Modifications of a 5-d GnRH-based timed-AI protocol to optimize fertility in Holstein heifers inseminated with sex-selected semen

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BACKGROUND & OBJECTIVES

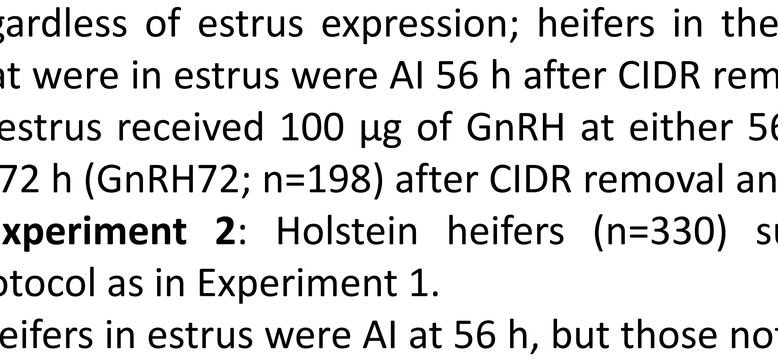
The use of sex-selected semen to inseminate heifers might increase the profitability of the dairy herd, as it provides an opportunity to increase the proportion of calves that are heifers (1). Optimization of a timed-AI (TAI) protocol that consistently yields high pregnancy per AI (P/AI) in heifers inseminated with sex-selected semen would increase the adoption of this technology (2).

This study evaluated the usefulness of an estrus detection aid, and timing of GnRH administration and AI on P/AI in Holstein heifers subjected to a modified 5-d GnRH-based protocol and inseminated with sex-selected semen

MATERIALS & METHODS

- **Experiment 1**: Holstein heifers (n=591) were subjected to a 5-d GnRH-based protocol (Figure 1).
- Estrotect™ was applied at CIDR removal and scored based on color change between initial application and 36 and 48 h after CIDR removal (Table 1; score 2 defined as estrus).
- Heifers were divided into 3 groups: Control (n=195) received 100 µg of GnRH and were inseminated 72 h after CIDR removal, regardless of estrus expression; heifers in the treatment groups that were in estrus were AI 56 h after CIDR removal and those not in estrus received 100 µg of GnRH at either 56 (GnRH56; n=198) or 72 h (GnRH72; n=198) after CIDR removal and were TAI at 72 h.
- **Experiment 2**: Holstein heifers (n=330) subjected to same protocol as in Experiment 1.
- Heifers in estrus were AI at 56 h, but those not in estrus were TAI at either 72 (TAI72) or 80 h (TAI80) after CIDR removal, and those with an Estrotec patch scored 0 or 1 at TAI received GnRH.
- All heifers were inseminated by the same technician with frozen-thawed, sex-selected semen and pregnancy was diagnosed by ultrasound 27 d after AI.
- Data analysed using PROC GLIMMIX in SAS (version 9.3).

Figure 1. Illustration of the 5-d GnRH-based protocol common for Expt 1 and 2.



CIDR= insert containing 1.38 g P4 (CIDR, Zoetis Animal Health)
$PGF_{2\alpha}$ = 500 µg cloprostenol i.m. (Bioestrovet, Vetoquinol NA Inc.)
ED patch = Estrotec™ (Estrotect Inc.)

Table 1. Estrotec patch scoring based on color change between application and 48 h after application (Expt 1) or TAI (Expt 2).

Score 0	Score 1	Score 2
		
Unchanged	< 50% change	≥ 50% change

RESULTS

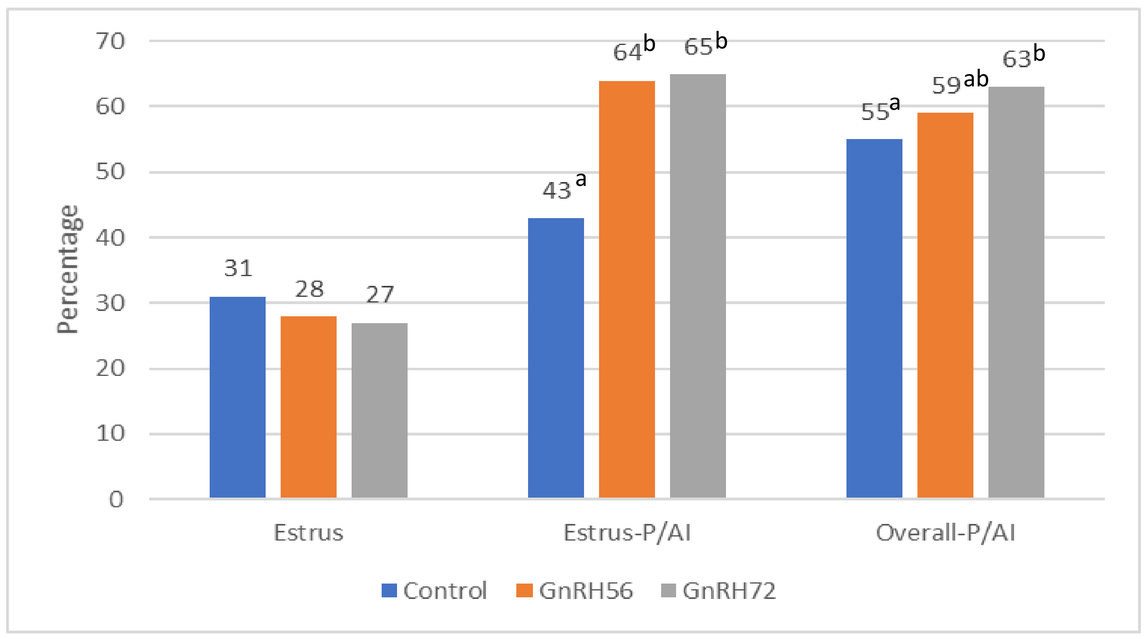


Figure 2. Estrus rate and P/AI in Holstein heifers in Experiment 1.
[a,b] Bars without a common superscript differed (P<0.05).

- **Experiment 2**: 118 heifers (36%) were AI at 56 h after CIDR removal and 74 (63%) become pregnant.

Table 2. P/AI between treatment groups in Experiment 2.

	TAI72	TAI80
No. of heifers	106	106
Patches scored 0 and 1 at TAI, n (%)	42 (40[a])	23 (22[b])
P/AI for score 0 and 1, %	33	44
Overall P/AI, %	55	61

[a,b] Percentages within a row, without a common superscript differed (P<0.01).

TAKE HOME MESSAGE

- Breeding heifers based on detected estrus increased P/AI with sex-selected semen.
- Administration of GnRH before TAI or delaying TAI did not increase P/AI.
- Estrus detection patches were considered useful to identify animals exhibiting estrus before TAI, increasing P/AI with sex-selected semen and reducing hormone usage.

References
[1] de Vries A. Adv Dairy Technol 2010;22:357–370.
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