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Building from straw

page 6

PHOTOS BY ROLF HAGBERG

ALSO IN THIS ISSUE:

roundabout
energy

page 4



seed chaff
is a gas

page 2



horse litter

page 5



Waste to watts

Northern Minnesota company to gasify grass-seed chaff

BY E. M. MORRISON

Williams, Minn. — A grassroots power movement is taking hold in northwest Minnesota.

Northern Excellence Seed, LLC, plans to gasify grass-seed chaff and straw to make electricity. The Lake of the Woods County business is one of the first companies in Minnesota to generate on-site power from biomass. And it may be the only factory in the country to gasify grass-seed waste.

Converting waste into watts will furnish energy to run the seed-cleaning plant, and will save the company at least \$60,000 a year in electricity and waste disposal costs, says Brent Benike, general manager of Northern Excellence Seed.

Just as important, the 100-kilowatt gasifier will be a model for other rural Minnesota communities that want to make renewable power from local biomass, says AURI project manager Michael Sparby, who has worked with Northern Excellence since 2002. "If it works in Williams, we can apply what's learned all over the state."

Beyond that, the pilot project "signals a commitment by our country to use more renewable fuels, to reduce our oil consumption, and to mitigate global climate change," says Steve Helmstetter, a Roosevelt, Minn., farmer and chair of Northern Excellence Seed.

The Williams gasifier is funded by a \$230,000 Conservation Innovation Grant from the USDA Natural Resource Conservation Service. The University of North Dakota Energy &

Environmental Research Center (EERC) in Grand Forks will design and build the gasification system. Benike expects facility permitting to take about nine months. The company hopes to break ground next spring and begin generating power in the fall of 2008.

Excellent way to use waste

Northern Excellence Seed cleans and bags about eight million pounds of grass seed a year, mainly Kentucky bluegrass and perennial ryegrass. Two million pounds of dry seed coverings, or chaff, are left over after processing.

In the past, the company has hauled this material to a landfill and burned it, spending \$10,000 to \$15,000 a year for disposal. "Currently, it's a waste product with no value whatsoever," Benike says. Yet, this "waste" has an energy content greater than wood.

Sparby thought the small-scale biomass gasifiers being developed at the University of North Dakota "might be a good fit for us," says Helmstetter, the board chairman. Gasification converts solid organic material, such as plant residue, into a low-Btu gas that can be burned like natural gas in a furnace, turbine or engine.

Gasification is especially well-suited for ag processors that generate biomass waste on-site and need energy, says Darren Schmidt, EERC research manager. It's too expensive for small factories to install steam power systems to burn their residues, he says. "It wouldn't make economic sense. What would make sense is an engine and generator. But an engine can't burn biomass. So what we do



Brent Benike, general manager of Northern Excellence Seed, says plans to burn seed chaff for fuel could save at least \$60,000 a year in electricity and waste-disposal costs for the grass-seed company.

with gasification is turn the residue into a gas, which an engine can consume. We can do this at low pressure and in a cost-effective way that produces a return on capital investment."

"We saw the potential right away," Helmstetter says. "We're big biomass producers here, and we're looking for some way to make use of it."

Getting started

In late 2005, AURI's Center for Producer-Owned Energy sponsored a five-day gasification trial at the EERC's Grand Forks pilot plant. "We got very good quality gas from grass-seed residue," Schmidt says. Screenings

yielded 140- to 150-Btu gas per cubic foot — about 15 percent better than the yield from wood gasification.

Those successful tests led to plans for what may be the nation's first commercial grass-chaff gasifier, Benike says. "AURI has been a tremendous help in getting this off the ground."

Grass-seed screenings will be combusted at low oxygen levels in a proprietary EERC reactor. The cylinder-shaped gasification chamber will be about 10 feet tall and specially designed to handle light, fluffy chaff

without expensive pelletizing. The resulting biogas will be filtered, then used to fuel an engine and generator, which will produce 100 kilowatts of electricity. That's a typical power load for a small manufacturing business, Schmidt says. The whole installation will be small enough to fit into a two-car garage.

In addition to grass-seed screenings, the gasifier will also burn perennial-grass straw from two northwest Minnesota grass farms. Other readily available biomass, such as wood chips, could also be used, Schmidt says.

Northern Minnesota biofuels future

Minnesota's grass-seed industry is concentrated in Roseau and Lake of the Woods counties. The climate, influenced by the vast Lake of the Woods, is wet and cool — ideal for growing grass. The industry took off in 1953, when the University of Minnesota released Park Kentucky bluegrass, a variety bred for northern Minnesota.

In 2002, the state produced about 40,000 acres of grass seed, according to the most recent Census of Agriculture. Today, Helmstetter estimates that northern Minnesota grass-seed acreage has swollen to about 60,000 acres, making the state a leading producer, along with Washington and Oregon.

Supplying biomass for energy is an obvious match for northern Minnesota's grass-based agriculture, Helmstetter says. A typical rotation for the area includes ryegrass planted into wheat stubble in the fall, followed by no-till soybeans or canola, followed by wheat. The region's largest grass crop, bluegrass, remains productive for 20 years without replanting or tillage. In this production system, "it's an advantage to remove the straw" from wheat, ryegrass and bluegrass fields, Helmstetter says. "So we already have a lot of acres of biomass available."

New strains of high-yielding native prairie grasses, which are now being developed at the U of M, also hold great promise as northern Minnesota energy crops, Helmstetter says. He notes that the region's lower land values would give biomass crops a competitive edge

there. In addition, northern farmers already have a lot of experience raising perennial grass crops. Plus, "we have a lot of underused forest products."

For all these reasons, "we're excited about the future potential of gasification in our area," Helmstetter says.

Once the bugs are worked out, small-scale gasification systems "will be fairly easy to mass produce, and the price will come down," Helmstetter predicts. Adds Benike: "Every area has some kind of biomass that could be converted to electricity. Towns up and down the road could have a gasifier to power their main industry, or a school or hospital." ■



Steve Helmstetter, pictured in his ryegrass field near Roosevelt, Minn., says supplying biomass for energy is an obvious match for northern Minnesota's grass industry. He chairs Northern Excellence Seed — one of the first Minnesota companies to generate on-site power from waste.

Producing excellent seed

Start-up company serves northern Minnesota grass-seed growers

Northern Excellence Seed, LLC, was founded in 2002 by 29 northern Minnesota grass-seed growers. The processing and marketing company is based in Williams, Minn., a town of 200 located 20 miles east of Warroad in Lake of the Woods County.

Williams-area growers teamed up with the local elevator, Northern Farmers Co-op,

to build a \$2 million grass-seed cleaning plant — Minnesota's third. The co-op, in business since 1936, owns 40 percent of the seed company. Grower-shareholders raise Kentucky bluegrass, ryegrass, timothy and other specialty grass seeds.

The first year, Northern Excellence Seed produced 3 million pounds of grass seed.

Today the plant contracts for 18,000 acres of grass and cleans and bags about 8 million pounds of seed, posting annual sales of about \$5 million. Marketing through LaCrosse Forage and Turf of LaCrosse, Wisc., Northern Excellence ships its products around the globe. ■



Gasification groundwork Pilot biomass gasifiers going up around the state

BY E. M. MORRISON

Minnesota's got gas!

The state is becoming a leader in the development of small-scale biomass gasification systems, which produce synthetic natural gas. "There's a considerable amount of buzz about biomass gasification in Minnesota," says AURI project manager Michael Sparby.

Several gasifiers are now being built around the state and more are in the works. The facilities will convert ag products, such as corn stover, grass-seed chaff and sawdust, into energy for use on-site. AURI has provided technical assistance to most of them.

These pilot projects will show that small-scale biomass gasification can work, laying the groundwork for commercialization, Sparby says. Although wood and coal gasification has been around for more than a century, small-scale biomass gasification technology is still in the development stage. "Once the demonstration plants are up and running, people can see how it works and go in and kick the tires."

Pilot gasifiers will also allow engineers to fine-tune the technology and learn more about operation and maintenance in real-life commercial settings, says Darren Schmidt, research manager at the University of North

Dakota Energy & Environmental Research Center in Grand Forks. EERC recently installed a pilot gasifier at Grand Forks Truss Company. The 100-kilowatt unit converts the plant's scrap wood to electricity.

These new gasifiers will be platforms for basic research, too. A corn-stover gasification plant at the University of Minnesota, Morris, which broke ground July 27, will do more than heat and cool the college campus. It will also assess gasification economics, experiment with a wide variety of feedstocks, and develop new ways to collect and handle local biomass crops.

These early gasifiers will also set the stage for converting synthetic natural gas to liquid fuels, such as ethanol, Schmidt says.

"We're seeing an immense amount of interest in this new technology," says Schmidt, adding that the EERC could keep a staff member busy doing nothing but fielding inquiries about biomass gasification.

Here's a quick look at Minnesota's small biomass gasifiers:

First in the nation

Central Minnesota Ethanol Cooperative in Little Falls, Minn., was the first American ethanol plant to install biomass gasification.

Late last year, the 20-million-gallon corn dry mill began converting about 280 tons of wood per day into synthesis gas. The biogas runs CMEC's ethanol and distiller's grains drying operations and also powers a 1.1 megawatt steam turbine, which generates a portion of the plant's electricity.

Campus greenery

UMM broke ground in July on a \$9 million biomass gasifier that will fuel the campus steam plant. The facility is expected to begin operating next spring. The gasifier will consume about 72 tons of corn stover a day, producing 18 million Btus per hour of green power. It's expected to furnish about 80 percent of UMM's heating and cooling needs. The U of M's West Central Research and Outreach Center and the USDA North Central Soil Conservation Research Lab will also use the gasifier for research.

New energy for ethanol

Chippewa Valley Ethanol Company, a 45-million-gallon corn dry mill in Benson, Minn., will gasify wood chips and corn stover to power its manufacturing operations. In July, the ethanol company began construction of a biomass gasifier that will burn about 75 tons of biomass per day — enough to furnish one-quarter of the plant's natural gas needs. The facility is expected to

begin producing synthesis gas in December. Eventually, CVEC plans to gasify about 300 tons of biomass a day, replacing 90 percent of its natural gas consumption.

Grassroots power

Northern Excellence Seed in Williams, Minn., plans to gasify grass-seed screenings and straw to power its seed cleaning plant. In July, the farmer-owned company received a \$230,000 USDA-NRCS grant to build a gasifier that will run a 100-kilowatt generator. The gasifier will burn about two million pounds of grass-seed waste a year, providing all the plant's electricity.

Charging up communities

AURI is helping several rural Minnesota towns look into community gasification projects. Roseau, in northwestern Minnesota, hopes to build a 400-kilowatt gasifier that would burn grass-seed screenings and straw produced in the area. Stevens County, in west central Minnesota, is organizing a \$55,000 study to explore corn stover gasification at the Morris Industrial Park. Little Falls, in central Minnesota, is exploring local markets for synthesis gas. In southern Minnesota, a Redwood Falls company is interested in small-scale gasification of garbage. ■



2008 AURI Initiatives

Nutraceutical and function food ingredient opportunities for wheat and barley
Identify opportunities that may lead to further research and development.

Phosphorus and potassium availability from ash
Evaluate ash from co-firing or gasification process as a fertilizer source.

Evaluation of biomass dryer technologies, costs and efficiencies
For use in biomass operations.

Commercial kitchens in Minnesota
List and assess processing capabilities of all commercial kitchens in the state. Identify kitchens willing to rent out space.

Evaluation of pyrolysis char fertilizer characteristics
Pyrolysis of biomass leaves a char residue which reportedly has long-lasting soil fertility. A higher char value would also increase the value of using pyrolysis to convert biomass to biofuels.

Economic impact of producer or local ownership
Quantify the economic impact that producer and local ownership has on Minnesota value-added processing.

Utilization of waste water for agricultural value-added processing
Evaluate municipal waste water as a source for agricultural processing water.

Economic and technical assessment of syngas production and utilization
Identify conversion processes and assess the efficiency and economics of each process.

Assessment of the feasibility of utilizing camelina as a feedstock for biodiesel
Identify camelina's agronomic and oil characteristics.

Ethnic sausages
Through product development and taste-panel testing, determine what sausage formulas can best be marketed.

Next generation technology and process identification
Identify new processes, products and technologies for using agriculture commodities.

Small-volume ethanol plants
Determine whether equipment and technologies used in standard plants can be downsized. Compare cost and net return of small-volume plants versus standard size.

Use of thick stillage in dairy digesters
Conduct a field test to look at collecting qualitative and quantitative information regarding gas production from the liquid ethanol coproduct.

How to start a food business in Minnesota
Create a list of common steps; include resources and links to business plan and other services.

Ground beef study
Evaluate differences in ground meat quality.

Study of organisms in biodiesel
Investigate biosurfactant organism found in biodiesel.

Genetic-specific crop for value-added agriculture
Identify manufacturers of seed corn or soybeans that meet a specific 'niche' market for value-added agriculture.

Potato cull opportunities
Assess and identify potential uses of potato culls in Minnesota.

TAKING THE INITIATIVE

BY DAN LEMKE

Crookston, Minn. — AURI staff understand that good ideas come from paying attention and asking questions.

Besides helping businesses and organizations with value-added projects, AURI staff design their own initiatives. They pay attention to emerging trends that present opportunity. And they meet regularly with the state's agricultural commodity groups and farm organizations to determine priority issues for each group. Many of those priorities could benefit large numbers of producers.

Whether the ideas come from inside or outside the organization, AURI initiatives aren't attached to a commercial business, but they warrant research because they are potentially large-impact projects.

"We have been developing these industry-wide initiatives for a number of years and have found them to be very helpful in examining trends that have the potential to either use a lot of commodities in a new way or develop a new use that hasn't been identified," says Michael Sparby, AURI project director. "Unlike other AURI projects that are proprietary and provide the information only to the entity we are working with, whatever we discover in the course of these initiatives becomes public."

Previous initiatives that have yielded valuable information include using the liquid leftovers from ethanol production for fertilizer, evaluating agricultural biomass for use in deep-bed compost barns, investigating new uses for glycerin and determining the economic realities of pelleting biomass for energy.

"AURI was created to be proactive," says AURI Executive Director Teresa Spaeth. "A large portion of our project portfolio is proprietary and the information can't be shared. But these initiatives allow us to be proactive and recognize or even set trends on a broad scale." ■





PHOTO BY ROLE HAGBERG

HORSE OF A DIFFERENT COLOR

Detroit Lakes company trots out new animal bedding

Julie Swanson of Isanti tries the new horse litter "Swheat Stall," made from wheat and aspen, which clumps like cat litter. "It absorbs really well," Swanson says. "Plus, it smells good."

BY DAN LEMKE

Detroit Lakes, Minn. — A Minnesota pet litter producer is riding its success into a new arena.

Pet Care Systems of Detroit Lakes manufactures Swheat Scoop cat and small-animal litter from non-food grade wheat. The popular scoopable, flushable, biodegradable litter is carried by thousands of retail stores nationwide. Now Pet Care Systems is considering the equine industry.

"It started when a cat-litter customer asked if we'd ever tried the litter with horses," says Mark Hughes, Pet Care Systems general manager. Wheat contains an enzyme that reacts with urine, significantly reducing ammonia, which can be harmful to horses. "We sent our customer six bags of our pelleted litter, but since it's made of 100 percent wheat, the horses ate it."

Then Pet Care began working with AURI to evaluate a variety of agricultural and wood combinations to develop bedding that reduces odor and comfort, but that horses would not eat. Dozens of fibers and

coproducts were tested with varying degrees of success. Cayenne pepper was even added to some blends to discourage eating.

"We chose fiber coproducts to blend with wheat, based on specific characteristics such as absorbency, ammonia control, handling and pelleting ease," says Alan Doering, AURI scientist.

While evaluating different fiber mixtures, Doering and Hughes remembered the results of work done years before. While developing its cat litter, Pet Care Systems patented a pelleted blend of wheat and aspen. While never used in cat litter, Hughes says the concoction was exactly what they were looking for.

"Aspen is absorbent and the wheat eliminates ammonia from the urine, so the combination made a really nice bedding," Hughes says. "The aspen gives the bedding a nice aroma, the wheat takes care of the ammonia, and the bedding clumps together for ease of cleaning so you tend to waste less."

The new product called Swheat Stall was tested in horse stalls at North Dakota State

University alongside traditional wood-shaving bedding.

The results were nothing to whinny at.

NDSU tested the two beddings on 12 stalls, each housing a horse averaging 1,100 pounds. The Swheat Stall test, with six 40-pound bags, lasted seven days, while wood shavings had to be added after three days. Ammonia tests in stalls with Swheat Stall showed substantially-reduced readings compared to wood shavings. Best of all, none of the horses ate it.

These results have Hughes hoping Swheat Stall achieves the same success as its feline predecessor. "From the testing we've done, people have been impressed."

"It reminds me of the clumping in the cat litter," says Julie Swanson of Eagle's Bend Ranch in Isanti. "It absorbs really well and when you clean it up, you're just getting the mess and not a lot of extra bedding."

"Plus it smells good." Swanson says a woman who came to the ranch for dressage lessons, "commented that we had the cleanest, nicest smelling barn."

"I also have six barn cats that use the stalls as their litter box. The Swheat Stall works for them, too."

Pet Care Systems recently started marketing Swheat Stall and is initially targeting Minnesota horse owners and those in east and west coast areas that have high horse populations. National retailer Tractor Supply Company has already agreed to test the bedding in some of its stores.

Hughes says a 40-pound bag of Swheat Stall runs about \$5.25. While it may cost more to fill a stall, the wheat and aspen blend should last significantly longer than traditional bedding, making it economically competitive with shavings.

"Swheat Stall fills a customer need while expanding uses for wheat and Minnesota-sourced aspen," Doering says. "It also continues to create processing opportunities."

While not currently produced at its Detroit Lakes facility, Hughes says Pet Care Systems may add horse-bedding manufacturing capacity once the market takes off. ■

buff stuff



PHOTOS BY ROLF HAGBERG

Warren Etches, left, and Mark Limpert, two of four partners with Limpert Environmental, have been churning out straw mats and wattles for erosion control since July. Soon they will start marketing their flagship product: Buff Stuff, a patent-pending buffalo-manure compost blend.

Litchfield company is developing bison-manure compost and straw products

BY DAN LEMKE

Litchfield, Minn. — A central Minnesota company is being built on buffalo manure and straw.

In a few months, Limpert Environmental expects to start marketing “Buff Stuff” — a patent-pending buffalo-manure compost blend — for mulch and fertilizer. In the meantime, the company is producing straw mats and wattles for erosion control.

“The ‘Buff Stuff’ mulch will be our flagship product because it is unique ... it’s a great growing medium,” says Warren Etches, Limpert Environmental president and partner. “It’s an all-natural product that contains no chemicals.”

“But the first phase of our business plan is the development of our straw products,” which creates cash flow for the company, allowing development time to get the Buff Stuff products to market.

Bison benefits

Two of the company’s partners, brothers Mark and Sandy Limpert, grew up on their family’s western South Dakota ranch. Sandy, who still ranches, became an expert at composting buffalo manure. Over the past eight years he perfected a process involving the bison’s diet and controlled composting to produce a quality growing medium for plants.

North Dakota bison rancher Wayne Buchholz, adopted the compost process and later became a company partner.

“The buffalo compost is pretty specialized,” says Mark Limpert, executive vice president. “We’ve perfected the way the animals are fed because it affects what comes out the other end. The compost process affects it as well.”

Expanding the bison line

In 2006, Mark Limpert met with Alan Doering at AURI’s coproducts lab in Waseca. They evaluated various blends of ag products and composted bison manure to make hydroseeding mulch.

Liquid hydroseeding mulch is sprayed on slopes and exposed areas to spur plant growth, stabilize the soil and reduce erosion. Limpert and Doering found a winning combination and identified blends that had potential for future products.

“They’ve taken the idea and run with it,” Doering says. “The fact that they are utilizing various agricultural coproducts in their products definitely raises the value.”

Straw first

While the buffalo product line, including hydroseeding mulch, seed-and-compost-impregnated straw mats and bagged premium compost, is not on the market yet, Limpert Environmental has been churning out straw erosion-control products since July.

Mark Limpert is trained in civil engineering and has worked in the Twin Cities area on erosion and sediment control projects for engineering firms.



In June, Limpert Environmental took possession of a large complex in Litchfield being vacated by a computer-component manufacturer. The next month, after building modifications and the installation of German-engineered equipment, the company started producing erosion-control mats and tubes called wattles made from straw.

“Wattles are essentially straw logs held together with photodegradable netting that can be staked to the ground to prevent sediment runoff,” Limpert says. “The straw mats are used for erosion control and slope stabilization, but they also help reduce dust pollution.”

Calculated growth

The mats and wattles are expected to provide an annual market for 3,000 tons of Minnesota-grown straw. “We are looking to build long-term relationships with growers,” Etches says.

Etches says his company is looking for consistent supplies of clean, dry straw bales that have been stored in shelters and contain long fibers for the wattles and mats.

But the straw products are just the beginning, Etches says. “We want to be multi-faceted and produce more than one product.”

Etches, a CPA who joined the company in March after years as a manufacturing senior executive, uses a calculated approach to growth.

“Our objective is to have 40-plus employees this time next year,” Etches says. “The community has been very supportive. They want us here.” ■

Energy roundtable



From scientists to bankers to business executives, leaders join ideas on making Minnesota a global bioenergy leader

BY CINDY GREEN

To be a national and global renewable-energy leader requires investing heavily in research, infrastructure, financing, public policy and developing talent.

Minnesota is ready, say many business, agricultural and political leaders. Facilitated by AURI, bioenergy leaders initiated the Renewable Energy Roundtable, a diverse group that includes bankers, politicians, processors, educators, researchers, economic developers, environmentalists, funders, utility managers and others who want to build one of the world's preeminent bioenergy industries in Minnesota.

"Minnesota is the only state I'm aware of that's doing something like," says Michael Sparby, AURI project director. The sessions start with a topical presentation, such as biobusiness, the federal farm bill, or energy research development. "We then do break-out networking sessions."

"The uniqueness of the roundtable is bringing together people who usually do not sit at the same table — private industry with academia with producer organizations with farmers — with the goal of renewable energy," Sparby says.

The roundtable has met quarterly at various sites in St. Paul and St. Cloud since it was launched in September 2006. Its stated goals are:

1) To ensure that Minnesota is a recognized leader in renewable energy knowledge, application and utilization; and

2) To create an implementation platform for moving short and long-term goals forward for Minnesota.

"That first meeting truly was a roundtable discussion, going around and around," Sparby says. "The feedback was extremely strong that we need to continue this conversation." The result was long lists of ideas that Sparby and a facilitator organized into five areas: research, public policy, talent development, infrastructure and economics. (see sidebar, page 9)

A team leader, AURI resource person, and roundtable members were assigned to each focus area. "We looked at what's going on in these areas in the state: Where are the opportunities? Where are the roadblocks that need to be addressed? Now we need to pull together either projects or initiatives to address this."

The Minnesota Legislature thought the roundtable was such a good idea that they made it law. The omnibus agriculture bill, enacted in May 2007, requires AURI to convene a Renewable Energy Roundtable to meet quarterly and "further the state's leadership on bioenergy issues." It is tied to the state's 25-25 goal, where Minnesota would produce 25 percent of its own energy by 2025.

The bill also created the NexGen Energy Board to fund bioenergy projects and make policy recommendations over the next two years. The 12-member board includes AURI Executive Director Teresa Spaeth and others representing state agencies, state House and Senate ag and energy committees, ag and natural resource organizations, and higher education.

"The theory behind it is that the roundtable will feed information to NexGen" to help it make decisions, Sparby says. "We'll be letting them know where the low-hanging fruit is and where the barriers are."



PHOTO BY DAN LEMKE

Participating in a Minnesota's Renewable Energy Roundtable discussion, clockwise from lower left, are Sam Gould, Minnesota Technology; Dick Hemmingsen, IREE; Max Norris, AURI; Dentley Haugesag, DEED; Dale Wahlstrom, Minnesota BioBusiness Alliance; Terry Tibbetts, White Earth Tribal Council; and Bruce Jones, Minnesota State University-Mankato.

In the meantime, roundtable members are already acting on issues that dominate group discussion. Talent development is a big concern. "For example, a local ethanol co-op CEO said he has gone through several plant managers in four years," Sparby says. With a burgeoning renewable fuels industry, managers and technicians are often lured away by more lucrative offers.

"It was one of the things that jumped out right away; we pulled together (representatives from) Farm Bureau, Farmers Union, corn ethanol, biodiesel, soybean folks and plant CEOs and had a conversation around it."

"The talent development team recognizes the great work that is currently being done through the Minnesota State Colleges and

Universities system but also realizes that we are seeing only the tip of the iceberg as far as what the need and demand will be in the near future."

AURI has initiated a biofuels assessment "and some partner dollars went into it," Sparby says. "AURI will be able to identify future trends that we can target ... to assess what the talent needs are for the industry." The survey should be released in November.

"By convening all these people together, you aren't going to have people working in their own silos, and you're hopefully able to save time, eliminate mistakes, share resources, save money, and strengthen projects." ■

A basket of energy ideas

The first brainstorming sessions of the Minnesota Renewable Energy Roundtable generated about 1,000 ideas on activities that could advance Minnesota's bioenergy industry. AURI facilitators categorized the ideas into five areas listed below. Team leaders and AURI resource staff have been assigned to each group, which meet quarterly.

The Roundtable's next phase is to prioritize ideas, design projects, and find funding and other resources to accomplish Minnesota's goal of producing 25 percent of its own energy by 2025.

Applied and basic research

Team leaders: University of Minnesota and Minnesota State Colleges and Universities

Focus areas: Researching bioenergy development in areas such as gasification and biofuels, and improving production efficiencies; analyzing bio-masses availability, production, conversion issues, and the most appropriate feedstocks for various technologies; looking at environmental challenges associated with biofuel production; developing new bioenergy forms such as cellulosic ethanol; sourcing research funding, especially in high-risk, high-yield areas.

Talent Development

Team leaders: Minnesota State Colleges and Universities and University of Minnesota

Focus areas: Developing educational curriculum in renewable-energy; promoting management, engineering and technology fields; training faculty; raising awareness of bioenergy career and research opportunities; recruiting, training and retaining plant managers and technicians; sharing basic and applied research between U of M and state colleges; designing accelerators to bring researchers and businesses together.

Economics and Financing

Team leader: Minnesota Department of Agriculture

Focus areas: Looking at renewable-energy financing, model development, cost comparisons between various energy forms, cost/profit analysis, access to capital, the economics of energy efficiency and conservation, rural economic development services, business assistance, the state's role, and economic challenges.

Public policy and awareness

Team leader: Minnesota Department of Commerce

Focus areas: Examining state and federal energy and environmental policies and financial incentives; building awareness and acceptance of biofuels among consumers, the transportation industry, business and political leaders, and others; exploring ways to increase public support for renewable energy.

Infrastructure development

Team leader: University of Minnesota-Crookston

Focus areas: Investigating current and future needs for energy transmission and transportation; looking at densifying feedstocks to reduce transportation costs; examining water availability and storage issues; securing funding for demonstration projects; analyzing costs, efficiencies, and infrastructure demands of large versus small plants.

Organizations represented in the Renewable Energy Roundtable

AgriNews
 AgriBank
 Agribusiness
 Alexandria Technical College
 American Crystal Sugar Company
 American Energy Systems
 Asclepian Arts Alliance
 AURI
 Authentic Leadership Action, Inc.
 Bemidji State University
 Bemidji Bio/BSU Joint Economic Development
 Benton County Economic Development
 BioSciences & Emerging Technology Committee
 Bison Renewable
 Blandin Foundation
 Bois Forte Development Corporation
 British Petroleum
 Capitol City Bioscience Corporation
 Cargill
 Center for Applied Research & Technology Dev.
 Center for Energy and Environment
 Central Minnesota Ethanol Coop
 Chisago County Board
 Clean Energy Resource Team
 Community Development of Morrison County
 Congressman Collin Peterson's Office
 Duluth Seaway Port Authority
 Eagle Bio-Fuels, LLC
 Farm Credit Services
 Fergus Falls Economic Improvement Commission
 Great River Energy
 Hubert H. Humphrey State & Local Policy Program
 Hunt Utilities Group, LLC
 Initiative Foundation
 Iron Range Resources
 LifeScience Alley
 McKnight Foundation
 Midwest Ag Energy Network
 Minnesota Barley Growers Assoc.
 Minnesota Corn Growers Assoc.
 Minnesota Corn Research and Promotion Council
 Minnesota Crop Production Retailers
 Minnesota Department of Agriculture
 Minnesota Department of Commerce
 MN Department of Employment & Economic Development
 Minnesota Farm Bureau Federation
 Minnesota Farmers Union
 Minnesota Forest Resources Council
 Minnesota House of Representatives
 Minnesota Milk Producers Association
 Minnesota Pork Producers
 Minnesota Senate
 Minnesota Small Business Development Center
 Minnesota Soybean Growers Assoc.
 Minnesota State Colleges and Universities
 Minnesota State Community and Technical College
 Minnesota State University Mankato
 Minnesota State University Moorhead
 Minnesota Technology, Inc.
 MinWind
 Minnesota Wheat Research & Promotion Council
 MN West Community & Technical College
 Natural Resources Research Institute
 Northwest Technical College
 Red Dragon Solutions
 Redwood Area Development Corporation
 Russell & Herder Advertising & Public Relations
 6Solutions, LLC
 Sandia National Laboratories
 Southwest Initiative Foundation
 Southwest Minnesota Private Industry Council
 Southwest Minnesota State University
 The BioBusiness Alliance of Minnesota
 Umore Park
 U.S. Senator Amy Klobuchar's Office
 University of Minnesota
 U of M Center for Diesel Research
 U of M - Crookston
 U of M Forest Resources
 Upper Midwest Hydrogen Initiative
 USDA Farm Service Agency
 USDA Rural Development - Albert Lea office
 USDA Rural Development - State Office
 West Central Initiative
 West Granite Falls
 White Earth Reservation
 Windustry
 Xcel Energy



PHOTOS BY DAN LEMKE

Better fair fare

Minnesota Cooks showcases local chefs and ingredients at State Fair

BY DAN LEMKE

St. Paul, Minn. — Not all Minnesota State Fair food is served deep fried or on a stick.

For the fifth year, the "Minnesota Cooks" program at Carousal Park served samples of healthy gourmet dishes made by premier Minnesota chefs using local, farm-fresh ingredients.

"This is the place to show consumers how they are connected to their food," says Doug Peterson, president of the Minnesota Farmers Union, which organizes the event. "Minnesota Cooks brings together farmers, chefs and consumers in a celebration of the great food produced in Minnesota."

This year, students from Southwest Minnesota State University's culinology program assisted restaurant chefs at seven 45-minute cooking demonstrations. Their creations were sampled by local celebrities and fairgoers.

"Few people have a direct connection to the farm and agriculture anymore," says Dennis Timmerman, AURI project development director. "Events like this help reconnect consumers with the high-quality food that is produced here. Plus it encourages them to buy locally-produced items ... providing market opportunities for farmers."

Presented by the Minnesota Farmers Union and the Food Alliance Midwest, Minnesota Cooks is sponsored by AURI, Renewing the Countryside, SYSCO Minnesota, the University of Minnesota and Rake Magazine.

"The demand for foods grown in environmentally and socially responsible ways has grown dramatically," says Jim Ennis, Food Alliance Midwest director.



JP Samuelson, chef at jP American Bistro of Minneapolis, simmers one of his specialty dishes made with locally-grown ingredients. Below, Minnesota State Fair visitors watching the "Minnesota Cooks" demonstrations are treated to samples of the local chefs' dishes.

"Restaurants, grocery stores, colleges and hospitals are responding to these changes in the marketplace."

Minnesota Cooks is publishing a 16-month calendar with recipes and stories about the chefs and farmers who produce the menu. For more information, visit www.minnesotacooks.org ■



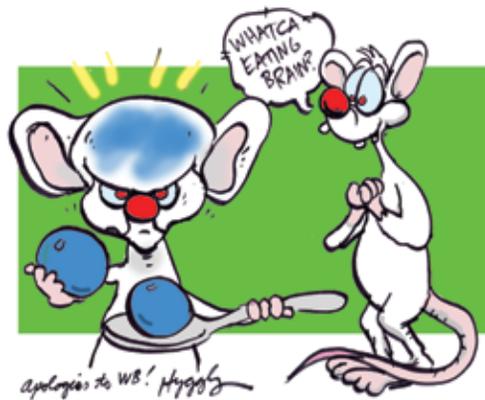
Elsewhere in ag innovations

BY DAN LEMKE
CARTOONS © UNCLE HYGGLY

Soy blocks the sun

A soy-based sunscreen has become the platform for an entire class of cosmetics. The SoyScreen formula, designed by ARS scientists in the late 1990s, is now being sold by iSoy Technologies Corporation of Cary, Ill. as a key ingredient in wrinkle-prevention products marketed by a major cosmetics company.

From: USDA-ARS, August 17, 2007



Blueberry brain boost

Blueberries have boosted brain activity in laboratory rats suffering from neuritic plaque buildup, often seen in Alzheimer's disease. Researchers at Tufts University in Boston fed adult rats, with the telltale brain buildup, a diet containing blueberry extracts. The control rats with a similar condition were fed standard fare.

After eight months, memory-maze tests showed rats with blueberry-extract diets fared as well as those with no buildup, and scored much higher than rats not fed the berry extracts.

From: USDA-ARS, August 8, 2007

Too hot for pests

A fiery habanero pepper, developed by USDA researchers, not only blasts taste buds but pests too. The Tiger Paw-NR pepper, developed at the U.S. Vegetable Laboratory in South Carolina, is resistant to nematodes that can seriously damage pepper plants. The natural resistance offers an alternative to applying chemicals to combat the nematodes.

Based on the standard heat scale, the new

habanero pepper is more than three times hotter than a typical habanero and more than 100 times hotter than an average jalapeno.

From: USDA-ARS, July 2, 2007

Catnip cologne

ARS researchers in Maryland have identified a catnip-oil compound that attracts natural predators to destructive aphids and mites. Iridodial imitates the pheromones of the male lacewing. This natural cologne attracts both male and female lacewings, which then feed on the damaging mites and aphids, providing natural biological pest control.

From: USDA-ARS, June 4, 2007

Film at 11

Dairy and biofuel byproducts may soon keep food fresher. Scientists at the USDA Eastern Regional Research Center in Pennsylvania have discovered a process that combines water with milk casein and glycerol to produce an edible film for protecting food. Glycerol is left over from biodiesel production.

Like conventional packaging, edible films can extend the shelf life of many foods, protect products from damage, prevent exposure to moisture and oxygen, and improve appearance.

From: USDA-ARS, June 5, 2007

Soy for bones

Brazilian scientists have determined that soy-based yogurt and exercise help increase bone density. Researchers found that soy isoflavones in yogurt were capable of preventing bone loss or even increasing bone mass in laboratory rats. Through a series of tests on various control groups, rats receiving both the yogurt and exercise fared best.

From: NewsRx.com, August 13, 2007

Easing menopause

Naturally-occurring edible plant compounds called polyphenols have been shown to help battle unwanted side effects of menopause. Scientists at the University of Alabama, Birmingham have conducted studies that show polyphenols found in grapes, soy and kudzu can help blunt cognitive loss, hypertension and insulin resistance. The natural treatments also showed fewer side



effects than standard hormone replacement therapy.

From: Newswise, August 8, 2007

Bright eyes

Nutritional supplements of omega-3 fatty acids may prevent eye disease according to researchers at the Harvard Medical School and National Eye Institute.

A study found that increased consumption of omega-3 improves the balance with omega-6 fatty acids, which have been linked to an increase in risk of retinopathy, a sight-threatening disease affecting four million premature infants and diabetics in the United States. Increased omega-3 consumption reduced abnormal blood vessel growth in the eyes, which is a hallmark of retinopathy.

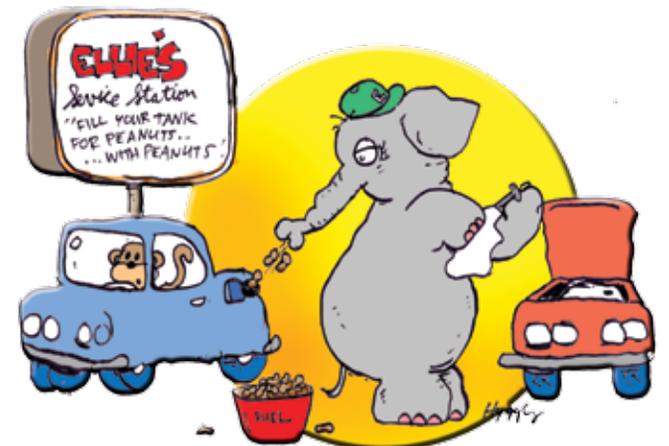
Omega-3 fatty acids are in fish, flax and eggs from chickens fed diets containing flax.

From: Nature Medicine, July 1, 2007

Nutty fuel

While America's biodiesel industry is now fueled primarily by soybean oil, scientists are working on other nutty options. ARS researchers at the National Peanut Research Laboratory in Georgia are testing peanut varieties not suited for commercial edible standards, but are high in oil and with low production-input costs. Scientists say soybeans produce about 50 gallons of fuel per acre, while peanuts can produce 120 to 130 gallons of biodiesel per acre.

From: USDA-ARS, July 30, 2007



AURI project director known for renewable-energy work



Hansen.

AURI mourns the passing of project development director Wayne Hansen, age 60, who died suddenly of a heart attack at his home in rural Morgan on August 3. He is survived by his wife Linda, daughter Danica Buckingham and son John Hansen.

Hansen was born and raised in rural Morgan and earned bachelors, masters and doctorate degrees before returning to his family farm in 1979. Besides operating the farm, Wayne worked for the USDA, then as a Redwood County Extension educator for the University of Minnesota from 1983 to 2003. He joined

AURI in 2005, working primarily on renewable energy and biomass projects at AURI's Marshall laboratory and Center for Producer-Owned Energy.

"Wayne had a wealth of knowledge that will certainly be missed, but most of all he will be missed as a person," says

Teresa Spaeth, AURI executive director. "He was well liked and respected personally and professionally, a person who was very active in his community. Wayne will certainly be missed by a lot of people." ■

Hitting the target

BY TERESA SPAETH

In March 2001, the Russian space station Mir was expected to make a fiery reentry to earth after orbiting the planet for 15 years. Russian scientists conducted a series of maneuvers to bring the station down away from populated areas and into the South Pacific Ocean.

At the same time, a fast-food company placed a 40-foot-square floating target in the South Pacific waters, promising to give a free taco to everyone in America if Mir hit their floating bullseye.

While it was a clever public relations move, the station did not hit the tiny target. No one really expected it to, but likely thousands were secretly hoping it might.

There's a big difference between hoping something hits the mark and making sure it's on target.

At AURI, we are experienced at helping value-added ventures hit their marks. Ag product development doesn't just happen. It takes vision, planning, commitment and follow-through. AURI's expertise and unique facilities can help Minnesota ventures reach their targets by providing technical assistance, feasibility assessments and network coordination.

But we don't just work to help others hit their targets — we set a few of our own. Through industry-wide initiatives that hold the potential for large-impact projects, we

help identify and even set trends for rural innovation. Each of these proactive projects could yield significant new markets for agricultural products. Not all will result in lucrative opportunities, but some will. We just won't promise free tacos.



Spaeth.

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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For staff e-mail addresses, visit AURI on the Web: www.auri.org

AURI Ag Innovation Quiz

- How much does a Minnesota grass seed business expect to save in electricity and waste disposal charges each year by installing a gasification system?
 - \$30,000
 - \$12,500
 - \$60,000
- About how many acres of grass seed are grown in Minnesota?
 - 5,000
 - 60,000
 - 1.3 million
- For use by what animal was the new Swheat Stall horse bedding originally patented?
 - Cats
 - Hamsters
 - Iguanas
- About how many organizations have taken part in Minnesota's Renewable Energy Roundtable?
 - 23
 - 60
 - 11
- What was the purpose of the Minnesota Cooks program at the Minnesota State Fair?
 - Highlight and connect consumers

- with locally-grown food
 - Offer healthy fair food alternatives
 - Share new recipes
- What is a key limiting factor in biomass pellet development?
 - Sourcing raw materials
 - Workable economics
 - Equipment
 - What is "Buff Stuff"?
 - Car wax
 - Bison polish
 - Composted bison manure
 - What is the purpose of AURI's initiatives?
 - Investigate potentially large impact emerging trends
 - Provide public information
 - Assist growers with priority issues
 - All of the above



Answers: c, b, a, b, a, b, c, d

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Pellet reality



Entrepreneurs are eager to put biomass fuel pellets on the market, but are they economical?

BY DAN LEMKE

Waseca, Minn. — Alan Doering receives dozens of phone call from entrepreneurs and businesses interested in developing biomass fuel pellets for energy. Many are familiar with feed pellets but inexperienced with biomass.

“It’s totally different producing a fiber-based biomass pellet than it is a starch-based pellet like feed,” says Doering, AURI scientist.

Most biomass is bulky but lightweight, reducing the distance it can be economically transported — and increasing handling headaches. Widespread use of biomass for energy depends on developing methods that increase bulk density such as briquetting or pelleting.

As head of AURI’s coproducts lab in Waseca, Doering recognized the need to develop baseline information comparing the economics of biomass verses feed pellets. With help from pellet-fuels experts, Doering documented the economics and average costs of pelleting.

“People are concerned with ‘throughput’ — how much product you produce in an hour — because that directly affects your fixed costs,” Doering says. “The more you produce, the easier and faster it is to spread out the cost of equipment. Biomass won’t give the same throughput.”

Doering says a 200 horsepower pellet mill that can crank out about 10 tons of feed per hour will only generate about 2 tons per hour of wood or biomass pellets. While feed-pellet costs range from \$8 to \$28 per ton, biomass pellet production can stretch from \$31 to \$79 per ton.

“Those figures don’t even include the cost of raw materials,” Doering says. “By far the largest variable in biomass pellet production is the cost of procuring and transporting biomass. That’s where the expense is.”

Doering says biomass blends tend to provide better throughput than wood, but will still produce variable results depending on the materials used.

The pellet economics information report addresses different pellet grades, raw materials, storage, feed mill conversion potential and equipment requirements. ■



PHOTO BY ROLF HAGBERG

Doering.