Effect of Inedible Egg Product on Growth Performance of Weanling Pigs

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Summary and Implications

Inedible egg product was evaluated as a replacement for soybean meal and soybean oil in diets fed to weanling pigs. Increasing egg product concentrations of 0, 3, 6, and 9% linearly decreased average daily gain and gain:feed ratio, but not average daily feed intake.

Introduction

Inedible egg product is a mixture of whole eggs and egg whites. The product we tested analyzed 55.2% crude protein and 28.6% ether extract. These analyses indicate a 50:50 mix of yolk and white. Our objective was to compare growth performance of increasing concentrations of 0, 3, 6, and 9% egg product in diets fed to weanling pigs. Egg product replaced soybean meal and soybean oil in the formulations. Diets were formulated to be equal in lysine content (1.60% in weeks 1 and 2 and 1.40% in weeks 3 and 4) and equal in ether extract (2.57% added by egg product and/or soy oil).

Materials and Methods

One hundred twenty-four pigs averaging 6.4 kg body weight and 18 days of age were weaned. They were randomly allotted to pens within blocks of four pens from outcome groups based on litter of origin and body weight. In block 1, there were six pigs per pen and in blocks 2, 3, 4, 5 and 6, there were five pigs per pen. The four dietary treatments were randomly assigned to the pens in each of the six blocks. Pigs were housed in an environmentally controlled room containing 24 raised-deck pens (4 × 4 feet). The pens had woven-wire flooring and contained a stainless steel self-feeder, a nipple drinker and a 1 × 4 foot heat pad that was warm for the first 2 weeks. The air temperature at pig height was maintained at a minimum of 72°F.

The four dietary treatments were increasing concentrations (0, 3, 6, and 9%) of inedible egg product in phase I (weeks 1 and 2) and phase II (weeks 3 and 4) diets. As egg product concentration increased in diets, it replaced soybean meal and soybean oil. The egg product analyzed 55.2% crude protein and 28.6% ether extract. Based on the protein and ether extract concentrations of the product, it was estimated to be a 50:50 mixture of white and yolk. By calculated analysis the mixture should have contained 3.72% lysine. By analysis it contained 3.36% lysine. Diets were then formulated to contain equal lysine concentrations (1.60% in phase I and 1.40% in phase II diets) and 2.57% fat from egg product and/or soybean oil. Diet formulas, and calculated and analyzed nutrient contents, are presented in Table 1.

Results and Discussion

The growth performance of the pigs is presented in Table 2. Data for average daily gain (ADG), average daily feed intake (ADFI), and gain:feed ratio (G:F) are presented by cumulative weekly periods. After 1 week of feeding, there were no effects of treatments on growth performance. After 2 weeks, however, gain:feed ratios were decreased ($P<.0001$) by increasing concentrations of egg product in diets. After 3 and 4 weeks, both average daily gain (.003) and gain:feed ratios (.0004) were decreased by increasing concentrations of egg products in the diets. At no period during the experiment was feed intake affected by dietary treatments.

The cause or causes of the depressing effect of egg product on growth performance is not clear. It is probably not related to the energy contribution of the diets because diets were very similar in energy concentration. Diet differences were more likely related to the protein (amino acid) sources. The amino acid composition of the egg product indicates that the essential amino acids were present in concentrations only slightly lower than those predicted by table values. Its amino acid composition was calculated from published composition tables for egg white and egg yolk (*Egg Science and Technology*, Stadelman and Cotteril, The AVI Publishing Co., 1973). Calculated lysine concentration was 3.72% and the analyzed concentration was 3.36%. It is possible that there is some destruction or complexing of critical amino acids before or during the process of drying the egg product. The product we used had an off odor that might indicate some spoilage prior to drying.

Table 1. Diet Composition.

Item	Phase I diets[a]				Phase II diets[a]			
	Egg product, %				Egg product, %			
	0	3	6	9	0	3	6	9
Corn	36.71	38.57	40.02	41.78	48.44	50.00	51.85	53.51
Soybean meal (48%)	26.00	22.00	18.40	14.50	33.70	30.00	26.00	22.20
Dried whey	25.00	25.00	25.00	25.00	10.00	10.00	10.00	10.00
Spray dried plasma	5.00	5.00	5.00	5.00	-	-	-	-
Egg product	-	3.00	6.00	9.00	-	3.00	6.00	9.00
Soybean oil	2.57	1.71	.86	-	2.57	1.71	.86	-
Dicalcium phosphate	1.65	1.65	1.65	1.65	2.20	2.20	2.20	2.20
Limestone	.90	.90	.90	.90	.78	.78	.78	.78
Salt	-	-	-	-	.25	.25	.25	.25
Lysine•HCL	.20	.20	.20	.20	.20	.20	.20	.20
Methionine	.10	.10	.10	.10	.10	.10	.10	.10
Vitamin premix[b]	.40	.40	.40	.40	.30	.30	.30	.30
Trace mineral[c]	.07	.07	.07	.07	.06	.06	.06	.06
Selenium premix[d]	.05	.05	.05	.05	.05	.05	.05	.05
Mecadox premix	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Zinc oxide	.35	.35	.35	.35	.35	.35	.35	.35
Calculated analysis:								
Crude protein	22.7	22.6	22.7	22.6	21.5	21.5	21.4	21.4
Lysine	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.40
Calcium	.99	.99	.99	.98	.95	.95	.94	.94
Phosphorus	.85	.85	.85	.86	.84	.84	.84	.84
Analyzed:								
Crude protein	23.2	23.1	22.7	23.0	22.1	22.0	21.4	21.7
Crude fat	4.22	3.65	3.73	3.90	4.63	4.63	5.03	4.50

[a] Phase I diets in weeks 1 and 2; phase II diets in weeks 3 and 4.

[b] At .40% of diet supplied 4,000 IU vitamin A, 1,000 IU vitamin D_3, 6 mg riboflavin, 16 mg pantothenic acid, 60 mg niacin, and 20 μg vitamin B_{12} per pound of diet.

[c] At .07% of diet supplied in ppm of diet: 165 Zn, 193 Fe, 66 Mn, 19.3 Cu, and .2 I.

[d] Supplied .3 ppm Se to the diet.

Table 2. Effects of inedible egg product on weanling pig growth performance.

Item	Period, wk	Egg product, % of diet 0	3	6	9	CV, %	P-linear[a]
ADG, lb							
	1	.34	.30	.36	.36	23.9	.39
	1 & 2	.66	.62	.63	.60	11.0	.21
	1, 2 & 3	.84	.75	.74	.71	8.2	.002
	1, 2, 3 & 4	.95	.91	.89	.81	7.6	.003
ADFI, lb							
	1	.47	.49	.52	.54	22.0	.26
	1 & 2	.81	.85	.84	.86	12.0	.42
	1, 2 & 3	1.08	1.09	1.05	1.07	8.8	.68
	1, 2, 3 & 4	1.33	1.36	1.31	1.28	6.9	.23
G:F							
	1	.734	.613	.690	.673	10.5	.42
	1 & 2	.820	.720	.743	.698	4.4	.0001
	1, 2 & 3	.783	.690	.699	.666	4.2	.0001
	1, 2, 3 & 4	.713	.670	.681	.632	4.2	.0004

[a] Probability level for linear responses.