

Effect of Different Doses PMSG on Estrus Synchronization and Fertility in Awassi Ewes Synchronized with Progesterone During the Transition Period

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Summary

The aim of the present study was to evaluate different of doses PMSG on estrus synchronization and fertility in Awassi ewes synchronized with progesterone during The transition period. A total of 92 ewes were used in this experiment. All ewes were treated with a vaginal sponge containing 30 mg fluorogestone acetate (FGA) inserted into the vagina of the ewes for 12 days. All animals were divided into four groups randomly and a single intramuscular (IM) dose of PMSG (group 1, 300 IU, n=21; group 2, 400 IU, n=27; group 3, 500 IU, n= 25), group 4 (n=19) was injected with 1 ml normal saline solution and as served control group at time of sponge removal. The interval between the withdrawal of the sponges and estrus was observed 40.82 ± 1.21 h, 40.20 ± 1.14 h, 38.7 ± 1.07 h and 41.79 ± 1.72 h in groups 1, 2, 3 and the control group, respectively. Estrus responses were similar in all groups (group 1, 81.0%; group 2, 92.6%; group 3, 92.0%; control group, 73.78%). There were no statistically significant differences ($P > 0.05$) between the treatment groups and the control group for the onset of estrus or estrus response. The duration of estrus was shorter in group 1, compared to the control group (24.9 ± 0.85 hr vs. 29.07 ± 1.31 hr), and that this difference was statistically significant ($P < 0.05$). Pregnancy rates were 82.35%, 80.0%, 82.60% and 78.5% in groups 1, 2, 3 and the control group, respectively. Lambing rates were obtained 100.0% among all the groups, or litter size (1.07 to 1.21) did not differ between the treatment groups and the control group. As a result, different doses of PMSG in Awassi ewes synchronized with progesterone during the transition period had similar effect on estrus synchronization and fertility parameters.

Keywords: *Awassi ewe, PMSG, Transition period*

Geçiş Döneminde Progesteron ile Senkronize Edilen İvesi Koyunlarda PMSG'nin Farklı Dozlarının Östrus Senkronizasyonu ve Fertilité Üzerine Etkisi

Özet

Sunulan çalışmada, geçiş döneminde progesteron ile senkronize edilen İvesi koyunlarda östrus senkronizasyonu ve fertilité üzerine PMSG'nin farklı dozlarının etkisinin değerlendirilmesi amaçlandı. Bu çalışmada toplam 92 baş İvesi koyun kullanıldı. Çalışmada yer alan koyunlara 30 mg fluorogestone acetate (FGA) içeren süngerler 12 gün süreyle intravaginal olarak yerleştirildi. Koyunlar rastgele 4 gruba ayrıldı ve süngerler çıkarıldıktan sonra grup 1'e (n=21) 300 IU; grup 2'ye (n=27) 400 IU; grup 3'e (n=25) 500 IU PMSG, grup 4'e (n=19) ise 1 ml serum fizyolojik intramuskuler yolla enjekte edilerek kontrol grubu olarak bırakıldı. Süngerler geri alındıktan sonra östruslar sırasıyla; grup 1, 2, 3 ve kontrol grubunda 40.82 ± 1.21 , 40.20 ± 1.14 , 38.7 ± 1.07 ve 41.79 ± 1.72 saatlerde görüldü. Östruslar; grup 1 de, %81.0; grup 2 de, %92.6; grup 3 de, %92.0 ve kontrol grubunda ise %73.7 olarak tüm gruplarda benzer oranlarda gözlemlendi. Östrus oranları ve östrusların görülme zamanı açısından PMSG grupları ile kontrol grubu arasında istatistiksel açıdan bir farkın olmadığı belirlendi. Östrus süresinin, kontrol grubu ile karşılaştırıldığında grup 1'de daha kısa sürdüğü (24.9 ± 0.85 ve 29.07 ± 1.31 saat) ve istatistiksel açıdan önemli olduğu belirlendi ($P < 0.05$). Gebelik oranları sırası ile grup 1, 2, 3 ve kontrol grubunda %82.35, %80.0, %82.60 ve %78.5 olarak elde edildi. Kuzulama oranı tüm gruplarda %100, gebelik başına düşen kuzu verimi 1.07 ile 1.21 aralıklarında belirlendi. Sonuç olarak, geçiş döneminde progesteron ile senkronize edilen İvesi koyunlara farklı dozlarda PMSG enjeksiyonlarının östrus senkronizasyonu ve fertilité parametrelerini eşit düzeyde etkilediği kanısına varılmıştır.

Anahtar sözcükler: *İvesi koyun, PMSG, Geçiş dönemi*



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INTRODUCTION

Estrus synchronization or the induction of estrus is a valuable management tool for increasing the pregnancy rate in ewes¹⁻³. Modern sheep husbandry has improved the efficiency of extensive production and controlled the reproductive process for intensive production⁴. The synchronization of estrus in ewes focuses on the manipulation of the estrus cycle⁵.

The fat-tailed Awassi breed is raised in Jordan⁶, Syria and neighbouring Middle Eastern countries, and it has been introduced into many other countries^{7,8}. It is also raised in Turkey along the border with Syria under the name Ivesi. For estrus synchronization or the induction of estrus in Awassi ewes, several protocols were accomplished with or without PMSG administration⁸⁻¹⁰.

Sponges impregnated with progesterone provide estrus synchronization by extending the luteal phase during the treatment period in ewes^{5,11}. Intravaginal sponges containing progesterone are one of the most commonly applied treatments for estrus synchronization in small ruminants during the breeding and non-breeding seasons. Sponges are usually inserted over periods of 12 to 14 days and are used together with PMSG, particularly out of season, at the time of sponge withdrawal or 48 h prior to sponge removal¹². It has been reported that PMSG can increase pregnancy and twinning rates in breeds characterized by low litter size¹³. However, there are many factors influencing the effect of PMSG, including the dose and administration time of PMSG¹⁴, and season¹⁵.

There were no study different doses of PMSG in Awassi ewes the transition period. Therefore, the present study was aimed at the investigation of the effects of different doses of PMSG on reproductive performance in Awassi ewes synchronized with progesterone during the transition period.

MATERIAL and METHODS

Location

The experiment was performed under natural conditions in early June in Sanliurfa province, located in the southeast of Turkey. This region is situated at 37°20'48"N latitude and 39°02'06"E longitude, and at an altitude of 518 m above sea level. A total of 92 Awassi ewes, 2-5 years of age and weighing 43-66 kg, were used in this study.

Treatment Schedule

A total of 92 Awassi ewes were allocated to four

groups. Intravaginal sponges (30 mg fluorogestone acetate, Chronogest®, grey sponges, Intervet-Turkey) were insert into vagina of the ewes for 12 days. In group 1 (n=21), group 2 (n=27) and group 3 (n=25) 300 IU, 400 IU and 500 IU of PMSG (Chorono-Gest/PMSG, Intervet International B.V., Boxmeer, Netherlands) was administered, respectively, at the time of sponge withdrawal. In the control group (n=19), ewes were injected with 1ml normal saline solution at sponge removal to act as untreated controls.

Estrus Detection

In order to determine the time of the onset, the end and the duration of estrus, all of the ewes were monitored every 8 h, from 12 to 120 h following sponge withdrawal with the aid of 11 teaser rams. The onset of estrus was confirmed by the passive ability of the ewes to stimulate the interest of the ram. Ewes exhibiting estrus mated naturally. The end of estrus was determined by the refusal of ewes to stand for the ram, in other words, their refusal to mate. The duration of estrus was determined by evaluating the movements or postures of the ewes.

The pregnancy of ewes was determined by trans-rectal ultrasonography using a real-time B-Mode ultrasound with linear-array transrectal probe (Pie Medical LC 100, Netherlands) on day 35 following the mating.

The following parameters were recorded:

Percentage of Animals in Estrus: Number of ewes showing estrus/Total treated ewes in each group x100

Interval to Onset of Estrus: Time from sponge removal to first mounting acceptance

Duration of Estrus: Time from first to last mounting acceptances

Pregnancy Rate: Number of pregnant ewes/Number of mated ewes in each group x100

Lambing Rate: Number of ewes lambing/Number of pregnant ewes in each group x100

Litter Size: Number of total lambs/Number of lambing ewes

Statistical Analysis

The onset and duration of estrus were statistically analyzed using analysis of variance (ANOVA). Estrus response and reproductive performance were analyzed using the chi-square test. The SPSS 10.0.1 software was used for all statistical analyses¹⁶. Differences were considered significant at a level of P<0.05.

RESULTS

The onset of estrus and the duration of estrus after the removal of the sponges are illustrated in *Fig. 1*. Furthermore, estrus response, pregnancy, lambing and fecundity rates are summarized in *Table 1*.

Mean intervals between the removal of sponges and estrus (\pm SEM) were 40.82 ± 1.21 h, 40.20 ± 1.14 h, 38.7 ± 1.07 h and 41.79 ± 1.72 h in groups 1, 2, 3 and the control group, respectively.

At the time of sponge removal, it was determined that, among the groups administered with different doses of PMSG, the duration of estrus was shorter in group 1, compared to the control group (24.9 ± 0.85 h vs. 29.07 ± 1.31 h), and that this difference was statistically significant ($P < 0.05$). There were no statistically significant differences ($P > 0.05$) between the treatment groups and the control group for the onset of estrus. Pregnancy rates were 82.35%, 80.0%, 82.60% and 78.5% in groups 1, 2, 3 and the control group, respectively. Pregnancy and lambing rates were similar to between the

treatment groups and the control group. The differences among all the groups were statistically insignificant. The mean litter size (1.07 vs. 1.21) did not differ between the treatment groups and the control group (*Table 1*).

DISCUSSION

The breeding season of Awassi ewes in south-eastern Anatolia usually lasts from July to November. However, the majority of ewes are bred between July and early September in this zone. The present study was performed at the beginning of the breeding season, in early June. Awassi ewes have a poor reproductive performance in Syria⁸ and south-eastern Anatolia. Progestagens or progesterone has been used for estrus induction during the non-breeding season and transition period^{5,17} with or without PMSG injection^{3,18,19}. Similarly, Karagiannidis et al.²⁰ reported that responses to different PMSG doses varied among various breeds.

In the present study, during the transition period, Awassi ewes were administered different doses of PMSG following a 12-day progesterone treatment. This protocol

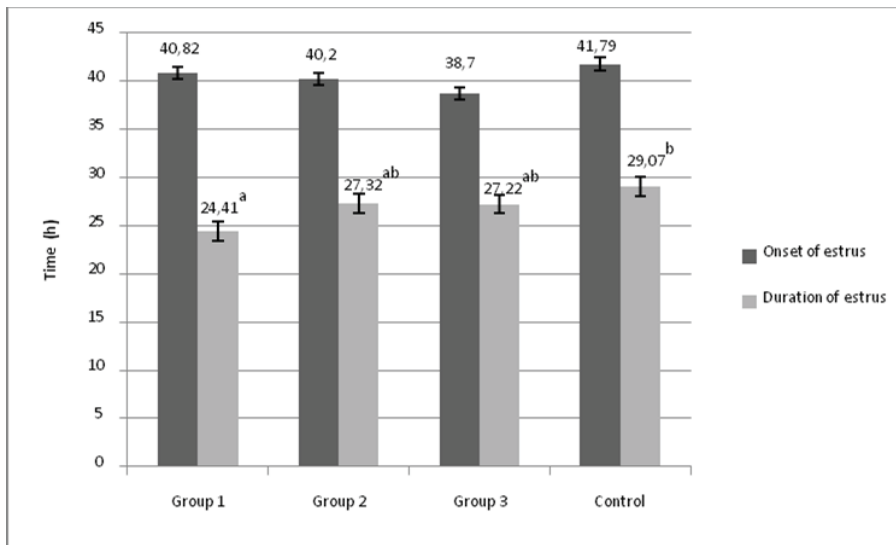


Fig 1. The onset of estrus and duration times of estrus after the removal of sponges, a, ab: $P < 0.05$.

Şekil 1. Süngerler alındıktan sonra östrusların başlama zamanı ve süresi

Table 1. Reproductive performance of ewes treated with different doses of PMSG following the withdrawal of intravaginal sponge

Tablo 1. Intravaginal süngerler alındıktan sonra koyunlarda PMSG' nin farklı doz uygulamalarının reproduktif performansları

Parameters	Group 1	Group 2	Group 3	Control
	300 IU (n=21)	400 IU (n=27)	500 IU (n=25)	Saline (n=19)
Estrus response (%)	81.0 (17/21)	92.6(25/27)	92 (23/25)	73.78 (14/19)
Pregnancy rate (%)	82.35 (14/17)	80.0 (20/25)	82.60 (19/23)	78.5 (11/14)
Lambing rate (%)	100 (14/14)	100 (20/20)	100.0 (19/19)	100.0 (11/11)
Litter Size (%)	1.07 (15/14)	1.20 (24/20)	1.21 (23/19)	1.09 (12/11)

produced similar results in groups 2 and 3 (92% and 92.6%), which were higher than those obtained in the controls and group 1. Luther et al.²¹ reported estrus rates of 86.7% and 75% in sheep, which were administered 400 IU of eCG after the administration of implants for 14 days and sponges for 12 days, during the breeding season. Ataman et al.²² reported to have obtained an estrus rate of 100% during the breeding season with injections of PGF_{2α} and 400 IU PMSG after long and short term progesterone treatment, and an estrus rate of 80% outside the breeding season, Ataman et al.²³ obtained significant difference in pregnancy and estrus response for FGA-30 than those of groups. Furthermore, Aköz et al.²⁴ reported to have obtained an estrus rate of 100% with PMSG injections of 300 and 700 IU, and estrus rates of 93.3% and 100% with injections of 40 mg FGA after a 7-day treatment with 30 mg of progesterone. They reported that the administration of 700 IU of PMSG was more effective in ewes outside the breeding season. Differences in the results obtained are considered to be related to the time of administration, duration of progesterone administration and climatic conditions.

In our study, we have shown that the use of progesterone sponges in combination with different doses of PMSG induced an interval, ranging from 38.7 to 41.7 h, between sponge removal and the onset of estrus. The time of onset of estrus was shorter than that reported by Ataman et al.²² and longer than that reported by Doğan and Nur²⁵. The results of the treatment and control groups demonstrated that the estrus response and interval to estrus were not affected statistically. The duration of estrus was found to vary significantly between group 1 (24.41±0.77) and the control group (29.07±1.3). The time of onset of estrus was shorter in ewes treated with progestagen and PMSG, compared to ewes treated with progesterone alone²⁶. The duration of estrus in the present study was shorter than that reported by Ustuner et al.²⁷ and longer than that reported by Zeleke et al.¹⁵. The results of the present study and those obtained by Zeleke et al.¹⁵ and Ustuner et al.²⁷ are in agreement.

In the present study, pregnancy and lambing rates were similar to between found to be the treatment groups and compared to the control group, but these results were not statistically significant between treatment and control group. Aköz et al.²⁴ observed no significant difference in pregnancy rates for different PMSG doses (300 IU, 500 IU and 700 IU). Koyuncu et al.²⁸ reported that the administration of 700 IU of PMSG increased multiple-birth rates and lambing rates. Zeleke et al.¹⁵ recorded a pregnancy rate of 75% and a lambing rate of 94.6% in ewes treated with sponges and 300 IU of PMSG. Also, Zarkawi et al.⁸ reported a higher lambing

rate (80%) in Awassi ewes, outside the breeding season, which were administered 600 IU of PMSG after 60 mg of medroxyprogesterone acetate (MAP), compared to ewes in the control group. Al-Merestani et al.⁹, in a study in which Syrian Awassi sheep were treated with intravaginal sponges combined with 400 IU of PMSG, reported a lambing rate of 78%. The results obtained by Zarkawi et al.⁸ and Al-Merestani et al.⁹ for lambing rate and fecundity were statistically important when PMSG injected groups were compared with animals that received no treatment. It was thought that fertility parameters could be affected by different treatment seasons such as anestrus, breeding or transition season. The mean litter size obtained in our study (1.07-1.2) was comparable with that (1.5-1.8) reported by Zarkawi et al.⁸ and Ataman et al.²²

Zarkawi et al.⁸ and Ustuner et al.²⁷ reported that PMSG administration improved the efficiency of synchronization of estrus and ovulation both during and outside the breeding season. However, the different PMSG doses (300 IU, 400 IU, and 500 IU of PMSG) did not affect fertility parameters during the transition period, when compared to the control group.

The results of this study suggest that the different doses of PMSG following a 12-day treatment with intravaginal sponges in Awassi ewes during the transition period had a uniform effect on the reproductive performance of the animals

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