

IMMUNIZATION OF POSTPARTUM COWS AGAINST GONADOTROPIN RELEASING HORMONE INFLUENCES THE ONSET OF LUTEAL ACTIVITY AND ESTABLISHMENT OF PREGNANCY

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Story in Brief

Ten Angus x Hereford postpartum cows were used to evaluate the long term effects of active immunization against gonadotropin releasing hormone. Five cows immunized before gestation were reimmunized approximately 30 days after parturition. Nonimmunized control cows were maintained in the same herd. The onset of luteal activity was delayed, and the interval from calving to conception was greater in immunized cows when compared to control cows. All control cows and three of five immunized cows became pregnant. We conclude that a booster immunization of cows previously immunized against gonadotropin releasing hormone results in a rapid increase in anti-gonadotropin releasing hormone titers. Resumption of luteal activity after parturition is delayed, affecting the establishment of pregnancy during the breeding season.

(Key Words: GnRH, Immunization, Luteal Activity.)

Introduction

Episodic release of gonadotropin releasing hormone (GnRH) from the hypothalamus has a primary role in the hormonal events necessary for normal reproductive function. The production of antibodies against GnRH creates an immunological barrier which prevents GnRH from reaching the anterior pituitary and stimulating the synthesis and secretion of luteinizing hormone (LH). The secretion of LH is essential for ovarian activity to occur. Neutralization of endogenous GnRH in heifers resulted in a reduction in pregnancy rate associated with an increase in antibody production (Johnson et al., 1988). In addition, the onset of pubertal cycles was delayed in heifers immunized against GnRH (Wettemann and Castree, 1988; O'Connell and

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Wettemann, 1989). The objective of this study was to evaluate the long term effects of GnRH immunization in postpartum cows.

Materials and Methods

Five Angus x Hereford postpartum cows which had been immunized against GnRH 6, 12 and 14 months prior to gestation were used to determine the long term effects of GnRH neutralization on reproduction. To enhance the immune response, GnRH was conjugated to human serum albumin (HSA) by the carbodiimide reaction. The GnRH-HSA complex was emulsified in Freund's Complete adjuvant and injected subcutaneously and intradermally into six sites in the mammary gland. Cows were given a booster immunization at 30 days postpartum. Nonimmunized control cows (n=5) were maintained in the same herd. Blood samples were obtained by venipuncture for 17 weeks to monitor antibody titers against GnRH and to quantify concentrations of progesterone in plasma. Antibody titers against GnRH were confirmed by the ability of serum dilutions to bind radiolabeled GnRH. Progesterone was quantified by radioimmunoassay. All cows were exposed to fertile bulls for a minimum of 90 days. Pregnancy was determined by rectal palpation 60 days after the end of the breeding season.

Results and Discussion

Antisera titers against GnRH increased in four of five cows within one week following reimmunization (Figure 1). Maximum antibody production was achieved one to three weeks after treatment and titers gradually declined.

Luteal activity (LA) after parturition was delayed in three of five immunized cows when compared to controls (Table 1). In one of the two remaining cows, LA was detected five days prior to immunization. After normal regression of the corpus luteum (CL), and the simultaneous increase in titer, the cow became anestrous for six weeks. The other cow was immunized seven days prior to detection of LA and titers against GnRH were probably not established rapidly enough to prevent ovulation. Progesterone concentrations over the nine weeks following treatment were elevated, and unlike those in a normal cyclic cow, indicating that pregnancy may have been established following exposure to bulls. After seven weeks, progesterone rapidly declined, suggesting that the CL had regressed.

Rectal palpation confirmed pregnancy in three of five immunized cows. All controls were pregnant. The calving to conception intervals in pregnant control and immunized cows were 74 ± 6 and 98 ± 8 days, respectively.

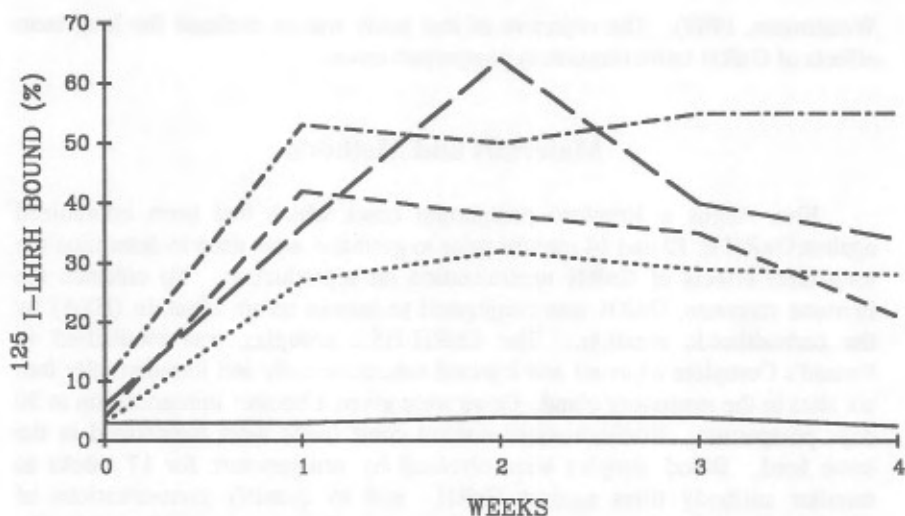


Figure 1. Antibody titers against GnRH in postpartum cows after booster immunization at week 0.

Table 1. Reproductive characteristics of immunized and control cows.

Cow	Treatment ^a	Days to LA ^b	Days exposed to bulls	Pregnant (P) or open (O)	Calving to conception, days
595	I	28 ^c	102	O	---
547	I	34 ^d	108	P	101
596	I	74	125	P	109
548	I	79	153	P	83
545	I	84	90	O	---
Controls (n=5)		63 ± 5	142 ± 5	All P	74 ± 6

^a I is immunized against GNRH.

^b Luteal activity.

^c Immunized 5 days after LA was detected - anestrus for 6 weeks.

^d Immunized 7 days before LA was detected.

We conclude that reimmunization of postpartum cows after parturition delayed the resumption of LA and caused a reduction in pregnancy rate and an increased interval from calving to conception. Immunization against GnRH is a technique to study the role of GnRH in controlling gonadotropin secretion and reproductive function in postpartum anestrous cows. This procedure also has potential to induce temporary sterility in cattle.

Literature Cited

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