



# 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 interval from onset of activity to ovulation.

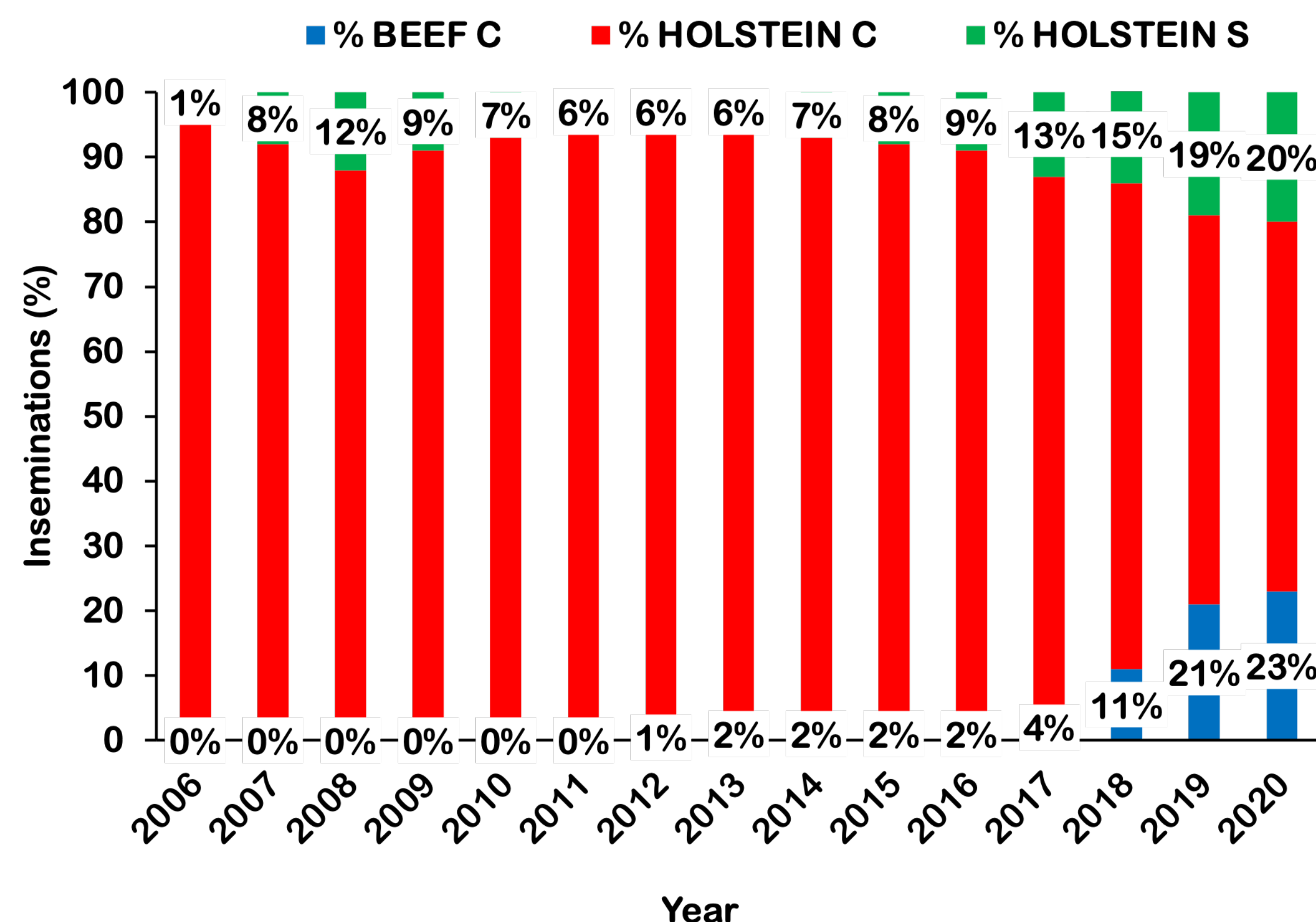


Figure 1: Proportion of inseminations using conventional beef (%BEEF C), conventional Holstein (%HOLSTEIN C), and sexed Holstein (%HOLSTEIN S) semen to inseminate Holstein females (heifers and lactating cows) in the U.S. from 2006 to 2020 (data from AgSource Dairy, Madison, WI).

## Experimental Design

### Standard Double-Ovsynch Protocol

G2 to TAI = 16 h

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					GnRH a.m.	
					PGF <sub>2α</sub> a.m.	
	GnRH a.m.					
	GnRH a.m.					
	PGF <sub>2α</sub> a.m.	PGF <sub>2α</sub> a.m.	G2 p.m.	TAI a.m.		

### Modified Double-Ovsynch Protocol

G2 to TAI = 24 h

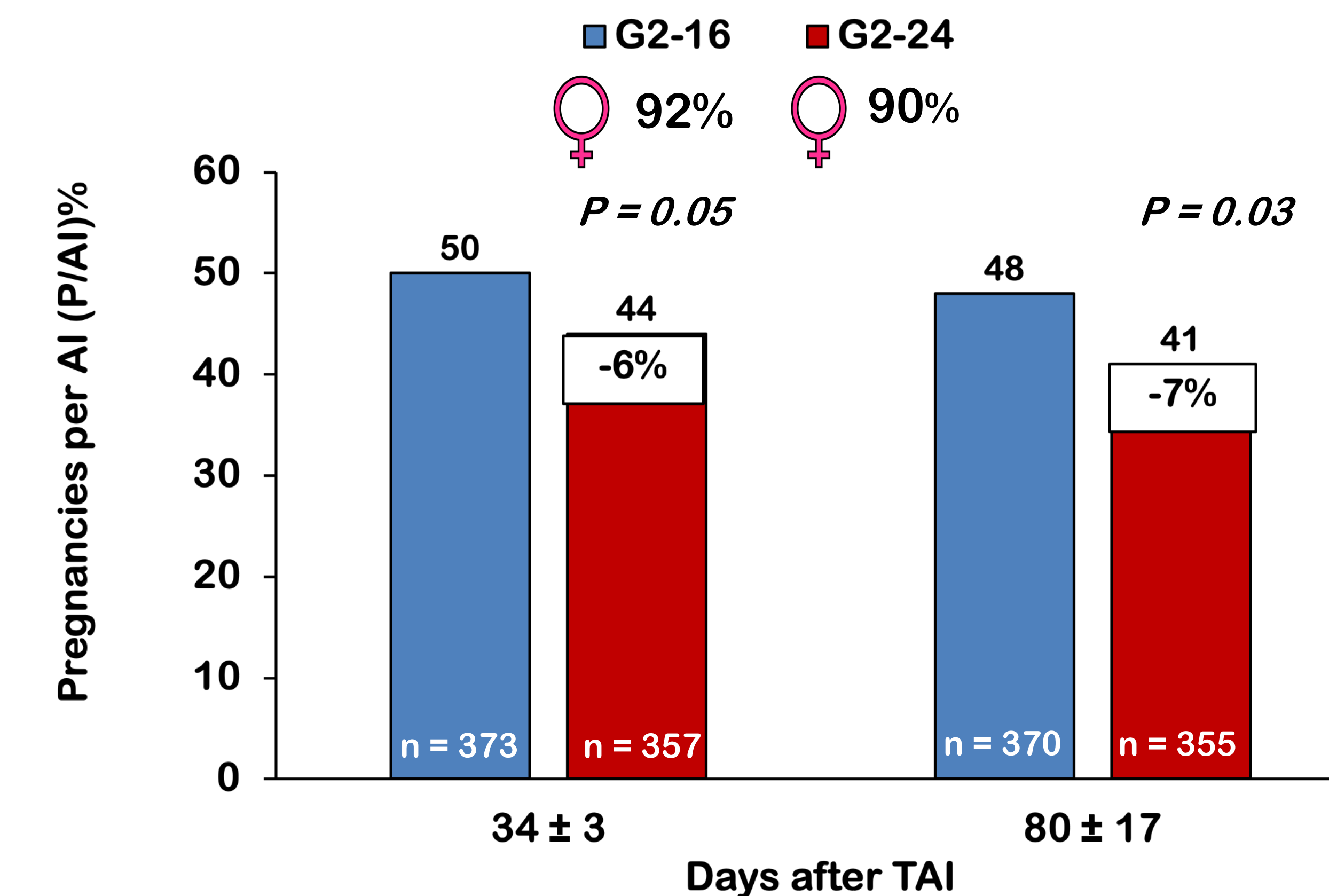
Sun	Mon	Tue	Wed	Thu	Fri	Sat
					GnRH a.m.	
					PGF <sub>2α</sub> a.m.	
	GnRH a.m.					
	GnRH a.m.					
	PGF <sub>2α</sub> a.m.	PGF <sub>2α</sub> a.m.	G2 a.m.	TAI a.m.		

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 portion (G2) either 16 h (G2-16, n = 373) or 24 h (G2-24, n = 357) before TAI. The TAI was fixed for all cows at 48 h after the second PGF<sub>2α</sub> treatment of the Breeding-Ovsynch portion.

## 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 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 SAS.

## Results



## Conclusion

- 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.
  - 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 = 0.70) 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.

## Objective

To determine the effect of altering timing of induction of ovulation relative to timed artificial insemination (TAI) with sexed semen after a Double-Ovsynch protocol in primiparous Holstein cows.

## Hypothesis

Earlier induction of ovulation relative to TAI within a Double-Ovsynch protocol (i.e., inseminating closer to the time of ovulation) would increase pregnancies per AI (P/AI).

**Acknowledgements:** We thank the Bridgewater Dairy Group (Montpelier, OH), Double P Dairy (Marathon, WI), and Rams Horn Dairy (McCook, NE) for use of their cows and facilities, ABS Global (Deforest, WI) for technical services, and Valley Ag Software (Tulare, CA) for DairyComp 305 Software. This work was supported by the USDA National Institute of Food and Agriculture (Washington, DC), Hatch project 1019532 and ABS Global to P.M. Fricke.