INFLUENCE OF FAT AND MONENSIN LEVELS ON PERFORMANCE OF FINISHING STEERS

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Summary

To evaluate effects and potential interaction of supplemental fat (0 to 4% tallow) and monensin (0, 20, 40 g/ton) in a corn-based finishing diet, 96 Continental crossbred steers (860 lb) were used in a 2 × 3 factorially arranged randomized complete block design. Consumption by steers fed the 0% fat diet decreased linearly ($P < .0001$) with increased monensin level, whereas consumption by steers fed 4% fat diets decreased curvilinearly ($P < .08$), indicating that monensin depressed intake much less when the diet contained fat. Daily gain decreased linearly ($P < .02$) with increased monensin level for steers fed no supplemental fat, but remained constant in steers fed 4% fat. Feed efficiency was improved ($P < .025$) by 4% fat across levels of monensin. This study provides further evidence of interactions between monensin and supplemental fat in effects on animal performance.

(Key Words: Fat, Monensin, Feedlot, Performance.)

Introduction

The potential exists for interactions between ionophores and supplemental fat in affecting ruminal fermentation and performance of finishing cattle. Because both fat and ionophores possess antimicrobial activities, the net effect of including both in finishing diets could be unpredictable. Because ionophores are fat-soluble, they may associate with lipids in ruminal contents and not be evenly dispersed throughout the rumen. Previous research at Kansas State on interactions between supplemental fat and ionophores has led to the hypothesis that supplemental fat might raise the threshold level for ionophore response in finishing diets. Our objective was to measure the effect of increasing ionophore levels in diets with or without supplemental fat.

Experimental Procedures

Ninety-six Continental crossbred steers (860 lb) that had previously been adapted to a high grain diet were selected from a larger group of 125 steers, based on uniformity of weight and breed type. Steers had previously received monensin (20 g/ton), although it was withheld for 7 days before this study was initiated. The steers were allotted to one of four weight replicates and then to one of six pens within each replicate in a 2 × 3 factorial experiment. Main effect factors were supplemental fat level (0 or 4% of diet DM) and level of monensin (0, 180, 360 mg/hd/d). Monensin was incorporated into complete supplements based on projected feed intake reduction with monensin. The final concentrations of monensin in the complete diet (90% DM basis) were 0, 20 and 40 g/ton for the 0, 180 and 360 mg/hd/d treatments, respectively.

Initial and final weights were the average of early morning, full weights on 2 consecutive days. All steers were fed an equal amount (20 lb/hd daily) of the control diet for 5 days before final weights were taken to minimize end point weighing errors resulting from differences in gut fill. The trial was conducted from September 10 to November 25, 1991 (77 days).

Results and Discussion

Results are shown in Table 1. Linear fat × ionophore interactions were observed for DM intake ($P < .02$) and average daily gain ($P = .10$). The nature of the interaction effect on DM intake is shown in Figure 1. In the 0% fat diet, DM intake decreased linearly ($P < .0001$) with increased monensin level. DM consumption by steers fed diets with 4% tallow decreased curvilinearly (linear, $P < .05$; quadratic, $P < .08$) with monensin level. Monensin caused less intake reduction in diets with 4% fat. Because of the interaction on DM intake, daily gain of steers fed no supplemental fat decreased linearly ($P < .02$) with monensin level, whereas monensin level had no effect ($P > .65$) on gains of steers fed diets with 4% supplemental fat (Figure 2). There was a main effect of fat ($P < .025$) on feed efficiency (Figure 3). Inclusion of 20 g/ton monensin in the 0% fat diet resulted in a numerical increase of 2.0% in feed efficiency compared to the control without monensin. The nature of the interaction effect on DM intake was similar to that observed in previous studies, suggesting that monensin may associate with the fat phase of gastrointestinal contents, thereby minimizing the expression of its activity on intake reduction. This effect might be ruminal, metabolic, or both and warrants further investigation. Higher levels (40 g/ton) of monensin decreased DM intake and cattle performance to an economically unjustifiable level in the 0% fat diet. This trial was relatively short (77 days); a longer feeding period might yield different results.

Table 1. Effect of Fat and Monensin Levels on Finishing Steer Performance

	Added fat, % of DM					
Item	----------0----------			----------4----------		
Monensin						
mg/hd/d[a]	0	180	360	0	180	360
g/ton	0	20	40	0	20	40
No. pens	4	4	4	4	4	4
No. steers	16	16	16	16	16	16
Initial wt, lb	862	857	857	861	861	861
Final wt, lb	1137	1113	1077	1122	1139	1117
Daily gain, lb[b]	3.58	3.33	2.85	3.39	3.62	3.33
Daily DM, lb[c]	23.8	21.6	19.7	21.3	21.7	19.8
Feed/gain[d]	6.62	6.49	6.90	6.29	6.06	5.99

[a]Intended level.
[b]Fat × ionophore level interaction. For 0% fat diet, linear effect ($P < .02$) of inophore level.
[c]Fat × ionophore interaction ($P < .02$). For 0 and 4% fat diets, linear ($P < .001$) and curvilinear ($P < .08$) effects of ionophore level, respectively.
[d]Fat effect ($P < .025$).

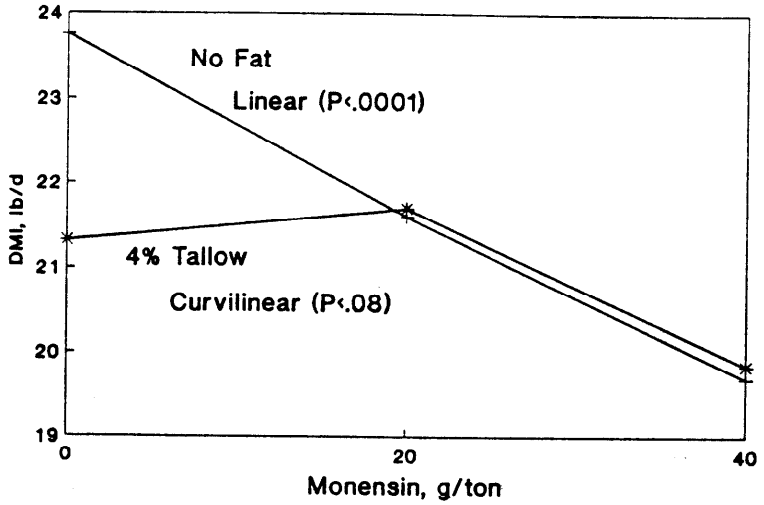

Figure 1. Interaction Effect of Monensin and Fat Levels on Dry Matter Intake.

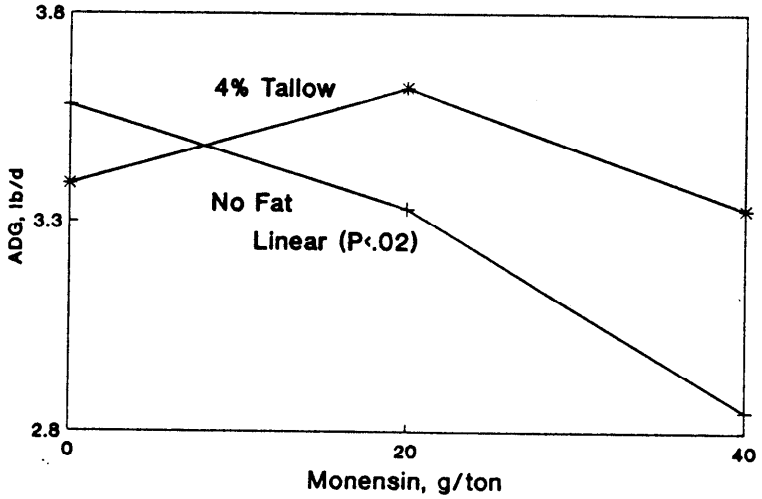

Figure 2. Interaction Effect of Monensin and Fat Levels on Average Daily Gain.

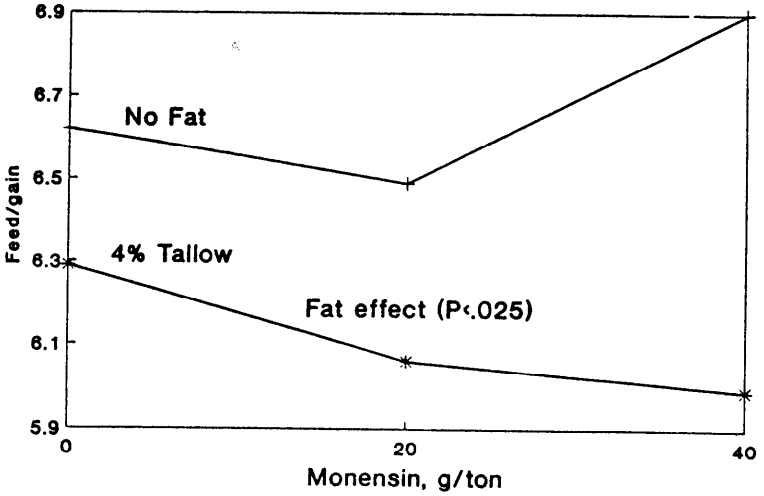

Figure 3. Effect of Monensin and Fat Levels on Feed Efficiency (feed/gain).