THE EFFECTS OF RACTOPAMINE-HCL (OPTAFLEXX[1]) ON FINISHING FEEDLOT HEIFERS

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Introduction

Whether occurring naturally or synthetically, beta-agonists are classified as phenethanolamines based on their chemical structure. Other specificities of structure determine the exact behavior of the compound in animals. Beta-agonists bind to specific receptors on the cell membranes of skeletal muscle, adipose, and other tissues. Upon binding, these agents alter metabolic pathways, ultimately causing a repartitioning of nutrients to increase muscle and decrease fat accretion. In cattle, beta-agonists such as cimaterol and clenbuterol improve feed efficiency, average daily gain, and longissimus muscle area. The proposed effects of ractopamine HCl are similar to those of other beta-agonists. The purpose of this study was to examine the effects of ractopamine-HCl on live performance, carcass characteristics, and meat quality of finishing beef heifers.

Experimental Procedures

Three hundred and two crossbred heifers (890±3 lbs) were purchased from salebarns and transported to Kansas State University Beef Cattle Research Center in Manhattan. All cattle were offered *ad libitum* access to hay and water prior to processing. Body weight was determined and the animals were given an internal/external parasiticide. Heifers were implanted with Revalor[2]-H (140 mg TBA, 14 mg estradiol) and gradually adapted to a diet containing 94% concentrate and 6% alfalfa hay. At the end of the adaptation phase, the heifers were blocked by initial weight and allotted to dirt-surfaced feeding pens containing 12 to 13 animals each. Treatments were with Optaflexx and a control treatment. Cattle receiving the Optaflexx treatment were fed 200 mg/day of ractopamine-HCl, beginning 28 days prior to slaughter. Pens of cattle were weighed using a platform scale on day 0, at approximately 28-day intervals thereafter, prior to the Optaflexx period, and immediately before being transported to a commercial abattoir for slaughter.

All cattle were allowed *ad libitum* access to a common finishing diet. The entire daily ration was delivered at approximately 1:00 p.m. At the end of the experiment, heifers were shipped to a commercial abattoir in Emporia, Kansas. Slaughter data, including hot carcass weight, incidence and severity of liver abscess, and dress yield, were obtained on the day of slaughter. Following a 24-hour chill, carcasses were evaluated for subcutaneous fat thickness; kidney, pelvic, and heart fat; longissimus muscle area; marbling score; and USDA yield and quality grades.

Following fabrication, loins were obtained from three animals randomly selected from each pen. The loins were aged for 14 days in

[1]Optaflexx is a registered trademark of Elanco Animal Health, Indianapolis, IN.
[2]Revalor is a registered trademark of Intervet, Inc.

cryovac packages at 32±2 F. After aging, loin steaks were removed and vacuum packaged for sampling. Loin steak samples were analyzed for fatty acid composition, purge loss measurements from a seven-day display period, and Warner-Bratzler shear force. Loin steak samples were cooked using to an internal temperature of 160° F. Samples were then refrigerated at 38 F for 24 hours. Following the 24-hour refrigeration period, six to eight half-inch cores were removed parallel to the fiber orientation of the steaks for shear force analysis.

Results and Discussion

Over the entire 75-day feeding period, dry matter intake, average daily gain, and efficiency of gain were not different between heifers that received 0 or 200 mg/day of ractopamine-HCl (P>0.17). However, Optaflexx-fed cattle had improved feed efficiency for the 28-day Optaflexx period (P = 0.056). Similar measurements (P>0.19) were obtained for the two treatments for dressing percent; hot carcass weight; marbling score; fat thickness; ribeye area; kidney, pelvic and heart fat; and USDA yield and quality grades. There was also no difference in Warner-Bratzler shear force between the two treatments (P>0.40). Purge loss during the seven day commercial display period and loss during cooking also were not different between treatments (P>0.50).

Table 1. Ingredients and Nutrient Composition of Finishing Diets

Item, % dry basis	Diet
Steam-flaked corn	79.55
Ground alfalfa hay	6.00
Corn-steep liquor	6.23
Vitamin/mineral supplement	6.01
Feed additive premix[a]	2.21[a]
Nutrient	
Dry matter	80.0
Crude protein	14.00
Fat	3.70
Calcium	0.75
Phosphorus	0.39

[a]Formulated to provide 300 mg monensin, 90 mg Tylosin, 0.5 mg MGA, and 0 or 200 mg ractopamine-HCl daily in a ground corn carrier.

Implications

Optaflexx added to the diets of finishing beef heifer improved gain efficiency during the 28-day feeding period with no effect on carcass quality or meat characteristics.

Table 2. Live Performance of Heifers Fed 0 or 200 mg Ractopamine-HCl for 28 Days Prior to Finishing

Item	Control	Optaflexx	SEM	P-Value
Number of heifers	150	152	-	-
Days fed Optaflexx	0	28	-	-
Initial weight, lb	1055	1054	6	0.91
Daily dry matter intake, lb	22.2	21.7	0.25	0.19
Average daily gain, lb	3.72	3.95	0.12	0.17
Feed:gain	5.98	5.46	0.005	0.06
Final weight[a], lb	1159	1164	7	0.59

[a]Final body weight based on carcass adjusted weight (carcass weight divided by 63.5% dress).

Table 3. Carcass Characteristics of Heifers Fed Either 0 or 200 mg/day of Ractopamine HCl

Characteristic	Control	Optaflexx	SEM[2]	P-Value
Carcass weight, lb	736	739	5	0.59
Ribeye area, square inches	13.38	13.67	0.2	0.31
Fat thickness (12^{th} rib), inches	0.31	0.30	0.01	0.47
Kidney, pelvic, heart fat, %	2.24	2.23	0.03	0.85
Marbling[1]	380	373	7	0.48
Average yield grade	1.99	2.01	0.07	0.85
USDA Choice, %	36.2	40.7	5.1	0.55
USDA Select, %	57.8	56.0	5.4	0.81
USDA Standard, %	6.0	3.4	2.0	0.37
USDA YG1, %	26.4	21.2	4.4	0.41
USDA YG2, %	51.6	58.3	4.2	0.28
USDA YG3, %	17.2	19.2	3.1	0.65
USDA YG4, %	4.1	1.3	1.5	0.19

[1]Traces=200-299; Slight=300-399; Small=400-499.
[2]SEM=Standard Error of the Mean.

Table 4. Meat Quality Characteristics of Control and Optaflexx Fed Heifers

Item	Control	Optaflexx	SEM	P-Value
Warner-Bratzler shear force, lbs	10.1	10.4	1.1	0.41
Purge loss from retail display, %	3.2	3.3	0.7	0.58
Purge loss from cooking, %	25	25	14	0.51
L*	42.4	41.5	5	0.11
a*	31.0	30.0	5	0.40
b*	24.1	23.7	2	0.17