1978

Effect of Antibiotics on the Growth of Growing Pigs Fed Different Levels of Protein

John Balios
South Dakota State University

George W. Libal

Richard C. Wahlstrom

EFFECT OF ANTIBIOTICS ON THE GROWTH OF GROWING PIGS FED DIFFERENT LEVELS OF PROTEIN

John Balios, George W. Libal, and Richard C. Wahlstrom

Department of Animal Science
Swine Section

South Dakota State University
A.S. Series 78-11

Since 1946 when the first antibiotics were discovered, extensive research has been conducted to study their growth promoting effect in many animal species. Animals fed diets containing antibiotics generally grow more rapidly. Enhancement of growth by antibiotics was often more striking when protein deficient diets were used.

The objective of this experiment was the measurement of the effect of aureomycin on growth rate of growing pigs fed diets of different protein levels.

Experimental Procedure

Eighty-eight pigs of an average weight of about 41 lb. were allotted to eight treatments each replicated three times. They were allotted 4 pigs per pen in the first and second replications and 3 pigs per pen in the third replication. The pigs were housed in a completely enclosed, slatted floor building and feed and water were provided ad libitum.

The composition of the corn-soybean meal supplemented diets is shown in table 1. The eight treatments used were 10, 12, 14 and 16% crude protein with and without antibiotic (aureomycin). The experiment was terminated when the average weight of the pigs in each pen reached 220 pounds. At the end of the experiment, all male animals were slaughtered and carcass measurements were taken for comparisons.

Results

Table 2 summarizes the results of average daily gain by periods and on an accumulative basis. There was a significant difference in daily gains during all periods. Gains increased as dietary protein increased during the first two periods but peaked at 14% protein in the third period and at 12% protein in the last period. Although there were no significant differences among pigs fed the 12, 14 and 16% protein with and without aureomycin, pigs fed the 10% protein diet with aureomycin gained significantly faster than those pigs fed the same diet without aureomycin, with the exception of the last period.

Accumulative gains added little to the information obtained from the per period gain. Pigs fed the 10% protein diet with aureomycin had an overall rate of gain approximately 15% greater than pigs fed the 10% protein diet without aureomycin.

The results are in agreement with research with other animals, showing a greater response to antibiotics at lower protein levels. However, levels of protein as low as 10% even with antibiotics resulted in gains and feed/gain that would not be economical.

Feed/gain data are shown in table 3. Significantly more feed was required by pigs fed the low protein diets. During the first 8 weeks, pigs fed aureomycin required significantly less feed at all levels of protein. During the last 8 weeks of the experiment, there was either no difference or the control pigs were slightly more efficient. However, overall feed efficiency was significantly improved when aureomycin was included in the diet. Feed/gain for the entire experiment was 4.29, 3.42, 3.20 and 2.93 lb. for pigs fed 10, 12, 14 and 16% protein diets with aureomycin and 4.74, 3.53, 3.27 and 3.17 for those diets without aureomycin.

Finally, table 4 shows the carcass characteristics. Dressing percent increased as the protein level in the diet increased. Pigs fed the 14 and 16% protein diets containing aureomycin had a slightly higher dressing percentage. Length was very similar in all treatments. Backfat increased and loin eye area decreased as dietary protein decreased. Aureomycin did not appear to have any effect on carcass backfat, but loin eye size was larger at all protein levels when aureomycin was included in the diet.

Summary

Eighty-eight pigs of an average weight of 41 lb. were used in this experiment. The eight treatments were 10, 12, 14 and 16% dietary protein with and without aureomycin. The results indicated that there was a significant difference in daily gains, with gains increasing as the protein level increased. There was no significant difference in daily gains among pigs treated with aureomycin vs. the controls at any level of protein with the exception of the 10% protein diet. Pigs treated with aureomycin required less feed per pound of gain at all levels of protein with differences more pronounced at the low level of dietary protein.

No significant differences were noted in carcass characteristics, although there was a trend of less backfat and a larger loin eye size among pigs fed aureomycin, especially at the low protein levels. Dressing percentage and loin eye area increased and backfat decreased as dietary protein increased.

Table 1. Composition of Experimental Diets (%)

Protein level, %	10	12	14	16
Treatment no.[a]	1,2	3,4	5,6	7,8
Corn	93.7	88.7	83.6	78.6
Soybean meal, 48%	3.2	8.4	13.5	18.6
Dicalcium phosphate	1.6	1.5	1.5	1.4
Limestone	.8	.8	.8	.8
Trace mineral salt, 1% zinc	.4	.4	.4	.4
Premix[b]	.2	.2	.2	.2

[a] Premix of diets 1, 3, 5 and 7 had aureomycin to supply 50 grams per ton.

[b] Supplied per lb. of diet: vitamin A, 1500 IU; vitamin D, 150 IU; vitamin E, 2.5 IU; vitamin K, 1 mg; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 8 mg; choline, 50 mg; vitamin B_{12}, 5 mcg and aureomycin, 25 milligrams.

Table 2. Average Daily Gains, Lb.

Protein level, %	10		12		14		16	
Antibiotic	+	-	+	-	+	-	+	-
Trt. no.	1[a]	2[a]	3	4	5	6	7	8
				By Periods				
0-4 wk.[b]	.94	.84	1.14	1.15	1.46	1.34	1.56	1.55
4-8 wk.[b]	.98	.85	1.49	1.41	1.76	1.80	2.02	1.98
8-12 wk.[b]	.83	.70	1.59	1.61	1.78	1.82	1.73	1.78
12-market[b]	.93	.93	1.84	1.89	1.85	1.68	1.64	1.73
				Accumulative				
0-4 wk.[b]	.94	.84	1.14	1.15	1.46	1.34	1.56	1.55
0-8 wk.[b]	.96	.81	1.31	1.27	1.61	1.57	1.79	1.76
0-12 wk.[b]	.91	.78	1.37	1.39	1.66	1.65	1.77	1.77
0-market[b]	.93	.81	1.49	1.50	1.69	1.66	1.73	1.76

[a] Significant differences among treatments due to antibiotic ($P<.05$).

[b] Significant differences among treatments due to protein level ($P<.05$).

Table 3. Feed/Gain

Protein level, %	10		12		14		16	
Antibiotic	+	-	+	-	+	-	+	-
Trt. no.	1[a]	2[a]	3	4	5	6	7	8
				By Periods				
0-4 wk.	3.35	4.16	3.03	3.17	2.64	2.76	2.43	2.51
4-8 wk.	4.17	4.75	3.16	3.45	3.06	3.14	2.38	2.86
8-12 wk.	4.79	6.22	3.79	3.78	3.72	3.56	3.52	3.83
12-market	4.93	4.56	3.65	3.63	3.86	3.54	3.96	3.94
				Accumulative[a]				
0-4 wk.	3.35	4.16	3.03	3.17	2.64	2.76	2.43	2.51
0-8 wk.	3.77	4.47	3.10	3.32	2.87	2.98	2.39	2.70
0-12 wk.	4.06	4.95	3.33	3.50	3.17	3.19	2.76	3.08
0-market	4.29	4.74	3.42	3.53	3.20	3.27	2.93	3.17

[a] Significant differences among treatments (P<.01).

Table 4. Carcass Characteristics

Protein level, %	10		12		14		16	
Antibiotic	+	-	+	-	+	-	+	-
Treatment no.	1	2	3	4	5	6	7	8
Dressing percent	72.5	73.9	74.1	75.1	76.9	74.6	76.9	76.0
Carcass length, in.	31.5	32.7	31.4	31.3	31.6	31.4	31.5	31.7
Backfat, in.[a]	1.67	1.74	1.33	1.40	1.38	1.35	1.33	1.30
Loin eye area, sq. in.	3.45	3.24	4.30	4.28	4.98	4.48	5.37	5.18

[a] Backfat values are average of three measurements, 1st rib, last rib and last lumbar.