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# EFFECT OF RE-MATING INTERVALS AND WEANING AGE ON PRODUCTIVE AND REPRODUCTIVE TRAITS OF RABBITS

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**Abstract:** *Total number of 48 multiparous does Bouscat were used in this study. The does were divided into four groups according to re-mating system, through three parities sequentially. First group, does were re-mated second day of post-partum (2D) and their litters were weaned at 28 day of age. Second group, does were re-mated 10 days post-partum (10D) and their litters were weaned at 35 day of age. Third group, does were re-mated after weaning (28D) of their litter which were at 28 day of age. Fourth group, does were re-mated second day of post-partum for two parities, and after weaning (28 day) in the 3rd parity (2D28D). The litters were weaned at 28 day after kindling in the 1st and 2nd parity and at 35 day in the 3rd parity.*

*The results showed that the conception rate for 2D and 10D were higher than other groups. Re-mating intervals affected in-significantly on litter size and weight at birth. Litter size and weight at 21 and 28 days in 10D were higher (P<0.05) than 2D group. Milk production was not affected significantly by re-mating intervals during 1st and 4th weeks thought 3 parities. Feed intake was decreased in 2D group as compared with the other groups.*

*$T_3$ level before mating and at mid of pregnancy were not significantly affected by re-mating interval system. However $T_3$ level was higher at mid of pregnancy than before mating in all groups. The progesterone ($P_4$) level was higher by the end of pregnancy than mid of pregnancy in all groups. The level of $P_4$ in 2D group was high as compared with the other groups. There were no significant differences in calcium level before mating and at mid or end of pregnancy. Glucose level decreased with the advances of pregnancy stages in all groups.*

## INTRODUCTION

The productivity of rabbits depends mainly on the number of young weaned per doe, which can be increased by maximizing the number of parities and minimizing intervals between them. Re-mating interval is

one of the most important items in the managerial regimes and it is a limiting factor for increasing the conception rate, and consequently the sequences of parities within a given period (Azoz, 2001 and Ahmed, Nagwa *et al*., 2004). The rabbit does are re-mated either immediately (24-48 h post partum) after kindling as an intensive system or about 12-19 days later as a semi-intensive system or after weaning as an extensive system. Although many research studied productive and reproductive performance but few studies studied the physiological response for these systems. Also, rabbit breeding may be need to more suggestion for combination between these systems.

The objective of this study was evaluate different systems of reproduction management to study physiological response of does and study the combination between the intensive system (for two parities) with semi-intensive (for one parity) systems in breeding rabbit.

## MATERIALS AND METHODS

This study was carried out during the period from October 2005 till May 2006 in El-Gimmizah Station, Animal Production Research Institute. The analytic work was carried out in Animal Production Research Institute, Ministry of Agriculture, Dokki, Giza, Egypt.

A total number of 48 multiparous does and 12 bucks Bouscat were used in this study. The does weighed 3150-3400g and aged 8-9 months while, the bucks weighed 3550-3600g with age of 9-10 months. The does were randomly divided into four groups according to their re-mating system (12 does each system) for 3 parities sequentially. First group, does were re-mated second day of post-partum (2D group) and their litters were weaned at 28 day. Second group, does were re-mated 10 day post-partum (10D group) and their litters were weaned at 35 day. Third group, does were re-mated after weaning (28D group) of litter at 28 day. Fourth group, does were re-mated second day of post-partum for two parities, and after weaning in the 3$^{rd}$ parity (2D28D group). In this group, the litters were weaned at 28 day in the 1$^{st}$ and 2$^{nd}$ parity and at 35 day in the 3$^{rd}$ parity.

Mating of does was executed twice by bucks to proven fertility. Pregnancy was diagnosed by abdominal palpation 10 days after service. Does failed to conceive were immediately re-mated.

Rabbits were reared in semi-closed rabbitry system. Does were kept in individual cages (60×50×30 cm). Provided with nest boxes (40×30×27cm). The bucks were housed in individual cages as that of does but without nest boxes. The rabbits were fed *ad libitum* commercial diets

and clean fresh water was available by nipple drinker all the time. All the experimental animals were reared under the same environmental and managemental conditions. Ambient air temperature ranged from 20 to $30^0$C.

Blood samples were withdrawn from ear vein of seven does in each group, before mating and at mid and 28 days of pregnancy in each parity. Plasma samples were prepared by centrifugation (3000-rpm for 15 minutes) and stored at $-20^o$C until the hormonal assay. Ready antibody coated tubes (kits, Coat-A-Count Total $T_3$, USA) were used to determination of $T_3$. The antibody used in the immunoassay is highly specific for total $T_3$ (both free and protein bound $T_3$). The standard curve of $T_3$ ranged between 20-600ng/dl and the analytical sensitivity was 7 ng/dl (Tietiz, 1995). Ready antibody coated tubes (kits, Immuno Tech, France) were used in determination of progesterone ($P_4$) by radioimmunoassay. The standard curve of progesterone ranged between 0.0 to 60 ng/ml and the analytical sensitivity was 0.003 ng/ml (Nulsen and Peluso, 1992). Glucose (mg/dl) was determined by colorimetric endpoint, increasing reaction GOD-PAP method using kits of Panlkengasse, Wien (Sacks, 1999). Calcium, Ca-kit enables colorimetric determination of total calcium, without de-proteinzation using kits of Marcy-Etoile, France (Lagente, 2000).

Feed intake was recorded bi-weekly intervals. Daily milk yield measured by doe's weight and their litter's after separation between them over night. Then each doe and litter's were weighted before and after suckling. Litter size and litter weight at birth, 21 and 28 days were recorded. Average monthly litter size and weight were calculated as following: calculation the total litter size and weight for the 3 parities and divided to the total of production period. Whereas the total monthly production period = (the period needed for getting weaned rabbit X 3 parity) + Period of last suckling.

Data were statistically analyzed using SAS (1999). according the following model:

$$Y_{ijk} = \mu + T_i + P_j + (TP)_{ij} + e_{ijk}$$

Where: $Y_{ij}$ = observation of the $ij^{th}$ rabbits, $\mu$ = overall mean, common element t all observations, $T_i$ = effect $i^{th}$ group, $P_i$ = effect $i^{th}$ parity $(TP)_{ij}$ =effect of the interaction between treatments and parties and $e_{ijk}$ = random error component assumed to be normally distribute Means were compared ($P<0.05$) using Duncan's multiple range test (Duncan, 1955).

## RESULTS AND DISCUSSION

### I- **Reproductive performance**

The conception rate in does re-mated 2 day post-partum (2D) and 28 day post-partum (28D) groups were higher than 10 day post-partum (10D) group (Table 1). This result was consistent with findings of Mendez *et al.*, (1986) and Azoz, (2004), they found that the conception rate was increased in does re-meted day after parturition and after weaning compared with those re-meted after 14 day of parturition. Low conception rate in does re-meted 10 days post-partum may due to particularly strong antagonism between lactation and reproductive functions (Theau-Clement and Roustan 1992). Whereas, rabbit-does tend to be sexual receptivity to males during 48 h post-partum conversely, females become moderate receptivity to males at 10-12 day's post-partum (Stoufflet and Caillol, 1988). Receptivity is correlated with an increase in number of follicles and consequently with concentration of LH receptors and prolactin receptors in rabbit. While, the high concentration of prolactin required for lactation associated with a reduction in normal gonadotrophin secretion especially LH in some way controlled by prolactin (Kermabon *et.al*.1994).

The re-mating intervals non-significantly affected litter size and litter weight at birth. Litter size and litter weight at 21 and 28 days in 10D group were significantly increased ($P<0.05$) than 2D group (Table 1). Similar results were obtained by Tawfeek, (1995), El-Kelawy *et al*., (1999) and Gad-Alla *et al*., (2002) who found that the does re-mated after 10 days of parturition gave more litters size and heavier weight at different age than these does re-mated at the second day of post-partum. These results may be due to the significant increase in milk production in 10D group compared with other groups as shown in Table (3). Low litter size and litter weight at 21 and 28 days in 2D group can be attributed to the fact that the fat and energy balance is always negative (around 25 to 30 % of the initial body content) in lactating does (Parigi Bini *et al*., 1996). In addition, pregnant does also display significant losses in nitrogen and mineral levels (Xiccato, 1996).

Although litter size at birth was in-significantly different between re-mating groups through sequentially three parities, but 2D group at $2^{nd}$ and $3^{rd}$ parity recorded the lowest values (Table 2). Similar results founded by Lamb *et al*., (1991) and Ahmed Nagwa, *et al*., (2004), they reported that does re-mated 14days post-partum had greater number of litter size at birth than those re-mated after 1 day of parturition. Litter size at birth is related to complex physiological events in does such as ovulation, implantation and

uterine environment. Reduce the litter size at birth in 2D group may be related to low of ovulation rate than in those mated on day 14 post partum (Lamb *et al*., 1991) or may be attributed to the higher re-absorbed fetuses in 2D group than other groups (Ahmed Nagwa, *et.al*., 2004).

The litter size and litter weight at 21 and 28 days in 2D group through sequentially three parities was lower than other group. These results are in agreement with the result of Nuria *et al*., (2002). While, litter size and litter weight at 28 days in 28D group at the third parity was highest value compared with other group. Azoz (2004) found that does re-mated 30 days postpartum gave greater litter size and heavier weight at weaning than those re-mated after parturition or 14 day postpartum. This may be due to decrease in milk production for 2D group, as shown in Table (3). Whereas, Xiccato, (1996) and Parigi Bini *et al*., (1996) reported that the 12-day post-partum re-mating of does not permit sufficient recovery of the energy deficit, which remains -32% of the initial energy level during the lactation period. While in longer re-mating interval (28-day PP) the energy deficit remains at -16%.

Concerning daily milk production, there are no significant differences between re-mating interval groups during $1^{st}$ and $4^{th}$ weeks through 3 parities (Table 3). In 2D group, the overall mean of milk production at $3^{rd}$ parity was lowest value. In this concept, Yamani *et al*., (1992) who found increasing of milk yield for does re-mated 10 days than in those re-mated 1 day after parturition. This result may be explained by Xiccato, 1996 who reported that an increase in milk production and improvement in reproductive performance when semi-intensive breeding rhythms were adopted (re-mating 9 to 15 days).

**II- Productive performance**

Monthly litter size and weight are suggested as an evaluation for productive performance (Table 3). They were calculated for comparison between re-mating interval systems associated with the time. Conceding, the economic target is producing more litter size and heavier weights in short time as possible. Monthly litter size monthly and weight in 2D group was high, but with long term the conception rate may be would reduce (Cervera *et al*., 1993).

**III- Feed intake**

Feed intake was significantly decreased ($P<0.05$) in 2D group compared to other groups (Figure. 1). However, the feed intake in 10D was insignificantly lower than 28D and 2D28D groups. This result is

undoubtedly caused by the natural decrease in the does' feed intake at the end of pregnancy (Parigi Bini *et al*., 1996). Whereas, voluntary feed intake is the main limiting factor in energy and minerals balance of lactating does because any intervention that stimulates feed ingestion tends to increase milk yield as well (Xiccato, 1996).

**IV- Hormonal Assay**

There were no significantly differences on the triiodothyroninie ($T_3$) as affected by re-mating intervals before mating and at mid of pregnancy, while there were an increase in $T_3$ at mid of pregnancy compared to before mating in all groups (Figure.2). This may be due to the free $T_3$ has been linked to the regulation of basal metabolism and consequently depression of free T3 would imply a reduction of energy requirements; this could explain the observed decreasing in feed intake of treatments (Vernon and Buttery, 1978).

Progesterone (P4) increased at the end of pregnancy than mid of pregnancy in all groups (Figure. 3). These results are harmony with results of Hillard *et al*., (1974) and Khadr, Amina *et al*., (1996) who reported that progesterone output of the female rabbits rose rapidly after implantation on day 7-8 post-coitus to reach peak values between days 14 and 18 and there after remained high until the final week of pregnancy. The level of P4 in $1^{st}$ group increased compared with others groups. This result may be related to reducing the feed intake (Table 1) that due to increase the progesterone in females feed restricted group as reported by Fortun-Lamothe and Prunier (1999).

**IIV- Blood parameters**

There were no significant differences in calcium level before mating and mid or end of pregnancy (Figure 4). These results can be explained by Ozil and Huneau (2001), where they reported that freshly oocytes were subjected to repetitive and modulated Ca2+ influx. Whereas, the $Ca^{2+}$ stimulus is the most efficient signal activating mammalian oocytes. Also, amplitude and temporal modulation of the Ca2+ signal in the early minutes influences the developmental performance and the morphology of the rabbit concepts at day 11.5 of pregnancy. Confirmed that these results, Ca2+ (Figure 4) before mating and at the end of pregnancy were higher in 2D, 10D and 2D28D groups. Also, these groups gave higher litter size at birth than other group except 2D (Table 1).

There were a decrease in glucose level with the advances of pregnancy stages in all groups (Figure 5). The trend of glucose decreasing

by the advances of pregnancy ranged by 37%, 14%, 20% and 20% for 1st, 2nd, 3rd and 4th group, respectively. Similar results reported by Hay *et al* (1984) who stated that in the pregnant rabbits, blood glucose concentration fell by the end of gestation (74.6 +/- 2.7 mg/dl), significantly less ($P< 0.01$) than the glucose concentration in the same animals before pregnancy (88.2 +/- 2.4 mg/dl). Glucose level was lowest in 10D group compared with other groups (Figure 5). This may be explain the decrease of conception rate in 10D group. Whereas, insulin and other hormones (such as, insulin-like growth factors, leptin and the neuron-peptide Y) are the main factors that link metabolism and reproduction. These hormone's acts and effects on the hypothalamo-pituitary axis (affecting gonadotrophin secretions) and directly on the ovaries (Theau-Clement, 2000).

Finally although the positive effect of more extensive re-mating intervals caused return to the original energy reserves in a long term but the productive per time in intensive re-mating intervals is best. So, extensive and intensive together in re-meting interval (2D28D group) may be preferred for obtaining high productive rate and maintaining the original energy in rabbit doe for a long term. In addition, the receptivity of doe to male after parturition and after weaning of litters was high (Theau-Clement and Roustan, 1992), so that decreases the time needed of natural mating which lager scales in Egypt, at the same time we save bucks by decreasing the number of service per conceptin

**Table (1): Effect of re-mating intervals on doe traits in Bouscat rabbits**

| Groups / Items | 2D | 10D | 28D | *2D28D* |
|---|---|---|---|---|
| Conception rat (%) | 93.3±0.17$^{a}$ | 83.3±0.17$^{b}$ | 93.3±0.17$^{a}$ | *90±0.17$^{a}$* |
| litter size at: birth | 7.29±0.34 | 8.16±0.36 | 7.86±0.34 | *7.93±0.35* |
| 21 days | 6.54±0.26$^{b}$ | 7.44±0.28$^{a}$ | 7.11±0.26$^{ab}$ | *7.26±0.26$^{ab}$* |
| 28 days | 6.36±0.24$^{b}$ | 7.22±0.24$^{a}$ | 6.90±0.24$^{ab}$ | *6.92±0.23$^{ab}$* |
| Litter weight at: birth (g) | 358.21±13.2 | 376.20±14.2 | 375.43±13.2 | *376.48±13.7* |
| 21days(g) | 1862.9±44.3$^{b}$ | 2035.6±46.9$^{a}$ | 1959.6±44$^{ab}$ | *2031.1±45.1$^{a}$* |
| *28days(g)* | *2786.4±81.4$^{b}$* | *2811.27±70$^{a}$* | *2991.1±81.4$^{a}$* | *2894.32±70$^{a}$* |

a, b Mean values having different superscripts in the same row are significantly different (P<0.05)
2D= does were re-mated second day of post-partum (pp); 10D= does were re-mated 10 day pp; 28D= does were re-mated after weaning and 2D28D= does were re-mated second day of pp for two parities, and after weaning in the 3$^{rd}$ parity.

**Table (2): Effect of re-mating intervals on litter size and litter weight through sequentially three parities in Bouscat rabbits**

| groups / Items | Parity | *Re-mating intervals* | | | |
|---|---|---|---|---|---|
| | | 2D | 10D | 28D | *2D28D* |
| *Litter size at :* | | | | | |
| Birth | P1 | 7.0±0.56 | 7.73±0.59 | 7.0±0.56 | *7.0±0.56* |
| | P2 | 7.44±0.59 | 8.80±0.63 | 8.44±0.59 | *8.67±0.59* |
| | P3 | 7.44±0.59 | 7.88±0.63 | 8.22±0.59 | *8.25±0.62* |
| 21 days | P1 | 6.20±0.41 | 7.22±0.43 | 6.20±0.41 | *6.20±0.41* |
| | P2 | 6.56±0.43 | 7.63±0.46 | 7.33±0.43 | *7.72±0.43* |
| | P3 | 6.89±0.43 | 7.50±0.46 | 7.89±0.43 | *8.0±0.46* |
| 28 days | P1 | 6.0±0.37 $^{b}$ | 7±0.40$^{ab}$ | 6.0±0.37$^{b}$ | *6±0.37$^{b}$* |
| | P2 | 6.22±0.40$^{ab}$ | 7.13±0.42$^{ab}$ | 7.11±0.40$^{ab}$ | *7.56±0.40$^{a}$* |
| | P3 | 6.89±0.40$^{ab}$ | 7.5±0.42$^{a}$ | 7.89±0.40$^{a}$ | *7.25±0.42$^{ab}$* |
| *litter weight (g) at:* | | | | | |
| Birth | P1 | 356.0±23.02 | 364.44±24.27 | 356.0±23.02 | *356.0±23.02* |
| | P2 | 357.78±24.27 | 395.0±25.74 | 388.89±24.27 | *387.78±24.3* |
| | P3 | 361.11±24.27 | 370.63±25.74 | 386.67±24.27 | *372.50±25.7* |
| 21 days | P1 | 1884.0±69.43 | 2087.8±73.18 | 1884.0±69.43 | *1884.0±69.4* |
| | P2 | 1934.4±73.18 | 2111.3±77.62 | 2075.6±73.18 | *2216.7±73.2* |
| | P3 | 1767.8±73.18 | 1901.25±77.6 | 1927.8±73.18 | *2107.5±77.6* |
| 28 days | P1 | 2779.0±121$^{bc}$ | 2956.7±128$^{abc}$ | 2779.0±121$^{bc}$ | *2779±121$^{bc}$* |
| | P2 | 2827.8±128$^{bc}$ | 2831.3±136$^{bc}$ | 2903.3±128$^{bc}$ | *3060±1128$^{ab}$* |
| | *P3* | *2753.3±128$^{bc}$* | *2628.75±136$^{c}$* | *3314.4±128$^{a}$* | *2866±136$^{bc}$* |

a, b, c Values having different superscripts in the same row are significantly different (P<0.05)

**Table (3): Effect of re-mating intervals on daily milk production (g) during 1st to 4th week of suckling through sequentially three parities in Bouscat rabbits**

| groups | Parity | 2D | 10D | 28D | *2D28D* |
|---|---|---|---|---|---|
| 1st week | P1 | 98.0±8.53 | 96.6±8.99 | 98.0±8.53 | *98.0±8.53* |
| 2nd week | | 100.0±4.67 | 114.4±4.93 | 109±4.67 | *109.0±4.67* |
| 3rd week | | 181.0±7.07 | 202.2±7.46 | 181±7.07 | *181.0±7.07* |
| 4th week | | 105.0±5.96 | 98.8±6.28 | 105±5.96 | *105.0±5.96* |
| Overall mean | | 123.2±4.34 | 128.0±4.58 | 123.25±4.34 | *123.2±4.34* |
| 1st week | P2 | 94.4±8.99 | 96.2±9.53 | 100±8.99 | *93.3±8.99* |
| 2nd week | | 111.1±4.93 | 118.7±5.23 | 112.2±4.93 | *120.0±4.93* |
| 3rd week | | 191.1±7.46 | 202.5±7.91 | 195.5±7.46 | *190.0±7.46* |
| 4th week | | 101.1±6.28 | 97.5±6.66 | 83.3±6.28 | *88.8±6.28* |
| Overall mean | | 124.4±4.58 | 128.7±4.85 | 122.7±4.58 | *123.0±4.58* |
| 1st week | P3 | 77.7±8.99 | 100±9.53 | 98.8±8.99 | *98.7±9.53* |
| 2nd week | | 98.8±4.93 | 118.7±5.23 | 101.1±4.93 | *118.7±5.23* |
| 3rd week | | 191.1±7.46 | 196.2±7.91 | 181.1±7.46 | *195.0±7.91* |
| 4th week | | 102.2±6.28 | 100.0±6.66 | 100.0±6.28 | *86.2±6.66* |
| *Overall mean* | | *117.5±4.58* | *128.7±9.85* | *120.2±4.58* | *124.6±4.86* |

**Table (4): Monthly litter size and/or weight at weaning monthly of each re-mating interval systems**

| Items | 2D | 10D | 28D | 2D28D |
|---|---|---|---|---|
| (1) Total of LSW in three parities | 19.08 | 21.6 | 20.7 | **20.7** |
| (2) Total of LWW (g) in three parities | 8359.2 | 8433.1 | 8973.3 | **8682.9** |
| (3) The total of period's production by monthly | 3 | 3.5 | 5.16 | **4** |
| (4)Average of LSW monthly | 6.36 | 6.17 | 4.00 | **5.17** |
| **(5)Average of LWW (g) monthly** | **2786.4** | **2409.4** | **1739.0** | **2170.7** |

LSW= litter size at birth, LWW= litter weight at weaning, (3)= (The period needed for producing weaned rabbits in 3 parities X 3 parities) + Period of last suckling, (4)= 1/3, (5)= 2/3

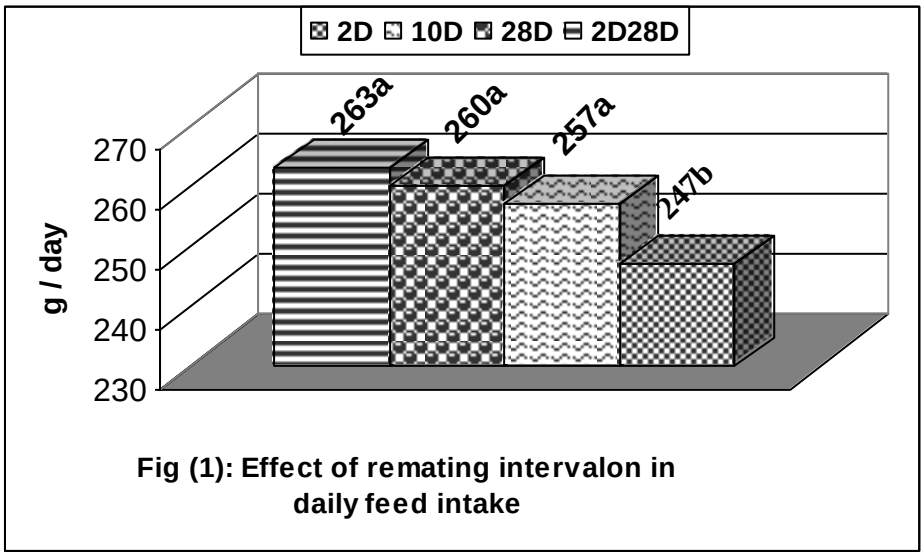



**Fig (1): Effect of remating intervalon in daily feed intake**

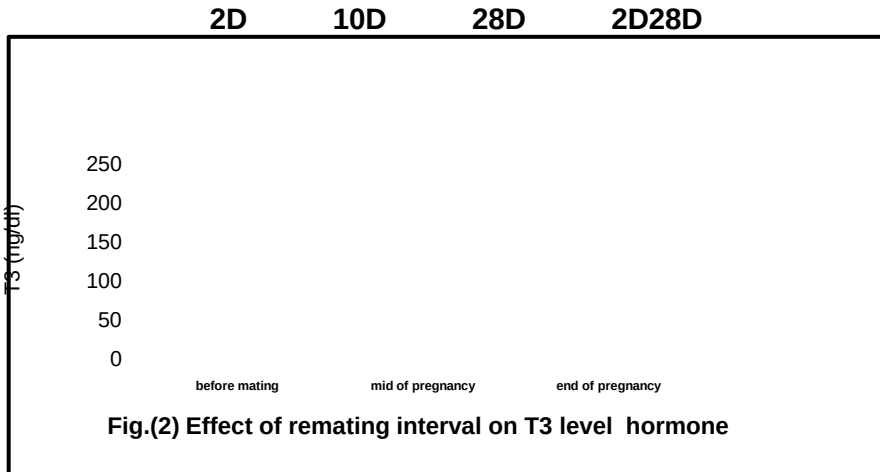



**Fig.(2) Effect of remating interval on T3 level hormone**

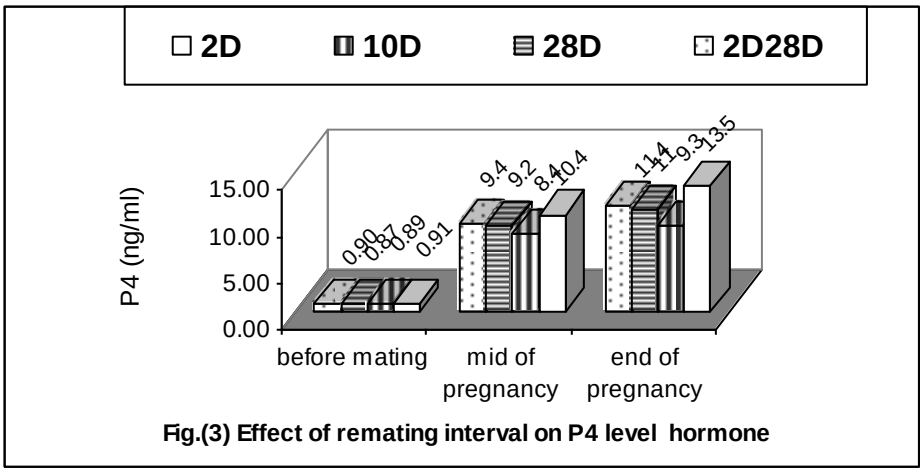
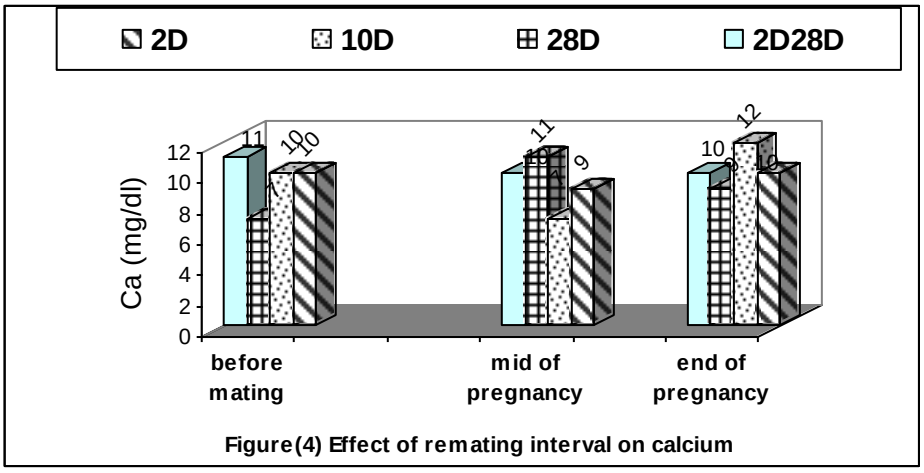
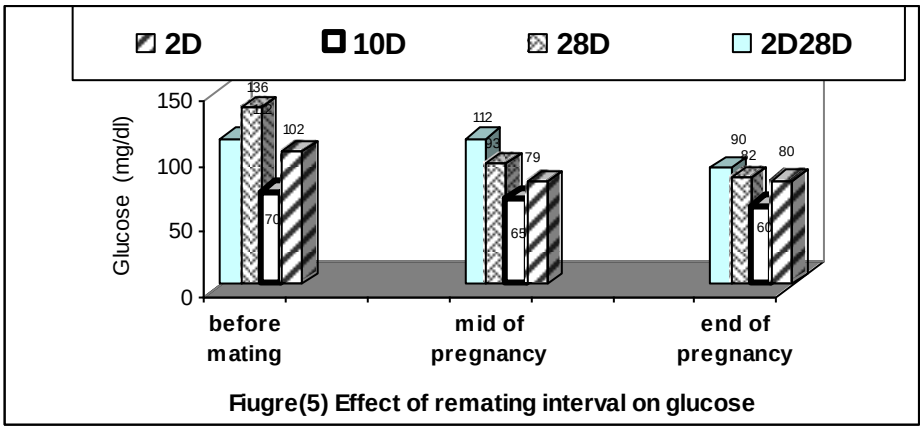



**Fig.(3) Effect of remating interval on P4 level hormone**




**Figure(4) Effect of remating interval on calcium**




**Fiugre(5) Effect of remating interval on glucose**

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## الملخص العربي

## تأثير نظم التزاوج والفطام علي الاداء الانتاجي والتناسلي في الارانب

**هدي عبد الرءوف شعبان و صلاح عبدالحكيم زكي جاد الله والسيد محفوظ عبدالكافي**

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أستخدم في هذه الدراسة عدد 48 أنثي أرنب بالغ بوسكات وزنها ( 3150-3400جم) وعمرها يتراوح من 8-9 شهور. وقد قسمت الامهات الي اربعة مجاميع متشابهه في كل مجموعة (12 أم) كما يلي:

- المجموعة الأولي : تم تلقيحها خلال اليوم التالي للولادة وتم الفطام علي عمر 28 يوم ،
- المجموعة الثانية: فتم تلقيحها بعد 10 أيام من الولادة وتم الفطام علي عمر35 ،
- المجموعة الثالثة: تم تلقحها بعد الفطام وكان الفطام علي عمر 28 يوم،
- المجموعة الرابعة : فتم تلقيحها خلال اليوم الثاني من الولادة وكان الفطام علي عمر 28 يوم في البطن الأولي والثانية وفي البطن الثالثة تم التلقيح بعد 28 يوم (الفطام) وتم فطام الصغارفي هذه البطن عند 35 يوم.

وأستمرت التجربة لثلاث بطون ، وكانت أهم النتائج :

- أرتفاع معدل الخصوبة لأمهات المجموعتين الاولي والثانية عن المجموعتين الثالثة والرابعة.
- كان تأثير ميعاد التلقيح بعد الولادة غيرمعنوي علي عدد ووزن الخلفة عند الميلاد. ولكن كان هناك زيادة معنوية في عدد ووزن الخلفة عند 21 و28 يوم للمجموعة الثانية عن المجموعة الاولي.
- لم يكن هناك اختلافات معنوية في انتاج اللبن خلال البطون الثلاثة.
- وجد أنخفاض لعدد ووزن الخلفة عند 21 ، 28 يوم خلال البطون الثلاثة للمجموعة الأولي عن باقي المجاميع.
- لوحظ انخفاض الغذاء المأكول للمجموعة الاولي يليه المجموعة الثانية عن المجاميع الاخري.
- كانت هناك زيادة معنوية في هرمون التراي ايودوثيرونين عند منتصف الحمل مقارنة بفترة قبل الحمل في كل المجاميع وكانت هناك زيادة لهرمون البروجستيرون عند نهاية الحمل عن منتصفه. كما لم توجد اختلافات معنوية لمستوي الكالسيوم في مرحلتي قبل ومنتصف الحمل. كما ولوحظ انخفاض لمستوي الجلوكوز كلما تقدمت مرحلة الحمل في كل المجاميع.

ومن هذه الدراسة يتضح أن الأفضل هو الجمع بين النظاميين المكثف والغير مكثف عند تلقيح بطنيين متتاليين ثم تلقيح البطن الثالثة بعد الفطام للوصول لاعلي معدل للانتاج مع حفظ حيوية الاناث علي المدي الطويل.