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Abstract

Twelve ruminally cannulated Holstein steers were used to determine the effect of monensin (0, 20, 30, and 40 g/ton) on grain bloat. Steers were fed a bloat-provocative, high-grain diet at 1% of body weight twice daily. Monensin premix was added directly to individual steers diets at the time of feeding. The severity of bloat was scored daily on a scale of 0 (no bloat) to 5 (severe bloat). The scoring was based on the degree of frothiness and abdominal distention. Bloat scores (mean of wk 2, 3, and 4) were lower (P<.0l) for monensin-fed steers than for the controls. The mean bloat scores were 1.43, 1.18, 1.00, and .93 for 0, 20, 30 and 40 g/ton monensin, respectively. Total gas production during in vitro ruminal fermentation tended to be higher (P=.12) for control than for monensin-fed steers. Ruminal pH and total volatile fatty acid concentrations were unaffected by treatment. Monensin decreased frothy bloat caused by the bloat-provocative diet, and the degree of control appeared to be greater with higher levels of monensin.

Keywords

Cattlemen's Day, 1996; Kansas Agricultural Experiment Station contribution; no. 96-334-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 756; Beef; Monensin; High grain diet; Frothy bloat

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EFFECT OF MONENSIN ON GRAIN BLOAT IN CATTLE

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Summary

Twelve ruminally cannulated Holstein steers were used to determine the effect of monensin (0, 20, 30, and 40 g/ton) on grain bloat. Steers were fed a bloat-provocative, high-grain diet at 1% of body weight twice daily. Monensin premix was added directly to individual steers diets at the time of feeding. The severity of bloat was scored daily on a scale of 0 (no bloat) to 5 (severe bloat). The scoring was based on the degree of frothiness and abdominal distention. Bloat scores (mean of wk 2, 3, and 4) were lower (P<.0l) for monensin-fed steers than for the controls. The mean bloat scores were 1.43, 1.18, 1.00, and .93 for 0, 20, 30 and 40 g/ton monensin, respectively. Total gas production during in vitro ruminal fermentation tended to be higher (P=.12) for control than for monensin-fed steers. Ruminal pH and total volatile fatty acid concentrations were unaffected by treatment. Monensin decreased frothy bloat caused by the bloat-provocative diet, and the degree of control appeared to be greater with higher levels of monensin.

(Key Words: Monensin, High Grain Diet, Frothy Bloat.)

Introduction

Bloat continues to be of concern to the feedlot industry because of reduced animal performance and death loss and is considered to be the major cause of digestive deaths in the feedlot. The cause of feedlot bloat is not fully understood. Feedlots have utilized several management techniques to control digestive death loss from bloat. Strict bunk management, quality control of dietary ingredients, and addition of antibiotics to the diet have proven beneficial. Monensin (Rumensin®) has been used to reduce grain bloat in feedlot cattle. A study conducted by researchers at Eli Lilly involving 988 Holstein steers in a commercial feedlot showed that 40 g/ton of monensin was more beneficial in reducing the incidence of digestive deaths than 30 g/ton (Table 1). Digestive deaths were .94 and 2.39% with 40 g/ton and 30 g/ton, respectively. The reduction in digestive death loss may have been due to more effective control of grain bloat. The objective of our study was to determine the effect of monensin (0, 20, 30, and 40 g/ton on a 90% dry matter basis) on frothy bloat in cattle fed a high-grain diet.

Experimental Procedures

Twelve ruminally cannulated Holstein steers were used in a replicated 4x4 Latin square design with 28-day periods. The interval between each period was 3 to 4 weeks. Steers were adapted to an alfalfa hay diet for 3 weeks prior to the beginning of the trial. At the start of each period, cattle were stepped up to 30%, 60%, and 100% of the bloat-provocative grain diet in successive increments, with 3 days for each step. The final diet was a 100% bloat-provocative, high-grain diet fed at 1% of BW twice daily. Steers were fed an alfalfa diet during the

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intervals between each period. The composition of the bloat diet was 60% cracked sorghum grain, 22% dehydrated alfalfa, 16% soybean meal, 1% salt, and 1% dicalcium phosphate. Monensin premix was added directly to individual steers diets at the time of feeding. The severity of bloat was scored daily at 3 hours after morning feeding with the following scale: 0 = no froth; 1 = slight froth but no pressure and abdominal distention; 2 = definite froth with sufficient pressure to expel froth but no abdominal distention; 3 = definite froth with sufficient pressure to cause abdominal distention on the left side; 4 = definite froth with sufficient pressure to cause abdominal distention on the left and right side; and 5 = definite froth, severe abdominal distention, animal in severe distress, terminal unless pressure is relieved. Ruminal samples were collected to monitor in vitro gas production and fermentation characteristics (pH and volatile fatty acids).

Results and Discussion

Bloat scores (mean of weeks 2, 3, and 4) were lower (P<.0l) for monensin-treated steers than for the control steers. The mean bloat scores were 1.43, 1.18, 1.00, and .93 for 0, 20, 30, and 40 g/ton, respectively (Figure 1). Total in vitro gas production tended to be higher (P=.12) for controls than for the monensin-fed steers (Table 2). Reduction in total gas production in the rumen will contribute to less froth formation. Ruminal pH and total volatile fatty acid concentrations were unaffected by treatment (Table 2). Acetate proportion was lower and propionate proportion was higher in steers fed monensin. Monensin decreased frothy bloat caused by feeding a bloat-provocative diet, and the degree of control appeared to be greater with higher doses of monensin. However, monensin is not approved for use in cattle above 30 g/ton.

Table 1. Effect of Rumensin® plus Tylan on Mortality Data for Holstein Steers Fed for 370 Days[1]

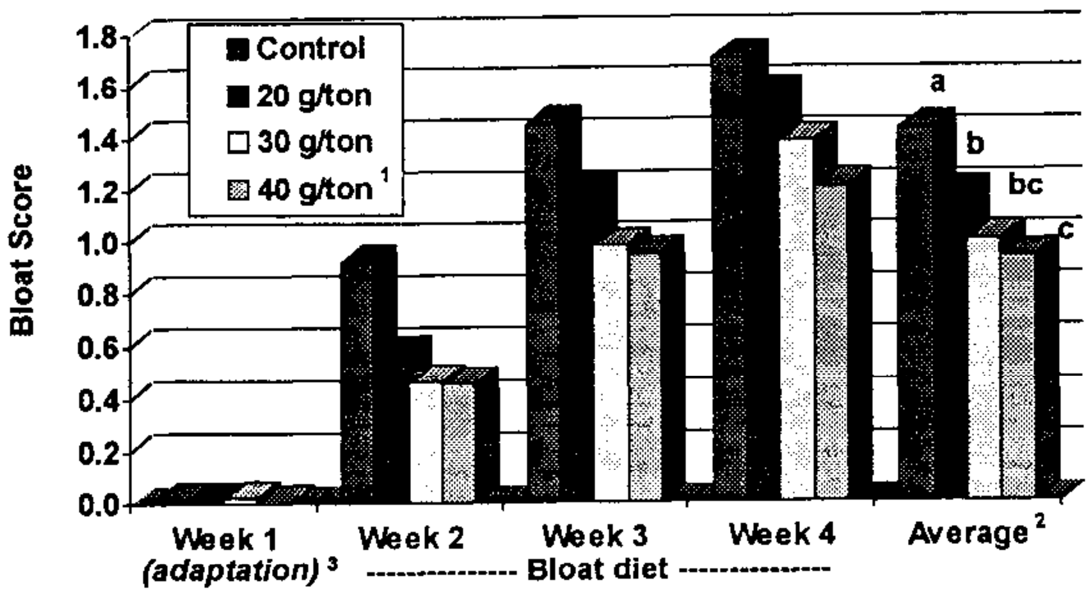
	Rumensin Level	
Item	30 g/ton	40 g/ton
No. of pens	6	6
No. of steers	503	514
Starting weight, lb	286	284
Final weight, lb	1289	1287
Total mortality, %	3.84	2.54
Digestive mortality, %	2.39[a]	.94[b]

[1]Adapted from Laudert S.B., G.J. Vogel, J.C. Parrott, and D.R. White. 1994. The effect of two levels of Rumensin on the feedlot performance of young Holstein steers fed to slaughter. J. Anim. Sci. 72 (Suppl. 1):291.
[a,b]Means not bearing a common letter in their superscripts differ (P < .06).

Table 2. Effect of Monensin on Ruminal Fermentation Characteristics

Item	Monensin, g/ton				P-value
	0	20	30	40[1]	
In vitro gas production, ml/6 hours	114.9	107.9	102.3	106.1	.12
Total VFA[2], mM	75.5	76.0	76.2	76.5	.96
Acetate, molar %	58.5[a]	57.4[ab]	56.2[b]	56.2[b]	.09
Propionate, molar %	20.8[a]	22.9[b]	24.8[b]	24.4[b]	.01
Acetate/propionate ratio	2.9	2.6	2.4	2.7	.31

[1]Monensin is not approved for use in cattle above 30 g/ton.
[2]VFA = volatile fatty acid.
[a,b]Means not bearing a common letter in their superscripts differ (P< .05).



[1]Monensin is not approved for use in cattle above 30 g/ton.
[2]Average bloat scores are means of weeks 2, 3, and 4.
[3]Adaption is 30% grain diet on days 1, 2, and 3 and 60% grain diet on days 4, 5, and 6.
[a,b,c]Means not bearing a common letter in their superscripts differ (P<.07).

Figure 1. Effect of Monensin on Bloat Score