

Synchronization of Estrus Using FGA and CIDR Intravaginal Pessaries During the Transition Period in Awassi Ewes

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Abstract: The objective of this study was to investigate the efficiency of synchronization using different progesterone treatments during transition period from the non-breeding to the natural breeding season. Thirty-four non-lactating Awassi ewes were randomly assigned to two groups, treated with fluorogestone acetate (FGA group, n = 19) or controlled internal drug release devices (CIDR group, n = 15) for 12 days. After pessary and sponges removal, all ewes received an intramuscular injection of 300 IU. eCG. There was no significant differences between treatments for ewes in estrus (FGA: 84.2%, CIDR: 86.6%). The onset of estrus from progestagen treatments, FGA and CIDR groups was (mean±S.D.) 45.00±1.00 and 36.00±3.40, respectively. Interval from the cessation of treatment to the onset of estrus was significantly ($p<0.05$) longer in FGA, compared to the CIDR. The duration of the induced estrus period did not differ significantly between in 2 treatment groups. Pregnancy rate did not differ ($p>0.05$) between FGA (52.63%) and CIDR (60.00%). As a result, Estrus synchronization with FGA and CIDR is found to be similar, although the onset time of estrus varies with the use of FGA or CIDR.

Key words: Ewes, progestagen, transition period, estrus induction

INTRODUCTION

Seasonal reproductive patterns of sheep are influenced by latitude, strain, age and nutrition (Hafez, 1952). In southeast Anatolia, sheep of Awassi is common. Controlled breeding of sheep involves artificial manipulations of ovarian activity with exogenous compounds. The most widely used procedures for synchronization and/or induction of estrus are 12-21 days of treatment with Fluorogestone Acetate (FGA), Medroxyprogesterone Acetate (MAP) -impregnated vaginal sponges, or intravaginal progesterone devices (CIDR) and intramuscular injection of Pregnant Mare Serum Gonadotrophin (PMSG) at the time of sponge removal during the breeding and non-breeding season (Ahmed *et al.*, 1998; Romano, 1996; Wildeus, 1999; Zarkawi *et al.*, 1999).

An intravaginal sponge impregnated with 60 mg Medroxyprogesterone Acetate (MAP) or 40 mg

Fluoroprogesterone Acetate (FGA) is main method (Kohno *et al.*, 2005). The Controlled Internal Drug Releasing (CIDR) device is an intravaginal pessary containing 300 mg progesterone was developed for goats and sheeps in New Zealand (Welch *et al.*, 1984). The Controlled Internal Drug Release (CIDR) devices have also been found to be effective in controlling estrus and ovulation in sheep (Ainsworth and Downey, 1986; Carlson *et al.*, 1989; Wheaton *et al.*, 1993). CIDR device acts similarly to that of the sponges. Inductions of ovulation with exogenous PMSG injections at the end of the progestagen treatment have resulted in satisfactory conception rates and prolificacy in small ruminants (Wildeus, 1999). These intravaginal sponges and devices have been applied worldwide in ewes (Wildeus, 1999) and acceptable pregnancy rates have been obtained. On the other hand, there are researches finding that one intravaginal device is higher to or lower to other. Crosby *et al.* (1988) reported that ewes synchronized with

progesterone had a lower lambing rate than ewes synchronized with FGA or MAP. Wilson and Maxwell (1989) found that pregnant ewes treated with FGA sponges were significantly higher than those treated with CIDR. On the other side, previous researcher (Fukui *et al.*, 1999; Hamra *et al.*, 1986; Wheaton *et al.*, 1993) found no differences in estrus synchronization and lambing rate after treatment between FGA and CIDR synchronized ewes. In ewes synchronized with progesterone or synthetic progestagen impregnated intravaginal sponge, effectiveness of methods depends on the absorption of an effective dose and the density of sponge (Lida *et al.*, 2004; Robinson *et al.*, 1968; Simonetti *et al.*, 2000). Intravaginal progesterone device and sponge was capable of inducing fertile ovulation in anestrus ewes as well as cycling animals (Wildeus, 1999). However, previous studies on estrus synchronization protocols with progestin based in ewes during transition period from the non-breeding to the natural breeding season are limited and this has precluded any conclusions on the preferred protocols in ewes.

This study was undertaken to compare the efficacy of 2 external sources of progestagens on estrus response, onset of induced estrus, estrus duration between intravaginal sponges impregnated with progestagens FGA and CIDR-G impregnated with natural progesterone during transition period from the non-breeding to the natural breeding season.

MATERIALS AND METHODS

The study was carried out from June to July of 2007 in Sanliurfa (37°07 N, 38°49 E), southeast region of Anatolia, thirty-four non-lactating Awassi ewes 2-5 years of age and weighing between 35-50 with good body conditions (BCS: 2.00 to 5.00) were used in this study. The ewes were allowed to graze on natural pasture 03.00 to 20.30 and kept overnight in pens. In addition to pasture grass, each ewe was received 250 g barley per day. Water and mineral licks were available *ad libitum*.

The ewes were randomly divided into two groups. Vaginal sponges containing 20 mg of flurogestone acetate (Chronogest® CR white sponges, Intervet, Turkey) were inserted into the vagina of ewes (n=19) in the FGA group. In the CIDR group, ewes (n=15) received intravaginal pessary containing 0.3 g of progesterone (CIDR-G, Inter Ag, Hamilton, New Zealand). Intravaginal sponges and device were left in place for 12 days in the 2 groups. All ewes received an intramuscular injection of 300 IU. eCG (Choronogest, PMSG, Intervet, Turkey) at the removal of intravaginal sponges and devices (the day of device removal: Day 0). Rams were introduced 6 h after

intravaginal progestagen device removal (1 rams per 5 ewes in each group) and the identification of ewes mated at every 6 h from 12-120 after ram introduction was made. The rams were withdrawn 120 h after introduction. The ewes were considered in estrus when they were mounted by the rams. Pregnant ewes were determined using the real-time B-mode ultrasound (Scanner LC 100 Vet, Pie Medical, Netherlands) with the 6-8 MHz linear-array transrectal probe on d 30 following the mating.

Estrus onset was defined as the time elapsed between intravaginal progestagen device and first accepted mount. Also, duration of estrus (When the ewe did not accept the ram during 2 consecutive observations, the end of estrus was noted.), pregnancy rate (number of pregnant females/number of mated females X100).

Statistical analysis contained t-test for testing differences in variable studied between treatments. Estrus response and pregnancy rate were analyzed by the Chi-square test. Differences were considered significant at a level of $p < 0.05$.

RESULTS AND DISCUSSION

The results in terms of estrus response for the within 120 h, time to onset and duration of the induced estrus and conception rates and pregnancy rates are gave in Table 1 and Fig. 1.

In the present study, a similar percentage of ewes exhibiting estrus were obtained from ewes after using both methods of estrus synchronization. However, the same intravaginal devices provided higher results (FGA, 91.5% and CIDR, 95.5%) when compared for estrus synchronization in anestrus ewes (Ungerfeld and Rubianes, 2002). Likewise, higher estrus responses (FGA, 90.0% and CIDR, 100%) have been reported by Fukui *et al.* (1999) in Suffolk and Suffolk-crossed ewes synchronized with FGA and CIDR in the breeding season. This disparity may be due to differences of variables, including month of year, breed of ewes, latitude and management.

Table 1: Percentage of animals in estrus, duration of estrus (h) and pregnancy rate in Awassi ewes which estrus was induced by FGA and CIDR-G plus eCG

Treatment group	n	Estrus response n/n (%)	Time to estrus onset mean±SE(h)	Duration mean±SE (h)	Pregnancy rate n/n (%)
FGA /eCG	19	84.21 (16/19) 86.67 (13/15)	45.00±1.00 ^a	18.00±0.89	10/19 (52.63) 9/15 (60.00)
CIDR-G/eCG	15	85.29 (13/15)	36.00±3.40 ^b	21.00±1.70	19/34 (55.88)
Total	34	(29/34)	40.85±1.85	19.38±0.95	

^{a,b}means in the same row, with different subscripts indicate a significant difference ($p < 0.05$)

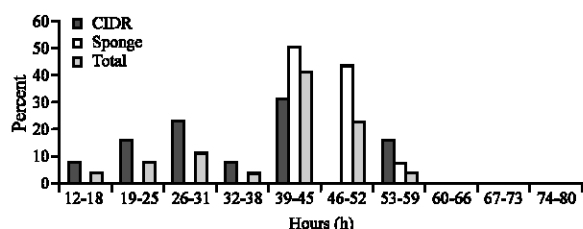


Fig. 1: Distribution of the onset of estrus after removal CIDR and FGA sponges

Results showed that the interval from intravaginal devices removal to the onset of estrus depend on the type of intravaginal devices in the ewes of Awassi during transition period. The onset time of estrus in ewes treated with CIDR was approximately 10 h earlier than that in ewes treated with FGA sponge. Similarly, Fukui *et al.* (1999) reported that ewes treated with CIDR (21.8 h) had a shorter time of estrus onset than Ewes treated with FGA sponge (31.2 h). As shown previous study (Daniel *et al.*, 2001; Fukui *et al.*, 1999) and this study, the earlier onset of estrus in ewes treated with CIDR may be related with an early preovulatory LH surge. In addition, this could be to the difference in rate of absorption and metabolism of each progestagen (Fukui *et al.*, 1999; Romano, 1996; Romano, 2004; Kohno *et al.*, 2005). The interval values obtained from both CIDR and FGA sponge in the present study longer than those reported by Fukui *et al.* (1999), Godfrey *et al.* (1999) and Kohno *et al.* (2005). These differences may be explained by the differences in breed, nutrition, season, location, climate and presence of male after intravaginal devices removal.

Similar estrus duration in ewes treated with FGA sponge (18.00 h) was found when compared to CIDR (21.00 h). Thus, the type of intravaginal device had no significant effect on the duration of the induced estrus period. These results are in agreement with those of Das *et al.* (2000), Zeleke *et al.* (2005) and Hashemi *et al.* (2006). However, the estrus duration in this study was lower than the 31.87 h reported by Hashemi *et al.* (2006), working with CIDR in natural breeding season.

For the pregnancy rate after natural mating, no significant differences were found between FGA and CIDR treatment in trial (52.63 and 60.00% for FGA sponges and CIDR). No significant differences in these traits were observed between ewes synchronized with FGA sponges and CIDR. The pregnancy rate for CIDR in this study was similar to rate (63.00%) obtained by Ungerfeld and Rubaines (2002-19) and slightly higher than the rate (44.40-55.60%) in other studies using CIDR (Daniel *et al.*, 2001; Fukui *et al.*, 1999; Godfrey *et al.*, 1999; Kohno *et al.*, 2005). Present results for FGA sponges in this trial were lower than those obtained by Ungerfeld and Rubenis (2002), Zeleke *et al.* (2005) and Luther *et al.*

(2007), but higher than those of Fukui *et al.* (1999) who recorded a pregnancy rate of 45.50% with FGA treated ewes. These differences are likely due to the variable number of ewes used and the application of different protocols.

CONCLUSION

The results of this study suggested that fertility was not different between ewes treated with the FGA or the CIDR in Awassi flock. In addition, the FGA or CIDR treatments can be applied to obtain satisfactory numbers of synchronized ewes for breeding during transition period from anestrus to breeding. However, the use of CIDR led to a shorter interval to onset of estrus than FGA sponges.

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