



AG INNOVATION NEWS

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Easy eatin' beans

Marshall company developing a high-protein, digestible soybean meal



PHOTOS BY ROLF HAGBERG

BY LIZ MORRISON

Marshall, Minn. — Jim Moline wants to make soybean meal easier eatin'.

He is co-founder and president of Midwest Ag Enterprises, which manufactures and exports specialty livestock feeds. With help from AURI, the Marshall company is developing an economical process to make high-protein, digestible soybean meal. Hydrolyzed soybean meal would offer an alternative to expensive protein sources, such as fish meal, in baby pig, turkey and aquaculture diets.

If it's successful, the company's new process could add value to ordinary soybean meal, expand markets for Minnesota soybeans and improve profits for livestock producers, says Denny Timmerman, AURI project director. "Everybody would get something out of this deal."

Fished out

Highly-digestible fish meal has long been a staple of nursery pig and poultry diets. But the wild catch of menhaden — a small, herring-like ocean fish that's the main source of U.S. fish meal — has been sharply depleted, Timmerman says. "The fish have gotten scarce because of heavy demand," causing fish meal prices to triple in recent years. "That's the driver behind the livestock industry trying to discover lower-cost protein alternatives."

Standard soybean meal, which contains about 44 percent protein, is an excellent source of amino acids, the building blocks of protein. But soybeans also contain fiber and complex sugars, called oligosaccharides, which interfere with digestion and nutrient absorption in young pigs and other single-stomach animals. (Think gas!)

"There's value to be captured by removing the anti-nutritional components of soybean meal and changing the protein structure to make it more available to animals," says Doug Root, AURI scientist.

Although the technology exists to make soybean meal products that are 60 to 90 percent protein, it's very expensive to do, Root says. "Our goal is to get close to 60 percent protein soybean meal at prices appropriate for livestock feed."

"We're really enthusiastic about Midwest Ag Enterprises taking on this project," he says. "They have great experience in the industry. They know what they are doing, and they do it well. Also, they are able to move quickly."

High protein demand

Midwest Ag Enterprises produces and markets a variety of high-protein feeds for young pigs. The company operates a manufacturing plant in northwestern Iowa.

"There's big demand for high-quality protein products that fit into livestock diets," says Moline, who has a track record of seizing business opportunities.

Throughout Asia, the livestock industry is advancing rapidly, he says. Animal genetics, housing and diets are all improving, creating a need for "better feed ingredients." Demand is especially strong in China, "which has over half of the world's pigs, a growing middle class and a huge demand for meat."

Moline, who travels to Asia several times a year, sees a chance to supply hydrolyzed soybean meal to these burgeoning markets — if manufacturing costs can be lowered. "That's when we approached AURI for help."

Development and testing

Moline assembled a team of consultants, including AURI, to devise a cost-competitive process. The goal was to remove most of the soybean meal's indigestible sugars and fiber and break up the protein molecules into smaller, more digestible pieces.

There are three ways to do that in the lab, says Root, who did the preliminary bench top trials: microbial fermentation, enzymatic digestion and chemical processing. But when it comes to scaling up a process from the lab to commercial volumes, "it's all in the details."

Midwest Ag Enterprises has been working for over a year to refine their proprietary manufacturing process. "This is new territory," Moline says, "but we're getting close." The company expects to begin livestock feeding trials this winter.

Initially, the improved soybean meal — it doesn't yet have a brand name — will be aimed at nursery pig producers in China, Vietnam, Thailand, South Korea and the Philippines — markets where the company already has a presence. The meal also has promise for poultry, pet food and aquaculture diets, Moline says. "Aquaculture is a huge and growing industry in Asia."

The company plans to manufacture the meal at its Iowa facility. AURI is assisting with plant design and equipment evaluation. If the product takes off, a new processing plant is likely, Moline says. "We hope to be out front on this with something nobody else has." ■

AURI and Midwest Ag Enterprises



Idea to opportunity: Find a protein feed source for nursery pigs and poultry to replace fish meal, which is decreasing in supply.

Outcomes: AURI staff helped Midwest Ag Enterprises identify a process to remove oligosaccharides, which interfere with digestion and nutrient absorption, from soy meal to make it an attractive feed option.

Funding partner: Minnesota Soybean Research & Promotion Council



Marshall entrepreneur knows exports

BY LIZ MORRISON

Jim Moline has his feet in Minnesota and his eyes on Asia.

The president of Midwest Ag Enterprises in Marshall, Minn., is a veteran of the ag export business. Since 1996, he has sold specialty feeds to China, Vietnam, Thailand and other Asian Pacific countries. "I love the export business."

The 52-year-old entrepreneur grew up on a farm near Slayton, earned a degree in agri-business from Ridgewater College in Willmar, and began his career in the fertilizer and grain business in Iowa. In 1996, he joined Minnesota Corn Processors in Marshall, where he sold corn gluten meal and other wet milling coproducts overseas.

In 2002, after the Marshall mill was acquired by Archer Daniels Midland Company, Moline and two colleagues struck out on their own, forming a liquid feed company, Midwest Ag Enterprises. The new venture was financed by the local Bremer Bank.

Moline and his partners marketed a wide variety of liquid coproducts, including beet molasses, dairy-processing liquids and corn steep water, and built a thriving regional feed business.

In 2003, as the Midwest's ethanol industry was shifting into high gear, Moline again turned

his attention to the Far East. "I saw an opportunity to export distillers grains (DDGS) to Asia," Moline says. "Our company was the first to market the new generation of higher-value DDGS in Asia, primarily for the poultry industry. Later, we expanded into swine." At the peak, Moline was exporting 20,000 tons of DDGS per month from the company's container loading facility in Kansas City.

But as the DDGS export sector matured and competition from giant players increased, profit margins began to shrink. "So we scaled back on DDGS exports and looked at other alternatives."

Moline saw a chance to supply higher-value feed products to increasingly sophisticated Asian livestock growers.

He and one of his partners in Midwest Ag Enterprises bought a plant in West Bend, Iowa, to manufacture high-protein, branded swine feeds. "We take liquid coproducts and dry them on different carriers," such as soybean meal. "We traded a high-volume, low-margin product — DDGS — for lower-volume, higher-margin products."

Later, they brought in other partners — the owners of Form A Feed and Tech Mix, Inc. of Stewart, Minn., who handle all domestic marketing of feed products from the Iowa plant.

Now, Moline's company is developing a high-protein, digestible soybean meal for export to Asia. "I'm all about developing proprietary branded products," Moline says. "I don't want to market a commodity." ■

Nature's filter

Straw and corn stover tested in bioreactors that filter water from farm drainage tiles

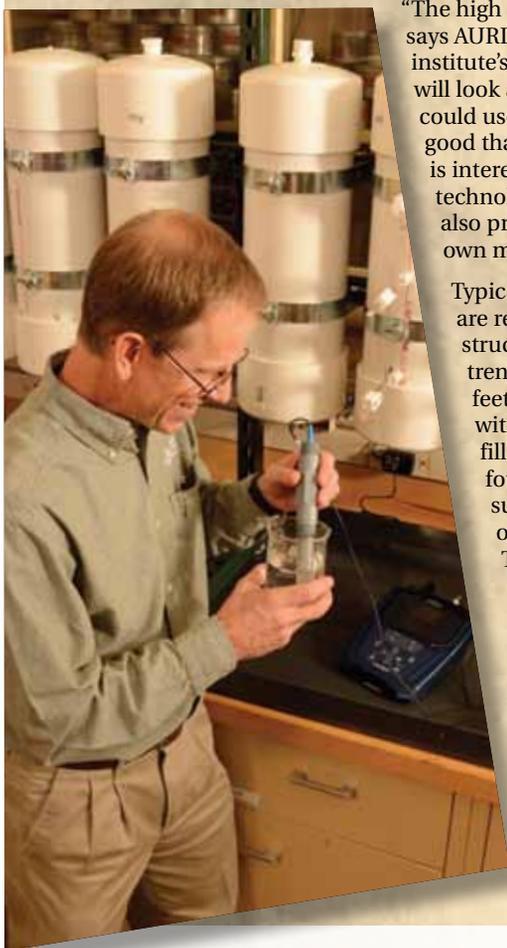
BY DAN LEMKE

St. Paul, Minn. — Crop residues may be used to clean up water drained from agricultural lands.

Still relatively new, bioreactors use organic materials such as wood chips or straw to reduce nitrogen in drainage water. When submerged, the residues provide an environment that supports microbes, which consume nitrate nitrogen in the water, reducing it to nitrogen gas and denitrifying the water.

“Bioreactors can reduce nitrate concentration in drainage water by 30 to 70 percent, which is substantial,” says Gary Feyereisen, agricultural engineer with the USDA Agricultural Research Service in St. Paul. “Drainage is a big issue in the entire Midwest, and many producers are interested in practices that lessen environmental impact.”

Bioreactors, also called biofilters, are becoming more common in agricultural drainage systems. Several have been installed in Illinois, Iowa and Minnesota. Currently, a bioreactor's price tag is determined by the cost of wood chips, the most common filter media. So AURI is evaluating and comparing the effectiveness of agricultural residues versus wood in bioreactors. The study, supported by the Minnesota Corn Growers, will be conducted by Feyereisen at the USDA-ARS lab in St. Paul.



“The high cost of wood drives the cost of bioreactors,” says AURI scientist Al Doering who heads the institute's coproduct utilization program. “This project will look at other available materials that producers could use. Chances are good that if a farmer is interested in this technology, they are also producing their own media.”

Typical bioreactors are rectangular structures or trenches, up to 200 feet long, lined with plastic and filled with three to four feet of media such as wood or ag fibers. They are then covered with a foot or two of topsoil. Farm drainage tiles direct water, through the biofilter, into existing ditches or tile mains.

*Bioreactors
can reduce nitrate
concentration in
drainage water by
30 to 70 percent*



PHOTOS BY ROLF HAGBERG

Feyereisen says bioreactors can treat water from areas up to 80 acres, and larger units are being tested.

“It's critical that there be water flow through the filter materials,” Feyereisen says. “Porous spaces are needed to convey water fast enough, so it's important that they maintain structure.”

According to Feyereisen, wood and corn cobs maintain their structure well, while other materials such as corn stover and grain straws tend to mat. For those residues, additional media may need to be added to maintain proper water flow. Also, AURI will be sourcing and characterizing the appropriate particle size of ag fibers, Doering says.

Temperature variability is another factor. Feyereisen says microbes generally are more active and denitrify water better in warmer weather. However, research shows there is nitrogen reduction even when temperatures are slightly above freezing. The 15-month AURI project will evaluate the cold weather effectiveness of various agricultural fibers.

The research offers potential new uses for agricultural byproducts, such as corn stover and wheat and barley straw. The fibers could also increase bioreactor efficiency, improve drainage water quality and potentially increase the number of acres that a single reactor can treat.

“It addresses several issues for producers who are using or considering biofilters,” Doering says. “It could allow them to utilize ag fibers that they are producing on their farm, increasing value of a coproduct they produce. Since the cost of the wood fibers is one of the largest expenses, using locally available media would help them avoid those costs.”

The initial evaluation of physical and biological characteristics of ag residue will be done in the ARS lab. This will help determine which ones have the potential to warrant in-field testing. ■

Top right photo: Gary Feyereisen (left), USDA Agricultural Research Service engineer, discusses results from testing agricultural residues in bioreactors with Riley Maanum (center) of the Minnesota Corn Growers and Al Doering, AURI scientist, at AURI's coproducts lab in Waseca. Left photo: Feyereisen draws water samples from a test bioreactor used to filter water from farm drainage tiles.

Editor's Note: about the writer Dan Lemke

This is the final Ag Innovation News story contributed by Dan Lemke, former AURI communications director. He has accepted the communications director position with Minnesota Soybean in Mankato. Dan has written a couple hundred stories for Ag Innovation News since he joined AURI in March 1995, coming from KEYC-TV in Mankato where he was a weather and farm market reporter. Not only did Dan write an abundance of short, reader-friendly articles about innovative projects and businesses, he was a great communicator for AURI, with a quick wit and friendly, positive attitude. Dan expanded AURI's presence at Farmfest, trade shows and through social media such as Facebook and YouTube, among other AURI online and print communications. While he may no longer be on AURI's staff, he won't be far away at one of AURI's partner organizations, Minnesota Soybean, which is the Minnesota Soybean Growers Association and Minnesota Soybean Research & Promotion Council.



AURI and bioreactors



Idea to opportunity: Bioreactors that filter water from farm drain tiles typically use wood chips, which are rising in cost. If the chips are replaced with ag residues, producers could use their own byproducts to filter drainage water.

Outcomes: AURI's 15-month project is testing and comparing the effectiveness of ag residues, such as corn stover and straw, at the USDA-ARS lab in St. Paul.

Funding partner: Minnesota Corn Growers

AURI and CHECKoff dollars at work

BY CINDY GREEN

Starch turned to plastic? Check.

Trucks run on soy? Check.

Got milk? Check.

For decades, checkoff dollars raised through the sale of commodities have funded projects that have escalated new uses and markets for ag products.

Farmers contribute the dollars when they are paid for commodities, and a small fraction is “checked off” for research and promotion. For example, corn growers pay a penny per bushel. Soybean growers contribute one-half of one percent of sales, and milk producers pay 15 cents per hundredweight (100 pounds) of milk. Almost all major commodities have checkoff programs.

The dollars fund research grants that churn out major new uses for commodities — like soy-based biodiesel and corn-based food containers. Or they pay for promotions like dairy’s “3-Every-Day” wellness program.

Farmer-controlled organizations, such as Research & Promotion Councils, manage the funds. A major portion is dedicated to research grants to develop new uses for commodities.

Several commodity groups have turned to AURI for help with identifying new use opportunities, defining research needs,

managing projects and conducting tests and analysis at AURI laboratories.

Jim Willers, who farms near Beaver Creek and is past chairman of the Minnesota Soybean Research & Promotion Council, credits AURI with being at the forefront of biodiesel development — perhaps soybean’s biggest success story. “AURI did a lot of testing in the early stages of biodiesel,” Willers says. The renewable fuel “created a major use for a large amount of soybean oil ... and has raised the price of soybeans.”

“Soybean oil use to be a drag on the market because there was a demand for soy meal and not for the oil. ... Now it tends to follow the price of petroleum oil 94 percent of the time.”

Corn and dairy at the table

Rich Trebesch, who farms near Sleepy Eye, Minn. and chairs the Minnesota Corn Growers expanded uses team, says AURI is often at the table when they make research decisions. “When we have people come in with proposals, people from AURI sit in on the presentations, and we get feedback from them.”

AURI also develops project ideas. “AURI will come to us with some projects that they think we would be interested in funding,” such as testing feeds with distillers dried grains in cattle, swine and poultry diets. The corn growers’ research funds go farther,

matched with AURI technical assistance and often state and federal funds.

“The reverse is also true. We’ll go to AURI with some proposals that we think they would fund ... a lot are with the University of Minnesota,” Trebesch says.

This past year, AURI initiated a partnership with the Midwest Dairy Association. “We have been invited to take part in their research priority meetings,” says Jen Wagner-Lahr, AURI project director.

AURI helps the association establish “what kind of research they want in the RFP process.” At the association’s annual meeting, dairy producers and industry members hear proposals from various universities. “We then meet with members and faculty members to set priorities,” Wagner-Lahr says. Projects are conducted through the Midwest Dairy Foods Research Center and some receive AURI funding.

Mary Higgins, Midwest Dairy Association vice president of ingredient marketing, says the goal is “to increase dairy consumption by giving consumers the products they want. ... We work on joint initiatives that benefit consumers, the industry and, ultimately, the dairy producers.”

A history with soy

Dennis Timmerman, AURI project director, has met annually with soybean growers for the past several years.

“One-third of the soybeans grown in Minnesota are exported. Soybean growers would like to have more of those processed here, because it creates jobs and markets for soybean growers,” Timmerman says.

With opportunities in “green” markets, soybean growers recently funded an AURI market study and Minnesota manufacturers survey on using bioplastics. “We also looked at feed markets and identified potential for low-oligosaccharide soybean meal,” Timmerman says.

“Back before AURI, our farmers would look over some of these research proposals, and they did not have the expertise to determine if they were viable or not,” Willers says. “If we did fund the projects, we weren’t always able to see if they were being handled properly.”

“We may have ideas within the farm community, and we can give it to AURI and they can come back with a project,” Willers says. If a project involves a private company, “they’ll vet that company, manage the project and see it through to the end.”

“Our percentage of successful projects is much higher now with AURI. They have the expertise.”

AURI has managed dozens of projects funded fully or in part by commodity checkoff dollars. Some of the projects recently initiated include:



Testing copper in milk

Some dairy co-ops are having problems with spontaneous milk oxidation before and after pasteurization, which may be related to high copper rates in dairy feed, common in the spring. AURI is helping to develop a quick test for copper levels in milk and a U of M flavor chemist is determining if a specific flavor compound could identify milk that is prone to oxidation. Project partners include the Midwest Dairy Association and Midwest Dairy Foods Research Center.

Building with bioplastics

Bio-Plastic Solutions, a plastic components manufacturer in Blooming Prairie, is developing moldings, trims, and cabinet accessories made with bio-based material. AURI’s coproducts lab in Waseca has helped identify biomass that can be combined with PLA and other materials to make bioproducts with structural integrity. Minnesota Soybean and Minnesota Corn Growers are project partners.

The future of bioplastics

AURI led a two-year bioplastic market study and a survey of Minnesota manufacturers on using biomaterials. The project culminated with a bioplastics forum in August, which brought together more than 80 industry, economic development, academia and government representatives to discuss opportunities for building a bioplastics industry in Minnesota. Sponsors included Minnesota’s Soybean Research & Promotion Council, Corn Research & Promotion Council and Southern Minnesota Initiative Foundation.

Tapping central Minnesota markets

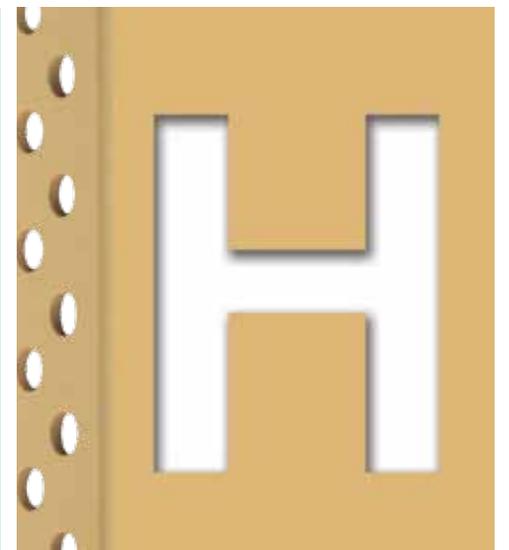
AURI is assisting the Ottertail County Soybean Processors Co-op with identifying niche markets in central Minnesota, such as livestock producers and pet food processors interested in purchasing soybean meal from the co-op.

Developing low-sodium cheeses

AURI assisted the Midwest Dairy Association and the Midwest Dairy Foods Research Center with developing and improving low-sodium processed and natural cheeses.

New wheat and barley uses

AURI is expanding a 2002 report on value-added and alternative uses for wheat to include barley. The updated report will look at opportunities and barriers for potential new or improved wheat and barley uses. The second phase will disseminate information and explore viable options in northwest Minnesota. The Minnesota Wheat Research & Promotion Council is a project partner.





Whey clean

This project follows a successful 2010 AURI initiative that demonstrated bacterial biofilms forming on the filtration process in whey-processing facilities. The study will test a sanitation protocol and provide recommendations to the dairy industry. The Midwest Dairy Association is a project partner.

High-tech livestock

In August, AURI held livestock technology forums at Farmfest to share results of AURI initiatives on new processes and products that can improve performance and reduce production costs for Minnesota's livestock industry. Forum sponsors included Minnesota's Soybean Research & Promotion Council and Corn Research & Promotion Council.

Goat meat feasibility

This project updated a 2001 AURI feasibility study on initiating a goat meat industry in Minnesota. The study looked at goat breeds and production issues in Minnesota, ethnic markets, potential slaughtering and processing facilities, and consumer demand. Midwest Dairy Association is one of several project partners.

Defatted soymeal

AURI assisted Midwest Ag Enterprises with developing a process to refine the protein in soybean meal to make a high-value feed ingredient for cattle, hogs and poultry — similar to soy protein concentrates used in the food industry. A process was developed to remove anti-nutritional oligosaccharides, which potentially could be used to make ethanol. (see story, page 2)

Cleaning drainage water with ag residue

Crop residues, such as straw and corn stover, are being tested in bioreactors that consume nitrates in water flowing from farm drainage tiles. (See story on page 3) The Minnesota Corn Growers Association is a project partner.

Corner stover estimates

This study will analyze potential corn stover biomass availability at various distances from electrical or biofuels plants. Stover, the leaves, stalks and cobs left in a field after harvest, is a feedstock for fuel production. Researchers will also look at how producers decide whether or not to harvest stover. The Minnesota Corn Growers Association is a project partner.



DISTILLERS DRIED GRAINS

The following research projects focus on the use of distillers dried grains, a nutrient-dense byproduct of ethanol production. Because of the increasing supply of distillers grains or DDGS, it is cost competitive with other feed sources and its use is increasing.

Controlling contamination

This project is evaluating the potential for antibiotic residues in distillers grains. In ethanol plants, small amounts of antibiotics are used to control bacterial contamination during fermentation. Bacteria compete with yeast for sugars and micronutrients during fermentation, and can reduce ethanol yields by up to 5 percent. Controlling bacteria also improves distillers grain quality. The Minnesota Corn Research & Promotion Council is a project partner.

Soluble-sensible cow diet

Corn solubles are a proven, effective dietary supplement for gestating cows. While their price is low, solubles in liquid form are costly to transport. Buying large quantities, such as a semi-load, could reduce costs. But corn solubles can only be stored for a week. This project looks at alternative methods of storing, handling and feeding corn solubles to reduce costs. The Minnesota Corn Research & Promotion Council is a project partner.

Feeding distillers grains to poultry

Distillers dried grains are becoming more common in poultry diets. However, some producers are concerned that DDGS nutritional content isn't consistent and energy derived from the feed can be influenced by the amount in feed and nutrient digestibility. This study will look at the relationship of various DDGS characteristics in poultry diets. The Minnesota Corn Growers Association is a project partner.

Balancing electrolytes

This study is identifying the optimum dietary electrolyte balance (DEB) in turkey diets that contain distillers dried grains and canola meal. DEB reflects the balance of sodium, potassium and chloride and, when optimized, improves the health of turkeys. DEB can be affected by alternative feed ingredients that contribute sulfur to diets, such as distillers grains and canola meal, but other diet additives can improve the balance. Minnesota Corn Research and Promotion Council is a project partner.

Improving distillers grains in cattle feed

Despite the known advantages of distillers grains low starch and high energy and moisture content for feed rations, some producers are concerned about DDGS sulfur content. If too high, sulfur could cause hydrogen sulfide toxicity and reduce cattle's performance. AURI is funding feed trials using distillers grains with low sulfur concentrations. The Minnesota Corn Growers and University of Minnesota are project partners.



Lowering unsaturated fat in cattle diets

AURI is studying cattle feed made with 35 percent distillers dried grains that have reduced soluble content, which lowers the unsaturated fatty acid in the feed. Increasingly, ethanol plants are removing distillers grains' solubles, which have other uses. Researchers expect feeding low-soluble grains will improve the nutritional benefits for cattle. The Minnesota Corn Growers and University of Minnesota are project partners.

Better with E

Mulberry Heart Disease in domestic swine is increasing. Distillers dried grains in swine diets have been blamed for increasing MHD, as DDGS contains high levels of polyunsaturated fatty acids that impair Vitamin E. However, Vitamin E can be added to DDGS and this study will assess the effects of supplements in sow and nursery pig diets. Project partners include the Minnesota Corn Growers, Minnesota Corn Research & Promotion Council and University of Minnesota. ■



American Bio-Labs founders, from the left: hog producer Scott Hislop, businessman Bruce Dorendorf and veterinarian Brian Caldwell test an improved pellet production system at AURI's coproducts lab in Waseca.

BY LIZ MORRISON

Winnebago, Minn. — American Bio-Labs is pursuing pellet perfection.

The 6-year-old company has developed an integrated system that speeds up the production of feed and fuel pellets and improves pellet quality. The company recently finished testing its patented Slip-Stik™ process and is now preparing to market the system.

In trials at AURI's pilot lab in Waseca, Slip-Stik improved the pellet durability index of crumbly, high-oil livestock feed pellets, such as dried distillers grains, by 10 to 30 percent, says Al Doering, AURI coproducts scientist. For wood pellets, Slip-Stik improved mill "throughput," or volume per hour, by 18 to 30 percent — without a loss of pellet durability. That's an astounding increase in efficiency, Doering says.

These improvements could easily be worth "tens of millions of dollars" in lower costs and greater efficiency for feed and biomass pellet manufacturers and livestock feeders, says Bruce Dorendorf, American Bio-Labs co-founder and president.

An adjustable system

The Slip-Stik process includes an innovative pellet-enhancing material, plus a "bolt-on" applicator that works with any existing pellet mill, Dorendorf says.

The EC-40™ enhancer improves pellet adhesion, slipperiness and water resistance, the company says. Improved adhesion cuts the amount of heat and pressure needed to form pellets, Dorendorf says, and also raises pellet density. Increased slipperiness speeds up milling, lowering costs.

EC-40, a concentrated powder, is made of natural, biodegradable ingredients and is approved for use in livestock feed.

The automated application system, SM-1, combines the EC-40 concentrate with hot water, and injects the solution into the pellet mill through specialized nozzles. American Bio-Labs developed the stand-alone applicator in collaboration with Easy Automation, Inc., a Welcome, Minn., company that makes computer-controlled feed processing systems.

One of the big advantages of hydrating the EC-40 concentrate at the pellet mill is logistics, Dorendorf says. "You're not bringing in pallets of material," which saves labor. Less than a pound of EC-40 is needed to improve a ton of feed pellets.

The Slip-Stik process is easily adapted for different raw materials, pellet specifications or milling needs, Dorendorf says. Often, feed producers are moving many different diet formulations through the same mill. "Our process lets them alter pellet characteristics on the fly," adjusting for variables like pellet hardness, pH, moisture and material throughput.

PELLET

Winnebago company develops
improve production of fuel and



Better feed pellet needed

The original Slip-Stik concept was borrowed from an unrelated industry, says Dorendorf, a Minnesota businessman and entrepreneur. "I was involved in another venture, and they were using a product that I thought could have applications in agriculture."

Dorendorf passed his hunch along to neighbor Scott Hislop, a sixth generation farmer and owner of Choice Connection, a Mapleton hog operation, and Choice Connection's consulting veterinarian, Dr. Brian Caldwell. "I asked Scott and Brian, 'What could we do with this? Is there potential for agriculture?'"

Hislop and Caldwell recognized an opportunity to improve feed pellets, a growing need in the livestock industry.

Feeds with more than 3 percent fat "are very difficult to pellet," Doering says. The soft pellets fall apart during handling, resulting in lots of fines and wasted feed.

In the livestock barn, "pellet quality affects feed conversion," Caldwell says. That's the amount of food an animal has to eat to gain a pound. Wasted feed means higher production costs. As grain prices have climbed, "the value of pellet quality has never been as high as it is today," he says. The swine industry, in particular, "is seeing greater value in pelleting feed," Hislop adds.

In 2006, the three businessmen formed American Bio-Labs, along with two other investors, and began their

pursuit of a perfect pellet. There was just one hitch: "We have livestock backgrounds," Caldwell says. "We didn't know squat about making pellets."

Enter AURI

In 2007, the company contacted Doering for help. "We felt confident coming to AURI" with a new idea, Hislop says, "knowing it would be held in confidence."

Doering has tested thousands of pellet formulations in AURI's pilot lab, and helped hundreds of Minnesota companies pelletize livestock and pet food, solid biomass fuel and natural fertilizers.

Over the course of the next five years, Doering worked with American Bio-Labs to test more than 30 versions of the Slip-Stik process. During the long development phase, a couple of unexpected opportunities appeared.

"Initially, we were focused on improving feed pellet durability," Dorendorf says. In the AURI lab, they discovered that the product had another valuable characteristic — it was very slippery. That meant pellet mill operators could improve pellet durability without having to slow down the processing speed. Ordinarily, Dorendorf says, "you have to sacrifice throughput to get better quality."

They also learned that the Slip-Stik process was a great benefit in pelletizing wood. Throughput for aspen pellets, for example, leaped by nearly one-third. Doering

PERFECT

Slip-Stik system to speed up and improve feed pellets



PHOTOS BY ROLF HAGBERG

American Bio-Labs has patented a Slip-Stik process that speeds up the process for making feed pellets from distillers dried grains. Typically DDGS pellets are crumbly (at left) and the process improves their durability. On cover: The new process includes an enhancer that is sprayed on distillers grains to improve pellet adhesion, slipperiness and water resistance.

recalls his surprise: "I looked at them and said, 'Nobody's going to believe this.'" Not all the biomass materials they tested saw such a big jump in pelleting efficiency, Doering says, "but even a five or ten percent improvement is huge in this industry."

After lab trials were completed last year, American Bio-Labs tested the Slip-Stick system in a variety of commercial pellet mills. In addition to validating performance claims, "we were testing financial viability," Dorendorf says.

"Agriculture, in general, is a low-margin business," Hislop says. "So our process needed to be economical. That's part of the reason it took so long to develop." Adds Dorendorf: "We feel confident that producers will see economic benefit from this."

Moving ahead

American Bio-Labs expects to move ahead with full commercialization this year. Up to this point, product development has been financed entirely by shareholder equity. "We have no debt so far," Dorendorf says. "Early on we decided to fund development internally so we weren't under pressure to take it to the marketplace prematurely."

There have been plenty of ups and downs getting this venture launched, Caldwell says: "Just about the time you think you have it figured out, it doesn't work the

way you expect, and then you have to figure out what went wrong."

"We've tried to take a methodical approach to development and commercialization," Dorendorf says. In the process, the three entrepreneurs have become good friends and discovered that they share a common outlook. "We're like-minded people," Hislop says. "Our glass is always half full."

Quips Dorendorf: "Yes, and we're trying to get it full!" ■

AURI and American Bio-Labs



Idea to opportunity: American Bio-Labs found a material that could potentially improve feed pellet durability and brought it to AURI for testing and development.

Outcomes: Trials by Al Doering, at AURI's pilot lab in Waseca, show American Bio-Labs new Slip-Stik™ process improves pellet density, durability and speeds up the production process.

AURI's busy pellet lab helps Minnesota companies test new ideas

BY LIZ MORRISON

When Scott Hislop and his business partners came up with an innovative product for improving feed pellets, they knew where to get help testing their idea.

AURI's pilot lab in Waseca includes a state-of-the-art CPM11124 commercial pellet mill and many other essential milling tools. Entrepreneurs who come to AURI to test their ideas can be confident that lab results will be similar to those in commercial settings.

"We have assisted hundreds of Minnesota companies and individuals with pellet development," says AURI scientist Al Doering who heads the pilot lab. "We're also working on ways to turn a wide variety of potential energy crops into solid fuel pellets."

"We wouldn't be nearing commercialization without AURI," says Hislop, who manages a Mapleton hog business and co-founded American Bio-Labs. The company is preparing to market its new pellet improvement process, called Slip-Stik.

Working with AURI "speeded up development three-fold — being able to use the lab and technical expertise here," he says. This type of development "is only possible in a lab setting like AURI's."

Bruce Dorendorf, president of American Bio-Labs, agrees: "A company like ours with an idea can't go to a commercial setting to develop it. They can't take time to do testing, and deal with plugged up dies when you don't get it right. It takes a lab setting so we can take lots of samples. The facility here is essential."

Here are just a few of the Minnesota companies and groups AURI has assisted with pellet development:

Alternative Energy Solutions, Altura, Minn. — Technical and pilot lab assistance to develop solid biomass pellets from crop residue and native prairie grasses for use as fuel to heat greenhouses.

Pet Care Systems, Detroit Lakes, Minn. — Technical and pilot lab assistance to identify the correct pelleting specifications for natural pet litters.

Minnesota Valley Alfalfa Producers, Raymond, Minn. — Technical and pilot lab assistance to make fuel pellets from a variety of plant residue fibers.

Hi-Tech Agro, Bloomington, Minn. — Evaluation and pilot lab testing of their flat die pellet mill, using a variety of ag fibers and feed ingredients.

Chippewa Valley Ethanol Company, Benson, Minn. — Assistance evaluating biochar densification.

University of Minnesota Southern Research and Outreach Center, Waseca, Minn. — Pilot lab assistance evaluating the densification and pelleting requirements for livestock feeds that include ag coproducts.

Riverview Dairy, Morris, Minn. — Densification of dairy digester solids into a pellet form for value-added opportunities.

Minnesota Wheat and Barley Growers — Evaluation of the potential for making barley straw pellets in a range of densities in order to pursue expanding market opportunities.

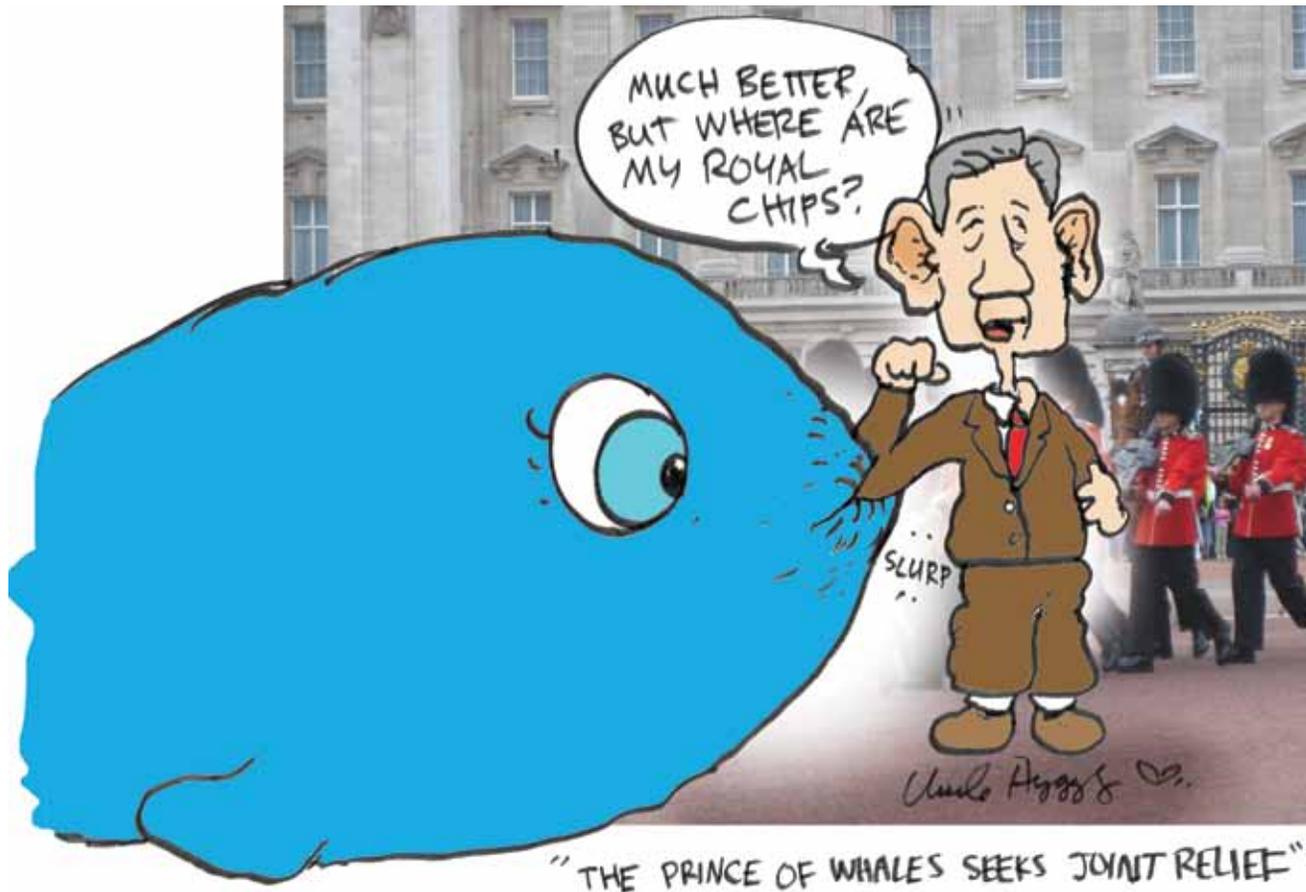
International Renewable Energy Technology Institute, Minnesota State University, Mankato — Densification of corn stover, wheat straw and prairie grass into a solid biomass fuel pellet for energy and emissions research. ■

Al Doering (right) heads AURI's coproducts utilization lab in Waseca that has helped hundreds of Minnesota businesses develop pellets made from agricultural biomass for feed and fuel uses.



BY ASHLEY HARGUTH
 CARTOONS BY UNCLE HYGGLY

Editor's note: As a service to our readers, we provide news about the work of others in ag utilization. Often, research done elsewhere complements AURI's work. Please note that ARS is the USDA's research division.



Algae ready for take-off

South Dakota State University researchers and collaborators are developing ways to use blue-green algae on Earth and in space. They are working on methods to produce oxygen, chemicals, fuel and cleaned water from carbon dioxide, wastewater and sunlight. The National Aeronautics and Space Administration awarded a grant to help fund this project.

From: Biorefining Magazine
 October 3, 2011

Dairy cuts belly fat

Dairy products can help cut belly fat, McMaster University researchers in Canada have found. After a 16-week study of 90 women, the researchers reported that overweight women, who accompanied their exercise program with a high-protein and high-dairy diet, lost more abdominal fat than those with a low-dairy diet.

From: www.dairyherd.com
 September 13, 2011

Omega-3 for joint pain

United Kingdom researchers have found that a diet rich in omega-3, from fish or flax oil, could significantly reduce the symptoms of osteoarthritis. Guinea pigs fed an omega-3-rich diet reduced the disease by 50 percent, compared to guinea pigs fed a standard diet. One researcher said there is evidence that omega-3 not only helps prevent the disease, but influences the biochemistry of osteoarthritis and slows its progression. Further studies will be conducted to confirm the effects in human osteoarthritis.

From: www.nutraingredients.com
 October 19, 2011



Energy in grass

USDA-ARS scientists have developed the use of near-infrared sensing (NIRS) to determine switchgrass value for biorefining. Using NIRS, 20 switchgrass components can be evaluated, such as cell wall sugars, lignin and soluble sugars. Results can be used to determine 13 traits, including ethanol yield.

Although NIRS is already used on corn, this is the first NIRS technology developed to predict ethanol yields of grasses. Researchers say the technology can also be used by breeders and agronomists who are creating cultivars and developing management practices to maximize yields.

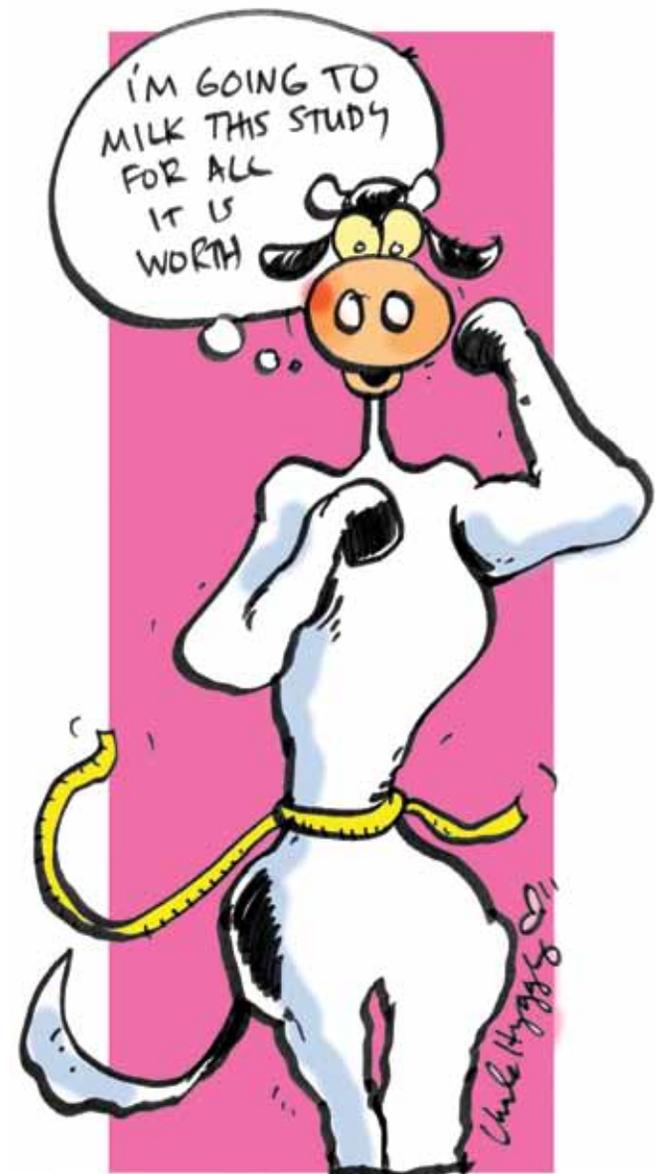
From: USDA-ARS
 August 2011

Super broccoli for the heart

A new broccoli breed that can help fight heart disease has been unveiled by British scientists at the Institute for Food Research. Broccoli was bred to contain two to three times the normal amount of glucoraphanin, the nutrient believed to help prevent heart disease by breaking down fat in the body.

The super broccoli is on sale in select stores in the United States and Europe. Scientists say it should taste slightly sweeter than conventional broccoli.

From: The Associated Press
 October 26, 2011





Meat industry trends

BY CARISSA NATH
AURI MEAT SCIENTIST

Ensuring a safe meat supply

Food industry regulations, particularly for meat and poultry, are becoming more and more prevalent. The USDA Food Safety and Inspection Service (USDA-FSIS) is responsible for ensuring a safe and wholesome meat supply and making sure that food safety hazards are addressed.

Escherichia coli (E. coli) has been a major food safety hazard in the beef industry. One particular serogroup: Escherichia coli O157:H7 was declared a ground beef adulterant in the early 1990s. Now, six other E. coli serogroups are considered adulterants in raw ground beef.

Meat processors will soon be required to closely monitor the six strains and evaluate whether they are reasonably likely to occur in their products. Tentatively in March 2012, USDA-FSIS will implement a routine E. coli sampling program.

Nutrition labeling

Food product nutrition labels are prevalent in the marketplace and provide consumers with information on a food product's nutrients. Until recently, meat product nutrition labeling has only been required on multi-ingredient or heat-treated products. However, starting in March 2012, USDA-FSIS will require nutrition labels on major cuts of single-ingredient raw meat and poultry products. Nutrient information can either be on product labels or point-of-purchase information such as signage and brochures.

What is a major cut of meat under these new requirements? Examples include:

- Beef: chuck blade roast, sirloin steak, brisket
- Pork: country style ribs, tenderloin, sirloin roast
- Lamb: shank, loin chop, leg
- Poultry: whole, breast, thigh

The new rule also requires nutrition labels on all ground or chopped meat products that are produced with or without added seasonings — including ground beef, chicken, turkey and pork. For these products, nutritional information must appear on the product label — not just at point-of-purchase. As with most rules, there are a few exemptions — most concern the meat product's final use when no nutritional claims are made on the product label, and there are some ground or chopped product exemptions as well.

To assist the meat industry, particularly small-scale processors, nutrition labeling materials can be downloaded from the USDA- FSIS website. In addition, if meat processors are members of the American Association of Meat Processors, nutrition labeling materials can be downloaded from the AAMP website.

For more information, contact me at: cnath@auri.org, (507) 537-7060.



PHOTOS BY ROLF HAGBERG

Carissa Nath prepares ground beef for testing at AURI's meat lab in Marshall, Minn.

Focus on AURI's Core Four

Editor's Note: This is the first installment in an ongoing feature on AURI's four primary focus areas. In each issue, we will update our readers on AURI activities, projects and events in these areas.

BY ASHLEY HARGUTH

FOOD PRODUCTS

Wild rice nutraceuticals

Wild rice might be a super food. AURI and University of Minnesota researchers are assessing possible uses for wild rice as a nutraceutical or health-promoting food. "There is increasing interest in nutraceuticals, as people are working to prevent health conditions by eating the right foods," says Charan Wadhawan, AURI food scientist. "This study is a great way to find value-added opportunities for wild rice," a Minnesota crop, says Randy Hilliard, AURI project director. The research will be finished in early 2012 and findings will be published on AURI's website.

BIOBASED PRODUCTS

Biobased event follow-up

During AURI's Biobased Products Event in August, breakout teams formed to brainstorm action items. AURI project director Randy Hilliard, the event's organizer, has been following up on these items.

The research and technology team has been the most active, Hilliard says. They met in October and November and are working on a compilation of biobased certification programs. Hilliard is identifying biobased manufacturing standards, specifications and certifications, including a summary on the USDA BioPreferred program.

For the full Biobased Products report, and presentation materials from the August event, visit the research section at www.auri.org or contact Randy Hilliard at rhilliard@auri.org.

RENEWABLE ENERGY

Midwest biomass resources

AURI project director Becky Philipp and scientist Alan Doering are leading a Midwest Biomass Resources Initiative. AURI is partnering with organizations in Illinois, Iowa, Wisconsin, Michigan, Minnesota, North Dakota and South Dakota to develop a Midwest biomass resource inventory, conducted by North Dakota State University researchers. Project funding is provided by AURI, Bemidji Joint Economic Development Commission and Minnesota Power.

This project follows AURI's participation in the Heating the Midwest Initiative and its biomass resources action team, with Philipp and Doering serving as team leaders. Members of the Heating Initiative represent industry, government, nonprofit, university and tribal organizations that are committed to advancing biomass thermal heat and power from sources such as pellets, wood, agricultural residue and energy crops.

Results of the Midwest Biomass Resources Initiative will be released at the spring 2012 Heating the Midwest Conference in Eau Claire, Wisc. The report will be useful to businesses and organizations interested in biomass energy, such as a north central Minnesota group that is considering a local market assessment of industrial-heating biomass pellet demand. For more information, visit www.heatingthemidwest.org.

COPRODUCTS

Assessing food-processing coproducts

AURI and the University of Minnesota are assessing coproducts produced by Minnesota food processors — particularly those that are under-valued or underutilized.

The assessment will include information on the volume produced in Minnesota, coproducts' composition and market feasibility for using coproducts.

Randy Hilliard, AURI project director, says various industries, including food, will benefit from this assessment that will identify opportunities such as animal feed, biobased products and fuels. When the assessment is finalized, results will be on the AURI website.



Innovation road tours

BY TERESA SPAETH
AURI EXECUTIVE DIRECTOR

At AURI, we don't work alone; we have an expansive network of experts and partners. Recently, I hit the road as part of a year-long "Innovation Tour" to meet up with a few of the important players in our network.

First stops: Suntava and Kindred Kitchen. Although these two organizations are very different, they represent the wide range of possibilities in food production.

Suntava has been working with AURI since 2002 to develop markets for Suntava Red Corn. After years of research and development, Suntava is gaining success not only as a food colorant, but also as a nutraceutical or health-promoting ingredient.

As a past AURI Ag Innovator of the Year, Suntava demonstrates that innovation is more than an idea. The company has worked to understand their product, diversify their markets, take a strategic and deliberate approach to scale-up, and keep an eye on the future. Under the direction of CEO Bill Petrich, Suntava has a clear plan for innovation.

Kindred Kitchen, profiled in the July 2011 Ag Innovation News, is a relatively new partner that we are extremely excited to be working with. Terese Hill, Kindred Kitchen director, took me on a tour of their facilities. This bright new commercial kitchen space looks out onto West Broadway in North Minneapolis. It is part of a revitalization project spearheaded by Kindred Kitchen's parent nonprofit, Catalyst Community Partners.

Entrepreneurs can enroll in Kindred Kitchen's 15-week training series that walks entrepreneurs through everything from food safety to business plans, from accounting to market strategy. Charan Wadhawan, AURI food and nutrition scientist, gives presentations on nutritional labeling and recipe scale-ups. We are happy to be a part of this holistic approach to growing local business.

Suntava and Kindred Kitchen exemplify two principles that AURI sees as critical to successful ventures: a focus on deliberate implementation of an idea and a comprehensive approach to supporting the whole venture – not just the product or technology.

Both stops provided me with insights on AURI's programs, our clients and the future of the food production sector. More importantly, the innovation tours first stops reinforced how valuable good networks and partners are to the work we do at AURI. ■



PHOTOS BY ROLF HAGBERG



Top right: Suntava, a Minnesota company, is extracting a red colorant from purple corn bred by Red Rock Genetics of Lamberton, Minn. The natural colorant is used in a range of products — from sports drinks to tortilla chips. Below left: Teresa Hill manages Kindred Kitchen, a food incubator in north Minneapolis that offers a fully-licensed commercial kitchen space and workshops for entrepreneurs such as Shashank Dhadphale (at right), of Tastee Blends, which makes various spice seasoning blends for the food service industry.

AURI provides assistance to Minnesota businesses, entrepreneurs, cooperatives and emerging companies to develop new uses for agricultural products, generate economic activity and stimulate job growth.

AURI is a dynamic research institute that provides scientific technical assistance, access to laboratories and pilot plants, technical and market feasibility reviews and a network of resources to help ideas become reality.

Project focus areas:

- Food Processing
- Ag-based Renewable Energy
- Biobased Products
- Coproduct Utilization

AURI helps clients:

- Develop a product or process
- Find process efficiencies
- Identify potential revenue streams
- Determine feasibility
- Prove a concept
- Advance to commercialization
- Find information on value-added agricultural industries

AURI technical staff have expertise in:

- Food product development (including meat and grain product specialists)
- Recipe scale-up and formulation
- Nutritional analysis and shelf-stability testing
- Pellet fuel development and feedstock densification
- Anaerobic digestion
- Project management
- Network development
- Many other areas

What to expect when working with AURI

- Seamless service from idea to implementation.
- Unbiased information grounded in science, technical knowledge and experience.
- Assistance from scientists and technicians in unique laboratory facilities.
- Dedicated project staff who help assess market opportunity, develop an implementation plan, explore available resources, and facilitate coordinated services from AURI.
- Access to leading research in agricultural processing in the areas of food, renewable energy, biobased products and coproduct or waste product utilization.
- Connections to a variety of resources that help businesses achieve goals.

AURI's specialized laboratories

AURI laboratories in Crookston, Marshall and Waseca provide specialized testing, analysis and product development assistance including:

Food product development

Shelf-life, sensory evaluation, nutritional assessment, regulatory assistance, packaging assistance, recipe formulation

Analytics

Microbial, gas analysis and chemical analyses

Fats and oils testing

Analysis in fats/oils, biomass, food, feed and meat

Meat products

Smoking, packing, processing and other meat product development

Coproduct utilization

Fertilizers, sorbents, renewable fuels, energy, animal feeds, soil amendments, biodegradables

Pilot performance

Grinding, milling, size reduction, blending, pelleting, drying

How to get involved with AURI

- Contact one of the AURI offices to speak with a project development director about your business.
- Visit www.auri.org to see the latest research and learn about upcoming events.
- Sign up to receive Ag Innovations News or the AURI e-newsletter to stay informed about AURI projects and clients.
- Follow AURI on Facebook and Twitter to get notices about new research, upcoming events and where to find AURI at tradeshow.

Visit www.auri.org or contact one of our regional offices:

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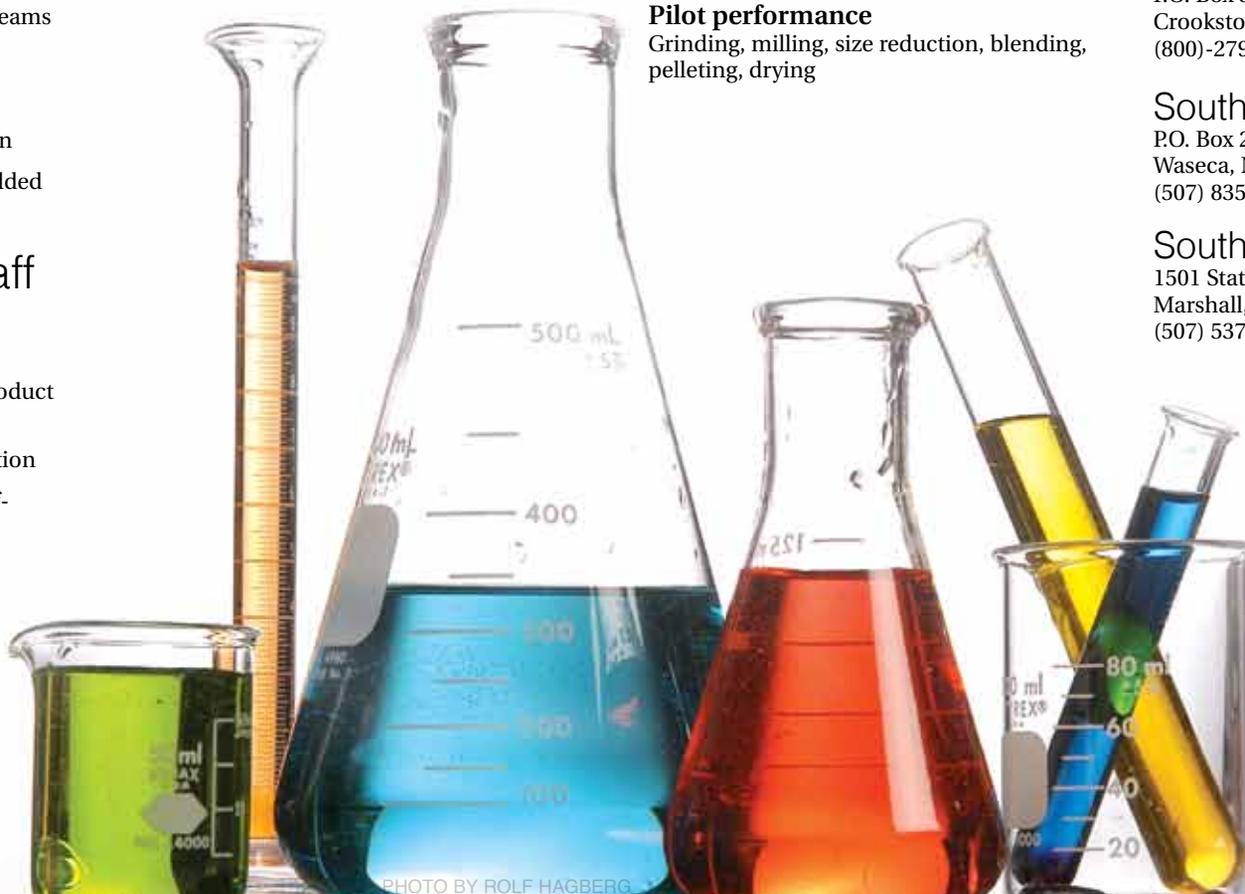


PHOTO BY ROLF HAGBERG

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Ag Innovation News celebrates 20th birthday



PHOTOS BY ROLF HAGBERG

BY CINDY GREEN

This issue marks the 20th anniversary of Ag Innovation News, AURI's flagship publication. The quarterly newspaper was designed in 1991 when one of AURI's early board members, Ralph Prescher of the Minnesota Soybean Growers Association, suggested that AURI be a comprehensive source of news about value-added agricultural developments.

In the inaugural January 1992 edition, Richard Nelson, then AURI's executive director, wrote: "Four times each year, these pages will offer a sampling of AURI's accomplishments in ag

product commercialization, technology transfer and applied research. ... There will also be news of important progress in agricultural utilization wherever it occurs." Along with news of AURI projects and activities, the first issue featured "New Uses Roundup — around the nation and the world." The regular feature later became "Elsewhere in ag innovations," and continues to offer news of ag product developments around the globe.

The newspaper is designed to make research and technical information easy to read and enjoyable for the average user. From an initial subscription list of 4,000, it has grown

to reach more than 12,000 print and online readers every quarter, covering AURI's work in the development of new food products, renewable energy, biobased products and new uses for agricultural coproducts.

"I can't count the number of times people have told me how much they love our newspaper," says Teresa Spaeth, AURI executive director. "Ag Innovation News brings to life the good work that is being done in our laboratories and in our clients' businesses. ... The stories in these pages highlight the opportunities, innovations and future of agriculture." ■