EFFECTS OF INCREASING TOTAL SULFUR AMINO ACID:LYSINE RATIO ON GROWTH PERFORMANCE OF 25 TO 50 LB PIGS

*M. De La Llata, M. D. Tokach [1], R. D. Goodband,
J. L. Nelssen, S. S. Dritz [2], P. R. O'Quinn,
J. C. Woodworth, and S. A. Moser*

Summary

Three hundred and fifty pigs were used in a 27-d growth study to determine the appropriate total sulfur amino acid:lysine ratio for 25 to 50 lb pigs. Pigs were blocked by weight (initially 22.5 lb) and allotted to one of 10 treatments arranged in a 2 × 5 factorial with two levels of total dietary lysine (.95 and 1.25%) and five total sulfur amino acid ratios (.45, .50, .55, .60, and .65% of total lysine). Increasing total lysine from .95 to 1.25% increased ADG and improved F/G. Increasing the total sulfur amino acid:lysine ratio did not affect ADG but improved F/G. These results indicate that the optimal total sulfur amino acid:lysine ratio for the 25 to 50 lb pig is not greater than 55%.

(Key Words: Methionine, Lysine, Nursery Pigs.)

Introduction

Some controversy exists concerning the optimal total sulfur amino acid:lysine ratio for swine diets. The University of Illinois has suggested that the methionine requirement should be 30% of lysine for pigs of all weights. They also suggest that the cystine requirement increases from 30% of lysine for young pigs to 35% of lysine for late finishing pigs. Thus, the total sulfur amino acid:lysine ratio would increase from 60% for young pigs to 65% for late finishing pigs. Recent research at Kansas State has shown that the methionine:lysine requirement for pigs weighing less than 25 lb is 27.5% of lysine,

and the total sulfur amino acid:lysine ratio is 55%. Other research at Kansas State and Louisiana State Universities has demonstrated that the total sulfur amino acid level needs to be only 50 to 55% of lysine for late finishing pigs. The total sulfur amino acid:lysine ratio commonly used by the swine industry for the late starter and early growing pig ranges from 50 to 60%. This range in values leads to wide variations in the amount of DL-methionine added to a sorghum or sorghum-soybean based diet. None of the prior research has been conducted to determine the optimal methionine:lysine ratio for the 25 to 50 lb pig. Therefore, the objective of this study was to determine the appropriate total sulfur amino acid:lysine ratio for pigs in this weight range.

Procedures

Three hundred and fifty pigs were blocked by weight (initially 22.5 lb) and allotted to one of the 10 dietary treatments. There were five pigs per pen and seven replicate pens per treatment. The experimental diets consisted of a 2 × 5 factorial arrangement with two levels of total lysine (.95 and 1.25%) and five increasing levels of total sulfur amino acid:lysine ratios (45, 50, 55, 60 and 65%). Therefore, the total sulfur amino acid levels in the 0.95% lysine diets were .43, .48, .52, .57, and .62%. For the 1.25% lysine diets, the total sulfur amino acid levels were .56, .62, .68, .75, and .81%.

The dietary treatments within the same lysine level contained equal amounts of all

added to maintain identical ratios of all amino acids relative to lysine except for methionine.

All experimental diets were sorghum-soybean meal based (Table 1) and were fed in a meal form through the 27 d experiment. Pigs were housed in the Kansas State University Segregated Early-Weaning facility and allowed ad libitum access to food and water through a dry feeder and one nipple waterer per pen. The pigs were weighed and feed disappearance was measured on d 10, 21, and 27 to determine ADG, ADFI, and F/G.

Analysis of variance was used to analyze the data as a randomized complete block design with a 2 × 5 factorial arrangement using GLM procedures of SAS with linear and quadratic polynomial contrasts to determine the effects of increasing total sulfur amino acid:lysine ratio within a lysine level.

Results and Discussion

Pigs fed the 1.25% lysine diets increased ADG and improved F/G (P<.01; Table 2) when compared to pigs fed .95% lysine for the overall experiment. Average daily gain and ADFI were not affected (P>.24), but F/G was improved (quadratic, P<.03) by increasing the total sulfur amino acid:lysine ratio. No lysine × methionine interactions were observed throughout the study.

The results from this experiment indicate that the total sulfur amino acid:lysine requirement for the 25 to 50 lb pig is not greater than 55%. These results agree with previous research at Kansas State University and Louisiana State University showing that the total-sulfur amino acid:lysine ratio requirements are 55% for pigs weighing less than 25 lb and from 50 to 55% for the late finishing pig.

The importance of determining the appropriate methionine:lysine ratio is that, as we increase or decrease the lysine level in the diet by increasing or decreasing soybean meal, the methionine:lysine and total sulfur amino acid:lysine ratios also change. By establishing the optimal ratio, we can balance the diets accordingly. Based on this research, we suggest that the optimal total sulfur amino acid:lysine ratio for the pig up to 50 lb is 55%.

Table 1. Diet Composition

Ingredient, %	.95% Lys Met & Cys:Lysine ratio, %					1.25% Lys Met & Cys:Lysine ratio, %				
	45	50	55	60	65	45	50	55	60	65
Sorghum	78.55	78.50	78.45	78.41	78.36	66.56	66.50	66.44	66.38	66.31
Soybean meal, 46.5%	14.50	14.50	14.50	14.50	14.50	26.50	26.50	26.50	26.50	26.50
Choice white grease	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Monocalcium phosphate	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Limestone	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Salt	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35
Vitamin premix	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
Trace mineral premix	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15
Lysine HCl	.42	.42	.42	.42	.42	.38	.38	.38	.38	.38
DL-Methionine	--	.05	.10	.14	.19	--	.06	.12	.18	.25
L-Threonine	.17	.17	.17	.17	.17	.20	.20	.20	.20	.20
L-Tryptophan	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
Calculated analysis, %										
Lysine	.95	.95	.95	.95	.95	1.25	1.25	1.25	1.25	1.25
Methionine:lysine ratio	23	28	33	38	43	22	27	32	37	42
Met & Cys:lysine ratio	45	50	55	60	65	45	50	55	60	65
Threonine:lysine ratio	69	69	69	69	69	70	70	70	70	70
Met & Cys	.43	.48	.52	.57	.62	.56	.62	.68	.75	.81
Ca	.72	.72	.72	.72	.72	.75	.75	.75	.75	.75
P	.67	.67	.67	.67	.67	.71	.71	.71	.71	.71

Table 2. Influence of Increasing Total Sulfur AminoAcid:Lysine Ratios on the Growth Performance of 25 to 50 lb Pigs[a]

| Item | .95% Total Lysine | | | | | 1.25% Total Lysine | | | | | CV | Probability (P<) | | |
| | Met & Cys:Lysine ratio, % | | | | | Met & Cys:Lysine ratio, % | | | | | | | | |
	45	50	55	60	65	45	50	55	60	65		Lys	Met	Lys × Met
Day 0 to 27														
ADG, lb	1.04	1.11	1.06	1.05	1.08	1.29	1.33	1.33	1.38	1.36	6.1	0.01	0.24	0.35
ADFI, lb	2.09	2.19	2.05	2.08	2.07	2.24	2.14	2.06	2:17	2.17	6.4	0.06	0.24	0.35
F/G[b,c]	2.00	1.96	1.94	1.97	1.91	1.73	1.61	1.55	1.57	1.60	4.9	0.01	0.01	0.21

[a]Three hundred and fifty pigs (initially 22.5 lb) with five pigs per pen and seven replications (pens) per treatment.
[b]Linear effect of methionine:lysine ratio (P<.01).
[c]Quadratic effect of methionine:lysine ratio (P<.03).

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