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B A. Koch

G Cowman

Robert H. Hines

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Animal Protein as a Source of Un-identified Growth Factors for Swine.

R. H. Hines, B. A. Koch, and Gary Cowman.

Most authorities agree that the value of a protein source is determined by its content of essential amino acids. On that basis soybean meal compares favorably with the other commonly fed animal protein sources. However, there is some evidence, especially in the poultry research literature, that certain animal protein sources may contain unidentified growth factors. This report describes a trial in which two different animal proteins were fed at the 5% level in place of soybean meal in growing-finishing swine rations.

Procedure

Forty-eight weanling pigs (Duroc or Hampshire) averaging near 50 pounds each in weight were divided into eight groups of six pigs each. Breed, sex and weight were considered in grouping the pigs. The twenty-four heavier pigs made up the first replicate and the twenty four lighter pigs made up the second.

Each group was fed free-choice from a two-hole self feeder. Ration composition is shown in Table 1. Pelleted rations were prepared in the Grain Science and Industry Department.

Pigs were housed in the West Nutrition barn in pens that were 6 feet by 8 feet with an outside area of the same size. All floors were concrete. No bedding was used. Pigs were hand-watered three times each day. The trial began on December 7.

Pigs and feeders were weighed at 14 day intervals until the first pig weighed 200 pounds. Thereafter, they were weighed weekly and pigs were slaughtered in the Animal Science and Industry Department meat laboratory when they reached approximately 210 pounds in weight. Stomachs were collected and examined for ulcers by Dr. Donald C. Kelley of the School of Veterinary Medicine. Carcass data was collected by Douglas Wolters (under-graduate student) under the direction of Dr. Donald Kropf.

Results and Discussion

Performance data and carcass measurements are summarized in Table 3. In both replicate one and replicate two it appeared that 5% whey added to the ration may have been beneficial in terms of increased daily gain and improved feed efficiency. The increase in average daily gain over and above the control ration did not occur when both 5% dried whey and 5% dried fish solubles were added to the diet. However, a slight improvement

in feed efficiency was indicated when 5% whey was added and also when the whey and fish solubles were both added to the ration.

No significant differences were noted in any of the carcass measurements reported. The occurrence of gastric ulcers was about the same in all groups. It appeared to be lowest in the case of those pigs eating the control ration which contained no animal protein. Between 15 and 20% of all pigs showed evidence of either (1) developing ulcers, (2) healed ulcers, or (3) active ulcers.

Summary

Adding either 5% dried fish solubles or 5% whey or both to a basal cornsoy growing-finishing ration did not increase rate of gain in all groups.

Feed efficiency may have been improved somewhat in the rations containing 5% dried whey.

There was no improvement in those carcass measurements that were reported.

Incidence of gastric ulcers was not reduced by adding either 5% dried whey or 5% dried fish solubles or both to the diet.

Table 1. Animal protein as a source of unidentified growth factors for swine. Composition of Rations

<u>Ingredients</u>	Control	+ 5% Dried Fish solubles	+ 5% Dried Whey	+ 5% Dried Fish and 5% Dried whey
Sorghum Grain, lbs.	824	830	780	785
Soybean Meal (50%), lbs. ¹	150	45	145	40
Dried Fish solubles, lbs. ¹	---	100	---	100
Dried whey, lbs. ²	---	---	50	50
Hardy T.M. salt, lbs. ³	5	5	5	5
Merck-MCR-42, lbs. ⁴	5	5	5	5
Calcium Carbonate, lbs.	7.5	7.5	7.5	7.5
Dicalcium phosphate, lbs.	8.5	7.5	7.5	7.5
Zinc oxide, gms.	72	72	72	72
Total, lbs.	1000	1000	1000	1000

1 - Furnished by National Fish Meal and Oil Association, Washington, D.C.

2 - Furnished by Milk Specialties, Inc., Dundee, Illinois

3 - Furnished by Hardy Salt Co., St. Louis, Missouri. Analysis: Evaporated salt, 97%; Zn, 0.800%; Co, 0.022%; Mn, 0.4000%; Cu, 0.048%; Fe, 0.33%, and I, 0.011%.

4 - Furnished by Merck & Company, Rahway, New Jersey. This premix furnishes the following per ton of complete feed: Vitamin A,

3,000,000 I.U.; Vitamin D, 300,000 I.U.; Riboflavin, 1 gm; Pantothenic Acid, 5gm.; Niacin, 15 gms.; choline, 100 gms.; Vitamin B₁₂, 16 mgm. and antibiotic, 20 gm. (Pro-Strex).

Table 2. Ration analyses as reported by the Grain Science & Industry Department laboratory.

	(average percentages as fed)			
	Control	+ 5% Dried Fish Solubles	+ 5% Dried Whey	+ 5% Dried Fish and 5% Dried Whey
Moisture	13.0	13.2	12.6	13.9
Crude Protein	14.3	14.2	14.5	14.8
Ether Extract	2.8	3.1	2.5	3.4
Crude Fiber	2.7	2.5	2.5	2.3
Total Ash	3.7	4.4	4.1	4.7

Table 3. Animal protein as a source of unidentified growth factors for swine. Performance data and carcass measurements of pigs.

	<u>Average initial weight, lbs.</u>			
Rep. 1	58	58	56	57
Rep. 2	47	42	45	46
AV.	52	50	50	52
	<u>Average final weight, lbs.</u>			
Rep. 1	209	211	210	211
Rep. 2	209	207	209	212
AV.	209	209	210	211
	<u>Average daily gain, lb.</u>			
Rep. 1	1.59	1.61	1.67	1.53
Rep. 2	1.45	1.42	1.62	1.51
AV.	1.52	1.51	1.64	1.52
	<u>Average lbs. feed per 100 lb. of gain</u>			
Rep. 1	320.8	324.4	307.0	301.8
Rep. 2	322.9	328.7	306.9	311.8
AV.	321.8	326.5	306.9	306.8
	<u>Average Carcass length, in.</u>			
Rep. 1	28.4	29.0	29.0	28.9
Rep. 2	29.1	28.8	29.1	29.2
AV.	28.8	28.9	29.0	29.0
	<u>Average carcass backfat, in.</u>			
Rep. 1	1.37	1.38	1.26	1.29
Rep. 2	1.27	1.07	1.22	1.23
AV.	1.32	1.22	1.24	1.26
	<u>Average carcass loin eye area, sq. in.</u>			
Rep. 1	4.99	4.71	4.73	4.73
Rep. 2	5.02	4.77	4.50	5.14
AV.	5.00	4.74	4.61	4.94
	<u>Average number of gastric ulcers per group</u>			
Rep. 1	0	1	2	2
Rep. 2	1	4	3	2
AV.	0.5	2.5	2.5	2