RUMENSIN HELPS TO REDUCE THE INCIDENCE AND SEVERITY OF LEGUME BLOAT IN CATTLE

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Summary

Monensin at 300 mg and 450 mg per 1000 lbs body weight reduced the severity of alfalfa pasture bloat by 41.2 and 73.1%, respectively. Lasalocid at the same levels reduced the bloat score by 25.5 and 12.4%. The difference between the two antibiotics appears to be in their ability to inhibit rumen protozoa. Monensin reduced protozoal population in the rumen, whereas lasalocid had no effect. A smaller protozoal population decreases compounds that contribute to frothiness and also increases substances such as plant chloroplasts, which have antifrothing properties.

Introduction

Legume or pasture bloat in cattle is caused by retention of gas - a normal product of microbial fermentation - in the rumen. Excessive gas production in the rumen is not a problem because cattle can void gas by eructation or belching. However, when frothing compounds are present, gas gets trapped in the rumen contents to form stable foam or froth. Froth inhibits eructation. The frothing compounds are supplied mainly by plants (primarily soluble protein) and to some extent by rumen microorganisms.

Bloat occurs mainly on legume forages but there are also reports of its occurrence on succulent grasses. The legumes most commonly causing bloat are alfalfa and various clovers. Cattle also bloat on wheat pasture. The full economic impact of bloat is not easy to deduce. Besides death loss, there are losses from lowered production (less gain or fewer pounds of milk), disruption of farm work and management programs, and cost of preventive medicines and treatment. Presently, poloxalone, sold under the trade name Bloatguard® (Smith Kline Co., Philadelphia, PA) is the only approved drug for the prevention of legume bloat in cattle. Many cattlemen have observed that cattle fed monensin, (trade name - Rumensin, Elanco Products Co., Indianapolis, IN) while grazing alfalfa pasture have fewer bloat problems. That led us to investigate the effect of monensin on alfalfa-pasture bloat. For comparison, lasalocid (trade name - Bovatec, Hoffmann-LaRoche Inc., Nutley, NJ), a feed additive similar to monensin, was also included in the study.

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Procedures

We divided our alfalfa pasture into small plots, which were strip-grazed to provide bloat-provocative lush forage at all times. Cattle equipped with rumen-fistulas were used in the study to facilitate visual examination of the rumen contents for frothiness and to collect rumen samples for laboratory analysis. Cattle were allowed to graze alfalfa for 1 hr in the morning and 1 hr in the evening - a schedule designed to cause bloat. When not grazing, cattle were held in dry lot with shade, salt, and water available. Bloat was scored on a scale of 0 to 5 (0 = no bloat; 1 or 2 = moderate bloat; 3 to 5 = severe bloat). We tested monensin and lasalocid at 300 mg (approved dose) and 450 mg per 1000 lbs of body weight. Drugs were given via the rumen fistula before the morning grazing period. Treatment was initiated after cattle had bloated for 3 consecutive days. Treatment periods were 7 days or fewer if there were 3 consecutive days without bloat. Rumen contents were sampled for various laboratory analyses before and after each treatment.

Results and Discussion

Bloat scores before and after treatment of each drug were compared, and percentages of reduction in bloat are shown in Table 1. Monensin at 300 mg and 450 mg reduced bloat by 41.2 and 73.1%, respectively. Lasalocid had almost no effect on the severity of bloat.

Analysis of rumen fluid collected before and after treatment revealed no changes in pH, ammonia, soluble nitrogen, total carbohydrate, ethanol-precipitable slime, and bacterial numbers (Table 2). The only significant difference we observed was a reduction in the total protozoal numbers in monensin-treated cattle. Lasalocid had no effect on protozoal numbers. When we incubated rumen fluid samples for 6 hr in a flask, total gas produced was considerably less in that from monensin-treated cattle. Again, lasalocid had no effect on the total gas production. Total volatile fatty acid concentration remained unchanged and, as expected, the acetate-propionate ratio declined in both monensin- and lasalocid-treated cattle.

Conclusions

Monensin reduced the severity of bloat in cattle grazing alfalfa pasture. Lasalocid had no effect on legume bloat. The difference between the two antibiotics appears to be in their activity against rumen protozoa. Monensin reduced protozoal population, whereas lasalocid did not. Protozoa contribute to frothiness by producing slime or carbohydrate and also by engulfing plant substances like chloroplasts, which have antifrothing effects in the rumen. Reduction of protozoal population thus lowers carbohydrate or slime content in the rumen fluid and also increases the natural substances of the plant that have antifrothing properties.

Even at doses slightly higher than the recommended dose, monensin was not 100% effective in reducing the incidence and severity of legume bloat. To ensure complete protection, Bloatguard is still the drug of choice.

NOTE: RUMENSIN IS APPROVED FOR DAIRY REPLACEMENT HEIFERS TO IMPROVE GROWTH RATE AND FEED EFFICIENCY. RUMENSIN IS NOT APPROVED FOR USE IN MILKING DAIRY COWS. BOVATEC IS NOT APPROVED FOR DAIRY HEIFERS OR COWS.

Table 1. Effect of monensin or lasalocid on alfalfa pasture bloat.

Treatment	Bloat Score[a]	Percent Reduction from Pretreatment
Pretreatment	3.23	
300 mg monensin	1.90	41.2
Pretreatment	2.94	
300 mg lasalocid	2.19	25.5
Pretreatment	3.08	
450 mg monensin	.83	73.1
Pretreatment	2.75	
450 mg lasalocid	2.41	12.4

[a]Bloat score based on visual evaluation 0 = no froth, 1-2 = moderate bloat, and 3-5 = severe bloat.

Table 2. Ruminal changes in monensin- or lasalocid-fed cattle grazing alfalfa pasture.

Rumen Fluid Measurements	Monensin[a]		Lasalocid[a]	
	Before Treatment	After Treatment	Before Treatment	After Treatment
pH	7.01	6.87	6.92	6.92
Ammonia, mg/100 ml	10.0	9.6	9.1	8.4
Soluble nitrogen, mg/100 ml	27.9	29.5	26.8	27.5
Total carbohydrate, mg/100 ml	1.1	1.1	1.2	0.9
Ethanol-precipitable Slime, mg/100 ml	54.4	61.5	45.5	58.6
Bacteria, billions/ml	3.4	3.2	2.4	2.4
Protozoa, millions/ml	0.39	0.25	0.35	0.33
Volatile fatty acids, mM[b]	107.1	102.3	112.0	103.8
Acetate:Propionate ratio[b]	3.6	2.8	3.7	3.1
Gas, ml[b]	194.8	148.4	164.2	168.5

[a]Average of 300 and 450 mg doses.

[b]Measured during 6 hr fermentation in the laboratory.