

## **Wheat Middlings in Swine Diets**

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Last summer when corn prices skyrocketed, swine producers were looking for alternative energy sources in order to keep their feed costs down. At that time, prices of soybean meal and other high protein meals were also quite high. Corn prices have since come down, but soybean meal prices have remained fairly high in price.

Many swine producers make their own feed using on-farm mixing facilities and depend largely on grain (generally corn), soybean meal, and mineral-vitamin base mixes. Hog feed that is made in feed mills may use these same ingredients, but they often include a certain amount of byproduct ingredients to reduce ingredient costs and to improve the process of feed manufacturing.

One of the most common cereal byproducts used in commercial pig feed is wheat middlings, commonly called "midds". Wheat midds is a byproduct of the wheat milling industry. This byproduct consists of the outer layers of the wheat kernel. The outer layers of the wheat seed include bran and other layers that are relatively high in fiber. Because most of the wheat in the USA that is not exported is processed into flour, a considerable amount of milling byproducts are available for use in the feed industry.

The outermost layer of the wheat kernel is called bran. Wheat bran slightly more crude protein (16%) than the entire kernel (11-12%), but it is also quite high in fiber and low in digestible energy. As a result, bran has limited usefulness in swine diets other than perhaps in sow diets.

Wheat shorts is another byproduct of wheat milling. This fraction consists on more inward layers of the seed coat and contains some starchy or floury components. The fiber content of shorts is less than that of bran. Wheat midds is simply an intermediate fraction that might be thought of as somewhere in the middle of the bran and shorts fractions (hence the term, "middlings"). It consists of a combination of bran and shorts and tends to be intermediate in composition as compared with these two fractions. Midds also may contain some wheat cleanings (weed seeds or other foreign matter that are removed prior to milling).

Wheat midds are commonly included in commercial feeds mainly because of the influence of midds on pellet quality. When midds are included in manufactured feeds, the pellets are more cohesive and there is less breakage and fewer fines.

Feed manufacturers are well aware of the fact that wheat midds is an extremely variable ingredient. Some midds are very "clean", meaning that they have more bran-like material with very little floury starch attached to the bran. At the opposite end of the spectrum are "heavy" (also called "floury" or "starchy") midds that have a relatively large amount of flour or starch attached to the particles. Naturally, there are many gradations of midds between these two extremes.

Without question, light and heavy midds differ from each other in their physical and chemical characteristics. Light midds are lighter in weight and are more bulky than heavy midds. Light midds typically weigh 18-20 lb/cubic ft, whereas heavy midds weigh 22-24 lb/cubic ft. With respect to chemical composition, light midds are more similar to bran, being higher in crude fiber (typically 9.6 vs

8.7%), protein (17.4 vs 16.5%), and fat (5.1 vs 3.8%) than heavy midds. Compared with the entire wheat kernel, both types of midds are higher in crude fiber (9 vs 2.5%), protein (17 vs 12%), lysine (.7 vs .4%), and fat (4.5 vs 1.9%).

Several years ago, we conducted experiments at UK to see if there was a difference in the nutrition value of light and heavy midds for growing-finishing pigs. We conducted four experiments in which we added two types of midds, light and heavy, to corn-soybean meal diets at levels of 0, 10, 20, 40, and 60% of the diet. The midds were substituted for corn and soybean meal on a lysine basis, so that all diets contained the same level of lysine during the growing (.80% lysine) and finishing (.65% lysine) period. The studies involved 400 pigs that were fed from 81 to 220 lb body weight.

The results are shown in Table 1. Pigs fed the light midds grew at a slower rate and were less efficient as the level of midds increased in the diet. However, in pigs fed the heavy midds, growth rate and feed efficiency were not affected with up to 20% midds in the diet and performance was only modestly reduced when 40% midds were fed. The highest level of either type of midds depressed performance in the pigs.

The results clearly indicate that growing-finishing pigs can efficiently utilize diets with relatively large amounts of wheat middlings, provided that the midds are starchy and not light. On a lysine equivalent basis, 100 lb of midds will substitute for 88 lb of corn and 12 lb of dehulled soybean meal. This assumes that corn contains .25% lysine, soybean meal contains 3.1% lysine, and midds contain .58% lysine. Based on this substitution rate and at current prices of corn (\$2.70/bu) and dehulled soybean meal (\$287/ton), wheat midds has a value of \$117/ton.

Presently, wheat midds are a good buy. According to the August 4, 1997 issue of *Feedstuffs*, the quotation for wheat middlings was \$62/ton in Kansas City and \$81/ton in Memphis. At these prices, midds would be a very economical ingredient to use in growing-finishing feeds.

**Table 1. Light and Heavy Wheat Middlings for Growing-Finishing Pigs<sup>a</sup>**

Wheat midds (%) <sup>b</sup> :	0	10	20	40	60
<b>Light midds<sup>c</sup></b>					
Daily gain, lb	1.81	1.78	1.72	1.70	1.59
Daily feed, lb	5.93	6.12	5.99	5.99	5.85
Feed:gain	3.27	3.42	3.49	3.54	3.70
<b>Heavy midds<sup>d</sup></b>					
Daily gain, lb	1.83	1.76	1.83	1.72	1.65
Daily feed, lb	5.99	5.81	5.94	5.72	6.17
Feed:gain	3.27	3.29	3.25	3.35	3.74

<sup>a</sup>Four experiments at the University of Kentucky involving 400 pigs from 81 to 220 lb body weight.

<sup>b</sup>Substituted for corn and soybean meal to maintain a constant lysine level of .80% from 81 to 125 lb and .65% thereafter.

<sup>c</sup>34% neutral detergent fiber (NDF), 15.1% crude protein, .65% lysine.

<sup>d</sup>30% NDF, 14.0% crude protein, .58% lysine.

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