2019

Evaluation of Reimplant Window with Revalor-200 ® on Steer Performance and Carcass Characteristics

Caitlin A. Ohnoutka

Brad M. Boyd
University of Nebraska-Lincoln, bboyd4@unl.edu

F. Henry Hilscher Hilscher

Brandon L. Nuttelman

Grant I. Crawford

See next page for additional authors

Evaluation of Reimplant Window with Revalor-200® on Steer Performance and Carcass Characteristics

Caitlin A. Ohnoutka
Bradley M. Boyd
F. Henry Hilscher
Brandon L. Nuttelman
Grant I. Crawford
Jim C. MacDonald
Galen E. Erickson

Summary with Implications

A feedlot study utilizing 800 crossbred steers (initial BW = 727 ± 55 lb) compared 5 different terminal implant (Revalor-200) times (160, 120, 100, 80, or 40 d prior to harvest) for steers fed 180 days on performance and carcass characteristics. All steers were implanted with Revalor-IS as an initial implant at trial initiation. Carcass-adjusted final BW, ADG, and F:G responded quadratically, with cattle implanted 80 to 120 d prior to harvest being the greatest. However, there was less than a 2% difference in performance between 120 and 80 days on terminal implant. Hot carcass weight responded quadratically, with no difference in fat thickness, rib eye area, marbling score, or calculated yield grade. When solved for the first derivative, all variables were maximized at 87 to 104 days on terminal implant when steers are fed for 180-d.

Introduction

In recent years, there has been much discussion on the ideal terminal implant window and the effect of re-implant time on finishing cattle performance and carcass characteristics. However, cattle are being fed longer and to heavier end points without facilities to handle larger cattle. The question becomes how early can cattle be re-implanted while still seeing advantages in performance. However, literature to define a terminal implant window is lacking, and most recommendations come from practical experience or closeout data from different groups of cattle. Therefore, the purpose of this experiment was to identify the optimum time on the terminal implant when steers are reimplanted with a Revalor-IS on arrival followed by Revalor-200 and fed for 180 d.

Procedure

A feedlot study was conducted at the University of Nebraska–Lincoln Eastern Nebraska Research and Extension Center (ENREC) near Mead. Crossbred yearling steers (n=800, initial BW = 727 ± 55 lb) were utilized in a generalized randomized block design with 2 initiation times, BW blocks within start times, and randomly assigned to pens (20 head/pen) within blocks. Pens were assigned randomly to 1 of 5 treatments (8 pens/treatment). Treatments included: 1) implanting with Revalor-200 (200 mg TBA + 20 mg E) on day 20 (160 days on terminal [DOT]); 2) Revalor-200 on day 60 (120 DOT); 3) Revalor-200 on day 80 (100 DOT); 4) Revalor-200 on day 100 (80 DOT); and 5) Revalor-200 on day 140 (40 DOT). All steers were implanted with Revalor-IS (80 mg TBA + 16 mg E) at initiation of the trial. Prior to the trial, steers were limit fed at 2% of BW with a 50% Sweet Bran (Cargill) and 50% alfalfa hay blend to limit BW variation due to gut fill. Steers were weighed on 2 consecutive days (day 0 and 1) to establish initial BW. All steers were adapted to a common finishing diet over a 24-d step-up period. The amount of wet distiller's grains, Sweet Bran, grass hay and supplement were held constant in the step-up diets (15%, 25%, 6% and 4%, respectively; DM-basis), while the amount of dry rolled corn was gradually increased replacing alfalfa hay. The finishing diet was identical across treatments and contained 50% dry rolled corn, 15% wet distiller's grains, 25% Sweet Bran, 6% grass hay and 4% supplement (DM-basis).

Individual BW was collected on days 0 and 1. Pen weights were collected for each pen on days 1, 20, 60, 80, 100, 140, and 180. Steers were weighed by replication, and once finished with each replication, steers that were to be re-implanted remained at the processing facility and other steers were returned to their home pen. Steers were harvested on day 180 at a commercial harvest facility (Greater Omaha, Omaha, NE). Prior to shipping, steers were offered 50% of the previous day's called feed. Final live BW was determined in the afternoon prior to shipping using the average pen weight shrunk by 4% to adjust for fill. Steers were then loaded onto trucks, transported to the abattoir, and harvested the following morning. Carcass-adjusted performance was calculated from HCW divided by a common dressing percent of 63%. At harvest, liver scores and HCW were recorded. After a 48-hour chill, 12th rib fat thickness, rib eye area, and USDA marbling score were recorded. Yield grade was calculated based on 12th rib fat thickness, rib eye area, HCW, and a constant kidney-pelvic-heart fat (KPH; 2.5%). Both performance and carcass data were analyzed in the MIXED procedure of SAS. The model included treatment, start time, block and block within start date as fixed effects and experimental unit was pen. Linear and quadratic orthogonal contrasts were evaluated for days on terminal implant. Alpha values of ≤ 0.05 were considered significant.

Results

Dry matter intake was the lowest for 40 DOT ($P \leq 0.04$, Table 1), with no differences between the other treatments ($P \geq 0.11$). Carcass-adjusted final BW responded quadratically ($P = 0.03$) with 100 DOT having the greatest final BW, but no differences between 100 or 120 DOT ($P = 0.82$). Carcass-adjusted ADG responded quadratically ($P = 0.02$), with 100 and 120 DOT being the greatest, but not different ($P = 0.87$) and 80 DOT being intermediate ($P \geq 0.57$). There was less than 1% difference in carcass-adjusted ADG between 120 DOT and 80 DOT. Carcass-adjusted F:G also responded quadratically ($P < 0.01$), with 160 DOT being the least efficient, but no

Table 1. Effects of day on terminal implant (DOT; Revalor-200) following initial implant (Revalor-IS) on growth performance of steers fed for 180 d.

	Days on Revalor–200								
	160	120	100	80	40	SEM	F-Test	Linear	Quad
Live Performance									
Initial Weight, lb	726	727	728	728	727	3.1	0.70	0.41	0.96
Final Weight, lb[1]	1448	1469	1480	1470	1451	10.5	0.17	0.32	0.05
DMI, lb/d	26.1	26.3	25.9	25.8	25.2	0.21	0.01	0.18	0.93
ADG, lb	4.03	4.16	4.19	4.16	4.03	0.054	0.11	0.42	0.03
F:G[3]	6.45	6.33	6.17	6.21	6.25	-	0.04	0.90	0.01
Carcass Adjusted Performance									
Final Weight, lb[2]	1481	1508	1511	1501	1474	9.4	0.03	0.13	0.03
ADG, lb	4.21	4.37	4.36	4.34	4.16	0.049	0.01	0.18	0.02
F:G [3]	6.21	6.02	5.92	5.95	6.06	-	0.01	0.66	<0.01

[1]Pencil shrunk 4%. Subsequent ADG and F:G calculated from shrunk final BW

[2]Calculated by HCW divided by common dressing percentage of 63%. Subsequent ADG and F:G re-calculated from adjusted final BW

[3]Analyzed as G:F

Table 2. Effect of DOT (Revalor-200) following an initial implant (Revalor-IS) on carcass characteristics of steers fed for 180 d.

	Days on Revalor-200								
	160	120	100	80	40	SEM	F-Test	Linear	Quad
HCW	933	950	952	946	929	5.95	0.03	0.14	0.03
REA, sq in	13.7	14.0	14.2	13.8	13.9	0.08	<0.01	<0.01	0.09
Fat Thickness, in	0.65	0.64	0.64	0.64	0.63	0.015	0.81	0.66	0.97
Marbling Score[1]	517	530	541	534	534	7.5	0.27	0.60	0.11
Calc. Yield Grade[2]	3.79	3.72	3.69	3.77	3.64	0.060	0.38	0.52	0.89

[1]400 = Small 00, 500 = Modest 00, 600 = Moderate 00

[2]Calculated using the following equation: 2.50 + (2.5 x 12th rib fat, in.) – (0.32 x REA, in^2) + (0.2 x 2.5 [KPH, %]) + (0.0038 x HCW, lb)

differences between other treatments ($P \geq 0.13$). Compared with 120 DOT, there was a 1.6% increase in F:G when cattle spent 100 DOT and a 0.5% increase in F:G compared to 80 DOT. There was a 1.2% improvement in F:G when steers spent 80 DOT compared with 120 DOT.

A quadratic response was observed for HCW ($P = 0.03$), with no differences between 80, 100 or 120 DOT ($P \geq 0.45$). There were no differences in backfat thickness ($P = 0.81$) and rib eye area decreased linearly with 100 and 120 DOT having the greatest rib eye area ($P \leq 0.05$). Marbling score and calculated yield grade were similar among treatments ($P \geq 0.27$).

Interim performance is summarized in Table 3. As expected, ADG and F:G were greater in most cases in each period following when the terminal implant was applied. The exception to this was when the 120 DOT treatment was applied. There were no differences in ADG or F:G between treatments ($P \geq 0.16$), but the respective treatment was not numerically greater compared to the other treatments. There was a tendency ($P = 0.06$) for ADG to be different among treatments when during d 82 to 101, however, 100 DOT was not the greatest despite those steers having received their terminal Revalor-200 on d 80. Due to DMI being the lowest for 100 DOT during that period ($P < 0.01$), 100 DOT had the lowest F:G during that period ($P = 0.02$).

Using the following quadratic equation for carcass-adjusted ADG: y =-0.00004204 (±0.0002044) DOT^2 + 0.008339 (±0.0041733) DOT + 3.763 (±0.19398) and solving for the first-derivative, carcass-adjusted ADG is optimized at 99 DOT. The quadratic equation for carcass adjusted G:F is: y =-0.00000128 (±0.000000577) DOT^2 + 0.0002222 (±0.0001179) DOT + 0.15865 (±0.0054785) and when solved for the first-derivative, G:F was maximized at 87 DOT. This simply means that to get the best gain and conversion, reimplanting between 87 and 99 days from harvest is best. However, small differences were observed anywhere from 80 to 120 days from harvest for the terminal implant, suggesting some flexibility for marketing.

Conclusion

Overall, performance was the greatest when steers spent 100 or 120 days exposed to the terminal implant (Revalor-200). When solving for the first-derivative for both carcass-adjusted ADG and feed efficiency, performance was maximized at 99 or 87 DOT, respectively. The relatively minor differences in performance and carcass characteristics when steers are reimplanted between 80 to 120 d prior to harvest suggests flexibility in reimplanting windows.

Table 3. Effect of DOT (Revalor-200) following initial implant (Revalor-IS) on interim performance of steers fed for 180 d.

	Days on Revalor-200								
	160	120	100	80	40	SEM	F-Test	Linear	Quad.
Day 1–20									
DMI, lb/d	20.3	20.8	20.6	20.4	20.3	0.20	0.47	0.16	0.77
ADG, lb[2]	3.40	3.56	3.91	3.40	3.29	0.25	0.48	0.13	0.32
F:G[1]	5.95	5.81	5.29	5.98	6.17	-	0.56	0.16	0.32
Day 21–61									
DMI, lb/d	24.6	25.1	24.5	24.8	24.3	0.31	0.42	0.99	0.96
ADG, lb	5.27	4.72	4.60	4.89	4.75	0.13	<0.01	0.12	0.09
F:G	4.69	5.32	5.32	5.07	5.13	-	0.01	0.17	0.12
Day 62–81									
DMI, lb/d	27.7	26.7	27.2	27.4	26.3	0.34	0.04	0.92	0.35
ADG, lb	5.24	5.55	5.09	5.04	4.96	0.21	0.34	0.44	0.36
F:G	5.32	4.81	5.37	5.46	5.29	-	0.16	0.43	0.17
Day 82–101									
DMI, lb/d	27.2	27.3	25.2	26.0	26.4	0.37	<0.01	0.35	<0.01
ADG, lb	3.68	4.16	3.93	3.49	3.24	0.22	0.06	0.03	0.95
F:G	7.41	6.58	6.45	7.46	8.20	-	0.02	<0.01	0.23
Day 102–141									
DMI, lb/d	27.8	28.1	27.4	26.7	26.6	0.29	<0.01	0.01	0.12
ADG, lb	3.92	4.42	4.49	4.34	3.94	0.12	<0.01	0.09	<0.01
F:G	7.09	6.33	6.10	6.13	6.71	-	<0.01	0.45	<0.01
Day 142–180									
DMI, lb/d	27.2	27.9	28.2	27.9	26.1	0.38	<0.01	0.14	<0.01
ADG, lb	2.68	2.72	3.19	3.34	3.64	0.18	<0.01	0.10	0.08
F:G	10.10	10.31	8.77	8.26	7.19	-	<0.01	0.03	0.25

[1]Analyzed as G:F.

[2]Calculated from pencil-shrunk (4%) interim BW

Caitlin A. Ohnoutka, graduate student

Bradley M. Boyd, research technician

F. Henry Hilscher, feedlot manager

Brandon L. Nuttelman, Merck Animal Health

Grant I. Crawford, Merck Animal Health

Jim C. MacDonald, professor, Animal Science, Lincoln

Galen E. Erickson, professor, Animal Science, Lincoln