Effect of timing of insemination using sexed semen relative to a synchronized ovulation on reproductive outcomes in lactating Holstein cows

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Introduction

- Use of sexed semen in lactating Holstein cows has dramatically increased over the past five years.
- Timing of insemination relative to a synchronized ovulation was optimized using conventional semen.
- Conception rates using sexed semen are 80-90% of that using conventional semen resulting in a decrease of 5-10 percentage points in fertility.
- The sexing process damages sperm cells and may initiate capacitation.
- Delaying insemination relative to the onset of activity using activity monitoring systems with sexed semen increased P/AI.
- Milk production near the time of AI is positively correlated with an increased P/AI.

Hypothesis

Earlier induction of ovulation relative to TAI would increase pregnancies per AI (P/AI).

Objective

To determine the effect of altering timing of induction of ovulation relative to timed artificial insemination (TAI) with sexed semen after a modified Double-Ovsynch protocol with sexed semen increased P/AI.

Materials and Methods

- Primiparous lactating Holstein cows (n = 730) from three commercial dairy farms were randomly assigned to treatment by identification number (odd vs. even).
- Cows were enrolled to receive either:
  - A standard Double-Ovsynch protocol with a 16 h interval from G2 to TAI (G2-16).
  - A modified Double-Ovsynch protocol with a 24 h interval from G2 to TAI (G2-24).
- Cows were inseminated with ABS Sexcel™ semen from sires chosen by the collaborating farms.
- Pregnancy diagnosis was performed using transrectal ultrasonography 34 ± 3 d after TAI, and pregnancy status was reconfirmed at 80 ± 17 d.
- Fetal sex was determined at 80 ± 17 d. Approximately 6% of females were sexed incorrect.

Results

- Earlier induction of ovulation relative to TAI decreased P/AI at 34 ± 3 and 80 ± 17 d after TAI by 6 and 7 percentage points.
- Pregnancy losses (5 vs 6%, P = 0.70) and percent female fetuses did not differ between G2-16 and G2-24 cows, respectively (92 vs 90%; P = 0.03).
- Conception rates using sexed semen were 92% and 90% for G2-16 and G2-24 cows, respectively.
- Pregnancy reconfirmation at 71 ± 4 d at two of the three farms.
- Reproductive data were extracted from weekly DairyComp305 backup files.
- Data were analyzed by logistic regression using the GLIMMIX procedure and Fisher's exact test of regression using the GLIMMIX procedure and Fisher's exact test of

Conclusion

- This decrease may be attributable to decreased time for sperm transport and capacitation, time for luteolysis, and ovulatory follicle size.
- Pregnancy loss (5 vs 6%, P = 0.7) and percent female fetuses did not differ between G2-16 and G2-24 cows, respectively (92 vs 90%; P = 0.64).
- Delaying insemination with sexed semen relative to the onset of activity or estrus may increase fertility because of the increased interval from the onset of estrus to ovulation.

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Figure 1: Proportion of inseminations using conventional beef (%BEEF C), conventional Holstein (%HOLSTEIN C), and sexed Holstein (%HOLSTEIN S) semen to inseminate Holstein females (heifers and lactating cows) in the U.S. from 2006 to 2020 (data from AgSource Dairy, Madison, WI).

Figure 2: Schematic diagram of treatments. Primiparous Holstein cows were randomized for first service to receive a Double-Ovsynch protocol with the second GnRH treatment of the Breeding Ovsynch protocol (G2-16) either 16 h (n = 373) or 24 h (n = 357) before TAI. The TAI was fixed for all cows at 48 h after the second GnRH treatment of the Breeding Ovsynch portion.