RESPONSE OF HEIFERS FED OPTAFLEXX™ TO SUPPLEMENTAL PROTEIN

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Summary

An experiment was conducted to determine the relationship between metabolizable protein supply and feeding Optaflexx™ (ractopamine-HCl) on growth and carcass characteristics of feedlot heifers. Seventy-two crossbred heifers (initially weighing 1048 lb) were fed diets based on steam-flaked corn. Treatments were arranged as a 2 × 3 factorial and included: 0 or 2 grams per heifer daily of Optaflexx™ (0 or 200 mg/day ractopamine-HCl), and diets containing one of three different protein sources (urea, solvent soybean meal, and expeller soybean meal). Optaflexx™ was fed for the final 28 days before slaughter. Optaflexx™ improved daily gain, feed efficiency, carcass-adjusted daily gain, and carcass-adjusted feed efficiency. Responses in gain and efficiency based on final live weights were dependent on protein source; for heifers fed no Optaflexx™, performance was best with expeller soybean meal, whereas performance was best with urea-based diets when Optaflexx™ was added to diets. Gains and efficiencies based on carcass weights were not affected by dietary protein source. Final live weights were 20 lb greater and carcass weights were 15 lb greater when heifers were fed Optaflexx™. Carcass characteristics were impacted little by either Optaflexx™ or dietary protein source. It does not seem that dietary metabolizable protein supply needs to be increased from that of typical finishing diets to achieve maximum response to Optaflexx™.

Introduction

Optaflexx™ is a growth promotant that recently has been introduced to the market in the United States. Optaflexx™ is the trade name for ractopamine hydrochloride, a β_1 adrenergic agonist that can lead to marked alterations in metabolism that result in increased leanness and muscle accretion. Data on the response to feeding Optaflexx™ to finishing heifers are limited. The objectives of our study were to determine the impact of feeding Optaflexx™ to heifers for 28 days before slaughter and to determine if increasing the amount of metabolizable protein available to the heifers would improve their performance.

Procedures

Seventy-two crossbred heifers (1048 lb initial weight) were used in a 2 × 3 factorial arrangement. Treatments included: 0 or 2 g/heifer daily of Optaflexx™ (providing 0 or 200 mg/day ractopamine-HCl; Elanco Animal Health), and one of three diets, based on steam-flaked corn, that contained either urea, solvent soybean meal, or expeller soybean meal as the primary supplemental protein source (Table 1). Heifers were fed individually and were given ad libitum access to their respective diets. Heifers were implanted with Revalor®-H (Intervet) 60 days before initiating Optaflexx™ feeding. Initial body weights were measured one day before initiation of Optaflexx™ feeding, and final body weights

were measured on the day of slaughter. Hot carcass weights were determined at slaughter, and other carcass characteristics were measured after a 24-hour chill. For reasons not related to treatment, data from one heifer were deleted from the analysis.

Results and Discussion

Our diets were formulated such that they would provide different amounts of protein to the small intestine (i.e., metabolizable protein), with the urea diet providing the least and the expeller soybean meal diet presumably providing the most. Performance of finishing heifers typically does not respond to the changes in protein supply that we implemented. Our hypothesis was that heifers fed Optaflexx™ might respond to increases in metabolizable protein supply because Optaflexx™ was expected to increase growth rate and lean tissue deposition, which might lead to a greater need for absorbable protein from the diet.

Optaflexx™ significantly increased average daily gain, with the response dependent on the protein source (Table 2). In the heifers not receiving Optaflexx™, increases in metabolizable-protein supply, particularly from the expeller soybean meal, led to improvements in daily gains. In contrast, for heifers fed Optaflexx™, the greatest daily gains were observed in heifers fed the urea-supplemented diet.

When daily gains were calculated with final weights based on carcass weights, Optaflexx™ still led to increases in daily gains, but no statistically significant effects of diet were present. For heifers fed Optaflexx™, however, the numerically greatest carcass-adjusted gains were observed in heifers fed the urea-supplemented diets, suggesting that there was no benefit of increasing the metabolizable protein supply, even when Optaflexx™ was fed. The carcass-adjusted gains of heifers not fed Optaflexx™ followed our expectation, in that they did not respond to changes in protein supply with changes in growth rate.

Feed intake was not affected by either Optaflexx™ or by dietary protein source. Feed efficiencies followed the pattern observed for daily gains, with improvements observed in response to Optaflexx™. Feed efficiencies based on live weights followed the trends observed for daily gains, although the interaction between Optaflexx™ and dietary protein source was not significant. Feed efficiencies calculated on the basis of carcass-adjusted body weights did not demonstrate any effect of dietary protein source.

Final live weights were 20 lb greater and carcass weights were 15 lb greater when heifers were fed Optaflexx™, but these differences were not statistically significant due to variation in the initial weights of the heifers.

In general, carcass characteristics were not greatly different among treatments, but the number of heifers used in our experiment was not large enough to ferret out small, but economically important, differences that might exist. Percentage of kidney, pelvic, and heart fat was statistically less for heifers fed solvent soybean meal without Optaflexx™ and for heifers fed expeller soybean meal with Optaflexx™, although these differences are unlikely to be of biological importance.

The results gathered from this experiment show that Optaflexx™ fed to heifers 28 days before slaughter can improve daily gains and feed efficiency. When final weights of heifers were based on carcass weight, dietary protein source had little effect on heifer performance. Our data do not support the concept that dietary metabolizable-protein supply needs to be increased beyond that presently used in typical feedlot diets to maximize the performance response of finishing heifers to Optaflexx™.

Table 1. Diet Composition

Ingredients	Urea	Solvent Soybean Meal	Expeller Soybean Meal
	---------- % of dry matter ----------		
Steam-flaked corn	82.4	77.0	75.7
Separator byproduct	6.0	6.0	6.0
Alfalfa hay	6.0	6.0	6.0
Urea	1.5	0.5	0.5
Solvent soybean meal	–	6.6	–
Expeller soybean meal	–	–	7.9
Limestone	1.5	1.4	1.4
Salt	0.3	0.3	0.3
Vitamins and minerals [a]	0.1	0.1	0.1
RTM premix [b]	2.2	2.2	2.2

[a]Provided 0.13 ppm Co, 10 ppm Cu, 0.63 ppm I, 0.17 ppm Fe, 60 ppm Mn, 0.25 ppm Se, 60 ppm Zn, and 1200 IU/lb Vitamin A to final diet.
[b]Fed to provide (mg/heifer daily): ractopamine-HCl (0 or 200 depending on treatment), melengestrol acetate (0.5), monensin (300), and tylosin (90).

Table 2. Growth and Carcass Characteristics of Heifers Fed 0 or 2 grams/day of Optaflexx™ with One of Three Protein Dietary Sources

	Control			Optaflexx™			
Item	Urea	Solvent Soybean Meal	Expeller Soybean Meal	Urea	Solvent Soybean Meal	Expeller Soybean Meal	SEM
Number of heifers	11	12	12	12	12	12	–
Initial body wt., lb	1047	1047	1048	1048	1048	1048	14
Final live wt., lb	1134	1145	1164	1180	1163	1158	18
Feed intake, lb dry matter	18.89	18.81	19.85	20.17	19.61	18.25	0.80
Daily gain, lb/day[ab]	3.01	3.37	3.99	4.55	3.98	3.78	0.34
Carcass-adj. daily gain, lb/day[ae]	3.50	3.28	3.66	4.73	4.20	4.12	0.40
Feed:gain[ac]	6.40	5.58	5.04	4.49	4.96	4.88	–
Carcass-adj. feed:gain[ace]	5.48	5.77	5.50	4.21	4.53	4.43	–
Hot carcass wt., lb	701	697	704	723	713	712	12
Dressing %	61.7	60.9	60.5	61.4	61.5	61.5	0.57
Kidney, pelvic, heart fat, %[b]	2.15	1.96	2.17	2.12	2.17	1.92	0.06
Ribeye area, square inches	14.2	13.0	12.7	13.3	14.0	14.2	0.54
12th-rib fat thickness, inch	0.27	0.26	0.30	0.29	0.33	0.30	0.034
Marbling score[d]	338	390	346	344	338	348	22
USDA Choice, %	27	33	8	25	17	8	–
USDA Select, %	64	42	92	58	75	58	–
USDA Standard, %	9	25	0	17	8	34	–
USDA Yield Grade 1, %	36	33	8	17	25	58	–
USDA Yield Grade 2, %	55	42	58	58	58	17	–
USDA Yield Grade 3, %	9	25	34	25	17	25	–

[a]Significant effect of Optaflexx™ ($P<0.05$).

[b]Significant Optaflexx™ × protein source interaction ($P<0.05$).

[c]Data were analyzed statistically as gain:feed, and the inverse is reported here as feed:gain; SEM for gain:feed was 7% of the average value, and SEM for carcass-adjusted gain:feed was 11% of the average value.

[d]Slight[00] = 300.

[e]Calculated by dividing carcass weight by mean dressing percentage (61%) and using this value as the final live weight.