Jerry Shurson, University of Minnesota swine nutritionist, says the oil-extraction process that more ethanol plants are using today may have only a limited effect on the energy value of distillers' dried grains with solubles.

# What You Need to Know about Reduced-oil DDGS

n the past few years, you've gone from learning about a new feed ingredient called distillers' dried grains with solubles, to adding a bit of it to some of your swine diets, to adding significant levels to most diets. You've worked through suppliers and the varying quality issues to ensure your diets are meeting pig performance needs and providing value.

Yes, as grain supplies tighten and prices rise, it's a bit of a balancing act to incorporate DDGS at the right levels and meet the challenges along the way.

But hold on; the nutrient profile of DDGS is still a moving target and the learning process is not over.

As some of the ethanol production incentives have evaporated, refiners are looking for ways to literally squeeze more value out of every bushel of corn and every gallon of ethanol. As a result, they are extracting more corn oil during the ethanol production process, which is again altering DDGS nutritional profiles.

The oil extraction occurs via a centrifuge system, and by year's end, up to 80 percent of U.S. ethanol plants may employ the process. While this involves a \$3 million investment for a plant, oil extraction offers ethanol refiners a rapid three- to four-month payback. With an estimated 143 U.S. plants manufacturing DDGS, the additional income for the sector is substantial.

But what does it mean to you and the nutritional make-up of DDGS in swine diets?

**DDGS samples averaged** 10 percent crude fat in March 2011, says Rob Musser, technical services director, NutriQuest, Mason City, Iowa. Due to increased oil extraction, DDGS samples now average 9.3 percent crude fat. The figures were derived using the company's Illuminate database. By 2013, Musser predicts the average will drop to 8.5 percent, with variation among plants ranging from 4 percent to 11 percent crude fat.

Since fats and oils contain approximately 2.25 times more energy than carbohydrates, it might be expected that reducing corn oil content in DDGS will reduce its energy value. But it's more complex than that.

Swine nutritionists Jerry Shurson, University of Minnesota, and Brian Kerr, USDA Agricultural Research Service, initiated a research project to shed light on the questions surrounding oil extraction and its effect on DDGS energy value. When they started their study, the two researchers expected to find that energy values would be significantly reduced in DDGS products from which more oil was extracted. However, because of many variables that exist with the pig's digestion process, they found a low correlation between the crude fat content in DDGS and its metabolizable energy content.

"The relationship does not hold true because of the variable concentrations of

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other nutritional components that either contribute to or reduce the energy value," Shurson says.

Shurson and Kerr studied pigs weighing 185 pounds to 230 pounds. "We felt this is where the highest DDGS levels would be fed," Kerr says. Today, diets for this age group often contain 20 percent to 40 percent DDGS, although the inclusion rate may be reduced or eliminated two to four weeks prior to marketing.

After analyzing 15 DDGS samples containing varying amounts of crude fat, Shurson and Kerr reported that predicting the reduction in metabolizable energy in DDGS as a result of reducing its oil content is not a simple task. "We knew the industry wanted to have a simple equation relating energy value for the pig to the oil content in DDGS," Kerr notes. "However, a simple relationship is not realistic."

### Although each 1 percent reduction

in oil results in a decrease in metabolizable energy of 30 to 50 kcal per kilogram of dry matter, there are other variables that affect the final metabolizable energy content of DDGS, Shurson explains. For example, each 25-micron reduction in DDGS particle size increases metabolizable energy by 13.46 kcal per kilogram of dry matter, according to the researchers.

However, the impact of DDGS' reduced oil content on metabolizable energy to the pig also depends on its fiber content, which is a significant contributor to the diet's overall energy value.

"A diet's energy value can vary considerably depending on the proportion of each diet component, such as fat, fiber, protein and ash, and their interactions," Shurson says.

As oil is extracted from DDGS, the researchers expected to see neutral detergent fiber content increase. Surprisingly, they did not find this to be true in the 15 DDGS samples they evaluated. "However, using total dietary fiber as the measure of fiber, it did increase as DDGS oil content decreased," Shurson notes.

The details of fiber's role in determining a diet's energy value is not fully understood, but it is significant. "We need to learn more about how to accurately measure fiber and better understand its relationship to the energy value of feed ingredients, especially DDGS," he says. "Overall, the reduction in energy value from feeding reduced-oil DDGS is less than we expected."

As part of previous research on corn coproducts, the two researchers have developed energy-prediction equations that will help swine nutritionists provide answers for using reduced-oil DDGS in swine diets. (For more, go to http://bit.ly/HxIFTJ.)

### To maintain pig performance when

including reduced-oil DDGS you may have to re-balance the diet. Musser has observed minimal differences in pig performance when diets containing reduced-oil DDGS are formulated with accurate amino acid and energy values based on a given DDGS source. "However, if a producer does a straight substitution, we have heard that poorer feed efficiency and lower average daily gain may result," he adds.

Farrow-to-finish producer Jamie Schmidt, Garner, Iowa, has not seen significant reductions in pig performance since including oil-extracted DDGS in his finisher diets. The crude fat level of his DDGS supply has been reduced from 10 percent to about 7 percent. Schmidt says he cannot justify the economics of increasing DDGS inclusion levels, which have remained around 15 percent in finisher diets, with a drop to 10 percent when pigs reach 240 pounds. Schmidt does not include DDGS in sow diets.

Schmidt expected the oil-extracted DDGS price to come down, but that's not been the case. "Right now, DDGS is just not a terrific buy," he says. "It represents less value to us, but the market has not differentiated between the oil-extracted product and conventional product." Schmidt, who markets about 18,000 hogs annually, has noticed improved handling characteristics of the reduced-oil DDGS, especially in the summer.

DDGS nutrient and quality variability among ethanol plants has always been an issue, and oil extraction will only increase the challenge. However, the value of the co-product likely will not change significantly, Shurson says.

One thing for sure, just looking at DDGS' crude fat content doesn't give you the complete picture. "If a particular DDGS source, regardless of oil content, has a good energy value relative to corn and is more economical, it will continue to be used," Shurson says. "However, if the oil

# CONSIDERING THE IODINE VALUE FACTOR

Since corn oil contains unsaturated fat, which can increase the iodine value and result in soft carcass fat, theoretically, higher levels of oil-extracted DDGS can be used without affecting pork fat quality.

However, since fat content is still highly variable among DDGS products, it's important to get frequent analysis updates. "Dietary inclusion rates will be determined by the relative value of a specific DDGS source and the need to limit the corn oil to meet pork fat iodine value targets," says Jerry Shurson, swine nutritionist, University of Minnesota.

As he points out, corn oil from DDGS is a predominant factor affecting pork fat iodine values. Since acceptable iodine values vary among packers, maximum DDGS inclusion rates also will vary. Pushing DDGS levels too high increases the chances of producing carcass fat that's unacceptable to packers. Maintaining a farm baseline iodine value of pigs fed known diets through finishing will help you predict consequences of raising inclusion rates.

Reducing iodine values also is possible. "If the reduced-oil DDGS is used at the same inclusion level of conventional DDGS, it could reduce iodine value levels," says John Goihl, president, Agri-Nutrition Service, Shakopee, Minn.

Changing the reduced-oil DDGS inclusion rate also may depend on supplementary fats used in the diet, says Rob Musser, technical services director, NutriQuest. "Producers that replace dietary fat lost in the DDGS oil-extraction process with fats that are less detrimental to belly softness, such as choice white grease, may be able to feed more DDGS in late-finishing diets."

Of course, choice white grease is an expensive product these days, so it's a matter of calculating your total price picture. For more information on DDGS, go to **ddgs. umn.edu**.

content limits a producer's ability to meet specific iodine value standards for pork processors, then producers will need to reduce inclusion rates." (See sidebar.)

Until more answers are available, ask your DDGS supplier about the extent of his oil-extraction practices. Get an updated DDGS nutrient analysis and plan to check on it periodically so it doesn't change without your knowledge. Your swine nutritionist also will be able to keep your DDGS feeding strategy on track through this rapidly evolving process. **PK** 

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