January 2006

Effect of Optaflexx Dosage and Duration of Feeding Prior to Slaughter on Feed Conversion and Carcass Characteristics

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Summary

Finishing steer calves were fed 0, 100, or 200 mg/head/day of Optaflexx for the final 28, 35, or 42 days of the finishing period. Steers were started on Optaflexx treatment at one-week intervals and marketed as a single group. Feeding Optaflexx to feedlot steers increased ADG, improved F:G, and increased carcass weight. Feeding 200 mg/head/day of Optaflexx improved feed conversion by 8.1% without impacting carcass characteristics. Feeding Optaflexx at 200 mg/head/d for 28 to 42 days appears beneficial when compared with feeding diets without Optaflexx.

Introduction

Optaflexx is a feed additive approved for use in feedlot cattle during the final 28 to 42 days of the feeding period. Optaflexx can be fed at a rate of 70 to 430 mg/head/day and 9.1 to 27.3 g/ton (100% DM basis) in the final mixed diet to improve rate of weight gain and feed efficiency.

While some information is available on effects of Optaflexx dosage and feeding duration from research prior to F.D.A. approval of Optaflexx, post-approval data are limited. Because of the wide range of approved inclusion rates, research to predict response at various doses and durations is warranted. The objective of this experiment was to evaluate F:G and carcass characteristics when steers were fed 0, 100, or 200 mg/head/day of Optaflexx for the final 28, 35, or 42 days prior to slaughter.

Procedure

Crossbred (English x Continental) steer calves were received at the Agricultural Research and Development Center near Mead, Neb. in the fall of 2003. Calves were received on a common program and adapted to grain over a 21-day period by replacing alfalfa with high-moisture corn. Prior to initiation of Optaflexx treatment all cattle were fed 58.5% high-moisture corn, 30% wet corn gluten feed (SweetBran, Cargill, Blair, Neb.), 7.5% alfalfa hay, and 4% dry supplement (DM basis).

In late January, steers were re-implanted and weighed individually on two consecutive days. At this time, steers were assigned to one of nine treatments, arranged as a 3 x 3 factorial with factors including Optaflexx feeding duration (final 28, 35, or 42 day of the finishing period) and Optaflexx dosage (0, 100, or 200 mg/head/day). Steers were separated into two blocks based on two-day re-implant weights. The heavy block consisted of 360 steers assigned randomly to 36 pens (10 steers/pen), while the light block consisted of 495 steers assigned randomly to 45 pens (11 steers/pen). Pens within a block were assigned randomly to one of nine treatments in the 3 x 3 factorial. An additional 69 steers were assigned randomly into six pens creating three baseline marketing groups. The baseline marketing cattle were fed the same diet as the heavy and the light block, and two pens (23 head) were slaughtered at initiation of each Optaflexx duration treatment (light block, 28, 35, 42 days) to determine carcass characteristics for later estimation of carcass changes during the Optaflexx feeding period. Carcass ADG and efficiency of weight transfer were calculated by regressing dressing percentage on days after initial weight using the baseline marketing cattle (day 0, 7, and 14; n=69) and all control cattle in the light block (day 42; n=164). This allowed for observations of dressing percentage at 0, 7, 14, and 42 days after initial weights were measured. From this regression, a theoretical dressing percentage was determined by multiplying the duration of feeding after initiation of treatment with the slope generated from the regression and then subtracting this value from final dressing percentage. The slope represents gain in dressing percentage for each day after initiation of treatment. An initial carcass weight was then calculated by multiplying the theoretical initial dressing percentage with live weight at the time of treatment initiation.

Steers were implanted with Synovex-S initially and re-implanted with Revalor-S 100 and 104 days prior to marketing for the heavy and light block, respectively. The baseline marketing cattle received the same implant treatments, and therefore were implanted 62, 69, and 76 days prior to slaughter for the 42, 35, and 28 day treatments, respectively.

During the Optaflexx feeding period, a new Optaflexx dry supplement consisting of fine-ground corn was added to all diets to provide 0, 100, or 200 mg/head/day of Optaflexx. These diets included 55.4% high-moisture corn, 30.0% wet corn gluten feed, 7.5% alfalfa hay, 4% supplement, and 3.1% of the Optaflexx supplement (DM basis). Cattle were fed twice daily throughout the entire experiment at approximately 0800 and 1300 hours. Steers received 60% of their daily DM during the A.M. feeding and 40% during the P.M. feeding. To determine actual Optaflexx concentration in the delivered feed, samples were collected daily at the beginning, middle and end of each A.M. load and assayed. Feed assays showed Optaflexx was provided at target levels throughout the Optaflexx feeding period.

Table 1. Final live weights and carcass characteristics of early marketing reference cattle.

Reference group[a]	28	35	42	SEM
Final BW, lb	1168	1141	1118	8
Carcass weight, lb	751	725	709	4
Dressing %	64.3	63.5	63.4	0.7
Marbling[b]	515	530	513	17
Longissimus area, in^2	11.60	12.23	11.18	0.45
12^{th} rib fat depth, in	0.48	0.48	0.46	0.04

[a]Baseline cattle were marketed at initiation of each Optaflexx feeding duration treatment (28, 35, 42 days for the light block)
[b]Marbling score called by USDA grader where 500 = small[0] and 550 = small[50].

Seven steers were removed from the experiment due to health reasons during the Optaflexx feeding period. In addition, one animal died from interstitial atypical pneumonia diagnosed during necropsy. All causes of removal from experiment appear unrelated to Optaflexx treatments. Individual steer weights were taken on day 1 of Optaflexx treatment. Therefore, steers assigned to 42 days Optaflexx treatment were weighed 42 days prior to marketing, with the 35 days treatment steers weighed one week later, etc. Steers assigned to the heavy block were marketed one week prior to steers on the light block with cattle being fed for an average of 178 days.

At the end of the experiment, all cattle within block were weighed live for determination of live performance during the Optaflexx feeding phase. All cattle were marketed at a commercial abattoir (Tyson Foods, Inc., Dakota City, Neb.) where carcass data were collected. Hot carcass weights and liver abscess scores were collected on the day of slaughter, while fat depth, kidney, pelvic, and heart fat (KPH), longissimus muscle area (LM area), marbling score, and overall maturity (lean and skeletal maturity) measurements were collected after a 36-hour chill. Yield grades were based on measured carcass characteristics.

All data were analyzed as a randomized complete block design with block (i.e. two weight blocks) as a random effect. Treatments were analyzed as a 3 x 3 factorial design where the interaction between dose of Optaflexx and duration of feeding was tested initially. Within duration, dosage of 0, 100, and 200 mg/head/day were analyzed for orthogonal linear and quadratic responses.

Results

Final live weight and carcass characteristics of the baseline marketing groups are presented in Table 1. In order to determine carcass weight gain and changes in carcass characteristics over the duration of Optaflexx feeding, it is assumed that the baseline marketing steers accurately represent the remaining steers in the experiment.

Steer performance data are for the last 28, 35, or 42 days of the finishing period. All performance data presented are based on live weight (4% shrink). Live weight at the initiation of Optaflexx treatment averaged 1,164 lb. Based on DMI, average Optaflexx intakes were 109 mg/day and 215 mg/day for the 100 and 200 mg treatments, respectively.

Simple effects outlining feedlot performance for the Optaflexx feeding period are presented in Table 2. There were no dose x duration interactions ($P > 0.58$) for feedlot performance, and there were only two carcass characteristics (LM area and calculated

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Table 2. Live performance and carcass characteristics of steers fed 0, 100, or 200 mg/head/day of Optaflexx for 28, 35, or 42 days at the end of the finishing period.

Duration:	28 day			35 day			42 day					Linear main effect[b]	
Dosage:	0	100	200	0	100	200	0	100	200	SEM	Int.[a]	dose	duration
Replications, n	9	9	9	9	9	9	9	9	9				
Steers, n	94	95	95	94	94	93	94	93	95				
Initial BW, lb	1194	1189	1194	1165	1171	1161	1134	1134	1137	37	0.59	0.79	<0.01
Final BW, lb	1311	1310	1323	1311	1317	1313	1309	1316	1320	50	0.58	0.07	0.93
DMI, lb/day	24.1	23.9	23.8	24.2	24.0	23.6	24.2	24.1	23.3	0.9	0.69	0.01	0.65
ADG, lb	4.01	4.16	4.48	4.07	4.06	4.22	4.09	4.23	4.28	0.37	0.65	0.01	0.72
F:G	6.10	5.77	5.34	6.00	6.01	5.69	5.93	5.73	5.53	0.33	0.58	<0.01	0.87
Carcass weight, lb	848	853	857	850	853	852	846	855	859	30	0.49	<0.01	0.74
Dressing %	64.7	65.1	64.8	64.9	64.8	64.9	64.6	65.0	65.2	0.2	0.42	0.14	0.75
Marbling[c]	538	551	543	562	547	534	547	550	532	10	0.44	0.10	0.95
Longissimus area, in^2	13.28	13.35	13.66	13.32	13.41	13.33	13.03	13.43	14.07	0.15	<0.01	<0.01	0.44
12^{th} rib fat depth, in	0.54	0.56	0.56	0.58	0.54	0.58	0.57	0.53	0.52	0.02	0.11	0.39	0.39
Calc. USDA YG[d]	3.24	3.28	3.18	3.33	3.21	3.33	3.38	3.20	2.97	0.07	<0.01	<0.01	0.08

[a]P-value for the interaction between dose and duration.
[b]P-value for linear effect of either main dose or main duration. No variables had a significant quadratic response.
[c]Marbling score called by USDA grader where 500 = small[0] and 550 = small[50].
[d]Calculated USDA yield grade on scale of 1 to 5.

USDA yield grade) exhibiting a dose x duration interaction ($P < 0.01$). Initial BW was similar across dosages and within feeding durations, however, cattle that began Optaflexx treatment 42 d prior to marketing were lighter and initial weights increased linearly as the shorter duration treatments were initiated. Beyond initial BW, duration of Optaflexx feeding had no effect ($P > 0.65$) on feedlot performance, and little effect on carcass characteristics ($P > 0.08$). Therefore, the focus will be on the main effects of Optaflexx dosage (Table 3). Overall, cattle gained more than 4.0 lb/day over the Optaflexx feeding period regardless of Optaflexx dosage. Feeding Optaflexx increased ADG linearly ($P < 0.01$) and decreased DMI linearly ($P < 0.01$). The actual decrease in DMI was slight (0.5 lb). The slight decrease in DMI and increase in ADG combined for a marked improvement in F:G ($P < 0.01$) due to feeding Optaflexx. Feed conversions were improved 2.9 and 8.1% when Optaflexx was fed at 100 and 200 mg/day, respectively.

Carcass weight increased linearly ($P < 0.01$) with Optaflexx dosage. Marbling scores tended ($P = 0.10$) to be reduced linearly with Optaflexx feeding, and it appears that the decline occurred primarily at the 200 mg/head/day level (Table 3). Longissimus area increased linearly ($P < 0.01$) from 13.2 to 13.7 square inches with Optaflexx dosage. An increase in muscling is a common observation with Optaflexx. Fat depth at the 12th rib averaged 0.55 inches, and was not impacted ($P > 0.30$) by dosage. The increase in longissimus area without an increase in 12th rib fat suggests that the weight gain observed when feeding Optaflexx is primarily in muscle tissue.

Table 3. Main effects of Optaflexx dosage (mg/head/day) on live performance and carcass characteristics.

Dosage	0	100	200	SEM	linear[a]	quadratic[a]
Initial BW, lb	1164	1165	1164	37	0.79	0.97
Final BW, lb	1311	1314	1319	50	0.07	0.95
DMI, lb/day	24.1	24.0	23.6	0.8	0.01	0.38
ADG, lb	4.06	4.15	4.32	0.35	<0.01	0.86
F:G	6.01	5.84	5.52	0.29	<0.01	0.76
Carcass weight, lb	848	854	856	30	<0.01	0.43
Carcass ADG, lb[b]	3.00	3.08	3.18	0.04	<0.01	0.87
Dressing %	64.7	65.0	65.0	0.2	0.14	0.27
Marbling[c]	549	549	536	6	0.10	0.33
Longissimus area, in^2	13.21	13.40	13.69	0.11	<0.01	0.54
12th rib fat depth, in	0.56	0.55	0.55	0.02	0.39	0.23

[a]P-value for linear and quadratic main effect of Optaflexx dose.
[b]Calculated using baseline marketing cattle as a reference for carcass weight at initiation of treatment.
[c]Marbling score called by USDA grader where 500 = small^0 and 550 = small^{50}.

In this study, carcass weight increased 6 and 8 lb for steers fed 100 and 200 mg of Optaflexx/head/day, respectively, compared with steers fed no Optaflexx. When comparing the final live weights of the treatment groups, the difference is 3 and 8 lb for the 100 and 200 mg/head/day treatments, respectively, compared with the steers fed no Optaflexx. This suggests the increase in ADG due to Optaflexx feeding was carcass gain, which is further supported by a slight numerical increase in dressing percentage and an increase in longissimus area with increasing Optaflexx dosage. By using the baseline marketing groups to estimate carcass gain during the Optaflexx feeding period, efficiency of weight transfer (carcass weight gain/live weight gain) was calculated at 74.6% across all treatments. This represents the proportion of weight gain during the final 28 to 42 days prior to slaughter that was carcass gain, showing that a large proportion of the gain during this time was carcass gain. Carcass ADG, estimated using the baseline marketing groups as a reference, increased linearly ($P < 0.01$) with Optaflexx dosage.

In summary, feeding Optaflexx up to 200 mg/head/day for the last 28 to 42 days prior to marketing increases live weight gain, carcass weight, and improves feed conversion in feedlot steers. Larger longissimus area without an impact on fat depth suggests most, and possibly all, of the weight gain associated with Optaflexx feeding is due to lean carcass gain.

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