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Action of decoquinate in altering feed efficiency of ruminants

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Abstract

The effects of adding decoquinate (Deccox®) to the diet at 0, 0.5, or 5 mg per kg body weight were evaluated with diets of 30 and 80% concentrate. Decoquinate did not influence rumen or plasma metabolites, diet digestibility, or volatile fatty acid production. No metabolic effects were seen that would suggest a role for decoquinate in altering rumen fermentation and feed efficiency of ruminants.

Keywords

Cattlemen's Day, 1985; Kansas Agricultural Experiment Station contribution; no. 85-319-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 470; Beef; Feed efficiency; Decoquinate; Digestibility; Fermentation

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Action of Decoquinate in Altering Feed Efficiency of Ruminants

David L. Harmon

Summary

The effects of adding decoquinate (Deccox®) to the diet at 0, 0.5, or 5 mg per kg body weight were evaluated with diets of 30 and 80% concentrate. Decoquinate did not influence rumen or plasma metabolites, diet digestibility, or volatile fatty acid production. No metabolic effects were seen that would suggest a role for decoquinate in altering rumen fermentation and feed efficiency of ruminants.

Introduction

Decoquinate is a synthetic compound marketed under the name Deccox® as a feed additive to control coccidia infestations. Previous research has shown that decoquinate, added to the ration at the level of 0.5 mg/kg body weight per day, resulted in improved feed intake and animal performance. It is unclear whether these improvements were due to the action of decoquinate as a coccidiostat, or to independent effects. Our objective was to find out if decoquinate altered rumen fermentation and digestive efficiency.

Experimental Procedures

Two experiments were conducted using ruminally fistulated cattle (570 lb) consuming two levels of dietary concentrate; 30% in Experiment 1 and 80% in Experiment 2. Corn was the concentrate and soybean meal was the supplemental protein in both diets. Animals received either 0, 0.5, or 5 mg of decoquinate per kg body weight daily. Feed was offered in two equal portions daily with each animal receiving half of the daily dose of decoquinate in 0.45 lb of grain immediately prior to feeding.

We measured volatile fatty acids (VFA), pH, lactic acid, and ammonia levels as indicators of rate and efficiency of rumen fermentation, as well as rate of VFA production and digestibility of dry matter, starch, and several fiber components. Plasma lactate and glucose levels were also determined.

Results and Discussion

The data on rumen and serum metabolites (Table 16.1), rumen VFA concentrations (Table 16.2), starch, dry matter, and fiber digestibilities (Table 16.3), and VFA production (Table 16.4), indicate that decoquinate had little, if any, effect on digestion or rumen metabolism.

For the diets we evaluated, we see no evidence that would suggest a role for decoquinate, other than as a coccidiostat.

Table 16.1. Rumen and Plasma Metabolites in Steers Supplemented with Decoquinate

Item	Level of Decoquinate[a]					
	30% Concentrate			80% Concentrate		
	0	0.5	5.0	0	0.5	5.0
Rumen pH	6.61	6.60	6.64	6.53	6.49	6.38
Rumen NH_3, mg/dl	5.06	5.03	5.49	2.71	3.50	1.76
Rumen L(+) lactate, mM	.01	.01	.01	0.05	0.02	0.03
Plasma L(+) lactate, mM	1.12	0.55	0.85	0.57	0.59	0.68
Plasma Glucose, mg/dl	61.82	56.76	63.81	83.30	92.75	85.66

[a]mg per kg body weight daily.

Table 16.2. Rumen Volatile Fatty Acids in Steers Supplemented with Decoquinate

Item	Level of Decoquinate[a]					
	30% Concentrate			80% Concentrate		
	0	0.5	5.0	0	0.5	5
Acetate, molar%	75.56	75.12	75.69	65.78	64.28	70.24
Propionate, molar%	13.19	13.26	13.35	20.25	20.20	17.85
Butyrate, molar%	9.78	10.01	9.45	9.57	10.67	7.75
Others, molar%	1.47	1.60	1.51	4.39	4.85	4.16
Total VFA, mM	87.17	85.59	80.42	92.16	84.09	97.82

[a]mg per kg body weight daily.

Table 16.3. Intake and Digestibility of Steers Supplemented With Decoquinate

Item	Level of Decoquinate[a]					
	30% Concentrate			80% Concentrate		
	0	0.5	5.0	0	0.5	5.0
Dry Matter Intake, lb	13.34	12.94	13.58	15.92	15.81	16.05
Dry Matter Digestibility, %	54.99	53.53	52.87	64.70	65.93	64.96
Neutral Detergent Fiber Digestibility, %	55.27	47.89	56.19	62.65	68.63	61.22
Acid Detergent Fiber Digestibility, %	47.27	40.82	46.60	56.03	52.04	51.92
Hemicellulose Digestibility, %	60.71	59.14	61.40	67.20	79.36	62.39
Starch Digestibility, %	60.71	59.14	61.40	80.46	82.63	82.42

[a]mg per kg body weight daily.

Table 16.4. Rate of In Vitro Volatile Fatty Acid Production in Steers Supplemented with Decoquinate

Volatile Fatty Acid	Level of Decoquinate[a]					
	30% Concentrate			80% Concentrate		
	0	0.5	5	0	0.5	5.0
	Rate of Production[b]					
Acetate	24.27	28.00	34.67	28.20	30.09	29.68
Propionate	5.52	5.77	6.01	6.09	11.70	10.07
Butyrate	3.97	7.07	4.01	4.48	5.84	3.61
Total VFA	34.11	44.63	45.23	40.69	49.49	45.33

[a]mg per kg body weight daily.
[b]mmole per liter rumen fluid per hour.