Incidence of Ovulation to GnRH at Onset of 5-d CO-Synch + CIDR Protocol and Impact on Reproductive Responses

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Summary and Implications

The objective of this study was to determine how response to GnRH at the onset of the 5-d CO-Synch + CIDR protocol (5dCO) affected estrous response, follicular dynamics, and pregnancy success to timed-AI (TAI) beef cows that had calved. On 359 cows, GnRH response at the onset of the synchronization protocol was 54.6%. Estrous response prior to TAI was greater in cows that failed to ovulate after GnRH administration than those that ovulated. However, dominant follicle diameter at TAI was not influenced by GnRH response. Timed-AI pregnancy rates were greater in cows that did not respond to GnRH (65.0%) than those that did (51.5%). These results cannot be interpreted as removing GnRH at the beginning of the 5dCO would affect TAI pregnancy responses. These results, however, warrant subsequent field studies to determine the necessity of GnRH administration at CIDR insert in the 5-d CO-Synch + CIDR protocol.

Introduction

The administration of GnRH at CIDR insertion is done to induce ovulation and reset follicular waves, which allows for synchronized follicular growth patterns during timed-AI protocols. It has been reported that responses to GnRH at CIDR insertion is variable and in many cows, follicular dynamics may not be controlled. Depending upon protocol used, failure of follicular turnover can result in ovulation of a follicle at TAI that is not optimal and produce altered reproductive steroid concentrations. When using the 7-d CO-Synch + CIDR protocol, it has been demonstrated that failure to respond to GnRH at CIDR insertion results in detrimental effects to estradiol and progesterone concentrations. Within the 5dCO protocol, however, endocrine responses are not impacted by response to GnRH at CIDR insertion. Therefore, the objectives of this study were to determine how response to GnRH at the onset of the 5dCO protocol in beef cows impacted 1) estrous response, 2) dominant follicle size at timed-AI, and 3) pregnancy success to timed-AI.

Materials and Methods

Suckled primiparous (n = 95) and multiparous (n = 264) beef cows at 4 locations (Table 1; n = 126, 2; n = 121, 3; n = 73, 4; n = 39) were enrolled in the 5dCO that consisted of GnRH (GnRH-1) and CIDR insertion on day -8, CIDR removal and two, 25-mg doses of $PGF_{2\alpha}$ given concurrently on day -3, and TAI on day 0 concurrent with GnRH (GnRH-2). Estrus was detected twice daily from day -3 to 0. Estrous cyclicity (70.6%) was determined at locations 1 and 2 via assessment of circulating progesterone concentrations. To determine response to GnRH-1, ovarian ultrasound was conducted on days -8, -3, 0, and 2. Ovulation to GnRH-1 was defined by the disappearance of a dominant follicle observed on d -8 and development of a new corpus luteum on d -3. Follicle diameter at GnRH-2 (day 0) was assessed and ovulation confirmed on day 2 via ultrasonography. Pregnancy to TAI was determined approximately 30 days after TAI via ultrasonography. Cows were classified as having ovulated (OV; n = 196) or not ovulated (NoOV; n = 163) to GnRH-1.

Statistical analyses were conducted using the MIXED and GLIMMIX procedures of SAS with location included as a random variable.

Results and Discussion

Response to GnRH-1 (54.6%) was not influenced by parity (multiparous versus primiparous) or estrous cyclicity status and similar to previously published studies. Estrus prior to TAI was greater ($P < 0.05$) in NoOV (47.6%) than OV (40.8%) cows (Table 2). In cows that displayed estrus, interval from CIDR removal to estrus tended to be greater ($P = 0.08$) in OV (64.4 ± 0.9 h) than NoOV (60.6 ± 1.0 h), and was greater ($P < 0.01$) in multiparous (64.4 ± 0.8 h) than primiparous (58.3 ± 1.4 h) cows. Ovulation to GnRH-1 did not impact follicle diameter at GnRH-2. Pregnancy rate to TAI was greater ($P < 0.05$; Figure 1) in NoOV (65.0%) than OV (51.5%), primiparous (68.4%) than multiparous (53.8%) cows, and those cows that did (63.9%) than did not (52.7%) exhibit estrous.

Ovulation in response to GnRH-1 at the onset of the 5-d CO-Synch + CIDR protocol influenced estrous response and timed-AI pregnancy rates. A greater percentage of cows that failed to respond to GnRH-1 exhibited estrous and conceived to timed-AI than cows that did respond to GnRH-1. However, as all cattle were given the opportunity to respond to GnRH, the impacts of removing GnRH-1 from the 5dCO protocol are unknown. Thus, field studies to determine the necessity of GnRH administration at CIDR insert in the 5dCO protocol are warranted.

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Table 1: Herd Characteristics

Location	n	DPP	BCS	Cyclic, %	Response to GnRH-1, %
1	126	79.5 ±2.5	5.3 ±0.04	76.6	48.8
2	121	70.0 ±1.4	4.6 ±0.04	64.5	55.3
3	73	63.3 ±1.7	5.2 ±0.04	83.6	58.9
4	39	78.7±2.2	5.0 ±0.1	92.5	62.5
All	359	71.2 ±1.1	5.0 ±0.03	75.7	54.6

Table 2: Estrous and Follicular Responses[1]

	Estrus Response, %		Interval to Estrus, h		Follicle Diameter at GnRH-2, mm	
Location	OV	NoOV	OV	NoOV	OV	NoOV
1	34.4	43.1	62.3 ±2.3	54.9 ±1.9	16.8 ±0.3	16.8 ±0.3
2	14.9	22.2	57.6 ±1.6	57.0 ±1.6	15.2 ±0.2	15.8 ±0.3
3	67.4	86.7	66.2 ±1.3	65.5 ±1.2	13.9 ±0.4	14.0 ±0.5
4	80.0	80.0	67.7 ±1.3	67.0 ±1.8	13.8 ±0.4	13.6 ±0.6
All	40.8[a]	47.6[b]	64.4 ±0.9[c]	60.6 ±1.0[d]	15.2 ±0.2	15.7 ±0.2

[1]Cows that did (OV) and did not (NoOV) respond to GnRH at the initiation of the 5-d CO-Synch + CIDR ovulation synchronization protocol
[a,b] $P < 0.05$, [c,d] $P = 0.08$

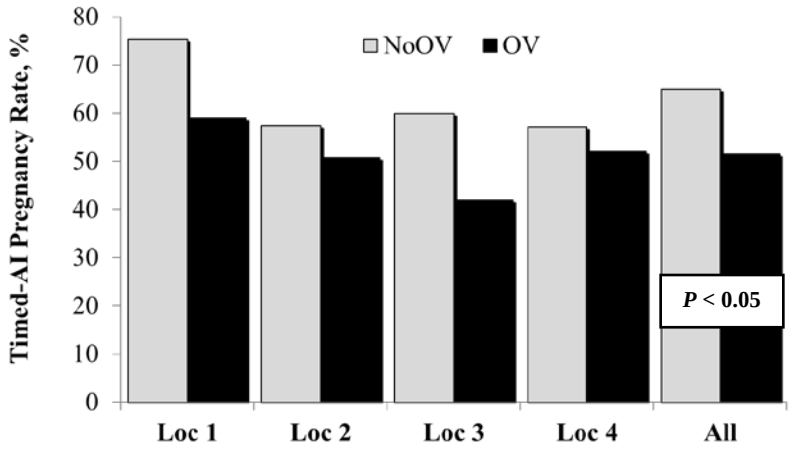

Figure 1. Timed-AI pregnancy rates of cows that did (OV) and did not (NoOV) respond to GnRH at the initiation of the 5-d CO-Synch + CIDR ovulation synchronization protocol.