Comparison of Grain Sources (Barley, White Corn, and Yellow Corn) for Swine Diets and Their Effect on Production and Carcass Traits

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Summary and Implications

Energy sources differ in content, quality, and availability of nutrients. The objective of this study was to identify and compare differences in production and carcass traits in pigs fed different energy sources. While pigs fed a barley-based diet had a smaller loin muscle area, there was no difference among diets when comparing fat depth or percent fat-free lean. Barley based-diets and a diet containing one-third yellow corn and two-thirds white corn had a lower lean gain per day on test. There was no significant difference in average daily gain or feed-to-gain ratios.

Introduction

Efficient pork production is an understood necessity for an economically viable swine industry. Number two yellow corn is considered the primary energy source for swine diets in the Midwest. Despite the low protein content, corn is considered one of the most economical feed stuffs available to the swine production system.

Barley is a high fiber, low energy product that has approximately 89% of the energy content of corn. While barley contains a higher protein and amino acid level than corn, animal performance will likely be depressed due to the high fiber content. Because barley lacks the carotene content that yellow corn possesses, it has been hypothesized that barley-fed pigs will yield a higher meat and fat quality that is desired by export markets. White corn was used in this trial to determine its contribution to meat quality and growth traits.

The objective of this study was to compare performance and carcass characteristics of market pigs fed traditional yellow corn diets with those of market pigs fed white corn or barley diets.

Materials and Methods

The experiment was designed as a randomized complete block with five treatments and eight blocks. Each block consisted of five contiguous pens, with each pen assigned to one of five dietary treatments. A total of 40 pens, each containing 26 pigs, was used in the trial. Two different genetic types as well as both barrows and gilts made up the population for this study (n=1,040). Pigs were individually weighed on test and randomly allocated to pens on the basis of gender and genetic type.

The pigs were housed in a mechanically ventilated, curtain-sided finisher building with totally slotted floors. Each pen was equipped with a five-space, single-sided, stainless steel self feeder, and nipple waterers allowing for ad libitum feed and water consumption. Pigs were weighed on test at 61 lb. and fed one of five diets containing a primary energy source throughout the grow-finish period:

1. Yellow Corn (YC)
2. White Corn (WC)
3. 1/3 YC, 2/3 WC
4. 2/3 YC, 1/3 WC
5. Barley

Diet composition can be found in Table 1.

Feed consumption was measured on a pen basis with the use of Arkfeld feed hoppers and scales mounted on every feeder. Pens were weighed and feed inventories recorded at two-week intervals to monitor growth and performance. Upon completion of the trial a National Swine Improvement Federation certified technician collected measurements for backfat thickness and loin muscle area between the 10^{th} and 11^{th} rib on the live animal. Measurements were collected with the use of an ALOKA 500V ultrasound machine equipped with a 12.5-cm, 3.5-MHz linear array transducer

Treatment effects were evaluated at the end of finishing period for daily gain, average daily feed intake, and feed-to-gain. Data were analyzed using the GLM procedure of SAS; treatment means (least-squares means) were considered significant at P values less than 0.05.

Results and Discussion

Least squares means for performance and carcass traits by diet are presented in Table 2. There were no significant differences among the five diets for average daily gain, average daily feed intake, and feed-to-gain during the grow–finish period. Likewise, no effects (P>.05) on backfat thickness or percent fat-free lean were observed. Barley-fed animals had a smaller loin muscle area than pigs on either the yellow corn or white corn treatments (P<.05). Pigs on the barley diet also exhibited a poorer lean gain on test (P<.05) compared with pigs fed diets containing all yellow corn, all white corn, and two-thirds yellow corn, one-third white corn diets. The results of the trial indicated that yellow corn could be replaced in a diet with barley or white corn as an energy source with no effect on performance. Decisions whether to include barley or white corn as an

energy source should be based on their relative cost and availability.

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Table 1. Composition of the diets (as-fed basis).

	Diet				
Ingredient, %	1	2	3	4	5
Yellow corn	82.1		27.1	54.9	
White corn		82.1	54.9	27.1	
Barley					89.1
Soybean meal	13.8	13.8	13.8	13.8	6.9
Dicalcium phosphate	0.85	0.85	0.85	0.85	0.39
Calcium carbonate	0.85	0.85	0.85	0.85	1.0
Choice white fat	1.0	1.0	1.0	1.0	1.0
Salt	0.35	0.35	0.35	0.35	0.35
Vitamin premix	0.50	0.50	0.50	0.50	0.50
Trace mineral premix	0.25	0.25	0.25	0.25	0.25
Tylan 40	0.25	0.25	0.25	0.25	0.25

Table 2. Effect of yellow corn, white corn, 1/3 yellow corn and 2/3 white corn, 2/3 yellow corn and 1/3 white corn, and barley on finishing pig performance and carcass traits.

	Diet				
Item	1	2	3	4	5
Average daily gain, lb.	1.74	1.75	1.72	1.76	1.72
Average daily feed intake, lb.	5.35	5.39	5.33	5.40	5.47
Feed-to-gain, lb.	3.08	3.09	3.10	3.07	3.17
Backfat, in.	.90	.88	.88	.89	.87
Loin muscle area, in.	7.74[a]	7.68[a]	7.66[a]	7.77[a]	7.48[b]
Percent fat-free lean, %	52.59	52.49	52.52	52.63	52.25
Lean gain on test, lb.	.71[a]	.71[a]	.70[ab]	.72[a]	.69[b]

[ab]Means with different superscripts differ (P<.05).