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Influence of dry, extruded-expelled soybean meal from different manufacturers on growth performance of nursery pigs

Abstract

A total of 150 pigs (initially 22 lb; 42 d of age) was used to determine the influence of dry, extruded-expelled soybean meal from three different manufacturers on growth performance of pigs. No differences were observed for ADG, ADFI, or F/G between any of the sources. All three sources resulted in performance similar to that with a cornsoybean meal diet with added fat. These results confirm the accuracy of the energy values published in the 1998 Swine Day Report for dry, extruded-expelled soybean meal.; Swine Day, Manhattan, KS, November 16, 2000

Keywords

Swine day, 2000; Kansas Agricultural Experiment Station contribution; no. 01-138-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 858; Swine; Nursery pigs; Growth; Soybean meal; Processing

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INFLUENCE OF DRY, EXTRUDED-EXPELLED SOYBEAN MEAL FROM DIFFERENT MANUFACTURERS ON GROWTH PERFORMANCE OF NURSERY PIGS¹

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Summary

A total of 150 pigs (initially 22 lb; 42 d of age) was used to determine the influence of dry, extruded-expelled soybean meal from three different manufacturers on growth performance of pigs. No differences were observed for ADG, ADFI, or F/G between any of the sources. All three sources resulted in performance similar to that with a corn-soybean meal diet with added fat. These results confirm the accuracy of the energy values published in the 1998 Swine Day Report for dry, extruded-expelled soybean meal.

(Key Words: Nursery Pigs, Growth, Soybean Meal, Processing.)

Introduction

Extrusion processing followed by expelling is a relatively recent technology developed for soybean meal processing. The extruder-expeller process (Insta-Pro Express™ extruder/press system) results in a product that has a higher fat content and improved amino acid digestibility compared to solvent-extracted soybean meal. In previous trials conducted at Kansas State University (1998 Swine Day Report), pigs fed diets containing extruded-expelled soybean meal had similar growth performance as pigs fed diets containing conventional soybean meal and soy oil when diets were formulated on an equal lysine and energy basis. In that trial, a research plant processed the extruded-

expelled soybean meal. However, the dry matter content and protein concentration of the soybean meal can vary considerably among commercial plants. Therefore, this experiment was designed to compare the influence of dry, extruded-expelled soybean meal from three different commercial manufacturers on growth performance of nursery pigs.

Procedures

A total of 150 pigs (initially 22 lb and 42 d of age) was used in a 15 d growth trial. Pigs (PIC, C-22 barrows) were blocked by initial weight and randomly allotted to one of five dietary treatments with five pigs per pen and six pens per treatment. Experimental treatments (Table 1) included a negative control diet containing conventionally processed soybean meal (46.5% crude protein, CP) formulated to 1.10% total lysine and 1.48 Mcal ME/lb, three diets (1.14% lysine and 1.55 Mcal ME/lb) containing dry, extruded-expelled soybean meal from one of three different manufacturers that were formulated to the same lysine:metabolizable energy ratio as the negative control diet, and a positive control diet containing the conventionally processed soybean meal and 3.29% soy oil formulated to the same total lysine and metabolizable energy concentrations as the diets containing the extruded-expelled meals. Nutrient profiles for the conventionally processed soybean meal and soy oil were from the 1998 Swine NRC, and profiles for the dry, extruded-expelled soybean meal

¹Appreciation is expressed to Bruning Grain and Feed Co., Inc., Bruning, NE; Klepper Oil, Dubois, NE; and North Central Kansas Processors, Washington, KS for use of their soybean meal products.

were from the previous research published in the 1998 KSU Swine Day Report. All dry, extruded-expelled soybean meal sources were processed by the Insta-Pro Express™ extruder/press system.

Pigs were housed in an environmentally controlled nursery at the KSU Segregated Early-Weaning Facility. Each pen was 4 × 4 ft and contained one nipple waterer and one self-feeder to provide ad libitum access to water and feed. Pigs were weighed and feed disappearance was determined on d 0, 7, and 15 to determine ADG, ADFI, and feed efficiency (F/G).

Data were analyzed as a randomized complete block design with pen as the experimental unit using the GLM procedure of SAS. Orthogonal contrasts were used to compare the growth performance of pigs fed diets containing 1) 46.5% CP soybean meal and no oil to the other diets, 2) dry, extruded-expelled soybean meal to the diet containing 46.5% CP soybean meal and soy oil, and 3) only 46.5% CP soybean meal without oil to the diet containing 46.5% CP soybean meal and soy oil.

Results and Discussion

For the entire trial, ADG was not influenced ($P>.10$; Table 2) by dietary treatment. No differences in growth performance occurred among pigs fed diets containing any of the dry, extruded-expelled soybean meal sources ($P>.10$). Pigs fed the negative control diet containing only 46.5% CP soybean meal had higher ($P<.01$) ADFI and poorer F/G compared to pigs fed other diets.

These data suggest that dry, extruded-expelled soybean meal from different commercial manufacturers elicits similar growth

performance from nursery pigs. This confirms the benefits (improved feed efficiency with similar ADG) of the higher energy content of the dry, extruded-expelled soybean meal compared to conventionally processed soybean meal. Consequently, a higher price can be paid for the dry, extruded-expelled soybean meal to reflect the higher energy concentration. The economic feasibility of using dry, extruded-expelled soybean meal to replace conventional soybean meal was reported in the 1998 KSU Swine Day Report and was calculated as a relationship with conventional soybean meal and fat prices.

One advantage of processing soybeans with the Insta-Pro Express™ extruder/press system is that the resultant extruded-expelled soybean meal commonly has a greater dry matter content than conventionally processed soybean meal. Because of this, some manufacturers add water to match the dry matter contents between the two products. The addition of water could negatively influence the nutrient concentrations and the quality of the soybean meal product and, thus, affect the growth performance of pigs fed the product. Consequently, it is important to know the dry matter content when comparing soybean meal sources. The manufacturers represented in this experiment did not add water to their products.

In conclusion, diets containing dry, extruded-expelled soybean meal can replace diets containing conventionally processed soybean meal and soy oil for swine. Dry, extruded-expelled soybean meal from the commercial manufacturers represented in this trial influenced growth similarly. Economics and availability will dictate which soybean meal source to use.

Table 1. Compositions of Experimental Diets (As-Fed Basis)

Ingredient, %	46.5% CP SBM	Dry, Extruded-Expelled SBM	46.5% CP SBM + Oil
Corn	65.40	62.78	60.37
46.5% CP SBM	30.39	-	32.13
Dry, extruded-expelled SBM ^a	-	32.99	-
Soy oil	-	-	3.29
Monocalcium phosphate	1.46	1.51	1.47
Limestone	1.00	.97	.99
Medication	1.00	1.00	1.00
Salt	.35	.35	.35
Vitamin premix	.25	.25	.25
Trace mineral premix	.15	.15	.15
Calculated analysis			
CP, %	19.82	21.14	20.19
Lysine, total, %	1.10	1.14	1.14
Methionine, total, %	.31	.32	.32
ME, Mcal/lb	1.48	1.55	1.55
Lys:ME, g/Mcal	3.31	3.31	3.31
Ca, %	.75	.75	.75
P, %	.70	.70	.70

^aDry, extruded-expelled soybean meal was from one of three different commercial manufacturers.

Table 2. Influence of Dry, Extruded-Expelled Soybean Meal from Different Processors on Growth Performance of Pigs^a

Item	46.5% CP SBM	Dry, Extruded-Expelled SBM			46.5% CP SBM + Oil	SEM	Contrast, P< ^b		
		Source 1	Source 2	Source 3			1	2	3
Day 0 to 15									
ADG, lb	1.18	1.18	1.17	1.19	1.23	.035	.76	.24	.34
ADFI, lb	1.93	1.74	1.78	1.67	1.81	.053	.005	.22	.10
F/G	1.65	1.47	1.52	1.40	1.47	.055	.007	.99	.03

^aValues are the means of 150 pigs (initially 22 lb) with five pigs per pen and six pens per treatment.

^bContrasts were 1) 46.5% CP SBM vs others, 2) Source 1, 2, 3 vs 46.5% CP SBM + oil, and 3) 46.5% CP SBM vs 46.5% CP SBM + oil.