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George W. Libal
South Dakota State University

Richard C. Wahlstrom

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Starter Diets for Weaned Pigs

George W. Libal and Richard C. Wahlstrom

The swine producer who operates a farrow-to-finish operation and the feeder pig producer who sells his pigs at 40 or 15 lb. are both interested in getting weaned pigs off to a quick start. Lack of palatability and low feed consumption are two problems associated with young pigs. Additions of ingredients to make the feed more acceptable to the pig add cost to an already expensive diet. Another problem often encountered is edema disease. High protein diets have often been listed as a predisposing cause of this disease. Work at this station (A.S. Series 70-33) has shown little benefit from complex starter diets over simple corn-soybean meal diets. In the simple starter diet, the high level of protein is the main contribution to the cost of the diet. It seems logical that the addition of limiting amino acids which constitute protein may allow for a reduction in the level of protein required for maximum pig performance. The trials reported herein were designed to test this hypothesis and to observe if differences in edema disease occurred on diets differing in protein content.

Experimental Procedure

Two trials were conducted to study the effects of protein level, lysine content and feed ingredients upon feed consumption, feed efficiency and gain of weaned pigs. In both trials the pigs were housed in inside, concrete floored pens. Supplemental heat was provided by space heaters to maintain at least a 50° F. temperature at all times. The pigs were weaned and allowed about a week to adjust to dry feed before allotment to treatments.

Trial 1

The first trial was conducted during the winter utilizing 54 crossbred pigs with an initial weight of approximately 17 pounds. The pigs were randomly allotted to three replications of three experimental diets on the basis of genetic background, weight and sex. The three experimental diets were:

1. 18% protein (corn-soybean meal + 30% rolled oats)
2. 18% protein (corn-soybean meal)
3. 15% protein + 0.20% lysine (corn-soybean meal)

Trial 2

The second trial was conducted in the spring utilizing 84 crossbred pigs with an initial weight of approximately 16 pounds. The pigs were allotted seven to a pen by the same criteria as in trial 1. Four experimental diets were used in this trial as follows:

1. 18% protein (corn-soybean meal + 30% rolled oats)
2. 18% protein (corn-soybean meal)
3. 15% protein + 0.20% lysine (corn-soybean meal)
4. 15% protein (corn-soybean meal)

In both trials, pig weights and feed consumption were obtained weekly. The length of both trials was five weeks (35 days).

Table 1 shows the experimental diets used in trials 1 and 2 and their calculated protein and lysine content. Diets 2 and 3 differed in protein but were equal in lysine and diets 3 and 4 were equal in protein but differed in lysine content.

Results

Trial 1

The results of trial 1 are shown in table 2. At the end of the five week experimental period, pigs in the three lots averaged 50, 52 and 54 pounds. The gain was considered acceptable in that pigs gained about 1 lb. per day from the initiation of the trial. No significant differences in average daily gain, feed consumption or feed per pound of gain were observed. This would indicate that under these conditions the 15% protein diet with additional lysine was as adequate for this stage of growth as either 18% protein diet. Two pigs fed the 15% protein diet died and one pig that was fed the 18% protein corn-soy-rolled oats diet died. Autopsy revealed cause of death was edema disease.

Trial 2

The results of trial 2 are shown in table 3. At the end of the five week period, lots averaged about 40 to 45 lb. and had gained from 0.71 lb. per day on the 15% protein diet to 0.83 lb. per day on the 18% protein corn-soybean meal diet. These gains were not statistically different because of the variation in gain of pigs within treatment groups. Feed consumption was equal between treatments but feed per lb. of gain was statistically ($P < .025$) different. Pigs receiving the 15% protein diet were least efficient and pigs receiving the 18% protein corn-soybean meal diet were most efficient. These results would indicate that the 15% protein diet was probably inadequate for efficient feed conversion by pigs at this stage of growth. However, when lysine content of the 15% protein diet equaled that of the 18% protein diet, improvement in feed efficiency was observed.

Summary

Weaned pigs fed diets containing 18% protein and 15% protein plus additional lysine to equal the lysine in the 18% protein ration performed similarly. However, when no additional lysine was added to the 15% protein diet, a poorer feed efficiency was obtained. The addition of 30% rolled oats and 5% sugar to the 18% protein diet was not beneficial. In these trials no additional edema disease was observed with high protein diets.

Table 1. Experimental Diets (Percent)^a

Ingredients	Diets			
	1	2	3	4
Ground yellow corn	42.95	73.85	80.55	80.75
Rolled oats	30.00	--	--	--
Soybean meal (49%)	19.00	23.00	16.00	16.00
Sugar	5.00	--	--	--
Dicalcium phosphate	1.70	1.80	1.90	1.90
Ground limestone	0.50	0.50	0.50	0.50
Trace mineralized salt (1% zinc)	0.50	0.50	0.50	0.50
Vitamin-antibiotic premix ^b	0.35	0.35	0.35	0.35
L-lysine monohydrochloride	--	--	0.20	--
	100.00	100.00	100.00	100.00
Calculated protein content, %	18.00	18.00	15.00	15.00
Calculated lysine content, %	0.80	0.89	0.89	0.69

^aDiets 1 through 3 were used in trial 1 and diets 1 through 4 were used in trial 2.

^bProvided per lb. of diet: 2000 I.U. vitamin A, 237 I.U. vitamin D, 1.25 mg. of riboflavin, 5 mg. pantothenic acid, 10 mg. niacin, 50 mg. choline, 7.5 mcg. vitamin B₁₂, 50 mg. chlortetracycline, 25 mg. penicillin and 50 mg. sulfamethazine.

Table 2. Growth Performance of Pigs in Trial 1

	Diets		
	1 18% protein Corn-soybean meal 30% rolled oats	2 18% protein Corn-soybean meal	3 15% protein Corn-soybean meal + 0.20% lysine
Number of pigs ^a	19	21	18
Avg. initial weight, lb.	17.2	17.4	17.3
Avg. final weight, lb.	54.0	50.0	52.0
Avg. daily gain, lb.	1.07	0.95	1.01
Avg. daily feed, lb.	2.41	2.05	2.32
Feed per lb. of gain, lb.	2.29	2.21	2.34

^aThree replicates of seven pigs per treatment. One pig died on the 18% rolled oats diet and two died on the 15% protein with added lysine diet and one pig was removed from each of these two treatments because of very slow growth. The diagnosis of cause of death of the three pigs was edema disease.

Table 3. Growth Performance of Pigs in Trial 2

	Diets			
	1	2	3	4
	18% protein Corn-SBM 30% rolled oats	18% protein Corn-SBM	15% protein Corn-SBM + 0.20% lysine	15% protein Corn-SBM
Number of pigs ^a	21	21	20	20
Avg. initial weight, lb.	15.7	15.7	15.8	15.7
Avg. final weight, lb.	43.0	44.9	42.2	40.4
Avg. daily gain, lb.	0.78	0.83	0.75	0.71
Avg. daily feed, lb.	1.84	1.82	1.80	1.81
Feed per lb. of gain, lb. ^b	2.36	2.19	2.40	2.51

^aThree replicates of seven pigs per treatment. One pig removed from the 15% protein corn-soybean meal plus lysine diet and one from the 15% protein corn-soybean meal diet because of slow unrepresentative gains.

^bA statistically significant difference in feed per lb. of gain was observed due to treatment ($P < .025$) and due to replication ($P < .05$).