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Summary with Implications

A feedlot study evaluated the effects of 4 implant strategies (Revalor-XR on day 1, Revalor-XH on day 1, Revalor-200 on day 1, and Revalor-200 on day 70) on growth performance and carcass characteristics of feedlot heifers compared to non-implanted heifers fed 198 days. Intake was not impacted by treatments. Implanted cattle had greater carcass-adjusted ADG and lower F:G compared to cattle that received no implant. Implanted treatments had significantly greater HCW, dressing percentages, and lower marbling scores compared to non-implanted cattle. Heifers implanted with Revalor-XR, Revalor-XH, and Revalor-200 on day 70 had larger LM area resulting in lower calculated yield grades compared to Revalor-200 administered on day 1 and control cattle. The response in gain, feed efficiency, and yield grade suggest that Revalor-XR, Revalor-XH, and Revalor-200 implanted on day 70 respond similarly when heifers are fed to similar days.

Introduction

Implanting cattle has been shown to improve growth performance and result in leaner carcass composition when fed to similar days on feed. Recent signals in the industry have encouraged larger carcasses. Therefore, the increase in price received for the added weight may compensate for the negative impacts of reduced marbling observed with aggressive implant strategies. Implant strategies have become more performance-based by increasing the

amount of trenbolone acetate and estradiol initially and prolonging its release (Revalor-XH), or by giving a long-lasting, delayed-release implant (Revalor-XR) that extends the payout of the implant. Therefore, the objective of this study was to determine the effects of a new long-lasting, delayed-release implant, Revalor-XR, compared to a long-lasting implant, Revalor-XH, on growth performance and carcass characteristics compared to traditional and delayed implant strategies (Revalor-200 on day 1 or day 70) and non-implanted feedlot heifers.

Procedure

A feedlot study was conducted at the University of Nebraska-Lincoln Eastern Nebraska Research and Extension Center (ENREC) near Mead, NE. Crossbred yearling heifers (n=500; initial BW =617 lb.) were utilized in a completely randomized block design (2 BW blocks) with five treatments. Pens were assigned randomly to 1 of 5 treatments (10 pens/treatment) and heifers were assigned randomly to pens within BW block (10 head/pen). The treatments involved in this trial were: 1) Negative control (no implant); 2) Revalor-XR on day 1 (200 mg TBA and 20 mg E, all coated pellets) 3) Revalor-XH on day 1 (200 mg TBA and 20 mg E; partially coated pellets); 4) Revalor-200 on day 1 (200 mg TBA and 20 mg E, all uncoated pellets); and 5) Revalor-200 on day 70. Prior to initiation of the trial, heifers were limit fed at 2% of BW with a 50% Sweet Bran (Cargill) and 50% alfalfa hay blend to limit gastrointestinal variation. Heifers were weighed on two consecutive days (day 0 and 1) to establish initial BW. At initiation of the trial, heifers assigned to Revalor-XR, Revalor-XH, or Revalor-200 on day 1 treatments received their respective implant. All heifers were adapted to a common finishing diet over a 24-day step-up period. The amount of wet distiller's grains, Sweet Bran and supplement were held constant in the step-up diets (15%, 25%, and 4% respectively), while

the amount of dry rolled corn and high moisture corn were gradually increased replacing alfalfa hay. The finishing diet was identical across treatments and contained 32.3% dry rolled corn, 16.2% high moisture corn, 15.0% WDGS, 25% Sweet Bran (Cargill), 7.5% grass hay, and 4% supplement.

Individual BW were collected on days 0, 1, 35, 70, 105, 140, and 175. On day 70, heifers assigned to Revalor-200 on day 70 were implanted. Heifers were harvested at 194 days (Block 1) and 201 days (Block 2) at a commercial harvest facility (Greater Omaha Packing Co., Omaha, NE). Final live BW was determined at shipping using the average pen weight shrunk by 4% to adjust for fill. Carcass-adjusted performance was calculated from HCW divided by a common dressing percent of 63%. On day 1 of harvest, both liver scores and HCW were recorded and after a 48-hour chill, 12th rib fat thickness, LM area, and USDA marbling score were recorded. Yield grade was calculated based on 12th rib fat thickness, LM area, HCW, and a constant KPH (3%). Both performance and carcass data were analyzed the MIXED procedure of SAS. The model included treatment and block as fixed effects and the experimental unit was pen. Treatment means were separated using LSD test when the F-Test was significant. In addition, quality and yield grade distribution were analyzed using the GLIMMIX procedure of SAS using a multinomial distribution approach. Alpha values ≤ 0.05 were considered significant.

Results

Heifers were checked for missing or abscessed implants on days 35 and 105 and if found, were removed from trial. There were two heifers removed for missing implants on day 35 (one from each block) and one heifer removed on day 105 (Block 1) for missing implant. No abscessed implants were observed.

Overall, there were no differences in DMI ($P=0.22$) between all treatments over

Table 1. Performance of Heifers implanted with Revalor-XR, Revalor-XH, Revalor-200 on day 1 or day 70 compared to non-implanted heifers

	Treatments ¹						P-Values			
	Control	Rev-XR	Rev-XH	Rev-200 d 1	Rev-200 d 70	SEM	F-Test	Control vs Implant	Rev-XR vs Rev-200 d 70	Rev-XH vs Rev 200 d 70
<i>Carcass-Adjusted Performance</i>										
Initial BW, lb	618	617	618	617	617	8.3	1.00	0.94	0.99	0.95
Final BW, lb ²	1234	1275	1276	1277	1273	12.5	0.09	<0.01	0.90	0.87
DMI, lb/d	21.3	21.5	22.1	21.8	21.7	0.26	0.22	0.12	0.47	0.28
ADG, lb ³	3.12 ^a	3.34 ^b	3.34 ^b	3.34 ^b	3.33 ^b	0.39	<0.01	<0.01	0.84	0.86
F:G ⁴	6.80 ^a	6.41 ^c	6.62 ^b	6.54 ^{bc}	6.54 ^{bc}	—	<0.01	0.02	0.21	0.29
<i>Live Performance</i>										
Final BW, lb ⁵	1241	1277	1278	1270	1270	12.9	0.26	0.03	0.69	0.67
ADG, lb ⁶	3.16 ^a	3.35 ^b	3.34 ^b	3.31 ^b	3.31 ^b	0.044	0.02	<0.01	0.55	0.59
F:G ⁴	6.76 ^a	6.41 ^b	6.62 ^a	6.58 ^{ab}	6.54 ^{ab}	—	0.02	0.01	0.13	0.54

^{a-c} Means with different superscripts differ (P<0.05)

¹ Treatments include: Control-no implant; Rev-XR-Revalor-XR on day 1 (200 mg TBA and 20 mg E, coated pellets); Rev-XH-Revalor-XH on day 1 (200 mg TBA and 20 mg E, partially coated pellets); Rev-200 d 1-Revalor-200 (200 mg TBA and 20 mg E, uncoated pellets) administered on day 1; Rev-200 d 70-Revalor-200 implanted on day 70.

² Calculated from HCW divided by a common dressing percent (63%)

³ Calculated using carcass-adjusted final BW

⁴ Analyzed as G:F, the reciprocal of F:G

⁵ Live final BW measured by weighing cattle on pen

Table 2. Carcass Characteristics of heifers implanted with Revalor-XR, Revalor-XH, Revalor-200 on day 1 or 70 compared to non-implanted heifers.

	Treatments ¹						P-Values			
	Control	Rev-XR	Rev-XH	Rev-200 d 1	Rev-200 d 70	SEM	F-Test	Control vs Implant	Rev-XR vs Rev-200 d 70	Rev-XH vs Rev 200 d 70
<i>Carcass Characteristics:</i>										
HCW, lb	778	803	804	804	802	7.9	0.09	<0.01	0.92	0.88
Dressing, % ²	62.66	62.95	63.10	63.34	63.17	0.12	0.18	0.04	0.43	0.81
LM area, sq in	12.3 ^b	12.8 ^a	13.0 ^a	12.4 ^b	12.9 ^a	0.11	<0.01	<0.01	0.62	0.62
Marbling ³	569	543	537	534	529	10.6	0.09	<0.01	0.38	0.61
12 th rib fat, in	0.67	0.66	0.65	0.69	0.64	0.022	0.58	0.70	0.44	0.61
Calculated Yield Grade	3.8 ^{ab}	3.7 ^b	3.6 ^b	3.9 ^a	3.6 ^b	0.077	0.04	0.28	0.47	0.78

^{a-c} Means with different superscripts differ (P<0.05)

¹ Treatments include: Control-no implant; Rev-XR-Revalor-XR on day 1 (200 mg TBA and 20 mg E, coated pellets); Rev-XH-Revalor-XH on day 1 (200 mg TBA and 20 mg E, partially coated pellets); Rev-200 d 1-Revalor-200 (200 mg TBA and 20 mg E, uncoated pellets) administered on day 1; Rev-200 d 70-Revalor-200 implanted on day 70.

² Calculated from HCW divided by live BW, with a 4% pencil shrink applied

³ Marbling Score: 300=Slight, 400=Small, 500=Modest, etc.

the entire feeding period (Table 1). Using carcass-adjusted performance, implant treatments impacted final BW, with implanted cattle being heavier than non-implanted cattle (P <0.01), but no difference between implant treatments (P >0.87). All implanted cattle had greater ADG compared to control cattle (P=0.03) which led to changes in F:G (P <0.01). Heifers implanted with Revalor-XR, Revalor-200 on day 1 or 70 had the lowest F:G (P>0.21), but Revalor-200 day 1 or 70 were no different than Revalor-XH (P>0.29), and the control heifers having the greatest F:G (P =0.01;

Table 1). Comparable results were observed when live final performance was evaluated.

Implanted heifers had greater HCW than non-implanted heifers (P<0.01). There were no differences in HCW, dressing percentage, fat thickness, USDA marbling score, or liver scores among all implanted treatments (Table 2), but non-implanted heifers had lower dressing percentage and greater marbling scores compared to implanted heifers (P ≤0.04). Heifers within the Revalor-XH, Revalor-XR, and Revalor-200 day 70 treatments showed an increase in LM area (P<0.01) compared to cattle implanted with Revalor-200 on day 1

or non-implanted cattle, which translated into a lower calculated yield grade (P=0.04). There was a change in the distribution of quality grade (P=0.07) and yield grade (P=0.10) between implant treatments and non-implanted heifers (Table 3).

During the first 70 days of the feeding period, heifers implanted with Revalor-XH and Revalor-200 administered on day 1 had greater ADG and were more efficient (P<0.01) compared to the other treatments (Table 4). From days 70 to 140, cattle implanted with Revalor-XR or Revalor-200 on day 70 gained more and were more efficient

Table 3. Quality and yield grade distribution for heifers implanted with Revalor-XR, Revalor-XH, and Revalor-200 on day 0 or 70 compared to non-implanted heifers

	Control	Revalor-XR	Revalor-XH	Revalor-200 Day 0	Revalor-200 Day 70
Quality Grade, %¹					
Prime	14.3	9.0	6.2	4.2	6.1
Upper Choice ³	56.1	54.0	55.7	55.4	49.0
Low Choice ⁴	22.3	28.9	26.8	33.2	35.9
Select	7.2	8.1	10.3	7.1	9.0
Standard	0.0	0.0	1.0	0.0	0.0
Yield Grade, %²					
1	1.0	2.0	2.0	0.0	1.0
2	16.7	12.3	16.7	11.6	16.4
3	48.6	48.4	42.9	37.8	45.1
4	28.6	34.2	34.3	42.3	36.4
5	5.2	3.0	3.0	8.3	1.0

¹ Quality Grade distribution (P=0.07)

² Yield Grade distribution (P=0.10)

³ Upper Choice = marbling score ≥ 500, but < 700

⁴ Lower Choice = marbling score ≥ 400 but < 500

Table 4. Interim performance of heifers implanted with Revalor-XR, Revalor-XH, Revalor-200 on day 0 or Revalor-200 on day 70 compared to non-implanted heifers.

	Treatments ¹					SEM	F-Test	P-Values		
	Control	Rev-XR	Rev-XH	Rev-200 d 1	Rev-200 day 70			Con vs Implant	Rev-XR vs Rev-200 d 70	Rev-XH vs Rev-200 d 70
<i>Day 0-70</i>										
DMI, lb/d	19.3	19.0	19.4	19.7	19.6	0.27	0.34	0.55	0.16	0.68
ADG, lb	2.85 ^a	2.87 ^a	3.13 ^b	3.31 ^c	2.88 ^a	0.063	<0.01	<0.01	0.89	<0.01
F:G ²	6.76 ^a	6.62 ^a	6.29 ^b	5.92 ^c	6.80 ^a	—	<0.01	<0.01	0.28	<0.01
<i>Day 70-140</i>										
DMI, lb/d	21.6	21.9	22.8	22.6	22.0	0.31	0.07	0.06	0.77	0.09
ADG, lb	3.21 ^d	3.83 ^a	3.64 ^{bc}	3.45 ^c	3.81 ^{ab}	0.07	<0.01	<0.01	0.83	0.08
F:G ²	6.71 ^c	5.68 ^a	6.25 ^b	6.53 ^{bc}	5.78 ^a	—	<0.01	<0.01	0.54	<0.01
<i>Day 140-Harvest</i>										
DMI, lb/d	23.3	23.8	24.3	23.6	24.0	0.29	0.18	0.06	0.76	0.47
ADG, lb	3.46	3.33	3.26	3.16	3.23	0.09	0.23	0.05	0.46	0.82
F:G ²	6.71 ^a	7.14 ^{bc}	7.46 ^{bc}	7.46 ^{bc}	7.46 ^{bc}	—	<0.01	<0.01	0.37	0.93

^{a-c} Means with different superscripts differ (P<0.05)

¹ Treatments include: Control-no implant; Rev-XR-Revalor-XR on day 1 (200 mg TBA and 20 mg E, coated pellets); Rev-XH-Revalor-XH on day 1 (200 mg TBA and 20 mg E, partially coated pellets); Rev-200 d 1-Revalor-200 (200 mg TBA and 20 mg E, uncoated pellets) administered on day 1; Rev-200 d 70-Revalor-200 implanted on day 70.

² G:F was analyzed, the reciprocal of F:G

(P<0.01) than the other treatments, which is consistent with the delayed release of Revalor-XR and the delayed implanting of the Revalor-200 day 70 heifers. Until day 175, all implanted cattle were heavier than the control (P <0.01). Interestingly, from day 140 to the end of the feeding period, the non-implanted heifers were more efficient (P=0.04) than all implanted cattle

and the non-implanted heifers numerically gained more than implanted treatments.

Conclusion

All implanted cattle had greater ADG and were more efficient than non-implanted cattle. Interim data show that heifers implanted with Revalor-XH and

Revalor-200 on day 1 performed better and were more efficient during the first 70 days, however, this changed after day 70. Heifers implanted with Revalor-XR and Revalor-200 on day 70 had greater ADG and were more efficient than other heifers during days 70 to 140. Revalor-XR, Revalor-XH, and Revalor-200 administered on day 70 had larger LM area and YG than

Revalor-200 on day 1 and control cattle, but not significantly different marbling scores among implant treatments, showing that the more aggressive and/or delayed implant strategies improved yield grade without having negative effects on marbling compared to cattle implanted once on arrival.

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