



AG INNOVATION NEWS®

The newspaper of the Agricultural Utilization Research Institute

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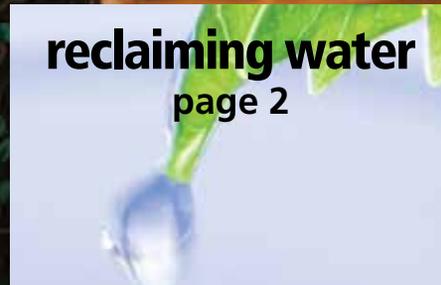
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Reclaiming water

Study looks at using treated wastewater in ag processing to conserve groundwater supplies

BY CINDY GREEN

Nothing can be sustained without water, including industry. Once considered a free and unlimited resource, water is now a limited resource in many parts of the United States, forcing communities and industries to conserve and recycle water.

Minnesota, fortunately, has not faced water shortages like California and Florida. But some Minnesota regions do have limited groundwater supplies that could hamper construction of new ag-processing plants there, says Jen Wagner-Lahr, AURI project director.

AURI and Metropolitan Council Environmental Services are collaborating on a study to look at using “reclaimed water” from municipal wastewater treatment plants for nonpotable ag-processing uses.

In Minnesota, agriculture uses about 40 percent of groundwater supplies. While only one percent of that is for biofuels production, ethanol critics frequently point to the fuel’s water use.

“Ethanol has come under fire — water use is a big thing that critics use against the renewable fuel,” Wagner-Lahr says. It’s arguable that petroleum production requires more water than ethanol, but a more palatable solution is to recycle water rather than pull fresh supplies from the ground.

MCES’ portion of the study, conducted by Craddock Consulting Engineers of St. Paul, found that using reclaimed water is most economical for ethanol plants close to a wastewater treatment facility with high-quality effluent. “Getting reclaimed water to the ethanol plant is a huge part of the cost,” says Deborah Manning, MCES principal engineer.

Ethanol plants are most likely to use reclaimed water for cooling, which requires more treatment before the ethanol plant can use it, Manning says. Further treating the effluent, which may include chemical additions, filtration and enhanced disinfection, also increases cost.

Regulating water

Changing regulations could impact the economics of using recycled versus fresh water.

The Minnesota Pollution Control Agency is developing a “Total Maximum Daily Load” program that will affect surface water discharges for most communities. For example, the Lake Pepin Watershed’s TMDL will affect nearly two-thirds of the state — including the Mississippi, Minnesota and St. Croix Rivers and all waters that feed into those systems.

“As wastewater treatment plants upgrade to meet TMDLs, their discharge may become closer to what an ethanol plant needs for uses such as cooling water,” Manning says.

Another factor making reclaimed water desirable is groundwater-permitting requirements by the Department of Natural Resources. “As water becomes more scarce, those permits are harder to get — an impetus for people to look at other nonpotable water-supply sources,” Manning says.

Southwest and southeast Minnesota have groundwater limitations, according to the DNR. “Ethanol plants are located in these areas because of proximity to corn. That’s good ... but the water supply issue can be a challenge. I would expect people would want to start looking at alternative water supplies,” Manning says.

Recycling now

Some Minnesota communities and ethanol plants are being proactive. The City of Winnebago, for example, discharges about 350,000 gallons of treated wastewater into the Blue Earth River daily. That’s about the same amount of water used daily by the Corn Plus ethanol plant, located just east of Winnebago, which is considering using the treated water in its plant. It would be the state’s first ethanol plant to use recycled water, although a natural-gas powered electrical plant in

Mankato is using reclaimed water for cooling.

Wagner-Lahr says there are also ethanol plants in North Dakota and Kansas using reclaimed water. “At the Casselton (N.D.) plant, they are piping water over 25 miles from Fargo; that’s expensive.” The reclaimed water is “not necessarily for their process water but certainly for cooling, nonpotable water,” Wagner-Lahr says.

Statewide, approximately 600 municipal plants yield about 425 million gallons of treated wastewater daily — nearly matching the daily water use of Minnesota industries. In the Twin Cities 7-county metro area, MCES collects and treats about 255 million gallons of wastewater a day at seven facilities.

“There is a question about why MCES is interested in an issue that is more of a Greater Minnesota issue in terms of where ethanol plants are and water supply concerns. However, the Twin Cities metro area has had an ethanol plant and there have been plans for others,” Manning says. “We are interested in reclaimed water; anything we learn can be applied to other sectors.”

Next step

This summer, MCES completed its portion of the reclaimed water feasibility study. “What we’re looking forward to is ... the implementation,” which will include industry forums on the topic led by AURI, says Wagner-Lahr.

“Ideally, we’d like to convene groups of people in a couple of venues,” such as the Corn Growers Association state convention in January, “and ask them, given this

information, is this something you would considered implementing? What is it going to take for industry to grab hold of it?”

So far, the reclaimed water-use study shows that “it’s feasible given the right set of conditions,” Wagner-Lahr says.

“Right now a lot of things have to line up for it to be financially viable,” Manning says. “But I do think there are shifts such as TMDL standards that will cause people to look more closely at reclaimed water ... it can become a stronger option.

“I would say that if an ethanol facility hasn’t had a conversation with their local wastewater plant, they really should.” ■



2010 AURI initiatives will help shape

Minnesota's ag future

By Dan Lemke

Every year, AURI helps dozens of businesses and entrepreneurs develop ag-based products, move technology into real-world applications and improve their likelihood of success.

But equally important to AURI's mission are industry-wide initiatives

that investigate emerging value-added opportunities. These projects are identified through stakeholder meetings and attention to budding trends.

"To see around corners we need to take advantage of the eyes of our working partners," says Michael Sparby, AURI project director. "What they see happening

in their industry, combined with our expertise and observations, helps us to see what possibilities are developing."

Unlike proprietary projects, information from AURI initiatives is public and meant to be shared with those who could benefit.

2010 INITIATIVES INCLUDE:

Biomass lignin content effect on densification

Identify lignin, cellulose and hemi-cellulose content of various biomass materials and the content's relationship to densification potential, specifically for pelleting biomass.

Biomass solid fuel heat/energy delivery evaluation

Identify a system to test combustion characteristics of multiple biomass fuels for residential and, potentially, industrial applications.

Natural and organic meat product requirements

Develop informational materials on natural and organic meat production requirements for processors and others interested.

Agricultural industry and urban outreach

Educate the urban consumer on safe food-handling techniques and the role we all play in assuring a safe and wholesome end product.

Oligosaccharide assessment validation

Validate the benefits of using low-oligosaccharide soybean meal in swine and turkey diets.

Assessment of carbon sequestration

Assess the soil amendment value of various carbon materials from direct combustion and gasification. Evaluate different application rates and the short and long term benefits of returning carbon to the soil.

BQ-9000 certification of biodiesel laboratory testing

Offer direct and timely support to the biodiesel industry including new plant start-up assistance and troubleshooting.

Sustainable switchgrass and cordgrass

Determine fertilization requirements for switchgrass and cordgrass, and evaluate switchgrass varieties for Northwest Minnesota.

Lactose analytical quality testing methods

Assist dairy industry in developing a biosensing method to quantify lactose blood-glucose meters. This will improve the dairy industry's ability to monitor lactose in dairy ingredients and products.

Membrane biofilms

Evaluate membrane properties and cleaning systems designed to prevent biofilm processing during membrane processing.

Local foods distribution systems

Examine supply and demand capacity of the local food system, bottlenecks that disrupt the system and potential solutions.

Organic and natural feed markets

Develop a guide for organic and natural feed suppliers to help connect them to producers.

Investigating drying technologies for post-digester solids

Identify and evaluate economical and practical solutions for drying post-digester solids.

Summary of the state of biofuel production technology in Minnesota

Report on planned or implemented technology for ethanol production around the state. Beside basic wet and dry milling processes, look at efforts to reduce carbon footprints, develop cellulosic ethanol and other technological advances.

Butanol diesel blends

Evaluate the performance and emissions of butanol fuel blends in modern diesel and gasoline engines. Butanol may reduce particulate-matter emissions while maintaining superior cold-flow properties.

Farm-scale energy generation with hydrous ethanol

Collaborate with industry to develop a portable generator optimized to use high-ethanol blends.

Crop residue valuation template

Develop a template that allows anyone to calculate the financial value of crop residues such as corn stover and wheat straw.

Biomass air emission profile

Develop a biomass emissions profile to reduce permitting time and expense, which may allow more renewable energy projects to be implemented in Minnesota.

Biomass crop establishment

Determine best methods to establish prairie cordgrass and wild rye for biomass energy production in northwestern Minnesota. ■

BETTER MEAL DEALS:

Low-O meal easier on piglet tummies and farmers' wallets

STORY BY LIZ MORRISON

What if you had to eat the fibrous coconut shell along with the delicious coconut meat and milk? Talk about digestive distress!

That's what it is like when a newly-weaned baby pig consumes the fiber portion of soybean meal — “gas, flatulence and overall discomfort,” says Sam Baidoo, University of Minnesota swine scientist.

Pigs and other animals with a single-chambered stomach can't break down complex-sugar molecules called oligosaccharides (oh•LIG•oh•SACK•uh•rides) in soybean hulls and fiber. In baby pigs' digestive systems, oligosaccharides interfere with nutrient absorption, slowing weight gain and causing bloating and diarrhea.

Now, Baidoo is testing soybean meal that has been specially processed to remove about 80 percent of oligosaccharides. Removing the offending sugars leaves a nutrient-dense soybean meal that is easier for baby pigs to digest and less expensive than other protein sources.

AURI and the Minnesota Soybean Research and Promotion Council are sponsoring the nursery-pig feeding trials at the University of Minnesota's research center in Waseca.

The two organizations are also funding “low-O” soybean meal feeding trials in poultry. Oligosaccharides in turkey and chicken rations increase the amount of moisture in the manure, degrading litter quality and raising waste management costs. The poultry research is led by U of M animal scientist Sally Noll.

Using low-O soybean meal in pig and poultry diets could improve feed efficiency and cut livestock production costs, says Dennis Timmerman, AURI project director. Low-O meal could also expand soybean meal consumption in Minnesota, the third-largest soybean-producing state.

Severe financial stress in the livestock sector adds urgency to this research effort, says Mike Youngerberg, Minnesota Soybean Growers Association field services director. After many months of thin or negative profit margins, “the swine and poultry industries are looking for any feed efficiencies they can find.”

A cheaper protein source

Removing most of the soybean fiber yields a higher-protein soybean meal — a big advantage for hog and poultry feeders. Low-O meal is about 57 percent protein, Baidoo says, compared to 44 percent protein in conventional soybean meal, or 49 percent in de-hulled soybean meal. And without the



Tests at a University of Minnesota research center show that a new Low-O soybean meal feed, with complex sugars removed, is easier for baby pigs to digest.

fiber, soybean amino acids — the building blocks of protein — are easier for monogastric animals to absorb, Baidoo adds.

Nursery pigs, which grow from about 14 pounds at weaning to about 40 pounds in 28 days, need a very high-protein diet. That's spendy.

Starter feed usually contains expensive, high-quality proteins such as whey and fishmeal, which supplement the amino acids in soybean meal. These feed ingredients may be two or three times the price of soybean meal, Timmerman says. The hope is that low-O soybean meal could perform comparably at a fraction of the cost, he says.

Baidoo is running trials to compare growth rates, feed conversion and health of pigs fed a conventional starter diet versus several different low-O diets. Sally Noll is doing the same with turkeys. Results will be available later this year.

The Minnesota research is attracting considerable interest from livestock nutritionists, Baidoo says. “Anything we can do to reduce costs is helpful.”

The next step

If low-O meal performs well in livestock rations, the next step is to improve the process for extracting oligosaccharides from soybeans, Timmerman says. AURI has already sponsored some preliminary research on this problem.

Another challenge will be “to find markets for the extracted sugars,” Youngerberg says. Uses for oligosaccharides include food additives and dairy cattle feed. In the future, oligosaccharides could be used to make cellulosic ethanol.

Eventually, genetically-modified, low-O soybean varieties may be developed for specific livestock markets, Baidoo says, offering Minnesota farmers another value-added crop to grow.

Soybeans — abundant, high in protein, palatable — are the foundation of livestock nutrition. Minnesota, which ranks first in turkey production and third in hog production, is a huge potential market for low-O meal, Youngerberg says. “We're trying to make soybean meal a better fit for our customers.” ■

Two AURI-sponsored projects will help make soybean meal a better nutritional fit for livestock feeders.

New soy plant captures niche market for dairy feed

STORY BY LIZ MORRISON

A new soybean crushing plant in the heart of dairy country will help farmers boost milk production.

Benchmark Ag LLC plans to build a \$14 million expeller plant to manufacture high-bypass protein soybean meal — a specialty dairy cow feed — in Cannon Falls, Minn. The plant will supply feed to milk producers in southeast Minnesota and west central Wisconsin.

High-bypass protein soymeal can bolster dairy profits by raising milk output three to five percent. Although it's not a new product,

“Minnesota dairy producers don't have a ready source now,” says Dennis Timmerman, AURI project director.

“I think this is a golden opportunity for investors as well as for soybean producers and the dairy industry,” says Benchmark Ag President Dewayne Bloem, a grain industry veteran and former Land O' Lakes executive. “For investors, it offers the prospect of a good return; for soybean producers, an alternative market close to home; and for dairy producers, huge transportation savings.”

The expeller plant will crush about four

million bushels of soybeans a year, producing 96,000 tons of specialty soymeal and 4.3 million gallons of partially-refined soybean oil, says Joe Mooney, Benchmark Ag founder and chief executive. The business, located near major dairy centers in two states, will tap a nearby market of more than 500,000 dairy cows, Mooney says.

Benchmark Ag just finished a feasibility assessment, funded by AURI and the Minnesota Soybean Research and Promotion Council. The company has purchased a 14-acre building site in the Cannon Falls industrial park. Now, the management team

— including Mooney, founder of several successful computer companies, Bloem and Mooney's longtime business partner, Dick Parry — is preparing to raise \$7 million in equity capital.

A growing market

The venture evolved from a 2007 AURI report that identified niche market opportunities

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PHOTOS BY ROLF HAGBERG

Business partners Dick Parry (left) and Joe Mooney stand in a soybean field near Cannon Falls, Minn. where their company, Benchmark Ag LLC, plans to build a soybean expeller plant that will produce high-bypass protein dairy feed.



A taste of Germany

An authentic German restaurant in southeast Minnesota now retails its popular sauces and schnitzel

BY MARY STEIDLER

Houston, Minn. — The flavors of Old World Germany can be found nestled in the Mississippi bluffs of southeastern Minnesota. “Through the Grapevine,” a restaurant featuring traditional German cuisine, offers homemade ketchup, shrimp dip, sweet horseradish and tartar sauce with every meal. Now the diner’s popular condiment sauces are being offered for retail, along with schnitzel mix for breading pork and fish.

Restaurant owner Rosemarie “Rosie” Buege says Through the Grapevine uses “as many Minnesota-grown ingredients as we possibly can,” including horseradish, tomatoes, potatoes, peppers and herbs. She chose her restaurant’s top four sauces to bottle and sells Rosemarie’s sauces at her restaurant, area retailers and eBay.

“People almost drink them like water,” Buege jokes, adding that all are versatile enough to be served with a variety of foods. The ketchup,

with its tangy German taste, is the best seller — appealing to all ages. Buege also designed a small booklet with cooking and serving suggestions, attached to each container.

Germany in Minnesota

Buege is a native of Germany who grew up eating and preparing traditional German foods. When she met her husband, he was serving in the United States Air Force in Germany. They moved to Houston, Texas in 1974 and three years later to another Houston — in Minnesota — where they purchased her husband’s family farm.

Buege owned and operated flower shops for many years, and continued to cook dishes she grew up with. “I cooked for twenty years in Germany and just couldn’t give it up,” she says.

In 1997, upon closing her Houston flower shop, Buege decided to fulfill a lifelong dream — to share her love of German food. She

converted her shop space to a restaurant and opened Through the Grapevine, which has operated for 12 years.

The quaint diner is known not only for delicious, authentic German cuisine but its Old World atmosphere with hanging flower baskets and German decorations throughout.

As soon as the restaurant opened, many German-American customers came to share stories of meals their parents and grandparents had cooked. “People remember good meals for a long time, and I kept hearing from customers who had great family memories.” But recipes for many of the dishes had not been passed down, and “no one in their family remembered how to make them,” Buege says.

“They wanted sauces; they asked about the spices. We decided to help them prepare the foods in their own homes.”

To begin, Buege prepared her own sauces in large volumes, then sold them at Through the Grapevine. They were an immediate hit and

one day an inspector suggested that she sell the sauces at retail establishments. Buege was interested but had to do some homework first.

Tradition bottled

“We were exempt from labeling (because of size), but we wanted to do it right to begin with,” Buege says. She contacted AURI’s food scientist Charan Wadhawan for a full nutritional analysis of the sauces. Then Wadhawan helped Buege formulate four sauces and a schnitzel mix at AURI’s food lab in Crookston. “We helped to standardize the recipes, source ingredients and analyze the nutrients so that customers would know exactly what they were getting,” says Wadhawan, who also connected Buege to a seminar on marketing new food products.

Buege hired a local company to design and print nutrition and package labels, and the old-time sauces emerged with an updated look and complete product information on each container.



At right, Rosemarie Buege (center), owner of Through the Grapevine restaurant, visits with AURI's Mary Steidler (left) and business advisor Shelby Martin about the restaurant's popular condiment sauces and schnitzel mix that are now on the retail market. Above, schnitzel-breaded pork fillets and, at left, a Reuben adorned with Rosemarie's horseradish sauce, are customer favorites.



To get new ideas for sauce uses, Buege pays attention to her customers. She noticed restaurant guests using the dip she created for seafoods on vegetables, bratwurst and bread. "A woman told me yesterday that she uses the tartar sauce on potatoes."

The schnitzel breading, a rich mix of herbs and spices, is traditionally used on pork loin and cod fillets, but can also be used on chicken, fish, cauliflower, mushrooms and onion rings. "The breading is very easy and fun to use ... it comes with instructions for beginners."

With demand for her products increasing, Buege is considering hiring a bottler and a Twin Cities distributor. Sam's Club has approached her with interest in carrying Rosemarie's sauces and mix.

Buege plans to add more items to her line, and currently has a new mustard sauce in the works. "We're excited that our customers can have an authentic German experience at our restaurant and now they can recreate those tastes in their own homes."

To purchase Rosemarie's products online, visit eBay.com and search for German sauces. Schnitzel mix and the condiments, which retail for about \$4.99 each, are also sold at Through the Grapevine restaurant and area retailers, including Winona, Houston and LaCrosse, Wisc. grocers. ■

Celebrating Farmfest 2009

BY MARY STEIDLER

Redwood Falls, Minn. — Cool, dry weather, topical forums and the opportunity to compare seed varieties and farm equipment brought thousands of people to Farmfest 2009 at the Gilfillan Estate near Redwood Falls August 4-6.

It was also an opportunity for AURI to celebrate 20 years of operation.

“Farmfest remains our single biggest opportunity to showcase agricultural innovations to people who care about the agriculture industry,” says Dan Lemke, AURI communications director. “And this year we had the opportunity to promote AURI’s two decades of assistance to Minnesota.”

AURI’s Farmfest tent included product and informational displays, food samples, games, registration to win biodiesel, a food drive to benefit the local food shelf and even AURI birthday cake.

“We always try to make our Farmfest display a fun event that provides information to people even if they’re not really there to learn,” Lemke says. “There are a lot of innovative things happening in Minnesota, so this is a perfect opportunity for us to highlight them and let folks know what’s being developed.” ■



PHOTO BY DAN LEMKE

Visitors at AURI’s Farmfest tent sampled barbecue sauces made by BOLT Enterprises, a business run by Westbrook-Walnut Grove High School students.



PHOTOS BY DAN LEMKE

Minnesota really cooks

BY DAN LEMKE

Falcon Heights, Minn. — While many State Fair visitors were noshing on corn dogs, deep-fried candy bars and other food on a stick, some dined on confit of duck rilette with roasted corn and lavender vinaigrette. Others sank their teeth into a Monte Cristo on Brioche with pork, Swiss cheese and fruit compote.

This wasn’t a new food stand, but savory entrees produced by chefs in the State Fair’s Minnesota Cooks program at Carousel Park. Now in its seventh year, the one-day event features hourly food demonstrations by chefs from top Minnesota restaurants. The audience is served up samples, then a panel of chefs and Minnesota farmers who produced the fresh ingredients answer questions.

This year, Minnesota Cooks “needed to strengthen the connection between farmers and consumers,” says Doug Peterson, president of Minnesota Farmers Union, which organizes the event along with Food Alliance Midwest. AURI is the primary sponsor.

Danny Schwartzman, owner of Common Roots Cafe in Minneapolis,

says 65 percent of the ingredients used in his restaurant are locally grown. “It’s a huge advantage for a restaurant to use really fresh ingredients,” Schwartzman says.

“AURI works in many different areas of agriculture, from renewable energy to industrial products and food,”

says Dennis Timmerman, AURI project director. “Strengthening the connection between consumers and the farmers who produce their food can only help the agriculture industry.” ■



At the Minnesota State Fair on September 1, Minnesota Cooks demonstrations were held hourly, each followed by panels featuring chefs and farmers who produced the ingredients. At left, Kay Taylor from the Common Roots Café in Minneapolis, prepares polenta with smokey black-eyed peas, sauteed greens and fried egg..

Dairy feed from page 5

for Minnesota soymeal. Nobody was manufacturing high-bypass protein soymeal in Minnesota, Timmerman says.

The dairy feed is specially processed so amino acids in the meal resist breaking down in the rumen, or first chamber of a cow's stomach. That allows most of the protein to pass into the animal's intestines where nutrients can be more easily absorbed. About 60 percent of amino acids in high-bypass protein soymeal "bypass" the rumen, compared to 40 percent in conventional soymeal.

About a quarter of Minnesota and Wisconsin dairy farms use high-bypass protein soybean meal, the USDA estimates — a market of roughly 185,000 tons per year, according to the AURI report. And demand is expanding, Bloem says, as dairy industry consolidation creates larger, more sophisticated operations. "We see this as a growing business — and a real advantage to dairy producers."

Location, location, location

Today most high-bypass protein soymeal used in southeast Minnesota and west central Wisconsin comes from crushing plants in Mason City, Des Moines or Ralston, Iowa, 120 to 250 miles south, says Bob Carlson, a leading oilseed industry consultant.

Freight charges, which add \$10 to \$20 per ton to the feed cost, discourage use in this region, says Carlson, who prepared the Benchmark Ag feasibility study. Minnesota and Wisconsin dairy farmers told Carlson they might use high-bypass protein meal if they didn't have to go so far to get it. "Or they said they used to use it but didn't anymore because it costs too much to go and pick it up."

Benchmark will have a significant "competitive advantage in lower freight costs," Carlson says. Shipping meal from Goodhue County, instead of central Iowa, could save local dairy farmers as much as \$500 per load, according to the company. "That's a huge savings per cow," Bloem says. "We believe we will have a tremendous transportation advantage."

Premium meal

The 20,000-square-foot Benchmark plant will use a mechanical processing method, called expeller pressing, which squeezes the oil out of the seed, leaving soymeal with a high-oil content of 5 to 7 percent. By contrast, most large soybean crushing plants use solvent extraction, a chemical process that maximizes oil yields.

"Expeller plants cater to niche markets," Bloem says, producing less soy oil than solvent plants but higher-value meal. Expeller-pressed, high-bypass protein soymeal is worth about \$50 per ton more than conventional soybean meal, he says. Although expeller plants operate on thinner margins than solvent plants, "the premium for high-bypass protein meal is enough to make this investment look very good," Carlson says.



PHOTO BY ROLF HAGBERG

Soybean's high-protein content is excellent for dairy feed, but cows are not able to absorb most of the amino acids from conventional soymeal. An improved high-bypass protein feed that will be produced in Cannon Falls, Minn. could offer a new market for local soybean growers.

Benchmark Ag expects about \$44 million in annual revenue, says Parry, Benchmark chief financial officer and former asset manager for Miles Homes. About 75 percent of projected revenue will come from sales of high-bypass protein meal to the dairy industry, Parry says. Benchmark will also market soymeal to hog and poultry farmers, but that product sells for less than the dairy feed, he says. About a quarter of the revenue will come from soybean oil, which will be marketed through distributors for industrial and food products.

The limited liability company has raised \$275,000 in seed money and is now seeking \$7 million from investors to build the plant. The rest of the \$14 million project will be debt financed, Mooney says. Benchmark will also secure \$1.3 million in state and local tax breaks through JOBZ, a rural economic development program. The business will create at least 16 new jobs in Cannon Falls, he says.

A challenging time

No doubt, starting a new business in the current economic climate is tough, Carlson says. The recession, credit contraction,

investor wariness, volatility in commodity markets, faltering demand for soy oil to make biodiesel — all add to Benchmark's challenges, he says.

In addition, "the dairy industry is getting pounded pretty hard," says Mike Youngerberg, Minnesota Soybean Growers field services director. Milk prices crashed in mid-2008, falling from a profitable \$20 per hundredweight to less than \$12 by early 2009 — below breakeven for most producers.

Still, Youngerberg says, high-bypass meal "can improve feed efficiency" for dairy cows, which helps the bottom line. And milk prices — always cyclical — are expected to recover next year when Benchmark breaks ground on the new plant, Mooney says. He's projecting an annual average of 25 percent return on investment.

An experienced entrepreneur, Mooney has launched several computer companies, starting with Benchmark Computer in 1972, when data had to be entered on paper punch cards. He sold that company a decade ago and "retired for about six weeks." Since then, he has started three new software businesses. "I like the front end, developing companies,

getting things started."

Mooney has been working on the Benchmark Ag venture for about 18 months. Initially, he was more interested in producing biodiesel from soy oil. But he shifted course after spotting a more promising opportunity to supply dairy feed to an underserved region. This is his first foray into agribusiness, and "it's been intellectually rejuvenating for me," he says.

Adds Bloem, who will run the new company: "I'm excited; this project has a lot of legs, and should be good for all involved." ■

Elsewhere in ag innovations

BY DAN LEMKE

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.

Samoan bug buster

ARS researchers from American Samoa are investigating the insect repellent qualities of essential oil from a native Samoan plant. The unnamed plant is one of more than 500 flowering species from the South Pacific U.S. island territory. Preliminary studies show the plant's oil repels mosquitoes and pest ants.

From: USDA-ARS
August 24, 2009

Yeast beast

A new yeast could boost ethanol production. ARS scientists have developed yeast that can produce ethanol from five or six carbon sugars without oxygen. This could be an important breakthrough as oxygen levels are difficult to control when yeasts ferment sugars to ethanol.

From: USDA-ARS
July 18, 2009

Runway soy

RePLAY, a soy-based asphalt sealer, is clear for takeoff at Tyndall Air Force Base in Florida. According to its manufacturer, BioSpan of Ballwin, Mo., environmentally-friendly RePLAY is 88-percent biobased and penetrates into asphalt, protecting it from moisture while strengthening existing pavement. Applying sealer is about one-tenth the cost of reconstructive overlays. RePLAY shouldn't need to be reapplied at the Air Force runway for at least three to five years.

From: Biobased Solutions
July 2009

Bio-powered hydroplane

A blended biomass fuel has successfully powered a high-performance hydroplane. The Boeing U-787 unlimited hydroplane was the first ever to be powered by 100-percent biofuel made primarily from camelina, jatropha and algae oil. The boat made several successful test runs during Seattle's Seafair. The biofuel performed the same as petroleum-based fuels during rapid acceleration, decelerations and cornering under a variety of water conditions. The boat's engine has the same fuel performance requirements as a commercial airliner.

From: Soyatech.com
August 24, 2009

Fine feathered fuel

Nevada scientists have developed an environmentally-friendly way to produce biodiesel from chicken feather meal. University of Nevada researchers are extracting fat from the meal with boiling water, then processing it into biodiesel. Feather meal contains up to 12 percent fat, making it a potential biodiesel feedstock.

From: Soyatech.com
July 23, 2009

Renewable jet power

A renewable jet fuel developed and produced by the University of North Dakota's Energy and Environmental Research Center has successfully powered a rocket — at speeds approaching sound to about 20,000-foot altitudes. The canola and soybean oil fuel meets the same screening criteria as petroleum for jet propellant-8 aviation fuel, which is widely used by the U.S. military.

From: undeerc.org
July 22, 2009

Spice power

Dried, ground cayenne peppers have been spicing up cuisine for thousands of years. ARS researchers have found that a patented antifungal plant compound in cayenne, CAY-1, holds promise as an antifungal agent in both agriculture and medicine. It's believed to work by attaching to fungal membranes, where it causes cell components to leak, eventually killing the cell.

From: USDA-ARS
July 9, 2009

Tank full of straw

For a month this past summer, motorists in Ottawa, Canada were able to fill their tanks with advanced biofuels made from wheat straw — the world's first commercial sale of cellulosic ethanol. The gasoline contained 10-percent cellulosic ethanol produced at Iogen Energy Corporation demonstration plant, which produces about 40,000 liters of fuel per month.

From: Soyatech.com
June 10, 2009



Online facelift

AURI's virtual presence is getting a new look. The website www.auri.org is undergoing a major renovation that will be complete in October.

"For many people, the first place they turn for information is the Internet," says Mary Steidler,

AURI communications assistant. "While AURI has had a fairly elaborate site for quite a few years, we're giving it an upgrade so that it will be easier to find information." Enhanced search capabilities will better access research and "overall it will have

a fresher look," Steidler says.

While the current site receives thousands of hits from all over the world every week, it hasn't undergone major changes since its launch more than 12 years ago. "It's important to add features that people want,"

Steidler says. "The web site has become one of our primary communication tools." ■



Enhanced biomass web site

The Minneapolis Biomass Exchange web site, mbioex.com, has been launched to simplify biomass exchanges between suppliers and buyers. The site builds on an earlier effort by AURI, Clean Energy Resource Teams, and state commerce and natural resource departments.

By linking harvesters and transporters to buyers and sellers, the site aims to increase market opportunities, knowledge of the biomass industry and reduce risk. ■

On AURI's 20th anniversary... Reflection and focus

BY TERESA SPAETH

For an organization to succeed, it's important to see the big picture. Many factors influence an industry, what it accomplishes and where it should go. Some are under your control; others are not.

Minnesota's agricultural economy, for example, not only entails grain and livestock production, but energy production, coproduct use, innovative technologies, land resources, green jobs and more. At AURI, we strive to continually monitor and understand how seemingly disparate factors — like government policy, weather,

consumer preference, even world events — can influence the agriculture industry.

While the whole picture is important, so is focusing on what we do best and recognizing how it fits into the overall scheme. AURI strives to provide the best scientific and technical expertise, feasibility studies and targeted networking to add value and long-term economic vitality to rural Minnesota. But we don't operate in a vacuum; rather, AURI services complement other resources to provide Minnesota businesses and entrepreneurs with a competitive advantage.

Throughout AURI's 20-year history, our service and delivery has evolved. Circumstances and needs have changed, but AURI's commitment to the mission of developing new uses for agricultural products has not wavered.

As AURI celebrates 20 years of operation, we reflect on our past achievements and clients while remaining firmly focused on meeting the agriculture industry's current needs. It's important to not only see the big picture, but to understand your role in it. ■



AURI GUIDE TO SERVICES

A nonprofit corporation created to strengthen rural Minnesota's economy, AURI helps businesses respond to market opportunities with new and value-added uses for agricultural goods. The Institute builds working partnerships with business innovators, agricultural groups and researchers, and provides technical support to clients conducting new product research and development.



AURI programs are available to legally-organized businesses or cooperatives with projects that have the potential to create new uses or new markets for Minnesota agricultural commodities. AURI assistance is designed for the early stages of a product's life cycle, while an element of feasibility is yet to be determined.

Project proposals are evaluated on the following criteria:

- Innovation/uniqueness
- Market viability
- Use of Minnesota commodities
- Number of farmer-producers impacted
- Amount of value added from further processing
- Economic impact
- Cost savings

Programs are designed to assist with:

- Identifying emerging value-added opportunities
- Developing innovative commodity-based products
- Developing production processes for feasible products
- Promoting products developed with AURI technical assistance
- Providing resources to bring new products and processes to the marketplace

Assistance may include:

- Access to AURI's scientific and business staff
- Access to laboratory and pilot plant facilities
- Product development and feasibility testing
- Process evaluation and improvement
- Technology transfer and applied research
- Business needs evaluation
- Links to available resources
- Potential for grant funds to qualifying applicants

AURI provides resources proportionate to the project's impact. Smaller-impact projects may be eligible for technical assistance only, while projects with industry-wide impact may be eligible for financial assistance.

AURI Facilities

- AURI operates several laboratories:
- Coproducts Utilization Laboratory and Pilot Plant, Waseca
 - Fats and Oils Laboratory, Marshall
 - Meat Laboratory, Marshall
 - Product Development Lab, Crookston
 - Fermentation and Chemistry Lab, Crookston

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AURI ag quiz

- This type of soybean meal will be produced by Benchmark Ag and could benefit the dairy industry.
 - Overpass protein
 - High-bypass protein
 - Forward pass protein
- This German breeding is typically used on pork and fish.
 - Streusel
 - Schnauzer
 - Schnitzel
- This mechanical process can be used for processing soybeans for oil and meal.
 - Expelling
 - Baking
 - Digesting
- Reclaimed wastewater could help the ag processing industry, particularly ethanol, by being used in what capacity?
 - Cooling
 - Cooking
 - Cleaning
- These AURI projects yield public information.
 - Inventions
 - Innovations
 - Initiatives
- These complex sugar molecules can cause digestive issues for baby pigs.
 - Oleomargarine
 - Oligosaccharides
 - Olive oil
- About how many bushels of soybeans will the new soybean crushing plant near Cannon Falls process each year?
 - 4 million bushels
 - 66 million bushels
 - 100,000 bushels
- What type of performance craft was tested using 100 percent biodiesel?
 - Hydroplane
 - Hyundai
 - Hai Karate
- AURI's website is getting a facelift. How many hits does the site average per month?
 - 1,500
 - 15,000
 - Over 150,000

Answers: 1. b; 2. c; 3. a; 4. a; 5. b; 6. b; 7. a; 8. a; 9. c



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AURI STAFF COLUMN

Seeing around corners

AURI scientist ponders the future of agriculture and ag processing

BY DOUG ROOT, PH.D.
AURI SENIOR SCIENTIST

Since a functioning crystal ball hasn't been invented yet, the experience, intelligence and resourcefulness of the human mind is the most valuable resource for identifying new opportunities.

Seeing around corners — looking into the near-term future of agriculture and ag processing — is AURI scientists' professional responsibility. Technical staff delve into new possibilities while remaining cautiously aware of the potential for failure when trying to predict the future. Nonetheless, there are intriguing possibilities and issues to consider for our state in the next decade ...

Fuel from glycerin

Most biodiesel plants use methanol derived from natural gas as a catalyst to produce

biodiesel from vegetable oil or other fats — and they produce a glycerin byproduct. Research suggests glycerin could be converted to methanol using chemical or biological systems. Either route would close a loop in the biodiesel production process and reduce the number of non-agricultural materials needed by biodiesel manufacturers.

Biofabrics

New bio-based fabrics may capture the fancy of consumers and the fashion industry and present ag-processing opportunities. Bio-based fabrics are not new — they include cotton, wool, rayon (regenerated cellulose), bamboo, silk and linen. But the appeal of new fabrics made from grown crops like corn, or hemp is unmistakable and eco-labels are likely to start showing up on clothing.

Crops for chemicals

Biotechnology will allow us to grow specialty crops "tailor-made" for the chemical industry to replace petrochemical feedstocks from refineries. If this technology matures, can producers come close to supplying the

needed volume of material? Is a replacement for polyethylene more valuable than a replacement for natural gas? Could we have a biofuels versus bioplastics debate in the future similar to the food vs. fuel debate today?

Fungible versus specialty crops

The opportunity to grow a crop variety tailored to a specific use comes with market risks. For example, a high-oil soybean variety would not be good if the market for soy meal increases and the market for soy oil decreases during a growing season. The future will provide more opportunities and risks for crops such as high-oil corn, low-oligosaccharide beans, low-lignin grasses, and high-omega-3 oilseeds. Segmenting commodity markets and relying on specialized processors may change the landscape for producers and processors.

Biotechnology and the food dilemma

Grain production historically matches population growth. But it's not clear whether the demand for food leads to increased crop production or whether wider availability

allows more people to survive.

Biotechnology promises to substantially increase commodity grain yields, but will that result in more rapid population growth and more U.S. exports, or will yield increases result in fewer acres used for grain production? The grains and acres not used for food may be available for biobased plastic, fabrics or fuels. Still, there remain a lot of hungry mouths to feed and numerous alternative uses for commodity grains.

It's a complicated world today and likely to get even more complex. It's enough to keep us scratching our heads and pondering the future. AURI scientists will keep an eye out for changes that could turn into opportunities for Minnesota agriculture. ■

