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DISTILLERS DRIED GRAINS WITH SOLUBLES (DDGS) IN SWINE DIETS

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In Ontario DDGS is becoming more available for use in swine diets. In fact, as corn is diverted from feed to fuel, we are being pushed into looking at DDGS as a viable feedstock. DDGS is essentially corn with the usable starch (energy) removed. When corn is processed to manufacture ethanol, roughly 1/3 of the corn is used for ethanol; 1/3 is lost as carbon dioxide, and DDGS makes up the final 1/3. This means the fiber, fat, mineral, crude protein and mycotoxin levels are roughly three times that of the original corn. What does that mean for pork producers?

Current research is indicating that substantial amounts of DDGS can be fed in various stages of production, assuming that proper adjustments are made to the diet. Although the level of protein is high in DDGS it has the same amino acid profile as corn; meaning it is lysine deficient. DDGS does however have roughly the same energy concentration as corn, although slightly less digestible. The digestibility of phosphorus in DDGS is higher than corn, meaning less inorganic phosphorus is needed in the diet if substantial amounts of DDGS are to be fed.

Diets containing DDGS must be formulated on the basis of digestible amino acids and digestible phosphorus. For growing pigs, as a rule of thumb, 10% DDGS can replace approximately 4.25% SBM and 5.7% corn, if .1% synthetic lysine is added. See Table 1. Gestating sows have a higher requirement for digestible tryptophan than lactating sows and growing pigs, and DDGS has a low concentration of tryptophan. Therefore it is not possible to lower the SBM amount by as much for gestating animals. See Table 1.

Table 1: Replacement value of 10% distillers dried grains with solubles (DDGS) in diets fed to growing and reproducing swine

ITEM	DIET: GESTATION DIETS	ALL OTHER DIETS[A]
Corn	↓ 7.40	↓ 5.70
Soybean Meal 48%	↓ 2.40	↓ 4.25
Monocalcium Phosphate %	↓ 0.22	↓ 0.20
Fat	↓ 0.10	↓ 0.05
L-Lysine HCL	↑ 0.03	↑ 0.10
Limestone	↑ 0.09	↑ 0.10

[A] If more than 20% DDGS is used in these diets, 0.015% of crystalline L-tryptophan needs to be included in the diet for each additional 10% DDGS that is used. Alternatively, the additional inclusion of DDGS can substitute corn and soybean meal as shown for gestating sows.

Given proper adjustments are made; and the DDGS is free of significant mycotoxins; how much DDGS can we add to diets to maximize profitability? The answer will of course depend on the cost of DDGS vs. corn and SBM. Assuming however it is a less costly feed item, we can increase DDGS consumption in swine diets. See Table 2.

Table 2: Recommended inclusion rates of distillers dried grains with solubles (DDGS) in diets fed to different categories of swine

CATEGORY	RECOMMENDED[A]
Gestation	40
Lactation	20
Nursery, week 0-2	0
Nursery, after week 2	20
Grower	20
Early Finisher	20
Late Finisher	20

[A] Recommended inclusion rates are based on a review of experiments in which DDGS was included in diets fed to swine.

The usage of DDGS in swine diets is rapidly increasing, especially in the US. Many producers are including 20% DDGS in diets fed to all categories of swine, with the exception of nursery diets for the 1st two weeks postweaning.

Some producers are using inclusion rates up to 35%, but it is important to note that carcass quality may suffer at rates over 20%. Carcass dressing percentage will also decrease with increased levels of DDGS in the feed; presumably because of the increased gut capacity of the animal being fed increased fiber levels. See Table 3.

Table 3: Expected consequences of feeding distillers dried grains with solubles (DDGS) to pigs

ITEM	YOU CAN EXPECT
Flowability	May become a problem in bins and feeders
Diet bulk	Will increase by approximately 3% for each 10% DDGS in diet
Feed intake	No effect if good quality DDGS is used
Daily live gain	No effect if good quality DDGS is used
Feed conversion	No effect if good quality DDGS is used
Dressing percentage	May be reduced by up to 0.5 percentage units for each 10% DDGS in diet
Belly softness	May become a problem if more than 20% DDGS in finishing diet
Intestinal health	Some evidence for improvement, more research needed
Litter size	May increase if DDGS included in gestating diets, more research needed
P excretion	Will be reduced if diet formulated correctly
N excretion	Will increase slightly if diet formulated correctly

If you are considering feeding DDGS here are some important considerations. Check mycotoxin levels. 2006 corn in Ontario was bad for toxins, so if Ontario corn is being used for ethanol production; the resulting DDGS will be three times worse. Variability is considerable in nutrient content of DDGS. See Table 4.

Table 4: Concentration, standardized ileal digestibility (SID), and ration of lysine to crude protein in distillers dried grains with solubles[A,B]

ITEM	AVERAGE	LOW	HIGH
Crude protein, %	27.5	24.1	30.9
Lysine, %	.78	0.54	0.99
SID Lysine, %	62.3	43.9	77.9
SID Lysine, g/kg	0.50	0.27	0.70
Lysine: CP, %	2.86	2.18	3.54

[A] Data calculated from Stein et al., 2005; Pahm et al., 2006a and b; Stein et al., 2006; Urriola et al., 2007.
[B] Data are based on in vivo measurements of standardized ileal digestibility of lysine and other amino acids in 36 samples of DDGS.

What should be your minimum standards? The crude protein level should be at 27% as a minimum. The lysine to crude protein ratio should be at least 2.8%. Fat should be 9% and total Phosphorus at .55%. Talk to your feed rep to ensure the proper diets are being formulated to minimize cost while helping maximize profitability.

References:

Stein, H.H., 2007. Distillers dried grains with solubles (DDGS) in diets fed to swine. Department of Animal Sciences - College of ACES -The University of Illinois at Urbana-Champaign. HHS-SwineFocus-001.

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