

# ACTIVE IMMUNIZATION OF PREGNANT BEEF COWS AGAINST GNRH

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## Story in Brief

Active immunization against gonadotropin-releasing hormone is a method to delay or block gonad function and is also an immunological tool for disconnecting the pituitary from the hypothalamus to study endocrine control of reproduction. Eight, 4-year old crossbred beef cows were used to evaluate the response of pregnant cows to active immunization against gonadotropin-releasing hormone. Four cows were immunized one year before breeding and a booster immunization was given at five weeks post-breeding. Immunized cows did not differ from controls for gonadotropin-releasing hormone antibody titer prior to the booster administration, but titers were greater after one week in cows given the booster immunization. Immunization against gonadotropin-releasing hormone did not influence concentration of progesterone during early pregnancy. Pregnancy proceeded normally in cows immunized against gonadotropin releasing hormone and resulted in the birth of live calves.

(Key Words: Immunization, GnRH, Progesterone, Cow.)

## Introduction

Active immunization against gonadotropin-releasing hormone GnRH, a hypothalamic decapeptide, is a non-traumatic and non-surgical method of altering gonadotropin secretions. Production of antibodies against (GnRH) neutralized hypothalamic GnRH which results in a depressed synthesis and secretion of pituitary gonadotropins. Active immunization of heifers against GnRH results in a variety of reproductive dysfunctions, including delayed puberty (Wettemann and Castree, 1988), and cessation of estrous cycles and anovulation (O'Connell and Wettemann, 1989).

In the cow, presence of the corpus luteum (CL) as the source of progesterone is required for maintenance of pregnancy during the first 200 days of gestation. Basal secretion of luteinizing hormone (LH) from the anterior pituitary, is essential for maintenance of the CL of pregnancy. Because active

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immunization against GnRH reduces secretion of LH and follicle stimulating hormone it is possible that pregnancy may be compromised by a reduced luteotrophic effect of LH.

The objectives of this experiment were to evaluate the GnRH antibody response of pregnant cows, and to determine if immunization of pregnant cows against GnRH influences concentrations of progesterone in plasma and maintenance of pregnancy.

## Materials and Methods

GnRH was conjugated to human serum albumin by the carbodiimide reaction. Both primary and booster immunization utilized conjugate (100 mg) emulsified in Freund's complete adjuvant which was injected intradermally and subcutaneously in the mammary gland.

Four pregnant cows that were actively immunized against GnRH about one year previously, were given a booster immunization. Four pregnant control cows were not treated. Pregnancy was confirmed prior to treatment by ultrasound to verify the presence of an embryo (day 28 to 38).

Collection of blood was initiated at 5 weeks post-breeding. Blood for serum titers of GnRH was obtained once a week for a period of 5 weeks. Plasma to quantify progesterone was obtained twice a week for 7 weeks. Blood samples for plasma and serum were collected by venipuncture.

Plasma concentrations of progesterone and LH were quantified by radioimmunoassays and analyzed by split plot analyses of variance. Antibody titers were expressed as total percent binding of the radioactive ( $^{125}\text{I}$ ) GnRH by the diluted antiserum.

## Results and Discussion

Titers against GnRH (Figure 1) were present in cows within one week after the booster immunization (week 6 of gestation). Prior to the booster immunization, titers were similar in control and treated cows. Immunization against GnRH did not influence ( $P > .10$ ) concentration of progesterone in plasma. Concentrations of progesterone during weeks 5 through 12 of gestation averaged  $9.8 \pm 1.2$  ng/ml in cows immunized against GnRH and  $11.5 \pm 2.4$  ng/ml in control cows (Figure 2). Concentrations of LH in plasma were not influenced ( $P > .10$ ) by treatment and averaged  $1.19 \pm .10$  ng/ml in control cows and  $1.04 \pm .19$  ng/ml in cows immunized against GnRH, during weeks 6 to 12 of gestation. Normal gestations were verified by the birth of live calves at term.

We conclude that a booster immunization against GnRH in pregnant cows will result in production of antiserum titers against GnRH. Production of

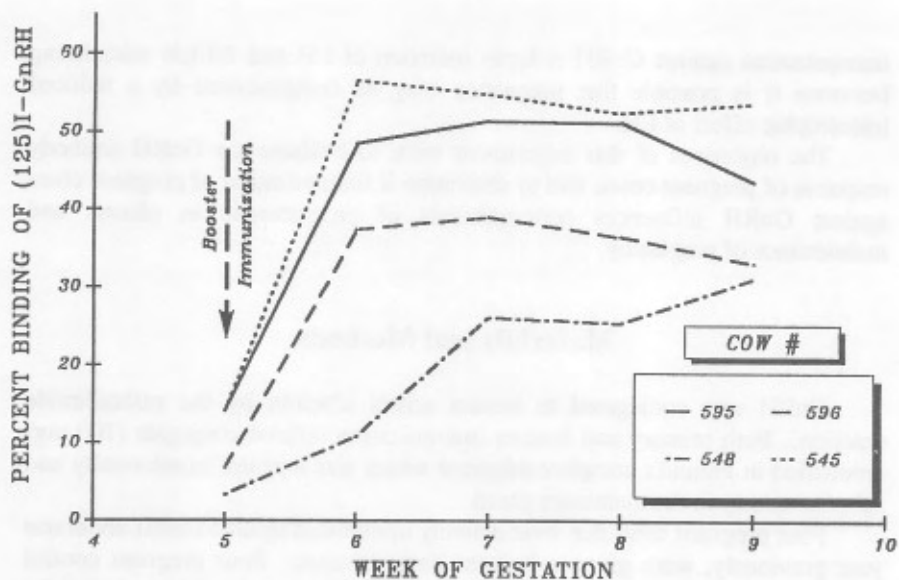


Figure 1. Antibody titers to GnRH in pregnant cows.

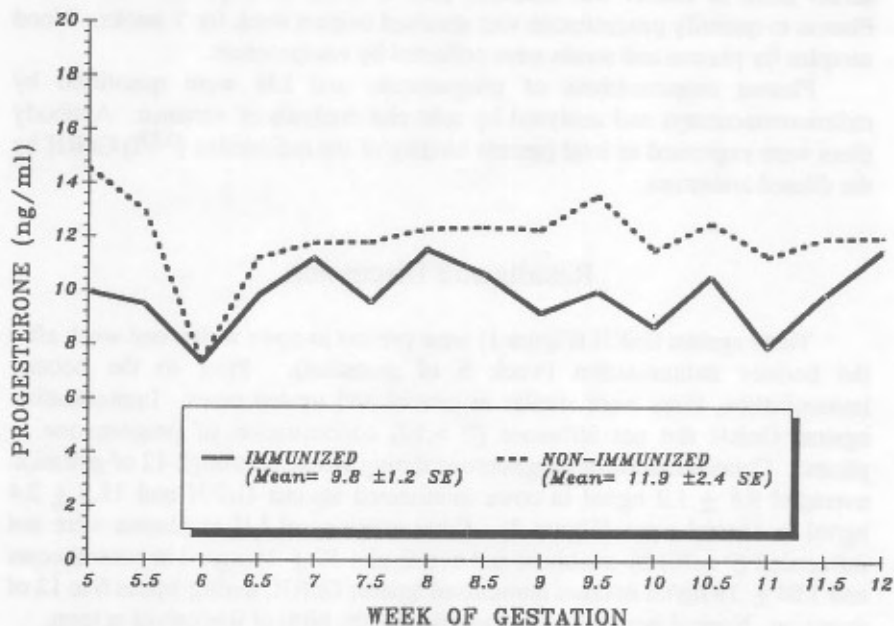


Figure 2. Concentrations of progesterone during early gestation in cows immunized against GnRH and in non-immunized cows.

antibodies against GnRH did not influence concentrations of progesterone in plasma or the maintenance of pregnancy.

### Literature Cited

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