

RESPONSE OF POSTPARTUM BEEF COWS TO TREATMENT WITH GONADOTROPIN-RELEASING HORMONE AND PROSTAGLANDIN $F_{2\alpha}$

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Story in Brief

Hereford and Angus x Hereford cows were used to determine if treatment with gonadotropin-releasing hormone (GnRH) seven days before prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) would increase the percentage of cows with synchronized estrus and initiate luteal activity in anestrus cows. Cows were classified as cyclic or anestrus based on concentration of progesterone in plasma one week before and on the day of GnRH treatment. Concentrations of progesterone in four weekly plasma samples after $PGF_{2\alpha}$ were used to evaluate the luteal response to treatment. In Experiment 1, cows were treated with 8 μ g of Buserelin or saline on d 0 and all cows received 25 mg of $PGF_{2\alpha}$ on d 7. In Experiment 2, calves were separated from all cows for 3 d at 7 d before treatment with 100 μ g of GnRH or saline (d 0), and $PGF_{2\alpha}$ was given to all cows on d 7 after treatment with GnRH. At treatment, 45% and 50% of cows had luteal activity for Experiments 1 and 2, respectively. Treatment did not affect the luteal response in either experiment. Buserelin did not influence the percentage of cows in estrus. However, in Experiment 2, 52% of GnRH treated cows expressed estrus within 7 d after $PGF_{2\alpha}$, while only 25% of the saline cows exhibited estrus. In Experiment 1, 69% of cows with ovarian luteal activity at the time of Buserelin or saline treatment had normal cycles following treatment, while only 10% of acyclic cows had normal luteal activity after treatment. Ninety-eight percent of cows in experiment 2 that were cyclic at the time of GnRH or saline treatment had normal luteal activity following treatment, compared with 48% of acyclic cows. Treatment of postpartum anestrus beef cows with Buserelin or GnRH 7 d before $PGF_{2\alpha}$ did not stimulate luteal activity.

(Key Words: Anestrus, Postpartum, Cows, GnRH, Estrous Synchronization.)

Introduction

Gonadotropin-releasing hormone (GnRH) induces the release of luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the anterior pituitary. Consequently, a single injection of GnRH or one of its agonists (i.e., Buserelin) will increase LH and FSH in the peripheral blood of cattle.

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Several reports indicate a GnRH-PGF treatment regime will increase the synchronization of estrus and ovulation (Twagiramungu et al., 1992; Pursley et al., 1995). Williams (1990) suggested that a combination of short-term calf removal and GnRH treatment of cows with good body condition would result in ovulation. The purpose of this study was to determine if treatment with GnRH 7 d before PGF increases the percentage of cows with synchronized estrus and initiates luteal activity in anestrus beef cows.

Materials and Methods

Hereford and Angus x Hereford cows (Exp. 1, n=93, 77 ± 17 d postpartum; Exp. 2, n=88, 92 ± 19 d postpartum) were classified as cyclic or anestrus based on concentrations of progesterone in plasma samples at 1 wk before (d -7) and on the day of GnRH treatment (d 0). In Exp. 1, cows had an average body condition score (BCS; 1=emaciated, 9=obese) of 4.4 and BCS averaged 4.5 in Exp. 2. In Exp. 1, cows were treated with 8 µg of Buserelin (GnRH agonist) or saline on d 0 and all cows received 25 mg of PGF_{2α} (Lutalyse; Upjohn Co.) on d 7. In Exp. 2, calves were separated from all cows for 3 d commencing 1 wk before treatment with 100 µg of GnRH or saline, and PGF_{2α} was given to all cows on d 7 after GnRH. Luteal activity of cows was evaluated by concentrations of progesterone in four weekly plasma samples after PGF_{2α}. Luteal activity after PGF_{2α} was classified into one of four categories: 1) acyclic (progesterone < 1 ng/ml in the four weekly samples), 2) normal cycle (progesterone ≥ 1 ng/ml in samples for wk 1 and 2 or wk 2 and 3 after PGF_{2α}), 3) short cycle (progesterone ≥ 1 ng/ml for only 1 wk after PGF treatment) and 4) late onset of activity (progesterone ≥ 1 ng/ml commencing on wk 3 or wk 4 after PGF treatment). Concentrations of progesterone in plasma of typical cows in each of the categories are depicted in Figure 1. The effects of treatment on estrus and luteal activity were analyzed by analyses of variance.

Results and Discussion

Experiment 1. Buserelin treatment did not affect ($P>.10$) the luteal response in either anestrus or cyclic cows (Table 1). Thirteen percent of the anestrus cows given saline had normal cycles, compared with 7% of Buserelin treated anestrus cows. Sixty-one percent of control cows had normal cycles after saline treatment compared with 79% of GnRH treated cows ($P>.10$).

Luteal activity at Buserelin treatment significantly affected the luteal response after treatment. Sixty-nine percent of cows with luteal activity at treatment with saline or Buserelin had normal ovarian cycles after treatment, while only 10% of cows lacking luteal activity at treatment exhibited normal cycles. More anestrus cows (43%) had a late onset of luteal activity after

treatment than cyclic cows. These results indicate that the ovaries of anestrous cows become functional at a later time after treatment than cyclic cows.

Experiment 2. Treatment with GnRH did not alter ($P>.10$) the luteal response in anestrous or cyclic cows (Table 2). In anestrous cows given saline or GnRH, 45% and 50%, respectively, had normal luteal cycles after treatment. If cows exhibited normal estrous cycles at treatment, a majority continued normal luteal responses (100% and 95%, for saline and GnRH, respectively). Overall, more cows exhibited normal ovarian cycles in this experiment compared with Exp. 1. This could possibly be due to the 3 d calf separation before treatment.

Luteal activity at GnRH treatment affected ($P<.05$) ovarian responses. Ninety-eight percent of cyclic cows had normal responses, compared with 48% of anestrous cows. Similar to the response in Exp. 1, more acyclic cows tended to have late luteal responses after treatment.

Increased synchronization of behavioral estrus did not occur after Buserelin treatment in Exp. 1 (30% vs 32% for saline and Buserelin, respectively). However, in Exp. 2, treatment affected ($P<.05$) the percentage of cows exhibiting estrus during the 7 d after PGF treatment. Fifty-two percent of GnRH treated exhibited estrus during this period compared with 25% of saline treated cows. Calf separation may result in a greater release of LH from pituitaries of postpartum cows. The combination of GnRH treatment and calf separation resulted in more cows exhibiting behavioral estrus during 7 d after PGF_{2 α} treatment.

In summary, treatment with Buserelin or GnRH 7 d before PGF_{2 α} did not initiate ovarian luteal cycles in anestrous suckled beef cows. Furthermore, this treatment regime did not influence luteal responses in either acyclic or cyclic cows. Treatment with GnRH after calf separation increased the percentage of cows in estrus within 7 d after PGF treatment.

Literature Cited

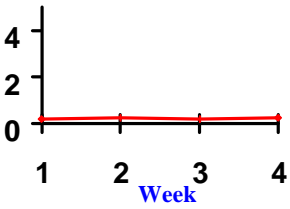
- Pursley, J.R. et al. 1995. Theriogenology 44:915-923.
Twagiramungu, H. et al. 1992. J. Anim. Sci. 70:1904-1910.
Williams, G.L. 1990. J. Anim. Sci. 68:831-852.

Table 1. Luteal response of anestrous (AN) and cyclic (CY) postpartum cows to treatment with Buserelin (BUS) or saline (SAL) (Exp. 1).

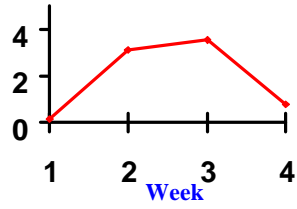
TRT	n	Luteal response (%)			
		Acyclic	Normal	Short	Late
AN-SAL	24	47	13	32	8
AN-BUS	27	37	7	52	4
CY-SAL	23	0	61	17	22
CY-BUS	19	0	79	5	16

Table 2. Luteal response of anestrous (AN) and cyclic (CY) postpartum cows to treatment with gonadotropin-releasing hormone (GNRH) or saline (SAL) (Exp. 2).

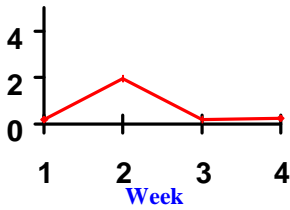
TRT	n	Luteal Response (%)			
		Acyclic	Normal	Short	Late
AN-SAL	22	23	45	27	5
AN-GNRH	22	14	50	23	13
CY-SAL	22	0	100	0	0
CY-GNRH	22	0	95	5	0



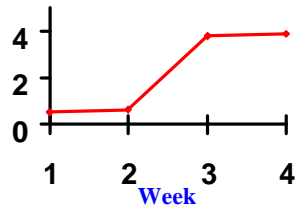
Acyclic



Normal



Short



Late

Figure 1. Progesterone profiles of luteal responses after PGF treatment.