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Effects of niacin supplementation of a semipurified diet on energy and nitrogen metabolism and niacin metabolite excretion by growing pigs. D. J. Ivers*, D. W. Bollinger and T. L. Veum, University of Missouri, Columbia.

Thirty six crossbred barrows (avg initial age = 6 wk and BW = 13.8±3 kg) were used in a 35 d experiment to determine the effects of supplemental niacin on nitrogen (N) and energy metabolism, and the urinary excretion of the niacin metabolite 2-pyridone-5-carboxylamide (2-PYR). A 13.25% CP (14% Trp) semipurified basal diet (corn syrup solids, casein, sucrose, corn oil and cellulose) contained added minerals, vitamins and amino acids to meet NRC (1988) requirements. Dietary treatments were made by adding 6, 10, 14, 18, 22 or 44 mg/kg niacin to the basal niacin-free diet. Pigs were fed individually at 5.5% BW/d in metabolism cages. Urine and fecal collections were made from d 0-7 and 28-35 of the experiment to determine N and energy balance and urinary 2-PYR excretion. Niacin treatment least squares means for N and energy utilization in both periods were not different (P>.07). Diarrhea, one symptom of niacin deficiency, occurred less frequently (P<.05) at niacin concentrations ≥14 mg/kg. Urinary concentration and daily excretion of 2-PYR from d 28-35 were higher (P<.05) for 44 ppm niacin compared to all other treatment groups which were not different (P>.05). In conclusion, urinary concentration and daily excretion of 2-PYR were not sensitive indicators of niacin status in growing pigs.

	Day of Exp.	Dietary niacin, mg/kg					RMSE ^a	
		6	10	14	18	22		44
ADG, kg	0-35	.67	.72	.75	.74	.74	.73	.06
Diarrhea score ^b	0-35	3.8 ^c	1.4 ^{cd}	0.0 ^d	1.0 ^d	0.0 ^d	0.0 ^d	.70
Urinary 2-PYR:								
mg/d	28-35	.2 ^c	.9 ^c	1.2 ^c	1.9 ^c	2.0 ^c	13.5 ^d	1.8
mg/l	28-35	.08 ^c	.30 ^c	.36 ^c	.60 ^c	.68 ^c	4.40 ^d	.47

^aRMSE: the square root of the error mean square.

^bPercentage of days with diarrhea/pig.

^{c,d}Least square means with no common superscript differ (P<.05).

Key Words: Pigs, Niacin, Metabolism

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Effect of manganese level and source on growth performance and carcass characteristics of finishing pigs. L.J. Kats*, J.L. Nelsken, R.D. Goodband, M.D. Tokach, K.G. Friesen, K.Q. Owen, and B.T. Richert. Kansas State University, Manhattan.

Eighty medium lean growth crossbred barrows (initial BW = 35 kg) were used to evaluate the effect of manganese level (24, 44, or 88 ppm) and source (inorganic vs chelated) on growth performance and carcass characteristics. Our objective was to determine if increased dietary manganese provided from a chelated or inorganic source, might improve growth performance and carcass traits. Barrows were allotted by weight and ancestry to pens containing two pigs/pen in a randomized complete block design. Pigs were assigned to each of four dietary treatments with ten replications per treatment. The control diet was corn-soybean meal based, formulated to contain 80% lysine, and provided 24 ppm of inorganic Mn supplied from manganese oxide. Three additional dietary treatments included the control diet plus 20 ppm of chelated Mn (a total of 44 ppm dietary Mn) which was a protein bound product; control diet plus 20 ppm of inorganic Mn (manganese oxide; a total of 44 ppm dietary Mn); and the control diet plus 64 ppm of inorganic Mn (manganese oxide; a total of 88 ppm dietary Mn). Pigs were fed their respective experimental diets for the entire study. Pigs and feeders were weighed every two weeks to determine ADG, ADFI, and gain to feed ratio (G/F) until the mean weight of pigs in a pen averaged 103 kg. At this time, both pigs were slaughtered and standard carcass measurements were recorded. For the overall trial, there were no differences in growth performance, average backfat thickness (ABF), or longissimus muscle area (LMA) among pigs fed any of the experimental diets (see table below). In conclusion, additional manganese above 24 ppm from an inorganic or chelated source had no effect on growth performance or carcass characteristics of medium lean growth finishing pigs.

Item	Inorganic Mn, 24 ppm	Chelated Mn, 44 ppm	Inorganic Mn, 44 ppm	Inorganic Mn, 88 ppm	P value	CV
ADG, kg	.96	.98	.94	.97	.66	7.4
ADFI, kg	3.07	3.13	3.13	3.16	.78	6.4
G/F	.31	.31	.30	.30	.39	6.3
ABF, mm	29	32	29	29	.16	10.7
LMA, cm ²	32.8	29.5	30.6	31.1	.15	10.3

Key Words: Manganese, Pigs, Growth performance.

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Effect of vitamin E administration on the response of young pigs to iron injections. L. Meyer*, J. Link, K. Fritsche, G. Hill, J. Hoffman, C. Kerr, and L. Vanskike. University of Missouri, Columbia.

The objective of this study was to determine the impact of vitamin E (E) status on Fe metabolism in the young pig. Two littermate gilts bred to the same boar were fed a NRC-based gestation diet with 1% corn oil, 1% cod liver oil, and no added E from day 84 of gestation. At 3 days of age, 12 pigs were weaned and allotted to treatment based on sex and litter and fed a slurry made from a semi-purified dried skim milk diet which met NRC requirements except for Fe and E. The treatments given IM at 6 days of age were (1) Fe dextran (Fe-200 mg), (2) Fe plus Se and vitamin E (FeSe-.15 mg Se and 1.5 IU E) or (3) Fe plus E (FeE-300 IU E). Serum alpha-tocopherol was determined by HPLC. Initially all pigs had low concentrations of E (mean= 2.6 ± .3 µg/ml), but only pigs receiving FeE had a significant (p < .0001) increase in serum alpha-tocopherol concentrations compared to Fe and FeSe (44.8 vs. 1.4 and 2.1 µg/ml, respectively) 24 hours after injection. The 18-fold increase in serum E for the FeE pigs was transient, and E concentrations were not significantly different from pigs receiving Fe or FeSe at 14 days of age (1.9 vs. .7 and .9 µg/ml, respectively). There was a significant treatment by bleeding time interaction (p<.0005). As previously reported, there was no effect of treatment on hematocrit, hemoglobin concentration, or ceruloplasmin activity. In conclusion, administration of a high dose of E in early weaned pigs caused a transient elevation of serum alpha-tocopherol concentration, but did not influence the changes in hematocrit, hemoglobin or ceruloplasmin associated with Fe administration. At 7 days post injection, neither injected E or Se and E provided adequate circulating alpha-tocopherol to pigs from dams fed a low E gestation diet. (This study was partially funded by the Missouri Pork Producers Association.)

alpha -tocopherol, iron dextran, pigs

Key Words:

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Effect of live weight and physiological status on the apparent digestibility of phosphorus and the efficacy of *Aspergillus niger* phytase in a diet for pigs. P.A. Kemme, A.W. Jongbloed and A.M. van Vuuren*. DLO-Institute of Animal Science and Health, Lelystad, The Netherlands.

An experiment was carried out on 56 piglets (BW 10 to 40 kg; exp. unit pen of 7 piglets). 32 growing pigs (BW 20 to 110 kg; exp. unit pen of 4 pigs) of the three way cross Y x (FL x DL) and 12 reproductive sows (parity 5 or more; exp. unit 1 sow) of the cross FL x DL during lactation and subsequent pregnancy to evaluate the apparent total tract digestibility of P (d_p) in a diet either or not supplemented with microbial phytase (MP) from *Aspergillus niger* (500 phytase units (PTU) per kg diet). The treatments were formulated without inorganic feed phosphate and consisted of corn (310 g kg⁻¹), tapioca meal (200 g kg⁻¹), phytase-inactivated wheat middlings (200 g kg⁻¹), peas (75 g kg⁻¹), extr. soybean meal (51 g kg⁻¹) and extr. sunflower meal (50 g kg⁻¹) as major components. The mix of minerals and vitamins was adapted according to the specific requirements of each category of pigs. The diet had an analysed content of Ca, total P and phytate P of 6.2, 4.8 and 3.7 g kg⁻¹, respectively and a low intrinsic phytase activity. Cr₂O₃ was used as a marker. The animals were fed twice daily at a feeding level of 2.8 times maintenance requirement (M = 418 kJ ME W^{0.75}), except for the pregnant sows which were fed at 1.2 * M. The diets were not soaked in water. In growing-finishing pigs, an effect of age/BW could be detected, however the course was inconsistent. d_p of the phytase-deficient treatment with growing pigs of 60 kg BW was 28.2 % and MP enhanced d_p by 16.7 percentage units. In piglets, d_p was strongly dependent on age/BW and was always lower than d_p with growing pigs of 60 kg BW (8.3 to 2.9 percentage units). As the piglets grew older, d_p increased and differences with growing pigs became smaller. Efficacy of MP on d_p in piglets was decreased by 4.2 to 2.0 percentage units as compared to growing pigs of 60 kg BW. d_p in multiparous sows during mid pregnancy, end pregnancy and lactation was substantially lower (14.5, 9.9 and 8.9 percentage units, respectively) as compared to growing pigs of 60 kg BW. Efficacy of MP in multiparous sows was lowered by 10.0 and 1.7 percentage units during mid pregnancy and end pregnancy, respectively. During lactation efficacy of MP was improved by 5.0 percentage units as compared to growing pigs of 60 kg BW.

It can be concluded that d_p of a phytase-deficient diet with piglets and multiparous sows is lower than in growing pigs. Efficacy of MP is lowered in piglets and multiparous sows during pregnancy, whereas it is increased in multiparous sows during lactation.

Key Words: pigs, age, phosphorus, digestibility