THE EFFECT OF OPTAFLEXX® ON GROWTH PERFORMANCE AND CARCASS TRAITS OF STEERS

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Key Points

When fed to steers during the last 28 to 42 days of the finishing period, Optaflexx:

- Improves average daily gain
- Improves feed efficiency
- Does not affect feed intake
- Increases hot carcass weight
- Does not affect marbling score

The responses in commercial research trials are similar to those seen in FDA registration trials

Introduction

Optaflexx is the trademark name for ractopamine hydrochloride, the first beta-agonist to be approved by the Food and Drug Administration (FDA) for increased rate of weight gain, feed efficiency improvement and increased carcass leanness when fed to steers and heifers during the final 28 to 42 days of the finishing period.

This publication compares and contrasts the relative results from FDA registration trials with those of two commercial trials conducted post-registration with steers. For the sake of simplicity, this publication will only compare the results from control groups to those of the 200 mg Optaflexx/hd/day groups (recommended use level).

Objectives

Two separate commercial research trials were conducted to confirm the performance response seen in FDA registration trials in feedlot steers fed Optaflexx at 200 mg/hd/day the last 28 days prior to slaughter.

Materials and Methods

Dose and Animal Numbers

FDA registration trials

Optaflexx was fed during the final 28 and 42 days of the finishing period prior to harvest in FDA registration trials conducted at five locations across the United States. Optaflexx was mixed in the feed at 0.0 and 18.2 g/ton (100 percent DM). This provided approximately 0.0 and 200 mg/hd/day. The steers were fed in eight- to 10-head pens during the trial. Each trial site consisted of five treatment blocks. The total number of steers per treatment was 220.

Commercial trials
Optaflexx was fed during the final 28 days of the finishing period prior to harvest in commercial trials conducted in Kansas and Colorado. In both the Kansas and Colorado trials, Optaflexx was mixed in the feed to provide 0 or 200 mg/hd/day to the steers. In the Kansas trial, a total of 1,064 steers were randomly assigned to one of eight blocks per treatment for a total of 16 pens; in the Colorado trial, 583 steers were randomly assigned to one of two blocks per treatment for a total of eight pens. In both studies, steers were fed in commercial feedlots consisting of approximately 60 to 75 steers per pen.

Season and Cattle Type

FDA registration trials
The trials were conducted at various locations across the US during different seasons of the year. Cattle for each trial were selected from a single source to minimize genetic variation within the trial, but across trials, the cattle represented a wide range of frame sizes and genotypes.

Commercial trials
The Kansas and Colorado trials were conducted from October to December of 2003 and February to March of 2004 respectively. In both the Kansas and Colorado trials, the cattle were described as "typical yearling steers," being predominantly English and English x Continental crossbred steers with a very few animals described as Bos Indicus.

Rations and Feed Ingredients

In all trials, rations were typical of the regions where the trials were conducted and met or exceeded National Research Council (NRC) requirements. Nutrient profiles of the diets fed at each location are provided in Table 1. In the FDA registration trials as well as the Kansas trial, neither Rumensin® nor Tylan® was fed during the final 28 to 42 days while Optaflexx was fed. In the Colorado trial, Rumensin and Tylan were fed during the pre-treatment phase, prior to Optaflexx feeding as well as through the final 28 days while Optaflexx was being fed.

Table 1.
Nutrient Profile of Rations (100% DM)

Location	Crude Protein %	NPN %	Ca %	P %
FDA registration trials				
Indiana	13.60	1.67	0.61	0.37
Colorado	14.62	3.06	0.65	0.32
Nebraska	13.03	1.74	0.99	0.35
California	13.81	0.93	0.65	0.34
Colorado	15.23	3.73	0.73	0.37
Commercial trials				
Kansas	12.81	2.65	0.70	0.31
Colorado	13.04	3.45	0.75	0.32

Cattle Management, Trial Duration and Total Days on Feed

FDA registration trials
Upon arrival, cattle were vaccinated, treated for internal and external parasites and implanted with a single estrogenic implant. Cattle at each trial site were fed and managed in two phases: 1) pre-treatment phase, and 2) Optaflexx-feeding phase. During the pre-treatment phase, cattle were fed a starter ration and gradually adapted to the final finishing ration. The length of the pre-treatment phase varied both within and across trial sites with the average pre-treatment period lasting 131 days (range of 94 to 193 days). The feeding of Optaflexx started when blocks of cattle were judged to be either 28 or 42 days from harvest, based on live weight, ultrasound measurements of back fat thickness and visual evaluation.

Commercial trials
Upon arrival at both sites, cattle were vaccinated and treated for internal and external parasites. Steers in the Kansas trial were implanted upon arrival with Revalor®-S, while the steers in the Colorado trial were re-implanted with Component TE-S® 98 days before harvest. Cattle at each trial site were fed and managed in two phases: 1) pre-treatment phase, and 2) Optaflexx-feeding phase. During the pre-treatment phase, cattle were fed a starter ration and gradually adapted to the final finishing ration. The length of the pre-treatment phase in Kansas averaged 107 days, while in the Colorado trial, the pre-treatment phase was 161 days.

Weights, Trial Termination and Harvest

FDA registration trials
Individual full weights were recorded at the beginning and end of each 28- or 42-day trial period. Cattle were shipped to commercial beef packing plants for harvest. Shipping distances ranged from 50 to 700 miles and cattle were commingled and held overnight before harvest.

Commercial trials
On the morning of treatment initiation, as well as the trial termination, steers were removed from their pens and weighed within a statistical block in one to four drafts of cattle (10-30 hd/draft). Cattle in the Kansas trial were shipped 121 miles to a commercial packing plant for harvest. In the case of the Colorado trial, the shipping distance was 20 miles.

Carcass Data Collection

FDA registration trials
Following an 18- to 24-hour chill, carcasses were ribbed between the 12th and 13th rib and standard carcass parameters were measured on both sides of each carcass. The average of the two-side values was reported for rib-eye area and marbling score. Percent kidney, pelvic and heart fat (KPH) and 12th rib fat thickness were recorded for use in calculating yield grade. Quality grade was determined using marbling score and carcass maturity. The same personnel evaluated all carcasses.

Commercial trials
Carcasses in the Kansas trial were chilled for a range of 30 to 54 hours, while those in the Colorado trial were chilled for 48 hours. All carcasses were ribbed between the 12th and 13th rib and standard carcass parameters were taken by an experienced group of carcass data evaluators.

Statistics

FDA registration trials
Data from all trials were pooled and statistically analyzed using a mixed model analysis (PROC MIXED, SAS). Trial heterogeneity was tested using a residual and random component. Depending on the results of these tests, either a weighted mixed model analysis was conducted for traits showing trial heterogeneity or an unweighted mixed model analysis was conducted for all traits without trial heterogeneity.

Commercial trials
Data were statistically analyzed using a mixed model analysis with treatment and block included in the model statement as fixed effects (PROC MIXED, SAS).

Results and Discussion

Growth Performance

In the FDA registration trials, the Optaflexx feeding period lasted either 28 or 42 days and the results were pooled across days and trials for reporting purposes (Table 2). Optaflexx was fed at 0.0 or 18.2 g/ton on a 100 percent dry matter basis. Based upon an average intake of 21.85 lbs per day for steers, the level of Optaflexx received was approximately 200 mg/hd/day. In the commercial trials, the concentration of Optaflexx (g/ton) in the treatment rations was adjusted according to the 7-day average intake of the respective pen to achieve an intake level of 200 mg of Optaflexx/hd/day. Feed intake was not affected by Optaflexx feeding in either the FDA registration trials nor in the commercial trials in Kansas and Colorado (P=.38, P=.36 and P=.39 respectively).

In the FDA registration trials as well as the commercial trials, average daily gain improved (P<.001) for Optaflexx treatments compared to controls. Average daily gain for steers fed Optaflexx at 200 mg/hd/day was improved by 17.1 percent, 19.6 percent and 25.7 percent, respectively. Total weight gained over the Optaflexx feeding period for steers by treatment was 17.0, 17.6 and 16.1 lbs above controls, respectively. Feed efficiency, on a pen basis, was also improved (P<.001) for steers by 20.5 percent, 18.4 percent and 19.0 percent for the FDA registration, Kansas and Colorado trials respectively.

No treatment differences were noted in animal health, behavior or mortality.

Table 2

Comparison of Growth Performance Results of Steers Fed Optaflexx (deads and rejects out basis)

	Optaflexx, mg/hd/day					
Research Trials	**FDA Registration Trials**		**Kansas**		**Colorado**	
Variable	**0**	**200**	**0**	**200**	**0**	**200**
No. Pens	25	25	8	8	4	4
No. Animals[b]	215	219	534	530	294	289
Initial Weight, lb[c]	1169.4	1167.9	1270.0	1266.3	1193.6	1192.5
Final Weight, lb[c]	1268.8	1284.6*	1353.6	1367.7	1266.6	1282.8
ADG[d], lb	2.80	3.52*	2.99	3.62*	2.63	3.21*
ADG Improvement, %	---	25.7	---	21.1	---	22.0
Total Weight Gain, lb	99.4	123.4	83.7	101.4	73.0	90.3
Optaflexx Response[d], lb	---	24.0	---	17.6	---	16.1
DM Intake, lb	21.73	21.82	21.78	21.84	19.33	19.01
Feed Efficiency[e]	8.10	6.44*	7.45	6.08*	7.35	5.95*
Feed Efficiency, %	---	20.5	---	18.4	---	19.0

[a] Least squares means
[b] Animals were removed for non-treatment-related causes
[c] Full weights in FDA registration trials. 4% shrunk weights in commercial Kansas and Colorado trials
[d] Equalized initial weight basis
[e] Results calculated by (total feed consumed/total weight gained) on a pen basis
*P<.001 compared to controls

Carcass Traits

The effects of Optaflexx on carcass traits are shown in Table 3. Hot carcass weights for steers were increased (P<.04) 14.1, 12.8 and 17.8 lbs for the FDA registration, Kansas and Colorado trials respectively. Dressing percent was improved (P<.05) in steers in the FDA registration trials and the Colorado trial. The dressing percent results in the Kansas trial were not significantly improved. Twelfth rib fat thickness and percent KPH were not affected in any of the trials. In the FDA registration trials, rib-eye area was increased (P<.02) 0.4 square inches for steers fed 200 mg/hd/day. Rib-eye area was not significantly different in the Kansas trial; however, rib-eye area of steers fed 200 mg Optaflexx/hd/day in the Colorado trial tended to improved (P=.07). In the FDA registration trials, calculated yield grade tended to be improved for steers fed 200 mg/hd/day (P=.058) while the differences were not statistically significant in either of the commercial trials. Optaflexx had no effect on marbling score in any of the trials. Similarly, Optaflexx had no effect on carcass maturity, muscle color firmness and texture, nor the incidence of dark cutters.

Carcass conformation (a visual assessment of muscling in the sirloin and round) was improved for steers fed 200 mg/hd/day in the FDA registration trials as well as the Kansas trial.

Table 3
Comparison of Carcass Traits of Steers Fed Optaflexx[a]

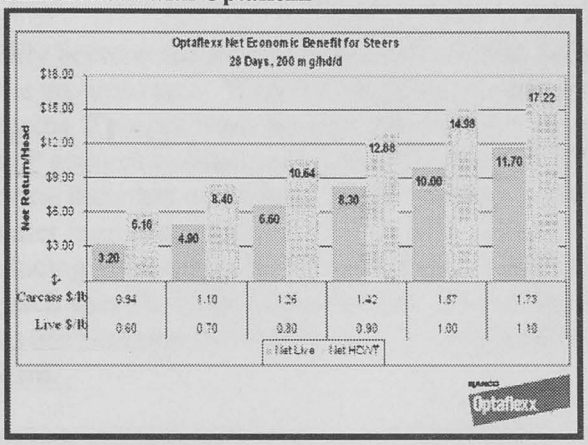
	Optaflexx, mg/hd/day					
Research Trials	**FDA Registration Trials**		**Kansas**		**Colorado**	
Variable	**0**	**200**	**0**	**200**	**0**	**200**
No. Pens	25	25	8	8	4	4
No. Carcasses	215	219	534	530	294	289
Hot Carcass Weight, lb	753.4	767.5*	876.5	889.32	813.0	830.8
Optaflexx Response, lb	---	14.1	---	12.8	---	17.8
Dressing Percent, %	61.9	62.2*	64.75[b]	64.85[b]	64.2[b]	64.8[b] *
12th Rib Fat Thickness[c], in	0.57	0.56	0.55	0.54	0.43	0.43
KPH, %	1.83	1.86	1.67	1.65	1.88	1.87
Rib-eye Area, in^2	12.0	12.4*	15.37	15.56	13.67	14.11
Yield Grade	3.32	3.22	2.39	2.35	2.68	2.60
Marbling[d]	532.9	530.7	515.6	514.5	495.5	490.2
Carcass Maturity[e]	155.7	157.1	170.5	172.3	175.6	175.6
Muscle Color[f]	6.02	6.07	6.04	6.07	NA	NA
Muscle Firmness[g]	6.14	6.21	6.00	6.00	NA	NA
Muscle Texture[g]	6.05	6.05	6.00	6.00	NA	NA
Carcass Conformation[h]	20.80	21.14*	21.1	21.7*	20.94	21.36
Dark Cutter, %	5.12	2.28	0.19	0.0	0.34	0.35

[a] Least squares means
[b] 4% pencil shrink applied to final full weight
[c] Actual 12th rib fat in FDA reg trials. Adjusted 12th rib fat in comm. trials
[d] Average of left and right sides, marbling score of 500=Small^0=low Choice
[e] Carcass maturity, A^0=100, B^0=200
[f] Color, firmness and texture scale, 1=unacceptable, 7=most desirable
[g] Carcass conformation, 20=average Choice, 21=high Choice
NA = Data not available
* P<.05 compared to controls

Economics

Finishing Improvement Technologies provide value to the entire food chain, including economic value to the producer. Chart 1 demonstrates what the expected returns for feeding Optaflexx are at various market prices. The live market price ranges from $0.60/lb to $1.10/lb and the corresponding carcass weight price ranges from $0.94/lb to $1.73/lb. Shown on the chart are net returns on a per head basis.

Chart 1. Expected Net Economic Benefit with Optaflexx



Conclusions

Commercial trial results confirm, when steers are fed Optaflexx at 200 mg/hd/day for the last 28 days prior to harvest similar performance and carcass results are achieved to those seen during FDA registration trials.

Growth and performance

- Increased average daily gain
- Improved feed efficiency
- No effect on feed intake

Carcass characteristics

- Increased hot carcass weight
- Increased red meat yield
- No effects on 12th rib fat thickness and KPH
- Minimal effects on marbling score and quality grade

Economics

- Cattle feeders can take advantage of a positive net return selling both live or on a carcass-weight basis
- By selling on a carcass weight basis, increased ROI can be received due to the efficiency of weight transfer from live to carcass

References

SAS, Version 6.12. SAS Institute Inc., Cary, NC.

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