Compudose — A Long-Lasting Implant for Pastured and Feedlot Steers

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Story in Brief

Compudose implants, new long-lasting growth stimulants, were administered to steers in two trials. Implants were solid or coated with the active ingredient estradiol; coated implants ranged from .25 to 1.5 in. in length. The first trial had three periods—suckling (140 days), grazing (120 days) and feedlot (139 days). Implants were administered at the start of the suckling phase. Gains were not significantly increased during the first two periods, but during the feedlot period, gains were increased 11.7 percent, and feed efficiency was improved a mean of 7.4 percent with 1-in. coated Compudose implants. The second trial was divided into two periods—grazing (104 days) and feedlot (84 days). Implants were administered at the start of the grazing period. Pasture gains were not significantly increased during the grazing period. On the average, implants increased rate (3.6 percent) and efficiency (5.7 percent) of gain during the feedlot period. Combining trials, Compudose implants increased rate and efficiency of gains during the feedlot period of steers implanted 104 to 260 days earlier. Coated implants with a length of 1 in. gave the greatest response. These data indicate that the implants worked very well. This new concept shows promise of improving the efficiency of beef production.

Introduction

Commercially available growth promoting implants effectively increase rate and efficiency of gain in cattle. Responses in weight gain are restricted to the period of release of drug from the implant, usually 75 to 100 days. To maintain beneficial effect of implants beyond 100 days, reimplantation is necessary.

A new implant (to be marketed under the trade name COMPUDOSE by Elanco Products Division of Eli Lilly Company) has been developed. This implant has several advantages: 1) release of compound from the surface is controlled to prevent any burst effect and to reduce the chance of side effects due to implant crushing, and 2) the active hormone is estradiol 17-beta, a naturally-occurring estrogen.

Compudose is an implant with greater longevity. The hormone is released uniformly for up to 400 days. To test these implants, calves were implanted in two trials, and gain and efficiency were measured during subsequent grazing and feeding periods.

Experimental Procedures

Experimental implants were constructed by mixing a nonpolymerized silicone rubber with microcrystalline estradiol 17-beta, adding catalyst and molding in long cylinders 4.7 mm in diameter. Implants were then cut to the desired length.

Implants were prepared in both solid and coated forms. The coated implant had the same outside dimension as the solid implant; however, the core of the coated implant was composed of nonmedicated silicone rubber (Dow Corning MDX-4210). The coating was .500 mm thick and had the same composition as the solid implant. Coating reduced the amount of drug which was needed in the implant. The active drug, estradiol, migrates through the silicone rubber at a constant rate. Release of compound is proportional to the drug concentration on the surface of the implant which contacts animal tissue.

The release pattern of hormone from the implant appeared to be relatively constant throughout the 399 days of this test.

Suckling phase: Trial 1

Sixty crossbred steer calves from the Kerr Foundation herd at Poteau, Oklahoma, ranging in age from 60 to 138 days, were divided on the basis of sire into one of six experimental groups. Table 1 shows the experimental treatments.

Table 1. Experimental design

Length of implant	Type	Number of steers
1.00 in.	control	10
1.00 in.	solid	10
0.25 in.	coated	10
0.50 in.	coated	10
1.00 in.	coated	10
1.50 in.	coated	10

The control implant was made of non-medicated silicone rubber (Dow Corning MDX-4210).

The calves were implanted on February 24, 1976. The cows and calves were placed on tall fescue winter pastures. Treatments were divided into two replications. One replication grazed pasture not previously grazed while the other grazed a pasture which had been grazed. Both pastures provided adequate forage. After 56 days, the cows and calves were moved to pastures containing both fescue and ladino clover. Calves were run with the cows for 140 days before weaning.

Growing phase: Trial 1

Following weaning, the cattle in trial 1 were pastured as a group for 120 days on pastures consisting of dormant fescue, fescue and ladino clover, or hybrid sudan. Pasture conditions were unfavorable due to extreme drought.

Feedlot phase: Trial 1

The cattle were trucked to Stillwater and fed in 14 pens at the Beef Cattle Center with two replicate pens per implant treatment. The diet consisted of whole shelled corn and supplement with cottonseed hulls for roughage. Rumensin was included at 30 grams per ton. The animals were fed 139 days on test, at which time the cattle were weighed after an overnight stand without feed or water. The implants were removed, and the cattle were fed for 35 additional days.

Growing phase: Trial 2

Ninety-six yearling three-way-cross (H x A) x Charolais steers were divided into six treatment groups as listed in Table 1 with 16 steers per treatment. Steers grazed native range near Arnett, Oklahoma, for 104 days.

Finishing phase: Trial 2

Steers were trucked to Goodwell, Oklahoma, and fed in 12 pens for 84 days and an additional 42 days after removal of implants. The diet was the same as used in trial 1.

Results and Discussion

The results from trial 1 are shown in Table 2.

Table 2. The effect of Compudose implants of various lengths on weight gains, trial 1

Implant length	Type	Suckling 140 days	Growing 120 days	Finishing 139 days
1.00	Control	1.94	.88	2.40
1.00	Solid	2.10	1.05	2.41
0.25	Coated	2.01	.99	2.30
0.50	Coated	1.94	.86	2.69
1.00	Coated	2.00	1.03	2.68
1.50	Coated	2.04	.97	2.48

The improvement in gain due to the implants was most pronounced in the feedlot phase. This was probably because gains during the suckling and stocker periods were restricted by drought conditions and poor pastures.

The effect of the implants on both gain and feed efficiency were measured during the feedlot phase (Table 3). Because of the long withdrawal period, weight gains are expressed as a shrunk basis, not a carcass basis as they usually are. No differences in carcass traits were apparent. Blood samples were taken 288 days after implanting and plasma estradiol 17-b levels determined using 10 control steers, 10 steers with 1.00-in. solid, and 10 steers with 1.00-in. coated implants. The results of these assays are shown in Table 4.

Table 3. The effect of various dose levels of Compudose on feedlot and gain efficiency, trial 1

Implant length	Type	Initial weight	ADG lb	ADF lb	F/G
1.00	Control	596	2.40	14.97	6.24
1.00	Solid	630	2.41	15.63	6.47
0.25	Coated	596	2.30	14.48	6.30
0.50	Coated	571	2.69	15.26	5.68
1.00	Coated	618	2.68	15.44	5.78
1.50	Coated	609	2.48	15.65	6.31

Results of the pasture and finishing periods of trial 2 are presented in Table 5. Gains were not significantly increased during either period with implants although gain and efficiency were improved by 3.6 and 5.7 percent, respectively, by implants.

Table 4. Plasma estradiol of steers, trial 1

Implant length	Type	Number of animals	Plasma pg/ml	E_2[b] SE
1.00	Control	10	1.5	0.8
1.00	Solid	10	6.8	4.4
1.00	Coated	10	4.3	1.8

Table 5. Performance of cattle, trial 2

Implant length	Type	Pasture gain, lb	Feedlot gain, lb	Total gain	Feed to gain ratio
1.00	Control	2.00	3.30	2.58	6.04
1.00	Solid	2.15	3.62	2.81	5.91
0.25	Coated	1.99	3.62	2.72	5.72
0.50	Coated	1.97	3.33	2.58	5.62
1.00	Coated	2.06	3.73	2.48	5.61
1.50	Coated	1.98	3.74	2.77	5.54

Results from these two trials have been combined for comparison in Table 6. Greatest rates of gain were for steers which received 1-in. solid or coated implants, with an average increase of 9 percent over the control implanted steers. Coated implants appeared as effective as solid implants. Efficiency of feed use was best for steers with the 1-in. coated implants. Shorter implants had less effect on performance. Increased rates of gain are usually observed with implants for pastured steers. Failure to see a response in these two trials may be attributed to the lack of available grass.

Table 6. Combined results, trials 1 & 2

Implant length	Type	Pasture gain, lb	Feedlot gain, lb	Total gain, lb	Feed to gain ratio
1.00	Control	1.72	2.85	2.02	6.13
1.00	Solid	1.88	3.02	2.19	6.09
0.25	Coated	1.77	2.96	2.10	5.92
0.50	Coated	1.71	3.01	2.06	5.79
1.00	Coated	1.80	3.21	2.21	5.70
1.50	Coated	1.88	3.11	2.14	5.97