

Progesterone supplementation improves fertility of lactating Holstein cows without a corpus luteum at initiation of the timed AI protocol

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Introduction

Ovulation synchronization and timed AI programs have been adopted in many dairy herds for managing reproduction in cows. Timed AI programs ensure maximum submission rates. However, pregnancy per AI is reduced when cows do not have a functional CL at initiation of the timed AI protocol. Suboptimal progesterone concentrations as observed in cows without a CL at initiation of timed AI negatively affects the quality of ovulatory follicle, oocyte competence, embryo growth, and endometrial functions. Ultrasound evaluation of the ovaries at initiation of the timed AI protocol combined with targeted progesterone supplementation can improve fertility in dairy cows lacking CL initiation of the timed AI protocol. Intravaginal controlled internal drug release (CIDR) devices offer a practical method to increase plasma progesterone concentrations in cows without a CL at initiation of the timed AI protocol. Our objectives were to evaluate the effects of progesterone supplementation using 1 or 2 intravaginal progesterone inserts on fertility of first service lactating dairy cows without a CL at initiation of the timed AI protocol.

Materials and Methods

Holstein cows (n=685) from a commercial dairy farm were enrolled in a timed AI protocol (d -10 GnRH, d -3 PGF2 α , d -0.7 GnRH, d 0 AI). Ovaries were scanned by ultrasonography on d -10 to determine the presence or absence of CL. Cows without a CL were randomly assigned to remain as non-supplemented controls (no CL; n=51), to receive 1 CIDR insert (Eazi-Breed CIDR Cattle Insert; Zoetis, Florham Park, NJ) from d -10 to -3 (1 CIDR; n=43) or 2 CIDR inserts (2 CIDR; n=50). Cows with CL at d -10 (with CL; n=479) served as positive controls and did not receive a CIDR insert. Cows were bred on d 0 and pregnancy was diagnosed on d 32 and 45 after AI. Binary responses were analyzed by multivariable logistic regression. Initial models included the fixed effects of treatment, parity (primiparous vs second lactation vs multiparous) and season of calving (winter, summer, and fall).

Covariates were continuously removed when $P > 0.10$ using a backward stepwise elimination method. Differences with $P \leq 0.05$ were considered significant and those with $0.05 < P \leq 0.10$ were considered tendencies. Treatments and parity were forced into the final model.

Results

The proportion of cows without a CL at enrollment (d -10) was 23.1% (144/623) out of which 40.1% (59/144), 31.3% (45/144), and 29.2% (40/144) were primiparous, second lactation, and multiparous (greater than 2 lactations) cows, respectively. Pregnancy per AI was greatest for 2 CIDR followed by 1 CIDR, with CL, and no CL at d 32 after AI (56.0, 39.5, 38.5%, and 33.3%, respectively). At d 45 after AI, proportions of pregnant cows were greatest for 2 CIDR followed by with CL, 1 CIDR, and no CL (46.0, 36.8, 34.9%, and 31.4%, respectively). Compared with no CL, 2 CIDR had greater odds of conception to first service (OR: 2.87; 95% CI: 0.62–3.46; $P=0.01$). Cows bred in the summer tended to have lower odds of pregnancy (OR: 0.67; 95% CI: 0.45–1.01; $P=0.06$). Pregnancy loss did not differ significantly between groups, but multiparous cows tended to have greater odds of pregnancy loss compared with primiparous cows.

Significance

Ultrasound examination at the initiation of the timed AI program was effective in identifying a cohort cows that needed progesterone supplementation based on the absence of CL at the time of the first GnRH injection of the timed AI protocol. Progesterone supplementation in Holstein cows without a CL at initiation of timed AI protocol using 2 CIDR's increased conception rates to first service. Cows without a CL at initiation of a timed AI protocol will benefit from supplemental progesterone using 2 CIDR inserts.