SYNCHRONIZATION OF OESTRUS IN HAMDANI EWES: THE USE OF DIFFERENT PMSG DOSES

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Received for publication January 14, 2005.

Abstract

The experiment was performed on 130 Hamdani ewes and 12 Dorset rams were used. The ewes were randomly divided into 4 groups. Intra-vaginal sponges, containing 40 mg of FGA, were left in the vagina of groups 1, 2, and 3 for 14 d. Immediately after removal of the sponges, PMSG hormones at the doses of 500 IU in group 1, 600 IU in group 2, and 750 IU in group 3 were administered intramuscularly. The group 4 served as control. Animals in groups 1, 2, and 3 were inseminated with 0.25 cm³ of fresh semen 72 and 96 h after PMSG administrations. Ewes in the control group were artificially inseminated during their spontaneous oestrus period. The percentages of ewes showing oestrus in the first 3 groups and control were determined as 100% and 97.05%, respectively. The conception rates in groups 1, 2, 3, and 4 were found as 90.62%, 93.75%, 100% and 79.4%, respectively. The conception rate was higher in groups 2 and 3 than in control and in group 3 than in groups 1 and 2 (P<0.05). The mean litter size in groups 1, 2, 3 and 4 were 1.06±0.09, 1.25±0.11, 1.40±0.12 and 0.88±0.09, respectively. The mean litter size in groups 2 and 3 was higher (P<0.05) than in group 4. The gestation period in groups 1, 2, 3, and 4 was 152±1.89, 151±1.33, 149±0.95, and 160±2.95 days, respectively. A significant difference (P<0.05) between 4 groups with regard to the gestation period was found. It was concluded that FGA and PMSG administration in the Hamdani ewes in the breeding season may be useful to condense oestrus and parturition and in order to increase pregnancy rate.

Key words: Hamdani ewe, progestogens, PMSG, reproductive performance.

Sheep are polyoestrous animals dependent on seasons in terms of features of breeding (11, 20). Breeding season of sheep shows regional changes. The breeding oestrus term in Turkey is the end of summer and months of fall, when daytime begins to shorten and sunlight begins to reduce its effectiveness. When circumstances of seasons are kept in view, the best suitable time for servicing and mating is the period from October to December (20).

To increase fertility in sheep and thus to benefit more from facilities, melatone, PGF$_2$α and progestogens are used to stimulate and synchronize oestrus. Progestogens can be used alone or with FSH and PMSG (11). Alaçam et al. (2) have put forward that the ovarian activity in sheep, which are in breeding season and in anoestrous term, can be initiated at a rate of 80% following application of vaginal sponges containing progesterone and that application of PMSG can be effective to initiate the oestrus earlier than in control animals after the sponges were taken out.

Some researchers (1, 16, 19) reported varying extents of oestrus and pregnancy rates, using different doses of FGA given intravaginally and PMSG administered via injection to ewes in the breeding season. Miljkovic et al. (19) reported that oestrus and pregnancy occurred in 90% and 85% of animals, respectively. Ainsworth and Wolynetz (1) and Langford (16) have obtained pregnancy rates of 98% and oestrus of 76%.

Following the application of intra-vaginal sponges containing 30-40 mg of FGA for 12-14 d, administration of 500 IU of PMSG to the sheep in mating season resulted in ratios of oestrus and pregnancy of 80% and 95% (14), respectively. Langford et al. (17) reported 87% oestrus rates after administration of 500 IU of PMSG in sheep treated in mating season with 40 mg of FGA in order to synchronize oestrus, compared to the oestrus rate of 48% in the control group. Intramuscular administration of 400 IU and 500-700 IU of PMSG at day when intravaginally applied sponges were removed increased the ratio of ovulation and twinning (4, 9).

According to some studies (13, 21), it is suggested that there are differences in terms of pregnancy period between sheep treated with progestagen-PMSG and sheep used as control.

There is no information regarding synchronization efficiency and fertility induced by administration of hormones in Hamdani ewes during breeding and anoestrous season. This aspect requires further researches as the PMSG+FGA treatment in Hamdani ewes during breeding season could be different. Thus, the purpose of this study was to
investigate the influences of intravaginally applied FGA and intramuscularly injected different doses of PMSG on pregnancy period, litter size, pregnancy rate, and oestrus synchronization in Hamdani sheep in mating season.

Material and Methods

Animals and study site. One hundred and thirty Hamdani breed ewes, three-year-old (average body weight 70-75 kg), which previously had at least one pregnancy, and 12 3-year-old Dorset rams were used for this study. The experiment was conducted between 15 October and 15 December, 1994, at the Department of Zootechnique, Faculty of Veterinary Medicine, Y.Y. University in Van, in the Eastern Anatolia province of the Republic of Turkey. The site is situated at an altitude of 1110 m above sea level.

Progestagen sponge and PMSG treatment. Animals were randomly divided into 4 groups. Groups 1, 2, and 3 received intra-vaginal sponges containing 40 mg of FGA (SYNCHRO-PART sponge, Sanofi) for 14 d. At withdrawal of the sponges on day 14, the ewes were given intramuscularly 500 (group 1, n=32), 600 (group 2, n=32), and 750 (group 3, n=32) IU of PMSG (SYNCHRO-PART PMSG, Sanofi). Group 4 (n=34) served as control.

Artificial insemination procedures. Oestrus was determined with a teaser ram in all groups. Ewes which showed oestrus were artificially inseminated. The was semen collected from fertile rams with the use of the artificial vagina. All the ewes were inseminated with 0.25 cm³ of diluted fresh semen with 80% motility of spermatozoa using an insemination pipette and speculum.

Data analysis: Two months after the insemination, conception rates of animals of all groups were checked by transabdomial ultrasonography, using B-mode diagnostic ultrasound scanner (100 Falco, Pie Medical Application Manual, Equipment B.V., Maastricht, Netherland). The numbers of lambs born per ewe were recorded daily during lambing. Fertility was monitored in terms of conception rate (percentage of ewes lambing/ewes inseminated) and mean litter size (lambs born/ ewes inseminated).

Pregnancy rates of the groups and litter size were compared by chi-square test, gestation period was compared by variance analysis (ANOVA) (12)

Results

Effects of FGA vaginal sponge which used to synchronize oestrus and different doses of PMSG on fertility parameters were presented in Table 1. The rates of oestrus in groups 1, 2, and 3 which received different doses of PMSG and in group 4 were found to be 100 and 97.05%, respectively. The conception rates in groups 1, 2, 3, and 4 were 90.62%, 93.75%, 100%, and 79.41%, respectively.

The conception rates in groups 2 and 3 were higher than those in group 4 (P<0.05) and the conception rate in group 3 was higher than those in groups 1 and 2 (P<0.05). There was no significant difference between groups 1 and 4 (P>0.05). The mean litter size in groups 1, 2, 3, and 4 were estimated to be 1.06±0.09, 1.25±0.11, 1.40±0.12, and 0.88±0.09, respectively. The mean litter size in groups 2 and 3 were higher than in group 4, however, there were no significant differences between the groups. Gestation periods of the animals in groups 1, 2, 3, and 4 were found to be 152±1.89, 151±1.33, 149±0.95, and 160±2.95 d, respectively. There were significant differences between the treated groups and also between the treated groups and the control group (P<0.05).

Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>500 IU</th>
<th>600 IU</th>
<th>750 IU</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of ewes</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td>Oestrus response (%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>97.05</td>
</tr>
<tr>
<td>Pregnancy rate (%)</td>
<td>90.62 bc</td>
<td>93.75 b</td>
<td>100a</td>
<td>79.41c</td>
</tr>
<tr>
<td>Singletons born/ewe</td>
<td>25</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Twins born/ewe</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Triplets born/ewe</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Litter size (mean±S.E.)</td>
<td>1.06±0.09 ab</td>
<td>1.25±0.11 a</td>
<td>1.40±0.12a</td>
<td>0.88±0.09b</td>
</tr>
<tr>
<td>Gestation period (d)</td>
<td>152±1.89b</td>
<td>151±1.33c</td>
<td>149±0.95d</td>
<td>160±2.95a</td>
</tr>
</tbody>
</table>

a,b,c,d : Means in the same row with different superscripts differ significantly (P<0.05)
Discussion

Progestogens and PGF$_2$α or analogues were used in order to condense parturition and oestrus of the ewes in the breeding season. Hormones such as GnRH, PMSG, FSH, and LH may be used to increase pregnancy rate and numbers of lambs (20).

Injection of 500 IU of PMSG following the treatment of ewes in the breeding season with vaginal sponges containing 30-40 mg of FGA resulted in 90% and 85% oestrous and conception rates, respectively (19). Pregnancy rates in ewes receiving the same dose of PMSG and FGA were higher than in the controls, but there was not significant effect on oestrus rate (6). In the present study, the percentages of oestrus and conception were 100% and 90.62% in the group 1. The oestrus rate of this group was consistent with that reported by some other researchers, whereas the conception rate was higher than the reported one (6). The conception rate was comparable to those reported by Miljkovic et al. (19). The different reproductive performance may be associated with using animals of different breeds and age, nutritional factors or type of insemination.

In the presented study, the percentages of oestrus and pregnancy rates in group 2 given 600 IU of PMSG were determined as 100% and 93.75%, respectively. The oestrus response rate was similar to the previous findings of Krajnovic et al. (15), Gokçen et al. (7), Domingues Fdez-Tejerina et al. (5) regarding the animals given same dose of PMSG and FGA. Pregnancy rate was similar to that reported by Horoz et al. (13), but lower than that by Krajnovic et al. (15), whereas higher than that by Domingues Fdez-Tejerina et al. (5) and Gokçen et al. (7). The differences reported by different researchers on pregnancy and oestrus response rate can be explained by the differences in body condition, breed, and management systems.

It was reported that percentage of oestrus and pregnancy rates in ewes treated with 30 mg of Cronolone (FGA) + 700 IU of PMSG were 90% and 76.4% (23) and in ewes given 40 mg of FGA+750 IU of PMSG were 100% and 96%, respectively (10). It is emphasized that all the ewes exhibited oestrus within 5 d after treatment with 60 mg of MAP+750 IU of PMSG (3). In the present study, both oestrus response and pregnancy rates in group 3 given 750 IU of PMSG were 100%. The oestrus rate was similar to the results of some researchers (7, 10), but higher than that reported by Gonzalez Lopez et al. (9). Pregnancy rate was in agreement with that observed by Gulyuz and Kozat (10), but higher than that found by Fukui et al. (7).

The conception rate in groups 2 and 3 was higher than that in group 4 (P<0.05) and the conception rate in group 3 was higher than that in groups 1 and 2 (P<0.05). Pregnancy rate in ewes receiving PMSG after sponge withdrawal was higher than in the control group. However, oestrous response did not differ significantly between control and treated groups (24). These results were in agreement with those reported by Zeleke et al. (24) and Dumitrescu et al. (6).

It was pointed out that administration of PMSG increased the number of follicles and therefore raised the twinning and triplet rates (10). Toteda et al. (22) reported 1.66 and 1.11 the mean litter size in ewes given 400 IU PMSG and control group, respectively. Cruz et al. (4) demonstrated that there was difference between the group treated with 300 IU of PMSG (2.1) and the control group (1.63) in mean litter size. However, Horoz et al. (13) observed no significant difference between control group (1.43) and group treated with 600 IU of PMSG (1.44). In the presented study, the mean litter size for groups 1, 2, 3, and 4 was found as 1.06±0.09, 1.25±0.11, 1.40±0.12, and 0.88±0.09, respectively. There was no significant difference between group 4 and group 1. However, the mean litter size in groups 2 and 3 was higher than in the control group (P<0.05) and increased depending on increasing PMSG dose. These results are consistent with those reported by some researchers (4, 22) with regard to effect of administered PMSG on litter size. The mean litter size obtained in group 2 and 3 was in agreement with that reported by Zeleke et al. (24). That for the control group was very similar to the results of Toteda et al. (22), but lower than the results obtained by Cruz et al. (4) and Horoz et al. (13).

Safranski et al. (21) reported that pregnancy period in control ewes and ewes treated with melengestrol acetate (MGA) + PG-600 (400 IU of PMSG+200 IU of HCG) was 163.8±4.9 and 157.±2.8 d, respectively. Horoz et al. (13) reported that gestation period in control Kivircik ewes and those treated with medroxyprogesterone+PMSG was 164±12.03 and 155±7.33 d, respectively. It was found that average pregnancy period in ewes given FGA+ PMSG was 147.53 (ranging from144 to 152 d) (5) and in ewes inseminated in breeding season the period was 145±0.31 d (18). In our study, gestation period was 152±1.89, 151±1.33, 149±0.95, and 160±2.95 d in groups 1, 2, 3, and 4, respectively. It was seen that with regard to gestation period there were significant differences both between the treated and control groups and also among treated groups (P<0.05). These results are consistent with the results of some other authors (13, 21), but, seem to be higher than those reported by Domingues Fdez-Tajerina et al. (5) and Mekonnen et al. (18).

In conclusion, administration of progestogens (FGA), using intravaginal sponges, and PMSG to Hamdani ewes in the breeding season appear to be effective in the synchronization of oestrus and parturition and in increasing mean litter size and rates of pregnancy.

References


