WATER SOLUBLE VITAMIN NEEDS OF WEANED PIGS

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Summary

Two trials, using 360 pigs weaned at 17 — 27 days, were conducted to evaluate pig performance as affected by the addition of folic acid, thiamin, biotin, pyridoxine, or ascorbic acid to the diet. Combined data from Trial I and Trial II indicated that adding these supplemental vitamins did not improve daily gain or feed efficiency. These results suggest the addition of these supplemental water-soluble vitamins to a corn-soybean meal 20% whey diet or injection of a B-vitamin complex for pigs weaned at 3-4 weeks of age is not beneficial.

Introduction

The ideal diet for pigs weaned at 14 — 28 days of age remains very debatable after numerous years of research. The abrupt change from sow's milk to starter feed is undoubtedly one of the greatest nutritional challenges of the pig's life. The weanling pig must cope with the stresses of a drastic change in diet, a new environment, and new pen mates. These stresses usually result in very little feed consumption and weight loss during the first week after weaning.

The young pig has virtually no tissue reserves of vitamins and the reduced feed intake and the stress of weaning could reduce microbial synthesis of vitamins. Recent research suggests that supplemental vitamin C may be of benefit to pigs immediately after weaning. Numerous commercial pig starter diets contain added thiamin, pyridoxine, biotin, folic acid, and vitamin C. However, data to support these additons cannot be found in the scientific literature. The objectives of these studies were to evaluate the effects of various vitamin additions (pyridoxine, biotin, thiamin, folic acid, and vitamin C) in diets for pigs weaned at 3-4 weeks of age. With the growing trend of 3 to 4 week weaning and the use of simplified diets, it is important that we evaluate the effects of these vitamins on the performance of young pigs.

Experimental Procedure

Pigs were weaned at approximately 3 weeks of age (19-27d range) and placed in an environmentally controlled nursery with wire floors over a Y-flush gutter. Each 4 ft.X 5 ft. pen contained a self-feeder and a nipple waterer. Composition of the basal corn-soybean meal-whey diet is shown in Table 1. Pigs were weighed and feed consumption determined each week for the 35-d trial. Criteria evaluated were average daily gain (ADG) and feed efficiency (F/G).

Trial I utilized 144 (10.1-14.5 lbs.) pigs. Pigs were blocked by weight and randomly allotted to 24 pens with 6 pigs per pen and 3 pens per treatment. Treatments were as follows:

1) Basal (B)
2) B + folic acid (900mg/ton)
3) B + thiamin (1.5g/ton)
4) B + biotin (150mg/ton)
5) B + pyridoxine (3g/ton)
6) B + ascorbic acid (450ppm)
7) B + ALL (folic acid, thiamin, biotin, pyridoxine and ascorbic acid)
8) B + 2X (Trt.7)

Trial II used 216 pigs (27 pens of 8 pigs) with the same 8 treatments used in Trial I, with the additional treatment of injecting pigs at weaning (d-0) and 7-d post weaning with a B vitamin complex (supplying: thiamin, 100mg; riboflavin, 5 mg; niacin, 100mg;d-pantothenic acid,10mg; pyridoxine,10mg; and B12,100mcg).

Results and Discussion

The results of Trials I and II, days 0-14, are presented in Table 2. During the first 2 weeks of Trial I, the addition of 450 ppm of ascorbic acid improved ($p<.05$) daily gain. Addition of folic acid, thiamin, biotin, and pyridoxine did not affect daily gain or feed efficiency in Trial I. During the first 2 weeks of Trial I, pigs fed the 2X level of all vitamins required more ($P<.05$) feed per unit gain. In contrast to Trial I, ascorbic acid addition did not affect daily gain in Trial II. Injecting B-vitamins at d-0 and d-7 did not improve pig performance during the first 2 weeks of Trial II. The combined results of Trial I and II, day 0-14, showed no treatment effects on daily gain or feed efficiency.

The results of Trial I and II, days 15-35, are presented in Table 3. No vitamin effects were noted for average daily gain or feed efficiency during days 15-35 of Trial I. Pigs fed supplemental biotin and those injected with vitamins in Trial II, days 15-35, gained less ($P<.05$) than those fed the basal diet. The combined results of Trial I and II, days 15-35 showed no effect from any vitamin addition.

Table 4 presents pig performance for the entire 35 day trial for Trial I and II and the combined results. In Trial I, vitamin additions had no effects on average daily gain or feed efficiency. In Trial II pigs fed supplemental biotin and those injected with vitamins on d-0 and d-7 had a decreased ($P<.05$) daily gain. The combined results for the two trial showed no difference in pig performance from vitamin supplementation.

These results suggest that a supplemental source of folic acid, thiamin, biotin, pyridoxine, and ascorbic acid is not necessary with a corn-soybean meal-20% whey diet for pigs weaned at 3-4 weeks of age.

Table 1. Composition of Basal Diet.

Ingredient	lbs/2000 lbs
Gr. Corn	847
Soybean meal, 44% C.P.	630
Spray dried whey	400
Soybean oil	60
Dicalcium phosphate	27
Limestone	15
Salt	2
Trace-mineral premix	2
L-Lysine HCL (98%)	2
Selenium premix (90 mg/lb)	3
Copper sulfate	2
Vitamin premix[a]	5
Antibiotic[b]	5
	2000

[a] Supplies the following per ton of complete diet: Vitamin A, 4,000,000 IU; Vitamin D_3, 300,000 IU; Vitamin E 20,000 IU; Menadione, 1.5g; d-pantothenic acid, 12g; niacin, 25g; choline 400g; and B_{12} 22mg.

[b] ASP-250.

Table 2. Effects of Vitamins on Weanling Pigs (0-14 days).

Vitamins	Trial I[a]		Trial II[b]		Total[c]	
	ADG, lb	F/G	ADG, lb	F/G	ADG, lb	F/G
Basal (B)	0.50	1.06	0.43	1.03	0.46	1.05
B+ Folic Acid	0.52	1.30	0.43	1.05	0.48	1.17
B+ Thiamin	0.52	1.22	0.34	1.27	0.45	1.24
B+ Biotin	0.49	1.20	0.33	1.29	0.41	1.25
B+ Pyridoxine	0.57	1.13	0.35	1.14	0.46	1.14
B+ Ascorbic Acid	0.58[d]	1.07	0.40	1.10	0.48	1.09
B+ ALL	0.49	1.21	0.38	1.16	0.43	1.19
2X (TRT 7)	0.46	1.45[d]	0.42	1.11	0.44	1.28
B+ injections on d-0 and d-7	---	---	0.35	1.23	---	---

[a]Each value is the mean of 3 pens of 6 pigs per pen.
[b]Each value is the mean of 3 pens of 8 pigs per pen.
[c]Each value is the mean of 6 pens.
[d]Significant ($P<.05$) from control.

Table 3. Effects of Vitamins on Weanling Pigs (15-35 days).

	Trial I[a]		Trial II[b]		Total[c]	
	ADG, lb	F/G	ADG, lb	F/G	ADG, lb	F/G
Basal (B)	1.27	1.59	1.22	1.53	1.25	1.56
B+ Folic Acid	1.27	1.63	1.19	1.48	1.23	1.56
B+ Thiamin	1.21	1.62	1.14	1.58	1.18	1.60
B+ Biotin	1.34	1.52	1.01[d]	1.44	1.18	1.49
B+ Pyridoxine	1.28	1.65	1.17	1.50	1.23	1.58
B+ Ascorbic Acid	1.36	1.60	1.09	1.75	1.20	1.69
B+ ALL	1.25	1.65	1.16	1.60	1.20	1.63
2X (TRT 7)	1.31	1.61	1.20	1.54	1.26	1.57
B+ Injections on D-0 and D-7	---	---	1.02[d]	1.60	---	---

[a]Each value is the mean of 3 pens of 6 pigs per pen.
[b]Each value is the mean of 3 pens of 8 pigs per pen.
[c]Each value is the mean of 6 pens.
[d]Significant ($p<.05$) from control.

Table 4. Effects of Vitamins on Weanling Pigs (0-35 days).[a]

	Trial I[a]		Trial II[b]		Total[c]	
	ADG, lb	F/G	ADG, lb	F/G	ADG, lb	F/G
Basal (B)	0.96	1.48	0.90	1.43	0.93	1.46
B+ Folic Acid	0.97	1.55	0.89	1.40	0.93	1.48
B+ Thiamin	0.93	1.53	0.82	1.53	0.89	1.53
B+ Biotin	1.00	1.46	0.73[d]	1.40	0.87	1.42
B+ Pyridoxine	1.00	1.53	0.84	1.44	0.92	1.49
B+ Ascorbic Acid	1.05	1.49	0.81	1.62	0.91	1.56
B+ ALL	0.95	1.56	0.84	1.53	0.90	1.54
2X (TRT 7)	0.97	1.58	0.89	1.46	0.93	1.52
B+ injections on d-0 and d-7	---	---	0.75[d]	1.53	---	---

[a]Each value is the mean of 3 pens of 6 pigs per pen.
[b]Each value is the mean of 3 pens of 8 pigs per pen.
[c]Each value is the mean of 6 pens.
[d]Significant ($P<.05$) from control.