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AG INNOVATION NEWS

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Local power surge

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PHOTO BY ROLF HAGBERG

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Local power surge

COMPOSITE IMAGE BASED ON PHOTO BY ROLF HAGBERG



A central Minnesota community looks at its renewable energy opportunities

The Central Minnesota Ethanol Cooperative in Little Falls is the first ethanol plant in the nation to convert from fossil fuels to a biomass-gasification system (bottom right) to power the plant. Little Falls business leaders envision using the plant's excess power as part of a future conversion to locally-produced green energy. Above: storage tanks holding some of the plant's 20 million gallons of annual ethanol production.

More energy ideas

CMEC's biomass gasifier is just one potential source of alternative energy for Little Falls, Anderson says.



Anderson.

The city is also investigating other local, renewable energy resources. For instance, the sanitary landfill could be tapped for methane — something that many communities are already doing. "We're also looking at our large dairy operations as sources of methane," Anderson says.

There's even talk of forming a municipal utility to sell biogas, she adds. Little Falls is seeing a lot of residential housing growth along U.S. Highway 10. "If a utility were formed, I could see it serving these new residential developments." Massie's engineering study will analyze the feasibility of these and other renewable energy scenarios for Little Falls.

Meanwhile, high oil and natural gas prices are igniting strong interest in alternative power, Massie says. "I get at least one call a week on biomass gasification." Nixon agrees. "We've had a lot of people inquire about what we're doing here." Other Minnesota cities, including Madelia and Morris, are also looking at community-wide renewable energy projects, Massie adds. "It's really exciting." ■

BY E. M. MORRISON

Little Falls, Minn. —

There is a saying that all politics is local. The same might be true for renewable energy.

As ag-based fuels replace traditional fuels, "the energy for each community is going to come from the surrounding area," says Cecil Massie, a renewable energy expert. "So a renewable energy economy will be local."

A central Minnesota community is taking the first steps toward that future. Little Falls is exploring ways to meet its power needs with locally-produced green energy. A feasibility study will survey the city's renewable energy resources and identify local markets for alternative power.

The \$44,000 study is funded by AURI's Center for Producer Owned Energy, the City of Little Falls, Initiative Foundation and the Central Minnesota Ethanol Co-op. Massie, a senior engineer at the Roseville-based engineering firm Sebesta Blomberg, will lead the study.

Sparked by gasification

The project was sparked by Central Minnesota Ethanol in Little Falls, which recently installed a biomass gasification system to run its 20-million-gallon corn dry mill. CMEC is the first American ethanol plant to switch from fossil

fuel to biomass gasification, says Michael Sparby, AURI project director. Today, nearly all ethanol plants run on coal or natural gas. But biomass gasification could become the standard for the next generation of ethanol plants, Sparby says.

CMEC's gasifier converts about 280 tons of sawdust per day into synthesis gas, a low-Btu substitute for natural gas. The syngas fuels CMEC's ethanol production and distiller's grain-drying facilities. It also powers a 1.1 megawatt steam turbine, which generates about a third of the plant's electricity.

Wood gasification allowed CMEC to cut its emissions and meet air quality standards for less money than a natural gas system, says plant manager Kerry Nixon. CMEC shut off the natural gas, replacing it with forest and urban slash wood and lumber industry tailings — waste materials that are typically landfilled. A 10-year wood supply contract has stabilized the plant's energy costs, Nixon adds. In the future, the plant may also gasify distiller's grains.

Envisioning energy

Little Falls, in Morrison County, is a farming community of about 8,100. Agriculture is the largest industry, says Carol Anderson, Morrison County economic developer. The county ranks third in the state in dairy production and is in the top quarter for farm cash receipts. The city also has a robust manufacturing sector, which includes Larson Boats, and a growing high-tech sector.

Little Falls business leaders can envision a

variety of ways to use CMEC's excess power, Anderson says. The plant's 300-degree hot air, which is now going up the stack, could heat a community swimming pool, for example. A heating and cooling district for the nearby industrial park is also a possibility. "Greenhouses are another thing we're looking at that could use the plant's CO2 and heat," Anderson says.

Although CMEC's gasifier is sized just for the ethanol plant's needs, another gasifier could potentially be added if the system is successful, Nixon says. It's possible excess syngas could be refined and piped to commercial natural gas users.



Biobusiness building

AURI partners with industry leaders to promote commercialization of biotechnology

BY CINDY GREEN

Minnesota is a dominant player in medical devices — ranking near the top in the United States. The state's \$1 billion ethanol industry ranks second only to Iowa in production — “an area where the world is watching Minnesota,” says a BioBusiness Alliance study released in August.

“Biobusiness: Minnesota's Present Position and Future Prospects,” the first comprehensive review of Minnesota bioindustry, highlights the state's achievements in medical, agricultural and other biosciences. Overall, the biobusiness sector is growing. An estimated 7,000 biobusiness jobs have been created in the state since 2002, and every bio-job results in 5.7 additional jobs.

However, “Minnesota's competitive position is under threat as other states invest heavily, aggressively and creatively in developing their own biobusiness industries,” states the report, authored by University of Minnesota Professor Kelvin Willoughby.

Key states are outpacing Minnesota in biobusiness start-ups, expansion and employment.

“Our state needs to act strategically and decisively to maintain a competitive position in biobusiness in future years.”

Jeremy Lenz, BioBusiness Alliance project executive, says past newspaper headlines exemplify the contradictions in Minnesota's bioindustry. “One newspaper headline read, ‘The train is leaving the station and Minnesota is not on it.’ Another said, ‘Minnesota: world leader in medical devices.’ ”

Minnesota is indeed a leader in biotechnology research and development. “We're just not a strong competitor in commercialization; we need to turn that around,” says Amy Johnson, project manager. “We have a troubling lack of turning an invention into a new enterprise.

“The train has not left the station, however. We just need to focus on our infrastructure. Other states are laying the tracks; we need to work on that too — factories and places where biobusiness can function,” Johnson says.

A new alliance

In 2003, Governor Tim Pawlenty established the Governor's Bioscience Council to address bioindustry growth concerns. After the blue-ribbon panel completed its 18-month investigation, Pawlenty asked Dale Wahlstrom, a Medtronic executive, to design an industry-led biobusiness nonprofit with board members representing industry, academia and public entities. “Dale jumped all over this ... he's given an amazing commitment of time,” Lenz says.



PHOTO BY CINDY GREEN

Jeremy Lenz and Amy Johnson of the BioBusiness Alliance

Wahlstrom met Teresa Spaeth, AURI's executive director, at a Bemidji State University dinner last February and AURI and the alliance were sponsors of a biobusiness conference in Bemidji in April. They agreed their organizations should work together on accelerating biotechnology commercialization.

“There is a lot of research going on and a lot of opportunity, but who is making sure it actually is commercialized?” Spaeth says. AURI's mission parallels the alliance's goals because the institute “is not just doing research for the sake of research, but research that will be applied to business.”



Teresa Spaeth, AURI Executive Director

“We're bringing agriculture to the biotechnology community ... To us, the BioBusiness Alliance brings a wealth of resources and information.”

The alliance's statewide assessment of Minnesota's knowledge and business-generation

capability was just a first step. The next, Destination 2025, will look at short to long-term growth strategies for the biobusiness industry. Finally, the alliance will create the BioBusiness Resource Network to help start-up and existing companies expand or move to Minnesota.

“When Destination 2025 is completed, not only will we have a focus on goals but a service model so we can link our resources to specific business needs,” Spaeth says.

“AURI will be the agricultural portal ... getting the research — the latest and greatest — into the hands of small and medium scale processors, which they don't have the capacity or funding to get on their own.”

The state of biotechnology

The most recent U.S. Economic Census data shows that in 2002 the biobusiness technology sector had 55,000 establishments, 1.2 million paid employees, a \$60 billion-plus annual payroll, and annual revenues exceeding \$330 billion. Average wages in the bioscience sector — almost \$66,000 — were \$26,000 above the average private-sector wage.

“Minnesota's economy is more heavily oriented toward biobusiness technology employment than is the economy of the country as a whole, with 1.33 percent of

our workforce employed in biobusiness technology, compared to 1.07 percent for the nation as a whole,” the report says.

“Our state's future employment prospects are, therefore, more dependent than other states on what happens to its biobusiness sector.” For example, the state employs 24 percent more workers in the medical devices industry than the national average, and is second only to Massachusetts in production.

The report found “we lost ground from 1997 to 2002 in total biobusiness technology employment and in key sectors ... where we historically have had clear dominance. We turned the trend around between 2002 and 2005, but we know that our competition is also improving.”

Overall, about 93 percent of Minnesota's biotechnology enterprises are involved with health care. Medical devices and life sciences research and development, are prime focus areas of the study, as they are well defined in U.S. Economic Census data.

Minnesota particularly lags in the commercialization of life sciences, which includes developmental research in medicine, biology and agriculture. Commercialization involves getting research off the shelf and into the hands of industry where it can generate products, services and economic activity.

“We have the brain power and the research capability,” Johnson says. But the study shows commercialization is growing faster in other states with similar biotechnology infrastructures, such as Iowa and Utah. “We don't know why, but we're going to find out.”

The agri-bio and bio-industrial sectors — generally defined as technology directed to biological systems outside the human body — were the most difficult to measure because there is no standard industrial classification for this area. The study, rather, looked at industry segments, including ethyl alcohol and cellulose organic fiber manufacturing, wet corn milling, soybean and other oilseed processing, breweries and wineries.

“Renewable energy is going crazy, but there are also coproducts and bio-based industrial products” that will play an important role in Minnesota's biotechnology growth, Spaeth says.

“We need more measurements and AURI is a good partner,” Johnson says. “AURI will be at the table as we begin to build the Destination 2025 visioning process.” ■

For the full report Biobusiness: Minnesota's present position and future prospects, see www.biobusinessalliance.org

burning for business

entrepreneurs eye coproducts for fuel and job development

PHOTO BY ROLF HAGBERG

BY DAN LEMKE

Bird Island, Minn. –

Like the pellets glowing in the nearby stove, Bob Ryan and Russ Koopman have warmed up to biomass fuel possibilities. They have even started a business producing biomass pellets for stoves.

A mutual interest in finding alternative heat sources sparked their business.

Ryan is experienced in home heating as operator of a fireplace store that sells solid pellet fuels. Koopman, an agronomist, bought a pellet stove from Ryan several years ago and began hearing comments from friends and family about how warm his home felt. At a church function, the two talked about finding alternative fuel sources for biomass stoves. After much discussion and planning, they formed Sunrise Agra Fuels in early 2006.

Ryan and Koopman first met business developers interested in their concept who encouraged them to continue their pursuits. Then they contacted AURI's Al Doering for help developing a fuel made from waste or byproducts, rather than corn and wood pellets that dominate the market.

"They clearly identified the characteristics of the product they wanted," Doering says. The resulting blend, Island Pellets, is made from ingredients that have minimal value on their own.

"We wanted to find blends that will create 8,000 Btu per pound and have less than 2 percent ash," Ryan says. And the partners wanted byproducts ... "where being a fuel is a secondary use."

"Going into the market we knew we'd have to be competitive with wood pellets," Koopman adds. "Corn is cheap if you have access to your own corn. Once you start adding the costs like bagging, we get competitive. Our market will be folks who don't necessarily have access to corn."

Koopman and Ryan say their Island Pellets work well combined with corn as they have a Btu value 15 percent higher than corn and about 3 percent higher than hardwood pellets. With a low, 6-to-10 percent moisture content, the pellets help corn burn better and more completely, yielding fewer unburned kernels and softer ash. In tests with multiple burner styles, the pellets have performed well.

At a cost of \$4.90 per 40 pound bag, the pellets' cost per million Btu is lower than wood, natural gas, LP gas, fuel oil and electricity. Sunrise Agra Products is finalizing arrangements with contract pellet processors to fulfill orders that are already coming in.

While the promise of marketing an alternative, natural resource-based fuel is encouraging, Ryan and Koopman are also enthused about



PHOTO BY DAN LEMKE

Russ Koopman (left) and Bob Ryan founded Sunrise Agra Fuels, which sells Island Pellets, made from waste products, to burn in biomass stoves.

the economic gain their venture could bring to Bird Island and western Minnesota.

"We're not trying to just market a pellet and make money," Koopman says. "We want to save our customers money, increase farmers revenue and provide economic activity for the community."

"I've been in farming, retail and transportation," Ryan says. "It's important to me to provide jobs ... and show that not all opportunities are in the metro area." ■

Ethanol leads the way to biobased economy

AURI-supported study shows encouraging trends for renewable fuels and other bioproducts



BY CINDY GREEN

Gas prices that spilled over \$3 per gallon this summer drew complaints at the pump. But the ensuing quest for renewable energy put ethanol production in overdrive — and that's having a big impact on the biofuels industry.

A study released in April showed national ethanol production had already hit a record 5 billion gallons for 2006. "By the year's end, we're going to reach 8 billion gallons," says Dennis Timmerman, AURI project director. "We're on a very rapid production increase," as crude oil prices have neared record highs.

Ethanol's success is the highlight of "The Emerging Biobased Economy," a study commissioned by AURI, the Minnesota Department of Agriculture and Minnesota Corn Growers. Conducted by Informa Economics, Inc. of Memphis, Tenn., the study looked at trends in ethanol, biodiesel, feedstocks, industrial biotechnology, biopolymers and other bioproducts.

Ethanol reigns

Ethanol is the star player in the emerging bioeconomy. Currently, it enjoys a highly favorable political as well as economic environment. The federal ethanol tax credit was extended to 2010 and the Energy Policy Act of 2005 set minimum requirements for renewable energy use through at least 2012. "Ethanol enjoys strong support from the agricultural community and increasingly from politicians that see it as a means toward enhancing the energy security of the U.S.," the Informa report states.

With efficiencies gained in ethanol production

and high corn yields, "the economics of ethanol production are expected to remain favorable."

"Minnesota now has 16 ethanol plants and new plants are coming on line" in Fergus Falls and Heron Lake, Timmerman says. Other plants are being proposed in Chokio, Lamberton, Madison, Granite Falls and the Moorhead area. "A lot of people are excited about ethanol," Timmerman says.

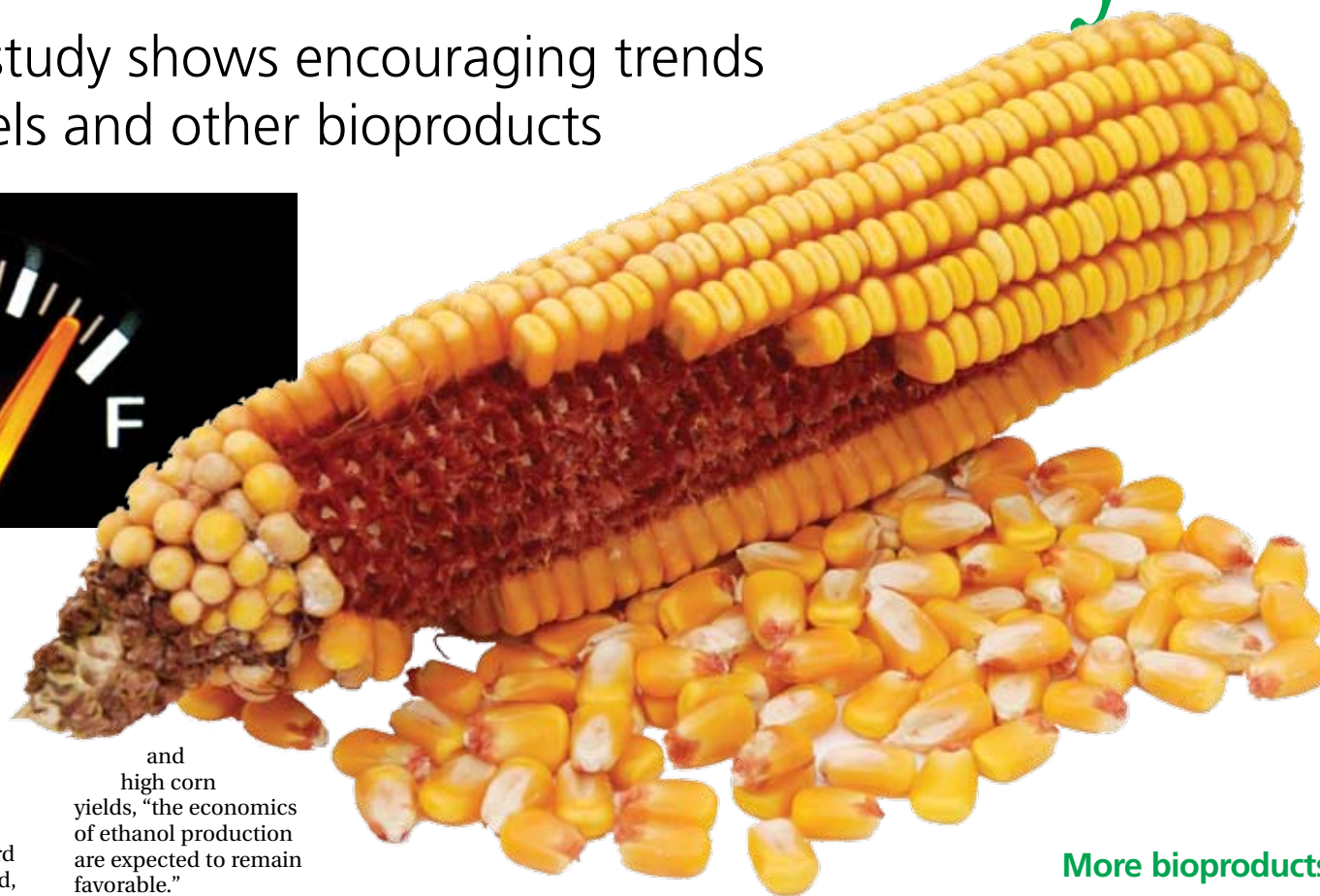
"The most significant finding in this report is the price of grain has the potential to be significantly impacted as a result of increased biofuels production."

With more ethanol production, the supply of a coproduct, distiller's dried grains, used primarily in cattle feed, could glut the market. So AURI is working to expand uses for the coproduct, such as hog rations, and is working with the Minnesota Pork Producers on assessing and increasing the use of DDGs.

Biodiesel pumping up

With oil prices expected to be at \$50 a barrel for the next 25 years, according to federal energy experts, ethanol isn't the only renewable fuel gaining momentum.

Biodiesel capacity is forecast to be at 688 million gallons by 2008, 711 million gallons by 2010, then rise to 860 million gallons by



More bioproducts emerging

Growing interest in renewables extends to a variety of consumer and industrial products. For example, researchers are attempting to process fine, cellulose fibers from straw and corn stover into resin that could be a low-cost replacement for glass fibers.

Biobased products are replacing petroleum in feedstocks, polymers, lubricants and adhesives. And biotechnology is likely to drive growth in the chemical industry, Informa predicts.

New biopolymers on the market that are substituting biobased resins for petrochemical products could reach 33 percent of total polymer production if economic conditions remain favorable, the report states. The global production of biobased plastics is expected to top 1.3 billion pounds by 2008.

Some of these bioproducts, which use corn stover and other crop residues, could be manufactured in biorefineries connected to ethanol plants — a full-circle bioproduction facility.

"The current energy crisis and development of renewable energy sources," Timmerman says, "has a huge potential to impact the overall economy of rural Minnesota." ■

2015, Informa projects. However, the current \$1 per gallon tax incentive will have to be extended beyond 2008 for biodiesel to be profitable — unless crude oil prices soar to above \$70 a barrel, the report says. At current diesel and soybean prices, the gross profit per gallon is about 77 cents.

About 82 percent of biodiesel feedstock will come from soybean oil, the rest from animal fats and other vegetable oils. The demand for soy oil will add crushing capacity and put more meal on the market. "Soybean meal use to be the main product of soybean production," Timmerman says. Now it could become a coproduct.

"There are processes that can increase protein concentrations in meal from 40 to 60 percent, which would greatly benefit the livestock industry." However, concentrating protein also increases the level of oligosaccharides, "which has some detrimental effects — it causes flatulence in poultry," Timmerman says.

AURI is looking at ways to extract oligosaccharides from meal and improve its quality. Better soy meal could be an alternative to bone-meal rations restricted by BSE (mad cow disease) concerns.

Wind by the book

AURI helps write the blueprint for community-based wind farms

BY DAN LEMKE

Marshall, MN —

Southwest Minnesota's Trimont Area Wind Farm, LLC, generates 100 megawatts of electricity annually. With 43 members, it is the largest landowner-developed wind enterprise in the nation, providing enough power for about 29,000 homes.

But TAWF board member Richard Peterson says the early stages of developing the wind farm were rocky, and the company would have benefited with a better blueprint. "We were pretty naive," says Peterson,



who farms near Mountain Lake. "We thought we could just put the turbines up and put it all together. But it's a risky business to get into."

Issues such as federal tax credits, power purchase agreements, land easements and wind rights faced landowners designing the project. TAWF eventually signed with PPM Energy of Portland, Oregon to develop and operate the farm and help navigate the complex waters of building a wind farm.

Despite the steep learning curve, the community-based farm has been providing electricity to Great River Energy since November 2005 and Peterson says the project could serve as a model for others.

Peterson chairs AURI's Center for Producer-Owned Energy board, which is providing community-owned wind projects with tools for making good business decisions. The Energy Center is collaborating with the Southwest Initiative Foundation, Minnesota Corn Research and Promotion Council and the Minnesota Rural Energy Board to develop the "Community Wind Development Handbook," a decision aid for groups that want to start community-based wind farms.

The handbook, which should be available by mid November, will identify issues to consider and pitfalls to avoid. Geared

for 2 to 50 megawatt plants, it "will outline examples of appropriate business and ownership structures, permitting and government approval considerations, financial, legal and accounting considerations," says Dennis Timmerman, AURI project director. "It will also address marketing issues like power purchase agreements and production tax credits, because there are a lot of factors to consider."

Minnesota has the nation's fourth-highest level of installed wind capacity, according to the American Wind Energy Association. Only California, Texas and Iowa have more capacity than Minnesota's 750 megawatts. An estimated 10 percent of Minnesota's power needs are met through wind-generated electricity. ■

Bio rider

Biodiesel an advantage at cold temps, ATV tests show

BY E.M. MORRISON

Thief River Falls, Minn. —

Arctic Cat has taken biodiesel fuel “off the road.”

The Minnesota company is recommending biodiesel blends of up to 20 percent in its new diesel ATV. The renewable fuel performed as well as standard diesel fuel in two test rounds last winter and this summer. B20 actually worked better than winter-blend diesel in some cold temperature tests.

“What is significant about the test results is that there was nothing very significant,” says Ole Tweet, Arctic Cat vice president of new product development. “Arctic Cat was very pleased with the minimal performance impact of biodiesel fuel.”

This was the first time B20 — a blend of 20 percent biodiesel and 80 percent petroleum diesel — had been commercially tested in small diesel engines. The research was sponsored by the Minnesota Soybean Growers Association, Minnesota Soybean Research and Promotion Council, Minnesota Corn Growers Association and AURI’s Center for Producer-Owned Energy.

Engine, fuel system OK with B20

The trials were done on three 2007 Arctic Cat ATVs equipped with 700 cc twin-cylinder Lombardini diesel engines. There were no significant differences between B20 and standard No. 2 diesel fuel or No. 1 winter blend diesel fuel for emissions, sound levels or hot-start capability at air temperatures of 95 degrees Fahrenheit.

B20 also performed well in normal-life engine durability tests, which simulate five years of consumer use. There were no differences in engine or component wear, and no degradation of the fuel system with B20, Tweet says.

Power and acceleration dropped slightly in the B20-fueled ATVs. Top speeds declined about 1.5 miles per hour, on average, and horsepower fell about six percent. Fuel mileage was lower, too, averaging about 15 percent less than regular diesel. That wasn’t a surprise, says Craig Kennedy, engineering project manager. “We had expected to see some power reduction based on the [lower] heat value of B20 versus straight petroleum.”

Arctic Cat was concerned about B20 gelling at cold temperatures. But biodiesel actually outperformed No. 1 winter blend diesel fuel in some tests. “We expected to see some fuel gelling above zero degrees Fahrenheit,” Tweet says. His team of engineers “were amazed when, on the first set of cold tests, the B20 started down to zero (degrees F), and the regular No. 1 winter-blend diesel did not start at zero.” In subsequent tests, though, the ATV running on winter diesel blend also started

at zero degrees. But B20 had the advantage in cold weather. “Biodiesel consistently helped the engine turn over faster at low temperatures,” Tweet says.

Arctic Cat began manufacturing the new diesel ATV in August. The machine comes with a fuel tag that recommends biodiesel blends up to 20 percent. Two percent biodiesel, or B2, is now standard in Minnesota, but higher concentrations of biodiesel are not yet available in most places.

However, distribution is expected to grow.

This summer, the Minnesota Soybean Growers demonstrated the diesel ATV at county fairs and parades where it generated lots of interest, Tweet says. The vehicle’s biodiesel fuel capability will be a great selling point, he adds, especially for farmers. “It says to them, ‘Here’s a vehicle for you that runs on the very stuff you grow.’ That’s a tremendous attribute.” ■



Arctic Cat’s new diesel ATV, test driven by Sam Ziegler of the Minnesota Soybean Grower’s Association runs as well or better on biodiesel than standard fuel, confirmed by tests conducted last winter and this summer. Sponsored in part by AURI’s Center for Producer-Owned Energy, the tests were the first using B20 in small diesel engines.

TAKING THE INITIATIVE

AURI annually investigates new ideas to see if they're worthy of further investment

BY DAN LEMKE

Marshall, Minn. – Often the key to finding a good answer is asking the right question: Could a syrupy ethanol coproduct be used as fertilizer? What is the energy value of Minnesota crops and residues? Are there better ways to stabilize processed meat products?

AURI has initiated the search for answers to these and other questions in setting its annual research agenda.

Besides helping start-up and existing businesses and cooperatives work on their ventures, AURI staff annually initiate their own projects that dive into potential new uses for Minnesota ag products.

"These initiatives are industry or commodity-wide," says AURI scientist Rose Patzer, who helps coordinate organizational initiatives. "They hopefully will have broad impact. No specific client has been identified, but these initiatives recognize emerging trends."

SYRUPY SOLUTION

AURI initiatives are often the result of staff simply recognizing opportunity. AURI scientist Alan Doering noticed that solubles or syrup left over from ethanol production handled like liquid manure. An analysis of the thick liquid showed intriguing levels of nitrogen, potassium and phosphorous. With commercial fertilizer prices rising, Doering wanted to find out if the syrup could be a viable fertilizer alternative.

"A lot of people have the equipment to handle liquid manure, so the solubles could be handled the same way," Doering says. "It could be a good situation for farmers to have access to another fertilizer source and for ethanol plants to find a potential market for one of their coproducts."

The solubles have been applied to corn test plots at a University of Minnesota research center in Waseca. Harvest yield data, tissue samples and other tests will be conducted later this fall to see if the syrup has fertilizer potential.

"Whether it works as a fertilizer or not, the potential for it to be successful was too good for us not to take a look," Doering adds.

PARTNERSHIP GELS

Other initiatives result from collaborative relationships. Every year AURI meets with

its key partners —commodity and grower groups and farm organizations — to review their research priorities.

"We move to pair up our initiatives with their priorities," Patzer says. "But it's not enough to propose initiatives.

... The idea may be great, but if (the research) is not completed and information is not brought back to our partners, then we're not doing our job."

One collaborative initiative is assessing commercial anti-gelling agents that can be used in biodiesel during winter. Biodiesel gelling is a common problem in cold-weather states.

Some initiatives that require extensive research are collaboratively funded. Others are just first steps AURI undertakes alone.

"Many of the unfunded initiatives focus on the diligence needed to determine whether a larger, funded project will be worth the investment of time and funding," Patzer says. If a project is deemed unworthy of further investment, "We may be able to save some group money in the long run."

"Initiatives are important because of the possibility of industry-wide impact," says Max Norris, AURI director of projects and technology. "Collaborative initiatives, in particular, ensure we are meeting the needs of Minnesota agriculture." ■

It's not enough to propose initiatives. ... The idea may be great, but if (the research) is not completed and information is not brought back to our partners, then we're not doing our job.

— AURI's Rose Patzer



AURI 2007 INITIATIVES



Economics of pellet production	Address and identify costs associated with pellet processing of ag products for varied uses. Address throughput variability and economics between pelleting a starch-based product vs. fiber.
Shelf-stable meats	Develop information on processing of shelf stable meats, including recipes, acid and drying levels as well as food safety information.
Meat processors short course	Host a hands-on training course that will cover product development and shelf stable meats.
Malic acid	Determine malic acid levels in northern-climate-adapted grape cultivars related to harvest time and field location. Malic acid impacts the smoothness and taste of wine.
Ag biomass harvesting	Provide accurate information on alternative procedures and costs for harvesting, storing and transporting ag biomass. Investigate short and long-term effects of stover and straw removal on soil organic matter and erosion. Determine the cost of procuring stover/straw including harvesting, storing, transporting and replacing removed nutrients.
Fuels initiative II	Research available biomass-combustion numbers. Update the Fuels Initiative brochure to include additional fuels and emissions information.
Suspension of anti-gelling agents in biodiesel	Characterize commercial anti-gels. Study the suspension of anti-gels in biodiesel via temperature curve and analyze results.
Renewable energy forums	Organize and host three renewable energy forums.
Identification of opportunities for grains as functional ingredients	Assess wheat and barley nutraceutical uses and functional-food ingredients that may lead to further research and development.
Commercial kitchens in Minnesota	Prepare a list of Minnesota commercial kitchens and identify those willing to rent out space to developing food businesses, Identify processing equipment and capabilities in those kitchens.
Biomass conversion methodology assessments	Identify biomass conversion technologies, producers and markets on a national scale.
Assessment of soybean by-pass protein opportunities	Complete assessment of potential markets for by-pass protein in rumen diets in Minnesota and nearby states.
Value-added organizational development guidelines	Create value-added organizational development handbook for agriculture and business groups.
Near-infrared spectroscopy	Determine if there are good quality and affordable databases and information to make new analyses available to clients using this technology to determine chemical makeup of various ag products.
Renewable energy dissemination	Disseminate information to growers on forecasted changes in Minnesota and Upper Midwest agriculture relating to renewable energy.
Biomass basics	Provide information on the location and volume of Minnesota biomass.
Cellulosic ethanol basics	Provide information on the latest technology for producing ethanol from cellulosic materials.
Switch grass basics	Provide information on the latest switchgrass and other biomass crop technology.
Canola seeds, oil and meal characteristics	Develop research report on common characteristics and traditional uses of canola seeds, oil and meal. Identify potential new uses or applications.
Assessment of sterol glucosides in soybean oil processing relating to biodiesel	Review literature regarding sterol glucoside content throughout soybean oil processing; establish a link to sterol glucosides in biodiesel quality.
Applications of soybean meal and its components	Identify the components and derivatives of soybean meal. Identify components' traditional and potential uses and applications.
Small scale ethanol plant	Determine whether equipment and technologies used in standard plants can be downsized; determine cost comparison and net return of small vs. standard.

Elsewhere in ag utilization

Editor's note: As a service to our readers, we provide news from around the globe on new uses for agricultural products. Please note that ARS is the research arm of the USDA

BY DAN LEMKE
CARTOONS BY UNCLE HYGGLY

Silkworms in space

A Japanese aerospace researcher has created a cookie recipe that astronauts can prepare in space. The "flavorsome" cookies include silkworm pupa powder, soy powder, soy milk, rice powder, soy sauce and milk. Developed by the Japanese Aerospace Exploration Agency, the silkworm pupas are fried, then ground to a powder. Scientists at China's University of Aeronautic and Astronautics say the silkworm could become a diet staple for Chinese astronauts as it is rich in protein, easy to raise and produces little waste.

From: Soyatech.com, July 24, 2006

Vitamin pea

One of the world's oldest food crops could increase pasta's nutritional value and reduce cooking time. Pigeon peas, a legume grown predominantly in developing countries, has been shown to increase several key vitamin levels. Researchers in Venezuela and Spain jointly tested adding pea flour to durum wheat pasta. Results showed an increase in vitamins B1, B2 and E, protein, fat, dietary fiber and mineral content. Cooking time was also reduced as pea flour concentrations increased.

Source: Foodnavigator.com, August 3, 2006



Manure-powered ethanol

Panda Ethanol of Dallas will begin constructing a 100-million-gallon ethanol plant in Hereford, Texas, powered by waste from local cattle herds. The first-of-its-kind facility will generate steam for ethanol production by gasifying more than one billion pounds of cattle manure a year. When completed in 2007, it will be the largest biomass-fueled ethanol plant in the United States.

From: Soyatech.com, August 1, 2006

Spicy fat fighters

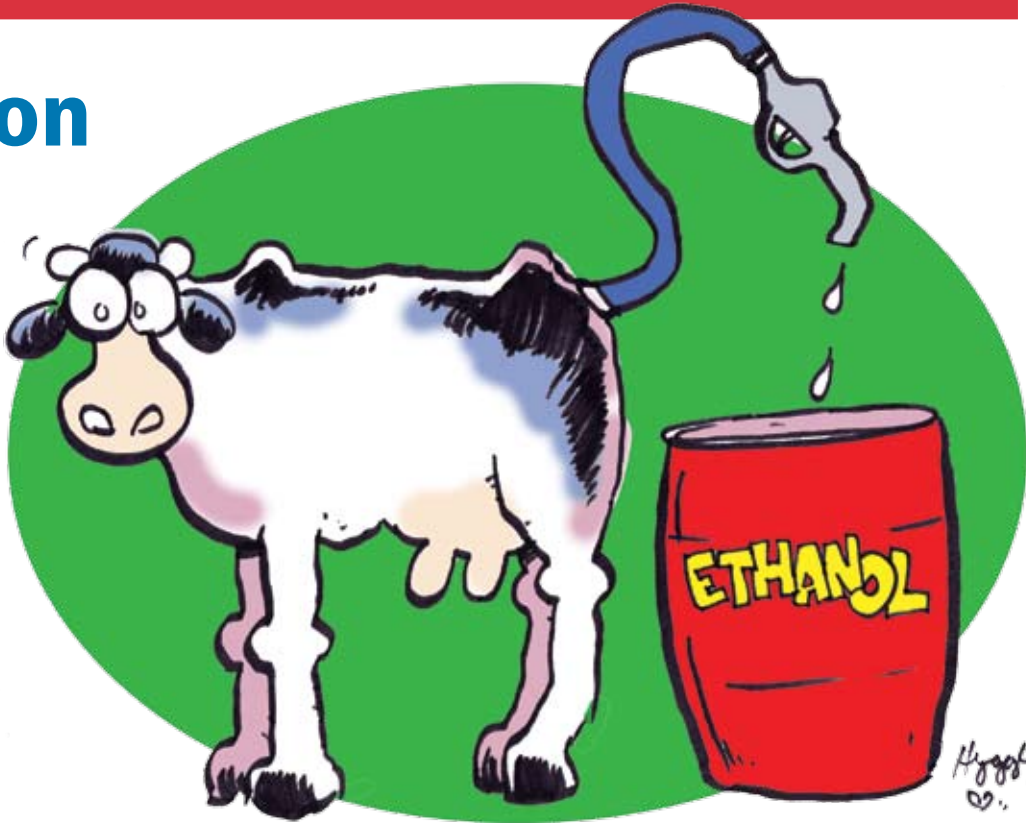
Breaking out into a sweat while eating a spicy meal may be a good thing for people hoping to lose weight. Beyond giving flavor to food, scientists from Canada and Holland believe some spices should be considered "functional" ingredients.

Researchers from Quebec and Holland universities have found that spicy foods such as peppers, turmeric, cumin and ginger actually helped boost the metabolism by increasing the body's generation of heat. In several studies, the scientists found that capsaicin, the compound the gives peppers heat, actually helped people burn as much as 23 percent more energy.

Source: Foodnavigator.com, July 31, 2006

Hearty walnuts

Walnuts, already shown to reduce bad cholesterol in some studies, may have other attributes for enhancing cardiovascular health. University of California-Davis scientists and ARS researchers found that laboratory hamsters fed a diet containing powdered walnuts had a significantly lower level of a natural chemical called endothelin.



The compound causes artery inflammation and plaque growth in blood vessels. Walnuts were effective at all levels tested, from the equivalent of eating three to eight handfuls of walnuts a day.

From: USDA-ARS, July 31, 2006

A hull of an idea

The solution to pollution, at least in water, could come from soybean hulls. ARS scientists have discovered that hulls, as well as corn stover and sugarcane plants, are ideal foundations for a potent filtering agent that absorbs harmful levels of lead, chromium, copper and cadmium from contaminated waters. Through a simple two-step process, the researchers were able to convert the cheap leftovers into a material called dual-functioning ion exchange resin — commonly

used for treating industrial and municipal waste waters.

From: USDA-ARS, June 21, 2006

Float plant filters

ARS scientists in Georgia are exploring ways to use floating plant mats to remove excess nutrients from manure lagoons in confined-feeding dairy and swine operations. Various grasses were tested, grown atop floating rafts made of PVC pipe and chicken wire. Cattails had the best results, producing the most biomass and removing the most nutrients from wastewater. A second test phase is being conducted with other plant species. The plant residue could be used as a bioenergy source.

From: USDA-ARS, August 1, 2006

AURI Ag Innovation Quiz

1. What percentage of the Central Minnesota Ethanol Cooperative's electrical needs are met by a biomass gasifier?
A. 5%
B. 12%
C. 33%
2. How much ethanol is estimated to be produced in the U.S. by the end of 2006?
A. 100 million gallons
B. 8 billion gallons
C. 26 billion gallons
3. What are Island Pellets?
A. Seashells
B. Coconut beans
C. Fuel pellets
4. About how many homes could be powered by wind turbines on the Trimont Area Wind Farm?
A. 29,000
B. 500
C. 4,500
5. Which Minnesota manufacturer is building a diesel-powered ATV, tested with biodiesel?
A. Polaris
B. Crestliner
C. Arctic Cat
6. Where does lycopene commonly come from?
A. Tomatoes
B. Potatoes
C. Fish
7. What is the main component of Compost-A-Mat hog mats?
A. Chicken feathers
B. Horse feathers
C. Corn stalks

ANSWERS: c, b, c, a, c, a, c



PHOTO BY CLUCK MCDUCK

Partner power

BY TERESA SPAETH

Some good things get better with a partner. Abbott had Costello, Fred had Ginger, peanut butter has jelly; milk has cookies. Likewise, AURI is a good organization that gets better with partners.

We're quite accomplished at scientific and technical assistance, feasibility reviews and identifying value-added opportunities throughout Minnesota. But we cannot and do not operate alone.



We work diligently with commodity and grower groups, farm organizations, universities, private industry and public agencies. AURI staff conduct annual sit-down meetings with our partners to discuss priorities and identify mutual interests. When our visions and capabilities match, good things happen. That is when initiatives emerge (see story page 8) and good ideas turn into great projects.

It may be a bit cliché, but together we are able to achieve more.

For example, we're building a relationship with the Minnesota BioBusiness Alliance. This high-tech businesses coalition connects agriculture to areas where our industry has been underrepresented.

While we are always focused on our mission to add value to Minnesota ag products, new partnerships can open up traditional commodity uses to some exciting and innovative arenas.

Combinations are winners — like corn and ethanol, soybeans and biodiesel. Who knows what next great combo we might discover — together.

ABOUT AG INNOVATION NEWS

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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

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AURI news briefs

BY DAN LEMKE

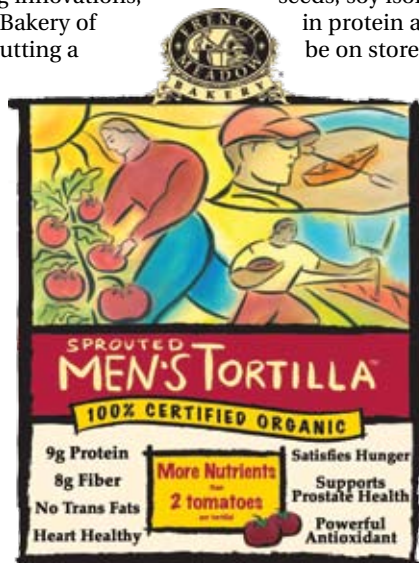
The power of red tortillas

Minneapolis, Minn. — Already known for bread-making innovations, French Meadow Bakery of Minneapolis is putting a new tortilla on the market, formulated for men's health.

Men's Tortillas are likely to stand out on grocery shelves not just for their mix of natural ingredients, but their color. "They're red," says AURI scientist Charan Wadhawan, who helped formulate the tortilla recipe. "They contain lycopene, which has been shown to help prevent prostate cancer."

Lycopene, a nutraceutical, gives red color to foods like tomatoes, guava, watermelon and pink grapefruit. Men's Tortillas also contain whole

grains, flax, sunflower, pumpkin seeds, soy isoflavones and are high in protein and fiber. They should be on store shelves this October.



"There is growing consumer interest in tortillas because they add variety to a healthy lifestyle," says French Meadow Bakery President Lynn Gordon. "Tortillas are an easy way to prepare and make meals."

The Men's Tortillas contain 9 grams of protein, 8 grams of fiber and yield the same nutrients as two tomatoes.

French Meadow Bakery has several other tortillas on the market and a line of healthful breads.

"These tortillas are a real powerhouse of nutrition," Gordon adds. "We think they'll be good sellers."

Biofuel bonanza

Redwood Falls, Minn. — Five Minnesota farmers came to Farmfest as visitors and walked away winners. They will be filling up their tanks with farmer-made fuel.

AURI, the Minnesota Corn Growers and Minnesota Soybean Growers sponsored a biofuel giveaway at Farmfest 2006, held near Redwood Falls. Five names were pulled from thousands of drawing entrants; the winners were offered \$500 worth of biodiesel or E-85, the 85-percent ethanol fuel.

Farmers Lance Oye of Pipestone, Ed Peter of Heron Lake and Bonnie Bleck of Fairfax chose biodiesel. Kerry Mathews of Glencoe and Brian Erickson of Montevideo selected E-85.



"This was an excellent promotion ... certainly timely," says Dan Lemke, AURI communications director. "It was a great way to promote biofuels, raise awareness of what biodiesel and E-85 have to offer, plus it got the fuels into the hands of people who want to use them."

Pigs on blankets

Tests show ag-based disposable mats may produce healthier baby pigs

BY DAN LEMKE

St. Joseph, Minn. – Small numbers have never meant so much to Tony Schmitt and Darryl Metcalfe of USA Solutions.

The Compost-A-Mat producers are paying close attention to studies showing that hog operations using their cornstalk-based mats may have lower baby-pig mortality rates than those using rubber mats.

Last year, the Swine Vet Center of St. Peter supervised tests conducted by University of Minnesota researchers at a privately-owned confined farrowing facility in central Minnesota. Litters raised on the cornstalk mats showed a 0.65 percent decrease in pre-weaning pig mortality compared to industry-standard rubber mats. The hog operation where the tests were conducted already had only an 8-percent baby pig mortality rate. Even a small reduction is significant as it means increased production from the same number of sows.

A second test round was just completed on a different herd, which showed a 9.3 pre-weaning mortality with Compost-A-Mats verses 10.8 percent with rubber mats.

“In the world of hog raising, that is almost unreal,” says Metcalfe, who spent more than 25 years in swine herd management. AURI scientist Alan Doering, who helped USA Solutions develop the mat, adds: “For producers who raise thousands of hogs each year, a percentage or two improvement in mortality can mean tens of thousands of dollars.”

Rubber mats generally are reused after each pig litter is weaned. Even though they are disinfected before they are used again, not all pathogens are completely removed. Compost-A-Mats are single use and biodegradable.

The USA Solutions owners say their mats offer a better environment for hogs, providing comfort but not harboring pathogens that can lead to disease and higher death rates. Tests also show

significantly lower E. coli and coccidiosis and 50 percent less scours in litters using Compost-A-Mats.

Metcalfe and Schmitt are already meeting with some of the nation's largest producers, from North Carolina to Colorado. “We’ve got their attention,” Metcalfe says. “We have one producer who says he has had \$1,500 in increased production by using about \$250 worth of our mats.”

However, Metcalfe adds, many producers are skeptical of new products until they are proven. “Rubber mats have been the standard for 40 to 50 years and producers have some hesitancy to change,” Schmitt adds. “But our product is starting to get their attention. As some of these rubber mats wear out, they might start replacing them with ours.”

Compost-A-Mat sales have tripled in the past three months, and they are now available in eight states, Canada and Australia.

Metcalfe expects the current test round to be completed in the next several weeks. If results hold, USA Solutions will have some compelling selling points.

“We have a foot in the door,” Metcalfe says, “and we’ll let the mats and the results speak for themselves.” ■

Compost-A-Mat test results can be found on the USA Solutions website: compostamat.com

