revalor®-h
(trenbolone acetate + estradiol)

Effects of Varying Forms and Dosage Levels of Trenbolone Acetate in Combination With an Estrogen Source on Feedyard Heifer Performance and Profitability

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ABSTRACT: This study compared four implant programs using 320 yearling English/Continental and crossbred heifers averaging 698 pounds, fed from March 23 to July 16, 1994. The treatments tested were: 1) Synovex® H (SYN); 2) revalor®-h (REV); 3) finaplix®-h and melengestrol acetate (MGA®) fed at a rate of .45 mg/hd/d (FINMGA), and 4) the concomitant use of finaplix-h and Synovex H (FINSYN). All implants were administered on d 0. On d 28 the implant sites were palpated to determine condition of implants. REV, FIN, and SYN had 5.00%, 13.83%, and 2.50% poor implants, respectively. All problem implants were excised and replaced. Final live weight was greater (P<.01) for REV vs SYN or FINMGA, with FINSYN being intermediate. Average daily gain (ADG) was faster (P<.01) for REV vs SYN heifers. Dry matter intake (DMI) was lower (P<.01) for FINMGA than for REV or SYN heifers. Heifers on the REV and FINMGA treatments had better feed efficiency (F/G; P<.01) and improved cost of gain (COG; P<.01) in comparison to SYN heifers. During the 114 days on test, 12 heifers were observed exhibiting estrus behavior, across all treatments except MGA. Hot carcass weight (HCW) was heavier (P<.05) for REV heifers compared to all other treatments. SYN exhibited higher (P<.05) marbling scores in comparison to all other treatments; however, the percentage choice carcasses were not different among treatments.

INTRODUCTION

revalor®-h (Hoechst-Roussel Agri-Vet Co., Somerville, NJ) is a new growth implant containing trenbolone acetate (TBA) and estradiol 17-beta approved for use in confinement heifers. Trials with revalor-h and previously approved anabolic agents are needed to identify the most economically viable implant strategies under a variety of cattle feeding conditions.

Studies indicate that finaplix®-h (Hoechst-Roussel Agri-Vet Co., Somerville, NJ), which contains TBA as the active ingredient, is as or more effective than estrogen implants in heifers and cull cows (Jones, 1982; Price and Makarecian, 1982). Implanting heifers with TBA has demonstrated an increase in blood concentrations of estradiol (Galbraith, 1980; Henricks et al., 1982). Anabolic response in heifers may be due to exogenous TBA and endogenous estrogens and therefore less dependent on exogenous estrogen from implants, such as Synovex® H (Fort Dodge Labs, Fort Dodge, IA), Ralgro® (Mallinckrodt Veterinary Inc., Mundelein, IL), Compudose® (Elanco Products Co., Indianapolis, IN) or Implus®-H (The Upjohn Co., Kalamazoo, MI). However, several trials indicate that combining TBA with an estrogen

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implant or MGA® (melengestrol acetate; The Upjohn Co., Kalamazoo, MI) or both increases gain and improves feed efficiency more than would be obtained when these anabolic agents are used singularly (Preston, 1987; Bartle et al., 1988; Hartman et al., 1989; Moran et al., 1989; Stanton et al., 1989; Clay, 1991). The above trials indicate that exogenous estrogen administration to heifers may not be required when utilizing TBA, but that either exogenous (implants) or endogenous (feeding MGA) estrogen will enhance TBA or testosterone-induced growth promotion in heifers.

Utilizing previous knowledge on the synergistic effects of these anabolic agents, this research trial was conducted to compare different implant strategies on performance and carcass characteristics of finishing heifers fed for an average of 114 days.

MATERIALS AND METHODS

Three hundred and twenty British, Continental, and crosses of the two breed types were used in this 114-day study. Cattle were from two groups, both originating near Oklahoma City, OK. The first group of 351 heifers averaged 689 lbs. on arrival, while the second group consisted of 217 heifers averaging 703 lbs. Cattle were given free-choice water and long-stemmed grass hay upon arrival. The following morning, heifers were vaccinated with a modified live IBR/BVD/BRSV/PI3 vaccine and a "7-way" clostridial bacterin-toxoid. Cattle were treated for internal and external parasites with fenbendazole and fenthion, respectively. Each heifer was identified with a sequentially numbered ear tag, weighed, and pregnancy-checked by palpation. Breed type was also recorded. No implants were administered at this time, but each animal was examined for previous implantation.

Heifers were then placed in pens and held for a seven- or four-day adjustment period. During this period, cattle were brought up on feed to the third of a five-ration step-up program, with no MGA fed. Cattle were checked daily for symptoms of morbidity.

On day -1, heifers were again individually weighed. These weights were used for treatment and weight block assignments. Randomization was done with a SAS (1990) program. A seed value was used to randomize treatment order, weight block within treatment, and animals within treatment and weight block. Pen numbers were randomly assigned by weight block with blocks being assigned to consecutive pens and not split across pen rows. A sequential number was generated for each animal to be assigned to the study. After removal of previously implanted, pregnant, undesired genetics, sick or injured animals, or extremely light or heavy heifers, d-1 weights were then sorted from lightest to heaviest within origin, as determined by a coin toss, and aligned with sequential number from the randomization. The four treatments were: 1) Synovex H (SYN), 2) revalor-h (REV), 3) finaplix-h and MGA fed at a rate of .45 mg/hd/d (FINMGA), and 4) finaplix-h and Synovex H (FINSYN). Each treatment contained 10 replicate pens consisting of 8 head each. Origin 1 and 2 consisted of six and four blocks, respectively.

On day 0, heifers were reweighed, given a coded treatment ear tag, implanted according to the assigned treatment and sorted into their respective pens. revalor-h and finaplix-h were implanted in the right ear, and Synovex H was implanted in the left ear. MGA was added to the ration at this time.

On day 28, implant sites were palpated and scored as "good," "missing," "partial," "abscessed," or containing fluid. All implants scored other than "good" were explanted and the proper implant readministered.

Although heifers were not specifically checked for exhibition of estrus, it was recorded when observed. Heifers were checked daily for symptoms of morbidity. Sick animals were treated and immediately returned to their study pens. Due to a heifer calving within two weeks following initiation of the study, all heifers were again palpated by a second veterinarian on the 28-day weight. Three additional heifers were found to be pregnant and these were aborted and returned to their study pens. No pregnant heifers were found at slaughter.

Starting weights were the mean of day -1 and day 0 weights, with a 1.5% pencil shrink applied. Interim weights taken on days 28, 56, and 84 were full weights to which a 3% pencil shrink was applied. Weights on days 113 and 114 were shrunk 4% and averaged for the final weight. All weights were taken in the morning, following an over-feeding of approximately 25% the day before.

Supplement and ration ingredients were weighed on gram, platform, or feed truck scales and placed in the mixers in the order indicated on batch sheets. Each batch was then mixed for the appropriate time as determined by mixing tests. Final finishing ration formula and nutrient/drug levels are shown in Table 1.

Cattle were fed ad libitum twice a day after checking feed bunks each morning and adjusting the previous day consumption. Feed remaining in the bunks was weighed when: cattle were weighed, a heifer was removed from the study, an excess build-up of feed occurred, or the feed had been rained on. A sample was collected each time to determine dry matter content. Disposal of weigh backs was recorded when it occurred. Weekly feed samples were composited into a monthly sample for determination of dry matter, crude protein, calcium, phosphorus, potassium, and magnesium.

The final finishing ration (Table 1) was formulated to meet or exceed all requirements for finishing heifers (NRC, 1984). Analysis of four pellet samples showed a mean of .41 mg MGA/lb. with all samples well within the 70 to 120 percent compliance range. Dry matter feed intake for each pen was determined from feed delivery, weigh backs, sample dry matters and pen head days. Ration costs were calculated using ingredient costs only. Cost of gain (COG) was based on feed costs only.

Slaughter and carcass data collection were conducted at a packing plant in Holcomb, KS, following a 48-hour chill. After cattle were stunned, treatment ear tags were recorded in the order the heifers hung on the rail. A sequentially numbered tag was pinned to the brisket after the hide was pulled back. Sequential tags and plant carcass tags were correlated at the hot scales enabling carcasses to be identified with the live animal. Livers were scored as they were being inspected on the viscera table using the Elanco Method (Elanco, 1985).

Carcasses were measured as they moved on the chain to the grading station. A filter paper was placed on the right ribeye for approximately 10 seconds after the side was split between the 12th and 13th ribs. Hot carcass weight (HCW) was also recorded on the paper. Papers were later dried and ribeye area determined by measuring the resulting image. Preliminary yield grade (PYG), adjusted PYG (APYG), and kidney-pelvic-heart fat (KPH) were recorded after removal of the paper. Marbling and muscle color score were recorded on the grading stand. These values were then used to calculate USDA yield, quality grades, and dressing percents.

Pen means of feedlot performance data were the observation units in the GLM (SAS, 1990) model which included treatment and weight block within origin. Individual animals were the observation units in the carcass data model which also included interaction of treatment and weight block. Means separation was done using the LSD method as outlined by Steel and Torrie (1980) if the model was significant at the .05 level.

RESULTS

Implant site evaluations done at 28 days showed revalor-h and Synovex H to have a similar percentage of good implants (95.00% and 97.50%, respectively), both of which were numerically better than finaplix-h (86.16%). The biggest problem with finaplix appeared to be the number of abscessed and/or missing implants. This may have been due to the pellet base ingredient (lactose) and/or number of pellets per implant (10). On day 56 no problems were observed for the 27 replaced implants. A total of 12 heifers, distributed across all treatments except MGA, were observed in estrus during the trial.

The 114-day feedyard performance (Table 2) demonstrated REV increased ADG (P<.01; 3.46 lb/d) and, therefore, produced the greatest final weight (P<.01; 1089.17 lb.). ADG for REV heifers was 8.13%, 5.17%, and 4.53% better than the SYN, FINMGA and FINSYN cattle, respectively. Gain for any treatment group receiving TBA was at least numerically better than the SYN treatment. DMI of SYN, REV, and FINSYN heifers was similar. Thus, with a higher ADG, REV improved efficiency of feed utilization (F/G) 7.05% over SYN (5.14 and 5.53 lb. DM/lb. gain, respectively; P<.01). In this study, FINMGA heifers had lower feed consumption and therefore the F/G was significantly (P<.01) better than SYN and FINSYN, but was only numerically better than REV.

Utilization of net energy was determined by using average body weights, DMI, calculated ration NEg and NEm, and NRC (1984) equations to calculate expected ADG. The ratio of actual to expected daily gain indicates the efficiency at which NE was utilized. Efficiency of the FINMGA heifers was better than SYN (120.84 vs. 103.95, P<.01) but did not differ from REV or FINSYN.

Cost of gain was lower (P<.01) for REV ($33.42/cwt gain) and FINMGA ($32.54) than for SYN ($35.96) by 7.06% and 9.51%, respectively. Although not significantly different, FINSYN improved COG 5.01% over SYN.

While REV carcasses were heavier (P<.05), any use of TBA and estrogen reduced marbling scores (P<.05), and although not significantly different, numerically lowered KPH and percent Choice and Prime carcasses. FINSYN heifers exhibited less back fat (P<.05) and larger ribeyes (P<.05) than FINMGA heifers. FINSYN heifers also had numerically lower yield grades. Muscle color score did not differ among treatments. Although not significantly different (P=.13), FINMGA heifers had the greatest percentage of yield grade 4 carcasses at 7.89%, while SYN, REV, and FINSYN had 5.06%, 2.56%, and 1.28%, respectively. Yield grade 4's had a much larger negative impact on carcass value than the difference in percent choice carcasses. Highest carcass value, calculated from prices on the day of slaughter, was seen for REV heifers and lowest for FINMGA (P<.05).

Although ADG, DMI, and F/G are important to commercial heifer feeding, COG is the measure of financial efficiency. In this study, revalor-h appeared to reduce that cost of production while improving performance. Despite having a numerically lower quality grade in comparison to Synovex H, revalor-h increased live animal and carcass weights, as well as efficiency of production, therefore enabling the feeder to experience a higher return for each heifer. These two factors, cost of gain and total sales dollars, will enable revalor-h to be a valuable tool in the production of fed heifers.

Table 1. Finishing ration content and calculated analysis[a]

Finishing Ration Content

Ingredients	Percentage
Corn Silage	9.33%
Flaked Corn	67.32%
Corn cond. dist. solub.	6.29%
Soybean Meal	8.23%
Soybean Meal Pellet	3.23%
Yellow Grease	3.60%
Supplement	2.00%

Nutrient	Percentage
Dry Matter	66.89%
Protein	13.50%
NEg	72.00 (Mcal)
NEm	103.53 (Mcal)
NPN, % CP equiv.	0.50%
Calcium	0.65%
Phosphorus	0.36%
Potassium	0.84%
Magnesium	0.20%
Rumensin (g/ton)	27.00
Tylan (g/ton)	7.00
Vit. A, IU/lb	2607.00
Vit. E, IU/lb	15.00

[a] Melengestrol acetate was added to the last three rations in a wheat middlings pellet to provide .45 mg/hd/d.

Table 2. Feedyard performance and carcass characteristics.

Feedyard Performance					
Parameter	SYN	REV	FINMGA	FINSYN	P-Level
Days on feed	114	114	114	114	________
In Weight	698	698	697	699	P=.77
Out Weight	1060[b]	1089[a]	1068[b]	1073[ab]	P<.01
Live Wt. Gain	362	391	371	374	________
ADG	3.20[b]	3.46[a]	3.29[ab]	3.31[ab]	P<.01
D.M.I.	17.70[a]	17.78[a]	16.40[b]	17.38[ab]	P<.01
F/G	5.53[a]	5.14[b]	5.01[b]	5.26[ab]	P<.01
Cost of Gain $/cwt	35.96[a]	33.42[b]	32.54[b]	34.16[ab]	P<.01
NE efficiency	103.95[b]	113.64[ab]	120.84[a]	111.44[ab]	P<.01

Carcass Characteristics

	SYN	REV	FINMGA	FINSYN	
HCW	695.68^{b}	711.18^{a}	693.00^{b}	699.51^{b}	P<.05
Dressing %	62.93	62.70	62.29	62.61	P=.86
YG (Equation)	2.51	2.52	2.66	2.29	P=.06
% YG 4's % 5's	5.06	2.56	7.89	1.28	P=.13
BF (in.)	0.51^{ab}	0.50^{ab}	0.54^{a}	0.46^{b}	P<.05
REA	13.75^{ab}	13.71^{ab}	13.38^{a}	13.98^{b}	P<.05
KPH	2.40	2.30	2.32	2.37	P=.43
Marbling[c]	4.29^{a}	4.05^{b}	4.07^{b}	4.04^{b}	P<.05
Ch. & Pr. %	64.47	54.55	57.33	53.85	P=.53
Color Scored[d]	4.53	4.65	4.57	4.73	P=.24
Avg. Carc. Value $/head	696.13^{a}	713.89^{b}	689.23^{a}	704.65^{ab}	P<.05

[a,b]means in the same row with different superscripts differ
[c]5.00 = modest 0, 4.00 = small 0, 3.00 = slight 0
[d]Scale 1-8, 4 = light cherry red, 5 = cherry red

RELEVANT LITERATURE

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