

EFFECT OF MELATONIN IMPLANTS ON CONCENTRATION OF LH, FSH, AND PROLACTIN THE REPRODUCTIVE PERFORMANCE IN IRAQ LOCAL GOATS

***Yazen. A . Sayel " ** Khawla. A. Hussein ***Dr. Ahmed A- AL-Ani**

*Ministry of agriculture

**Department of Surgery and Obstetrics, College of Veterinary Medicine, Baghdad University,
Iraq

***Ministry of agriculture

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Abstract

The present study was designed to investigate the role of melatonin on ovarian activity anestrus female goats, hormonal profile (LH, FSH, and prolactin) before and after melatonin implantation. and study reproductive performance, estrus activity, and pregnancy rate detected by ultrasonography. The study was conducted on 30 does divide randomly into the 2 groups and 6 fertile bucks. Group 1 (15) does treat by s/c melatonin implant 18mg put at the base of the ear, group 2: without treatment. Blood samples were taken from the jugular vein will be collected before and after treatment, for estimation concentration of FSH, LH, and Prolactin hormone. The result in current study revealed that 12 (80 %) and 9 (60 %) doe in group one and two respectively were expressed estrous signs after estrous induction regimes , with significant difference ($p \leq 0.05$) between group one as compared with group two. The results was showed that the number of follicles in group one 34(61.82%) appeared significantly ($p \leq 0.01$) higher as compared with group two 21(38.18%). the number of corpus luteum in group one 22(61.11%) appeared significantly ($p \leq 0.01$) higher as compared with group two 14(38.89%).The results of current study that illustrate serum prolactin concentration after treatment group one (1.26 ± 0.03) showed significant difference ($p \leq 0.05$) as compared with group two (1.20 ± 0.01). The results illustrate serum of FSH concentration . at estrous phase the group one (2.57 ± 0.04) showed significantly ($p \leq 0.05$) increased compared with group two (1.90 ± 0.01). study showed that the number of pregnancy does in group one 11(57.89) appeared significantly ($p \leq 0.01$) compared with group two 8(42.10).

Key words: goats, fertility, melatonin, LH, FSH , prolactin, ultrasnography

Introduction

Goats are short day breeders, they started estrus cycles in autumn, in response to declining day length, and experience seasonal anestrus in spring, when day length is increasing. After parturition, all the females suffer from anestrus for a variable but short period, known as postpartum anestrus. The period of postpartum an-estrus is usually longer in Melatonin controls the reproductive rhythm in various ruminant species, like goats and sheep (short-day species) . Melatonin-mediated pathways regulate GnRH pulsatility and, therefore, the activity of the reproductive neuroendocrine axis (20). Melatonin did not the frequency of LH pulses [12]. Estrus synchronized in livestock is one of the important methods in assisted reproductive technologies in goat reproduction(6) . The administration of melatonin is used usually to increase reproductive performance during anestrus in both highly seasonal [5] The physiological response characteristic of short day length is evident even during periods of extended day length when exogenous melatonin is provided 6–8 h before the actual onset of darkness (1). Conception rate is known to decline after treatment by superovulation in anestrous animal (8) possibly because of seasonal shifts in LH secretion and or associated effects on follicular function (3) functioning of the reproductive system in animal, the administration of melatonin to aged female rats increases GnRH synthesis (14) . Several researchers demonstrated that melatonin given by injection, oral administration, or vaginal or subcutaneous implantation can advance the breeding season in animals (17). In sheep, the rise in circulating melatonin is responsible for the increase in GnRH and gonadotropins, thus leading to follicular growth and ovulation(50). The ovarian activities of sheep can be induced during seasonal anestrus by various treatments to increase the pregnancy rate (2,13-15). Anestrus is one of the most commonly occurring reproductive problems in goats (2)

Materials and Methods

This study was carried out in a state board-for Agricultural Researches, Ruminant Researches Station –Ministry of Agriculture thirty local breed and 6 fertile bucks used for detecting estrus and mating .They were housed in semi opened shade concerning the nutritional regime. The animals were kept on the same nutrition regime used in the station early grazing for about 4 hr. in addition to provision with green food, and concentrated diet daily, at a range of 500 gram besides the supplemented with minerals and water ad libidum. Careful clinical examination was done to determine that they are healthy and free from disease. Before starting the experiment all does were submitted to trans-rectal and trans-abdominal ultrasonography. 30 does divided randomly on the 2 groups and 6 fertile bucks group 1 (15) doe treated by s/c melatonin implant 18mg put at the base of ear, group 2: without treatment, The animals were prepared prior examination such as fasting of feed for (12) hrs. to improve the accuracy of transrectal and transabdominal scanning and vaginal inspection by speculum to be sure that the female were non pregnant and free from any infection or abnormalities. The ventral abdomen hair was clipped and shaved carefully by using manual clippers and super stainless blades (Super-Max, Green, Feltham). Adequate amount of gel was applied to the probe to form good contact and remove air between the probe and animal skin and also the gel was placed at the right side of the goat before scanning. before trans-rectal examination the rectum was evacuated from feces. (Inskip and Schrich, 1993). Whitee *et al*, (1994) reported that the examination of the doe in room with low light and far about the sunlight to get high-quality image. This technology requires on average 2.5 and 1.5 minutes for trans rectal and trans abdominal transducers, respectively (Padilla- Rivas *et al.*, 2005).

Statistical Analysis:

The Statistical Analysis System- SAS (2012) program was used to detect the effect of difference factors in study parameters. Least significant difference –LSD test (Analysis of Variation-ANOVA) was used to significant compare between means. Chi-square test was used to significant compare between percentage (0.05 and 0.01 probability)in this study.

Result:

Estrus induction

The result in current study revealed that 12 (80 %) and 9 (60 %) doe in group one and two respectively were expressed estrous signs after estrous induction regimes , with significant difference ($p\leq 0.05$) between group one showed higher significantly ($p\leq 0.01$) as compared with group one 3(20%). duration of estrous phase/hours non-significantly. presented in table(1)

Table (1): Effect of melatonin on estrus rate and duration phase of estrus

Group No.	No. of goats	No. of estrus goats	No. of non-estrus goats	Duration of estrus phase / h
Group 1 (melatonin implant 18 mg/s .c)	15	12 (80%)	3 (20%)	40.75 ± 4.82
Group 2 control	15	9 (60%)	6 (40%)	41.00 ± 2.07
Total	30	21	9	44.73 ± 1.68
Chi-Square (χ^2)	---	7.25 **	7.25 **	T-test = 6.382 NS
** ($P\leq 0.01$), NS: Non-Significant.				

2. Effect of melatonin injection on number of follicles, corpus luteum

The current study showed that the number of follicles in group one 34(61.82%) appeared significantly ($p\leq 0.01$) higher as compared with group two 21(38.18%) . the number of corpus luteum in group one 22(61.11%)

appeared significantly ($p \leq 0.01$) higher as compared with group two 14(38.89%). The details presented in table (2).

Table (2): Effect of melatonin injection on number of follicles and corpus luteum

Group No.	No. of goats	No. of follicle	No. of corpus luteum
Group 1 (melatonin implant 18 mg/s.c)	15	34 (61.82%)	22 (61.11%)
Group 2 control	15	21 (38.18%)	14 (38.89%)
Total	30	55	36
Chi-Square (χ^2)	---	8.942 **	8.775 **
** ($P \leq 0.01$).			

3. Concentration of serum prolactin indifferent period of pregnancy:

The results of current study that illustrate serum prolactin concentration after treatment group one (1.26 ± 0.03) showed significant difference ($p \leq 0.05$) as compared with group two (1.20 ± 0.01) . while the minimum level of prolactin concentration in group one before treatment(0.70 ± 0.01) and the minimum level of prolactin concentration in group two was (0.766 ± 0.03). the details presented in table (4-3).

Table (3) : Concentration of Prolactin during different period of pregnancy.

Time of collection	Group 1 treated with melatonin	Group 2 control	T-test
	Mean of Prolactin iu/L \pm SD	Mean of Prolactin iu/L \pm SD	
Before treatment	0.70 \pm 0.01	0.766 \pm 0.03	NS
After treatment	1.26 \pm 0.03	1.20 \pm 0.01	0.051 *
At estrus phase	1.7 \pm 0.06	1.43 \pm 0.02	0.228 *
15 day of pregnancy	2.10 \pm 0.03	2.54 \pm 0.04	0.263 *
30 th day of pregnancy	4.17 \pm 0.02	3.97 \pm 0.04	NS
45 th day of pregnancy	7.77 \pm 0.08	6.40 \pm 0.05	0.572 *
60 th day of pregnancy	10.06 \pm 0.08	8.60 \pm 0.03	1.054 *
75 th day of pregnancy	13.13 \pm 0.07	10.96 \pm 0.08	1.761 *
90 th day of pregnancy	16.27 \pm 0.14	13.80 \pm 0.11	2.085 *
LSD value	1.379 *	1.408 *	---
* ($P \leq 0.05$), NS: Non-Significant.			

4. Serum FSH concentration in different time and different group.

The results of current study that illustrate serum of FSH concentration . at estrous phase the group one (2.57 ± 0.04) showed significantly ($p \leq 0.05$) increased compared with group two (1.90 ± 0.01) . the details presented in table (4)

Table (4) : Concentration of FSH during different period

Time of collection	Group 1 treated with melatonin	Group 2 control	T-test
	Mean of FSH iu/L \pm SD	Mean of FSH iu/L \pm SD	
Before treatment	1.80 \pm 0.1	1.77 \pm 0.02	NS

After treatment	2.43 ± 0.06	1.73 ± 0.03	0.217 *
At estrus phase	2.57 ± 0.04	1.90 ± 0.01	0.336 *
15 day of pregnancy	0.60 ± 0.01	0.53 ± 0.01	0.0526 *
30th day of pregnancy	0.87 ± 0.01	0.70 ± 0.01	0.0822 *
45th day of pregnancy	0.53 ± 0.01	0.60 ± 0.01	0.0631 *
60th day of pregnancy	0.90 ± 0.01	0.63 ± 0.02	0.1327 *
75th day of pregnancy	0.63 ± 0.01	0.47 ± 0.01	0.094 *
90th day of pregnancy	0.80 ± 0.02	0.30 ± 0.01	0.2116 *
LSD value	0.2073 *	0.2167 *	---

* (P≤0.05), NS: Non-Significant.

5. Serum LH concentration in different times and different groups

The results of study that illustrate serum LH concentration . at estrous phase the group one (1.56 ± 0.03) showed significant ($p\leq 0.05$) compared with group two (0.01 ± 0.002) . The maximum level of LH concentration in group one in at estrous phase (1.47 ± 0.01) compared with group two in 30 day of pregnancy (0.046 ± 0.005) .while the minimal level of LH concentration in group one in 15 day of pregnancy (0.03 ± 0.004) compared with group two (0.03 ± 0.002) . the details presented in table (4).

Table (4): Concentration of LH during different period

Time of collection	Group 1 treated with melatonin	Group 2 control	T-test
	Mean of LH iu/L ± SD	Mean of LH iu/L ± SD	
Before treatment	1.43 ± 0.02	1.40 ± 0.01	NS
After treatment	1.50 ± 0.01	1.37 ± 0.02	0.0593 *
At estrus phase	1.56 ± 0.03	1.47 ± 0.01	0.061 *
15 day of pregnancy	0.03 ± 0.004	0.03 ± 0.002	NS
30th day of pregnancy	0.023 ± 0.004	0.046 ± 0.005	0.0126 *
45th day of pregnancy	0.026 ± 0.003	0.026 ± 0.003	NS
60th day of pregnancy	0.05 ± 0.004	0.023 ± 0.002	0.0133 *
75th day of pregnancy	0.026 ± 0.002	0.04 ± 0.003	0.0108 *
90th day of pregnancy	0.013 ± 0.002	0.02 ± 0.002	NS
LSD value	0.03275 *	0.03061 *	---

* (P≤0.05), NS: Non-Significant.

Discussion

The results in current study revealed that 12 (80 %) and 9 (60 %) doe in group one and two respectively were expressed estrous signs after estrous induction regimes , with significant difference ($p\leq 0.05$).The results of the present study indicated that the usage of melatonin implants to induction of an estrus goats showed higher significantly differences ($p\leq 0.01$) as compared with group one 3 , (20%). The results of the present study showed the effect melatonin on the duration of estrous phase / hours non-significantly. presented in table(1). The results agreement with results of goats observation increased the serum levels of luteinizing hormone (LH) and progesterone (Zarazaga *et al.* 2009; Abecia *et al.* 2002) . Exogenous melatonin administration increased the number of corpora luteum maybe dependent on an interaction between the time of melatonin treatment and the day length the goats have experienced before being treated with melatonin (7) The administration of - melatonin (implants) was responsible for an increase in the number of corpora luteum and follicles.(24) and other reported that The failure of ovulation of largest follicles could be a drive of a lack of sufficient LH stimulus. Some researcher recorded the follicles do not produce sufficient estrogen to induce an LH surge, which precedes ovulation, until suckling subsides, (McNeilly, 1997) . and another reported Suckling blocked the LH pulsatile secretion in the early postpartum, and thus the first LH wave. The impact however depends on the time of year (Garcia-Garcia, 2012). The results in table 3 agreement with (Karsch *et al.*, 1983). Which recorded that follicular growth may be a consequence of increased utilization of the circulating FSH, reasonably than increased secretion. While plasma LH levels did not significantly differ during the estrous cycle. Our results in table 3 prolactin

levels that peaked at the onset of estrus and increased during estrous period . Few studies have been reported on the FSH profiles in goats. The results of current study that illustrate serum of FSH concentration . at estrous phase the group one showed significantly ($p\leq 0.05$) increased compared with group two may be related to the follicular growth a significance of increased utilization of the FSH . (Bono et al., 1983).

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