



FATS AND PROTEINS RESEARCH FOUNDATION, INC.

3150 DES PLAINES AVENUE • DES PLAINES, ILLINOIS 60018
(5 MINUTES FROM CHICAGO'S O'HARE AIRPORT)

TELEPHONE AREA CODE 312 827-0139

THE DIRECTOR'S DIGEST
D. M. DOTY
TECHNICAL DIRECTOR

July 16, 1968
No. 49

MEAT AND BONE MEAL IN SWINE RATIONS

Professor R. J. Meade, University of Minnesota, has been studying the value of meat and bone meal from different sources in rations for growing pigs. Preliminary results (See "The Director's Digest," September, 1967) indicated that meat and bone meal could be effectively used to supply one third of the supplementary protein in a basic corn-soybean meal ration.

To establish the limiting amino acids in meat and bone meal for growth and protein synthesis in growing swine, Professor Meade and his associates determined the amino acids in the blood plasma of pigs fed diets containing meat and bone meal from different sources. Two series of experiments were run. In series A the basal diet consisted essentially of corn-soybean meal (14% protein diet) with the necessary minerals and vitamins added. The experimental diets in Series A were formulated with meat and bone meal from six different sources, corn and corn starch to a 12% protein level with the required mineral and vitamin supplement added. In series B the basal diet was formulated to a 14% protein level with soybean meal and corn starch and the experimental diets were formulated with the six meat and bone meal lots and cornstarch to a 12% protein level. Blood samples were taken six hours after the pigs were fed one half of their daily feed allotment.

Based on the accepted published amino acid requirements for growing swine and the essential amino acid content of the diets fed (Tables 1 and 2) it would be expected that the limiting amino acids in the diets would be as follows:

Methionine and/or lysine in Basal Diet A

Methionine in Basal Diet B

Methionine, lysine, isoleucine in Experimental Diets of Series A

Methionine, isoleucine and possibly histidine, lysine, and phenylalanine in some of the Experimental Diets of Series B

The free amino acid values from the blood plasma analyses (Tables 3 and 4) are somewhat difficult to interpret. The data do not indicate any major differences in the availability of the essential amino acids in the meat and bone meal from different sources. As expected the levels of methionine and lysine were low in the blood plasma of pigs fed Basal Diet A and methionine was low in the plasma of pigs fed Basal Diet B and in the plasma of all pigs fed the experimental diets. There is some suggestion that isoleucine was relatively less available in the basal and experimental diets of Series A than in the diets of Series B.

Studies at the University of Minnesota are continuing to determine the extent to which individual amino acids may be limiting in meat and bone meal from different sources. These data will be most helpful in formulating swine rations containing meat and bone meal.

Table 1. Essential Amino Acids in Basal Diet A and in Experimental Diets Containing Meat and Bone Meal from Different Sources

	Basal	Experimental Diets						Req't.
		1	3	5	7	9	11	
	%	%	%	%	%	%	%	
Arginine	.85	.74	.75	.64	.74	.62	.72	.25
Histidine	.39	.27	.28	.29	.26	.29	.29	.23
Isoleucine	.60	.39	.39	.43	.36	.39	.38	.52
Leucine	1.43	1.05	1.05	1.07	.97	1.06	1.08	.67
Lysine	.62	.50	.52	.55	.47	.53	.52	.74
Methionine	.20	.19	.20	.23	.19	.20	.19	.50
Phenylalanine	.68	.47	.48	.48	.50	.48	.48	.54
Threonine	.54	.43	.42	.44	.45	.42	.43	.45
Valine	.71	.57	.57	.57	.52	.57	.59	.46

Table 2. Essential Amino Acids in Basal Diet B and in Experimental Diets Containing Meat and Bone Meal from Different Sources

	Basal	Experimental Diets					
		2	4	6	8	10	12
	%	%	%	%	%	%	%
Arginine	1.07	.85	.91	.72	.89	.68	.86
Histidine	.36	.20	.23	.24	.20	.24	.24
Isoleucine	.67	.34	.34	.43	.30	.36	.34
Leucine	1.07	.71	.74	.78	.62	.76	.80
Lysine	.85	.60	.67	.72	.57	.68	.66
Methionine	.14	.16	.18	.25	.17	.20	.18
Phenylalamine	.70	.39	.42	.43	.36	.42	.43
Threonine	.55	.40	.41	.44	.35	.41	.42
Valine	.70	.52	.55	.55	.46	.56	.58

Table 3. Essential Amino Acids in Blood Plasma of Growing Pigs Fed Basal Diet A and Experimental Diets Containing Meat and Bone Meal from Different Sources (results are expressed as μ moles/ml.)

	Basal	Experimental Diets					
		1	3	5	7	9	11
Arginine	.12	.17	.14	.15	.17	.15	.16
Histidine	.11	.10	.09	.10	.10	.09	.09
Isoleucine	.11	.09	.08	.10	.09	.09	.08
Leucine	.31	.25	.18	.28	.24	.24	.23
Lysine	.04	.12	.14	.15	.11	.16	.15
Methionine	.04	.04	.03	.05	.04	.04	.04
Phenylalamine	.16	.14	.13	.13	.14	.12	.13
Threonine	.48	.42	.43	.57	.42	.49	.41
Valine	.27	.27	.23	.26	.25	.26	.27

Table 4. Essential Amino Acids in Blood Plasma of Growing Pigs Fed Basal Diet B and Experimental Diets Containing Meat and Bone Meal from Different Sources (results are expressed in μ moles/ml.)

	Basal	Experimental Diets					
		2	4	6	8	10	12
Arginine	.22	.08	.09	.08	.09	.08	.08
Histidine	.12	.06	.07	.07	.06	.06	.07
Isoleucine	.26	.12	.10	.12	.11	.11	.09
Leucine	.28	.17	.16	.15	.15	.18	.16
Lysine	.29	.15	.13	.15	.11	.13	.14
Methionine	.03	.03	.03	.03	.03	.03	.02
Phenylalanine	.12	.06	.07	.06	.05	.07	.07
Threonine	.37	.29	.23	.22	.20	.20	.25
Valine	.42	.31	.30	.29	.30	.35	.29