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Use of fluorogestone acetate after breeding to reduce the effect of premature luteal regression in dairy goats when superovulation is induced with FSH

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Abstract

The aim of the present study was to determine the effect of fluorogestone acetate (FGA) administered after mating, on embryo production in the dairy goat subjected to conventional superovulatory and embryo recovery protocols. Adult does, most of them of the French Alpine breed, were randomly assigned after a FSH-superovulatory estrus and fertile matings to a control group ($n = 20$) or to a treated group ($n = 20$) in which intravaginal sponges impregnated with FGA were inserted after mating and remove before embryo collection (day 6). Blood samples were collected every 12 h from days 1 to 7 post-estrus and serum progesterone concentrations were determined. The FGA-group had a lesser percentage of does with normal corpora lutea (CL) and a greater percentage of animals with CL in regression or mixed (normal and in regression) when compared with the control group (13.3 and 64.7%, 53.3 and 23.5%, and 33.3 and 11.8%, respectively; $P < 0.05$). Mean number of normal CL per doe was less and mean number of regressed CL greater in FGA as compared with the control group (4.2 compared with 10.7 and 8.5 compared with 3.6, respectively; $P < 0.05$). There were no differences ($P > 0.05$) in recovery rate, total number of CL, total recovered structures, oocytes and transferable and non-transferable embryos between groups. Serum progesterone concentrations from day 5 to 7 post-estrus were lower ($P < 0.05$) in FGA as compared with the control group. Percentage of does with luteal failure on day 6 post-estrus was greater in FGA as compared with the control group (86.6 compared with 33.3%; $P < 0.01$). When considering only does with luteal failure on day 6 post-estrus, mean total recovered structures, transferable embryos and percentage of does rendering ≥ 3 transferable embryos were greater in the FGA compared with the control group (6.3 and 1.3 structures, 4.5 and 1.2 embryos, 67 and 17%, respectively; $P < 0.05$). In does not having luteal failure, FGA administration did not appear to affect embryo production or embryo survival. These results indicate that FGA administration after mating

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improves embryo recovery in dairy goats with luteal failure after superovulatory treatment. However, it also increases the incidence of luteal regression when administered early in the estrous cycle.
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Keywords: Goats-luteal failure; FGA; Superovulation; Embryo production

1. Introduction

Superovulation followed by embryo recovery and transfer has been considered an effective technique to increase the offspring of genetically superior females with an underlying improving of the population (Cognie, 1999). Premature regression of corpora lutea (CL) after superovulation is frequently present in goats; this has been related to lesser rates in embryo recovery. Premature luteal failure, between the third and fourth day after mating, results in a reduction in progesterone concentrations detrimental to embryonic migration through the oviduct (Bindon et al., 1986; Tervit et al., 1986; Ishwar and Memon, 1996). Early luteal regression is caused by the premature release of prostaglandin F2α (Battye et al., 1988), which may indirectly function as an embryo toxic factor (Hernandez-Fonseca et al., 2000).

To diminish the consequences of premature regression of CL, prostaglandin synthesis inhibitors, such as flunixin meglumine (Gilbert et al., 1990), indomethacin (Battye et al., 1988) and meclofenamic acid (Cooke and Homeida, 1983) have been administered, as well as hormones having luteotropic effects such as human chorionic gonadotropin (hCG) and gonadotropin-releasing hormone (GnRH) (Saharrea et al., 1998). In adition, the administration of a progestin after mating has been successfully used as an alternative treatment to counter the decrease of circulating progesterone associated with premature CL regression (Espinosa-Márquez et al., 2004). With use of fluorogestone acetate (FGA) using the superovulated Spanish goat, which is a type of meat goat without economical value and with a poor capacity to produce embryos (Espinosa-Márquez et al., 2004), treatment with an exogenous progestin (fluorogestone acetate) increased embryonic survival, however, did not prevent premature CL regression. Moreover, embryo recovery rate was so poor in both treated and non-treated animals that the effectiveness of the progestin treatment could have been masked. Besides, in the latter study, females were superovulated with eCG, which compared with FSH induced a lesser superovulatory response and greater luteal failure (Pendleton et al., 1992). The aim of the present study was to determine the effect of FGA, administered after a superovulatory estrus, on embryo production in the dairy goat superovulated with FSH.

2. Materials and methods

The present study was performed during the reproductive season for goats (October–December) in an experimental center located near Mexico city (19° north latitude, 99° west longitude). Adult non-lactating dairy goats ($n = 40$), 2–6 years old, mostly of the French Alpine breed, were utilized. Estrus was synchronized using intravaginal sponges impregnated with 40 mg of fluorogestone acetate (FGA; Chrono-Gest, Intervet, Mexico) for 12 days. Superovulation was induced by intramuscular injection of 180 mg FSH (Folltropin, Vetrepham, Canada Inc.). Total dosage was divided into two daily administrations for 4 days with a decreasing dose pattern across days. The first administration was at 48 h before the withdrawal of the vaginal sponge (Caballero et al., 1995).

After sponge removal, estrus was detected using an intact buck fitted with an apron. The day in which estrus was manifested was designated as day 0. Females in estrus were mated twice a day

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