

## *Using Distiller's Dried Grains with Solubles (DDGS) in Swine Diets*

### **What is DDGS?**

Distiller's Dried Grains with Solubles is a by-product of dry mill ethanol plants. These plants use yeast and enzymes to produce ethanol from readily fermentable starch. After the ethanol is removed from this process two fractions remain - the wet grains and the solubles. The wet grains and solubles fractions are mixed, and then dried, to produce Distiller's Dried Grains with Solubles. Although it is possible to use other grains to supply the fermentable starch, Upper Midwest ethanol plants nearly always utilize corn as the starch source. Most of the DDGS now available for use in swine diets comes from newer ethanol plants that produce higher quality DDGS than has typically been available in the past. Most notably, the drying processes in the newer plants are much less severe, and this results in better nutrient availability. This bulletin refers specifically to DDGS produced from corn in the newer ethanol plants.

### **How does DDGS composition differ from the corn that it is made from?**

The table below illustrates the difference in composition between corn and DDGS. Normal corn contains about 62% starch. Because ethanol production removes most of the readily fermentable starch from corn, the remaining fractions become concentrated (by approximately threefold). In addition, DDGS contains residual yeast cells left over from the fermentation process that may contribute nutrients and unique fractions such as yeast cell wall polysaccharides.

**Table 1. Nutrient Composition of Corn and DDGS**

%	Corn	DDGS
Protein, %	8.30	27.20
Lysine, %	.26	.75
Phosphorus, %	.38	.80
Fat, %	3.90	9.80
Fiber, %	2.30	7.90

### **What is the nutrient value of DDGS in swine diets?**

Because of the alterations that take place during ethanol fermentation, DDGS nutrient levels and nutrient availabilities are quite different than the corn from which it is made. In addition to the previously mentioned concentration of non-starch fractions, two key nutrient availability changes take place. On the positive side, the phosphorus in DDGS is much more available than the phosphorus present in corn. On the negative side, the lysine in DDGS is less available than that found in corn.

Because of the alterations in the availabilities of phosphorus and lysine, swine formulations utilizing DDGS should be done on the basis of Available Phosphorus and Standardized Ileal Digestible (SID) Lysine. If swine diets containing DDGS are formulated based on Total Phosphorus and Total Lysine values, DDGS will be overvalued, and the diet will short pigs on essential nutrients.

Studies at the University of Minnesota have found that Metabolizable Energy (ME) level of Upper Midwest DDGS is approximately 95% of that of corn. This is considerably higher than indicated in most standard ingredient tables, such as NRC, that reports ME values for DDGS at only about 83% of that of corn.



**What diet alterations should be made when using DDGS?**

DDGS can be used to replace corn, soybean meal, and dicalcium or monocalcium phosphate in swine diets. The following table shows the amounts of corn, soybean meal and dicalcium phosphate that can be replaced by each 200 lb of DDGS that is added to the diet.

**Table 2. Pounds of Ingredients Replaced by Each 200 lb of Added DDGS**

Corn	175.6	174.8	174.7	173.9
SBM, 46.5%	18.5	18.5	-	-
SBM, 47.5%	-	-	19.4	19.4
Dical, 21%	5.9	-	5.9	-
Dical, 18.5%	-	6.7	-	6.7
Total	200.0	200.0	200.0	200.0

**What are the economics of using DDGS in swine diets?**

The use of DDGS should be evaluated based on potential feed cost savings when replacing corn, soybean meal, and dical according to the table above. In addition, before deciding to utilize a by-product one generally require that there be a consistent payback of at least 50¢ per ton to cover the additional purchasing, inventorying and handling associated with the by-product.

**How much DDGS can be included in swine diets?**

Producers are using DDGS at 10% and 20% of the diet (200 and 400 lb/ton, respectively). University of Minnesota researchers suggest that levels up to 20% can support typical performance of nursery pigs over 15 lb body weight, grow-finish pigs, lactating sows and developing gilts. They recommend levels up to 50% of the diet for gestating sows and boars.

