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Abstract
Infrared thermography (IRT) can be used successfully to differentiate abscessed implanted ears from nonimplanted ears 8 days postimplanting. Abscessed ears averaged 5.7EF warmer than nonimplanted ears when ambient temperature was 60 to 63EF. Average daily gain and feed efficiency were reduced 8.9% and 8.3%, respectively, over the 91-day feeding period for cattle with abscessed implants compared to cattle with normal implants. Dry matter intake was not affected by an abscessed implant and averaged nearly 18.0 lb/head/day for both treatment groups. Abscessed implants reduced economic return by $17.70 per head.

Keywords
Cattlemen's Day, 1999; Kansas Agricultural Experiment Station contribution; no. 99-339-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 831; Beef; Infrared thermography; Abscessed implants; Feedlot performance

IMPLANT QUALITY ASSURANCE: DETECTION OF ABSCESSED IMPLANTS AND THEIR EFFECT ON FEEDLOT PERFORMANCE OF BEEF HEIFERS[1]

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Summary

Infrared thermography (IRT) can be used successfully to differentiate abscessed implanted ears from nonimplanted ears 8 days postimplanting. Abscessed ears averaged 5.7EF warmer than nonimplanted ears when ambient temperature was 60 to 63EF. Average daily gain and feed efficiency were reduced 8.9% and 8.3%, respectively, over the 91-day feeding period for cattle with abscessed implants compared to cattle with normal implants. Dry matter intake was not affected by an abscessed implant and averaged nearly 18.0 lb/head/day for both treatment groups. Abscessed implants reduced economic return by $17.70 per head.

(Key Words: Infrared Thermography, Abscessed Implants, Feedlot Performance.)

Introduction

Growth-promoting implants that combine strong estrogen and an androgen are reported to improve average daily gain by 14.8% and feed efficiency by 7.5% for feeder heifers. They are intended to be placed aseptically as a series of pellets in the subcutaneous tissue of the middle one-third of the back of the ear. Feedlot implant audits by Fort Dodge Animal Health for 1996 and 1997 found 6.0% (range by state = 2.2 to 33.3%) of 109,388 implants to be classified as problem implants: abscessed following placement; missing at audit; or improperly placed in the ear, such as bunching or crushing of pellets or pellets placed in the cartilage. Abscess formation and its sequelae accounted for over 60% of the observed problem implants. The effect of abscessed implants on performance has not been well documented. This trial evaluated the thermographic appearance of ears following the placement of aseptic or septic implants in the ears of feedlot heifers and the performance of those cattle during a 91-day growing period.

Experimental Procedures

A total of 72 British crossbred heifers (400 to 550 lb) were assigned to one of two treatment groups in May,1997. Group A (normal implant) received a Synovex®-H (200 mg testosterone + 20 mg estradiol benzoate, Fort Dodge Animal Health, Overland Park, KS) implant in an ear washed with a brush saturated with Nolvasan® solution (Fort Dodge Animal Health) at 6 oz. per gallon of water. Group B (abscessed implant) received a Synovex-H implant in an ear to which a slurry of water and cattle feces had been applied immediately prior to and after implanting. The nonimplanted ear served as the control for thermographic evaluation. The heifers were stratified by weight and fed in pens of six head each with a total of six replicates per treatment. The heifers were fed once per day a sorghum silage plus dry rolled corn ration (Table 1) for a 91-day growing period. Feed consumption, weight gain, and gain efficiency were recorded for each pen. Thermal

[1]The authors express their appreciation to Fort Dodge Animal Health for providing grant support and survey data for this research.

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imaging was done on unrestrained cattle in their pens 8 days after implantation. The front of each ear was imaged from a distance of 6 to 24 feet. A high resolution, short wave (3 to 5 um), infrared thermal imaging camera (Radiance PM®, Amber Engineering, Goleta, CA) was used. An analysis of a rectangular area on the front of each ear was made to determine minimum, maximum, and mean temperatures. Analysis of variance was used to determine the relationship between mean ear temperature (response variable) and treatment. Least square mean temperatures of ears having normal and abscessed implants were compared to those of nonimplanted control ears using Tukey's correction for multiple comparisons. Analysis of variance was used to evaluate average daily gain (ADG), feed intake, and gain efficiency over the 91-day feeding period.

Results and Discussion

Ambient temperature during the thermal observation period was 60 to 63EF. Abscessed ears were warmer (P<0.001) than nonimplanted ears. Mean ear temperatures were 79.0±0.5EF for nonimplanted; 81.0±0.6EF for implanted, non-abscessed; and 84.7±0.6EF for abscessed ears. No difference (P=0.15) was found between nonabscessed and nonimplanted ears. Abscessed implants reduced (P<.05) average daily gain over the 91-day feeding period (2.92 vs. 3.18 lb/day) (Table 2). Total weight gains were 291 vs. 267 lb/head for normal vs. abscessed implants. Dry matter intakes of 18.01 lb for normal and 17.97 lb for abscessed implant groups were not affected (P=0.97) by treatment. Though not significant (P=0.11), efficiency (gain/feed) tended to be higher for nonabscessed heifers (0.178 vs. 0.163) corresponding to feed/ gains of 5.62 vs. 6.13.

For the 91-day growing period, cattle with abscessed growth implants showed $17.70 lower return per head compared to their counterparts with nonabscessed implants. That number is based on a 650 lb heifer price of $74/cwt and a ration cost of $120 per ton.

Infrared thermography (IRT) can be used as part of an implant quality assurance program when cattle are screened in the pen within 8 days of implanting. The use of IRT as a screening tool would eliminate multiple handling of cattle, would provide a rapid assessment of implanting technique as compared to conventional quality assessment programs, and would decrease reliance on quality audits at slaughter.

Table 1. Composition of Diet Fed to Heifers

Ingredient	% of DM
Dry rolled corn	45.60
Sorghum silage	40.00
Soybean meal	10.80
Dicalcium phosphate	1.33
Limestone	1.22
Urea	.67
Premix[a]	.38

[a]As formulated premix provided .30% salt, 1200 IU Vit A/lb., 48 ppm Mn, 48 ppm Zn, .23 ppm Se, 8.0 ppm Cu, .50 ppm I, .04 ppm Co, and 25 g/ton monensin.

Table 2. Effects of Abscessed Growth Promotant Implants on Feedlot Performance of Beef Heifers [a]

	Abscessed		Non-Abscessed		
Item	Mean	SEM	Mean	SEM	P-value
ADG	2.92	.65	3.18	.77	.02
DMI	17.97	.75	18.01	.80	.97
Gain:Feed	.163	.006	.178	.005	.11

[a]Average initial weight of both treatment groups was 446 lb.