RESPONSE IN LIVESTOCK AND CARCASE GAIN TO TYPE OF ANABOLIC AGENT AND REPEAT IMPLANTATION OF STEERS AND HEIFERS ON FEEDLOT

G.J. Sawyer, M.P. Jennings, D.J. Barker and R.H. Casey

SUMMARY

An experiment using 610 steer and heifer calves compared the weight gain and carcase characteristics of cattle treated with the short-acting anabolics Ralgro and Synovex and two new as yet unregistered products, Crestar F and M. The consistency and duration of response, and the effect of re-implantation after 42 days were measured. Overall, when both sexes were combined, there were significant increases in weight gain due to growth promotant treatment (p<0.001) ranging from 6.5% for Ralgro to 15.6% for Synovex, but no significant difference in effectiveness between the products. The pattern and duration of response to all agents did not differ with sex or treatment, though steers grew faster than heifers (p<0.001). There was no further benefit of repeat implantation with either of the oestrogen-based products. All treatments increased the carcase weight of treated cattle without an increase in the level of fatness.

Keywords: weight gain, carcase, repeated anabolic agents.

INTRODUCTION

Ralgro has been especially popular for growth promotion in steers in intensive production systems where weight gains may be increased by 10-15% (8-20 kg) (Geldorf and Wellington 1981; Hodge et al 1983). Recently developed products use the naturally occurring steroids including oestradiol 17β (Compudose) or pellets incorporating oestradiol and progesterone or testosterone (Synovex). Comparisons between these products or combinations with trenbolone acetate (TBA) (Keane and Sherington 1985), have been reported for lot fed and winter finishing systems in Europe. Few comparative studies are available for beef production systems in Australia.

Clarification is needed on the effects of repeated implantation of anabolic agents, when the finishing period is longer than the expected duration of activity of the product. Response to repeated implantation of Ralgro was inconsistent even when planes of nutrition were high and growth rates of untreated cattle were at least 0.8 to 0.9 kg/day (Sammons 1980; Hodge et al. 1983; Mason et al.1984). Sawyer (1987) suggested that further weight gains in calves may be forthcoming from repeat implantation because some products acted for a shorter period than claimed by the manufacturers. This study compared weight gain and carcase characteristics of weaned steer and heifer calves treated with the short-acting anabolics currently used in Australia and two new unregistered products, Crestar F and M. The consistency and duration of response, and the effect of repeat implantation of these anabolics were also examined.

MATERIALS AND METHODS

Animals and Management

The experiment used 305 steer and 305 heifer calves (8 to 11 months of age) on two properties at Capel and Busselton in the south west of Western Australia. Predominant breeds included Hereford, Angus, Angus x Friesian, Hereford x W.A. Department of Agriculture, P.O. Box 1231, Bunbury, 6230. W.A.
Friesian, Devon or Devon x Hereford. Distribution of breeds within treatment was even. Animals were kept in paddocks of four ha with all treatments equally represented in each mob. Cattle were given an intrarumenal injection of **oxfendazole** (1 ml/50 kg weight), and vaccinated against clostridial diseases with a "5 in 1" vaccine.

On the first property animals were, as a group, offered a complete diet ad lib. consisting of milled meadow hay, apple pomace, barley and lupin grain. Weekly samples averaged 66% dry matter digestibility (DMD) (McLeod and Minson 1978) (range 57.3-76.4) and 10.3% crude protein (CP) (range 8.2-14.0). Average consumption of these diets was 8.3 kg D.M. head/day (steers) and 7.8 kg D.M. head/day (heifers). The digestibility of the diets was gradually increased by incorporation of more barley and lupin grain only after the first five weeks to avoid animals fattening too early. On the second property animals were offered long hay ad lib. (55.4% DMD and 9.3% CP), and a barley urea mix which was 85% DMD and 15.4% CP, but intakes were not monitored.

**Experimental procedure**

On the first property 180 steers and 180 heifers were allocated at random to six treatments as detailed at the foot of table 1. On the second property 125 steers and 125 heifers were similarly allocated to treatments one to five only. Implants were given subcutaneously according to the manufacturer's directions. Animals were weighed direct from the feedlot paddocks at allocation (day 0) and day 21, 42, 63, 84 and 105. Implant sites were checked on days 21, 42 and 63 and there were no losses. Animals were sent to slaughter from day 63 onwards and cold carcase weights and fat depth data at the 10th/11th rib site from 258 carcases were recovered.

**Statistical analysis**

Weight gains were analysed for the main effects and first order interactions of treatment, sex and property using analyses of variance generated by GENSTAT regression routines, with the weight at allocation fitted as a covariate. Initial weight and days on feed were used as covariates in analyses of variance conducted on carcase weight, backfat thickness and dressing percentage data.

**RESULTS**

**Live weight gains**

Despite significant property effects (p<0.001), probably due to management strategies to reduce the rate of fattening of females, there was no significant interaction of property and treatment. There were significant effects of growth promotant treatments (p<0.001) and sex (p<0.001) on weight gains (Table 1). By day 63 the mean adjusted weight responses above controls were: Crestar implanted once 5.5 kg (9.2%), Synovex once 8.9 kg (15.6%), Crestar twice 6.8 kg (11.2%), Synovex twice 8.8 kg (14%) and Ralgro once 3.8 kg (6.5%).

Overall, with the sexes combined, the products did not differ in effectiveness (0.2<p<0.4). However, steers implanted with Crestar or Synovex grew significantly faster than either controls or Ralgro-treated steers (Table 1), but this result was not evident in heifers. No change in growth rate of treated animals compared with controls was detected in the first 21 days, but after this, all treatments increased weight gains by 0.11 to 0.18 kg/day and this improved to 0.21 to 0.31 kg/day above controls between days 42 and 63. These trends continued until day 84 when approximately 35% of the cattle had been sent for
slaughter, though analysis was only performed on data up to day 63 to preclude bias. The pattern of response to all agents did not differ with sex or treatment. There was no response to repeated implantation at day 42 of either Crestar or Synovex in steers and heifers.

Table 1. The initial weight and average daily gain until day 63 of steers and heifers implanted with Crestar, Synovex or Ralgro or re-implanted.

<table>
<thead>
<tr>
<th>Treatment group *</th>
<th>Steers</th>
<th>Heifers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial weight (kg)</td>
<td>A.D.G. (kg/day) % above controls</td>
</tr>
<tr>
<td>1 Control</td>
<td>290</td>
<td>1.02 b</td>
</tr>
<tr>
<td>2 Crestar once</td>
<td>290</td>
<td>1.11 a</td>
</tr>
<tr>
<td>3 Synovex once</td>
<td>289</td>
<td>1.18 a</td>
</tr>
<tr>
<td>4 Crestar twice</td>
<td>291</td>
<td>1.15 a</td>
</tr>
<tr>
<td>5 Synovex twice</td>
<td>284</td>
<td>1.17 a</td>
</tr>
<tr>
<td>6 Ralgro</td>
<td>284</td>
<td>1.05 b</td>
</tr>
</tbody>
</table>

Means in the same column with different letters differ significantly (p<0.05).

* Treatment definitions:-
1) Control - no implant.
2) Crestar F in heifers (200 mg testosterone and 20 mg oestradiol in eight pellets - *Intervet* Australia Ltd.) or Crestar M in steers (200 mg progesterone and 20 mg oestradiol) implanted at day 0.
3) Synovex H (heifers - *Syntex* Australia Ltd.) or Synovex S (steers) implanted at day 0.
4) Crestar F (heifers) or Crestar M (steers) implanted at days 0 and 42.
5) Synovex H (heifers) or Synovex S (steers) implanted at days 0 and 42.
6) Ralgro (heifers and steers - *Zeranol* 36 mg - *Coopers Animal Health Australia Ltd.*) implanted at day 0.

Carcase measurements

Table 2. Cold carcase weight, backfat thickness (10th/11th rib), dressing percentage and days to slaughter of the sample of 258 carcases.

<table>
<thead>
<tr>
<th>Treatment group</th>
<th>Cold carcase weight (kg)</th>
<th>Backfat thickness (mm)</th>
<th>Dressing percentage</th>
<th>Days to slaughter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Control</td>
<td>1923.3 a</td>
<td>6.8</td>
<td>51.9 a</td>
<td>77.2</td>
</tr>
<tr>
<td>2 Crestar once</td>
<td>1973.3 b</td>
<td>6.5</td>
<td>53.3 b</td>
<td>76.0</td>
</tr>
<tr>
<td>3 Synovex once</td>
<td>1999.6 b</td>
<td>6.5</td>
<td>52.9 b</td>
<td>76.9</td>
</tr>
<tr>
<td>4 Crestar twice</td>
<td>1993.3 b</td>
<td>6.3</td>
<td>52.7 ab</td>
<td>76.9</td>
</tr>
<tr>
<td>5 Synovex twice</td>
<td>1999.9 b</td>
<td>6.6</td>
<td>53.3 b</td>
<td>76.9</td>
</tr>
<tr>
<td>6 Ralgro</td>
<td>194.7 a</td>
<td>6.9</td>
<td>53.1 b</td>
<td>75.2</td>
</tr>
<tr>
<td>5% LSD</td>
<td>3.65</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Means in the same column with different letters differ significantly (p<0.05)

Carcase data (Table 2) were distributed uniformly across properties, sexes and treatments with a minimum of 10 carcases in each subclass. On average, the cold carcase weights of steers were 14 kg heavier than heifer carcases (p<0.001). The carcases of steers and heifers implanted with Crestar or Synovex were significantly heavier than controls (p<0.01), but were at similar fatness.
Heifer carcasses carried 0.8 mm more backfat than steer carcasses (6.91 mm vs 6.13 mm, p<0.01) but there was no effect of treatment. Dressing percentage was improved by between 0.8 and 1.4 per cent in four of five treatment groups compared with controls (p<0.05). The number of days to slaughter was not affected by any of the growth promotant treatments.

DISCUSSION

These results demonstrate that, under typical commercial feedlot conditions in Southern Australia significant extra liveweight and carcass weight gains can be made by using anabolic agents. This agrees with many reports in the literature (Geldard and Wellington 1981; Hodge et al. 1983; Roche and Davis 1983) on products currently available in Australia, and provides comparative data on the new products Crestar M and Crestar F. All Crestar and Synovex products tested gave responses between 5 and 12% above Ralgro in steers and agree with differences in favour of the oestrogen-progesterone products claimed in earlier reports (Roche et al. 1981; Keane and Sherington 1985). The response to zeranol was better in heifers than in steers, and similar to that using oestrogen-testosterone.

Because of continued responses in liveweight gain after the first 21 days, there was no benefit of repeated implantation of Crestar or Synovex in either sex. Repeated implants have not shown consistent additive effects, and certainly any additive effects have not been of the same magnitude. Most other work was conducted over a longer period than the current study (Hodge et al. 1983; Mason et al. 1984).

All treatments increased the carcass weight of treated cattle without a detectable increase in the level of fatness, and there were no treatment effects which agrees with other reports (Keane and Sherington 1985). The larger response in carcass gain of cattle treated with either Crestar or Synovex compared with Ralgro mirrors the trends in liveweight gain and agrees with similar work with indoor-fed steers (Keane and Sherington 1985). Dressing percentage was consistently higher for implanted cattle compared with controls (by between 0.8 and 1.4%). This result disagrees with the majority of published literature (e.g. Sammons 1980; Roche and Davis 1983; Hodge et al. 1983). The reason for this is unknown though it could reflect the tendency for increased synthesis of muscle tissue of treated cattle.

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REFERENCES