J. Dairy Sci. 96:1009–1020
http://dx.doi.org/10.3168/jds.2012-5892

Evaluation of presynchronized resynchronization protocols for lactating dairy cows

R. C. Chebel,*[1] A. A. Scanavez,* P. R. B. Silva,* J. G. N. Moraes,* L. G. D. Mendonça,* and G. Lopes Jr.†
*Department of Veterinary Population Medicine, University of Minnesota, Saint Paul 55108
†Accelerated Genetics, Baraboo, WI 53913

ABSTRACT

The objectives of this experiment were to determine the speed at which cows that had their estrous cycle presynchronized with a GnRH or $PGF_{2\alpha}$ injection are reinseminated and become pregnant. Furthermore, this experiment aimed to determine whether treatment with a controlled internal drug-releasing (CIDR) insert during the timed artificial insemination (AI) protocol improves pregnancy per AI (P/AI) of cows that had their estrous cycle presynchronized with GnRH or $PGF_{2\alpha}$. Lactating cows from 2 herds were assigned to 1 of 2 presynchronization treatments at 32 ± 4 d after AI: GGPG (n = 452)—GnRH injection at enrollment (d 0), 7 d before the start of the timed AI protocol, and P11GPG (n = 466)—$PGF_{2\alpha}$ injection on d 3, 11 d before the start of the timed AI protocol. Cows observed in estrus at any interval after enrollment were reinseminated on the same day. Cows not observed in estrus by d 7 were paired by presynchronization treatment and assigned to receive or not receive a CIDR insert during the timed AI protocol (CIDR = 240, no CIDR = 317). Timed AI protocols were the Ovsynch56 at site A and the Cosynch48 at site B. A subsample of cows from site A had their ovaries scanned by ultrasound at enrollment and on the day of the first GnRH and $PGF_{2\alpha}$ injections of the timed AI protocol and had blood sampled at each injection of the timed AI protocol for determination of progesterone concentration. Cows were examined for pregnancy 32 ± 4 and 67 ± 4 d after reinsemination. Cows in the P11GPG treatment had a faster reinsemination rate [adjusted hazard ratio = 1.24 (95% CI = 1.07, 1.45)] and were less likely to be submitted to the timed AI protocol (40.3 vs. 89.8%) and to be reinseminated at a fixed time (38.6 vs. 83.9%). The interval from enrollment to reinsemination was shorter for cows in the P11GPG group (13.0 ± 0.4 vs. 15.0 ± 0.2 d). Presynchronization treatment did not affect P/AI 32 ± 4 d (GGPG = 42.3%, P11GPG = 39.3%) and 67 ± 4 d (GGPG = 37.0%, P11GPG = 35.4%) after reinsemination. Pregnancy rate from d 0 to 7 (GGPG = 3.6%, P11GPG = 17.7%) and from d 8 to 14 (GGPG = 1.6%, P11GPG = 5.7%) were greater for cows in the P11GPG treatment. Treatment with the CIDR insert during the timed AI protocol did not affect P/AI 32 ± 4 d (CIDR = 41.7%, no CIDR = 41.4%) and 67 ± 4 d (CIDR = 36.5%, no CIDR = 35.3%) after reinsemination. A greater percentage of cows in the GGPG treatment had progesterone concentration ≥1 ng/mL on the day of the first GnRH injection of the timed AI protocol (83.8 vs. 51.5%), but a greater percentage of cows in the P11GPG treatment ovulated in response to the first GnRH injection of the timed AI protocol (66.1 vs. 46.8%). We conclude that the P/AI of cows that had their estrous cycle presynchronized with GnRH or $PGF_{2\alpha}$ was not different, but in herds with adequate estrous detection efficiency and accuracy, presynchronization with $PGF_{2\alpha}$ may reduce the interval to the establishment of pregnancy.

Key words: presynchronization, resynchronization, controlled internal drug-releasing insert, lactating dairy cow

INTRODUCTION

Several protocols for resynchronization of the estrous cycle of nonpregnant cows have been developed and evaluated since the development of timed AI protocols in the 1990s (Pursley et al., 1995). In general, resynchronization protocols must result in acceptable pregnancy per AI (**P/AI**) and timely reinsemination of cows to avoid an extended inter-AI interval. Because many dairy herds have inadequate estrous detection rates, timed AI protocols are often recommended for reinsemination of lactating dairy cows.

In recent studies, presynchronization of the estrous cycle of nonpregnant cows with $PGF_{2\alpha}$ 12 d before the start of the timed AI protocol (Silva et al., 2007) and with GnRH 7 d before the start of the timed AI protocol (Dewey et al., 2010) improved P/AI after reinsemination. In the experiment in which $PGF_{2\alpha}$ was used to presynchronize the estrous cycle, however, cows

Received June 29, 2012.
Accepted October 7, 2012.
[1]Corresponding author: chebe002@umn.edu

were not reinseminated if detected in estrus, and all cows were submitted to the timed AI protocol, thereby extending the interval between inseminations by approximately 12 d compared with nonpresynchronized cows (Silva et al., 2007). On the other hand, in the experiment in which GnRH was used to presynchronize the estrous cycle, cows were allowed to be reinseminated if detected in estrus (Dewey et al., 2010), but GnRH reduced the percentage of cows observed in estrus and increased the interval to reinsemination by approximately 2 d (Mendonça et al., 2011). The comparison of estrous cycle presynchronization protocols using GnRH or $PGF_{2\alpha}$ injections in herds that also rely on estrous detection for reinsemination of nonpregnant cows is important because of the different effects of GnRH and $PGF_{2\alpha}$ on estrous expression (Chebel et al., 2006; Mendonça et al., 2011).

Treatment of cows with controlled internal drug-releasing (**CIDR**) inserts during resynchronization protocols improves P/AI to reinsemination by approximately 5 percentage units when the resynchronization protocols are initiated at approximately 38 ± 3 d after AI (Dewey et al., 2010; Bilby et al., 2011). It is not clear, however, whether the use of a CIDR insert during a resynchronization protocol would increase P/AI to reinsemination of cows that had their estrous cycle presynchronized with GnRH or $PGF_{2\alpha}$.

The hypothesis of the current experiment was that cows that had the estrous cycle presynchronized with $PGF_{2\alpha}$ would be reinseminated at a faster rate and would therefore have greater pregnancy rates before being submitted to the timed AI protocol than would cows that had their estrous cycle presynchronized with GnRH. Furthermore, it was hypothesized that cows submitted to a timed AI protocol and treated with a CIDR insert would have greater P/AI than cows submitted to a timed AI protocol and not treated with a CIDR insert.

The objectives of the current experiment were to (1) determine the speed at which cows that were not pregnant to a previous AI and that had their estrous cycle presynchronized with a GnRH or $PGF_{2\alpha}$ injection were reinseminated and would become pregnant, and (2) determine whether treatment with a CIDR insert during the timed AI protocol of cows that had their estrous cycle presynchronized with GnRH or $PGF_{2\alpha}$ would improve P/AI.

MATERIALS AND METHODS

Cows, Nutrition, and Facilities

Lactating Jersey (site A, n = 611) and Holstein (site B, n = 307) cows that had previously been inseminated were enrolled in the experiment 32 ± 4 d after the previous AI (day of enrollment = d 0). Sites A and B were cross-ventilated freestall barns. Site A was located in Nicollet, Minnesota (44°16′25″N 94°11′18″W), and site B was located in Rice Lake, Wisconsin (45°29′54″N 91°44′20″W). At site A, cows were fed a TMR twice daily, and at site B, cows were fed a TMR once daily. The main ingredients in the TMR at both sites were corn silage, alfalfa hay, corn meal, soybean meal, cottonseed, and a mineral and vitamin premix. At both sites, first-lactation and mature cows were kept separate throughout their lactation. The experiment was conducted from May to September at site A and from October to December at site B.

Treatments

Cows were assigned randomly to a presynchronization treatment (GGPG = 452 or P11GPG = 466) at enrollment (d 0). Cows enrolled in the GGPG treatment received a presynchronizing injection of GnRH (100 μg of gonadorelin hydrocloride; Factrel, Pfizer Animal Health, Madison, NJ) on d 0 and, if not observed in estrus and reinseminated, they were enrolled in the timed AI protocol on d 7 (Figure 1). Cows enrolled in the P11GPG treatment diagnosed as not pregnant 32 ± 4 d after a previous AI received a presynchronizing injection of $PGF_{2\alpha}$ (25 mg of dinoprost tromethamine; Lutalyse, Pfizer Animal Health) on d 3 and were observed for estrus, and if not observed in estrus and reinseminated, they were enrolled in the timed AI protocol on d 11 (Figure 1).

Cows enrolled in the GGPG and P11GPG treatments that were submitted to the timed AI protocol were assigned randomly to receive (n = 240) or not receive (n = 317) a CIDR insert [1.38 g of progesterone (**P4**), Eazi-Breed CIDR; Pfizer Animal Health] from the first GnRH injection to the $PGF_{2\alpha}$ injection of the timed AI protocol. The timed AI protocol to which cows were submitted were the Ovsynch56 (GnRH, 7 d later $PGF_{2\alpha}$, 56 h later GnRH, and 12 to 16 h later fixed-time AI) at site A and the Cosynch48 (GnRH, 7 d later $PGF_{2\alpha}$, 48 h later GnRH and fixed-time AI) at site B.

Estrous Detection and AI

At site A, estrous detection was primarily performed by tail paint removal, and at site B, estrous detection was primarily performed by pedometers (Afimilk; S.A.E. Afikim, Kibbutz Afikim, Israel). Furthermore, in both herds, the following symptoms were used to characterize estrus: vaginal mucous discharge, bellowing, increased nervousness and activity, walking the