

REPRODUCTIVE PERFORMANCE IN RESPONSE TO DIFFERENT HORMONAL TREATMENTS IN LOCAL GOATS

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ABSTRACT

To evaluate the effect of different hormonal treatments on reproductive performance of local goats, 60 adult does were synchronized by using sponges impregnated with 40 mg medroxy acetate (MAP) for 14 days. Following sponges withdrawal, the does were allocated randomly to four equal groups. The first group was served as control and intramuscularly injected with normal saline (T1). The does in group 2,3 and 4 were injected intramuscularly with 250 i.u hCG(T2) 400 i.u. eCG(T3) and 20 µg GnRH(T4), respectively. Results revealed that the highest estrus response was recorded in T2 (100%) followed by T4(93.3%), T1 (86.7%) and T3(73.3%). Fertility rate was significantly ($p<0.05$) higher in T4 (93.3%) and the lowest was found in T3 (66.7%). A significantly higher kidding rate (146.7%) and litter size (1.69) was recorded in T2. While the lowest kidding rats and litter size was recorded in T4 and T3, respectively.

Keywords: fertility; conception; prolificacy; sponges , does .

بامرني وآخرون

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استجابة الاداء التناسلي للماعز المحلي لمعاملات هرمونية مختلفة

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المستخلص

لتقويم تأثير معاملات هرمونية مختلفة في الاداء التناسلي للماعز المحلي تم توحيد الشبق ل 60 معزة بالغة باستخدام الاسفنجيات المهبلية الحاوية على 40 ملغم ميدروكسي اسيتيت لمدة 14 يوم . بعد سحب الاسفنجيات تم توزيع المعزات عشوئيا الى اربعة مجاميع متساوية اذ تم حقن المجموعة الاولى بمحلول الملح الفسيولوجي كسيطرة في حين تم حقن المجموعة الثانية ب 250 وحدة دولية ب كوندوترويين المشيمة البشري (hCG) والثالثة ب 400 وحدة دولية من هرمون مصل الفرس الحامل (eCG) والرابعة ب 20 مايكروغرام من الهرمون المحرر للغند (GnRH). تشير النتائج بان اعلى نسبة استجابة للشبق كانت لدى المجموعة الثانية (100%) تبعها الرابعة (93.3%) والاولى (86.7%) والثالثة (73.3%). تفوقت المجموعة الرابعة مغنوياً في نسبة الخصوبة (93.3%) على نظيراتها وكانت ادناها لدى المجموعة الثالثة (66.7%). كما تفوقت المجموعة الثانية على بقية المجاميع في معدل الولادات (146.7%) وعدد المواليد من البطن الواحد (1.69) في حين كانت ادنى معدل ولادات وعدد المواليد من البطن الواحد لدى المجموعة الرابعة والثالثة على التوالي .

الكلمات المفتاحية: خصوبة، اخصاب، الخصب، ماعز، هورمون ز.

INTRODUCTION

Goats are numerous and are important from a social and economical point of view in most semi-tropical and tropical areas. They are found in diverse ecological zones and all types of agricultural systems. These animals are very suitable to increase in general rate of animal production in these areas (24). The goats population in Iraq are estimated at 1.5 million heads (21), and are considered an important livestock and has significantly functions for meat and milk production especially under the systems prevailing in the country (34). The economic value of goats depends upon its productive and reproductive efficiency which determine the producing ability up to marketing or to breeding age (30) In goats, reproductive efficiency is always are considered to be the most vital factor particularly when the major emphasis is on meat production to ensure replacement, to provide surplus stock for sale or build up number and finally to ensure as high selection differential as possible (10). Estrus synchronization is a valuable management tool which has successfully employed to enhance reproductive efficiency (37). Estrus synchronization can be carried out by the conventional method, like alteration in the light exposure period, buck exposure and the use of hormonal treatments. Worldwide, the most common administration of progesterone administrated in goats via different routes (oral, injection, vaginal pessaries) (14,17,49). Synthetic Gonadotropin releasing hormone (GnRH) preparation, equine chorionic gonadotropin (eCG), human chorionic gonadotropin (hCG) and prostaglandin (PGF 2α) in different combination and regimen are used for estrus synchronization in ruminants (54). Moreover., it has been reported that the use of GnRH, hCG and eCG is effective in improving reproductive performance of goats (22,32,35,56). Thus the aim of the present work was to investigate the efficiency of different hormonal treatment (eCG, hCG and GnRH) on reproductive aspect of local goats.

MATERIALS AND METHODS

Location and duration of the experiment

This experiment was conducted at commercial farm located in Jom Jehany village, Summel

region, Duhok governorate during the period from 1-8-2020 to 15-5-2021.

Animals and management

A total of 60 mature healthy does of 3-4 years old and average 43kg in weight were used in the present work. At the start of the experiment, all does were weighted and identified using plastic ear tags. Also, all does were marked with different numbers by spraying color on both sides to facilitate detection of estrus and mating. Animals were allowed to graze on natural pasture during the day from 8:30 a.m to 5:00 p.m. All does have free access to water and trace mineral salt blocks. Also, does and bucks were drenched against the internal parasite and repeated 21 days later using Levazide forte and external parasite by using Cypervet 100 EC at the start of the experiment by dipping and vaccinated against common diseases, viral and bacterial diseases including Toxoplasmosis, Brucellosis, Foot and Mouth Disease (FMD).

Experimental treatments

During the breeding season (1st of September) does were randomly divided into four equal groups (15 does each). All does were synchronized by using sponges impregnated with 40 mg medroxyacetate (MAP)^a for 14 days. Following sponges withdrawn, the first group was served as control and intramuscularly injected with normal saline (0.9% NaCl) only (T1). The does in group two were intramuscularly injected with 250 IU hCG^b (T2). The third groups were injected intramuscularly with 400 IU eCG^c (T3), and the fourth group was injected intramuscularly with 20 μ g GnRH^d (T4).

Estrus detection and mating

After 24 hrs from withdrawal of sponges, two proven intact fertile bucks were introduced to each group separately for estrus detection and mating and the bucks were rotated among groups for a period of 5 days. After 21 days, non-mated goats were introduced again to the bucks for the 2nd time (6-10-2020) and 3rd time (27-10-2020). Does were observed visually for behavioral oestrus manifestation continuously using a recording camera. Progesterone level was measured at days 35 post-mating by sampling of blood through jugular vein puncture. The samples (5ml/animal) were collected at 9:00 am morning before grazing

and the blood were emptied in to sterile glass test tubes and then centrifuged (3000 RPM) for 15 minutes and the serum was separated by micropipette and emptied into eppendorf/micro-centrifuge plastic tubes and stored at -20°C until analyses to detect pregnancy by using Liaison Diasorin Kit^e

a (40 mg medroxyacetate (MAP) SPAIN).
 b hCG (Weser-HCG5000 IU,Germany).
 c *eCG (OVISER 5000 , SPAIN)
 d GnRH (Gestar, GnRh OVER,Argentina).
 e Progesterone Kit (Liaison DiaSorin kit, Germany).

Determination of reproductive parameters

Fertility percentage, conception, kidding, twinning rate, Prolificacy and bareness were calculated according to Alkass et al., (8) using the following equations:

Estrus response % = No. does exhibited estrus/ No. does exposed to buck X 100

Fertility rate % = No. does kidded / No. does exposed to buck X 100

Barrenness % = 100 - Fertility rate

Conception rate % = No. does kidded and aborted/ No. does exposed to buck X 100

Kidding rate % = No. kids born / No. does exposed to buck X 100

Twinning rate % = No. does with twin kids / No. does having birth X 100

Litter size % = No. kids at birth/ No. kidded does

Statistical analysis

Chi-square test was conducted to analyze the reproductive parameters by using SAS (47).

RESULTS AND DISCUSSION

Estrus response

In the current study, the results indicated that the highest estrus responses were induced when native does were treated with MAP impregnated sponges and hCG (100%), followed by does treated with GnRH (93.3 %), control (86.7%) and eCG (73.3%), with no significant differences ($p > 0.05$) among them was noticed (Table 1). Therefore, it seems that, a combination of progesterone plus hCG was successful in inducing estrus in all does treated. Similarly, it has been found that the use of hCG in goats has also successfully used to synchronize estrus in a cyclic goats or during anestrus season in combination with long or short-term progesterone administration (11,23,40). Also, Gonzalez-

Alvarez et al (26) demonstrated that estrus response was 100% in groups of goats treated with hCG, which are higher than previous study where treated females depicted 75% of estrus response (23), and they suggest that hCG represents a viable option to induce estrus during the out-off-season in goats. The estrus response of treated goats with GnRH was (93.3%) which is similar to 90% obtained by Cinar et al. (18) in hair goats, but it is higher than 50% recorded by Alkass et al (4) in Awassi ewes. Although, administration of intervaginal sponges such as FGA for 10-16 days followed by intramuscular injection of eCG appear to be the most practical method for estrus synchronization (25,48). However in the current investigation the lowest response was recorded in does treated with eCG (73.3%) which may be attributed to the effect of age, parity, nutrition, breed, treatment, protocol, location and management (36,53). This response is lower than the reports of Ungerfeld and Rubianes (52) in Polwarth ewes treated progesterone and 380 iu PMSG (95.9%). It is also lower than the 100% obtained by Dogan et al (20) in Saanen goats, the 100% recorded in Saanen and Nubian goats (44) and the 87% for Toggenburg goats (22). However, the response obtained herein is resemble (76.7%) to those obtained by Mutiga and Mukasa Mugerwa,(43)(75%). Ahmed et al, (3) (77%), and it is higher than the 65% reported by Greyling and Vander Nest (27).

Fertility and Conception rates

In the present investigation, fertility rates averaged 86.7, 86.7, 66.7 and 93.3 for does in T1, T2, T3 and T4, respectively, and the difference among them was significant ($p < 0.05$), whereas, the corresponding values for conception rates are 86.7, 100, 73.3 and 93.3% with no significant difference among them (Table 1). The fertility rate observed in this study was higher than those reported earlier in Iraqi goats raised on station condition (67.6-78.3%) (33) or under farm condition (77.27 and 80.72%) (7,10). However, it is lower than fertility rate (95%) recorded earlier by Alkass et al.(5). The positive effect of exogenous GnRH administration on fertility and conception rates recorded in the current work (93.3%) presumably induced the LH surge which in

turn may had promoted either ovulation or follicular atresia (31). Furthermore, in many studies having carried out (2,12,13,19,38) it has demonstrated that GnRH treatment applied until 12th day of gestation support luteal function and it has beneficial effects on embryonic development. Thus GnRH injection enhanced reproductive performance of ewes and does when injected at the time of mating (38). As previously mentioned that administration of intravaginal sponges followed by intramuscular injection of eCG appear to be the most practical method for estrus synchronization (48). However, the lowest fertility (66.7%) and conception rates (73.3%) was attained when does were treated with eCG are consistent with the previous reports by Baril et al.(15)(65%); Baril et al. (16), (49.5%) Ritar et al (45), (68.89) Hamra et al (28), (73%) but it is lower than those observed by Zaiem et al (55); Zebari (57), Mohamed Al Rez et al. (42), Alkass et al(6). However, the variation among these studies is due to different doses being used, difference in responsiveness of the ovaries to eCG (41), alteration in sperm transport within the female reproductive tract (39) or in the cleavage rate (1) may affect the dissimilarities among studies. It is worth to note that does treated only with the FGA had a reasonable fertility and conception rates (81.5%). The use of hCG in goats has been successfully used to synchronize estrus in acyclic goats in combination with long or short-term progestagen administration (23,40). In the current study, the fertility and conception rates of does treated with hCG were 86.7 and 100%, respectively. This indicate that a single

injection of hCG is necessary for triggering the ovarian activity of goats mediated through LH receptors that promote follicular growth and advanced follicular growth to ovulation (29). Similar, results have been reported by other workers(11,46).

Kidding rate and Prolificacy

It is known that litter size at birth is a combination of ovulation rate and embryo survival. In the present investigation, the average litter size in control, hCG, eCG and GnRH groups of does was 1.61, 1.69, 1.50 and 1.21, respectively and the difference among them was significant ($p<0.05$). The values obtained herein is higher than the values (1.15-1.19) reported by Alkass et al (7) and Alkass and Mayi(9) on goat maintained on commercial herds as well as the value of 1.33 observed by Juma et al (33) raised in state farm. This higher litter size was attributed mainly to use hormone in this experiment. Similarly, it has been demonstrated previously that litter size was increased as a result of hormones (11,15,18,45,51). In the current work, kidding rates were 140, 146.7, 100 and 113.3% for control and does treated with hCG, eCG and GnRH, respectively, and the differences among them was highly significant ($p<0.01$) (Table 1). These values are higher than those reported earlier (91.23-95.0%) by Alkass et al (5), Alkass et al (7) and Alkass and Mayi (9). Such higher kidding rate was mainly due to higher incidence of multiple births resulted from using hormones in this experiment. Similarly, Ugur Sen and Hassan Ouder (50) reported that kidding rates ranged between 129-165% in Saanen goats using FGA and 500 iu PMSG.

Table 1. Effect of hormonal treatments on reproductive performance of native goats.

Group/Treatment	Control T1	T2 hCG	T3 eCG	T4 GnRH	Chi-Square (χ^2)	P-value
No. of Does	15	15	15	15		
No. of Does exhibited estrus	13	15	11	14		
Estrus Response (%)	86.7	100	73.3	93.3	4.629 NS	0.0682
No. of does Kiddid	13	13	10	14		
Fertility rate (%)	86.7	86.7	66.7	93.3	6.719 *	0.0474
Barrenness (%)	13.3	13.3	33.3	6.7	6.719 *	0.0474
No. of does aborted	0	2	1	0		
Conception rate (%)	86.7	100	73.3	93.3	4.629 NS	0.0682
No. of kids at birth	21	22	15	17		
Litter size	1.61	1.69	1.50	1.21	8.509 *	0.0417
No. does with twin kids or triplet	7	7	4	3		
Twining rate %	53.8	53.8	40	21.42	7.911 *	0.0485
Kidding rate (%)	140	146.7	100	113.3	10.728 **	0.0008

* ($P\leq 0.05$). ** ($P\leq 0.01$).

NS: Non-Significantly.

CONCLUSION

For the present results, it can be concluded that hormones and particularly hCG is effective in improving the reproductive capacity of local goats. However further work is needed to use different protocols of hormones in an attempt to improve reproductive treats in goats.

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