

EFFECT OF CHRONIC ADMINISTRATION OF THE ORAL ANTIBIOTIC SULFAMETHOXAZOLE AND TRIMETHOPRIM (SMZ) ON DIGESTIBILITY IN MATURE HORSES

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Introduction

Horses evolved as nonruminant herbivores, entirely dependent on plant material as a source of nutrients. Through millions of years of evolution they have developed voluminous digestive tracts which house billions of bacteria and protozoa that allow the horse to breakdown and utilize plant fiber. These bacteria are essential for proper digestive function, and any disturbances to the gut microflora can lead to a wide variety of problems including colic and laminitis. One typical way in which gut microflora are imbalanced is through the chronic administration of antibiotics to the horse. These drugs are intended to fight infection by killing bacteria that have entered the horse's bloodstream. Unfortunately, they also kill beneficial bacteria in the digestive tract.

An oral antibiotic often used in horses is Sulfamethoxazole and trimethoprim (SMZ). Sulfamethoxazole works as an antibiotic by inhibiting bacterial synthesis of dihydrolic acid by competing with para-aminobenzoic acid (PABA). Trimethoprim blocks the production of tetrahydrofolic acid from dihydrofolic acid by binding to and reversibly inhibiting the required enzyme, dihydrofolate reductase. It is not known what effect chronic SMZ administration has on gut function in horses, but it has been reported to cause diarrhea and colic in humans. Therefore, this experiment was designed to test whether chronic SMZ administration affects digestibility in mature horses.

Experimental Design

Four mature horses were used in a replicated 2X2 Latin square design digestion trial to evaluate the effect that chronic oral administration of SMZ has on digestibility of a complete pelleted diet. The horses were divided into two groups and fed a 12.0% protein, 41.2% NDF complete pelleted diet (table 1 and 2) either with or without SMZ for a 4 week period. The SMZ treated horses were dosed twice daily with a solution of water, 30 grams of sugar, and 10 SMZ tablets. Each tablet contained 800 mg of sulfamethoxazole and 160 mg of trimethoprim, so that each horse received 16,000 mg of sulfamethoxazole and 3,200 mg of trimethoprim per day. Horses not receiving SMZ received 30 grams of sugar twice daily.

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Table 1. Ingredient Composition of Experimental Diet

Ingredient	Amount (%)
Ground Oat Feed	24.90
Pulverized Oats	22.75
Ground Corn	22.50
Alfalfa Meal	22.50
Ameribond (pellet binder)	.85
Limestone	.50
Salt	.50
Vitamin/mineral premix	.35

During each 4 week period, the horses were fed their experimental rations for a three week acclimation period followed by a five day complete collection digestion trial. During the collection period, daily feed intake and total fecal output was measured. Subsamples of daily feed and feces were taken and frozen. These subsamples were dried and composited for chemical analysis. Both feed and feces were analyzed for dry matter, crude protein, ADF, NDF, fat, calcium, phosphorus, magnesium, potassium, zinc, copper, manganese, and ash. Digestibilities were calculated for each nutrient measured.

Table 2. Nutrient Composition of Experimental Diet

Nutrient	Concentration (dry basis)	Nutrient	Concentration (dry basis)
dry matter	88.7%	calcium	.86%
crude protein	12.0%	phosphorus	.31%
ADF	20.6%	magnesium	.19%
NDF	41.2%	potassium	.98%
Hemicellulose	15.4%	zinc	147 ppm
Fat	3.7%	copper	20 ppm
Ash	6.26%	manganese	119 ppm

Table 3. Apparent Nutrient Digestibilities (%)

Nutrient	No SMZ	With SMZ	Nutrient	No SMZ	With SMZ
dry matter	67.25	66.80	magnesium	47.29	46.67
crude protein	78.02	78.35	potassium	83.29	84.59
ADF ¹	29.06	27.36	zinc	13.04	10.27
NDF ²	42.00	40.93	copper	33.40	28.35
Hemicellulose	54.94	54.48	manganese	12.24	11.36
Fat	80.25	79.10	ash	40.61	41.13
Calcium	49.69	50.86	TDN ³	68.42	67.89
Phosphorus	18.49	20.47			

¹acid detergent fiber

²neutral detergent fiber

³total digestible nutrients

Results and Discussion

The apparent digestibility of each of the nutrients is shown in table 3. Chronic SMZ supplementation did not affect the digestibility of any of the nutrients measured in this study. None of the horses showed any signs of digestive upset while receiving the SMZ. The results of this study indicate that horses tolerate chronic administration of SMZ and that SMZ does not have an adverse effect on gut microflora. It remains to be determined how other types of antibiotics affect nutrient digestibility in horses.