Induction of estrus and fertility using subcutaneous implants in anestrous dairy goats

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INDUCTION OF ESTRUS AND FERTILITY USING SUBCUTANEOUS IMPLANTS IN ANESTROUS DAIRY GOATS

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SUMMARY

Forty-four multiparous dairy goats, purebreed and cross-breed of Nubian, Toggenburg, Saanen, La Mancha and French Alpine breeds were used to determine the effect of Norgestomet (3 and 6mg) when used in conjunction with eCG during the anestrous season on the time to onset of estrus, induced estrous, fertility, gestation duration, number of kids per doe and kids birth weights. The animals were assigned randomly to 3 groups; a control group (n=15) without hormonal treatment, another group (n=14) treated with 3mg of Norgestomet (half implant) placed subcutaneously in the ear for 11d; and a third group (n=15) treated with a 6mg Norgestomet implant placed in the same location for 11d. Both treated groups received 500IU eCG i.m. 24h prior to progestagen removal. The group treated with 6mg Norgestomet had a shorter (P<0.05) interval from progestagen removal to estrus than the group treated with 3mg (16.8 ±0.76h vs 24.6 ±0.8h). Nevertheless, the induced estrus (100 vs 93%) were similar (P>0.05) in both groups. Fertility was higher (P<0.10) in the 6mg group (87 vs 57%). No estrous activity was observed in the control group. Gestation length, mean number of kids per doe and mean weight at birth were also similar (P>0.05) in the 3 and 6mg groups. Dairy goats implanted with 3mg Norgestomet exhibited similar estrous induction, but had lower fertility rate than the group implanted with 6mg.

RESUMEN

Cuarenta y cuatro cabras lecheras multiparás puras y cruzadas de razas Nubia, Toggenburg, Saanen, La Mancha y Alpina Francesa fueron utilizadas para determinar el efecto de la aplicación de dos dosis de Norgestomet (3 y 6mg) más eCG en el tiempo a la presentación del estrus, inducción de estrus, fertilidad, duración de la gestación, prolificidad y peso promedio de cría al nacimiento, durante la época de anestro. Los animales se asignaron aleatoriamente a 3 grupos; un grupo testigo (n=15) sin tratamiento hormonal; otro grupo (n=14) tratado con 3mg de Norgestomet (medio implante) aplicado subcutáneamente en la oreja por 11d; y un tercer grupo (n=15) tratado con 6mg de Norgestomet (implante entero) colocado en el mismo lugar por igual tiempo. A los animales tratados se les administró 500UI de eCG i.m. 24h antes de retirar los implantes. El grupo tratado con 6mg de Norgestomet presentó un menor intervalo (P<0.05) desde el retiro del implante al estrus que el grupo tratado con 3mg (16.8 ±0.76h vs 24.6 ±0.8h). El porcentaje de inducción de estrus (100 vs 93%) fue similar (P>0.05) en ambos grupos tratados; sin embargo, la fertilidad fue mayor (P<0.10) en el grupo con 6mg que en el grupo con medio implante (87 vs 57%). No se observó ninguna actividad sexual en el grupo testigo. La duración de la gestación, promedio de crías por parto y peso promedio al nacimiento fueron también similares (P>0.05) en los dos grupos tratados. Cabras lecheras implantadas con 3mg de Norgestomet exhibieron una inducción de estrus similar pero mostraron menor fertilidad que animales implantados con 6mg de Norgestomet.

Introduction

The seasonality of reproduction exhibited by dairy goats in the Mexicali Valley, Mexico, results in an inadequate milk supply during winter months. This situation has created a strong interest among local producers in methods to induce estrus during the anestrous season that includes April and May in this zone (Correa et al., 1996). Induction of estrus in anestrus dairy goats has been successfully achieved by altering the photoperiod or by using a treatment combining a vaginal sponge impregnated with fluorogestone acetate (FGA) as a source of progestagen. Barker (1966) evaluated FGA intravaginal sponges for estrous synchronization in dairy goats, and found 100% of estrus in animals treated with 25mg FGA within 72h of sponge removal. FGA has also been used successfully for induction of estrus when combined with pregnant mare serum gonadotropin (eCG) or eCG and cloprostenol (Corteel et al., 1988; Ritar et al., 1984; Tampani et al., 1985). Another method widely used in the induction of estrus is a progestagen implant normally placed in the ear, originally used for estrus synchronization in cattle. This implant contains 6mg of the synthetic progestagen Norgestomet (17-acetoxy-11B-methyl-19-pregna-4-ene-3,20-dione). Implantation...
tion period varies from 9 to 14d and it is combined with eCG or PGF$_2\alpha$ 2 days ... 0
3 mg 0 0 14 14 14 15 16.8 ±0.80 b
a,b Means with different superscript differ (P<0.05)

Quarenta e quatro cabras leiteiras multiparas puras e cruzadas de raças Nubia, Toggenburg, Saanen, La Mancha e Alpina Francesa foram utilizadas para determinar o efeito da aplicação de duas doses de Norgestomet (3 e 6mg) mais eCG no tempo à apresentação do estro, indução de estros, fertilidade, duração da gestação, prolificidade e peso médio da cria ao nascimento, durante a época de anestro. Os animais designaram-se aleatoriamente a 3 grupos; um grupo testemunha (n=15) sem tratamento hormonal; outro grupo (n=14) tratado com 3mg de Norgestomet (meio implante) com aplicação subcutânea na orelha por 11d; e um terceiro grupo (n=15) tratado com 6mg de Norgestomet (implante inteiro) colocado no mesmo lugar por igual tempo. Aos animais tratados foram-lhes administrada 500UI de eCG i.m. 24h antes de retirar os implantes. O grupo tratado com 6mg de Norgestomet apresentou um menor intervalo (P<0.05) desde a retirada do implante ao estro que o grupo tratado com 3mg (16.8 ±0.76h vs 24.6 ±0.8h). A porcentagem de indução de estro (100 vs 93%) foi similar (P>0.05) em ambos grupos tratados; no entanto, a fertilidade foi maior (P<0.10) no grupo com 6mg que no grupo com meio implante (87 vs 57%). Não se observou nenhuma atividade sexual no grupo testemunha. A duração da gestação, média de crias por parto e peso médio no nascimento, foram também similares (P>0.05) nos dois grupos tratados. Cabras leiteiras implantadas com 3mg de Norgestomet exibiram uma indução de estro similar, mas, mostraram menor fertilidade que animais implantados com 6mg de Norgestomet.

Results and Discussion

The cumulative number of goats detected in estrus by period of survey is shown in Table I.

The average time to onset of estrus in the 3mg group was higher (P<0.05) than the corresponding time in the 6mg group (24.6 ±0.76h vs 16.8 ±0.8h). No goats were in estrus from 0 to 12h in the three groups, and one goat, from 3mg Norgestomet treatment, was in estrus from between 32 and 72h. Bretzlafl and Madrid (1989) found an
average time to onset of estrus of 20h using ear implants containing 3mg Norgestomet placed for 11d plus 50μg Cloprostenol, a synthetic analogue of prostaglandin F2α, and 500IU PMSG administered i.m. prior to implant removal, a time slightly lower than that found in the present study, probably due to Cloprostenol administration. Bañuelos et al. (1992) indicate an interval of 24 to 48h to estrus onset with the same treatment, but the implant was kept for 9d. Pendleton et al. (1992) observed 31.5h in average time to onset of estrus in dairy goats treated with 6mg of Norgestomet for 14d plus FSH administered at 12h intervals, 48h before implant removal. Their results differ from the present study (16.8h), perhaps due to their longer interval between observations (08:00 and 20:00h). Also the used FSH rather than eCG in their treatment protocol, although both FSH and eCG could have had the same effects on the animals. In the present study, 14 out of 15 goats treated with 6mg were in estrus between 12 and 16h after implant removal. Correa et al. (1994) reported that the anestrous season in goats was in April and May for this zone of the northwestern region of Mexico, and this study confirmed this result, as no goat presented estrus signs in the control group (0/15); after one month this group was checked again and no goat was found with signs of estrus. Bretzlaff and Madrid (1989) and Bretzlaff et al. (1991) reported similar results (90-100%) in the induction of estrus using 3mg of Norgestomet.

Table II shows the results for occurrence of estrus and fertility in goats by treatment. The induced estrus in the 6mg group was similar (P>0.05) to that observed in the 3mg group. The fertility rate observed in the 6mg group was higher (P<0.01) than that of the 3mg group. Bretzlaff and Madrid (1985) reported 75% of fertility in cycling goats treated with 3 or 6mg of Norgestomet in an experiment conducted to synchronize estrus. Similar results have been obtained by Bretzlaff and Madrid (1989) and East and Rowe (1989) working with goats during their anestrous season. Bretzlaff et al. (1991) found 83% of fertility in dairy goats treated only with 3mg of Norgestomet; a result higher than expected that was attributed to the use of bucks for the estrus detection and to the fact that the goats were in breeding, not in anestrous season.

Mean gestation time was similar (P>0.05) between the 3mg and the 6mg groups (Table III). This variable was not affected by the season of the year and Arbiza (1986) mentions a range between 144 and 151d for gestation duration in goats, depending on several genetic and environmental factors. Using Norgestomet implants, Bretzlaff and Madrid (1985) reported a mean duration of 151d, close to the one observed in the present study. Prolificity (mean number of kids per doe; kpd) and mean birth kid weight were similar (P>0.05) between the 3mg and the 6mg treatments, as shown in Table III. Bretzlaff and Madrid (1985) found an average of 2.3 and 2.1kpd in goats treated with 3 and 6mg of Norgestomet, respectively, similar to the averages observed in the present study. However, the average kid weights in our study are lower when compared with other reports. In the same zone but during the breeding season, Correa et al. (1994) found an average of birth kid weight of 3.0kg, higher than the one found in the present study. This probably was due to the drastic weather conditions of the zone, where the temperatures reach 48°C during July and August. Brown et al. (1977) indicated that heat stress during late pregnancy and nutrition may contribute to retardation of fetal lamb growth and to lower lamb birth weights. Sheep and goats exposed to heat stress during late gestation period, even during the last month of pregnancy, may produce kids with low birth weights, increased mortality rate at birth and decreased postpartum milk production (Chemineau, 1993). The low quality of the hay (bermuda) offered to the experimental animals during the gestation period could be another factor of great influence on the prolificity and the mean birth kid weights.

In conclusion, goats treated with 3mg of Norgestomet (half of normal implant) showed similar percentage of estrus induction than animals treated with the whole implant (6mg), but showed lower fertility than the 6mg group, a result that does not agree with other studies that recommended a lower dose than the whole implant. Gestation time, prolificity and average kid weight did not differ among the two treatments. However, prolificity and average birth kid weight were probably affected by the drastic summer conditions of the zone. Further research is needed in order to confirm whether switching the breeding season of goats at the Mexicali Valley in Mexico is economically feasible.

**REFERENCES**


