

Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 10 *Swine Day (1968-2014)*

Article 461

1989

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Recommended Citation

Fitzner, G E.; Weeden, T L.; Li, D F.; Jones, D B.; Hines, Robert H.; Goodband, Robert D.; and Hancock, Joe D. (1989) "Effect of roasting on utilization of sunflower oil seeds in nursery pig diets," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 10. <https://doi.org/10.4148/2378-5977.6301>

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Effect of roasting on utilization of sunflower oil seeds in nursery pig diets

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EFFECT OF ROASTING ON UTILIZATION OF SUNFLOWER OIL SEEDS IN NURSERY PIG DIETS¹

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Summary

One hundred twelve weanling pigs were used to evaluate effects of diets containing 25% raw or low or high roasted sunflower seeds on performance. Pigs fed meal and pelleted diets containing sunflower seeds roasted to a roaster exit temperature of 264 °F (low roast) were more efficient (F/G) than pigs fed raw sunflower seed diets in meal form. Pelleting raw, low roast, and high roast sunflower seed diets significantly improved F/G compared to raw sunflower seed and basal diets fed in meal form. These results indicate that meal diets containing 25% low roasted sunflower seeds or pelleted diets containing 25% raw or low roasted sunflower seeds can be fed to weaned pigs with no reduction in performance.

(Key words: Nursery Pigs, Sunflower Seeds, Roasting, Pelleting.)

Introduction

Sunflower oil seeds have become an important agricultural commodity in Kansas because of the increasingly large number of acres devoted to their production. At times, sunflower oil seeds may be available for use in swine diets. Research utilizing 15% sunflower oil seeds in nursery pig diets has indicated no impairment in performance. Also, fine grinding (1/8 in screen) minimized the effect of increased crude fiber, permitting the inclusion of 25% sunflower seeds in nursery diets with no reduction in performance. Other types of feed processing may also affect the palatability of diets containing sunflower seeds, thereby increasing their utilization for nursery pigs. This study was designed to evaluate the effects of roasting sunflower oil seeds and of pelleting sunflower seed diets on the performance of nursery pigs.

Experimental Procedures

One hundred twelve weanling pigs with an average weight of 16.1 lb were randomly allotted to one of seven dietary treatments based on weight, sex, and ancestry. Pigs were housed in an environmentally controlled nursery, with four pigs per pen and four pens per treatment. Pigs were weighed weekly for the duration of the 5-week trial. Feed additions were recorded and average daily gain (ADG), average daily feed intake (ADFI), and feed conversion (F/G) were calculated weekly. Feed and water were provided ad libitum. The diets (Table 1) contained 25% sunflower seeds or none. The diet without seeds included rice hulls and soybean oil to approximate the percentages of crude fiber and oil in the sunflower seed diets. Diets containing 25% sunflower seeds were formulated using raw, low roasted, or high roasted

¹The authors wish to thank Suther Feeds, Frankfort KS, for roasting the sunflower seeds.

Table 1. Composition of Diets

Ingredients	Percentage sunflower seeds	
	0	25
Corn	28.76	29.13
Soybean meal (48% CP)	27.28	21.85
Sunflower oil seeds	--	25.00
Dried whey	20.00	20.00
Soybean oil	10.00	--
Rice hulls	9.86	--
Monocalcium phosphate	1.68	1.73
Limestone	.72	.59
Salt	.10	.10
Trace mineral premix ^a	.10	.10
Vitamin premix ^b	.25	.25
Copper sulfate	.10	.10
Selenium premix ^c	.05	.05
L-lysine HCl	.10	.10
Mecadox ^d	1.00	1.00
<u>Chemical analysis</u>		
Fat/oil	9.43	11.66
Crude fiber, %	6.2	6.0
Crude protein (N × 6.25), %	20.72	21.03
Lysine, total %	1.15	1.14
<u>Calculated analysis</u>		
Calcium	.9	.9
Phosphorus	.8	.8

^aContains 10% Mn, 10% Fe, 10% Zn, 4% Ca, 1% Cu, .4% K, .3% I, .2% Na, and .1% Co.

^bEach lb of vitamin premix contains: Vitamin A, 1,000,000 IU; vitamin D₃, 100,000 IU, vitamin E, 4,000 IU; menadione, 400 mg; riboflavin, 1,000 mg, pantothenic acid, 2,500 mg; niacin, 5,500 mg; choline, 100,000 mg; and vitamin B₁₂, 5 mg.

^cEach lb of selenium premix contains 272.4 mg Se.

^dEach lb of antibiotic contains 2.5 g carbadox.

sunflower seeds (Table 2). Sunflower seeds were roasted using a Mix-Mill, Inc., gas Roast-A-Tron roaster. Low roasted sunflower seeds had an average exit temperature from the roaster of 264°F. High roasted sunflower seeds had an average exit temperature of 319°F. All dietary treatments were ground through a hammermill equipped with a 3/16 in screen. Sunflower seed diets were fed in both meal and pelleted form.

Table 2. Analysis of Raw and Roasted Sunflower Oil Seeds

Item	Raw	Low roast	High roast
Roaster exit temperature, °F	--	264	319
Moisture, %	6.64	2.41	1.26
Oil, %	43.74	45.60	44.90
Protein (N × 6.25), %	17.88	19.14	18.46
Crude fiber, %	25.80	23.80	30.16
Lysine, total %	.55	.56	.41

Results and Discussion

The 2-week performance data (Table 3) shows no significant difference in average daily gain (ADG). Average daily feed intake (ADFI) was similar for pigs fed all diets in meal form, but those pigs fed the pelleted 25% sunflower seed diets had reduced ADFI. Feed efficiency (F/G) was significantly improved ($P<.05$) for those pigs fed the pelleted diets. However, low or high roasted sunflower seeds did not improve F/G. The improvement in F/G at two weeks is similar to results of other experiments evaluating pelleted diets fed to weaned pigs.

After 35 days on trial, no difference in ADG was observed among treatments. ADFI was similar for all pigs fed meal diets and was reduced for pigs fed pelleted diets. The reduction in ADFI with no differences in daily gains resulted in improved F/G for those pigs fed pelleted diets. Pigs fed meal diets containing low roasted sunflower seeds demonstrated improved F/G ($P<.05$) compared to those fed raw sunflower seeds. Low roasting sunflower seeds improved F/G for pigs fed both meal and pelleted diets. The F/G of pigs fed low roasted sunflower seed diets as meal was similar to the F/G of pigs fed pelleted diets with raw, low roasted, or high roasted sunflower seeds.

These data indicate that sunflower oil seeds can be included in nursery pig diets at levels up to 25% with no reduction in performance if the sunflower seeds are roasted to a roaster exit temperature of 264 °F or if the diets are pelleted.

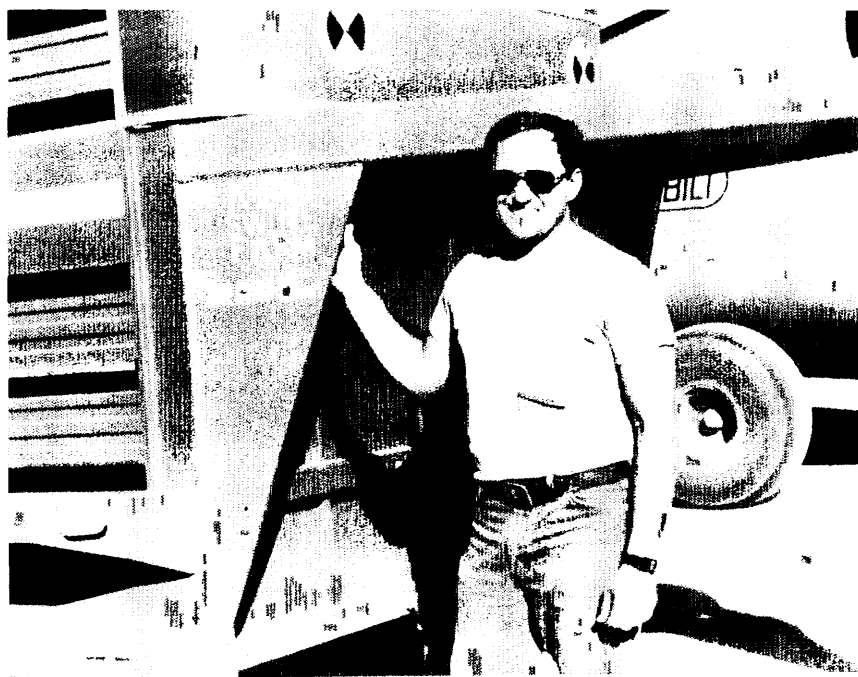
Table 3. Performance of Pigs Fed 25 Percent Raw and Roasted Sunflower Oil Seeds^a

Item	Basal	Type roast/diet form ^b					
	-/M	Raw/M	Low/M	High/M	Raw/P	Low/P	High/P
<u>0 to 14 d</u>							
ADG, lb	.48	.46	.51	.58	.58	.51	.53
ADFI, lb	.84	.85	.79	.89	.72	.72	.71
F/G	1.81 ^c	1.89 ^c	1.57 ^{ce}	1.56 ^{ce}	1.25 ^d	1.41 ^{de}	1.33 ^{de}
<u>0 to 35 d</u>							
ADG, lb	.89	.92	.93	.99	1.00	.99	.98
ADFI, lb	1.58	1.66	1.46	1.64	1.51	1.48	1.52
F/G	1.79 ^c	1.80 ^c	1.57 ^{de}	1.66 ^d	1.51 ^e	1.49 ^e	1.56 ^{de}

^aA total of 112 weanling pigs, 4 pigs/pen, 4 pens/treatment, avg initial wt = 16.1 lb, avg final wt = 49.6 lb

^bM = meal; P = pellet.

^{cde}Means with unlike superscripts differ (P<.05).



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