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# AG INNOVATION NEWS

*The newspaper of the Agricultural Utilization Research Institute*

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PHOTOS BY ROLF HAGBERG

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BY EDGAR OLSON

It's one thing to talk about renewable energy, and another to do something about it.

Many Minnesotans recognize the impact renewable energy has on agriculture and our economy. But recognizing opportunity isn't enough. Capitalizing on it is key — and it's happening in Minnesota.

The state legislature has elevated our national leadership in ethanol production by passing legislation requiring a 20-percent ethanol blend in gasoline sold here. Currently most

# Just do it.

Minnesota gasoline contains a 10-percent ethanol blend. The mandate takes effect in 2013, unless ethanol makes up one-fifth of the gas sold in the state by then.

A 20-percent blend would create an annual ethanol demand estimated at 575 million gallons. Right now, the state's capacity is more than 400 million gallons. But with more plants being constructed and planned, we should be able to meet the increased demand.

Minnesota's biodiesel industry is also moving up. FUMPA Biofuels in Redwood Falls has been operating a refinery for more than half a year, plus plants are under construction near Albert Lea and Brewster. When they start operating later this summer, the state's biodiesel capacity will swell to nearly 60 million gallons per year. When Minnesota's capacity reaches 8 million gallons, a

mandate passed several years ago will kick in requiring a 2-percent biodiesel blend in every gallon of diesel sold. That will place Minnesota squarely in the forefront of the industry.

The Center for Producer-Owned Energy, a USDA-funded Ag Innovation Center operated by AURI, is also furthering ag-based, renewable-energy applications such as biomass gasification, biodiesel/wind hybrid projects, biogas production and improved ethanol manufacturing.

Minnesota has the natural resources, open-mindedness and drivers to take the lead in renewable energy from agricultural sources.

In fact, we're already doing it.



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 Ag Innovation Quiz

After perusing all the information about value-added uses for Minnesota crops, test your recall with the following quiz. Good luck!

Hint: If you get stumped, the answers are at the bottom of this quiz.

- From what parent crop is canola derived?
  - maize
  - sugar cane
  - rapeseed
- How many turkeys were produced in Minnesota last year?
  - enough for Thanksgiving
  - 46.5 million
  - 300 million
- What Minnesota commodity could possibly be added to ethanol to boost production?
  - sugar
  - beer
  - animal tallow

- What is a diluent?
  - a kid who skips school
  - a pickling spice
  - a diluting agent
- How many loaves of bread are produced by French Meadow Bakery annually?
  - 4 million
  - 356,000
  - 1.8 million
- Wild rice is actually not rice.
  - true
  - false
  - who cares, it's tasty
- What processing coproduct is going to be gasified to produce energy in northern MN?
  - barley straw
  - grass seed chaff
  - sunflower hulls
- How many tons of distiller's grains are produced by the state's ethanol plants each year?
  - 1.1 million tons
  - 22 million tons
  - 50 million tons



ANSWERS:  
1) c 2) b 3) a 4) c 5) a 6) a 7) b 8) a

### ABOUT AG INNOVATION NEWS



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# DUST BUSTER

## AGRONOMIST PATENTS FUNGICIDE CARRIER MADE FROM SUNFLOWER HULLS

BY DAN LEMKE

Waseca, Minn. — Paul Kresge says his good dust will help snuff out bad dust and be good for potatoes and farmers to boot.

An agronomy consultant from Forest Lake, Minn., Kresge holds a provisional patent for a “diluent” powder made from sunflower hulls, which he developed with the help of AURI technical services specialist Alan Doering.

Diluents are diluting agents used, in this case, for farm herbicides and pesticides. For liquid chemicals, water is the chief diluent, but dry pesticides require something else.

“A lot of powdered pesticides put on active ingredients at a very low rate, so something is needed as a carrier,” says Kresge, who holds a Ph.D. in soil fertility. “You want a dry diluent, but you also don’t want fugitive or nuisance dust that can be respirable.”

Nuisance dust from dry pesticides can be released into the air when handled, creating a potential health concern for applicators. “Someone has to apply the fungicide, but you don’t want respirable dust. You don’t want it released into the air,” Kresge says.

### Potato powder

Powdered pesticides are especially common in the potato industry. The majority of farmers in the western United States and Midwest plant potato seed pieces rather than whole potatoes. The cut surfaces are perfect entry points for disease-causing fungus. To prevent fungal diseases from causing the potatoes to rot in the ground, cut pieces are sprinkled with dry fungicides. The pieces are then stored for about 10 days while a new skin naturally forms over the cut.

Currently, talc and powdered alder bark are the primary diluent ingredients used in potato fungicides, but as the supply of alder dwindles, new ingredients are needed.

In 2003, Kresge and Doering started experimenting with a wide range of ag fibers that could be ground finely enough to work as a carrier. After nearly two years of evaluation, they developed a powder with sunflower hulls as the key ingredient because the hulls’ high-oil content reduces dust. The shredded fiber’s shape also helps hold on to small particles.

The dust-reducing quality of the diluent was tested and received high marks from the USDA Agricultural Research Service laboratory in Lubbock, Texas.



PHOTOS BY ROLF HAGBERG

Sunflower hulls are a key ingredient in a new pesticide carrier developed for the potato industry.

### Spud Tested

Kresge tested the ag-based carrier on several plots in Oregon last year. Three more plots have been planted this year. But the fiber carrier has moved beyond testing as 7 tons of demonstration products have already been produced and another 20 to 30 tons will be made by the end of summer for potato markets in Colorado, Florida and the Red River Valley.

Kresge, who was raised in Northeast California’s potato-growing region and has 25 years experience in agriculture as an agronomist, knows there is significant market potential for his fiber carrier in all the potato-growing states. Idaho leads the nation in potato production, followed by Washington, North Dakota and Wisconsin. Minnesota ranks 7th.

“Potato growers are the target market because the growers are the end user,” Kresge says. “The seed-piece fungicide market exceeds 4,000 tons per year.”

Doering says the ag-fiber carrier development is good for Minnesota because the sunflower hulls are sourced and processed here. “It

reduces dust, plus it utilizes what is typically viewed as a waste product.”

While potato-seed treatment is the initial market, future opportunities include flea and tick powders as well as livestock insecticides. ■



AURI technician Alan Doering (left) and agronomist Paul Kresge developed an ag-based diluent that is being tested as an alternative ingredient for potato pesticides.



*SMALL MEAT SHOPS  
ARE NOT THREATENED  
BY BIG-BOX STORES;  
LOYAL CUSTOMERS  
WANT THE  
PERSONAL SERVICE  
AND LOCAL SUPPLY.*



PHOTOS BY ROLF HAGBERG

Cherry Hill Meat Processing employee Mark Posey, far right, helps customer Mike Tubbs bag a quarter beef that the plant custom-processed into steaks, roasts and ground meat. "Buying bulk is cheaper," which is why Jeff Purch, far left, says his customer base is steady. Also pictured are employees Carrin Ohlsen, left, and Marjean Legler.

# My butcher

BY CINDY GREEN

*Taylor's Falls, Minn.* — Tucked in the hills above a St. Croix River town, Cherry Hill Meat Processing can only be found with good directions. But the little butcher shop on Maple Street is hardly a well-kept secret. Cars arrive steadily on a Friday afternoon, leaving with trunks full of white-wrapped steaks, ground beef, chops and roasts.

Jeff Purch, who is buying the custom-processing plant from his uncle, hurriedly wraps a few more T-bones before leaving for a Wisconsin fishing trip. "This place is a little gold mine," profitable enough to pay for a boat and a few other toys. "It's easier when you have a good income coming in," says Purch, 31, who has cut meat since he was 14.

Purch slaughters, cuts, wraps and freezes beef, pork, lamb and wild game. And the service comes with a broad grin and personal attention. "He does good work, never had a complaint," says customer Mike Tubbs. "He always does what I tell him."

## Small advantage

Cherry Hill is one of Minnesota's 380 meat-processing plants. "About 90 percent of them are small, with 10 or employees or less," says Dennis Timmerman, AURI project director. "When I talk to these small meat processors, most are so busy that they're scheduled from six weeks to two months out — because we have a lot of people who want to identify the source of their food."

"Small processors bring something that large processors can't — service and product identity," Timmerman says. "They're a growing sector."

Why are small meat shops thriving in an era of franchises, mergers and big-box stores? "Buying bulk is cheaper," Purch says of buying an animal direct from a farmer and having it processed. Compared to store cuts, "individual packages cost so much less."

Cherry Hill is a state-inspected plant — equivalent to federally-inspected but it can't ship outstate. It does not sell retail, although many small plants do.

Food safety concerns are increasing the popularity of local butchers, says Ed Lorentz, head of the Minnesota Association of Meat Processors. "You never hear of a local processor having a problem with e.coli — it's always from a bigger plant."

"All but one or two of our (association's) 140 members have 10 or fewer employees. ... And I'd say the majority are happy with business."

## Beef verses pork

Beef processing is doing especially well, but "(exclusive) pork plants are on the decline," Lorentz says. "Because of the big producers, there are not many small farmers anymore." Lorentz explains that most hogs are now owned by large corporations but raised by farmers under contract.

"Farmer Jones who use to have a half-dozen or 10 sows ... might be feeding and raising for somebody else. They don't actually own the animals," so they don't have any pork to sell directly to customers, he says.

"There are more small farmers who might

raise a few beef. Even if they raise a lot of beef, I'm not aware of any contract feeders like hogs."

Purch, on the other hand, is seeing increased demand for both beef and pork because of a growth in hobby farms just outside the metro area's periphery. "People from the cities moving out here all want a couple cows, some pigs to raise."

## The Cherry Hill climb

Purch's uncle John Campbell bought Cherry Hill Meat Processing, named after the neighborhood, 27 years ago. "When they started, they struggled," but slowly built a loyal customer base, says Purch. This fall, his fiancé will join him in a business he could carry to the next generation.

Cherry Hill has four regular employees and processes 12 to 13 cattle per week and 10 to 30 hogs. In the fall, the plant brings in "Mom, uncles, brothers, sisters-in-law, nephews," to help process 400 to 600 deer during hunting season. They also wrap elk, bear, buffalo,



caribou, antelope, moose and, occasionally, ostrich.

## Travel for organic

Meat shops close to the metro have an advantage. "But people are not afraid to travel," Lorentz says. "They make a trip into the country an outing."

"Organic is a big selling point," Purch says. Many customers want animals raised on organic grains and grass without antibiotics or growth hormones. However, Purch says he doesn't know any cattle farmers in the area who inject hormones.

"I use to laugh at organic beef — it's a small niche market, but it amounts to quite a bit of business," Lorentz says. His two sons run Lorentz Meats in Cannon Falls, which "is butchering close to 20 head of organic beef per week. They have big hopes on that."

## Custom pricing

Direct-buy consumers save money — as much as half what a store charges. But for the novice, pricing and cuts for all or part of a carcass can be confusing.

Farmers sell by hanging weight — a skinned but untrimmed carcass. Prices vary on how the animal was raised (organic and grass-fed will be more expensive). Some customers pick out their own animals; others ask the plant to contact the farmer. Cherry Hill's

slaughter fee is \$50, divided between buyers who want halves or quarters.

Processing charges vary by customer preference; the more value-added processing, the higher the price.

Cherry Hill charges 34 cents per pound for processing most animals, and 50 cents for a split-side quarter beef (half front, half hind). Grinding adds another 18 cents. Customers choose the size and thickness of cuts.

Here's a hypothetical on what a customer might expect to pay:

A typical quarter beef is 200 pounds hanging weight, so if a farmer charges \$1.50 per pound, the customer pays \$300. About 30 percent is trim, resulting in 140 pounds that cost 50 cents per pound to process (not including sausages, patties or other specialty processing) or \$70. If 35 pounds (25 percent) is ground for burgers, that adds about \$6. The total cost including slaughter would be \$389 — or \$2.78 per pound — for everything from ground beef to tenderloins.

Cherry Hill charges extra to make summer sausage, patties, ring bologna and pepper sticks. Smoked hams and bacon or other specialty products must be contracted out.

## Sausage savvy

Some small shops like Lorentz Meats are giving more attention to value-added products. "Flavored sausage is a growth area," Lorentz says. "It use to be you could

buy fresh or smoked brats. Now there are all these different flavors — apple, cherry, even rutabaga."

But plants with retail stores are facing a state sales tax on sausage snacks that applies only to the shop's own products. "If you make jerky, beef sticks or anything that can be eaten in the car on the way home, you have to charge a sales tax on it. But if you sell a stick of Hormel, you don't charge a tax."

The tax was passed in 2002, but meat shops were given a three-year exemption so it will go into effect on January 1, 2006. The meat processors association has been lobbying for permanent exemption, which passed the Minnesota House this session; a Senate measure extends the exemption two years. As of press time, the difference had not been resolved in the omnibus tax bill, which is tied up in a special session.

## Irreplaceable shops

Lorentz said he doesn't see the little butcher shop meeting the same fate as so many other small businesses that have closed — like the local hardware store or shoe shop. "It use to be when a (meat shop) guy would retire or quit, he would just close the business. Now these places are selling."

Nothing can replace the service, Lorentz says. "People call it 'my butcher' — it's a personal thing." ■

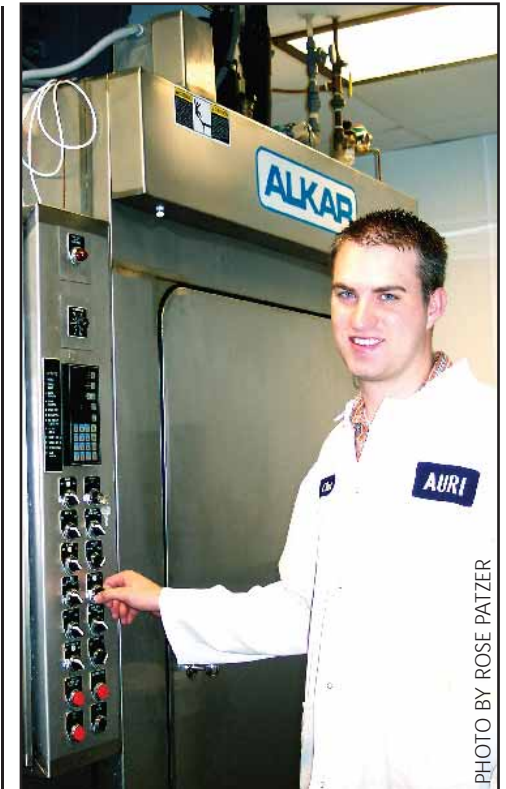


PHOTO BY ROSE PATZER

AURI's new meat technologist Clint Gehrke at the controls of the smokehouse in AURI's Marshall meat lab where he assists clients with developing and testing meat products.

# Meat technologist joins AURI

New AURI talent is ready to serve Minnesota's meat industry. In March, Clint Gehrke joined the AURI animal products lab in Marshall.

A native of Luverne, Minn., Gehrke is a 2004 graduate of South Dakota State University in Brookings where he majored in animal science and minored in ag business. He gained hands-on experience in meat research working at the SDSU meat lab for three years.

"Working at AURI is challenging because you never know what kind of project is going to come next," says Gehrke. "I look forward to helping to build a strong working relationship with meat processors in the state."

"The meat industry is extremely important to Minnesota," says Edgar Olson, AURI executive director. "Clint will help AURI meet the needs of processors across the state and assist in new product development."

Gehrke and his wife Nikki live in Marshall.



Mark Posey checks hanging beef carcasses at Cherry Hill Meat Processing, which will cut, wrap and freeze the meat according to customers' specifications.



# Special section: A vision for Minnesota commodities

This is the final installment in a three-part series on Minnesota commodities. We interviewed leaders of Minnesota commodity groups about their vision for the future. What new uses are developing for their commodities? What are the challenges and prospects for expanding markets? Where are the best opportunities?

## Minnesota leads nation in turkeys; 10th in broiler chickens

BY DAN LEMKE

Poultry producers have found Minnesota a fertile place to roost. As the nation's number one turkey producer, Minnesota gets a big economic boost from millions of the feathered fowl, as well as chicken broilers and eggs.

But Minnesota poultry growers are facing increased competition from other protein sources, such as beef and pork. As a result, growers are looking at new ways to put poultry on consumers' plates.

### Turkey

Blame it on Norman Rockwell.

Turkey dinner to most people means a golden-roasted whole bird, like Rockwell's "Thanksgiving Dinner" image on a Saturday Evening Post cover.

While Minnesota turkey producers are happy to fill the holiday demand, they want consumers to know there are other culinary options.

"When people think of turkey, the image they have is that they have to cook this whole big bird," says Steve Olson, executive director of the Minnesota Turkey Growers Association. "The whole bird is great, but they don't always think of the other ways they can use turkey in their meal rotation."

While deli meat cuts have helped increase demand, Olson laments that few restaurants feature "center of the plate" turkey cuts on their menus, such as turkey tenderloin or roast turkey.

The turkey industry is seeking new markets to increase demand for birds in plentiful supply. Last year, Minnesota growers led the nation in turkey production with 46.5 million birds, up from 44 million the year before. Olson says a University of Minnesota study shows that each turkey adds \$11.68 in value to Minnesota's economy, with a total impact of more than \$600 million annually.

"With turkey, it's a challenge to make people aware of its versatility and nutritional attributes," Olson says. "It's very lean and, per portion, turkey is higher in protein than other meats — plus it's affordable. Most consumers also don't realize that turkey can be used in place of other proteins to lower fat content."

Several large Minnesota turkey processors, including Jennie-O Turkey Store, Turkey Valley Farms and Northern Pride are tapping into the popularity of ready-to-eat foods and developing new products. Consumers

can now find pan roasts, turkey sausage, burgers, seasoned ground turkey, turkey ham, kielbasa, even turkey bacon.

With domestic consumption holding steady the past few years at about 17 pounds per capita annually, growers are giving more attention to foreign markets. Olson says products are being developed that fit the cultural and market needs of China, Mexico and Russia. Halal processed products are also being developed for Muslim markets.

But new meat products aren't turkey producer's only opportunities. Coproducts such as feather meal and even turkey litter offer revenue potential. Feather meal can be used as a feed ingredient or made into biodegradable plastics. The litter is a valuable fertilizer, but also holds promise for energy generation.

Although it has been delayed, ground has been broken for a turkey-litter powered electrical plant. The Fibrominn plant near Benson, Minn. will produce 50 megawatts of renewable energy each year, beginning in mid 2007. Besides poultry litter, the plant will likely use other biomass sources as fuel.

### Chicken broilers

Minnesota poultry producers raised more than 44 million broilers last year, ranking

10th in the nation. Like the turkey industry, Minnesota is home to some industry-leading companies, including St. Cloud-based Gold'n Plump. And just like their feathered relatives, broilers have a big economic impact. Economists value birds at \$2.85 each, giving the Minnesota broiler industry an overall impact of \$77.7 million annually.

In recent years, sales of ready-to-eat products and convenience foods that include chicken have increased. From rotisserie chickens at the supermarket to menu items at both fast-food and white-linen restaurants, chicken is widely available to consumers in many forms. However, Olson says broiler consumption has remained steady over the past several years.

### Eggs

Eggs have undergone an image makeover. Once vilified as a cause of high cholesterol, eggs are again being promoted as a valuable part of the human diet. In fact, the slogan "an egg a day is okay," is being used by the egg industry to highlight recent studies that show consuming one egg per day does not significantly increase cholesterol levels.

Producers are hoping to crack other markets for their eggs and Olson, who represents the Broiler and Egg Association of Minnesota, says they are finding some success.



"It's largely a nutrition message," Olson says. "The cholesterol issue has been addressed, plus research has shown eggs contain nutrients that are important to the brain development in an unborn child. Eggs can also reverse some symptoms of age-related macular degeneration (an eye disease that causes gradual deterioration of sight). Plus, they're an excellent source of protein."

Designer and specialty eggs are also helping egg producers reach more consumers. For example, eggs high in Omega-3 fatty acids are being marketed to health-conscious consumers. Pasteurized eggs and ready-to-eat hard-boiled eggs are capturing niche markets.

Not all of the targeted consumers are human. Olson says the industry is actively pursuing ways to use egg ingredients in pet foods and treats. ■



PHOTOS BY ROLF HAGBERG



# Wild rice special traits open up food and nonfood markets

BY CINDY GREEN

Wild rice is not rice. It is a water grass — the only cereal grain native to North America. Called “manoomin” or “precious grain” by Native American tribes, it was named “wild rice” by early fur traders.

Though traditional wild rice is still hand-harvested by native tribes, cultivated wild rice has been grown as an agricultural crop since the 1950s. It is primarily grown on organic or mineral soils bordered by dikes to retain water, where it matures in about 120 days.

Minnesota produces 4.5 to 6 million finished pounds of wild rice annually on about 17,000 acres. Although Minnesota has twice the acreage, California produces more because yields are higher. Idaho, Wisconsin and Oregon grow small amounts of wild rice and Canada annually produces about 2.5 million finished pounds.

An acre of cultivated wild rice yields about about 720 pounds of unprocessed or 317 finished pounds, as more than half the weight is reduced during drying and processing. It sells for about 44 cents per unprocessed pound.

Wild rice was highly profitable when it was



first cultivated in the 1950s; consumers were already accustomed to paying high prices for hand-harvested grain. But as yields improved and acreage climbed, prices leveled off.

However in the past several years, with wild rice's unique traits and new cooking processes, market opportunities are expanding in a number of food and non-food areas including:

## Quick-cooking wild rice.

AURI food scientist Charan Wadhawan developed a quick-cooking frozen wild rice product in 1995. Another dried quick-cooking product is currently available in supermarkets, sold by Riviana Foods under the Gourmet House label.

“Quick-cook is doing well,” Jon Dockter, associate director of the Minnesota Cultivated Wild Rice Council says. “Normally wild rice cooks in 30 to 40 minutes; quick cook takes 5 to 10 minutes.” Pre-cooking and drying “doesn't compromise flavor or quality,” Dockter says.

## Meat booster

In the mid-1990s, an AURI study confirmed that wild rice has anti-oxidant properties that can extend meat's freezer life. It is being added to brats, burgers, sausages and other ground-meat products to not only keep them fresher, but add moisture and flavor.

## Cosmetics

Wild rice, a natural antioxidant and exfoliant,



is showing up in Northwoods Blend® hand soaps, body washes, shampoos and lotions made by Botanicare, Inc. of Minneapolis. Sold through mail order and specialty stores such as Love From Minnesota, Botanicare products feature natural ingredients, no animal products and plant materials indigenous to Minnesota.

## European export markets

In 2004, the United States exported 2,070 metric tons of wild rice — primarily to Germany, France, Switzerland and Great Britain. As Europe does not produce wild rice, the export market “is currently our largest growth segment.” The difficulty, Dockter says, is increasing production for markets would mean expanding or creating new paddies. “There are so many hoops to jump through,” with creating new paddies, “that it's not very easy to expand acres.” ■

# Canola: the heart-friendly oil

BY CINDY GREEN

Health-conscious consumers are increasing demand for canola oil — lower in saturated fat than any other vegetable oil. The heart-friendly oil is showing up in fast-food chains such as McDonalds, and even some movie theatres are swapping artery-clogging cottonseed for canola.

Canadian canola growers — with more than 12 million acres last year — have enjoyed most of the increased demand for the 41-percent-oil grain. However, U.S. production is nearly a million acres — most in North Dakota. Northern Minnesota counties have gained some ground — reaching a high point of 200,000 acres in 1998. But late springs and wet conditions prevented growers from getting their crops in the past couple years. Only 32,000 acres were harvested in 2004, down from 57,000 in 2003.

“Our biggest-producing counties — Roseau and Marshall — have had the biggest problems with wet or flooded conditions,” says Jon Dockter, associate director of the Minnesota Canola Council. Canola thrives best with cool nights and well-drained soils.

The council has been awarded an AURI grant to investigate how small grains rotated with canola affect subsequent canola yields.

## Plentiful opportunity

There is plenty of opportunity for northern growers. The United States still imports much of its canola — estimates project imports will swell to 670,000 acres worth in 2005.

Canola is a relatively modern crop. It is derived from rapeseed, a centuries-old crop grown primarily in Europe for industrial lubricants. Rapeseed's high erucic-acid content make it unfit for human consumption. However, breeders eliminated almost all the erucic acid to make “canola,” first registered in Canada in 1979. In 1985, the U.S. Food and Drug Administration recognized canola's separate identity from rapeseed.

The Minnesota Canola Council was established in 1997, funded with producer check-off dollars, deducted when canola is sold. Since production has been low the past couple years, the council's budget for developing new markets hasn't been as high as it should be, Dockter says. But the council is still investigating markets that can expand opportunities for Minnesota producers. Some of those include:

## Traditional food-oil markets

Canola oil is only 7-percent saturated fat. It is 61-percent monounsaturated fat - oleic acid, which has been shown to reduce serum and LDL cholesterol. Also, 11 percent of canola oil's composition is heart-healthy alpha-linolenic acid.

Besides its nutritional benefits, canola is flavorless, so it lets other flavors come through in cooking. Are the benefits improving canola growers' price? “Not as much as it should,” Dockter says. “Canola oil is line-priced in grocery stores, which means that it's priced the same as other oils, which may not be as

healthy. Since we're not getting a premium for canola oil on the grocer's shelves, it's hard to realize any advantage.

Yet, the market price and the floor set by the federal government's \$9 per hundredweight loan rate make it profitable to grow.

## Gourmet cooking oils

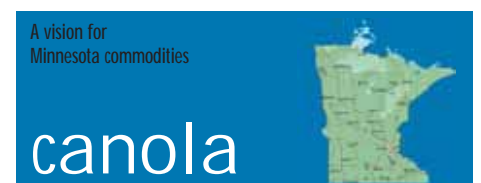
“There are some opportunities to work with other commodities, such as olive oil, to make a blend,” Dockter says. “You would get the lower-saturated fats of canola with the flavor of olive oil.” There is also a canola/soy blend hitting the grocer's shelves which has great potential.” However, a squeezed budget “doesn't allow the council to undertake any significant marketing efforts right now,” he says.

## Mexican markets

Canola council efforts have been targeted at foreign markets. “We do work with the Mid America International Agri-Trade Council to promote canola in Mexico. We are trying to reach the Mexican consumer to let them know how well canola compares to corn oil in saturated fats,” Dockter says. “Hopefully that will spark some demand.”

## Renewable fuels

Canola oil can be used for both biodiesel and motor oils. Tests have shown that “canola has some advantages over soy because it has higher lubricating and fuel-efficiency qualities; it also stood up to cold weather better.”



“This is an area of opportunity but, unfortunately for us, soybeans take such a large share of the biodiesel market,” Dockter says.

“Things are looking up, however,” Dockter says, with “the recent announcement of a \$50 million biodiesel manufacturing plant being built this August in Minot, N.D., which will use 355,000 acres worth of canola.” The plant “hopefully will reinvigorate interest in canola production in our area.”

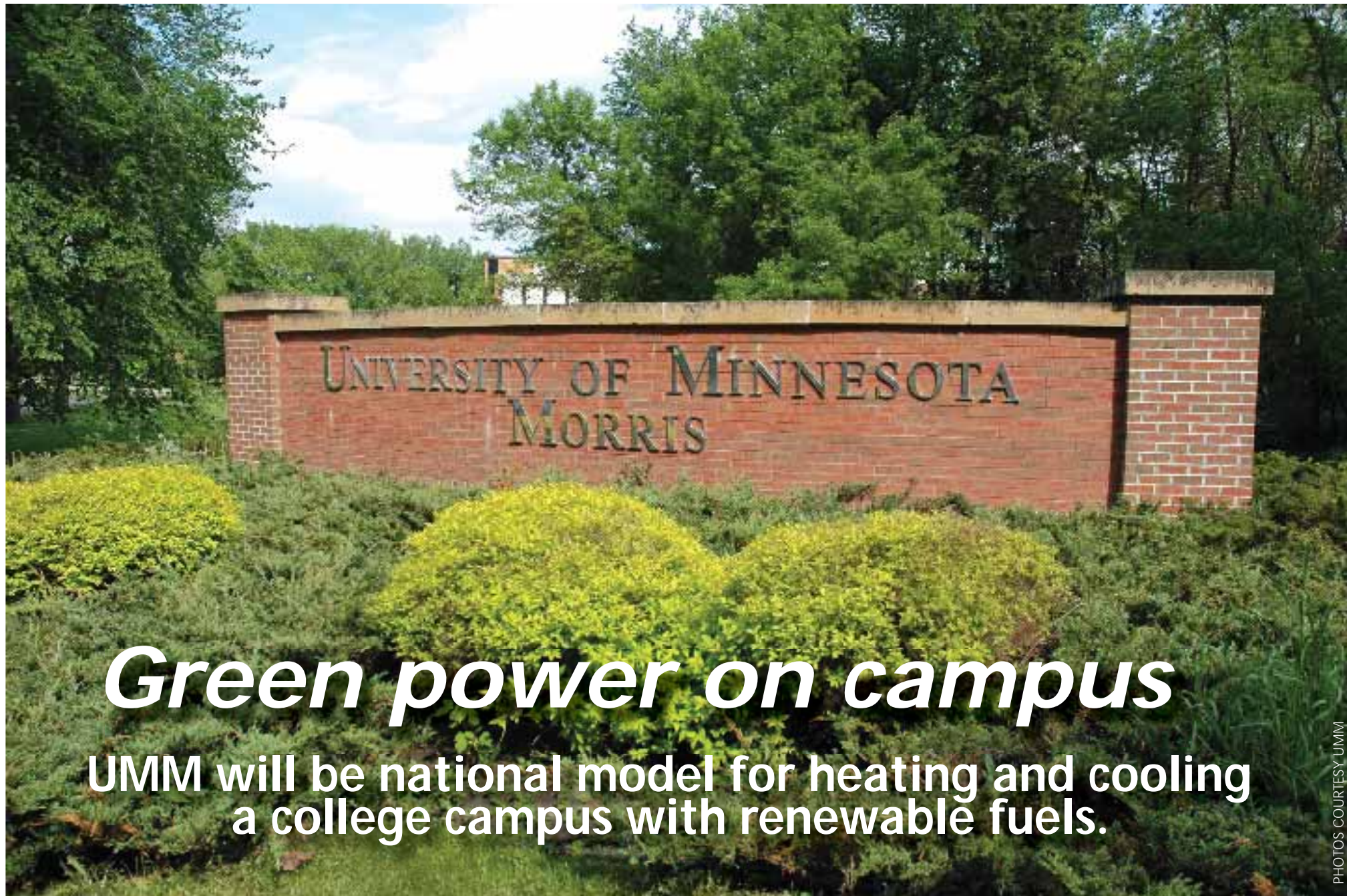
## Sudsing, silken oil

Canola could be genetically engineered to be high in laurate, which is typically found in tropical oils such as coconut and palm kernel oil. Laurate's sudsing quality is useful in shampoos, soaps and detergents. The silken texture is ideal for chocolate-flavored candy coatings, frostings and whipped toppings, and as a dairy substitute in coffee creamers.

The genetically-engineered oil must be labeled as either “high-laurate canola” or “laurate canola” because it is nutritionally different from conventional canola oil. A cocoa-butter-alternative from canola laurate was developed by Calgene for the confectionery markets but has not been marketed. ■



# AURI ENERGY CENTER NEWS



PHOTOS COURTESY UMM

## *Green power on campus*

**UMM will be national model for heating and cooling a college campus with renewable fuels.**

BY E. M. MORRISON

*Morris, Minn.* — Corn stalks will provide “fuel for thought” on a college campus in west central Minnesota.

The University of Minnesota, Morris plans to build a \$6 million biomass gasification plant that will heat and cool the school’s two-dozen buildings. The gasifier will convert corn stover and other plant materials into renewable energy. And it will serve as a national model for rural schools, factories and communities interested in producing green power from local agricultural resources.

The biomass gasifier — the first in the state to run on crop residue — is part of UMM’s new Renewable Energy Research and Demonstration Center in Morris. Besides biomass power, the center will demonstrate wind energy systems, renewable hydrogen generation and storage, and methane power. The center’s goal, says Charles Muscoplat, dean of the U of M College of Agriculture,

Food and Environmental Sciences, is to create opportunities for rural communities to develop their own local renewable-energy resources.

### **Making location an asset**

UMM is a small public liberal-arts college set amid farm fields near the state’s western border. Here, fertile glacial soils produce abundant crops of corn and soybeans and support a robust livestock industry. But these bountiful farm fields are far removed from the world’s oil fields. “Our location is a disadvantage in terms of energy,” says Lowell Rasmussen, who directs UMM plant services and planning.

So, when natural gas prices soared in 2000, squeezing the college’s operating budget, school officials began asking, “How can we turn our location from an energy negative to an energy positive, an energy resource?” Rasmussen says. At the same time, he says,

UMM’s 2,000 students began pushing hard for a “greener” campus. “That’s what started the discussions of a biomass gasification plant.”

Working with scientists at the university’s nearby West Central Research and Outreach Center (WCROC), UMM officials began looking at alternative energy sources. “We had a lot of expectations,” Rasmussen says. The fuel had to be clean, renewable and available on demand. It had to be price-competitive with natural gas. And it had to be locally-produced, to “keep our energy money in the rural area.” As it turned out, alternative fuels that fit the bill were growing just outside the college doors.

The Morris region produces more than 650,000 tons of potential gasification feedstocks a year, according to a 2003 survey by the Energy Environment Research Center in Grand Forks, N.D. The most plentiful: corn stover (the stalks and leaves left in the field after harvesting) and distiller’s grains, an ethanol byproduct.

### **An emerging industry**

Gasification systems heat organic materials in a low-oxygen environment, producing a synthesis gas, or syngas, that can be substituted for natural gas. Large commercial gasification facilities, such as municipal garbage incinerators, have been used in this country for many decades. Wood- and forest-product gasification are also well established. But crop-residue gasification is a new technology that hasn’t yet been commercialized, says Michael Sparby, AURI project director.

AURI, a state leader in renewable energy development, helped UMM evaluate the feasibility of using this emerging technology to heat and cool the campus. In January, Coaltec Energy of Carterville, Ill., performed pilot test burns of 30 tons of corn stover and distiller’s grains in a commercial gasifier. Test results were encouraging, Rasmussen says. The corn feedstocks handled well and



*It had to be price-competitive with natural gas. And it had to be locally-produced, to "keep our energy money in the rural area."*

— Lowell Rasmussen

gasification efficiency was 99.6 percent, according to an April 2005 report from Recovered Energy Resources, the marketing arm of Coaltec Energy. Also, emissions with proper controls and ash quality were environmentally-acceptable, with high heat-recovery.

Rough-cost estimates suggest that corn stover gasification for heat can be price competitive, if natural gas prices rise above \$5 per million Btu's, according to Rasmussen. UMM's 2005-2006 forward contract price for natural gas is twice that, he says. "As the price of natural gas goes up, we're seeing even more incentive to continue exploring renewables."

This spring, the Minnesota Legislature provided \$6 million to build a biomass gasification plant at UMM. Rasmussen expects the Minnesota Pollution Control Agency (MPCA) permitting and licensing process to take at least a year. Crop residue gasification is so new, in fact, that MPCA has not yet developed permitting procedures, he says. Officials hope to have the new plant on line by winter 2007.

The biomass plant will generate a new ag business, too, which will harvest and supply corn stover to the campus, Sparby says. He estimates that UMM will buy about \$300,000 of corn stover and other feedstocks a year.

## A sophisticated research tool

The gasification system will not only produce syngas to run UMM's existing steam plant, it will be a sophisticated scientific tool, says Mike Reese, who directs WCROC renewable energy programs. "It's unique, in that it will be both a working production facility and a research platform."

WCROC scientists will use the biomass facility for a range of renewable-fuels research projects, Reese says. In the next five years, the research station will test gasification of perennial grasses, hybrid poplars and other potential crop feedstocks. University engineers will study biomass collection, transportation, storage and processing methods.

Scientists at the USDA-ARS soils research



Lowell Rasmussen

lab in Morris will work on related problems, such as using gasification ash for fertilizer, and how much corn stover should be removed from farm fields. "There will also be a strong economic research component," Reese says. Longer-term research goals include processing syngas for transportation fuels and hydrogen.

## A national model

The biomass plant will be an educational and outreach tool — a working prototype for others interested in adopting this technology, Reese says. Real-time operating data from the facility will be available via the Internet. And there may even be Web-cameras inside the gasifier, Reese says, "so you can see the syngas being produced." In this way, what scientists in Morris learn about using agricultural biomass for energy "will be available to the world."

Sparby expects UMM's pilot plant to stimulate a lot of interest in making energy from farm products. This technology could bring new economic opportunities to rural areas, especially for farmers, he says. He foresees Minnesota farmers growing special biomass crops to supply locally-owned gasification plants — just as they do now for local ethanol plants.

"Farmers growing crops for energy, in addition to food and fiber — that's the biggest economic promise of biomass technology." ■

## ENERGY News Briefs

### Grass power

Northern Minnesota farmers look at generating green power from grass seed chaff.

BY E. M. MORRISON

*Williams, Minn.* — Grass seed chaff could provide renewable energy to run a northern Minnesota seed-cleaning plant.

Northern Excellence Seed, LLC and AURI's Center for Producer-Owned Energy will test the feasibility of generating power from gasified grass-seed screenings. The project could transform what is now agricultural waste into a renewable fuel — saving growers both disposal costs and energy expense.

Northern Excellence Seed, a group of 30 grass-seed producers in Roseau and Lake of the Woods counties, operates one of the state's three main grass-seed processing plants. Minnesota is the nation's number two producer of grass seeds, a crop that generates \$120 million in economic activity for the state, according to a 2005 AURI estimate.

Northern Excellence Seed, which last year reported sales of \$5 million, cleans and packages Kentucky bluegrass, ryegrass, timothy, reed canary and other grass seeds. The cleaning process separates the tiny seeds from the heads and straw, which are now hauled to a local landfill and burned.

Gasifying this waste material, instead, could potentially generate enough power to run the factory, says Michael Sparby, AURI project director. Gasification tests will be conducted this summer at the Energy Environment Research Center in Grand Forks, North Dakota. The research will look at how grass chaff and rye grass straw perform in a small, modular gasifier. Data will be collected on energy production, emissions and ash, as well as power-generation costs.

Gasification converts solid biomass into a synthetic fuel gas that can be burned like natural gas in a furnace, turbine or engine. Large-scale commercial biomass gasifiers, such as municipal solid waste incinerators, have been around for many decades, Sparby says. But small-scale biomass gasification technology is still developing.

However, small on-site crop-waste gasifiers hold great promise for generating renewable power for factories, schools and other buildings, Sparby says. The U.S. Department of Energy estimates that Minnesota has enough renewable biomass fuel to power three million homes.

Northern Excellence is the first in the nation to explore gasifying grass-seed processing waste, Sparby says. If it proves feasible, "this would definitely add value to a product grown in this region."

### Sweetening corn

Minnesota beet co-op to study adding sugar to corn ethanol process.

BY E. M. MORRISON

*Renville, Minn.* — Could sugar beets sweeten corn ethanol manufacturing?

Minnesota beet farmers hope the answer is "yes," when a study sponsored by AURI's Center for Producer-Owned Energy is completed. The study being conducted for the Southern Minnesota Beet Sugar Cooperative will determine if adding sugar during fermentation speeds up ethanol production. The research could benefit both the corn and sugar beet industries by boosting ethanol plant efficiency and offering a new use for excess beet sugar.

The Southern Minnesota Beet Sugar Cooperative was founded in 1972 by about 300 sugar beet growers. Today its 584 farmer-shareholders operate 12 beet-receiving stations in southwest Minnesota. The cooperative employs about 350 full-time workers during the beet-processing season and an additional 320 during the fall harvest.

The co-op's Renville refining factory has the capacity to produce 400,000 tons of sugar a year. That's about 30 percent more volume than it is allowed to market at federally-supported prices. Growers are looking for new outlets for the excess sugar, says Dennis Timmerman, AURI project director.

Laboratory tests, which will evaluate 2- to 7-percent sugar concentrations in corn mash, will start this summer at Greenway Consulting in Morris, Minn. If lab results look promising, the cooperative will do several plant-scale tests at a Minnesota ethanol facility.

The co-op will also evaluate the economics of using its excess sugar for ethanol. Under current federal trade quotas, Timmerman notes, the extra sugar is worth considerably less than it costs to produce.

Timmerman emphasizes that sugar beet growers are not seeking to displace corn in ethanol production. Rather, he says, the goal is to improve the efficiency of corn-ethanol manufacturing — in effect increasing the capacity of the state's ethanol plants. ■



## Nation's largest biodiesel refinery opens in Albert Lea

BY DAN LEMKE

*Albert Lea, Minn.* — Renewable energy proponents in Minnesota have cause to celebrate.

SoyMor, the nation's largest biodiesel manufacturing facility and the second to be built in Minnesota began operating in late June.

Owned by more than 600 farmer members and investors, the refinery can produce 25 million-gallons of biodiesel per year from soybean oil. It will process 3,150 gallons per day from 1,700 acres worth of soybeans — for an annual total of about 18 million bushels of soybeans.

SoyMor's capacity activates the so-called "Minnesota mandate," which requires every gallon of diesel fuel sold in the state to include a 2-percent biodiesel blend. Minnesota's production capacity needs to reach 8 million

gallons and be certified by the commissioner of agriculture in order for the act to take effect.

The cooperative is also constructing a lecithin fractionation refinery set to begin operating in the next several weeks. The innovative facility will further refine crude lecithin, a component of soybean oil, into food and nutraceutical ingredients.

"SoyMor has been and continues to be very progressive in their thinking," says Max Norris, AURI director of projects and technology. "It's a great way to add value to Minnesota soybeans."

A grand opening ceremony on June 14 included an address by Minnesota Governor Tim Pawlenty and tours of the biodiesel refinery.



SoyMor, the second biodiesel refinery to be built in Minnesota, will produce 25 million gallons annually, using 18 million bushels of soybeans.

## With the flow

AURI and corn growers research improving distiller's grains for exporting

BY DAN LEMKE

*Waseca, Minn.* — Minnesota's 14 ethanol plants process about 152 million bushels of corn into 400 million gallons of ethanol each year. But liquid fuel isn't the plants' only value-added product.

Each bushel of corn, processed into ethanol, also yields 18 pounds of distiller's dried grains, according to the National Corn Growers Association. DDGs primary market in Minnesota is the livestock industry. But with about 1.1 million tons a year, ethanol plants have to look beyond state borders for DDG markets.

However, the challenge to exporting DDGs is they don't flow well after transport. Traveling long distances by rail car or trucks can compact the product so tightly that it is difficult to unload — a serious drawback for potential buyers.

AURI and the Minnesota Corn Growers are undertaking research to solve the problem. "Ethanol plants are looking to expand markets for the DDGs, but one negative right now is the flowability," says Alan Doering, AURI technical services specialist in Waseca.

AURI will do analytical tests on distiller's grains and evaluate moisture, fat, sugar and oil content — factors that affect flowability. Some tests will use DDGs as they are currently produced. Others will use altered samples to evaluate how certain production changes

impact flowability.

An engineering firm specializing in bulk material handling will evaluate how DDGs perform under various handling conditions and look at product cohesion, temperature, compaction and how storage time affects product flow.

"We're hoping to develop a baseline of information that can be used by ethanol plants, feed manufacturers and anyone else in Minnesota that deals with DDGs," Doering says.

"This project is looking at ways to improve flowability in such a way that it would be relatively easy for an operating plant to adapt what we've learned."

Doering expects the information to be available later this summer. ■



PHOTO BY ROLF HAGBERG



## Elsewhere in ag utilization

BY DAN LEMKE  
CARTOON © UNCLE HYGGLY / POUNCE.COM

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

### Better bones, not breath

Swiss researchers have found that onions may be good for bones. A peptide in onions called GPCS appears to retard bone loss. University of Bern scientists made the discovery after laboratory rats treated with GPCS showed a significant decrease in bone loss. That could be good news for those fighting bone-wasting diseases such as osteoporosis. Human trials are next.

From: Food Navigator, April 6, 2005

### Cosmetic beans

Soy-processing waste is being used to tone and soften the skin of Japanese women. Bernet International, in cooperation with Osaka Prefectural University, designed technology to extract a moisture-rich substance from okara — a soybean leftover from the tofu-making process. The “soyfun” ingredient, used in cosmetics and soaps, has been registered with the U.S. Food and Drug Administration.

From: Soyatech.com, March 29, 2005

### Not just for ducks

Japanese scientists are turning bread waste into energy. Using new technology, Sapporo Breweries, Shimadzu Corp. and Hiroshima University have been operating a system for six months that produces sulfur-free hydrogen and methane from waste. Besides bread, the group has used forestry and agricultural waste.

From: BioCycle magazine, March 2005

### Honey for the tummy

Complex sugars found in a New Zealand honey variety appear to have some functional-food traits. These prebiotic carbohydrates promote gut health by feeding beneficial bacteria in the digestive tract, and could be used as a food ingredient. Researchers in the United Kingdom and Spain found that honey oligosaccharides significantly increased the population of several strains of helpful bacteria.

From: Foodnavigator.com, March 29, 2005

### Better chocolate

The more cocoa in chocolate, the better for your health, ARS scientists have found. They evaluated the antioxidant levels of six chocolate and cocoa products: natural (unsweetened) cocoa powder, Dutch-processed cocoa powder, unsweetened baking chocolate, semi-sweet chocolate baking chips, dark chocolate and milk chocolate.

Cocoa beans contain hefty quantities of natural antioxidants called flavonoids. Natural, unprocessed 100-percent cocoa powder contains the highest level of the flavonoid procyanidin; processed cocoa has less. The higher the cocoa-content in chocolate, the higher the antioxidant levels, so dark chocolate contains more than milk chocolate. Antioxidants are thought to be effective in helping to prevent cancer, heart disease and stroke.

From: USDA-ARS, April 4, 2005

### Light as a plastic feather

ARS researchers have developed a method to turn chicken feathers into plastics. The technology involves cleaning and separating

the feathers into chopped fibers and quill pieces. They then can be converted into plastics similar to polyethylene and polypropylene. The lightweight, biodegradable and moldable plastic can be used alone or in composites. About 4 billion pounds of feathers are generated each year from poultry processing; most is treated as waste.

From: USDA-ARS, Feb. 24, 2005

### Mussel muscle from soy

New wood adhesives have been developed by mimicking the mussel. Oregon State University researchers developed the adhesives after analyzing the tiny threads that mussels use to attach to rocky surfaces. Called byssus, the threads help mussels stay put even in pounding surf. The researchers were able to copy the mussel-gel protein by adding certain amino acids to soy protein. The new adhesives could replace some of the chemical-based adhesives used to make plywood, oriented strand board, particle board and laminated-veneer lumber products.

From: Soyatech.com, April 12, 2005

### Corn composites

A large Japanese paper mill is starting to produce and market a composite made from used paper and corn-based plastic. The composite is formed into pellets, which can then be used to make items such as tableware. The paper is primarily scrap and the plastic is derived from corn starch.

From: Soyatech.com, February 10, 2005

# Bio-Match

## Web site links fiber and residue sources with users

BY DAN LEMKE

*Waseca, Minn.* — The internet is littered with dating and matchmaking services of every type. Now there is even a service to match ag “leftovers” — biomass processing residues — with people who value corn stalks or alfalfa stems or poplar branches.

The new AURI-hosted Web site — [www.mnbiomassexchange.org](http://www.mnbiomassexchange.org) — will help biomass users find those with spare fibers and residues. For example, a power plant operator might be looking for sunflower hulls or baled corn stalks or sawdust to use as solid fuels.

“We hope that this site will be a tool to get those buyers and sellers in communication with each other,” says Joel Haskard of the Clean Energy Resource Teams at the University of Minnesota, a site sponsor.

“There is a lot of interest ... whether it's for energy or fiber use, there are people who are looking to source biomass,” says Alan Doering, who operates AURI's coproducts lab in Waseca. Doering has worked with dozens of projects that need affordable biomass. “There are supplies out there, but it can be hard to find them or to find sources that are nearby to make transportation cost effective.”

The Minnesota Biomass Exchange is a clearinghouse of information on the type, quantity and location of available wood, agriculture and processing coproducts. It can be accessed via AURI's Center for Producer-Owned Energy Web site: [www.mncpoe.org](http://www.mncpoe.org)

Besides linking buyers and sellers, Mike Taylor of the Minnesota Department of Commerce says the site will “create new thinking around biomass as a product for energy

rather than just a waste or byproduct to be disposed. Farmers, industries, municipalities and schools are in completely different markets so they may not be aware of each other.”

“A steady fuel source can make or break a biomass project,” Haskard adds. “Getting a decent price for ag wastes or alternative fuel crops will mean more cash in our farmers' pockets. Gathering and transporting biomass will mean job creation. And locally-produced, renewable biomass is a win for Minnesota's environment and energy infrastructure.”

Designed and maintained by Karen Zimny, AURI communications assistant, the site will be updated weekly to ensure a steady supply of current information.

“We don't want site users to be sent on any wild-goose chases because the information is

old or outdated, so we intend to keep it fresh,” Zimny says.

The site is offered at no charge and visitors can browse to see what is available. However, user must register to access contact information. The biomass exchange site is a collaborative effort of AURI, Green Institute, Minnesota Department of Commerce, Minnesota Department of Natural Resources and CERTs, which is part of the University of Minnesota's Regional Sustainable Development Partnerships. ■





# Local flavor for the international traveler

## French Meadow Bakery opens restaurant at Minneapolis/St. Paul airport

BY DAN LEMKE

*Minneapolis, Minn.* — Travelers visiting the Minneapolis/St. Paul International Airport are now being tempted by home-cooked aromas from a pioneering Minnesota bakery.

French Meadow, a south Minneapolis cafe and bakery, opened a scaled-down airport version of its Lyndale Avenue restaurant in late April. "It's a sweet little space," company president and founder Lynn Gordon says of the 1,800 square-foot cafe on Concourse F, across from gate F-4.

"We've worked very hard to maintain the culture of our Lyndale space," Gordon says. The airport French Meadow Cafe will offer the same menu, including organic and yeast-free breads, wraps, salads, homemade soups, grilled salmon with fresh organic greens and even organic oatmeal. About 75 percent of the menu will be delivered daily from the main kitchen; the rest will be made fresh on site. The cafe only seats 18, but Gordon expects significant carry-out sales.

French Meadow Bakery is a natural-foods pioneer, particularly in organic and yeast-free breads. Founded 20 years ago as a small bakery, it now annually sells about four million loaves of bread sprouted tortillas, bagels, pizza crusts and Texas toast made at its 24,000 square-foot bakery in south Minneapolis. It opened the cafe on Lyndale Avenue in 1989.

"Lynn is good at marketing ... they are very progressive in looking at new ideas and



PHOTO SUBMITTED BY FRENCH MEADOW BAKERY

French Meadow Bakery opened a scaled-down version of its popular south Minneapolis Restaurant at the Minneapolis/St. Paul International Airport in late April. The cafe offers organic and yeast-free breads, wraps, salads, soups and other natural-food specialties.

opportunities," says AURI food scientist Charan Wadhawan. She helped Gordon develop several new products, including the functional-food Woman's Bread and Men's Bread with ingredients specially suited to each gender's dietary needs.

Last year, Gordon was approached by Host International, an airport concessions provider, about opening a restaurant with local flavors.

"They thought it would be a great fit for a new airport culture," Gordon says.

"It's an ambitious effort." The atmosphere is European and eclectic, with a tribute to Minnesota's agricultural heritage. One of the cafe's walls is adorned with a red tractor painting.

In May, Gordon was named Minnesota's Small Business Person of the Year, an annual

award presented by the U.S. Small Business Administration's Minnesota office. The award recognized Gordon's innovation, business growth and her community support. It is the first such award to a natural foods manufacturer. ■