# EFFECTS OF ACTIVE IMMUNIZATION AGAINST LHRH IN BEEF HEIFERS ON THE ONSET OF OVARIAN ACTIVITY

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## Story in Brief

Prepuberal Angus x Hereford heifers were used to determine the effect of active immunization against luteinizing hormone releasing hormone (LHRH) on the onset of luteal activity (OLA). Six heifers were immunized at 13 months of age against LHRH and six heifers were maintained as controls. Treated heifers received a booster injection 45 days after the initial immunization. All heifers responded to immunization with the production of antibodies against LHRH. Luteal activity in immunized heifers was suppressed for 22 weeks when compared to nonimmunized controls.

(Key Words: LHRH, LH, Ovarian Activity, Estrous Cycle.)

## Introduction

The release of LHRH from the hypothalamus results in the synthesis and secretion of pituitary gonadotropins which are responsible for normal reproductive function. Physical separation of the hypothalamus from the pituitary by transection of the infundibular stalk median eminence or hypothalamic lesions have been used in rodents, primates, and domestic animals as a means to study the regulation of the pituitary gland in the absence of LHRH. We have tried a different approach by neutralization of endogenous LHRH through the production of antibodies. This method could provide a useful experimental tool for studying the importance of LHRH in reproduction as well as an effective means to prevent pregnancy in heifers.

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## Materials and Methods

Twelve prepuberal Angus x Hereford heifers at approximately 13 months of age were used to evaluate the effects of immunization against LHRH. Preparation of the antigen consisted of conjugating LHRH to Human Serum Albumin (HSA) by the carbodimide reaction. Six heifers received a primary injection of LHRH-HSA conjugate emulsified in Complete Freunds adjuvant (day 0). The imulsion was injected intradermally and subcutaneously at 6 sites in the mammary gland.

On day 45 a booster immunization of conjugate in Incomplete Freunds Adjuvant was given in the same manner as the initial injection.

Blood serum and plasma were obtained weekly for 36 weeks by jugular venipuncture. Concentrations of progesterone in plasma were quantified by radioimmunoassay and used to determine the onset of OLA. Antibody titers were determined in the serum and expressed as the $\%^{125}$I LHRH bound in the serum at a dilution of 1:100.

## Results and Discussion

Luteal activity occurred at 5 1 and 27 4 weeks after the initial immunization for control and treated heifers respectively. Antibody production against LHRH as evident by increased binding of $^{125}$I-LHRH in

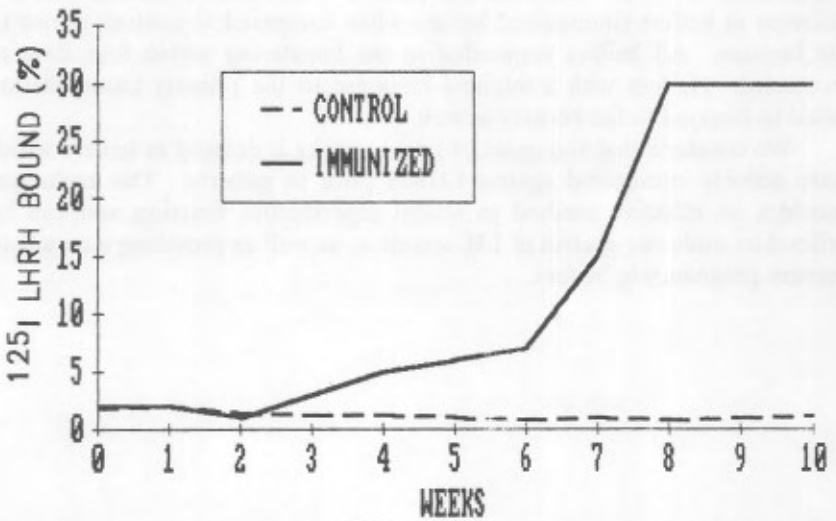


Figure 1. Binding of $^{125}$I-LHRH to serum (1:100) from control heifers and heifers immunized against LHRH.

Table 1. Antisera titers in heifers before and after (days) booster immunization against LHRH.

| Heifer | Treatment[a] | Binding (%) of $^{125}$I-LHRH to antisera (1:100) | | |
|---|---|---|---|---|
| | | -3 d | +4 d | +11 d |
| 531 | I | 1 | 5 | 7 |
| 257 | I | 1 | 7 | 5 |
| 581 | I | 2 | 4 | 19 |
| 580 | I | 2 | 21 | 62 |
| 552 | I | 7 | 16 | 40 |
| 930 | I | 28 | 37 | 48 |
| All | C | <2 | <2 | <2 |

I=immunized against LHRH and C=control

the serum occurred in response to the primary immunization by 2 to 3 weeks after treatment, with a gradual increase in titer until week 6 (Figure 1). Immunized heifers received a booster between weeks 6 and 7 and this resulted in a rapid increase in titer by week 8.

At week 10, all immunized heifers had antisera titers against LHRH and titer was not directly related to the week of onset of OLA. For example, of two heifers with the lowest titers against LHRH at week 10 , one exhibited estrus at 14 weeks as opposed to 35 weeks in the other heifer.

The responses of individual heifers to booster treatment with LHRH is depicted in Table 1. With the exception of two heifers, binding was not different in heifers (immunized heifers when compared to controls) prior to the booster. All heifers responded to the boostering within four days of treatment. Heifers with a minimal response to the primary immunization failed to respond to the booster as well.

We conclude that the onset of luteal activity is delayed in heifers which were actively immunized against LHRH prior to puberty. This technique provides an effective method to inhibit reproductive function and can be utilized to study the control of LH secretion, as well as providing a means to prevent pregnancy in heifers.