Comparison of fluorgestone and medroxyprogesterone intravaginal sponges for oestrus synchronization in Saanen does during the transition period

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Abstract

The efficiency of medroxyprogesterone acetate (MAP) and fluorogestone acetate (FGA) sponges for synchronizing oestrus in lactating Saanen goats was investigated during the transition from non-breeding to natural breeding season. Does were treated for 11 days with 60 mg MAP (n=19) or 40 mg FGA (n=24) sponges. All does received intramuscular injections of 750 IU pregnant mare serum gonadotrophin (PMSG) and 125 µg cloprostenol (PGF$_2\alpha$) 48 h prior to sponge removal. Cervical artificial insemination (AI) with fresh diluted semen was performed at a fixed time (36 and 48 h) followed progestagen withdrawal. The two progestagen treatments showed no significant difference in oestrous response (100% both for MAP and FGA groups), time to the onset (15.8±09 and 15.0±06 h for the MAP and FGA groups, respectively), duration (30.5±1.9 and 34.0±1.4 h for MAP and FGA, respectively) and cessation (42.32±1.6 and 43.25±1.3 h for MAP and FGA, respectively) of the induced oestrus period. No significant difference was observed with respect to pregnancy rates determined at the 53rd day after AI (52.6 and 50.0% for MAP and FGA, respectively). These dates indicate that the use of MAP and FGA intravaginal progestagen treatments are equally efficient in synchronizing oestrus in lactating goats during the transition from the non-breeding to the natural breeding season.

Introduction

The majority of goat breeds shows seasonality in their reproductive activities (Chemineau *et al.,* 1992). Therefore, synchronization of oestrus is an important management tool that has been used as an aid for artificial insemination (AI) and to reduce seasonal effects in the reproduction of dairy goats (Freitas *et al.,* 1997). In order to achieve this goal, progesterone or a progestagen analogue is usually used to synchronize oestrus in goats during the breeding and non-breeding season (Ak *et al.,* 1998). Both progesterone and its analogues have an inhibitory effect in the release of luteinizing hormone (LH) from the anterior pituitary so that the endocrine events that influence the maturation of the ovarian preovulatory follicles and their later ovulation are suppressed. Hence, following withdrawal of progesterone, oestrus and ovulation occur at a predictable period of time (Bretzlaff, 1997; Leboeuf *et al.,* 1998). Worldwide, the most common route of application of progestagens in goats is intravaginal (Bretzlaff, 1997). Two of the types of intravaginal sponges (pessaries) commonly used for synchronization and/or induction of oestrus in does are medroxyprogesterone acetate (MAP) and fluorogestone acetate (FGA) (Baril *et al.,* 1993; Romano, 1996; Ak *et al.,* 1998; Romano, 1998; Motlomelo *et al.,* 2002). Even though some studies have found these two progestagens to be equally effective in the induction of oestrus, ovulation and fertility (Gordon, 1975; Smith *et al.,* 1981), some researchers have favoured fluorogestone acetate (Boland *et al.,* 1978; Alifakiotis *et al.,* 1982).

Pregnant mare serum gonadotrophin (PMSG) administration with follicle stimulating hormone (FSH) and (LH) activity 48 h before or at progestagen withdrawal have been shown to stimulate follicular growth in both anoestrous and cycling goats and affect the time of ovulation (Bretzlaff, 1997; Leboeuf *et al.,* 1998). Pregnant mare serum gonadotrophin is generally administered at the time of progestagens removal during the breeding season (Motlomelo *et al.,* 2002). During the non-breeding season, PMSG is administered 48 h prior to progestagen removal (Baril *et al.,* 1993). At the same time the use of the synthetic prostaglandin F$_{2\alpha}$, analogue, cloptostenol, causes luteolysis in does having a functional corpus luteum at the end of the treatment (Baril *et al.,* 1993; Bretzlaff, 1997; Leboeuf *et al.,* 1998; Motlomelo *et al.,* 2002).

The objective of the present study was to compare the efficiency of MAP and FGA in synchronizing oestrus in lactating Saanen goats during the transition period from non-breeding to natural breeding season and compare the fertility rates obtained following AI at the induced oestrus.

Materials and Methods

The study was carried out at a farm located in Balikesir (latitude 39° 06′ and 40° 39′ N, longitude 26° 39′ and 28°58′ E, altitude 139 m) in western Turkey during June (the transition from non-breeding to natural breeding season in the region) under natural lighting. Forty-three lactating Saanen does two to five years of age and weighing between 35 to 85 kg with good body conditions (BCS: 2.00 to 5.00) were used in this study. The does were allowed to graze on natural pasture from 07:30 to 19:30 and kept overnight in pens. In addition, does were fed 350 g of a balanced concentrate/doe/day. A mineral lick and water was available *ad libitum*. All lactating does were machine-milked once a day at 20:00. The management of the does did not change throughout the entire experimental period.

The experimental does were divided into two groups according to age, milk yield and body weight. Oestrus was synchronized with 60 mg MAP (n = 24,Vetimex, Bladel, Netherlands) or 40 mg FGA (n = 19, Intervet, Netherlands) intravaginal sponges. The sponges were left *in situ* for 11 days. All goats also received an intramuscular injection of 750 IU PMSG (Intervet, Netherlands) and 125 µg of cloprostenol (estroPLAN, Parnell Laboratories, Austria) 48 h prior to progestagen withdrawal. Oestrus was detected with the aid of teaser bucks every six hours from 12 to 60 h following progestagen withdrawal. The male considered the does in oestrous when they allowed mounting. Oestrus duration was defined as the time elapsed between the first and last accepted mount within the same oestrus period. Oestrus cessation was defined as the time elapsed between sponge removal and last accepted mount within the same oestrous period.

One Saanen buck of proven fertility was used for semen collection in order to minimize the effect of buck variation. The semen was collected by artificial vagina in the presence of a doe in oestrus. During collection and examination the semen was protected from temperature shock. Each ejaculate was immediately evaluated for volume, wave motility and concentration. Only ejaculates with a volume higher than 0.5 mL and good wave motility were used. The volume was recorded from the collection tube, which was graduated in 0.1 mL divisions and the motility was assessed by depositing a drop of semen on a glass slide and examining it on a warm stage (35 °C) under the microscope (x40). The semen sample was scored using a scale ranging from 0 (no wave movement) to 5 (extreme wave movement). Only ejaculates with scores of 3 and higher were used. The semen was diluted to a sperm concentration of 600×10^6 motile cells/mL after being counted with the aid of a haemocytometer. A one-step dilution was performed at 30 °C with the addition of sterilized cow skim milk containing 1000 IU sodium G penicillin and 1000 µg/mL dihydrostreptomycine sulphate. The diluted semen was cooled to 5 °C over a two hour period and kept at this temperature until insemination. Each doe (whether in oestrus or not) was inseminated intracervically twice at 36 and 48 h following sponge withdrawal, with a 0.25 mL straw containing 150 million spermatozoa. All does were tested for pregnancy 53 days after AI with the aid of a trans-abdominal ultrasonic scanning apparatus.

Oestrous response, onset of oestrus, duration of oestrus, cessation of oestrus and pregnancy rates were compared between groups using the Mann-Whitney U test. The 95% significance level was noted. The SPSS 10.0 software was used for all statistical analyses.

Results and Discussion

The oestrous response and pregnancy rate following oestrous synchronization and fixed time AI are set out in Table 1. All does in both treatment groups showed oestrus after sponge removal. The mean interval from sponge withdrawal to onset of oestrus was 15.8±0.9 and 15.0±0.6 h for the MAP and FGA groups, respectively. Oestrus duration was 30.5±1.9 and 34.0±1.4 h for the MAP and FGA groups, respectively. Oestrus cessation occurred at 42.32±1.6 and 43.25±1.3 h following sponge withdrawal for the same groups, respectively. Pregnancy rates at day 53 after AI for the MAP and FGA groups were 52.63 and 50.0%, respectively. None of these differences were significant, as demonstrated in Table 1.

Table 1 Response of Saanen does to oestrus synchronization with medroxyprogesterone acetate (MAP) and fluorogestone acetate (FGA) and artificial insemination

Treatment group	No. of does (n)	Oestrous response*				Pregnancy rate* (%)
		(%)	Onset Mean± s.e. (h)	Duration Mean±s.e. (h)	Cessation Mean±s.e. (h)	
MAP	19	100	15.8±0.9	30.5±1.9	42.32±1.6	52.63
FGA	24	100	15.0±0.6	34.0±1.4	43.25±1.3	50.0
Total	43	100	15.4±0.5	32.5±1.2	42.8±1.0	51.16

*Within columns differences were not significantly different

The two types of progestagens used in this trial were equally efficient in synchronizing oestrus in does. Similar findings were observed by Freitas *et al*. (1996b; 1997) and Motlomelo *et al*. (2002). On the other hand, the oestrus response obtained in this study was higher than the 73.5% reported by Greyling & Van der Nest (2000), using intravaginal MAP progestagen sponges.

Researchers have reported the onset of oestrus to occur within 6-120 h following progestagen withdrawal (Freitas *et al.,* 1996a; Romano, 1998; Greyling & Van der Nest, 2000). In this study, the overall mean interval to onset of oestrus following progestagen removal was 15.4±0.5 h and was not significantly different between the MAP and the FGA groups (Table 1). However, this interval was relatively shorter than those reported by Freitas *et al.* (1996a,b), Romano (1996), Freitas *et al.* (1997), Romano (1998), Ak *et al*. (1998), Greyling and Van der Nest (2000) and Motlomelo *et al.* (2002) in does. These differences may be explained by the differences in breed, lactation**,** nutrition, season, use of gonadotrophins, presence of females in pro-oestrus/oestrus and presence of the male after sponge removal that are known to influence this parameter (Doney *et al.,* 1973; Greyling & Van Niekerk, 1990; Mani *et al.,* 1992; Romano, 1998; Ahmed *et al.,* 1998; Romano, 2002).

Longer oestrus duration in does treated with FGA sponges (34.0±1.4 h) was recorded when compared to MAP sponges (30.5±1.9 h). Type of progestagen thus had no significant effect on the duration of the induced oestrus period. The mean duration of the induced oestrus (32.5±1.2 h) obtained in this study is in line with that reported by Romano (1996), Geyling & Van der Nest (2000) and Motlomelo *et al.* (2002).

The overall mean interval from sponge withdrawal to cessation of oestrus was 42.8±1.0 h and no difference was observed for mean time to cessation of oestrus between the treatment groups. This is in agreement with data obtained by Freitas *et al.* (1996a) and Freitas *et al.* (1997), but was shorter than the periods reported by Baril *et al.* (1993), Romano (1998) and Greyling & Van der Nest (2000). These differences may be due to the different techniques used in these studies.

None of the two progestagen treatments showed any significant advantage over the other with respect to conception rate (52.63 and 50.0% for MAP and FGA groups, respectively). The overall pregnancy rate at 53 days following AI for all does in this study was 51.2%. This is similar to the result reported by Motlomelo *et al.* (2002) and lower than that reported by Freitas *et al.* (1996a), Romano (1996) and Greyling & Van der Nest (2000)**.** In the present study, AI in synchronized does was carried out at a fixed time following sponge withdrawal, which could imply that the difference in the conception rate could be due to the differences in the time of occurrence of oestrus and the set time of AI (Baril *et al.,* 1993). In the present study, the low conception rate recorded could be attributed to the inseminations being executed too late.

Conclusions

The progesterone treatments with the aid of MAP and FGA intravaginal progestagen sponges are almost equally efficient in synchronizing oestrus in lactating Saanen does during the transition from non-breeding to the natural breeding season. Although low, the conception rates obtained justify further investigation.

Acknowledgements

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