

## Digesting Potential

*Fergus Falls, Minn.* --Anaerobic digestion could boost ethanol plant profits by millions of dollars — and make corn ethanol “greener.”



That’s the finding of a new AURI-sponsored study that showed the feasibility of making methane and fertilizer from thin stillage, dissolved corn solids left over from ethanol production.

“Ethanol plants could potentially become energy independent if all the energy in thin stillage could be captured in the form of methane,” says study author David Rein of Rein & Associates, a wastewater engineering company based in Moorhead.

Anaerobic digestion could add \$10 million to the bottom line of a 50-million-gallon ethanol plant, Rein estimates. Digestion could also conserve water, earn valuable carbon credits, and boost corn ethanol’s energy balance by offsetting fossil-fuel use, he says.

Anaerobic digestion is a microbial process that produces methane and carbon dioxide, or “biogas,” from organic materials. Biogas is a natural-gas substitute that can be burned in a furnace or used to power a turbine for electricity.

Some ethanol plants already use small digesters to clean up their wastewater. But the ethanol industry is not yet using anaerobic digestion to generate power, says Michael Sparby, AURI project director. That could change as ethanol plants seek renewable alternatives to natural gas, he says. “I’m hearing a lot of interest in stillage digestion.”

Stillage is the slurry of corn solids and water left over after corn starch has been fermented and distilled. Ethanol plants separate whole stillage into distiller’s grains, a nutritious animal feed, and thin stillage, which is water and dissolved solids. Usually, thin stillage is concentrated through evaporation and added to the distiller’s grains.

All of these ethanol coproducts “contain significant amounts of energy that could potentially be recovered in the form of biogas, through anaerobic fermentation,” Rein says.

**continued...**

## Energy Partners

To develop projects that are bigger and better means you have to work with the best and the brightest.

AURI scientists Doug Root and Alan Doering recently traveled to the National Renewable Energy Laboratory in Golden, Colorado. NREL develops renewable energy and energy efficiency technologies and practices, advances related science and engineering, and transfers knowledge and innovations to address the nation’s energy and environmental goals. Developing partnerships and working relationships with researchers at NREL offers the potential for bringing cutting edge technologies back to renewable energy projects in Minnesota.

“The National Renewable Energy Laboratory is involved in some of the most advanced energy research in the world,” says Doering, who heads up AURI’s coproduct utilization program. “To develop partnerships with leaders such as NREL will give Minnesota access to advancements that could be put to use in the state.”

The NREL facility contains research laboratories focusing on alternative fuels, thermo-chemical fuels, photovoltaic testing and solar laboratories. Much of NREL’s focus is on transportation



*National Renewable Energy Lab, Golden, Colorado*

fuels and includes an emphasis on cellulosic ethanol. They are working to meet a goal of producing cellulose-based ethanol for \$1.31 per gallon by 2012. Researchers in Colorado are also actively working in the areas of biomass utilization and biodiesel development, both areas that are important to AURI.

While NREL offers access to cutting edge technology and advanced research, collaborative relationships imply a two-way relationship. AURI offers resources that are beneficial to the national lab, including in the areas of biomass densification and biodiesel testing.

## Future continued...

AURI tested both whole stillage and thin stillage digestion, with support from the Minnesota Corn Growers Association, Otter Tail Power Co., Otter Tail Ag Enterprises and the City of Fergus Falls.

One of the problems associated with anaerobic digestion is the formation of “struvite,” a hard, scaly compound that builds up in the digester and fouls the equipment. Struvite is composed of magnesium, phosphate and ammonia — all important plant nutrients.

Thin stillage contains very high concentrations of these chemicals, Rein says. “Struvite is a threat to effective digester operation,” but also “presents a significant opportunity for fertilizer recovery.”

By harvesting magnesium, phosphate and other nutrients from thin stillage before it goes to the digester, ethanol plants could produce more biogas and generate another commercial product, Rein says. “It’s the struvite recovery that makes it workable.”

Further information on stillage digestion is available in the April issue of Ag Innovation News.



*Struvite, a combination of minerals from thin stillage can cause trouble for digesters, but could have value as fertilizer.*



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