Swine

Grinding and Dry Rolling of Milo and Wheat for Growing Finishing-Swine*

W. G. Luce, I. T. Omtvedt and D. F. Stephens

Story in Brief

Two trials were conducted to study the effect of particle size of grind and dry rolling of wheat and milo for growing-finishing swine.

Trial 1 consisted of 144 pigs fed in confinement from 8 weeks of age to an average weight of 201.6 pounds. No significant differences in average daily gain, feed utilization or probed backfat thickness were noted among pigs fed diets of wheat ground through a hammer mill using a 1/8 inch (fine), 3/16 inch (medium) and 1/4 inch (coarse) grind or a close dry roll.

Trial 2 in which milo was the cereal grain used consisted of 192 pigs fed in confinement from 8 weeks of age to an average weight of 205.5 pounds. Pigs fed a 1/8 inch (fine grind) or a close dry roll milo ration required significantly less fed per pound of gain than pigs fed a 3/16 inch (medium) or a 1/4 inch (coarse) grind. No significant differences among treatments were noted for average daily gain or probed backfat thickness.

Introduction

Most grain utilization studies with swine have involved corn. However, corn is not a major crop in Oklahoma and, therefore, is not used extensively as a feed for swine. Traditionally, milo has been the chief feed for swine in Oklahoma. Milo production in 1969 in Oklahoma was 25,474,000 bushels as compared to 3,770,000 bushels of corn.

Recently wheat has been competitively priced with other cereal grains to suggest its use as a feed for swine. Furthermore, it is a very

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important economic crop in Oklahoma. In 1969, 4,150,000 acres were harvested with a yield of 118,275,000 bushels.

Since feed cost alone is approximately 75 percent of the total cost of producing swine, improvement of feed utilization of cereal grains becomes of great economic importance. Recently research has been conducted to explore methods of improving the utilization of these two cereal grains.

Procedure

Trial 1

Trial 1 was conducted in the fall of 1968 using pigs from the Swine Breeding Project at the Fort Reno Livestock Experiment Station. One hundred forty-four Duroc and Beltsville gilt pigs were self fed in confinement from eight weeks of age to an average weight of 201.6 pounds to evaluate processing methods of wheat. Pigs were randomly allotted within breed and litters to four experimental treatments. Each experimental treatment consisted of three pens containing 12 pigs each. Upon completion of the experiment, all pigs were probed for backfat thickness adjusted to 200 pounds.

Composition of the experimental ration fed is shown in Table 1. The four experimental rations fed were identical with exception of the preparation of the wheat. Rations 1 through 3 were ground through a hammer mill using a 1/8 inch, 3/16 inch and 1/4 inch screen, respectively. Ration 4 was processed through a roller mill using a close dry roll with rollers set at a tolerance of approximately 0.003 inches. Processed

Table 1. Composition of Experimental Ration in Trial 1

Ingredients, percent	
Wheat	82.50
Soybean meal (44%)	12.85
Molasses	1.50
Dicalcium phosphate	1.05
Calcium carbonate	1.05
Trace mineralized salt	0.50
Vitamin-antibiotic mix[1]	0.55
Total	100.00
Composition percent	
Protein	16.00
Calcium	0.70
Phosphorus	0.60

[a] Vitamin-antibiotic mix furnished 1000 IU Vitamin A, 100 IU Vitamin D, 1.1 mg. riboflavin, 10 mg. niacin, 3.5 mg. pantothenic acid, 52.5 mg. choline, 7.5 mcg. Vitamin B_{12} and 20 mg. tylosin per pound of feed.

grain samples were taken at regular intervals to determine particle size and density.

Trial 2

Trial 2 was conducted in the spring of 1969 using pigs from the Swine Breeding Project at the Fort Reno Livestock Experiment Station. One hundred ninety-two crossbred pigs were self fed in confinement from eight weeks of age to an average weight of 205.5 pounds to evaluate processing methods of milo. Pigs were randomly allotted within sex and litters to four experimental treatments. Each experimental treatment consisted of three pens containing 16 pigs (8 barrows and 8 gilts). Upon completion of the experiment, all pigs were probed for backfat thickness adjusted to 200 pounds.

Composition of the experimental ration fed is shown in Table 2. The four experimental rations were identical with exception of the preparation of the milo. Processing methods and sampling procedures were identical to those described in Trial 1 with wheat.

Results and Discussion

Trial 1

A summary of particle size and density data for the processed wheat in each treatment is shown in Table 3. Density of dry rolled wheat was reduced 35.2 percent, 38.1 percent and 39.4 percent as compared to the 1/8 inch ground, 3/16 inch ground and 1/4 inch ground wheat, respectively.

Table 2. Composition of Experimental Ration in Trial 2

Ingredients, percent	
Milo	74.60
Soybean meal (44%)	20.40
Molasses	1.50
Dicalcium phosphate	1.50
Calcium carbonate	0.80
Trace mineralized salt	0.50
Vitamin-antibiotic premix[1]	0.70
Total	100.00
Composition, percent	
Protein	15.00
Calcium	0.70
Phosphorus	0.60

[1] Vitamin-antibiotic mix furnished 1000 IU Vitamin A, 100 IU Vitamin D, 1.1 mg. riboflavin, 10 mg. niacn, 3.5 mg. pantothenc acid, 52.5 mg. choline, 7.5 mcg. Vitamin B_{12} and 20 mg. tylosin per pound of feed.

The results of the feeding trial is shown in Table 4. The data suggests that the preparation methods used (different grinds and a close dry roll) had little effect on average daily gain, feed utilization or backfat thickness. However, the fine grind wheat (Ration 1) did not feed down in self feeders as readily as the other rations. Gains and feed utilization appear not to be optimum for any of the treatments. However, it should be pointed out that the animals were purebred gilts fed during the winter season.

Trial 2

A summary of particle size and density data for the processed milo in each treatment is shown in Table 5. Density of dry rolled milo was reduced 11.1 percent, 18.4 percent and 20.0 percent as compared to the 1/8 inch ground, 3/16 inch ground 1/4 inch ground wheat, respectively.

The results of the feeding trial are shown in Table 6. Processing methods used appeared to have little effect on rate of gain or probed

Table 3. Particle Size[1] and Density[2] of Processed Wheat

Grind	Screen Size, mm.								Wt./ Bu. (lb.)
	8mm	4mm	2mm	1mm	1/2mm	1/4mm	1/8mm	<1/8mm	
	Percent Retained on Screen								
1/8 inch	0	0	1.6	32.8	32.6	18.4	10.4	4.2	48.6
3/16 inch	0	0	8.0	37.6	27.9	15.1	7.4	4.0	50.9
1/4 inch	0	0	17.1	40.7	22.8	10.5	6.3	2.6	52.0
Dry roll	0	3.1	48.7	26.8	10.6	6.6	2.8	1.4	31.5

[1] Five 100 gm. samples of each grain were used.
[2] Values reported are an average of five determinations.

Table 4. Processing of Wheat for Growing-Finishing Swine

Treatment	Ration Designation			
	1	2	3	4
	Fine Grind (1/8 in)	Medium Grind (3/16 in)	Coarse Grind (1/4 in)	Dry Roll (close)
Pens per treatment, no.	3	3	3	3
Pigs per pen, no.	12	12	12	12
Av. initial wt., lbs.	45.8	45.5	45.6	45.5
Av. final wt., lbs.	200.7	202.7	201.1	202.0
Av. daily gain., lbs.*	1.40	1.39	1.42	1.43
Feed per lb. gain, lbs.*	3.44	3.49	3.46	3.42
Av. adjusted backfat, in.*	1.39	1.39	1.39	1.35

*No significant differences ($P < .05$) between treatment means.

4.82 4.85 4.91 4.81

backfat thickness. However, pigs on Ration 1 (fine grind milo) and Ration 4 (close dry roll) required significantly less feed per pound of gain than pigs on the other two rations.

Table 5. Particle Size[1] and Density[2] of Processed Milo

Grind	Screen Size, mm.							Wt./ Bu. (lb.)
	4mm	2mm	1mm	1/2mm	1/4mm	1/8mm	<1/8mm	
	Percent Retained on Screen							
1/8 inch	0	1.8	21.2	61.2	15.1	0.7	0	45.0
3/16 inch	0	5.4	31.0	57.9	5.7	0	0	49.0
1/4 inch	0	12.2	33.3	31.7	21.5	1.3	0	50.0
Dry roll (close)	0	15.6	48.4	21.4	7.9	4.9	1.8	40.0

[1] Four 100 gm. samples of each grain were used.
[2] Values reported are an average of four determinations.

Table 6. Processing of Milo for Growing-Finishing Swine*

Treatment	Ration Designation			
	4	1	2	3
	Dry Roll (close)	Fine Grind (1/8 in)	Medium Grind (3/16 in)	Coarse Grind (1/4 in)
Pens per treatment, no.	3	3	3	3
Pigs per pen, no.	16	16	16	16
Av. initial wt., lbs.	57.1	56.4	56.8	57.5
Av. final wt., lbs.	205.3	206.1	205.0	205.5
Av. daily gain, lbs.	1.69	1.69	1.66	1.65
Feed per lb. gain, lbs.	3.13	3.18	3.37	3.39
Av. adjusted backfat, in.	1.25	1.27	1.30	1.28

*Treatment means not underlined by same line are significantly different ($P < .05$).