

EFFECT OF OATS IN PIG STARTER DIETS ON GROWTH PERFORMANCE

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ABSTRACT

The objective of this study was to examine the effect of including steamed rolled oats in the nursery diet on pig performance. Pigs were fed diets with 10% oats in the phase 1 diet (day 0-10 post-weaning) and 5% in the phase 2 diet (day 10-28 post weaning). There were 5 pens of 7-8 pigs each on the control and oat diets. Pigs fed the oat diets had greater gain from day 0-10 and overall. Feed intake was not different between the diets. Feed efficiency was improved in pigs fed the oat diets. Overall these results indicate that although oats are more expensive than corn, the improved growth performance offsets the added cost, particularly in the phase 1 nursery diet.

INTRODUCTION

Oats have historically been used in pig starter diets as an alternative grain source. Use of oats in starter diets is reported to reduce the incidence of diarrhea in young pigs (Maser, 1978; Rivera et al., 1978). However, there are limits to the amount of oats that can be included in the diet. While oats have more favorable amino acid profile than corn, they are higher in fiber and lower in energy (Meyer, 2008). High fiber ingredients are typically not used in pig nursery diets. Despite the relatively common use of oats in diets, there is relatively little research comparing the effects of oats on growth performance to that of pigs fed corn-based diets. The objective of this study was to compare diets with 0 and 10% steamed rolled oats in phase 1 (day 0-10) and 0 and 5% in phase 2 diets.

MATERIALS AND METHODS

The amino acid profile of the ingredients was determined at the University of Missouri (Table 1). Proximate analysis was performed at the University of Georgia (UGA) Ag Services laboratory. The protocol for the study was approved by the UGA Animal Care and Use Committee. Pigs from the UGA swine unit were used in the study. The study was conducted on the UGA Double Bridges Swine Unit. Pigs were weaned at approximately 3 weeks of age and transferred to the nursery. Pigs were allotted based on weight and gender to one of 10 nursery pens with 7-8 pigs per pen. Gender was balanced within pens in a weight block. Dietary treatments were randomly assigned within weight blocks to pens of pigs. There are 2 dietary treatments (Table 2) that were administered in the phase 1 and 2 diets. Phase 1 diets were fed from day 0-10 post-weaning. On day 10 post-weaning, pigs were switched to phase 2 diets which will be fed until day 28. Diets were formulated to meet or exceed all the nutrient requirements except energy based on the 2012 NRC. Diets were produced at the UGA Poultry Science Department Feed Mill and fed in pellet form.

Pigs were weighed on days 0, 10, 21 and 28 post-weaning. Intake was monitored at each weigh period. Diet samples at each phase were collected and for proximate analysis at the UA Ag Services laboratory.

Growth performance results were analyzed with pen as the experimental unit using the PROC G.M. procedure in SAS. The model included dietary treatment and block.

RESULTS AND DISCUSSION

The analyzed composition of ingredients was similar to published values in the 2012 NRC. Amino acid analysis of the diets was also similar to the expected values (Table 2)

There was a trend for greater body weight in pigs fed the oat diet on day 21 and 28 (Table 3). Growth rate of pigs fed the oat diet was significantly greater for days 0-10, 0-21 and 0-28. In the first period after weaning, pigs fed the oat diet had 44% greater growth rates (90 vs 130 g/d, $P < 0.03$). Overall for the 28 day study, pigs fed the oat diet had 7% greater gain. Average daily feed intake was not different during any period or overall. Since growth rate was greater and intake unchanged, the gain:feed ratio was improved, particularly in phase 1 (day 0-10). Overall, there was a trend for improved feed efficiency in pigs fed the oat diet.

In this study, oats largely replaced corn in the diet (Table 2). Since oats are typically more costly than corn, this resulted in an increase in diet cost. In order to maintain a similar energy level in the oat diet, additional fat was added which also contributed to a higher diet cost. The steamed rolled oats used in this study were obtained from a local feed mill in bagged form and were 3-4 times the cost of corn. However, even with this added cost, the improved performance of pigs fed the oat diet resulted in an overall reduction in the cost of gain. It is likely that bulk quantities of oats could be obtained at a much lower cost. The results of the study indicate that pigs fed diets with 10% oats for the first 10 days post weaning had improved growth rate and feed efficiency compared to those fed a standard diet. Despite the higher cost of the oat diet, the improved performance of animals fed this diet offset the greater cost.

LITERATURE CITED

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Rivera, E. R., W. D. Armstrong, A. J. Lawson and A. G. Laniard. 1978. Effect of dietary oats and kaolin on performance and incidence of diarrhea in weanling pigs. J. Anim. Sci. 46:1685.

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Table 1. Analysis of Ingredients

	Corn	DDGS	Soybean Meal	Oats	Fish Meal	Plasma Protein	Whey
Proximate, %							
Crude Protein	7.91	26.5	46.31	12.32	64.25	78.08	12.68
Ether Extract	3.41	9.66	1.82	6.58	9.39	3.48	0
Crude Fiber	1.62	6.98	4.38	10.50	0.96	0	0.15
Ash	1.25	4.57	6.08	1.84	19.39	9.44	6.79
Moisture	11.41	11.58	10.45	10.64	7.93	8.11	4.36
Selected Amino Acids, %							
Lysine	0.25	0.85	2.94	0.52	4.61	6.93	0.91
Threonine	0.25	1.00	1.73	0.38	2.38	5.08	0.71
Tryptophan	0.05	0.19	0.65	0.12	0.60	1.52	0.22
Methionine	0.16	0.49	0.62	0.19	1.62	0.91	0.18
TSAA	0.33	0.94	1.22	0.55	2.08	3.18	0.42

Results are the average of duplicate or triplicate (oats) analysis of each ingredient.

Table 2. Diet Composition

	Phase 1 (Day 0-10)		Phase 2 (Day 10-28)	
	Control	Oats	Control	Oats
Corn	40.54	29.44	49.71	44.14
Soybean Meal	16.78	16.15	31.55	31.25
Fat	1.65	3.43	2.26	3.15
Oats	0	10.00	0	5.00
Whey	27.50	27.50	10.00	10.00
Fishmeal	5.00	5.00	3.00	3.00
Spray Dried Plasma	5.00	5.00	-	-
Salt	0.20	0.20	0.25	0.25
Limestone	0.88	0.86	0.87	0.86
Dicalcium Phosphate	0.17	0.18	0.76	0.77
Swine Vitamins	0.25	0.25	0.25	0.25
Swine Trace Minerals	0.15	0.15	0.15	0.15
Zinc Oxide	0.375	0.375	0.375	0.375
L-Lysine	0.30	0.30	0.30	0.30
DL-Methionine	0.18	0.12	0.14	0.11
Threonine	0.03	0.04	0.02	0.02
Antibiotic (Mecadox)	1.00	1.00	0.50	0.50
Total	100.0	100.0	100.0	100.0
Calculated Analysis				
Energy, kcal ME/kg	3400	3400	3400	3400
SID Lysine, %	1.50	1.50	1.35	1.35
Crude Protein	22.40	22.03	23.02	22.94
Ether extract	4.15	5.92	4.83	5.71
Crude Fiber	1.64	2.45	2.36	2.77
Total Phosphorus	0.65	0.65	0.60	0.60
Analyzed Composition				
Lysine, %	1.54	1.62	1.54	1.57
Threonine, %	1.00	0.92	0.83	0.86
TSAA, %	0.82	0.83	0.75	0.75
Tryptophan, %	0.30	0.29	0.27	0.26

Table 3. Effect of Oats on Growth Performance of Nursery Pigs

	Control	Oats	SEM	P- Value
Body Weight, kg				
Day 0	6.64	6.39	0.18	NS
Day 10	7.55	7.70	0.11	NS
Day 21	11.13	11.47	0.09	0.06
Day 28	14.90	15.28	0.13	0.10
Average Daily Gain, g/d				
Day 0-10	92	130	8	0.03
Day 10-21	325	343	5	0.06
Day 0-21	214	241	6	0.03
Day 21-28	537	545	14	NS
Day 10-28	408	421	7	NS
Day 0-28	295	317	5	0.05
Average Daily Feed, g/d				
Day 0-10	226	195	21	NS
Day 10-21	514	510	28	NS
Day 0-21	377	360	24	NS
Day 21-28	787	758	19	NS
Day 10-28	616	607	19	NS
Day 0-28	476	460	19	NS
Gain:Feed				
Day 0-10	0.41	0.65	0.02	0.001
Day 10-21	0.64	0.67	0.03	NS
Day 0-21	0.58	0.67	0.03	0.06
Day 21-28	0.68	0.72	0.02	NS
Day 10-28	0.66	0.69	0.02	NS
Day 0-28	0.62	0.69	0.02	0.10

Values are LS Means for 10 pens of 7-8 pigs per pen (5 pens per dietary treatment)