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Abstract
One hundred ninety-two crossbred steers were used in a 2 x 4 factorially arranged experiment to study the effects of including fat and ionophores in finishing rations. Main effects were level of supplemental fat (0 or 4% tallow) and ionophore type [none, Bovatece (B), Rumensine + 'JYlane (RT), or daily rotation of Band RT (BRT)]. Daily feed intake (P<.10) and daily gain (P<.OO5) were reduced for steers fed R'T, but only when fat was included in the diet. In diets containing no supplemental fat, RT increased daily gain 10%. RT improved feed efficiency 8% (P<.05) in nonfat diets, but there was no difference between ionophores in diets containing fat. Adding fat improved feed efficiency of steers fed no ionophore or B. This study suggests that response of finishing steers to ionophores can be modified by the inclusion of fat in the diet.

Keywords
Cattlemen's Day, 1990; Kansas Agricultural Experiment Station contribution; no. 90-361-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 592; Beef; Ionophores; Fat; Finishing; Performance

INFLUENCE OF FAT AND IONOPHORES ON PERFORMANCE OF FINISHING STEERS[1]

E. M. Clary, R. T. Brandt, Jr., and R. V. Pope

Summary

One hundred ninety-two crossbred steers were used in a 2 × 4 factorially arranged experiment to study the effects of including fat and ionophores in finishing rations. Main effects were level of supplemental fat (0 or 4% tallow) and ionophore type [none, Bovatec® (B), Rumensin® + Tylan® (RT), or daily rotation of B and RT (BRT)]. Daily feed intake ($P<.10$) and daily gain ($P<.005$) were reduced for steers fed RT, but only when fat was included in the diet. In diets containing no supplemental fat, RT increased daily gain 10%. RT improved feed efficiency 8% ($P<.05$) in nonfat diets, but there was no difference between ionophores in diets containing fat. Adding fat improved feed efficiency of steers fed no ionophore or B. This study suggests that response of finishing steers to ionophores can be modified by the inclusion of fat in the diet.

(Key Words: Ionophores, Fat, Finishing, Performance.)

Introduction

Previous KSU research indicates that adding fat to finishing diets can improve daily gain and feed efficiency. Two ionophores, Bovatec and Rumensin, are currently cleared for improvement of feed efficiency in feedlot cattle. There has been interest in evaluating rotational feeding of these ionophores, because some research suggests that rumen microorganisms adapt to an ionophore during the feeding period, thus diminishing its effect. Recent KSU research suggests that feeding supplemental fat may alter the response of finishing steers to an ionophore. We studied the potential interactions between fat and these two ionophores fed separately or in daily rotation.

Experimental Procedures

One hundred ninety-two crossbred steers originating from Louisiana were blocked by previous nutritional treatment to one of 48 pens in a 2 × 4 factorially arranged, randomized, complete block design. Main effects were ionophore type (none, Bovatec (B), Rumensin + Tylan (RT), or B and RT fed in a daily rotation (BRT)) and level of supplemental fat (0 or 4% tallow). Bovatec, R, and T were fed at levels of 30, 25, and 10 g/ton of complete feed (90% dry basis), respectively. Compositions of final diets are listed in Table 4.1. Initially, steers were weighed; treated for endo- and ectoparasites; vaccinated against IBR, PI_3, BVD, and

[1]Appreciation is expressed to National Byproducts, Inc., Wichita, for supplying the tallow used in this research.

seven clostridial strains; implanted with Compudose®; and allotted to pens as described above. The feeding period lasted from July 17 to November 9, 1989 (116 d). Final weights were pencil shrunk 4% to reflect pay weight performance. Carcass data were obtained following a 24-hr chill.

Table 4.1. Composition of Diets[1,2]

Diet	Rolled corn	Prairie hay	Sorghum silage	Beet molasses	Animal tallow	Supplement
No fat	78.0	5.0	5.0	4.0	0.0	8.0
Fat	78.0	5.0	5.0	0.0	4.0	8.0

[1]Dry matter basis.
[2]Formulated to contain 12% CP, 0.7% Ca, 0.3% P, 0.35% NaCl, 0.7% K, and 70 ppm Zn.

Results and Discussion

During the course of the trial, five steers were removed because of factors not related to the trial; 187 head remained.

There was a fat × ionophore interaction (P<.10) for daily feed intake (Table 4.2). Fat supplementation reduced feed intake 10% in steers fed RT, but had no effect in steers fed B or no ionophore. Fat supplementation resulted in a numerical reduction in feed intake in steers fed BRT. A fat × ionophore interaction (P<.005) was also noted for average daily gain (ADG). Fat supplementation reduced ADG 13% in steers fed RT, but increased ADG 10% in steers fed B. In fat-containing diets, ADG of steers fed RT was decreased compared with those fed no ionophore or BRT. In diets containing no supplemental fat, steers fed B gained 7% less than steers fed no ionophore. Rumensin + Tylan increased ADG 10% compared with no ionophore in steers receiving no supplemental fat.

Fat and ionophore type also interacted (P<.05) on feed conversion (F/G). Supplemental fat improved F/G 6.0, 9.5, and 3.9% for steers fed no ionophore, B, and BRT, respectively. However, supplemental fat reduced F/G of steers fed RT by 4.2%. With fat supplemented diets, ionophores did not improve F/G, consistent with previous KSU research. In cattle receiving no supplemental fat, feed efficiency was improved 8% by the addition of RT.

Fat × ionophore interactions (Table 4.3) were observed for hot carcass weight (P<.10), ribeye area (P<.05), backfat thickness (P<.05), yield grade (P<.10), and dressing percentage (P<.10). Fat supplementation reduced hot carcass weight in steers fed RT, but in non-fat diets, steers fed RT had higher carcass weights compared with those fed B or no ionophore, thus mirroring the differences in ADG. In cattle receiving no supplemental fat, dressing percentage was higher with B and BRT compared with cattle fed no ionophore. With the exception of steers receiving B, fat supplementation tended to increase dressing percentage, which may have been partially the result of increased kidney, pelvic, and heart (KPH) fat observed with fat supplementation. Contrary to our expectations, fat supplementation reduced (P<.01) marbling scores.

Table 4.2. Effect of Fat and Ionophore Treatment on Steer Performance

Item	Ionophore	None		Bovatec		Rumensin/ Tylan		Daily rotation		SE
	Fat	−	+	−	+	−	+	−	+	
Initial wt, lb		770	775	773	771	771	773	772	770	2.2
Final wt, lb[a,b]		1,122	1,153	1,102	1,133	1,158	1,109	1,140	1,135	12.8
No. of pens		6	6	6	6	6	6	6	6	
No. of steers		22	23	24	24	24	23	24	23	
Daily feed, lb DM[c]		21.74	21.93	21.25	21.21	22.12	19.97	21.96	20.94	.497
Daily gain, lb[b]		3.04	3.26	2.84	3.12	3.34	2.90	3.18	3.15	.102
Feed/gain[d]		7.19	6.76	7.51	6.80	6.62	6.90	6.94	6.67	.149

[a]Final wt pencil shrunk 4%.
[b]Fat × ionophore interaction (P<.01).
[c]Fat × ionophore interaction (P<.10).
[d]Fat × ionophore interaction (P<.05).

Table 4.3. Effect of Fat and Ionophore Treatment on Carcass Traits

Item	Ionophore	None		Bovatec		Rumensin/ Tylan		Daily rotation		SE
	Fat	−	+	−	+	−	+	−	+	
Hot weight, lb		715	738	709	728	740	712	730	737	9.8
Dressing, %		63.7	64.3	64.4	64.2	63.9	64.5	64.4	64.9	.265
KPH fat, %[a]		2.62	2.77	2.34	2.62	2.46	2.62	2.67	2.79	.136
Marbling score[b]		5.75	5.22	5.30	5.31	5.50	5.03	5.58	5.02	.183
Backfat, in.[c]		.48	.54	.51	.54	.54	.48	.55	.49	.024
Ribeye area, in.^{2} [c]		12.8	13.2	13.0	12.8	13.4	12.6	12.8	13.2	.232
Yield grade		2.84	2.98	2.82	30.3	2.85	2.91	3.12	2.85	.093
Liver abscesses, %		23.8	4.5	22.7	34.8	12.5	17.4	4.2	21.7	

[a]Fat effect (P<.10).
[b]Fat effect (P<.01).
[c]Fat × ionophore interaction (P<.05).

The results of this study indicate that the response of finishing steers to ionophores can be altered by fat supplementation. Further research is needed to enable the response of these feeding combinations to be predicted in a dependable manner.