Does DDGS Affect Pork

Recent trials at the University of Minnesota offer insight into the impact that dried distiller's grains with solubles has on growth performance and pork quality.

By Joe Vansickle
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University of Minnesota animal scientist Gerald Shurson admits there are limitations to feeding dried distiller's grains with solubles (DDGS). But it is a by-product of inherent value that shouldn't be ignored in these times of high-priced corn, he stresses.

"Corn DDGS contains about 10% corn oil, which is very important because it allows DDGS to retain about the same amount of energy as corn. As a result, the energy value of swine diets is maintained when DDGS is added to replace some of the corn and soybean meal," he says.


Gerald Shurson

For those who question its value, Shurson suggests it's time to understand its benefits and manage its limitations as the industry continues to incorporate DDGS into swine diets.

"There are growing supplies of this ingredient, so rather than trying to avoid the inevitable, let's understand the nutritional value and feeding applications of this alternative feed ingredient and figure out how to use it most effectively," he declares.

DDGS Use Climbing

Roughly 15% of DDGS currently being produced is being used in swine feeds. Production of DDGS has gone from 77,000 tons in 2001 to an estimated 1.76 million tons in 2006, Shurson says.

Compared to its long-term use in the cattle industry, DDGS use has been limited in U.S. hog operations, he says, with the majority of DDGS being added to grow-finish diets and lesser levels in sow diets and late nursery diets.

Studies from Shurson's research group have shown consistently that swine diets containing 10% DDGS will provide the same growth performance in grow-finish diets as pigs fed typical corn-soybean meal diets.

If more than 10% DDGS is added to grow-finish diets, rations should be formulated on a digestible amino acid basis, to account for differences in amino acid digestibility among DDGS sources, to achieve good performance.

In the latest University of Minnesota study on growth performance, presented at the Minnesota Pork Congress, Shurson explains that when diets are properly formulated (See Table 1), average daily gain is maintained, feed intake declines slightly, and feed conversion is improved as the level of DDGS increases to up to 30% of the diet.

Feeding Debate

"There are still segments of the swine industry that are reluctant to use DDGS due to differences in performance responses being reported, while at the same time, other segments of the pork industry want to use increasing levels of DDGS in grow-finish diets when the price is right," Shurson says. "The issue of feeding 10% DDGS is a no-brainer. The real question is how high can we go when the price relationship is right, or before we run into performance or pork quality issues?"

Others have reported performance lapses when DDGS was fed at higher inclusion rates of 20-30% of the diet.

For their part, Shurson's research team hasn't found that to be true as long as the quality, nutrient content and digestibility of the DDGS source being used is known. The disparity in research results may reflect differences in quality of DDGS, or different approaches in diet formulation.

First, as with traditional corn-soy diets, it's important to start with good quality distiller's grains. Pay for the good stuff. Last fall the price was $75/ton. Now with added demand and limited availability, the price is $125-135/ton – if you can get it, he states.

Get to know your supplier. Build a good relationship. Have samples tested by an outside, third-party laboratory to determine the nutrient content and

Table 1. Effect of Formulating Grow-Finish Diets on a Digestible Amino Acid Basis, with Increasing Levels of DDGS, on Overall Growth Performance

	0% DDGS	10% DDGS	20% DDGS	30% DDGS
Initial wt., lb.	49.7	50.3	49.7	49.7
Final wt., lb.	252	253	251	250
ADG, lb./day	2.03	2.03	2.03	2.01
ADFI, lb./day[a]	5.66	5.62	5.49	5.42
F/G[a]	2.79	2.76	2.71	2.70

[a]Linear effect of DDGS level
Data from 64 pens, 16 pens/treatment (Xu et al., 2007, unpublished)
ADG = average daily gain; ADFI = average daily feed intake

Quality ?

quality of the DDGS you're going to buy.

Plus, ask your supplier to "level with you" if a bad batch of distiller's has been produced at your local ethanol plant, Shurson says.

Pork Quality Responses

Shurson says discussions involving DDGS and pork quality research trials at Minnesota basically center on four major issues:

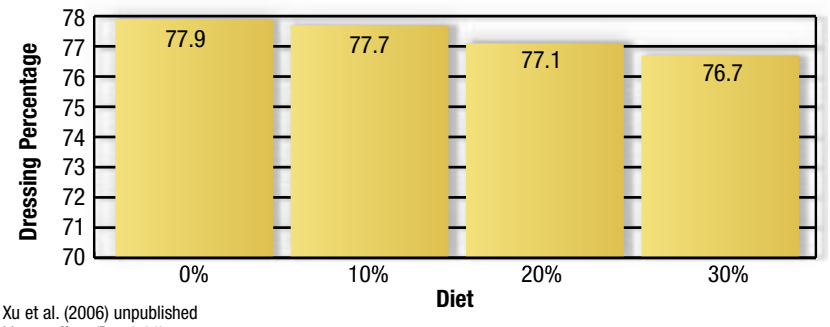
- Dressing percentage or yield slightly declines as pigs are fed the higher rates of DDGS. Figure 1 shows that the percentage of carcass yield starts to fall at 20% and 30% dietary levels. However, the percentage of carcass lean tends to increase at 30% DDGS vs. the control diet (Figure 2).
- Belly fat becomes less firm when higher levels of DDGS are fed (Figure 3). That is attributed to the higher level of unsaturated fatty acids, especially linoleic acid, that is found in corn oil. Softer fat results from the high amounts of unsaturated fatty acids in the diet.
- The pork industry needs to discuss endpoint measurements in reevaluating maximum inclusion rates of DDGS in swine diets. The most common measurement associated with pork fat quality being discussed in the industry is iodine value, which Shurson explains is simply the ratio of unsaturated fatty acids to saturated fatty acids in pork fat. The higher the number, the greater the proportion of unsaturated fatty acids compared to saturated fatty acids.

Some have suggested the maximum iodine value should be 72. The Danes have suggested it should be 70. Nothing has been clearly defined in the U.S. swine industry. "A corn-soy diet in the United States would produce a backfat iodine value of about 67," he says.

"For every 10% you increase distiller's grains, you increase your iodine value by about 1.5 points," he says. Shurson's group reports that in one of four recent studies at the University of Minnesota, feeding 30% DDGS still produced an acceptable iodine level of 72.

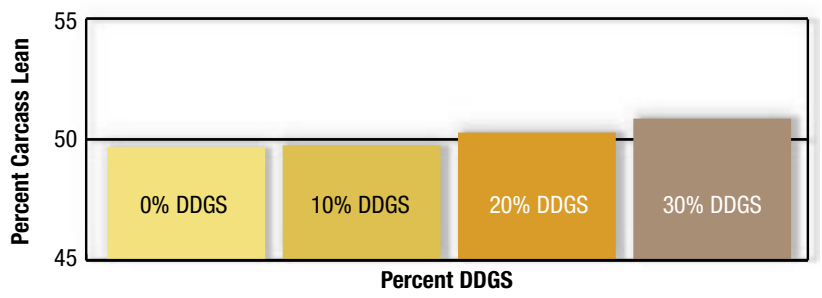
Granted, in one of their four studies, higher levels of DDGS slightly reduced

Figure 1. Effect of Dietary DDGS Level on Dressing Percentage



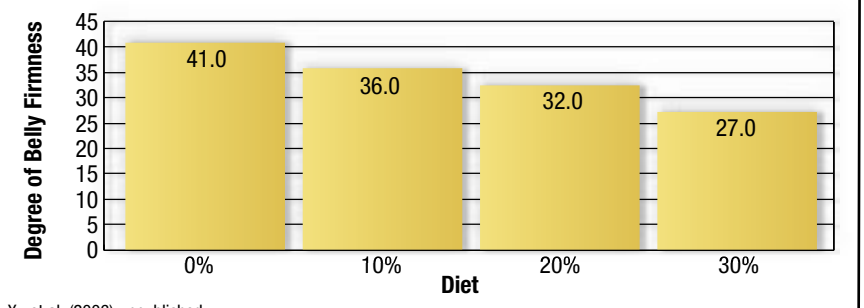
Xu et al. (2006) unpublished
Linear effect ($P < 0.01$)

Figure 2. Effects of Dietary DDGS Level on Percent Carcass Lean



Xu et al. (2006) unpublished
30% DDGS tended to be higher than 0% DDGS ($P = 0.11$).

Figure 3. Higher Levels of DDGS Linearly Reduced Belly Firmness



Xu et al. (2006) unpublished

Figure 4. Effect of DDGS Level on Loin Firmness and Marbling Score

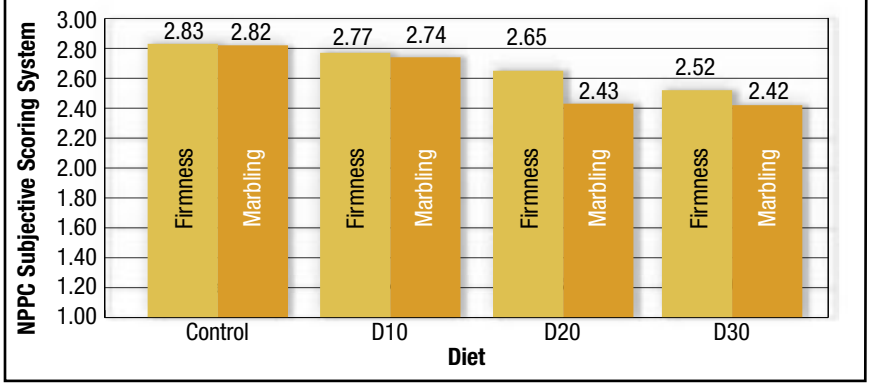
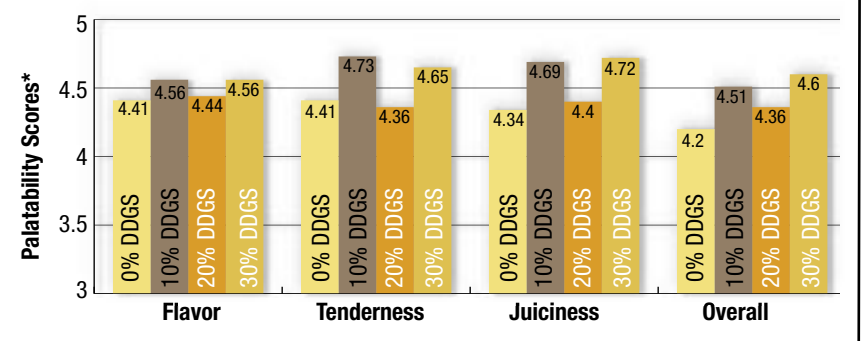


Figure 5. Effects of Increasing Dietary DDGS Levels on Eating Characteristics of Pork Loins



No significant differences among dietary treatments
*Scores rank from 0 to 5, with 5 reflecting the highest level of product satisfaction.

loin firmness and marbling scores, as shown in Figure 4, but they were still within acceptable standards published by the National Pork Producers Council, he emphasizes.

But a recent consumer taste panel who ate pork loins from pigs fed diets containing 30, 20, 10 and 0% DDGS couldn't detect any appreciable differences between the various products (See Figure 5), Shurson adds.

- The fourth major issue is if distiller's grains makes pork fat softer and more unsaturated, does that in turn make the product more susceptible to rancidity or lipid oxidation and reduce its shelf life?

To answer that question, Shurson's research team partnered with Hormel Foods and evaluated carcasses from hogs fed diets containing up to 30% DDGS, processed and packaged pork loin or chops in retail packages and stored in retail-type temperatures and conditions for 28 days.

"At the end of the 28 days, we saw no differences among treatments, and results tested at about half of what the minimum amount would be to indicate for oxidative rancidity," he says.

Japanese Studies on DDGS

All of the data on DDGS tests at Minnesota indicates there is no evidence to suggest that feeding grow-finish hogs diets containing 10% DDGS will decrease the quality and acceptability of U.S. pork in the Japanese export market, Shurson affirms.

A group of Japanese researchers recently completed a study to evaluate DDGS inclusion rates in a study sponsored by the U.S. Grains Council.

A total of 50 Large White-Duroc crossbred pigs at 61-83 lb. were tested in a three-phase program, from 66 to 110 lb. in phase 1, from 110 to 154 lb. in phase 2 and from 154 lb. to market weight in phase 3.

Pigs were divided into five dietary treatments: 1 – Control or 0% DDGS from 66 lb. to market; 2 – Fed 10% DDGS in phase 1 and 2, no DDGS in phase 3; 3 – Fed 15% DDGS in phase 1 and 2, no DDGS in phase 3; 4 – Fed 20% DDGS in phase 1 and 2, no DDGS in phase 3; and 5 – Fed 10% DDGS in phase 1, 2 and 3.

Shurson reports that Japanese researchers concluded that DDGS is an acceptable feed ingredient for use in Japanese swine diets, and that pork quality is not an issue with the inclusions rates tested.

Shurson's research group is currently working to complete studies using the Japanese approach of withdrawing DDGS from grow-finish diets, only using higher inclusion levels and withdrawing DDGS at different time periods.

"The preliminary analysis of our work suggests that if you want to be really conservative and use high inclusion rates, you can withdraw DDGS from the diet three weeks prior to slaughter, when feeding at the 30% DDGS level, and get the animal's tissue to revert back close to what it would be in the control group," he observes.

Conclusion

Shurson believes that their research results suggest that DDGS does have a place in grow-finish diets, and that the perception that feeding diets containing DDGS has a major negative effect on pork quality are unwarranted.

"We have growing evidence that indicates that using high quality DDGS in grow-finish diets at levels above 10% can result in acceptable growth performance, shelf life and fat stability of pork

products and eating characteristics of pork for consumers."

He admits adding DDGS to grow-finish diets makes pork fat softer and slightly reduces dressing percentage.

"Although consumer taste panel results indicate that consumers can't taste a difference in pork loins from pigs fed diets containing 20 or 30% DDGS compared to pork from pigs fed a typical corn-soybean meal diet, the greasy or oily appearance of bacon in a thawed package could be a significant deterrent when consumers make their bacon selection decisions," says Shurson.

For more information on University of Minnesota research trials, nutrient profiles, links to other DDGS sites and international audiences, log onto *www.ddgs.umn.edu.* NHF

Soft Bellies Not a Concern – Yet

Next Generation Pork of LeRoy, MN, has been feeding dried distiller's grains with solubles (DDGS) to market pigs for four years.

Growing pigs are fed a 10% DDGS level and late finishers as much as 20%, according to the pork company's swine nutritionist Gregg Sample.

Over 100,000 pigs are sold to nearby Hormel Foods every year with nary a mention of fat quality issues from the DDGS, says Sample.

The Austin-based packer, in fact, participated in a University of Minnesota/Land O'Lakes field study that looked at carcass quality in pigs fed 10% DDGS.

Two 1,000-head commercial finishing barns were compared: One was fed a typical corn-soy diet and a second, diets containing 10% DDGS.

Results of that study, presented by DDGS researcher Jerry Shurson at the January Minnesota Pork Congress, showed no reason for concern with carcass or pork quality. Furthermore, there was no evidence to suggest that feeding a 10% diet would decrease the quality and acceptability of U.S. pork in the Japanese export market.

Price a Bigger Factor

With DDGS selling for $120/ton and more, Sample is considering pulling it out of his least-cost rations. Choice white grease, too, is high-priced at the present time; with the exception of a small amount for dust control, it is being eliminated from the grow-finish diet.

Energy levels are being lowered in the finishing rations until "ingredient prices come back into line," Sample says. He's worried about corn prices, but says uncertainty of what will happen is the worst part.

"If we can predict corn will be $3.50/bu. for the next four years, we can do something about it. But with the uncertainty, we don't know what to do."

Aside from price, product inconsistency can be a negative with DDGS. It's important to know your source, he advises. Next Generation uses two sources they feel provide a consistent quality product – a plant about 25 miles away in Preston, MN, and one in Mason City, IA.

Sample periodically runs an analysis on the DDGS to know what he's feeding and always includes lysine. Lysine analysis is expensive, but important, he adds.

When the price drops below $120, there are advantages to feeding DDGS. "For one thing, the phosphorus is more readily available than regular corn. With DDGS, a high level of phytase and a very small amount of meat and bone meal, I can eliminate added phosphorus in our diets. It saves us money and is good for the environment," notes Sample.

Is he concerned with any adverse affect high levels of DDGS may have on iodine value and carcass fat? "No, not until Hormel tells me I should be. No matter what level of unsaturated fat you add, whether DDGS, vegetable oil or soybean oil, it will raise the iodine level," replies Sample. "At what point it becomes objectionable is up to the customer. The Japanese will be the first to tell us." NHF