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RESUMPTION OF OVARIAN CYCLES OF SHAMI GOAT DOES THROUGHOUT POSTPARTUM PERIOD USING GNRH AGONIST AND PGF_{2A} ANALOGUE

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SUMMARY

A total of 100 adult Shami goat does was used to determine the effect of early postpartum treatment with gonadotropin releasing hormone (GnRH) and/or prostaglandin $F_{2\infty}$ ($PGF_{2\alpha}$), on estrous and ovulation incidence as well as subsequent fertility. Does were randomly allocated into four groups. Does in groups 1 (G1) and 2 (G2) received 8 µg GnRH (Receptal) between day 10 and 14 postpartum while does in groups 3 (G3) and 4 (G4) were injected with saline solution. Ten days later, does of G2 and G3 received 25 mg $PGF_{2\infty}$ (Lutalyse) and does in G1 and G4 received the same volume of saline solution. Visual observation for signs of estrus throughout the day by the herdspersons were supplemented by two daily 30-min observations between 07:00 and 08:00 h and between 17:00 and 18:00 h. Blood samples were collected thrice weekly via vein puncture from all does and continued until 6 weeks post mating or 120 days postpartum for progesterone assay. Progesterone profile was used for characterization of estrus and ovulation. All does were hand mated with 5 fertile bucks at the onset of the first estrus after 6 weeks postpartum and fertility in terms of non return to estrus, days open and conception rate were also recorded.

Results revealed that treatment with GnRH reduced intervals to first ovulation ($P<0.05$) and first detected estrus as well as increased the proportion of does with more ovulations before first service (83%) compared with saline treated group (57%). Treatment with $PGF_{2\alpha}$ reduced ($P <0.05$) intervals to second and third ovulation (20 and 19 day) as compared to G4 (26 and 27 day) group, respectively as well as shortened ($P <0.05$) interval to the first estrous cycle. There was a numerical tendency of insignificant increases for G2 does (pre-treated with GnRH) to respond to $PGF2_{\infty}$ (45.0 vs. 35.0%) as well as decreasing percentage of those with no luteal function (20 vs. 25.0%), at the time of $PGF2_{\infty}$ treatment, than those of G4 treated does. Does in G2 have the shortest ($P< 0.05$) interval to first estrus (35 days) compared to the other treated groups. Interval to the second estrus was ranged from 22 to 26 day with differences being insignificant among treatments. Percentage of does with cycles classified as short (<18) d), normal (18 - 24 d), or long (> 24 d) duration appeared similar, but when the ratio of normal to abnormal length cycles was examined, G1and G3 does showed more ($P< 0.05$) normal estrous cycles than G4. The average frequency (number of estrus per doe) before either 6 weeks postpartum or first service was unaltered by treatment. Treatment of does in G1 and G3 increased the proportion of does having estrous cycles of normal duration ($P<0.05$). Days open, improved ($P< 0.01$) in the G1 and G2 groups compared with *control (115 d, Table 7). Days open in the G3 (96 d) were intermediate between the G4 and other treated groups. Does of G1, and G3 showed less services for conception by 26 and 22% compared with G4. Days open, Interval from kidding to conception, was reduced by 27-29 d ($P<0.05$) for does treated with either GnRH or $PGF_{2\alpha}$ compared with control group.*

The obtained results revealed that early resumption of ovulation and estrous cyclicity has been found in groups treated either with GnRH between d 10 and 14 (G1), or followed by $PGF2_{\infty}$ (G2) between days 20 and 24 as compared with control group (G4). It could be concluded that treatment with GnRH or $PGF_{2\alpha}$, but not their combination, improved fertility of dairy goats.

Keywords: Goats, GnRH, $PGF_{2\alpha}$, postpartum, estrous cycle and ovulation

INTRODUCTION

Small ruminants are the most dominant livestock in North Sinai region where they played an important role in the social life of Bedouins. Damascus (Shami) goats, in particular, are characterized by their higher milk production and faster growth rate in addition to their large size relative to Baladi goats (Hammam *et al*., 2008) and were planned to be distributed through the MERC project to improve productivity of local breeds. Their reproductive potentiality especially during postpartum period has not been investigated.

Because early reestablishment of cyclic ovarian function and estrous activity is essential for maintaining an acceptable kidding interval in dairy goats, postpartum ovarian activity has been studied extensively (Britt *et al*., 1974, Stevenson and call, 1983 and Bartlewski *et al*., 1999). Interval to first ovulation was reported to average about 3 wks, whereas interval to first detected estrus was about 6 weeks (Menchaca, *et al*., 2001 and Menchaca and Rubianes, 2002).

Throughout the postpartum period, involution of the uterus and resumption of ovarian estrous activities occur. Length of this period may lower fertility rates (Kiracofe, 1980). Resumption of postpartum ovarian activity is not only affected by the internal physiological mechanisms but also by social, behavioural and phermonal interactions in the flock (Knight *et al*., 1983 and Thimonier *et al*., 2000).

Synchronization of estrus has been used in small ruminant industry to improve flock productivity and to facilitate artificial insemination and embryo transfer technique (Brice *et al*., 1989 and Beck *et al*., 1993). Prostaglandin $F_{2\alpha}$ or its analogues are known to be the most effective luteolytic agent for synchronizing estrus. Treating animals with $PGF_{2\alpha}$ is followed by luteolysis and decrease in plasma progesterone concentrations (Macmillan and Thatcher, 1991).

Numerous studies have been conducted using the combined treatment with GnRH agonist followed by $PGF_{2\alpha}$ to improve the synchronization of estrus and fertility in bovine species (Twagiramungu *et al*.; 1995). Furthermore, Pursley *et al*. (1995) suggested that GnRH-$PGF_{2\alpha}$ protocol could have a major impact on managing reproduction of dairy cows, particularly performing AI at the appropriate time. This protocol was based on the assumption that synchronization of follicular waves with GnRH induces the emergence of a new follicle which becomes the ovulatory follicle after prostaglandin treatment.

Administering GnRH before d 60 postpartum is an effective tool for treating ovarian follicular cysts, enhancing uterine involution and increasing frequency of estrus and ovulation (Correa *et al*., 1993). Several studies reported fertility improvement associated with an increase in frequency of estrus and ovulation due to GnRH treatment (Thatcher *et al*., 2002; Spencer *et al*., 2004 and Moore *et al*., 2005).

Because both GnRH and $PGF_{2\alpha}$ induce precocious estrus, ovulation, or both, they might have potential to control both timing and frequency of those traits for does in postpartum. Little information is available for ovine species (Beck *et al*., 1996 and Hafez, 2000) concerning the potentials of these two hormonal treatments during postpartum anoestrus period of goats.

The objective of this study was to determine if early postpartum (10-20 days) treatment with GnRH, or $PGF_{2\infty}$ or both can improve the ovarian cyclicity as well as subsequent fertility in lactated Shami goats.

MATERIALS AND METHODS

Location

This study was conducted in Abou-ElFeta experimental station at Al-Arish, North Sinai Governorate. The work was carried in collaboration with the Middle East Regional Cooperation (MERC) program for Economic, Growth, Agriculture and Trade; and the U.S. Agency for International Development. It was supported under the Grant No., M18-001, Bureau.

Animals

One hundred adult Shami goat does (58 from the experimental flock in addition to another 42 goat does from the small holder Bedouins in the same area) were used in this study. Does of the Bedouins were previously mated with their partners in the station in the same time and returned again to the station at late gestation (last 2 months of pregnancy) and kept under the same management till the end of the experiment. All does were ranged from 2.0 to 2.5 years old and average body weight of 42.5 ± 1.65 kg.

Experimental Design

Does were assigned randomly at kidding, with respect to age and live body weight, into four treatment groups (25 each). Does in groups 1 and 2 (G1 & G2) receive a single i.m. injection of 8 µg GnRH analogue (2 ml Receptal, Intervit, Co. Holland) between day 10 and 14 postpartum, while does in groups 3 and 4 (G3 & G4) injected with 2 ml physiological saline solution (0.09 % Nacl, Placebo, Egypt). Ten days later, between d 20 and 24, does in G2 and G3 received 5 ml $PGF_{2\infty}$ (25 mg Lutalyse®, Upjohn, Belgium).i.m., while does in G1 and G4 injected with 5 ml saline. G4 is assigned as control group.

Animal Handling

Does were housed under local environmental conditions in semi-open pens covered with metallic sheets. They were fed on concentrate feed mixture (43% yellow corn, 22% cotton seed meal, 20% wheat bran, 12% rice bran 1.5% limestone, 1% sodium chloride and 0.5% minerals mixture) at the rate of 1kg/head/day to cover 100% of their maintenance requirements of energy (Kearl, 1982) plus berseem

(*Trifolium alexandrinum*) hay offered *ad libitum*, while water was made available twice daily. A visual observation for signs of estrus throughout the day was followed by herdsmen. Each observation spent for 30-min between 07:00 and 08:00 h and between 17:00 and 18:00 h. All does were hand mated with 5 fertile bucks at the onset of the first estrus. Sires were used randomly across treatments and pregnancy status was determined by non-return to estrus or by pulse-Mode ultrasound (RENCO PREG-ALERT®, RENCO®-Corporation, Minneapolis, Minnesota 55401, U.S.A.) 45 to 60 d after mating.

Measurements

Blood samples were collected thrice weekly (Monday, Wednesday, and Friday) via vein puncture from all does and continued until 6 weeks post mating or 120 days postpartum. In addition, from all does in G2 and G3 (those receiving $PGF_{2\infty}$), blood was collected at 0 and 48 h after $PGF_{2\infty}$ injection to determine the incidence of luteolysis. Blood was chilled upon collection, held at 4°C overnight, and serum was harvested after centrifugation at 3000 r.p.m for 20 minutes and frozen at -20°C until progesterone assay.

Serum progesterone (P_4, ng/ml) was carried out using a direct radioimmunoassay technique (RIA) with commercial radioimmunoassay kits (Coat-A-Count, Diagnostic Products, LA, CA, USA). The sensitivity of the assay was 0.03 ng/ml whiles the intra and inter assay coefficients of variation were 4.3 and 8.4%, respectively.

Characterization of estrus and ovarian activity

Serum progesterone (P_4, ng/ml) concentrations for each doe (20 does/treatment) were plotted versus day's postpartum (abscissa) to determine ovulation frequency and characteristics of estrous cycles (ovarian and luteal function). Day of ovulation was estimated by the following criteria according to Stevenson and Call (1983) and confirmed by Moncef and Stevenson (1998): 1) ovulation occurred on the day after served estrus by buck if serum P_4 was >1 ng/ml on the day of estrus; 2) When estrus was not observed, ovulation supposed to occur either 2 d before any increase in P_4 that exceeded 0.5 ng/ml (basal concentration) and was less than 2 ng/ml or 4 d before elevation of P_4 concentration from basal levels to >2 ng/ml. Ovulation after GnRH injection was estimated when serum P_4 increased (>1 ng/ml) within 3 to 5 d after treatment. If P_4 concentration increased before 3 d or after 5 d, does were assumed to have ovulation not related to the treatment. Luteolysis after $PGF_{2\infty}$ injection was determined when P_4 exceeded 1 ng/ml at treatment (0 h) and was less than 1 ng/ml 48 h later. No luteolysis was indicated for those does with serum P_4 greater than 1 ng/ml at 0 and 48 h. A developing corpus luteum was indicated when serum P_4 increased from less than 1 ng/ml to greater than 1 ng/ml (0 to 48 h). No luteal function (anestrus) was indicated when serum progesterone was less than 1 ng/ml at 0 and 48 h after $PGF_{2\infty}$ injection.

Normal estrous cycles (without detected estrus at 18 to 24-d intervals) were indicated when does had elevated serum P_4 exceeding 1 ng/ml for approximately 2 wk and concentrations was less than 0.5 ng/ml for about 1 wk. Persistent luteal maintenance after first ovulation was noted when P_4 concentration exceeded 1 ng/ml for more than 2 wk after the first rise in P_4 postpartum.

Prolonged anovulation or anestrus was indicated when serum P_4 remained below 1 ng/ml for at least 6 week after kidding. Does were classified as anestrus after first ovulation when serum P_4 persisted at basal concentration after a sustained rise above 1 ng/ml for at least 1 wk.

Unless otherwise noted, all ovulation and estrous traits (except estrous behavior) were limited to 80 does (20 does/treatment) for which serum P_4 profile was available. Incidence of estrus and fertility traits (interval to first service, conception at first service, days open, and No. of services per conception) were measured in all 100 does.

Statistical Analyses

Data were subjected to one way analysis of variance for repeated measurements using the general linear model procedure of the Statistical Analysis System (SAS, 1998). Treatment means were separated using Duncan's test after detection of a significant F test to make comparisons of groups G1, G2 and G3 with the control group (G4). Enumeration data (percentages) were tested by chi-square for independence.

RESULTS AND DISCUSSION

Responses to GnRH and PGF$_{2\infty}$ treatments

Shami does response to GnRH treatment that taken place between d 10 and 14 postpartum is presented in Table 1. The obtained results indicated that, the percentage of responded does is almost three times higher (P< 0.01) than control group (75 vs. 27.5%). Percentage of does that ovulated in G1 and G4 before treatment was relatively similar. The delayed ovulatory response was higher (P<0.01) in G4 compared to G1.

Table 1. Ovarian response of Shami does that treated with gonadotropin releasing hormone GnRH agonist between d 10 and 14 postpartum compared with the control group

Item	Treatment	
	GnRH	Control
No of animals	40	40
Ovulation after treatment[1]	30 (75%)[a]	11 (27.5%)[b]
Ovulation before GnRH[2]	6 (15%)	9 (22.5%)
Delayed ovulation after GnRH[3]	4 (10%)[a]	20 (50%)[b]

* Treatments were combined to make comparisons of GnRH (G1 and G2) with control (G3 and G4) for various traits. 1, Number and percentage of does with serum P_4 greater than 1 ng/ml between d 3 and d 5 after GnRH or saline treatment. 2, Number of does with serum P_4 greater than 1 ng/ml at the time of GnRH or saline treatment. 3, Number of does with serum P_4 greater than lng/ml at d 6 or more after GnRH or saline treatment. Means with different superscript in the same raw are different from saline group at P< 0.01.

The obtained results of ovulatory response to GnRH are close to that reported by Shaham-Albalancy *et al*. (2001). Lack of unanimous response to GnRH might be due absence of maturing ovarian follicles (Macmillan *et al*., 2003), inadequate estradioI concentrations (Mann *et al*., 1992), or attenuated magnitude or duration of the GnRH-induced LH surge (Rhodes *et al*., 2003).

The luteolytic response to $PGF_{2\infty}$ between d 20 and 24 postpartum was shown in Table 2. There was a numerical tendency of insignificant increases (10%) for G2 does (pre-treated with GnRH) to respond to $PGF2_{\infty}$ (45.0 vs. 35.0%) as well as decreasing percentage of those with no luteal function (20 vs. 25.0%), at the time of $PGF2_{\infty}$ treatment, than those of G4 treated does. The poor luteolytic response might be attributed to either high resistance of the corpus luteum to the luteolytic effects of exogenous $PGF2_{\infty}$ during early stages of the cycle (Menchaca *et al*., 2001) or as a result of the absence of corpus luteum.

Table 2. Ovarian responses of Shami does to gonadotropin releasing hormone (GnRH agonist) and prostaglandin $PGF_{2\alpha}$ between d 20 and 24 postpartum

Item	Groups	
	G2	G3
No of animals	20	20
Luteolysis after $PGF_{2\alpha}$[1]	9 (45.0%)	7 (35.0%)
No luteolysis after $PGF_{2\alpha}$[2]	6 (30.0%)	6 (30.0%)
No luteal function[3]	4 (20.0%)	5 (25.0%)
Developing corpus lutum[4]	1 (5.0%)	2 (10.0%)

1, Number of does with serum P_4 greater than 1 ng/ml at 0 h and less than 1 ng/ml at 48 h after $PGF_{2\alpha}$ treatment. 2; Number of does with serum P_4 greater than 1 ng/ml at 0 and 48 h after $PGF_{2\alpha}$ treatment. 3; Number of does with serum P_4 less than 1 ng/ml at 0 and 48 h after $PGF_{2\alpha}$. 4; Number of does with serum P_4 less than 1 ng/ml at 0 h and greater than 1 ng/ml at 48 h after PGF.

On the other hand, the effect of $PGF_{2\alpha}$ in the absence of a luteal structure suggested that uterine smooth muscle stimulated by $PGF2_{\infty}$ might have been the mode of $PGF2_{\infty}$ action (Thatcher *et al*., 2002). Earlier reports (Robin *et al*., 1994) revealed that GnRH and $PGF2_{\infty}$ accelerate the rate of uterine involution and consequently enhance fertility by improving the uterine environment at earlier postpartum. It would appear that the use of PGF in the immediate postpartum period in the absence of a luteal structure is not desired (Hashem *et al*., 2002).

Ovulation Traits

Based on P_4 profile, interval to first detected ovulation varied among hormonal treatments; G2 (combined treated group) recorded the shortest interval (12.0 ± 1.32 days, n=4) compared to either G1 (14.0 ± 2.15 days , n=6) or G3 (16.0 ± 2.12 days, n=4) while G4 recorded 19.0 ± 3.21 days (n=7) with differences being insignificant (Table 3). Meanwhile, higher percentages of G2 and G3 (75 and 85%) treated does exhibit their induced ovulation in short interval (32.0 ± 3.14 and 35.0 ± 5.14 days, respectively) compared to both G1 (39.0±5.14 days) and G4 (45.0 ± 4.14 days).

Also, results of the present study indicated that 80, 95, 85 and 100 % of G1-G4, that exhibit their first ovulation, continued to exhibit their second ovulation with cycle duration averaged 26, 25, 20 and 27 days respectively, with differences being insignificant.

In the meantime, for those does given $PGF_{2\alpha}$ (G2 and G3), interval to second (20 and 19 day) and third ovulation (25 and 20 day) were shorter ($P<0.05$) compared to G4 (26 and 27 day) group, respectively.

Table 3. Postpartum intervals to ovulation (days) and ovulation rate of different experimental goat groups (Mean ± SE)

Item	Groups[1]			
	G1	G2	G3	G4
interval to first detected ovulation	14.0± 2.15	12.0± 1.32	16.0 ± 2.15	19.0± 3.21
Days to second ovulation	39.0±5.14	32.0 ± 3.14	35.0 ± 5.14	45.0 ± 4.14
Does detected in 2nd estrus (%)	11 (55%)[b]	15 (75%)[a]	16 (80%)[a]	11 (55%)[b]
Days to third ovulation	65.0± 7.23	57.0± 7.23	55.0 ± 7.23	72.0±7.23
Does detected in 3rd estrus (%)	16 (80%)[a]	19 (95%)[a]	(85%)[a]	(100%)[b]
No of ovulations/doe through 6 weeks[2]	1.7 (70%)[a]	1.9 (95%)[a]	1.7 (75%)[a]	1.5 (35%)[b]
No of ovulations/doe before first service[2]	3.0 (65%)	3.0 (100%)	2.9 (55%)	2.7 (60%)

1; G1= Gonadotropln releasing hormone, saline; G2 = gonadotropin-releasing hormone, prostaglandin; G3 = saline, prostaglandin; G4 = saline, saline. 1; Average number of ovulations per doe (Total number of ovulations / does ovulated) and their percentage *; Means with different superscript within the same raw are different at $P<0.05$.

Whether ovulation rate (No of ovulations/doe) was calculated before 6 weeks or before first service, all three hormonal treatments increased ($P<0.05$) the percentage of ovulated does compared to control one (Table 3). Results demonstrated that intervals to ovulation were altered by both GnRH and $PGF2_{\infty}$ treatments. Reducing interval to first ovulation and eliminating anovulation before 6 weeks have beneficial effects of the two hormones. These results tend to agree with those of Twagiramungu *et al*. (1995).

Characteristics of Ovarian Function

Does were classified into four categories based on their ovulatory response (Table 4). Percentage of does that resumed ovulation and estrous cyclicity after first ovulation was insignificantly higher among hormonal treatments groups compared with control group (75 vs. 55%).

Table 4. Characteristics of postpartum ovarian function of goat does under different treatment groups

Item	Groups[1]			
	G1	G2	G3	G4
No of treated does	20	20	20	20
Does exhibit estrous cycles (%)	15 (75.0%)	15 (75.0%)	14(70.0%)	11(55.0%)
Does with persistent corpora luteal	3 (15.0%)	2 (10.0%)	2 (10.0%)	2(10.0%)
Does exhibit anestrous after ovulation[2]	2 (10.0%)	3 (15.0%)	1 (5.0%)	2(10.0%)
Does with prolonged anovulation[3]	0 (0.0 %)*	0 (0.0%)*	3 (15.0%)	5(25.0%)

1; G1= Gonadotropln releasing hormone, saline; G2= gonadotropin-releasing hormone, prostaglandin; G3 = saline, prostaglandin; G4 = saline, saline. 2; Discontinued estrous cycles after regression of first luteal structure 3; No rise in serum P_4 before 6 wk postpartum. s *; Different from control at P< 0.05.

The proportion of does that had persistent corpora lutea after first ovulation or returned to anestrous and anovulatory condition was relatively similar among studied groups. Generally, it was reported that duration of postpartum acyclicity is influenced by suckling status, nutrition, kidding season, age, and several other factors (Doaa *et al*., 2004). Although uterine involution begins and ovarian follicular waves resume soon after parturition, dominant follicles of these waves fail to ovulate, due to a failure to undergo terminal maturation (Hafez, 2000). As a result, postpartum anovulatory dominant follicles are smaller than the ovulatory follicles in cyclic animals. Failure of postpartum dominant follicles to undergo terminal maturation might be due to absence of appropriate LH pulses, a prerequisite for follicular terminal maturation prior to ovulation (Menchaca *et al*., 2001). However, incidence of prolonged anovulation was reduced (P <0.05) by GnRH treatment, whereas 15 and 25% of the does pretreated with saline remained anestrous for at least 6 weeks postpartum (Table 4).

Estrous Traits

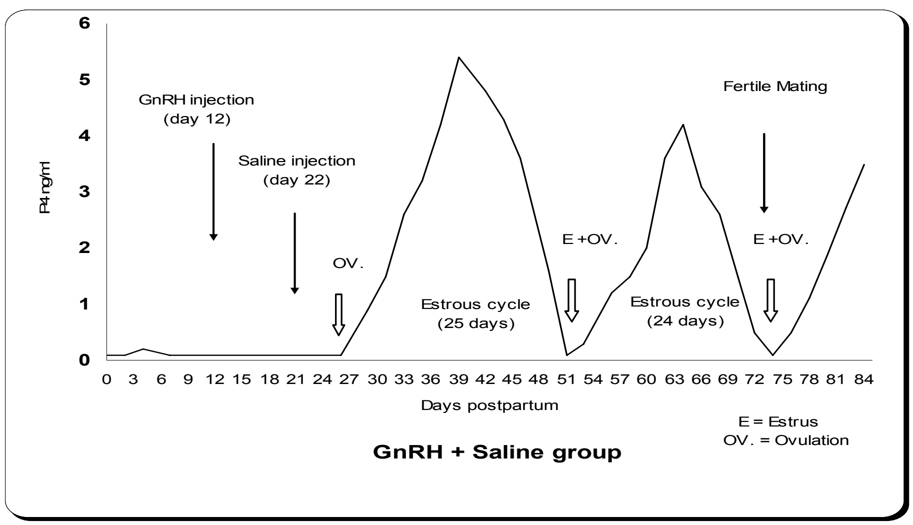
Intervals to first and second detected estrus are shown in Table 5 and Figure 1. Does in G2 have the shortest (P< 0.05) interval to first estrus (35 days) compared to the other treated groups. There were no treatment differences for intervals to the second estrus which ranged from 22 to 26 day).

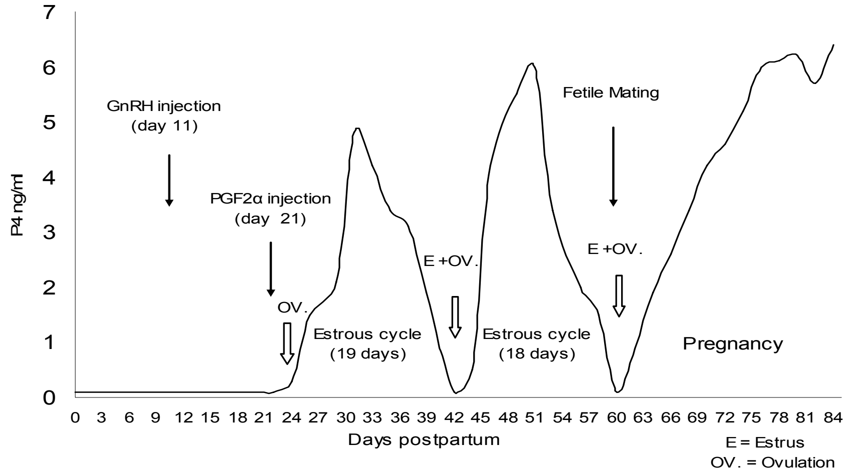
The average frequency (number of estrus per doe) before either 6 weeks postpartum or first service was unaltered by treatment. But for all does treated with GnRH, (G1 and G2) overall mean percentage , based on pooled data, of does detected in estrus before either 6 weeks or at first service tended to increase (P< 0.01) by 32 (50 vs. 38%) and 44%,(49 vs. 34%), respectively compared to those receiving saline (Table 5).

Table 5. Postpartum interval to estrus (day) and frequency of heat at 6 weeks and before 1st service of different treated goat does groups (Means ± SE)

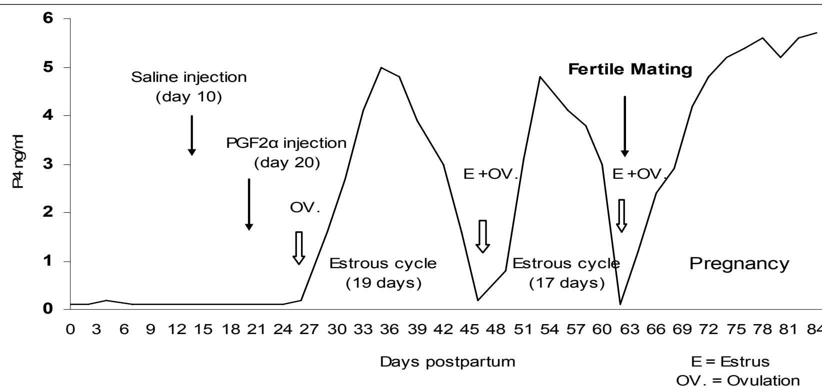
Item	Groups[1]			
	G1	G2	G3	G4
No. of does	25	25	25	25
Postpartum interval to 1st estrus	43.0 ± 4.22 [a]	35.0±4.22[b]	49.0±4.22[a]	45.0± 4.22[a]
Postpartum interval to 2nd estrus	59.0±5.11	57.0±5.11	62.0±5.11	61.0±5.11
Average number of heats /doe during 6 weeks	0.7±0.07	0.7±0.07	0.7±0.05	0.7±0.05
% of does with one or more heat during 6 weeks	56.0	44.0	32.0	44.0
Average number of heats /doe before 1st service	0.7±0.07	0.7 ± 0.07	0.6 ±0.07	0.5 ±0.05
% of does with one or more heat before 1st service	52.0	46.0	32.0	46.0

1; G-S = Gonadotropln releasing hormone, saline; G-P = gonadotropin-releasing hormone, prostaglandin; S-P = saline, prostaglandin; S-S = saline, saline. 3; Means with superscript within the same raw were different from control (G4) at P< 0.05.





GnRH + PGF2α group



Saline +PGF2α

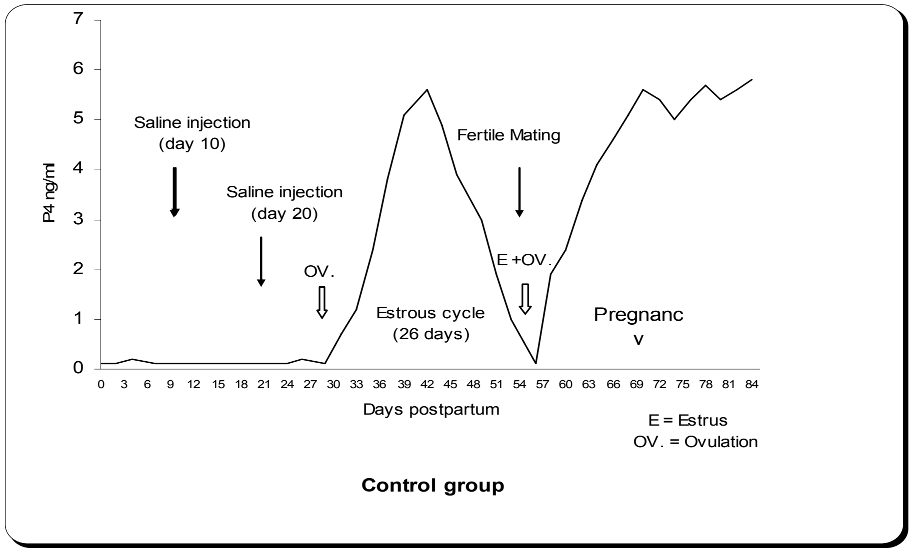


Figure 1. Postpartum ovulatory response and estrous cycle duration in some animals within different hormonal treatments (data presented based on the average of 5 doe goats/ treatment)

Characteristics of Estrous Cycles

Based on the observed symptoms of estrous cycles and P_4 profile, total number of estrous cycles/ doe was almost similar among the studied groups (Table 6). Percentage of does with cycles classified as short (<18) d), normal (18 - 24 d), or long (> 24 d) duration appeared similar, but when the ratio of normal to abnormal length cycles was examined, G1and G3 does showed more (P< 0.05) normal estrous cycles than G4.

Table 6. Characterization of postpartum estrous cycles of different goat does treated groups

Item	Groups[1]			
	G1	G2	G3	G4
Total estrous cycles before 6 wk (per doe)	33 (1.7)	38 (2.0)	31 (1.6)	29 (1.6)
Estrous cycles length[2]				
Short (< 18 d)	7 (21.2%)	9 (23.7%)	9 (29.0%)	8 (27.6%)
Normal (18 to 24 d))	16 (48.5%)	15(39.5%)	15(48.4%)	12(41.3%)
Long (>24 d)	10 (30.3%)	14(36.8%)	7 (23.6%)	9 (31.0%)
Ratio of normal to abnormal cycles	0.94[a]	0.65[ab]	0.94[a]	0.58[b]

1; G1 = Gonadotropln releasing hormone, saline; G2 = gonadotropin-releasing hormone, prostaglandin; G3 = saline, prostaglandin; G4 = saline, saline.2; number of does (percent of total) *; Different from control (S-S) (P< 0.05)

The present results revealed that the proportion of does having normal estrous cycles was not influenced by the treatment combination (G-P). These data might suggest that although occurrence of estrus and ovulation was enhanced, return of estrous cycles of normal length was delayed. This effect on subsequent fertility in both G2 and G4 groups agreed with those results of Pursley *et al*. (1995), who reported poor conception rate for does inseminated early postpartum when estrous cycles had abnormal length. Length of first cycles was normal (18 to 20 d) in G2 does, but second cycles averaged 26 d, similar to controls. Use of $PGF2_{\infty}$ was beneficial for reducing first estrous cycles duration and likely might prevent subsequent luteal regression because of uterine pathogens (Stevenson *et al*., 2004). These data might suggest that the treatment combination was not effective for unknown reasons. Further work is warranted to understand the apparent conflict with other results from previous work (Pursley *et al*., 1995).

Fertility traits

Days open, improved (P< 0.01) in the G1 and G2 groups compared with control (115 d, Table 7). Days open in the G3 (96 d) were intermediate between the G4 and other treated groups. However, Robin *et al*. (1994) illustrated that GnRH increased days open compared with controls unless PGF was given 9 d after GnRH (d 24 postpartum) because of increased incidence of pyometra and pre-breeding anestrous. Does of G1, and G3 showed less services for conception by 26 and 22% compared with G4 (Table 7). These results are in agreement with those of Riek (1984) for abnormal cows treated with GnRH and with experiments when 250 µg GnRH was administered (Freitas *et al*., 1997). Pregnancy rate had improved in G1 and G3 groups (76 and 72%) as compared to G4 or G1 (64%).

Table 7. Mean±SE of some fertility parameters of different treated goat groups

Item	Treatments[1]				Overall mean
	G1	G2	G3	G4	
Days to 1[st] service	67±3.1	63±3.1	61±3.1	63±3.1	63.7±2.25
First service conception, %	40±3.2	38±3.2	42±3.2	29±3.2	37.3±4.65
Days open	86±8.2[a]	88±8.2[a]	96± 8.2[a]	115± 8.2[b]	96.3±4.21
Service/conception	1.7± 0.2[a]	2.1±0.2[ab]	1.8±0.2[a]	2.3±0.2[b]	2.3 ±0.2

Summary of reproductive performance

Item	G1	G2	G3	G4
No. of does bred	25	25	25	25
No. of does conceived	16	19	18	16
No. of does failed to conceive	4	4	5	3
No. of barren does	5	2	2	6
Pregnancy rate (%)	64	76	72	64

1; G1= Gonadotropln releasing hormone, saline; G2= gonadotropin-releasing hormone, prostaglandin; G3 = saline, prostaglandin; G4 = saline, saline. Means with different superscript are significantly different at P< 0.01.

The obtained results revealed that early resumption of ovulation and estrous cyclicity associated with increase of fertility, as previously suggested by Nogueira *et al*. (2004). Ovulation frequency and occurrence of estrus before first service as well as increased occurrence of estrous cycles of normal length has been found in all hormonal treatments groups favour to those treated either with GnRH between d 10 and 14 (G1), or followed by $PGF2_{\infty}$ (G2) between d 20 and 24 followed by S-P compared with control group (G4).

Judging by the lower fertility (conception rate) from the first estrus, it is evident that the re-establishment of normal ovarian function, at the second occurring ovulation, enables goats to conceive much more readily than they do at the first ovulation of the season. Results were confirmed with those reported by El-Zarkouny *et al*. (2004). They demonstrated that as the postpartum interval increases, sensitivity of the GnRH pulse-generator to the negative feedback effect of ovarian estradiol-17β decreases followed by an increasing frequency of GnRH discharges and LH pulses, terminal follicular maturation, ovulation, and continued cyclicity.

CONCLUSIONS

Improved fertility was observed in does given GnRH between d 10 and 14 or $PGF2_{\infty}$ between d 20 and 24 postpartum. Overall days open as well as No. services per conception were decreased in either GnRH or PGF treated groups. Improvement of fertility was associated with increased frequency and occurrence of ovulation and estrus before first services and the reestablishment of estrous cycles of normal duration before 6 weeks postpartum . Our study might suggest that treatment of Shami does with GnRH or $PGF_{2\infty}$ at early postpartum can improve their fertility reflecting the possibility of increasing kidding frequency (3 kiddings/2 years) as a main task for improving productivity and increased meat production.

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استعادة النشاط لمبيضى للماعز الشامى خلال مرحلة ما بعد الولادة باستخدام مشابه هرمون الغدة المنسلية والبروستاجلاندين

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أجريت الدراسة بمحطة ابو الفيتة بالعريش (محافظة شمال سيناء) ضمن أنشطة مشروع تحسين إنتاج المعز بشمال سيناء (MERC) على 100 أنثى معز شامى (2.0-2.5 سنة ومتوسط وزن 42.5 كجم) بهدف دراسة اثر استخدام المركبات الجونادوتروفية والبروستاجلاندينية فى المراحل المبكرة (10-24 يوم) بعد الولادة على عودة النشاط المبيضى والشبقى فى المعز الشامى واثر ذلك على بعض مقاييس الخصوبة من خلال تقدير هرمون البروجيسترون وتحديد حالات النشاط المبيضى. قسمت المعز عشوائيا الى 4 مجموعات: المجموعة الاولى والثانية تم حقنها فى العضل بشبية هرمون الـ GnRH بعد 10-14 يوم من الولادة بينما حقنت اناث المجموعة الثالثة والرابعة بمحلول ملحى وبعد 10 ايام من الحقنة الاولى (20-24 يوم بعد الولادة) تم حقن حيوانات المجموعة الثانية والثالثة بشبية البروستاجلاندين بينما حقنت حيوانات المجموعة الاولى والرابعة بمحلول ملحى. تم ملاحظة الشياع مرتين يوميا. استخدم فى التجربة 5 ذكور شامى لتلقيح الحيوانات التى اظهرت الشياع وسجلت القراءات الخاصة بالنشاط الشبقى والتلقيح ومقاييس الخصوبة.

أظهرت النتائج ان الحقن بشبيه هرمون الـ GnRH ادى الى تقليل الفترة لاستحداث أول تبويض وكذلك أول شياع وازدادت النسبة المئوية لعدد الإناث التى أظهرت أكثر من تبويضة قبل التلقيح الأول حيث بلغت 83% مقارنة بالكنترول (57%).

أدت المعاملة بشبيه البروستاجلاندبن إلى خفض(P <0.05) الفترة بين التبويضة الثانية والثالثة (20& 19 يوم مقارنة بمجموعة الكنترول (26 & 27 يوم) وكذلك انخفضت الفترة لحدوث اول دورة شياع. لم تتاثر النسبة المئوية لعدد الحيوانات التى أظهرت دورات شياع سواء كانت قصيرة (اقل من 18 يوم)، طبيعية (18-24 يوم) أو طويلة (اطول من 24 يوم) وعند حساب نسبة الدورات الطبيعية إلى تلك القصيرة والطويلة أظهرت حيوانات المجموعة 1 & 3 عددا اكبر(P< 0.05) من دورات الشياع الطبيعية مقارنة بالكنترول. أدت المعاملة بشبية هرمون الـ GnRH او بشبيه هرمون الـ GnRH مع البروستاجلاندين الى زيادة عدد الحيوانات التى أظهرت دورات شياع طبيعية وانخفضت الفترة من الولادة وحتى التلقيح المخصب بـ 27-29 يوم (P< 0.05)مقارنة بالمجموعة المقارنة. تستخلص الدراسة إلى إمكانية استعادة النشاط المبيضى والشياع فى المراحل المبكرة بعد الولادة (10-24 يوم) فى المعز الشامى بالحقن بشبيه هرمون الغدة المنسلية او البروستاجلاندين .