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THE EFFECT OF PEN SPACE AND VITAMIN C ADDITION TO THE DIET ON WEANLING PIG PERFORMANCE

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It is assumed that there is no dietary requirement for vitamin C by the pig. However, recently there has been some indication that, under certain conditions, vitamin C or ascorbic acid may boost pig performance. Vitamin C is involved in development of the immune response. Therefore, if a requirement for dietary vitamin C exists, it should be demonstrated with pigs under stressed conditions. The study reported in this paper is a part of a cooperative project by the NCR-89 Committee on Confinement Management of Swine. It is designed to evaluate the response of weaned pigs to a vitamin C addition to the diet when placed under the stress of reduced pen space and feeder space.

(Key Words: Swine, Weaned Pigs, Pen Space, Vitamin C.)

Experimental Procedure

One hundred ninety-two crossbred pigs were allotted to four replications of four treatments when weaned at 3 to 4 weeks of age. Allotment was based on age, weight and ancestry. The pigs were housed in the environmentally controlled nursery unit in the Animal Science Complex. Temperature was maintained at 80 F during the early part of the 4 week experiment and then reduced to 75 F during the second half of the experimental period. The experimental pens consisted of plastic or plastic coated perforated flooring material. Each pen provided approximately 22.5 sq. ft. of total space with about 1.8 sq. ft. taken up by the feeder. The experimental diet (table 1) was the same for all treatments except for the additions of vitamin C. The experimental treatments consisted of two levels of floor space (1.33 vs 2.66 sq. ft./pig) and 0 or 625 ppm of vitamin C. The four treatments were as follows:

	Floor space/pig	Vitamin C level (ppm)
Treatment 1	1.33 sq. ft.	0
Treatment 2	1.33 sq. ft.	625
Treatment 3	2.66 sq. ft.	0
Treatment 4	2.66 sq. ft.	625

The pig space differences were accomplished by changing pig density in the pen (16 pigs vs 8 pigs). Feeder space per pig was also different as no change in number of feeders or size of

Table 1. Composition of Experimental Diet

Ingredient	Percent of Diet
Soybean meal (44%)	25.0
Ground corn	51.66
Dried whey	20.00
L-lysine HCl	.15
Dicalcium phosphate	1.10
Limestone	.76
Salt, white	.25
Premix[a,b]	12.08

[a] Includes a trace mineral premix, ASP-250, and a vitamin premix.

[b] Vitamin premix and vitamin C provided by Hoffman-La-Roche, Nutley, NJ. Supplied per ton of complete feed: Vit A, 10,500,000 IU; Vit D_3, 1,500,000 IU; Vit E, 22,500,000 IU; Vit B_{12}, 36 mg; Riboflavin, 7.5 g; Niacin, 45 g; P.A., 30 g; Choline, 375 g; Vit K_3, 5.4 g; Vit B_1, 1.5 g; Vit B_6, 3.0 g; Biotin, 150 mg.

feeder was made. Thus, expected response in the crowded pen with limited feeder space was a reduction in feed intake and a reduction in gain. If a response to vitamin C was to be seen, it would be expected to be greatest in the more crowded, stressful conditions.

Results

A summary of the combined effects of pen space and vitamin C level is shown in table 2 and summaries of the main effects are shown in tables 3 and 4.

Table 2. Effect of Floor Space and Vitamin C on Weaned Pig Performance

Floor space/pig	1.33 sq. ft.		2.66 sq. ft.	
Treatment	Control	Vitamin C[a]	Control	Vitamin C[a]
No. of pigs/pen	16	16	8	8
No. of pigs/treatment	64	64	32	32
Initial weight, lb	15.5	15.5	15.5	15.5
Final weight, lb	36.8	37.5	39.6	40.5
Avg daily gain, lb	.76	.78	.86	.89
Avg daily feed, lb	1.37	1.39	1.51	1.53
Feed/gain	1.81	1.78	1.77	1.71

[a] 625 ppm Vitamin C.

Pigs which were limited to 1.33 sq. ft. of pen space during the 28 day experimental period ate significantly less feed and gained at a significantly slower rate regardless of the addition of vitamin C to the diet. Feed/gain differed by .05 due to pen space but this difference was not significant.

Table 3. Effect of Floor Space on Weaned Pig Performance

Floor Space, sq. ft.	1.33	2.66
No. of pigs	128	64
Initial weight, lb	15.5	15.5
Final weight, lb[a]	37.2	40.1
Avg daily gain, lb[a]	.77	.88
Avg daily feed, lb[b]	1.38	1.52
Feed/gain	1.79	1.74

[a] $P<.01$.

[b] $P<.05$.

Table 4. Effect of Vitamin C on Weaned Pig Performance

Treatment	Control	Vitamin C[a]
No. of pigs	96	96
Initial weight, lb	15.5	15.5
Final weight, lb	38.2	39.0
Avg daily gain, lb	.81	.84
Avg daily feed, lb	1.44	1.46
Feed/gain	1.79	1.74

[a] 625 ppm vitamin C.

Pig performance was not affected by the addition of vitamin C to the diet. The highest feed intake, greatest rate of gain and most efficient conversion of feed to gain was observed for pigs with more space and receiving vitamin C. However, almost all of the difference observed is a function of less crowding instead of the level of vitamin C. It would appear that under these conditions there is no advantage to adding vitamin C to the diets of weaned pigs.

Summary

The effect of pen space (1.33 vs 2.66 sq. ft.) and level of vitamin C (0 vs 625 ppm) was studied in a 4 week trial utilizing 192 crossbred weaned pigs. Significant depression in feed intake and gain was observed in the more crowded environment regardless of the presence of vitamin C. No response in performance was seen due to the addition of vitamin C.