentration were significantly higher ($P<0.05$) than other periods (except period 8). The decrease in Cu level has been reported to induce infertility in cows such as poor conception rate (Whitaker, 1982). The serum Cu and ceruloplasmin have been reported to increase during pregnancy, as estrogen induces de novo synthesis ceruloplasmin (Hankin *et al.,* 1969). Thus the increase in Cu accompanying pregnancy can be attributed to the effect of estrogen on ceruloplasmin synthesis. El-Tohamy *et al.*, (1989) found a reduction in serum cupper level in repeat breeder buffaloes. They attributed that to the interrelationship between estrogen and cupper for ceruloplasmin synthesis. They emphasized that the decrease in serum Cu levels in repeat breeders might be related to the decrease in ceruloplasmin introduced by low estrogen level. Sato and Henkin (1973) reported that intravenous administration of the copper could induce ovulation.

Table (6) showed no significant differences in ferrous blood plasma concentration within both summer feeds (G1 & G2) and winter-feeds (G3 & G4). Winter feeds caused insignificant increase in plasma Fe concentration by 3.7% than that of summer feeds. Plasma Fe concentration in short days open (G1&G3) and long days open (G2 & G4) were not significantly differ ($P<0.05$). El-Tohami *et al.*, (1989) did not detect significancy in Fe level when they compared normal buffaloes with rebreeders . They suggested that ferrous is of little importance for fertility if it is compared with Cu and Zn. Also Maynard and Loosli (1969) suggested that Fe be of

Table (5) Effect of type of feeding on plasma cupper concentration (µg,100 ml) in lactating buffaloes featured by short or long days-open .

	Summer feeding .		Winter feeding		
	Short	Long	Short	Long	Mean
Period	G1	G2	G3	G4	
1	105±0.11	53±0.067	106±0.058	79±0.058	85 [a] ±0.04
2	97±0.07	69±0.067	103±0.068	81±0.048	87 [a] ±0.03
3	109±0.16	69±0.050	107±0.097	74±0.053	90 [a] ±0.04
4	-	78±0.053	107±0.177	81±0.057	89 [a] ±0.05
5	-	70±0.062	-	57±0.064	63 [b] ±0.06
6	-	56±0.058	-	70±-0.064	63 [b] ±0.05
7	-	42±0.114	-	74±0.072	58 [b] ±0.07
8	-	78±0.114	-	78±0.109	78 [ab] ±0.09
9	-	-	-	69±0.114	69 [b] ±0.13
Mean	103±0.07a	64±0.03b	105±0.05a	73±0.03b	86±0.05

A, b. Means bearing different superscripts in the same raw are significant ($p<0.05$) and for periods, refer to the last column. Type of feeding average values were 83.5 and 89 ug% for summer and winter feeding orderly with an increase of about 6.6% by winter feeding while days open average values were 104 and 68.5ug% for short and long periods orderly with and increase by about 51.8 % by short days open

Table (6) Effect of type of feeding on plasma ferrous concentration (µg 100ml) in lactating buffaloes featured by short or long days open .

	Summer Feeding		Winter Feeding		
Period	Short	Long	Short	Long	Mean
	G1	G2	G3	G4	
1	139±0.34	114±0.24	172±0.23	137±0.24	141±0.13
2	134±0.24	193±0.21	139±0.22	164±0.19	158±0.11
3	133±.61	110±0.2	122±0.37	156±0.21	130±0.14
4	-	111±0.21	122±0.64	107±0.24	113±0.17
5	-	179±-0.24	-	135±0.23	157±0.18
6	-	118±0.24	-	125±0.27	121.5±0.19
7	-	147±0.44	-	135±-0.31	141±0.26
8	-	102±0.44	-	149±0.35	126±0.29
9	-	-	-	162±0.60	162±0.60
Mean	135+0.40	134+0.12	139+0.19	141+0.11	137+0.02

Type of feeding average values were 135 and 140 ug% for summer and winter feeding orderly with an increase of about 3.7% by winter feeding while days open average values were 137 and 138 ug% for short and long period orderly with an increase by about 0.7 % by long days open.

Reproductive phenomena

Means of the reproductive phenomena are shown in Table 7 little importance if compared with Zn and Cu.

Postpartum anoestrus interval

The overall means length of postpartum anoestrus interval was 82.07 days (ranged between 26.0 and 120 days). The length of postpartum anestus reported here was shorter than that reported by Jainudeen *et al*, 1983 (96.0 days) for Swamp buffaloes and Mohamed and El-Sheikh, 1983 (108.5 days) and Tharwat *et al.*, 2001 (83.29) for Egyptian buffaloes.

The average lengths of postpartum anestrus of buffaloes calved during summer and winter were 81.15 and 73.2 days, respectively which may be attributed to the difference in concentration of Zn and Cu blood plasma (Tables 4 and 5).

The present results showed that 57.14% of the female buffaloes terminated their an estrus on more than 40 days after calving. The blood plasma progesterone was basal and less than 0.5 ng/ml during the anestrus period (Fig. 1)

The long postpartum anestrus in the buffaloes was not a result of the maintenance of corpus luteum because of pregnancy, (Madan, 1985). The long postpartum anestrus may be a result of postpartum ovarian hypoplasia as indicated by basal blood plasma progesterone level. Singh et al., (1997) and Peters (1984) reported that postpartum anestrus was due to non-functional ovaries. From the results, it could be concluded that ovarian hypoplasia in buffaloes is considered to be a serious problem, because it increased the length of post partum anestrus and decreased the percentage of buffalo that has tended to resume their ovarian activity during the first 40 days post partum. Careful examination of Tables 4, 5 and 7 showed that when the blood plasma levels of Zn and Cu increased above 100 µg/dl the postpartum anestrus decreased to less than 45 days. This reduced Zn and Cu level below normal limits was detected in inactive ovaries (Khattab *et al.*, 1995). Also low level of Zn and Cu in blood at the 15th day postpartum is a sign of subsequent infertility of the tested buffalo (Khattab *et al.*, 1995).

Short low peak progesterone ($SLPP_4$) cycles

The overall length of $SLPP_4$ cycles was 9.77 days. The average of progesterone peak during the cycle was 1.04 ng/ml. Similar results were obtained by Youssef (1992); Hashem (1996) and Badr (2000), they reported that the length of $SLPP_4$ cycle was 10.1; 10.02 and 10.57 days, with progesterone peak 1.1; 1.04 and 1.39 ng/ml, respectively. All $SLPP_4$ cycles were not coupled with detectable estrus signs. Britt and Roche (1980) mentioned that the source of progesterone of SLPP cycle may come from the ovary or the adrenal gland or from the non ovulatory luteinized follicles as reported by Kaur *et al.* (1982). The rise of progesterone during SLPP cycles stimulates the adenohypophysis to release the ovulatory surge of gonadotropic hormone.

First postpartum ovulation

The overall first postpartum ovulation interval was 113.71 days (ranged between 33 and 187 days). This average was lower than that reported by Hashem (1996). However, Badr (2000) reported the same average (111.18 days). Buffalo cows calving during winter had insignificant longer (110 days) interval to first postpartum ovulation than that calving during summer (101days). Increasing the period to first post-partum ovulation in winter calving buffaloes may be due to the increase in milk production in these groups (Table, 3) than the other two groups calving in summer (G1 and G2) .

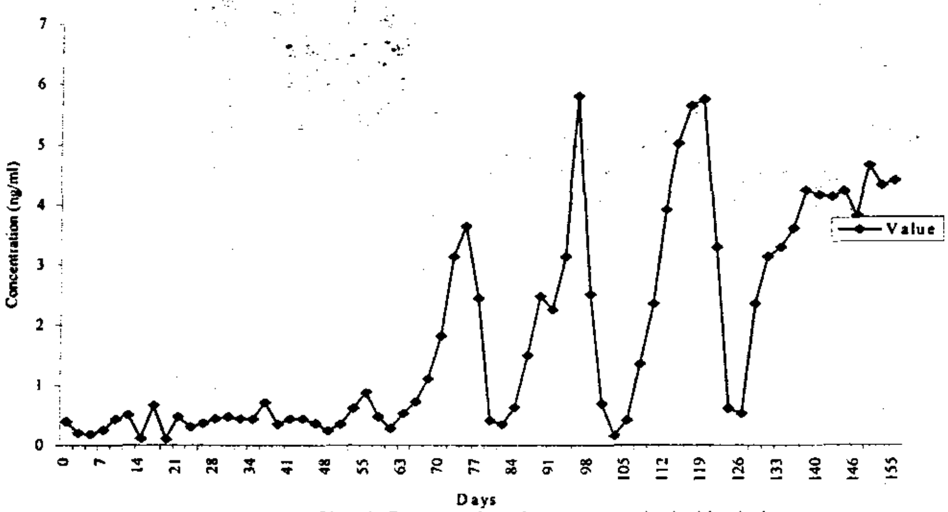

Fig.(1): Concentration of progesterone in the blood plasma

Table (7): Least square mean ± SE for some reproductive traits of the investigated Egyptian buffaloes

Groups	Summer feeding		Winter feeding		
Traits	Short G1	Long G2	Short G3	Long G4	Overall mean
Anoestrus interval (days)	43.0±16.44	119.3±29.45	26±12.26	120.5±29.45	82.07
Length of SLLP4cycle (day)	7.5±0.98	9.9±0.69	11±0.97	10.13±0.69	9.77
P4 peak (ng/ml) during SLLP4	1.28±0.37	0.6±0.26	1.7±0.37	1.1±0.26	1.04
Ist postpartum ovulation (days)	47.5±22.45[b]	154.3±30.02[a]	33±15.02[b]	187±30.02[a]	113.71
Ist postpartum estrus (days)	80.0±22.41[b]	188±34.23[a]	73±19.56[b]	283±-34.23[a]	169.21
Days open (day)	82±22.61[b]	193.9±34.36[a]	73.5±34.36[b]	283±34.36[a]	170.07
Number of ovulation/conc.	2.5±0.95	2.75±0.67	2.25±0.67	5.0±0.67	3.21
SLLP4 cycle animal	1.5±0.52	1.5±0.36	1.0±0.52	1.25±0.36	1.33
Number of service/conc.	1.0±0.22	1.5±0.16	1.0±0.16	1.0±0.16	1.14
Ovulation cycle(length)	21.4±2.71	24.5±2.22	23.5±1.92	24.6±1.92	23.75

A, b Means bearing different superscripts in the same raw are significant ($p<0.05$)

The delay in first postpartum ovulation in groups 2 and 4 might be due to the low postpartum plasma Zn and Cu which causes inactive ovaries as reported by Khattab *et al.*, (1995).

First postpartum estrus interval

The overall postpartum interval to first ovulatory estrus was 169.21 days. This mean was longer than that reported by Badr (2000) 135.37; Hashem (1996) 121.33. Buffaloes calved during summer had shorter interval to first ovulatory estrus than those calved during winter. Buffaloes calved during summer was fed on the green barseem during the last half of gestation and the resumption of ovarian activity is usually completed at the start of winter season. So type of feeding may be one of the reasons affecting the sexual activity of these investigated buffaloes. The long period to postpartum ovulatory estrus obtained may be because of that estrus was not detected during evening up to next morning. Vale et al., 1994 reported that 84% of the estrus in buffalo cows was detected during night.

Days open

The overall days open interval was 170.07 days. This interval ranged between 82.0 and 193.3 days in buffalo cows calved during summer and from 73.5 to 283.0 days in that calved during winter. The days open reported here was longer than that reported by Badr (2000), and Youssef (1992). However it was shorter than that reported by Chudhry and Pasha (1988), 243.81 days. The long days open may be a result of active ovaries postpartum. Many authors reported that length of days-open was affected by the month of calving (Nazir et al ,. 1983 and Cady et al , 1983) .

Number of ovulation per conception

The average number of ovulation per conception was 3.21 Buffaloes calved during summer had less number of ovulation per conception than that calved during winter (Table 7).

Tharwat *et al.*, (2001) reported a value of 2.19 in average. They added that the high number of ovulation per conception in buffalo may reflect the high percentage of quiet ovulation.

Number of ovulatory estrus per conception

The overall number of ovulatory estrus per conception was 1.33. This average is almost close to that reported by Badr (2000); 1.48; El-Menofy *et al,* (1984) 1.42, Youssef (1992) 1.42, Hashem (1996) 1.38.

Number of service per conception

No significancy (p>0.05) was detected in this parameter. However, the lowest estimate of most of these traits was that of G3 (winter feeds with short days-open. Generally, estimates of fertility parameters in the present study were comparable with those obtained by Afifi *et al.,* (1992) who recorded means of calving interval, and days open as 500.3 and 202.7 days, respectively for 430 Egyptian buffaloes. In contrary, mean of number of services / conception estimated for all groups were comparable to that recorded by Khattab *et al.*, (1988) being 1.83 services/conception on average among a group of ten buffaloes with normal ovarian activity. They reported that incidence of ovulatory anoestrus was 81% in buffalo group (77 females) subjected to the normal farm routine of checking for estrus twice daily .The result of length of days open for winter group (group, 3) was concomitant with increased productivity of milk in the present study and came in line with the finding of Khalil *et al.*, (1992) who stated that most of buffalo lactation yield increases as days-open increase.

In conclusion, results indicated that type of feeding had affected animal production, feed efficiency, length of days-open interval and the concentration of some blood plasma metabolites such as Zn and Cu. In addition there are strong proofs in results showing that the concentration of these metabolites in blood plasma could be used as indicators to recognize the long or short days-open female buffaloes during early postpartum. Further investigations could be proceeded in this field.

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تأثير نوع التغذية على الأداء الإنتاجي و التناسلي و تركيز بعض المعادن فى بلازما دم الجاموس المصري الحلاب بعد الولادة

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تم توزيع ١٦ جاموسة حلابة بعد الولادة و معرفة طول الفترة المفتوحة لها على أربعة مجاميع تجريبية من أ الى د تضم كل منها أربعة حيوانات لدراسة تأثير نوع التغذية (جاف حيث يمثل ذلك التغذية الصيفية أو جاف +اخضر حيث يمثل ذلك التغذية الشتوية)على أداء الحيوانات الإنتاجي و التناسلي و تركيز بعض المعادن فى بلازما الدم حيث بدأت الحيوانات التى ولدت فى فصل الصيف فى التغذية على العلف المركز و قش الأرز (مجموعة أ،ب) بينما تغذت الحيوانات التى ولدت فى فصل الشتاء على العلف المركز والبرسيم المصرى (مجموعة ج ،د) وذلك طبقا لمقررات العشرى ١٩٨٠ علما بأن المجموعة أ و المجموعة ج كانت تتميز بقصر الفترة المفتوحة (أقل من ٩٠ يوم) بينما تميزت المجموعتان ب ،د بطول الفترة المفتوحة (أكثر من ٩٠ يوم)و تلخصت أهم النتائج بأن طول الفترة المفتوحة و تركيز معادن الزنك و النحاس و كذا هرمون البرجسترون فى بلازما الدم قد تأثر معنويا عند ٠,٠٥ بنوع التغذية. تأثر ايضا المأكول من المادة الجافة إلا أنه عند نسبته الى حيز الجسم التمثيلي لم يحدث تأثير معنوى. و عند حساب الكفاءة الغذائية على أساس عدد كجم اللبن المنتجة لكل كجم مادة جافة مأكولة أو عند حسابها على أساس عدد كجم اللبن المصحح لنسبه ٤% دهن لكل كجم مادة جافة مأكولة وجد أن ذلك أيضا يتأثر عند ٠,٠٥ بنوع التغذية . و تشير النتائج ايضا الى أن تركيز بعض العناصر المعدنية فى بلازما الدم و على الأخص الزنك و النحاس لها تأثير على طول الفترة المفتوحة فى الجاموس ٠