The effects of short-mid-long term intravaginal sponge application on reproductive performance of karacabey Merino ewes in the anestrous season

Seniz Öziş Altuçekiç*1 and M. Koyuncu1

Department of Animal Science, Faculty of Agriculture, Uludag University, Turkey
Received: 01-11-2016 Accepted: 12-10-2017 DOI: 10.18805/ijar.B-646

ABSTRACT
The aim of the present paper was to investigate the efficiency of different progestagen treatment methods in combination with Pregnant Mare Serum Gonadotrophin (PMSG) in Merino ewes outside the breeding season. A total of 78 ewes (2 to 4 years old) with a mean bodyweight of 58.4 kg and an average body condition score (BCS) of 3.5 were used in the trial. The ewes were randomly divided into 3 equal groups [n= 26]. Intravaginal progestagen sponges containing Fluorogestone Acetate (FGA; 30 mg) were inserted intravaginally for different periods (7_days: short-term; 10_days: mid-term, 14_days: long-term). In all cases, 500 IU PMSG was administered intramuscularly at sponge withdrawal. The oestrus response, lambing rate, multiple birth rate, fecundity and litter size were [65.4, 61.5, 18.8 %, 0.77 and 1.25] in the short-term group; [80.8, 88.5, 34.8 %, 1.31 and 1.48] in the mid-term group; and [96.2, 92.3, 62.5 %, 1.50 and 1.63] in the long-term group, respectively. Oestrus manifestation and multiple birth rate were greater in long-term than in mid- and short-term groups, whereas for lambing rate, fecundity and litter size, better results were obtained in long- and mid-term than in short-term protocol. In conclusion, in Merino ewes, oestrus synchronisation outside the breeding season with long and mid-term progestagen treatment was found to be more effective than short-term treatment.

Key words: Anestrous, Merino ewes, Oestrus synchronisation, Progesterone, Reproductive performance.

INTRODUCTION
Reproductive performance is an essential trait in sheep production enterprises, particularly when meat production from young animals is the chief aim. In general, the more intensive a meat production system is, the more desirable is the production of large numbers of young per breeding female (Kaymakci, 2006).

Increasing the productivity of Merino sheep by increasing lambing frequency and fecundity is considered important in the development of Merino sheep breeding. The induction of oestrus outside the breeding season is important in supplying meat throughout the year. Currently, the Merino is primarily used for mutton production; therefore improving the fertility performance of this breed is of paramount importance for the efficient use of its productive potential. The birth weight, daily weight gain, fleece yield, breeding age and litter size were 4.4 kg, 322 g, 3.6 kg, 10-14 months and 1.4 in the Merino, respectively (TAGEM, 2011). Some research has been performed on the hormonal application of the reproductive cycle of the Merino sheep, particularly oestrus synchronisation (Koyuncu et al., 2006). Among breeds, the Merino is considered to have low prolificacy. PMSG application increases the ovulation rate and thus helps increase both the chance of pregnancy and the rate of multiple births (Simonetti et al., 2000; Xiao et al., 2013).

Oestrus synchronisation provides aggregate births and thus saves labour. It also allows for meat, milk output and a uniform lamb presentation to the market in certain periods of the year (Whitley and Jackson, 2004).

Most of the methods used in oestrus synchronisation have been developed over the last decade. The most commonly used method is the mating of sheep, which occurs after a sponge that has stayed in the vagina for 12-14 days is removed and PMSG is applied in various dosages (Zarkawi, 2001; Husein and Hamit, 2005; Ustuner et al., 2007; Amer and Hazzaa, 2009; Almariol et al., 2011; Ozyurtlu et al., 2011). However, some studies have stated that the application of progesterone impregnated vaginal sponges for short periods such as 6-9 days is sufficient for successful oestrus synchronisation in sheep and goats (Fonseca et al., 2005; Dogan et al., 2008; Ozyurtlu et al., 2011; Machiya et al., 2012). Similarly, it is stated that short periods of sponge applications such as 5-7 days give successful results in oestrus initiation and synchronisation for sheep both during and out of mating season (Fitzgerald et al., 1985; Beck et al., 1993; Vinoles et al., 2001; Ataman et al., 2006).
Progesterone secretion for 2 days in sheep is required for the formation of normal luteal function whereas 4-5 days is required for the final stages of growing (McLeod and Haresign, 1984). In vaginal sponges, progesterone secretion decreases over time. The success of short periods of sponge application is explained by the sponge’s ability to allow progesterone secretion in a shorter time and higher concentration compared with longer sponge applications (Karaca et al., 2010).

The purpose of this study was to assess the effects of (FGA; 30 mg) sponge treatment applied in the vagina for 7, 10 and 14 days combined with PMSG on the reproductive performance of ewes outside the breeding season.

MATERIALS AND METHODS

Location: The study was conducted at the Application and Research Farm of the Agricultural Faculty. This farm is located in the humid lowland tropics, at an altitude of 100 m above sea level and at longitude 29 °E and latitude 40 °N (average minimum temperature 9.0 °C, average maximum temperature 20.2 °C). The average annual rainfall is 713.1 mm.

Treatment Schedule: A total of 78 ewes were used in the experiment. The body weights and body condition score (BCS) of these animals were recorded prior to the experiment. The ewes used in this experiment were 2 to 4 years old, weighed an average of 58.4 kg and had an average BCS of 3.5 on a scale from 0 (emaciated) to 5 (obese) (Romdhani et al., 2004). The ewes from all groups were kept in the same shed and kept as one flock while grazing. The ewes grazed on a pasture consisting of a mixture of common vetch (Vicia sativa L), Hungarian vetch (Vicia pannonica L), alfalfa (Medicago sativa) and sainfoin (Onobrychis sativa) mixtures. In addition, the ewes received 200 g of concentrate (wheat 75%, sunflower oilcake 23%, limestone 1.4%, salt 0.5% and premix 0.1%) / animal / day during the entire period of study. The animals were routinely drenched for fluke, roundworm and vaccinated against pasteurellosis and clostridia infections. Clean water was available ad libitum throughout the study period.

The effect of different lengths of progesterone administration (long-term: 14 days; middle-term: 10 days; short-term: 7 days) in combination with PMSG treatment was studied. The ewes were randomly divided into 3 equal groups (n=26). The groups were synchronised using 30 mg fluorogestone acetate (FGA) progestagen sponges (Chronogest, grey sponges, Intervet-Turkey) that were inserted intravaginally for different periods (7, 10, 14 days). At sponge withdrawal, 500 IU PMSG (Chorono-Gest/PMSG, Intervet International B.V., Boxmeer, Netherlands) was administered intramuscularly. Research on animals was conducted according to the institutional committee on animal use (protocol number: 2013-10/03).

After sponge withdrawal, ewes were kept in the presence of a 7 fertile Merino rams previously tested. Merino rams and ewes were kept together for three weeks during the month of January. In order to determine the time of the onset estrus, all of the ewes were monitored twice a day (7:00 a.m. and 07:00 p.m.) for a period of thirty minutes in each observation. The acceptance of male by the female was considered as onset of oestrus. Ewes exhibiting estrus were mated naturally.

The ewes lambed indoors and the lamb weights were recorded at birth. The birth weights of the male and female lambs were 4.0 and 3.7 kg, respectively. The lambs were weaned at an average age of two months and separated into gender groups.

The parameters calculated following the FGA sponge removal were oestrus response (percentage of ewes showing oestrus/total ewes treated); lambing rate (percentage of ewes lambing/total ewes mated); multiple birth rate (percentage of multiple lambing/total lambing); fecundity (percentage of lambs born/total ewes mated); litter size (number of lambs born/ewes lambing) (Table 1).

Analyses for the percentage data were conducted after square root of the arc sine transformation of the data. Significant differences among treatment means were determined using Duncan’s multiple range test (Minitab 2010).

RESULTS AND DISCUSSION

No sponges were lost during the insertion period. From the 78 ewes used in the trial, 63 (81.4%) exhibited overt signs of oestrus during the 48—72 h observation period. The incidence of oestrus response in the 7, 10 and 14-day groups (65.4, 80.8 and 96.2 %, respectively, p<0.05) was significantly higher in the 14-day group (Table 1). In this study, the observed oestrus response showed that a 14-day treatment can induce and synchronise oestrus in the most effective manner in Merino ewes. Treatment with PMSG has been shown to advance the intervals to oestrus in sheep (Killeen and Moore, 1970; Cardwell et al., 1998; Husein et al., 1998; Amer and Hazzaa, 2009). These effects are consistent with the gonadotropic action of PMSG in sheep. Ungerfeld and Rubianes (2002) reported that short-term

Table 1: Reproductive response in experimental ewes following FGA treatment for different time intervals

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Experimental groups</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7-days</td>
<td>10-days</td>
</tr>
<tr>
<td>Ewes exposed (n)</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Estrus induction (%)</td>
<td>65.4 ± 4</td>
<td>80.8 ± 4</td>
</tr>
<tr>
<td>Lambing rate (%)</td>
<td>61.5 ± 6</td>
<td>88.5 ± 4</td>
</tr>
<tr>
<td>Multiple birth rates (%)</td>
<td>18.8 ± 6</td>
<td>34.8 ± 4</td>
</tr>
<tr>
<td>Fecundity</td>
<td>0.77 ± 0.33</td>
<td>1.31 ± 0.33</td>
</tr>
<tr>
<td>Litter size</td>
<td>1.25 ± 0.45</td>
<td>1.48 ± 0.45</td>
</tr>
</tbody>
</table>

Values with different superscripts in the same row differ at 
(p<0.05)

Values with different superscripts in the same row differ at 
(p<0.01)
progestagen treatment was adequate to induce fertile oestrus. In their study, when anoestrous ewes were primed for 6 or 14 days with intravaginal sponge treatments, a difference was observed in the oestrus response. Such differences are likely to result from the age, fitness, care or feeding conditions of the ewes used in the studies or from racial and genetic characteristics. Ewes undertake reproductive activity depending on the season, which suggests that climate conditions might affect the determined results.

The oestrus induction rate, lambing rate, multiple birth rate, fecundity, litter size interval and interval from sponge withdrawal to the onset of oestrus are presented in The 14-days of sponge withdrawal had a significant effect on the oestrus induction (p<0.05) and multiple birth rates (p<0.01). Moreover the highest lambing, fecundity rates and litter size were recorded following sponge removal in the ewes treated with FGA for 14-days. The rates of total lambing and fecundity identified in this study are quite similar to the results obtained by Hill et al. (1998), Zeleke et al. (2005) and Ozuyurtlu et al. (2011) in Merino, Dorper and Awassi ewes, respectively. Conversely, Ataman et al. (2006) reported that during the breeding season of Akkaraman crossbred ewes, no difference was observed between the 7 and 12-day progestagen treatments in terms of fertility parameters. The lambing rate in the differently treated ewes was 61.5, 88.5 and 92.5%, respectively. The results of the present study are compatible with the study results of Santos et al. (2010) who demonstrated that short-term progestagen treatment does not improve the fertility of ewes, as was previously reported (Husein et al., 2007; Ustuner et al., 2007; Amer and Hazzaa, 2009). In the present study, the multiple birth rate and litter size in the treatment groups were lower than the values observed in hormone treated native ewes of Turkey (Askin, 1988; Koyuncu and Yerlikaya, 2007; Karaca et al., 2009).

CONCLUSION
As a result, it is observed that medium (10 days) and long (14 days) term application of vaginal sponge including FGA with PMSG combination had better results for fertility parameters than short term (7 days) application in anoestrous period. However, it could be concluded that to generate the multiple birth rates which is main purpose of sheep production, long term traditional method (14 days) had more advantage with the highest values in anoestrous period.

REFERENCES


TAGEM. (2011). Domestic Animal Genetic Resources in Turkey, Republic of Turkey Ministry of Food Agriculture and Livestock General Directorate of Agricultural Research and Policy.


