Corn - Is it Still the Best Feed Grain for Swine?

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Corn is the major cereal grain fed to pigs in Kentucky and throughout the U.S., accounting for over 80% of the total feed grain tonnage. This popular cereal grain is an excellent energy source, it is very palatable, and it can be fed in a variety of ways. However, corn is a poor source of protein (amino acids), minerals, and vitamins, so it must be properly supplemented to correct its nutrient deficiencies.

At the present time, the price of corn in central Kentucky is approximately $2.85 per bushel. This price is considerable higher than it was 6 months ago ($2.15 per bushel) or one year ago ($2.05 per bushel). When corn prices creep upward, swine producers often look into the possibility of using alternative feed grains that might be more economical.

Grain sorghum (commonly called milo), barley, and wheat are the three most common alternative grains that are used for feeding pigs. Presently, grain sorghum is selling for $4.85 per cwt (or $2.72 per bushel, Kansas City price), which is slightly less than corn. Barley is priced this week at $2.65 per bushel (Kansas City price), which is about the same as grain sorghum. Wheat prices are the highest they have been for many years, largely because of major harvest losses in the hard winter wheat belt due to flooding. The Central Kentucky price for soft winter wheat is presently $4.15 per bushel, and the Kansas City price, based on hard winter wheat, is $4.55 per bushel.

Before a good decision can be made relative to the possible use of an alternative grain, it is important to understand the differences in nutrient composition and feeding value of the various feed grains. The average composition of corn, grain sorghum, wheat, and barley is shown in Table 1. From an energy standpoint, corn is slightly higher in metabolizable energy than sorghum or wheat, due to its higher oil content, and barley has about 12% less energy that corn, due to its higher fiber content. Corn and sorghum are similar with respect to their protein and lysine contents, whereas wheat and barley are slightly higher in protein, lysine, and most of the other amino acids. Wheat and barley are also higher in available phosphorus than corn or grain sorghum.

Over the past 25 years, we have conducted a number of experiments at the University of Kentucky to assess the comparative feeding value of corn, wheat, barley, and grain sorghum. Table 2 presents a summary of our data combined with data from three other universities. The table shows responses in growing-finishing pigs that were fed grain-based diets supplemented with soybean meal, minerals, and vitamins. Note that growth rate is essentially the same for pigs fed corn or wheat, but is slightly less for pigs fed grain sorghum or barley. Efficiency of feed utilization (feed:gain ratio) was poorer for pigs fed barley as compared with those fed the other cereal grains.

The conventional method of comparing feed grains is to base their relative value on their energy content. According to this method, grain sorghum, wheat, and barley have 96, 97, and 88%, respectively, of the feeding value of corn. However, one needs to also consider the additional lysine and phosphorus in wheat and barley (i.e., less soybean meal and inorganic phosphate is required to meet the pig's requirements), and the relative performance of pigs consuming these grain sources. When these factors are taken into consideration, the relative value becomes 96% for sorghum, 105% for wheat, and 93% for barley, compared with a value of 100% for corn.

The U.S. system of pricing feed grains on a bushel basis also makes comparisons of feed grains difficult, because weight per bushel differs for corn (56 lb/bu), wheat (60 lb/bu.) and barley (48 lb/bu). To further complicate matters, grain sorghum is generally priced on a hundred-weight (cwt) basis.

Table 3 gives equations to calculate the relative value (or break-even price) of the common feed grains on a bushel or cwt basis. Using the current price of corn at $2.85 per bushel, grain sorghum would have to be priced at $4.87 per cwt (or $2.73 per bushel) or less for it to be an economical substitute. Barley would have to be $2.28 per bushel or less, and wheat would have to be $3.19 per bushel or less.

Based on these calculations, grain sorghum is the only cereal grain that approaches corn as a possible substitute at the present time. While there is some grain sorghum in the state, it is not as available to Kentucky swine producers as it is to producers in areas such as Texas, Oklahoma, and Kansas; and certainly it is not as readily available as corn to most of the swine producers in Kentucky. Without question, barley and wheat are priced much too high to be considered as alternatives to corn for the feeding of pigs.

Therefore, based on current prices, corn still is the most economical cereal grains to use in swine feeds.

Table 1. Chemical Composition of Feed Grains Commonly Fed to Pigs[a]

Item	Grain			
	Corn	Sorghum	Wheat[b]	Barley
Metabolizable energy, kcal/lb	1,550	1,490	1,500	1,366
Fat, %	3.6	2.8	1.6	1.7
Crude fiber, %	2.3	2.2	2.3	5.0
Protein, %	8.5	8.5	11.4	11.5
Lysine, %	.25	.23	.36	.40
Tryptophan, %	.07	.10	.27	.15
Calcium, %	.02	.03	.05	.05
Phosphorus, %	.25	.27	.33	.34
Available phosphorus, %	.03	.03	.15	.10

[a]As-fed basis (88% dry matter).
[b]Soft red winter wheat.

Table 2. Grain-Soybean Meal Diets for Growing-Finishing Pigs[a]

Feed grain source:[b]	Corn	Sorghum	Wheat	Barley
Average daily gain, lb	1.64	1.60	1.65	1.59
Average daily feed intake, lb	5.25	5.30	5.26	5.57
Feed:gain ratio	3.20	3.31	3.19	3.50

[a]Summary of 28 experiments conducted at the University of Kentucky, Kansas State University, Texas Tech University, and Washington State University and involving 1,708 growing-finishing pigs from 47 to 218 lb.

[b]Grain-soybean meal diets fortified minerals, vitamins, and antibiotics.

Table 3. Factors to Determine the Relative Value of Grain Sorghum, Wheat, and Barley as Compared with Corn for Growing-Finishing Pigs[ab]

Sorghum ($/cwt)	= 1.71 x Corn ($/bu)
Wheat ($/bu)	= 1.12 x Corn($/bu)
Barley ($/bu)	= .80 x Corn ($/bu)

[a]Assumes that corn is $2.50 to $3.50/bu, soybean meal is $200 to $250/ton, dicalcium phosphate is $300 to $350/ton and limestone is $60 to $80/ton.

[b]For example, if corn is $3.00/bu, grain sorghum is worth $5.13/cwt, wheat is worth $3.36/bu, and barley is worth $2.40/bu.