# Feeding DDGS to Pigs: Overcoming Barriers and Finding Value-Added Features

Dr. Jerry Shurson
Department of Animal Science
University of Minnesota

The swine and feed industries are embracing the use of DDGS in commercial diets. Historically, about 96 percent of distillers grains coproducts were consumed by beef and dairy cattle. However, it has been estimated that over 1.1 million metric tons (16 percent of total production) was consumed in the U.S. pork industry in 2004. This is a dramatic increase since only about 70,000 metric tons were fed to pigs in 2001. One of the biggest reasons for this increase has been a result of the extensive amount of research and educational programs conducted during the past eight years.

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Research results have clearly shown that high-quality corn DDGS is a highly acceptable feed ingredient for use in swine diets. It's a relatively new market with tremendous growth potential, but there are some significant challenges that need to be addressed before there will be greater acceptance of this ingredient in the feed and swine industries.

One of the biggest challenges in developing domestic and export markets for DDGS is dealing with the variability in nutrient content and digestibility among DDGS sources. Animal nutritionists want predictability and consistency in nutrient content, and quality for all feed ingredients they use. Unfortunately, there are no grades for DDGS like those that exist for grain. Standardization of DDGS production procedures among ethanol plants does not appear to be a realistic solution. In fact, many ethanol plants are experimenting with various production processes, which will create an even wider variety of distillers coproducts in the future. In addition, the amount of product sampling, nutrient analysis and quality control procedures used in many ethanol plants are inadequate for meeting the information needs of DDGS customers that manufacture swine feeds.

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Flowability of DDGS from some sources continues to be a significant issue affecting the

acceptance and use of DDGS in swine diets. In addition, segments of the U.S. pork industry that manufacture pelleted feeds limit the amount of DDGS added to swine diets because of reduced feed mill throughput. A few research groups are now beginning to look for potential solutions to these and other challenges related to the physical characteristics of DDGS.

In order to assist DDGS users in identifying DDGS sources that they want to use—and understanding the differences in nutrient content and physical characteristics among various sources—the University of Minnesota partnered with Land O'Lakes Purina Feed to collect samples from various sources in order to analyze their nutrient content and physical characteristics. These analytical results, along with digital photos of each sample tested, are then posted under the "Nutrient Profiles" section on the University of Minnesota DDGS Web site (www.ddgs.umn.edu). Ideally, this database needs to be expanded to include more than the 32 sources currently represented. It also needs continual updating, due to production process changes being made in some ethanol plants.

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Plans are also underway to provide swine amino acid digestibility estimates of several DDGS sources. This should enhance confidence among current and prospective DDGS users when selecting sources to use for manufacturing swine feeds. Energy, amino acids and phosphorus are the three most expensive nutritional components of swine diets. Studies have been conducted showing that DDGS has about the same amount of energy as corn. This was an important finding because it means that little or no additional fat supplementation is needed in order to achieve desired energy levels in diets containing DDGS.

Research results have shown that light, golden-colored DDGS is high in amino-acid digestibility for swine. Studies have been conducted using a Minolta color meter to show that lightness and "yellowness" of color are highly correlated with lysine digestibility. Additional studies are underway at South Dakota State University and the University of Minnesota to evaluate other analytical methods that can be adopted by the feed and ethanol industries for predicting amino acid digestibility of DDGS sources for swine.

The high available phosphorus content of corn DDGS is another attractive feature for using this ingredient in swine diets. The phosphorus content in corn is relatively low (0.25 percent), and only 14 percent of it is in a chemical form that can be utilized by the pig. However, when corn goes through the fermentation process in a dry-grind ethanol plant, the phosphorus content is concentrated by a factor of three (0.78 percent), and it is converted to a chemical form that is highly digestible for pigs. This feature has allowed nutritionists to reduce the amount of inorganic supplementation needed in the diet, reduce diet cost, and still support optimum nutrition and animal performance.

In December 2006, federal regulations will require livestock and poultry producers to apply manure to cropland based upon a phosphorus standard rather than the nitrogen standard used in the past. This will require adjustments in diet for-

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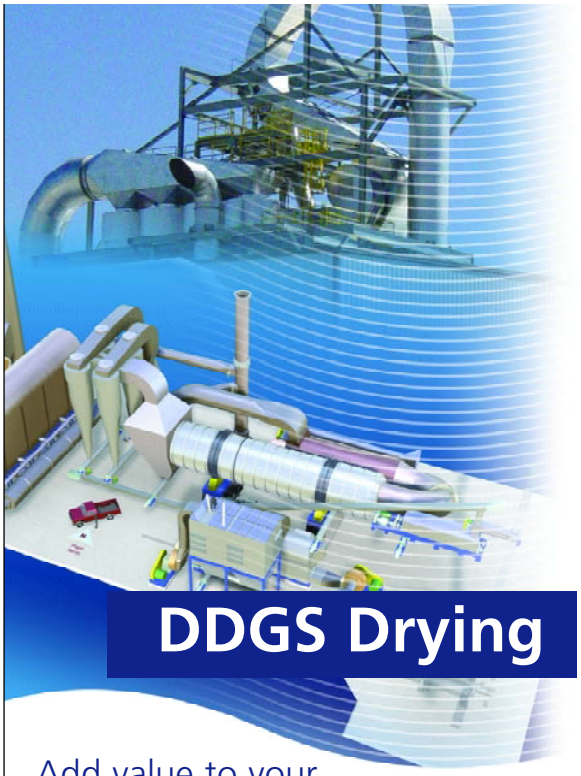


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mulations and management of feeding programs to minimize the amount of phosphorus in manure. Recent research sponsored by the Iowa Corn Growers Association and conducted at the University of Minnesota has shown that feeding diets containing 20 percent DDGS, along with the enzyme phytase, can reduce manure phosphorus excretion in pigs by 47 percent compared to feeding a typical corn-soybean meal diet without these ingredients. However, if DDGS is added to swine diets without adding phytase, the phosphorus content of manure is reduced, but the amount of manure produced is slightly increased, resulting in only small reductions in manure phosphorus excretion. Therefore, the combination of phytase and DDGS in swine diets can have a significant impact on reducing manure phosphorus excretion.

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Most of the DDGS used in the U.S. swine industry today is consumed in the grow-finish phase of production. Most pigs in commercial pork production units are fed corn-soybean meal diets containing 10 percent DDGS. However, recent research studies conducted at the University of Minnesota have shown that higher levels (up to 25 percent) of DDGS can be added to diets for growing pigs to achieve optimum performance, if diets are formulated on a digestible amino acid basis. One potential limitation of including DDGS at levels in excess of 20 percent of the diet for grow-finish pig diets is that there may be a reduction in pork—fat quality due to the high amount of oil contributed to the diet from DDGS. Research studies are underway to determine if feeding high levels of DDGS to grow-finish pigs is a concern relative to pork—fat quality.

One of the interesting value-added features of adding DDGS to grow-finish pig diets is its apparent beneficial effects on gut health. Some research results obtained at the University of Minnesota have shown that adding DDGS to a growing pig diet reduces the negative effects on gut health caused by ileitis, a common gut health problem in the U.S. swine industry. This supports the observations commonly seen in commercial production units where significant reductions in mortality have been achieved—in herds where ileitis is a recurring problem—after they began adding DDGS to the diet. It is unknown which components of DDGS may be contributing to this benefit, but results from other studies conducted at the University of Minnesota have shown an improvement in villi height in the upper portion of the small intestine when a spray-dried fraction of condensed distillers solubles was fed to weaned pigs, compared to when an antimicrobial was included in the diet.

High levels of DDGS can be successfully fed to sows while supporting satisfactory reproductive performance. Researchers at the University of Minnesota conducted a study where diets containing 50 percent DDGS in gestation and 20 percent DDGS in lactation were fed to sows over two reproductive cycles. An interesting finding in this study was that sows fed DDGS diets in gestation, lactation or both had more pigs weaned per litter during the second reproductive cycle compared to sows that were fed control corn-soybean meal diets in gestation and lactation. Also, abruptly switching from a corn-soybean meal diet to a diet containing high levels of DDGS temporarily (three to five days) reduces feed consumption until sows adapt to the high DDGS diets. This effect can be avoided by adding lower levels of DDGS to the diet or by gradually transitioning sows from a corn-soybean meal diet to a diet containing DDGS. However, swine nutritionists and pork producers have been reluctant to use DDGS in sow diets because of the perceived risk of mycotoxin contamination. If ethanol plants implemented a more rigorous mycotoxin screening program for corn and DDGS, and shared this information with their DDGS customers to build their confidence, there could be a significant increase in DDGS use in sow feeds.

The many positive research results and the dramatic increase in DDGS use in the U.S. pork industry have also caught the attention of the export market, particularly in Asia. Swine and poultry production are the predominant animal industries among countries such as South Korea, Japan, Taiwan and Southeast Asia. Exports of DDGS are increasing to these countries, but high freight rates, inconsistent quality, inconsistent supply and building relationships with reliable suppliers are some of the issues that must be overcome in order to increase exports of U.S. DDGS to other countries. DGQ

**AUTHOR** Dr. Jerry Shurson is a professor of Swine Nutrition and Management in the Department of Animal Science within the University of Minnesota's College of Agriculture, Food and Environmental Sciences in St. Paul, Minn. Reach him by e-mail at shurs001@umn.edu or by phone at (612) 624-2764.