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Betaine supplementation for finishing cattle

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BETAINE SUPPLEMENTATION FOR FINISHING CATTLE

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Summary

Crossbred heifers (756 lb) were used to evaluate the effects of feed-grade betaine on animal performance and carcass characteristics. Heifers had ad libitum access to a finishing diet without betaine or with 4, 8, or 12 g/day of feed-grade betaine top-dressed at feeding. Feed intakes, gains, and feed efficiencies were not significantly altered by feed-grade betaine. Hot carcass weights tended to increase with the betaine supplementation, but dressing percent; percentage of kidney, pelvic and heart fat; fat thickness; or ribeye area were not altered. Yield grades were numerically greater, and marbling scores significantly greater for heifers supplemented with 4 or 12 g/day of betaine. These results demonstrate that supplementation of feed-grade betaine may have minor effects on performance and carcass characteristics.

(Key Words: Betaine, Heifers, Performance, Carcass.)

Introduction

Previous research at Kansas State University has suggested that feed-grade betaine may improve feedlot performance and carcasses quality grades. Differences were more apparent with 10.5 g/day than 21 g/day, suggesting that the response to supplemental betaine may peak, and then decline.

Our objectives were to investigate the effects of feed-grade betaine supplementation on animal performance and carcass characteristics and to find the optimal level of supplementation.

Experimental Procedures

Three hundred twelve crossbred, non-pregnant heifers averaging 756 lb were used in a randomized block design. Heifers were individually weighed and implanted with Revalor-H®. Then they were allotted to one of three blocks based on weight and previous treatment and, within each block, were stratified by weight to one of eight pens (12 to 13 heifers per pen). Heifers were adapted to a common finishing diet before the start of the experiment. Treatments were a control without betaine and three levels of feed-grade betaine (4, 8, and 12 g/day) top-dressed onto the diet at feeding. The basal diet was provided once daily, and heifers had ad libitum access. The three blocks of heifers were fed for 117, 127, or 159 days before final pen weights were obtained and they were shipped to a commercial slaughter facility.

Results and Discussion

Top-dressing feed-grade betaine to the finishing diet had no effect on feed intakes (Table 2). Gains of heifers fed 12 g/day of betaine were 2.5% greater than those of controls, but the difference was not statistically significant. Similarly, feed efficiencies were not greatly affected by betaine addition. Hot carcass weights tended to increase (linear; $P=.15$) with the betaine supplementation; carcasses from heifers fed 12 g/day betaine weighed 7 lb more than those of controls. Dressing percent; percentage of kidney, pelvic and heart fat; twelfth rib back fat; and ribeye area also were not altered. Yield grades were numerically greater, and marbling score significantly greater (cubic, $P<.05$) for heifers fed 4 or 12 g/day of feed-

grade betaine. Carcasses grading USDA Choice averaged 77% for control heifers, which left little room for improvement in response to betaine.

The results of this study suggest that supplementing finishing heifers with feed-

grade betaine has minor effects on performance and carcass characteristics. This study and a previous KSU study suggest that supplementing finishing cattle with 10 to 12 g/day of feed-grade betaine may improve carcass value.

Table 1. Ingredients and Nutrient Composition of the Finishing Diet

Item	% of Dry Matter
Ingredient	
Steam-flaked corn	81.61
Chopped alfalfa hay	7.00
Cane molasses	4.00
Feather meal	3.01
Bleachable tallow	2.00
Limestone	1.27
Urea	.55
Salt	.30
Potassium chloride	.15
Trace mineral mix ^a	.06
Rumensin-80 ^b	.02
Tylan-40 ^c	.01
Vitamin A premix ^d	.01
Nutrient, calculated	
Crude protein	13.0
Calcium	.65
Phosphorus	.28
Potassium	.65

^aTo provide (dry basis): 60 ppm Zn, 60 ppm Mn, 10 ppm Cu, 1.1 ppm Fe, .63 ppm I, .25 ppm Se, and .05 ppm Co to diet.

^bTo provide (dry basis): 30 g monensin per ton of diet.

^cTo provide (dry basis): 10 g tylosin per ton of diet.

^dTo provide (dry basis): 1200 IU vitamin A per lb of diet.

Table 2. Effects of Feed-Grade Betaine on the Performance and Carcass Characteristics of Finishing Heifers

Item	Betaine, g/day				SEM
	0	4	8	12	
No. of heifers	78	77	78	77	-
Performance Data					
Initial weight, lb	754	754	756	757	1.5
Final weight, lb ^a	1084	1075	1085	1093	7.7
Dry matter intake, lb/day	18.1	17.8	17.6	18.1	.30
Average daily gain, lb ^a	2.44	2.40	2.44	2.50	.058
Gain:feed ^a	.136	.135	.140	.139	.0032
Carcass Characteristics					
Hot carcass weight, lb	699	693	705	706	5.2
Dressing percentage	64.5	64.5	65.0	64.6	.17
Ribeye area, in ²	14.2	13.9	14.3	14.0	.22
Fat thickness, in	.40	.40	.40	.40	.021
KPH ^b fat, %	2.2	2.2	2.3	2.2	.066
Yield grade 1, %	18	22	19	10	3.7
Yield grade 2, %	38	34	37	44	5.2
Yield grade 3, %	40	36	37	41	5.7
Yield grade 4 & 5, %	4	8	6	5	2.6
Marbling score ^{cd}	SI ⁴⁴	SI ⁸¹	SI ⁴²	SI ⁶⁰	13
USDA Prime, %	6	9	3	5	3.1
USDA Choice, %	71	69	71	73	4.7
USDA Select, %	19	18	24	20	4.5
USDA Standard, %	4	4	3	3	1.6
Liver abscesses, %	7	7	3	7	2.7

^aComputed by applying a 4% shrink to the final weights.

^bKPH = kidney, pelvic & heart.

^cSI = Slight.

^dCubic effect of betaine (P<.05).