

Impact of Tylosin Phosphate and Distillers Dried Grains with Solubles on Amino Acid and Energy Digestibility of Diets Fed to Growing Pigs

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Summary and Implications

Eighteen barrows with a T-cannula in the distal ileum were utilized in a study evaluating the impact of tylosin phosphate on amino acid and energy digestibility in corn-soybean meal and corn-soybean meal-distillers dried grains with soluble (DDGS) based diets. There were no interactions between the responses to tylosin phosphate and DDGS ($P>0.10$). DDGS inclusion reduced the standardized ileal digestibility of most indispensable amino acids ($P<0.05$) and the apparent ileal digestibility and apparent total tract digestibility of energy. Under the conditions of this experiment, tylosin phosphate did not affect digestibility of amino acids or energy and the inclusion of DDGS did not affect the response to TP.

Introduction

Tylosin phosphate is a macrolide antibiotic used in swine diets to control diseases, such as ileitis and swine dysentery, and to improve growth performance. At least four mechanisms have been proposed as explanations of the growth promoting effects of antibiotics: 1) inhibition of sub-clinical infections, 2) reduction of growth-depressing microbial metabolites, 3) reduction of microbial use of nutrients, and 4) enhanced uptake and use of nutrients through the thinner intestinal wall associated with antibiotic-fed animals. The objective of this study was to evaluate the impact of tylosin phosphate on amino acid and energy digestibility in growing pigs fed corn-soybean meal or corn-soybean meal- DDGS based diets.

Materials and Methods

This study was conducted at the Iowa State University Swine Nutrition Farm under the approval of the Institutional Animal Care and Use Committee (#2-10-6900-S).

Eighteen barrows (initial BW=76.9±2.20 lbs.) were surgically fitted with a T-cannula in the distal ileum. Treatments were arranged in a 2×2 factorial: tylosin phosphate (0 vs. 44 ppm) and DDGS (0 vs. 25%). Two nitrogen-free dietary treatments (0 vs. 44 ppm tylosin phosphate) were also included for determining basal ileal endogenous amino acid losses (IAA_{end}) to calculate standardized ileal digestibility (SID) of AA. Replicate periods included 4 d of adaptation to treatments and two

sampling periods (SP1 and SP2). Fecal collection occurred on d 5 and 6 and ileal digesta collection on d 7 and 8 for SP1; SP2 included fecal collection on d 11 and 12 and ileal digesta collection on d 13 and 14. For N-free treatments, corn-soybean meal diets were fed d 1 through d 7 followed by a 5-d adaptation to N-free diet and ileal digesta collection on d 13 and 14. All samples from SP1 and SP2 were analyzed for dry matter and gross energy, and amino acid analysis was conducted on ileal digesta samples from SP2.

Results

Results of this study are presented in Table 1 and Table 2. There were no significant interactions ($P>0.10$) between tylosin phosphate, DDGS or sampling period. Inclusion of DDGS reduced apparent ileal digestibility (65.3 vs. 71.9%; $P<0.0001$) and apparent total tract digestibility (79.7 vs. 85.5%; $P<0.0001$) of energy. There were no effects of tylosin phosphate on energy digestibility. There were no effects of tylosin phosphate on basal IAA_{end} ($P>0.10$); therefore, standardized ileal digestibility of amino acid values were calculated using means of the two nitrogen-free diets. The standardized ileal digestibility of Lys (79.6 vs. 84.1%; $P<0.0001$) and all other indispensable amino acids, except Leu, was lower in the DDGS diets. Inclusion of tylosin phosphate did not influence standardized ileal digestibility of AA.

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Table 1. Effects of tylosin phosphate and distillers dried grains with solubles (DDGS) on apparent ileal digestibility (AID) and apparent total tract digestibility (ATTD) of dry matter (DM) and gross energy (GE) by growing pigs.

	Tylosin phosphate			<i>P</i> -value	DDGS			<i>P</i> -value
	0 ppm	44 ppm	SEM		0%	25%	SEM	
AID, %								
DM	68.3	68.9	0.64	0.13	71.9	65.3	0.64	<0.0001
GE	70.2	70.6	0.69	0.34	72.8	68.0	0.69	<0.0001
ATTD, %								
DM	82.6	82.6	0.63	0.98	85.5	79.7	0.62	<0.0001
GE	82.4	82.4	0.57	0.82	85.0	79.9	0.56	<0.0001

Table 2. Effects of tylosin phosphate and distillers dried grains with solubles (DDGS) on standardized ileal digestibility of crude protein (CP) and amino acids by growing pigs.

	Tylosin phosphate			<i>P</i> -value	DDGS			<i>P</i> -value
	0 ppm	44 ppm	SEM		0%	25%	SEM	
CP	81.5	82.8	1.34	0.28	84.0	80.4	1.31	0.0021
Lys	81.9	81.8	1.03	0.80	84.1	79.6	1.02	<0.0001
Thr	77.1	77.2	1.28	0.97	79.5	74.9	1.26	<0.0001
Met	85.2	84.7	0.91	0.35	86.0	83.9	0.90	0.0003
Met + Cys	80.0	79.4	1.26	0.37	81.5	77.9	1.25	<0.0001
Trp	84.9	84.7	1.53	0.83	85.6	84.0	1.51	0.0403
Ile	82.6	82.7	0.90	0.77	84.2	81.1	0.90	<0.0001
Val	80.0	79.6	1.03	0.39	81.2	78.5	1.02	<0.0001
Arg	90.8	90.7	1.16	0.83	92.3	89.1	1.15	<0.0001
His	83.7	83.4	1.10	0.54	85.5	81.7	1.09	<0.0001
Leu	84.8	84.9	0.84	0.88	85.2	84.5	0.84	0.0503
Phe + Tyr	83.9	83.9	0.96	0.91	84.9	83.0	0.95	0.0001
Phe	83.7	83.8	0.96	0.81	84.9	82.6	0.95	0.0002