

# PLASMA ESTRADIOL AFTER IMPLANTING STEERS WITH ESTRADIOL BENZOATE

D.K. Bishop<sup>1</sup>, R.P. Wettemann<sup>2</sup>, B.S. Beard<sup>3</sup>,  
G. Cross<sup>3</sup>, J.L. Ellis<sup>1</sup>, S.D. Flock<sup>3</sup>,  
B.N. Patterson<sup>3</sup> and M.T. Spicer<sup>1</sup>

## Story in Brief

Angus x Hereford steers (n=8) were used to evaluate the rate of absorption of estradiol from estradiol benzoate-progesterone implants (Synovex-S). Steers weighed an average of 548 lb and were fed maintenance diets. All steers were implanted on Day 0 and reimplanted on Day 21. Plasma estradiol was quantified in samples collected on Day -2, -1, 0, 1, 2, 3, 7, 10, 12, 14, 17, 19, 21, 23, and 26. Half of the steers were exposed to a warm environment from Day 12 through Day 19 and the others were exposed to a cool environment. Concentrations of estradiol in plasma increased after initial implantation and following reimplantation. Concentration of estradiol in plasma were not influenced by ambient temperature.

(Key Words: Estradiol, Implant, Steers, Synovex-S, Temperature.)

## Introduction

Concentrations of estradiol in plasma of steers implanted with growth stimulants may vary and influence performance. Plasma estradiol concentrations increased in calves implanted with estradiol benzoate and progesterone, and growth rate was correlated with estradiol concentrations (Castree et al., 1988). Absorption rates of hormones from implants may change with time, and reimplanting increases estradiol concentrations and weight gains in steers (Wagner et al., 1976). The rate of absorption of hormones from implants may influence growth rate, feed efficiency and behavior of cattle. The objectives of this study were to evaluate concentrations of estradiol in plasma after an initial implanting with estradiol benzoate-progesterone (Synovex S) and after reimplanting, and to determine if ambient temperature alters concentrations of estradiol in plasma of implanted steers.

---

<sup>1</sup>Graduate Student <sup>2</sup>Regents Professor <sup>3</sup>Student

## Materials and Methods

Eight Angus x Hereford steers with an average weight of 548 lb were used in this study. All steers were implanted with 20 mg estradiol benzoate and 200 mg progesterone (Synovex-S) on Day 0 and were reimplanted on Day 21. Implants were placed under the skin in the middle 1/3 of the dorsal side of the ear. Steers were fed maintenance diets and subjected to ambient temperatures during November in Stillwater, Oklahoma. During Days 12 through 19 of treatment, 4 steers were maintained in a building where temperatures were maintained at  $87 \pm 1^\circ\text{F}$ . Ambient temperatures were recorded at 8:00 a.m. and 4:00 p.m. during the study. Rectal temperatures of steers were recorded on Day 14.

Blood samples were obtained from steers by venipuncture on Days -2, -1 and 0 prior to implanting, and on Days 1, 2, 3, 7, 10, 12, 14, 17, 21, 22, 23 and 26 after the initial implanting. Blood samples (12 h intervals) were collected for 48 h after each implanting. Oxalic acid was added to blood and samples were cooled to  $5^\circ\text{C}$  and centrifuged to recover plasma. Estradiol was quantified in plasma by radioimmunoassay.

## Results and Discussion

Concentrations of estradiol in plasma of steers are summarized in Figure 1. Estradiol concentrations increased in response to the first implant (Day 0). Maximum concentrations of estradiol in plasma after initial implantation (25 pg/ml) occurred 36 h after treatment. During the first three weeks after

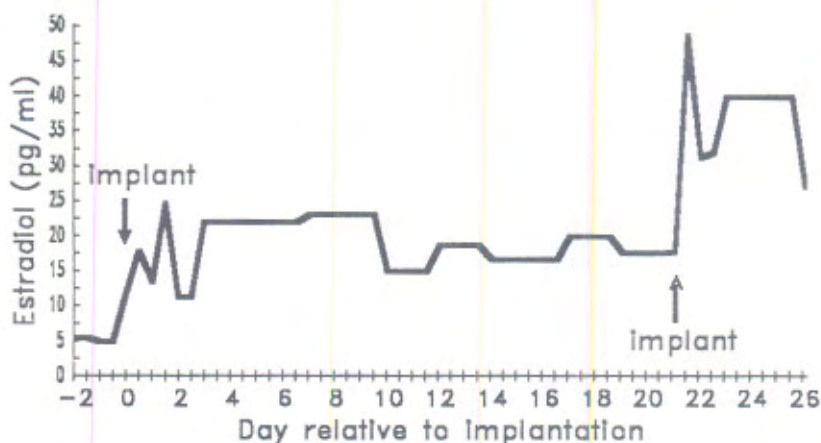


Figure 1. Concentrations of estradiol in plasma of steers after implantation with estradiol benzoate-progesterone.

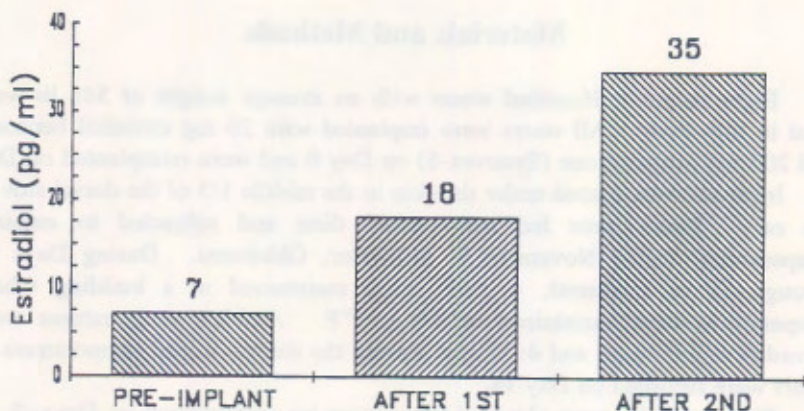


Figure 2. Mean concentrations of estradiol in plasma of steers implanted twice.

implantation, concentrations of estradiol averaged 18 pg/ml (Figure 2). Estradiol concentrations increased after reimplanting on Day 21 and averaged 35 pg/ml during the next 5 days.

Maximum ambient temperatures ranged from 48 to 77°F during the study. The average ambient temperatures during Day 12 to Day 19 of the study was  $59 \pm 1$  and  $87 \pm 1$ °F for steers housed outside and inside, respectively. Rectal temperatures of steers on Day 14 were not significantly different for animals maintained outside and inside. More extreme environmental temperatures (i.e., > 90°F) than evaluated in the present study may influence body temperature of animals and estradiol release from implants.

Implanting growing steers with Synovex-S increased concentrations of estradiol in plasma. Reimplanting steers resulted in an additional increase in estradiol concentrations in plasma. Exposure of steers to a warm environment for 8 days did not alter concentration of estradiol in plasma compared with steers exposed to a cool environment. Additional studies are needed to evaluate the influence of heat stress on concentrations of estradiol in the plasma of steers implanted with growth stimulants.

### Literature Cited

- Castree, J.W. et al. 1988. Plasma estradiol after implanting with estradiol benzoate. Okla. Agr. Exp. Sta. Res. Rep. MP-125:38.
- Wagner, D.G. et al. 1976. Reimplanting studies with feedlot cattle. Okla. Agr. Exp. Sta. Res. Rep. MP-96:65.