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Animal Science Reports

1973

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Richard C. Wahlstrom
South Dakota State University

George W. Libal

Alan Vogel

Richard M. Luther

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Recommended Citation

Wahlstrom, Richard C.; Libal, George W.; Vogel, Alan; and Luther, Richard M., "Effect of Environment and Feeding Antibacterial Compounds During Early Growth on Performance on Growing-Finishing Pigs" (1973). *South Dakota Swine Field Day Proceedings and Research Reports*, 1973. Paper 2.

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Effect of Environment and Feeding Antibacterial Compounds During
Early Growth on Performance of Growing-Finishing Pigs

Richard C. Wahlstrom, George W. Libal, Alan Vogel
and Richard M. Luther

It has been recommended by the Food and Drug Administration Task Force that antimicrobial agents used in clinical medicine be prohibited from use as growth promotants in animals after December 31, 1973. They have asked for further research on the efficacy and safety of these compounds, particularly in the area of development of resistant organisms. Early research conducted at South Dakota and several other stations indicated that the greatest benefit in growth performance occurs when these compounds are included in rations of young pigs. It was also shown that removing an antibiotic from the feed at about 100 lb. live weight resulted in a loss of part of the increased gain by market weight.

The objectives of this experiment were to study the value of several antimicrobial agents as feed additives when included in the diet of young weaned pigs for approximately 5 weeks and to compare the performance of pigs fed in an enclosed confinement building with those fed in an outside, open-front building.

Experimental Procedure

Sixty-four crossbred pigs that averaged about 26 lb. were allotted to two replications of four treatments. Eight pigs, six barrows and two gilts, were assigned to each lot. One replicate of four pens was housed in concrete floored pens in a totally enclosed building, while the other replicate of four pens was housed in open-front, uninsulated buildings having concrete floored pens and outside feeding areas.

All pigs were fed the basal diets shown in table 1. Antimicrobial compounds were added to the diets during the first 37 days of the experiment and then removed and all treatments were fed the unsupplemented basal diets to termination of the experiment at an average weight of about 185 pounds.

The experimental treatments for the first 37 days were as follows:

1. No additive (control)
2. 200 g furazolidone (Furox) per ton
3. 150 g furazolidone, 100 g oxytetracycline and 90 g arsanilic acid (FOA) per ton
4. 100 g chlortetracycline, 100 g sulfamethazine and 50 g penicillin (ASP-250) per ton.

Results

The effect of the various antimicrobial compounds on growth performance is shown in table 2. There were significant differences in average daily gain and feed/gain for the 37-day period that antimicrobial compounds were included in the diet. Daily gains were increased 0.17, 0.30 and 0.42 lb. by feeding ASP-250, Furox and FOA, respectively. Feed efficiency was also improved from 6 to 12% when pigs were fed these growth promotant compounds.

The initial treatment during the first 37 days did not appear to have any effect on performance of the pigs during the subsequent 70-day period when all pigs were fed the basal diet. Gains, feed consumption and feed efficiency were similar for all treatments during this period. The advantage in increased gains observed during the first 37 days was essentially maintained for the remainder of the experiment. However, when considering the entire experiment, average daily gains for pigs fed the antimicrobial compounds were only slightly better than those of pigs fed the control diets. Daily gains were 1.42, 1.47, 1.55 and 1.48 for pigs fed the basal, Furox, FOA and ASP-250 diets, respectively. There were no differences in feed efficiency for the total experimental period.

The comparison of pigs housed in total confinement or in open-front buildings is summarized in table 3. No significant differences were found in average daily gain. However, during the final 70-day feeding period pigs housed in the open-front buildings consumed significantly more feed than those housed in total confinement and they consumed approximately 10% more feed daily during the entire experiment. Less feed was required per lb. of gain when pigs were confined indoors. As an average of the experiment, pigs fed in outside lots required 6% more feed per lb. of gain than those pigs fed in confinement. This experiment was conducted from November 1 to February 16 and the data indicate that pigs fed outside had to utilize a part of the energy of their diet for body heat. The pigs appeared to compensate for this by consuming more feed and maintaining their gains equal to those pigs fed in a building where temperature rarely fell below 50° F.

More feet and leg problems, tail biting and poor growth were encountered with pigs in the confinement house as indicated by the fact that nine pigs were removed from this group and only two pigs needed to be removed from the outside group. It is not possible to conclude whether these differences were totally due to housing conditions.

Summary

Sixty-four weanling pigs were used in an experiment to study the effects of feeding furazolidone, a furazolidone-oxytetracycline-arsanilic acid mixture and a chlortetracycline-sulfamethazine-penicillin mixture for 37 days. All of the antimicrobial compounds increased gains and improved feed efficiency during the 37-day period they were fed. These compounds did not have any carry-over effect on performance of pigs fed the basal diet for a subsequent 70-day period. Feeding the above compounds for the initial 37 days of the experiment resulted in overall increases in daily gain from 0.05 to 0.13 pound.

Pigs fed in total confinement required less feed per unit of gain than pigs housed in open-front buildings and fed in outside lots. Gains did not differ significantly among these treatments.

Table 1. Composition of Basal Diets (Percent)

	To 125 lb.	125 to 200 lb.
Ground yellow corn	79.4	89.8
Soybean meal (44%)	17.7	7.9
Dicalcium phosphate	1.7	1.1
Ground limestone	0.5	0.5
Trace mineral salt (0.8% zinc)	0.5	0.5
Vitamin premix ^a	0.2	0.2

^aProvided per lb. of diet: vitamin A, 1500 IU; vitamin D, 200 IU; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 10 mg; choline, 50 mg and vitamin B₁₂, 7.5 mcg.

Table 2. Effect of Feeding Antimicrobial Compounds for 37 Days on Performance of Growing-Finishing Pigs

	Control	Furox	FOA	ASP-250
<u>First 37 days</u>				
Number of pigs	16	16	16	16
Avg. daily gain, lb.*	0.90	1.20	1.32	1.07
Avg. daily feed, lb.	2.47	3.04	3.20	2.79
Avg. feed/gain**	2.76	2.54	2.43	2.60
<u>From 37 days to termination</u>				
Number of pigs ^a	13	13	12	15
Avg. daily gain, lb.	1.65	1.57	1.66	1.67
Avg. daily feed, lb.	5.67	5.58	6.05	5.75
Avg. feed/gain	3.44	3.54	3.64	3.44
<u>Complete trial</u>				
Number of pigs ^b	13	13	12	15
Avg. daily gain, lb.	1.42	1.47	1.55	1.48
Avg. daily feed, lb.	4.62	4.85	5.11	4.74
Avg. feed/gain	3.24	3.30	3.28	3.20

^aEleven pigs were removed during this period because of tail biting, leg problems and failure to grow.

^bData adjusted to include only those pigs that completed the experiment.

*Significant treatment differences (P<.05).

**Significant treatment differences (P<.01).

Table 3. Effect of Type of Housing on Growth Performance

	Total confinement	Open-front
Number pigs started	32	32
Number pigs finished	23	30
Avg. initial wt., lb.	25.6	25.9
Avg. final wt., lb.	181.2	187.2
Avg. daily gain, lb.		
First 37 days	1.10	1.14
37 days to end	1.59	1.68
Complete trial	1.45	1.50
Avg. daily feed, lb.		
First 37 days	2.77	3.01
37 days to end**	5.17	6.04
Complete trial	4.54	5.03
Avg. feed/gain		
First 37 days*	2.52	2.64
37 days to end*	3.25	3.60
Complete trial*	3.14	3.34

*Significant difference (P<.05).

**Significant difference (P<.01).