

Value of Distillers Dried Grains in Swine Diets

Corn is used to produce ethanol, and distillers dried grains (DDG) is a by-product of this process. A rising number of ethanol plants are coming on-line in the U.S., increasing availability of DDG for animal feeds. Currently, most DDG are used in ruminant feeds because of its low protein quality and reduced amino acid digestibility, high fiber level and low metabolizable energy (ME) content. With increased production of DDG, however, use in swine feeds should be evaluated based on cost vs. value. Consider the following:

1. DDG are high in total (0.78%) and available (0.321%) phosphorus. If we account for this increase in available phosphorus when formulating diets, DDG become more valuable.
2. DDG contain 27% crude protein (CP) vs. 47.5% for soybean meal.
3. Total and available lysine levels in DDG are 0.80% and 0.352%, respectively. Compared to soybean meal (3.02% total and 2.57% available lysine), the amount of available vs. total lysine for DDG is lower as a percentage of CP. High levels of heat applied to DDG during the drying process make the lysine less digestible in pigs. Swine diets are formulated on an available amino acid basis and the first limiting amino acid is usually lysine. Thus, with lower levels of available lysine, DDG are less valuable in swine diets.
4. Some DDG are high in fat (11%), which may improve growth and feed efficiency of pigs at lighter body weights. However, high fat levels in late finisher diets can lead to soft bellies in carcasses. To avoid this problem, DDG high in fat should be added at <10% of the diet. Not all DDG contain high fat levels. Thus, it is essential to have samples analyzed on a routine basis so formulations can be updated based on actual nutrient content.
5. DDG are high in fiber (7.5% crude fiber, 42% NDF), which pigs are unable to digest except for limited hindgut fermentation in finisher pigs and sows. For this reason and because of its low amino acid availability, Akey does not recommend using DDG in starter feeds. Grower diets (up to 120 lb body weight) should include no more than 5% DDG, and finisher diets should have a maximum of 10% DDG, assuming diets can be formulated on an equivalent available lysine and ME basis. Boars and gestating sows can be fed diets with 20% DDG, but DDG is not recommended for lactating sows.
6. DDG are low and variable in ME content compared to whole grains. Research conducted at the University of Minnesota suggested the ME levels of DDG ranged from 2378 to 1041 kcal/lb. NRC gives DDG an ME value of 1280 kcal/lb, whereas corn is 1500

kcal/lb. The difference in ME levels between corn and DDG must be accounted for when evaluating DDG for swine diets.

7. Many least cost formulas used to determine the feeding value of DDG are based on total rather than available lysine and phosphorus content, and no corrections are made for lower ME levels. To calculate feeding value correctly, formulas must use available lysine (0.352%), available phosphorus (0.321%) and ME (1280 kcal/lb) values.
8. If corn is contaminated with mycotoxins and subjected to the ethanol extraction process, mycotoxins will be concentrated at least 3-fold in DDG. Mycotoxins can be detoxified during the distillation and drying process, but this is not done in most cases. Mycotoxin levels in DDG should be evaluated, especially if there are high mycotoxin levels in corn supplying the ethanol plant. If mycotoxin levels are high, DDG should not be fed to swine.
9. High fiber ingredients such as DDG added at 50-200 lb/ton of finisher feed may prove beneficial in systems with nonspecific enteric challenges. Field experience suggests hemorrhagic bowel syndrome may be less of a problem when dietary fiber levels are increased in finisher feeds. When evaluating DDG as a fiber source to help control enteric challenges, value is not related to cost as a feed ingredient per se, but rather its impact on morbidity and mortality.

To evaluate the feeding value of DDG, a shadow price needs to be calculated. The shadow price is the maximum amount that can be paid to use DDG in the formula and have the diet be equal or lower in cost compared to a diet without DDG. When formulation can take advantage of the higher levels of phosphorus (i.e., adding dical and limestone separately instead of a base mix), the following equation can be used to determine the shadow price of DDG for swine:

$$\text{Shadow price of DDG (\$/lb)} = [(1878 * \$/\text{lb corn}) + (95 * \$/\text{lb SBM}) + (27 * \$/\text{lb dical}) - (156 * \$/\text{lb fat})] / 1844$$

If the added phosphorus in DDG cannot be accounted for (as in the case of a base mix), omit the value of dical from the equation:

$$\text{Shadow price of DDG (\$/lb)} = [(1878 * \$/\text{lb corn}) + (95 * \$/\text{lb SBM}) - (156 * \$/\text{lb fat})] / 1844$$

If DDG are available at a competitive price, and there is sufficient cost savings to justify handling it, DDG can be used in swine diets. If the economics are not favorable, DDG should not be used except in special situations (i.e., to help control nonspecific enteric challenges or when low energy diets are desired).