EFFECTS OF A CLOSTRIDIAL BACTERIN-TOXOID ADMINISTERED SUBCUTANEOUSLY AT THE BASE OF THE EAR ON STOCKER HEIFER PERFORMANCE, TESTOSTERONE SERUM CONCENTRATIONS, AND INFRARED THERMAL CHARACTERISTICS OF THE INJECTION SITE AND ADJACENT TISSUES[1]

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Summary

A 129-day field study was conducted to evaluate the effects of a clostridial bacterin-toxoid administered subcutaneously at the base of the ear on heifer calf performance, surface-ear temperature, and testosterone concentration. Two hundred previously non-implanted heifers averaging 372 lb were assigned to one of four treatments: 1) Alpha-7 (clostridial toxoid) in left neck, Synovex-H in left ear (NL); 2) Alpha-7 in left neck, Synovex-H in right ear (NR); 3) Alpha-7 in right ear, Synovex-H in opposite ear (OP); and 4) Alpha-7 in right ear, Synovex-H in same ear (SM). On day 7, the right ear of each heifer was thermographically imaged. On trial days 7, 28, 59, and 87, jugular blood samples were collected to determine if placement of the clostridial vaccine reduced serum concentration of testosterone. Although vaccinating in the base of the ear increased (P<.01) ear temperature, daily gains through 59 days were similar (P$.44) for heifers injected in the neck (NL + NR) vs those injected in the base of the ear (SM + OP). Additionally, ear temperature and animal performance were similar (P$.11) for OP and SM placements of vaccine and implant. Testosterone concentrations were similar (P>.84) for heifers implanted in the right ear and vaccinated in the same side ear or neck.

(Key Words: Infrared, Injection Site, Growth Implant, Heifers.)

Introduction

Over the past 6 years, the beef industry has encouraged the use of alternative injection sites to reduce intramuscular injection-site blemishes and has discouraged the development of products whose label requires intramuscular injection. In response to this issue, two clostridial vaccines, Alpha-7® and Alpha-CD®, have received FDA approval for subcutaneous administration in the base of the ear. Although favorable immune responses are achieved with an ear injection, placing an implant in the same ear might alter the release characteristics. The middle third of the ear is the only approved site for placement of growth-promotant implants.

Identification tags and other biological products targeted for placement at the base of the ear also might have to be placed in the same ear as growth implants. Sustained absorption of the active ingredients from the surface of the implants is required, if they are to improve carcass gain and feed efficiency. Localized tissue reactions following vaccination or antimicrobial usage might alter blood and lymph drainage from the implant site.

Experimental Procedures

Two hundred forty eight heifers averaging 372 lbs were received from Mississippi in two truckloads. Upon arrival, all heifers were weighed individually, evaluated for abnormalities, and tagged in the left ear.

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[1]Sincere appreciation is expressed to Great Plains Cattle, Pratt, Kansas for providing cattle, facilities, and assistance and to Boehringer Ingelheim Animal Health for financial support.

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Forty eight heifers were removed from the study because of horns, abnormalities, and extreme weights. The remaining heifers were allotted by weight within truck load on the basis of uniformity, breed type, frame size, body condition, and health to one of the following four treatments: 1) Alpha-7 (clostridial toxoid) in left neck, Synovex-H in left ear (NL, N = 33); 2) Alpha-7 in left neck, Synovex-H in right ear (NR, N = 33); 3) Alpha-7 in right ear, Synovex-H in opposite ear (OP, N = 67), and, 4) Alpha-7 in right ear, Synovex-H in same ear (SM, N = 67).

On the following day, each heifer received a Fusion-4® (killed/modified live IBR, BVD, PI3 and BRSV) and Bar Somnus + 2P bacterin vaccination, a vitamin ADE injection, and a mass medication with Micotil® (as per label); was wormed with Cydectin®; and was weighed and branded. All heifers were vaccinated and implanted according to treatment assignment on day 0. On day 7, all heifers were weighed individually and the back of the right ear was thermographically imaged. Each ear was examined physically to assess the presence of implants and any anatomical alteration at the site of implantation and/or vaccination. Then a second matching identification tag was placed in the right ear. All heifers were weighed individually on days 28, 56, 87, and 129 of the trial. On days 7, 28, 59, and 87, blood samples were obtained (left jugular vein) for testosterone analysis.

A one-way analysis of variance was used initially to model the effects of treatment on ear temperature, interim-weight, and daily-gain variables. Orthogonal contrasts were used to make direct comparisons of surface temperature and animal performance between the different combinations of implant and vaccine sites. This method was used to test: 1) the null hypothesis of no difference between neck (NL and NR) and ear (OP and SM) vaccination, 2) vaccination in the neck and implant in right vs. left ear (NL vs. NR), and 3) vaccination in the right ear and implant in the right vs. left ear (OP vs. SM).

Results and Discussion

Heifers injected in the ear had higher ear temperatures. No differences ($P>.44$) with regard to vaccination placement (neck vs. ear) occurred in weight gain from 0 to 28, 29 to 59, and 0 to 59 days. However, over the entire 129-day period, heifers injected in the neck gained faster ($P=.02$). Although ear temperatures were similar ($P=.28$) between the NL and NR treatments, weight gain was greater ($P<.04$) for calves implanted in the right ear (NR) over all weigh periods. With vaccination in the ear, ear temperature and growth performance were similar ($P>.11$) for calves implanted in either the left or right ear. We have no explanation for the significant gain response for the NR treatment relative to the other three treatments.

All blood samples came from the left jugular. Figure 1 shows that at all sampling times, serum testosterone was higher for heifers with the left ear implant (NL and OP vs NR and SM). The similar testosterone concentrations observed between treatments NR and SM suggest that serum testosterone was not affected by vaccination with Alpha-7 in the same ear as the growth implant. Serum testosterone values peaked at 28 days post-implantation. Implanting and vaccinating in the same ear did not alter performance when compared to implanting and vaccinating in opposite ears.

Table 1. Effect of Clostridium Bacterin-Toxoid Administered Subcutaneously at the Base of the Ear on Calf Performance and Infrared Thermal Characteristics of the Ear

	Treatments					Contrasts		
Item	NL	NR	OP	SM	SE	Neck vs Ear vacc (NL+NR) vs (OP+SM)	Neck vacc site (L) R vs L ear implant (NL vs NR)	Ear vacc site (R) R vs L ear implant (OP vs SM)
Ear temp. °C	28.6	29.1	29.4	29.8	0.24	<.01	.28	.16
Wt gain 0-29 d	28	36	30	31	2.2	.44	.04	.46
Wt gain 29-59 d	50	61	52	57	2.9	.84	.03	.16
Wt gain 0-59 d	78	97	82	89	3.7	.49	<.01	.11
ADG, 129-d	1.63	1.87	1.64	1.66	0.04	.02	<.01	.64

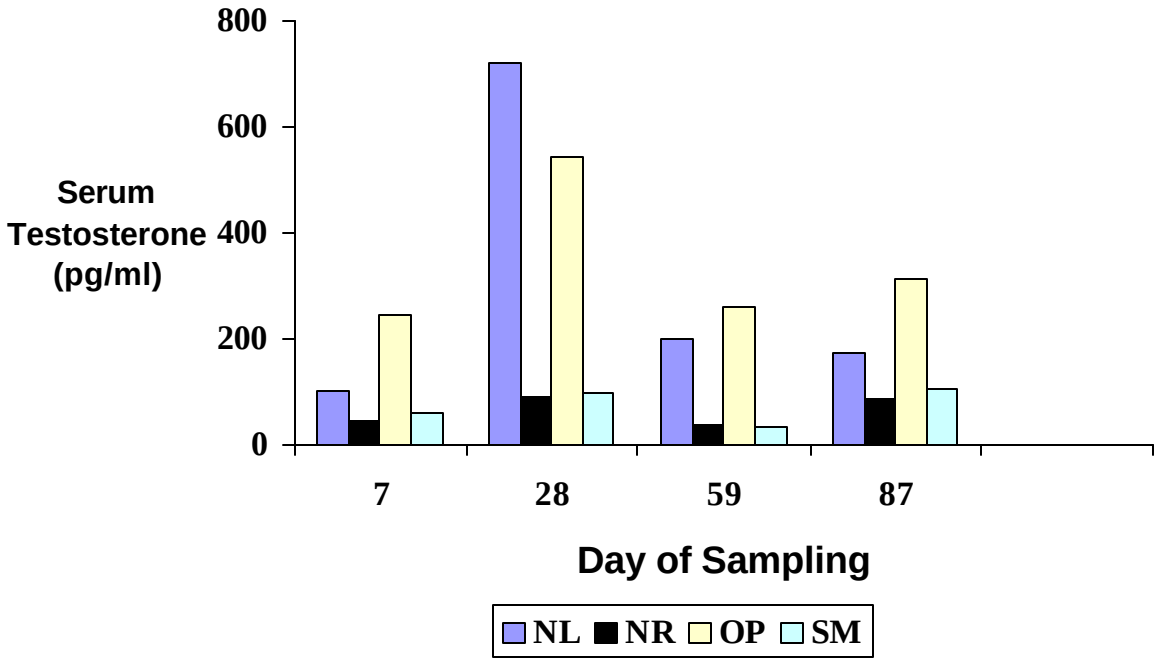

Figure 1. Testosterone Levels in Heifers from Serum Collected on the Same Side (NL and OP) or Opposite Side (NR and SM) from the Ear Bearing a Growth Implant.