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Maschhoffs Reduce Manure's Impact

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By Joe Vansickle Senior Editor

The environmental services team is aggressively working to reduce the impact of swine manure on the environment.

A joint study conducted by The Maschhoffs, Inc., based in Carlyle, IL, and nutrition supplier JBS United (formerly United Feeds) of Sheridan, IN, has shown that adding an enzyme to pig diets greatly reduces phosphorus levels in manure.

In findings presented at the Midwest meeting of the American Society of Animal Sciences in Des Moines, IA, the study revealed that supplementing rations with the JBS United product, OptiPhos, profoundly impacted phosphorus excretion.

The six-month study looked at manure content, bone density and impact on meat quality.

"This was unique in that the study used 600 Maschhoff pigs and was conducted in a specialty barn that exactly mirrored our production conditions," reports Bradley Wolter, director of production technology at The Maschhoffs.

In the study, OptiPhos, described as the latest generation in phytate enzymes, was fed as part of a wean-to-finish diet. Wolter says those enzymes enhance the ability of animals to digest phosphorus that is naturally present in feedgrains such as corn and soybeans.

As a result of using the product, phosphorus excretion levels in treated pigs decreased by 45% compared to diets used in the past (See Table 1), he adds. Pigs also retained a high level of bone density and there was no change in meat quality, he added.

"Basically, this involves the lowering of phosphorus in swine excretions while not compromising the animal's welfare or growth performance," adds Tim Laatsch, environmental systems manager for The Maschhoffs.

"The key thing for row crop agriculture is that we are able to drive that phosphorus-to-nitrogen ratio to the point where it is much more favorable and more balanced in a corn-soybean rotation than it would previously have been," says Laatsch. This makes manure a more valuable source of fertilizer for crop nutrition.

He continues: "Historically, before phytase was used in the diet and swine manure was applied to meet the nitrogen needs of the corn crop, phosphorus was applied in excess of crop removal. Through time, soil phosphorus tends to accumulate, increasing the risk for losing phosphorus from the system and having it enter surface waters.

"Elevated phosphorus stimulates algal growth and has been implicated by the Environmental Protection Agency as a major cause of surface water impairment in the United States."

Laatsch says at this point, the source of the phosphorus problem remains unclear — stream bank erosion, agriculture, urban uses, forested land or some combination. But adding a product that reduces phosphorus levels in swine manure has huge potential for The Maschhoffs' 120,000-sow system and the environment.

"We're now introducing OptiPhos to all of our pigs' diets, system-wide," says Wolter. "OptiPhos has enabled us to cease supplementing diets with inorganic phosphorus."

Monitoring Manure

Laatsch reports that the enzyme supplement is included in a new manure-monitoring program just underway. "We'll be monitoring the success of this new product as it relates to our production of quality organic fertilizer, and incorporating this data into our nutrient management plans."



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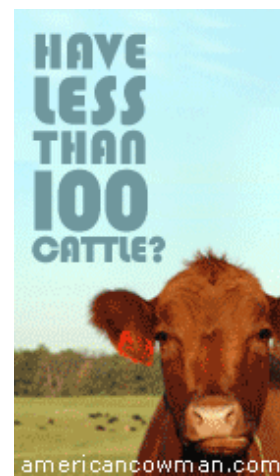
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The monitoring effort will help standardize and improve feedback on manure composition and management throughout the production system.

"We knew we had to get better, because the analyses from our growers had all been collected by different methods and sent to different laboratories," explains Laatsch. "Our goal was to standardize collection methods for the whole Maschhoff system."

To determine the best sampling method, manure was collected from several different locations down the length of two double-wide, wean-to-finish barns. A vertical profile sampler was then used to extract a complete column of manure from various locations along a transect from the pump-out port to the interior wall.

In all, 80 samples were collected and preserved independently. The barns' deep manure pits were then agitated for 30 minutes at each pump-out port and all 80 sites were sampled again, bringing the total number of samples to 160.

Those results suggest taking samples pre-agitation along the exterior pump-out ports could effectively represent the agitated mean of the whole barn. And it means manure collection can effectively be done while still preserving biosecurity, notes Laatsch.

This standard protocol was used to test 156 barns in The Maschhoff system for manure quality. Four core samples were pulled from outside each of the pump-out ports on one side of the barns. This preliminary work was completed last year.

To add to this benchmark, Laatsch says the goal this year is to sample every deep-pitted barn in the system.

Meeting Regulations

Along with this approach is a strong commitment to ensure that all production partners (contract growers) meet environmental regulations in their states. For example, The Maschhoffs will be helping their production partners in Iowa write phosphorus-based nutrient management plans to meet those coming regulations.

To meet all of these environmental challenges, The Maschhoffs now have a staff of four in their Environmental Services Department. Water quality issues are fairly well under control. But odor and air emissions represent the new frontier of regulations for the environment, he says.

Air Quality Research

To help further knowledge on air quality, a novel project was initiated last fall with the University of Illinois under the direction of Michael Ellis, a professor in the Department of Animal Sciences and leader of the project.

The goal is to test promising technologies for the reduction of objectionable emissions from swine facilities.

"Although there are a relatively large number of products and technologies being promoted for emission reduction, few have been subjected to evaluation in the real world of swine production," explains Ellis. "We will create a number of 'Discovery Farm' existing enterprises that will not only test these new technologies, but demonstrate the best design and management practices to achieve emission reduction."

Illinois Pork Producers Association (IPPA) invested \$80,000 on odor reduction projects. IPPA leaders determined independently tested and validated information is needed to help make wise decisions about technologies that could be used on their farms.

One Discovery Farm is a nine-barn, tunnel-ventilated, deep-pitted, wean-to-finish system owned by The Maschhoffs near McLean, IL. The site is equipped with a gas sampler and automated monitoring equipment, including a pneumatic sampler that pulls air samples from ventilation and pit fans. Data for ammonia and hydrogen sulfide gases and other barn environmental conditions will be continuously monitored in an adjacent mobile trailer.

The study tracks animal performance and weather patterns in conjunction with measuring barn emission levels, says Laatsch. But it goes one important step further in that it will evaluate various emission control technologies to objectively gauge results in a full-scale production setting.

The Illinois attorney general's office has contributed \$250,000 to the project, along with funding from the IPPA and the National Pork Board, says Laatsch.

Ellis says technologies to be tested include biofilters, chimney stack exhausts, lagoon covers and a system that uses electric current to kill bacteria.

"We look at odor and emissions litigation as being one of the biggest risk factors to our business right now," observes Laatsch.

Table 1. Phosphorus Excretion of Pigs Fed According

to Different Phosphorus Utilization Strategies¹

Diet Program	Phosphorus excreted, g./pig/day
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Diet Program with monocalcium phosphorus ²	6.70
Diet program with phytase ³	2.06
P-value	0.001

¹Data are means of three pits, each under three pens of gilts fed their experimental diets for a period of 16 weeks.

²In this treatment, dietary inorganic phosphorus was provided through monocalcium phosphorus supplementation.

³In this treatment, dietary inorganic phosphorus was provided through graded levels of OptiPhos supplementation.

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