

Comparison of the Effects of Gonadotropin-Releasing Hormone, Human Chorionic Gonadotropin and Progesterone on Conception Rates in Repeat Breeder Dairy Cows

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Introduction

A slower than normal rise in progesterone concentrations and a lower total progesterone concentrations have been measured in low-fertility cows and repeat breeder (RB) heifers in the first six days after estrus. Several methods have been used to attempt to increase conception rates (CR) through a greater plasma progesterone (P_4) concentrations during the luteal phase, including those that increase endogenous function of the existing corpus luteum (CL), induce accessory CL, or act as a direct progesterone supplement. The aim of the present study was to determine whether supplementing with exogenous P_4 or the administration of gonadotropin-releasing hormone (GnRH) or human chorionic gonadotrophin (hCG) during early luteal phase could increase CR in RB cows.

Materials and Methods

A total number of 103 Holstein RB cows with a history of three to seven unsuccessful artificial inseminations (AI) and normal inter-estrus intervals, in a large dairy herd, were selected for the study. They were less than ten years of age and had no history of recent reproductive diseases. All of the selected cows were paired according to their parity, milk yield, number of AI services and body condition scores. Cows were divided into four groups: Group one cows (n=26) received 20 μ g of the GnRH agonist, buserelin (Receptal; Intervet International, Holland) intramuscularly (IM) on day five to six post-AI. Cows in group two (n=25) received an IM injection of 1500 IU hCG (Chorulon; Intervet International, Holland) 5-6 days post AI. In group three (n=25) a controlled internal drug release device (CIDR; Inter Ag, New Zealand) previously used for seven days was applied to each cow on day five to six after AI and removed ten days later. Group four cows (n=27) received five ml of sterile normal saline solution IM as placebo the same time period after AI. Milk samples (15-20 ml) were collected five to six days after AI, just before treatment was administered for measuring P_4 concentrations by an ELISA method. All cows were palpated per rectum for pregnancy diagnosis 45 days after AI. Data were analyzed using SPSS (version 9). Differences between

groups with a P-value ≤ 0.05 were considered significant.

Results

CR on day 45 was significantly lower in cows in groups one and four compared to groups two and three ($P < 0.05$). There was no significant difference in CR between groups one and four. There was also no significant difference between groups two and three. There was no significant difference in milk fat P_4 concentrations among four groups. Milk fat P_4 concentrations in pregnant cows and non-pregnant cows did not differ significantly between the four groups. Milk fat P_4 concentrations between pregnant and non-pregnant cows in each group were compared separately. In only the second group (hCG) were P_4 concentrations significantly lower in pregnant cows ($P < 0.05$).

Significance

Progesterone supplementation via used CIDR early in the luteal phase (days five to six pp), increased pregnancy rates in RB cows in this study. A slower than normal rise in P_4 concentrations and a lower total P_4 concentrations has been measured in RB cows in the first six days after estrus. It has been reported that the highest CR occur when day five milk P_4 concentrations are between three and nine ng/ml. CR significantly decreased both above and below this range. Results of this study also showed that RB cows treated with hCG on five to six after AI had significantly higher CR. Human chorionic gonadotrophin induces the formation of accessory CLs and increases the concentrations of P_4 during the mid-luteal phase. It also promotes three follicular wave estrous cycles that may delay the occurrence of pre-ovulatory follicles around the time of maternal recognition of pregnancy. In the present study, GnRH administration on day five to six after insemination did not increase CR on Day 45. It seems that the timing of administration and the potency of GnRH, or both, may affect the ability of GnRH to alter luteal composition and subsequent P_4 concentrations. In conclusion, treating RB cows with hCG or a used CIDR improved CR in this study.