

EFFECTS OF TWO GROWTH PROMOTANTS ON
LIVEWEIGHT GAINS IN GRAIN- AND GRASS-FINISHED ZEBU CROSSBRED STEERS

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SUMMARY

Four experiments were undertaken with 2-3-year-old zebu crossbred steers to assess liveweight gains and side effects following a single ear implantation of 36 mg zeranol (ZERA) or 140 mg trenbolone acetate combined with 20 mg oestradiol 17 β (TBAO), compared with non-implantation. Experiments 1 and 2 involved the ad lib. feeding of 96% crushed grain to 5/8 Brahman- or 3/4 Santa Gertrudis-crossbred (SG) steers for 72 or 100 days post-implantation respectively. In experiments 3 and 4, 5/8 Brahman crossbred steers grazed pastures of Para grass (*Brachiaria mutica*) and marine couch (*Sporobolus virginicus*) for 89 or 92 days post-implantation.

In all experiments the two implants produced additional liveweight gains in treated steers compared with non-implanted steers. The ZERA- and TBAO-implanted steers on average gained an additional 13.6 and 30.6 kg respectively, compared with the non-implanted controls. While no side effects were apparent in three experiments, 4.3, 20.8 and 0.0% of the ZERA-, TBAO- and non-implanted SG steers respectively, were affected by preputial prolapse in experiment 2. Three in 23 (13.0%) of the TBAO-implanted SG steers in this same experiment developed a 'staggy' appearance. The commercial relevance of these results is discussed.

(Keywords: growth promotants, zeranol, trenbolone acetate, oestradiol 178)

INTRODUCTION

Zeranol (Ralgro, International Minerals & Chemical Corporation) (ZERA) was first introduced into the Australian beef industry in 1979 and has demonstrated its ability to increase liveweight gains of steers in a number of environments (Sammons 1980; Hodge et al. 1983). A new growth promotant comprising 140 mg trenbolone acetate and 20 mg oestradiol 17 β (Revalor, Rouse11 Uclaf Ltd) (TBAO) became available for experimental evaluation in Australia in 1983. This new implant, like zeranol, has the potential to be used in both intensive- and pasture-finished situations to stimulate growth in steers during the final 3-4 months prior to slaughter. The series of Queensland experiments reported in this paper aimed to assess the potential of TBAO to increase growth rates in such steers, in comparison with those of non-implanted and ZERA-implanted steers on grain- and grass-finished diets. Local information was also required on the occurrence of any side effects in treated zebu crossbred steers, especially since none had occurred in such ZERA-implanted steers in an earlier series of experiments (Hodge et al. 1983).

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MATERIALS AND METHODS

In all experiments pasture-reared steers aged 2-3 years, were randomly allocated to the three treatment groups and were either implanted subcutaneously on the dorsum of the ear with ZERA or TBAO, or not implanted, at experiment commencement, according to the manufacturers' directions. All steers shared common enclosures in each of the experiments and live weights recorded were unfasted.

Experiment 1

Seventy-one 5/8 Brahman 3/8 Shorthorn steers were lot-fed for a period of 72 days post-implantation, commencing on 10 October 1983. The ration, which was fed on an ad lib. basis, comprised 96% by weight of crushed maize and 4% commercial feedlot premix. The feedlot was located in a coastal tropical environment near Townsville (19° 16'S, 146° 49'E).

Experiment 2

Seventy-one 3/4 Santa Gertrudis 1/4 Hereford steers were lot-fed for 100 days post-implantation, commencing on 13 September 1983. The ad lib. diet comprised 96% grain by weight, 1% molasses and 3% feedlot premix. The actual grains used varied according to managerial preference, where crushed sorghum and barley were fed in the early stages and gradually changed over to barley, triticale and oats. This feedlot was located in a subtropical environment near Toowoomba (27° 34'S, 151° 57'E).

Experiments 3 and 4

In experiment 3, ninety 5/8 Brahman 3/8 Shorthorn steers aged 2-3 years grazed a pasture comprising Para grass (*Brachiaria mutica*) and marine couch (*Sporobolus virginicus*) over an 89-day period commencing on 2 February 1984. In experiment 4, eighty-nine 5/8 Brahman 3/8 Shorthorn steers aged 2-3 years grazed a similar pasture to experiment 3 and represented the next annual crop of steers on the same property. This was located 50 km south of Townsville in a coastal tropical environment. Following the initial weighing and treatment of steers on 12 March 1985, they were finally weighed 92 days later.

Statistical analysis

Liveweight data were analysed by analysis of variance. Where appropriate, analysis of covariance was used with initial liveweight as the concomitant variable. Differences between treatment means were tested using the protected least significant difference procedure, which requires the F-test of treatments in the analysis to be significant before treatment means are compared. Differences in the incidence of side effects between treatments were tested by calculating a standard normal test statistic (Johnson and Leone 1964).

RESULTS

Average daily gains of 1.04, 1.59, 0.78 and 0.48 kg/day were recorded in the non-implanted steers in experiments 1, 2, 3 and 4 over 72, 100, 89 and 92 days respectively. The ZERA-implanted steers gained 2.5 (N.S.), 18.5 ($P<0.05$), 18.7 ($P<0.01$) and 14.9 kg ($P<0.01$) more live weight than the non-implanted steers in these four experiments. In the same experiments, the TBAO-implanted steers gained 32.4, 31.0, 27.5 and 31.6 kg (all $P<0.01$) more than the non-implanted steers - Table 1. On average, the ZERA- and TBAO-implanted steers gained an additional 13.6 and 30.6 kg respectively, compared with their non-implanted contemporaries.

Table 1 Effect of implantation with two growth promotants on live weight (kg) of steers in four experiments

Expt. No.	Implant treatment	No. of steers	Initial wt (kg)	L'wt gain over expt. period (kg)	Expt. period+ (days)
1	Nil	23	293.4	75.1 ^a	72
	ZERA	24	291.3	77.6 ^a	72
	TBAO	24	285.9	107.5 ^b	72
	LSD++		(12.5)	(12.3)	
2	Nil	24	426.0	159.6 ^a	100
	ZERA	23	421.3	178.1 ^b	100
	TBAO	23	430.1	190.6 ^b	100
	LSD		(16.6)	(17.2)	
3	Nil	31	363.4	69.1 ^a	89
	ZERA	31	353.6	87.8 ^b	89
	TBAO	28	360.3	96.6 ^c	89
	LSD		(20.8)	(8.1)	
	Nil	30	419.8	44.0 ^a	92
	ZERA	29	429.3	58.9 ^b	92
	TBAO	30	424.0	75.6 ^c	92
	LSD		(26.6)	(8.4)	

abc Within each experiment, figures in columns with different superscripts differ significantly ($P < 0.05$)

+ Experimental periods: Expt. 1 10 Oct 83 - 21 Dec 83;
Expt. 2 13 Sep 83 - 22 Dec 83; Expt. 3 2 Feb 84 - 1 May 84;
Expt. 4 12 Mar 85 - 12 Jun 85

++ LSD Least significant difference ($P < 0.05$)

Side effects

One ZERA- and five TBAO-implanted steers developed a prolapse of the prepuce between 7 and 14 days after implantation in experiment 2 - Table 2. These were sufficiently oedematous and infected to warrant veterinary treatment. Apart from one TBAO-implanted steer, all prolapses regressed within 10 days. The animal whose prolapse did not regress was culled from the experiment. Between 90 and 100 days after implantation three of the TBAO-implanted steers developed a strongly masculine appearance or 'stagginess', including a pronounced neck crest - Table 2.

Table 2 Incidence of side effects in 3/4 Santa Gertrudis steers in three treatment groups in experiment 2

<u>Side effect</u>	Nil	ZERA	TBAO
Preputial Prolapse	0/24 ^a	1/23 ^{ab}	5/24 ^b
'Staggy' appearance	0/24 ^a	0/23 ^a	3/23 ^a

ab Figures in rows with difference superscripts differ significantly ($P < 0.05$)
5/24 indicates that 5 in 24 animals were affected

DISCUSSION

The increased liveweight gains attributable to a single implantation of TBAO compared with ZERA are noteworthy. The results suggest that the use of either product would be warranted in both lot- and pasture-fed situations to increase live weights in finishing steers. Economic assessment would necessarily involve selling steers on a weight basis, and would depend upon current market prices, as well as implant and handling costs. No explanation can be given for the reduced liveweight gain in the ZERA treatment of experiment 1. However the ZERA implants used originated from the same manufacturer's batch and were administered by the same operator as the other north Queensland experiments. Occasional situations arise where such unpredictable responses occur with various growth promotants (K.F. Howard pers. comm.). The additional liveweight gain attributable to a single ZERA implantation in the remaining three experiments averaged 17.4 kg, which was similar to the 19.3 kg average recorded after 60-93 days in six experiments with zebu crossbred steers in an earlier series of experiments (Hodge et al. 1983).

Preputial prolapse has been occasionally observed following the administration of various growth promotants to steers on both feedlot and pasture diets, usually between 7 and 14 days post-implantation (R.A. Barnett and A.W. Plasto pers. comm.). The condition appears to be associated with an inflammation of the prepuce and usually regresses without treatment. In some years steers of a number of different genotypes have been affected, especially in individual animals which were endowed with very pendulous prepuces (R.A. Barnett unpublished data). Prolapse was not observed in the other three experiments of this study, or in the previous series which involved Brahman-cross and Droughtmaster steers (Hodge et al. 1983). Nevertheless its occurrence should create an awareness that the use of growth promotants may result in occasional undesirable side effects. Also, the development of a 'staggy' appearance, as observed in a proportion of the TBAO implanted steers in this same experiment, could result in buyer prejudice at saleyard auctions. However, it would be unlikely to affect prices where they were sold directly to an abattoir.

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