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AG INNOVATION NEWS[®]

The newspaper of the Agricultural Utilization Research Institute

pigging OUT

on ethanol byproducts

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CERTIFIED ORGANIC

FARM CALLED EARTH



ORGANIC ENTREES

BEEF STROGANOFF
Organic Beef with Pasta

KEEP FROZEN MICROWAVE OR REGULAR COOK NET WT. 8 OZ. (227G.)

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Pocket of Opportunity

soybean crushing, page 12

Innovations defy timing

BY EDGAR OLSON

A man ahead of his time, Leonardo da Vinci drew elaborate sketches of flying machines, helicopters, weapons and irrigation equipment more than 500 years ago. Though unheard of back then, today many of his concepts are commonplace. As the saying goes, timing is everything.

By their very nature, innovations are ideas ahead of their time. At AURI, we have seen many ideas come through the door in our 15-year history, and we try to help inventors make the most of current opportunities. Sometimes innovations match perfectly with market opportunities. Other times, the market is not ready and more work needs to be done.

For example, 10 years ago not many had heard of global positioning systems. Today GPS units help apply appropriate amounts of fertilizer to farm fields; they

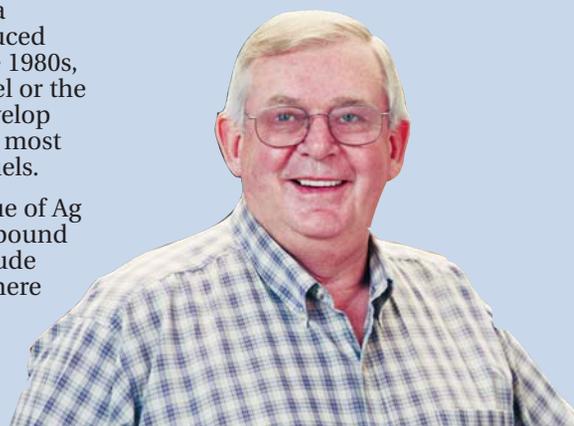
steer farm implements and even locate hot fishing spots.

Nearly 15 years ago, AURI began working with the former U.S. Bureau of Mines on a vegetable-oil-based fuel for underground mining equipment. The cleaner-burning fuel was perfect for conditions with limited ventilation. Today that fuel, called biodiesel, is available at dozens of Minnesota locations and will soon be produced by our state's farmers. In the late 1980s, few people were aware of the fuel or the work that was being done to develop biodiesel — currently one of the most talked about renewable liquid fuels.

As you will note reading this issue of Ag Innovation News, innovations abound in agriculture — whether it is crude oil from hog manure (see Elsewhere in Ag Innovations, page 10) or using ethanol coproducts to replace medicines in swine diets (see page 3). We are

dedicated to helping innovators realize those ideas, because who knows what we'll be talking about in 10 years. ■

Edgar Olson



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/uniqueeness
- 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

AURI Offices

Headquarters

P.O. Box 599
Crookston, MN 56716
1-800-279-5010

Southeast Office

P.O. Box 251
Waseca, MN 56093
(507) 835-8990

Southwest Office

1501 State Street
Marshall, MN 56258
(507) 537-7440

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

AURI Success Stories

Woolly relief



High Pointe Coverings designs therapeutic wool pillow for diabetics

Harmony, Minn. — High Pointe Coverings has developed a unique wool pillow to help people suffering from diabetes and other circulatory ailments. The Knee to Toe Circulatory Pillow relieves stress at the knees, ankles and feet while sleeping or sitting.

The pillow is designed with large foot pouches on each side of a rectangular cushion. With one foot in each pouch, the pillow rests between the ankles

and knees, providing leg support. It reduces pressure points, which can impact circulation in the legs and cause discomfort. "Wool is very therapeutic," says Lloyd Peterson, High Pointe Coverings owner.

Besides the circulatory pillow, High Pointe Coverings produces barn blankets, wool mattresses and wool pillows. Recently, the company opened a retail store and art gallery at its Harmony location.

For more information on High Pointe Coverings products, visit www.natureswool.com

Visit AURI at FARMFEST 2004

See the latest in Minnesota value-added agriculture — from food to fuels

The AURI exhibit is located next to the Forum tent in lot 612



August 3-5
at the Gilfillan Estate
near Redwood Falls

ABOUT AG INNOVATION NEWS



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Address correspondence or subscription requests to:

Dan Lemke, Communications Director
Ag Innovation News
P.O. Box 251
Waseca, MN 56093
Telephone: (507) 835-8990
dlemke@auri.org



A Soluble Solution

Ethanol coproducts could be key new ingredient for baby pig diets

University of Minnesota graduate student Jeff Knott (left), with assistance from AURI's Al Doering (pictured on cover, at right), has tested baby pig feed made from corn solubles left over from ethanol processing.

PHOTOS BY ROLF HAGBERG

BY DAN LEMKE

St. Paul, Minn. — Baby pigs may soon be chowing feed fortified with ethanol-processing leftovers. And the diet won't contain animal byproducts or antibiotics that are facing increasing consumer scrutiny.

Recently completed baby pig feeding trials at the University of Minnesota show favorable results using ethanol coproducts — a vegetable-based alternative to antimicrobial and porcine blood plasma products that are the gold standard for today's swine rations.

"These findings should calm some food-safety and health concerns and add value to ethanol plants," says Jeff Knott, a U of M animal nutrition graduate student who conducted the feeding trials headed by swine nutrition professor Gerald Shurson.

Diseases such as BSE (commonly called "mad cow disease") have amplified concerns about using animal byproducts such as blood plasma. And some consumers and scientists are concerned that overusing antimicrobials in animals could promote bacterial resistance to antibiotics. Finding ag-based alternatives

that perform to the same standards would be a winning solution.

Knott says as far back as the 1940s and 50s, research was done on distiller's solubles' unexplained effect on livestock growth. The solubles are solids left in water after soaking corn during the ethanol-making process. Often the solubles are sprayed back onto distiller's grain — another ethanol coproduct — and fed to livestock.

Past research shows that solubles hold promise, but they can be difficult to handle. Wet solubles — only about 35 percent solid matter — tend to bind and plug equipment.

Before the new solubles trials commenced, the U of M animal science and the food science and nutrition departments developed a patent-pending process to spray-dry the solubles.

Three superior products were developed as a result: spray-dried distiller's solubles, cream from yeast byproduct and residual solubles — the syrupy material left after separating liquid from wet mash, then drying the product to a solid form. The products were blended

into baby pig diets and compared to feeds containing combinations of porcine plasma and antimicrobials. Knott examined the feed supplement's effect on animal growth, feed intake, feed conversion, intestinal health and immune system.

Seven different test groups were fed various diet combinations for 10 days after weaning. Then all the pigs were fed the same diet. Knott found the ethanol coproducts yielded comparable or superior results to plasma and antimicrobials.

"It's not a bad thing that there weren't statistical differences (between the ethanol and animal byproduct)," Knott says. "We found that (ethanol) coproducts are effective in maintaining animal performance when plasma and antimicrobials are taken out."

"With the size of the swine industry in Minnesota and the movement away from blood plasma and medications in pig diets,

this could be huge," says Alan Doering, AURI technical services specialist. "Just about every ethanol plant is looking for ways to add value to their distiller's grains."

Knott says further nutritional research could lead to including distiller solubles coproducts in poultry, pet or even aquaculture diets.

The economic pay-off could be enormous, Knott says. "Wet solubles are worth about \$10 a ton. Plasma and antimicrobials are expensive ingredients in swine diets. We're converting a lower-value item into a value-added product, plus it's a vegetable-based alternative the industry is looking for."

The solubles study is among numerous projects undertaken by AURI and the Minnesota Corn Growers to investigate new uses for distiller's grains and other corn-processing coproducts. ■

Beefing up organics



PHOTOS BY ROLF HAGBERG

Kent Wolfe, president of Kinship Resources, prepares boxes of steaks and other organic meat products for distribution to food cooperatives and upscale groceries in Minnesota, Wisconsin and Iowa. Later this summer, the company will introduce Farm Called Earth organic beef, pork and chicken entrees, which will be marketed nationally.

BY CINDY GREEN

St. Paul, Minn. — Natural food stores' frozen sections are ruled by vegetarian entrees — rice bowls, Szechwan noodles, spinach lasagna, roasted vegetable pizza. So where's the beef? An organic pork or beef entree is a rare find — even at upscale groceries and food cooperatives.

But soon, Farm Called Earth entrees, made with organic meat, will be vying for freezer space in stores nationwide. Not only are consumers getting what they want, but farmers are getting what they should demand — a profit, says Kent Wolfe, president of Kinship Resources. The St. Paul company has been marketing organic pork and beef since January and will introduce the entrees later this summer.

Culinary pleasure

The gourmet meat entrees are not your typical TV dinner fare: chicken picatta in wine sauce, creamy ham penne, ziti pasta with Italian sausage, rotini pasta and steak, and ham with dill sauce. The line includes six beef, pork and chicken dinner entrees that sell for about \$6 each, and four breakfast entrees with variations on ham, sausage, steak, eggs, cheese and potatoes. Farm Called Earth also will offer one vegetarian breakfast bowl with broccoli and eggs.

"There are almost no organic meat dishes available in the stores," says AURI food scientist Charan Wadhawan, who tested 40 recipes designed by a professional chef for the company. "They have a real good chance," in the marketplace. "Because of food safety concerns, people are buying more organic products."

Farm Called Earth entrees use premium ingredients, "the best available," Wadhawan says. The chicken picatta entree, for example, uses chicken breasts that are coated with flour, spices and fresh parsley, then pan roasted with olive oil and wine, and accompanied by basmati rice. The ziti pasta includes hot Italian sausage, white onions, olive oil, sweet red and yellow peppers, fresh parsley and parmesan. "These are high-end products," Wadhawan says.

As she has done for hundreds of companies, Wadhawan analyzes how recipes will perform as commercial products, and where nutritional adjustment need to be made. "If it's too high in fat or sodium, I let them know and we work on reducing the amounts." She further evaluates the products in her test kitchen. With frozen dishes, "I warm them up and see how they cook out. If it's too watery, I look at reducing liquids. If they are using cheddar cheese, it can toughen up with high heat," so the microwaving instructions may need to be adjusted or another cheese selected.

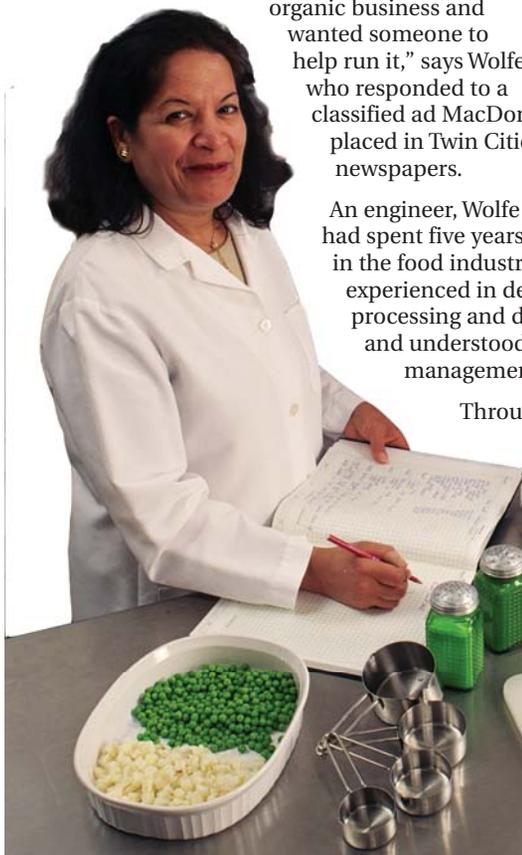
Wadhawan is happy with the results achieved by Farm Called Earth products. "The products are of good quality, they taste good and of course all the ingredients are organic, which does increase their cost."

"There are about 15 other products in the pipeline that we want to bring out," including pre-cooked barbecued pork and beef ribs, Wolfe says.

Engineer to entrepreneur

The company was co-founded by entrepreneur Buck MacDonald, who helped develop Oats Cream frozen dessert for the American Oats company. "He had an idea for an

St. Paul company debuts beef, pork and chicken entrees



AURI food scientist Charan Wadhawan tested 40 frozen entree recipes for Kinship Resources, a St. Paul organic meat company that selected six dinner and four breakfast entrees to debut this summer.

organic business and wanted someone to help run it," says Wolfe who responded to a classified ad MacDonald placed in Twin Cities newspapers.

An engineer, Wolfe had spent five years in the food industry, was experienced in designing efficient processing and distribution systems, and understood sales, finances and management.

Throughout his career, Wolfe says he has "turned around operations, designed process controls — and this just fit well. I wanted to find something where I could be (personally) successful, rather than just be dictated to in a job." Wolfe says he is "a believer in the Lord," and "did a lot of praying, got my answers and we got started."

In July 2002, Wolfe started running all aspects of the

company and took it in a different direction — manufacturing, costing, distribution, sales and marketing. For the first three months, Kinship planned to manufacture pork and beef entrees. However, when Wolfe and MacDonald started pricing organic ingredients, they found "it's absurd what it costs," Wolfe says.

"We looked at what farmers were getting paid — they were hardly getting anything. We kinda looked in the mirror and decided this was wrong. It was not something we would go into business and tolerate. We decided to pay the farmers a fair price."

"We lined up organic farmers and paid them 20 to 30 cents more per pound than the competition. To some farmers, that added up to \$20,000 more in income."

Farmer-friendly from the start

Rather than starting out with manufacturing entrees, Kinship decided to market pork and beef cuts, ground meat, and some processed meats such as brats and wieners. With an economic recession, "it was tough to raise capital," for full-scale manufacturing, Wolfe says.

Through organic agencies, Kinship found beef and pork producer-suppliers in Minnesota, Iowa, Wisconsin, the Dakotas, Illinois and Kansas. "All our steaks are choice or prime meat, and 90 percent of hamburger is choice or prime," Wolfe says. Products made from pork trim, such as brats and breakfast links, are processed in Hibbing, Minn. and other products in Iowa. "We structured a lean machine so



we would take less margin to support the farmer," Wolfe says.

The entrees are "non-GMO, certified organic, and animals are treated good, with humane processing," Wolfe says. "We don't do any corporate farming."

Enter the entree

In the fall of 2002, Julie Andres joined the Kinship Resources team. Though an improbable fit, with a background in psychotherapy, "she has lived organic for years ... and she helped connect us to investors."

"So along the way we raised some money," and hired the Kenyon Marketing Group in Minneapolis to design a logo and packaging for the company's Farm Called Earth organic meat line.

Kinship Resources now has 40 individual investors and has gone back to its original plans to make entrees. The frozen products will be manufactured by Siyeza, a minority-owned company in Minneapolis, which "use to do a lot for General Mills until they shut down their organic entree line," although the company still markets frozen vegetables and other organic products.

Scaling-up nationally

Distributed by Roots & Fruits Produce, Farm Called Earth entrees will be sold in about 20 food cooperatives and upscale groceries such as Kowalski's and Byerly's in Minnesota, Wisconsin and Iowa. The company expects to eventually be in at least 100 stores and is focusing on California markets. "We want to kind of blast open the entree market ... go to a big market and open up the volume," Wolfe says. "We're in talks now with some nationwide distributors."

Current sales are about \$10,000 a month. "Our goal is to be at \$100 million in seven years. If we are funded, we will hit that," Wolfe says the company projects it will have more than 50 products on the market within three years.

Fair price bottom line

As much as it wants to grow in profits and distribution, Kinship Resource's bottom line still includes a profit for farmers. For example, studies show organic hogs cost 65 cents per-pound live weight to raise, but some organic food manufacturers only pay 60 cents per pound, Wolfe says. "That's not right. We found (organic) farmers going to the bank to get loans to stay in business. Some were near bankruptcy."

"My feeling is almost 100 percent of companies out there don't treat the farmers right; they give them a price to keep their margins fatter. We work the opposite — we pay a fair price for labor and support the family farm. We work that through our margins."

Maximizing profits will come through value-added processing, Wolfe says. "As profits increase, we'll give more to farmers. ... Besides paying the highest price, we give farmers shares in our company — so as the stock price increases, they build a nest egg."

"We will be responsible to shareholders, but we also want to change the industry."



What defines organic?

Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones. Organic food is produced without using most conventional pesticides, synthetic fertilizers, sewage sludge, bioengineering or ionizing radiation.

Before a product can be labeled "organic," a government-approved certifier inspects where the food is grown to make sure the producer is following USDA organic standards. Companies that handle or process organic food before it gets to the supermarket or restaurant also must be certified.

To be accredited, producers and handlers must submit their production practices, substances used, record-keeping procedures, and methods for preventing organic products from commingling with non-organic products. Operations that sell less than \$5,000 a year in organic products are exempt from certification and can label their products organic if they abide by the standards, but they cannot display the USDA Organic seal. Retailers, such as grocery stores and restaurants, do not have to be certified.

Labeling standards are based on the product's percentage of organic ingredients. To be labeled "100 percent organic," a product must contain only organically-produced ingredients. Products labeled "organic" must consist of at least 95 percent organic ingredients. Both may display the USDA Organic seal.

Processed products that contain at least 70-percent organic ingredients can use the phrase "made with organic ingredients" and list up to three organic ingredients or food groups on the principal display panel. For example, soup made with at least 70-percent organic ingredients and only organic vegetables may be labeled either "made with organic peas, potatoes, and carrots," or "made with organic vegetables." The USDA seal cannot be used anywhere on the package. Up to \$10,000 in civil penalties can be levied for knowingly mislabeling a product "organic."

Imported agricultural products may be labeled "organic" if they are certified by a USDA-accredited agent or approved foreign agent.

The term "natural" on meat and poultry labels is not regulated by USDA National Organic Standards, but by the agency's Food Safety and Inspection Service. A "natural" labeled product may not contain artificial ingredients or added color and can only be minimally processed without fundamentally altering the raw product. The label must explain the "natural" term such as "no added colorings or artificial ingredients; minimally processed."

For more information, see www.fsis.usda.gov

AURI ENERGY CENTER

n e w s

STORIES BY DAN LEMKE

BUILDING BIODIESEL in Brewster

Brewster, Minn. — For some southern Minnesota farmers, the soybeans they planted this spring could yield a bumper crop of biodiesel next year.

Just two years after helping to convince state legislators to pass a biodiesel mandate, the Minnesota Soybean Processors broke ground for a biodiesel refinery in March. The 30-million-gallon facility should be operational by early 2005. It is adjacent to MSP's 100,000 bushel-per-day soybean crushing facility, which began operating in December 2003.

State law now requires that all diesel fuel sold in Minnesota contain at least 2-percent biodiesel by June 30, 2005 — if the state has at least 8 million gallons in production capacity.

"Minnesota uses 831 million gallons of diesel fuel each year," says Ron Jacobsen, Minnesota Soybean Growers Association president. "At 2 percent, that means a brand new market demand of over 16-million gallons of biodiesel."

The legislation helped MSP, owned by more than 2,000 producers, raise equity to construct the renewable-fuel refinery, which will easily surpass the mandate's requirements. Minnesota will be the first state in the nation to have a biodiesel standard.

"This is a state that time and time again has put the mark of leadership out in front of everybody else on renewable fuels," says Minnesota Governor Tim Pawlenty. "Our agricultural economy and agricultural communities ... are tremendously important to our state's economy. One of the ways we can diversify our economic opportunities is to be aggressive on renewable fuels and other value-added agricultural initiatives."

A Minnesota Department of Agriculture study found that transportation demands for biodiesel will generate \$212 million annually and create more than 1,000 jobs, primarily in rural Minnesota. ■



PHOTO BY JENNIFER PENA

Minnesota Governor Tim Pawlenty (third from left) joined agriculture officials and cooperative board members for the March 19 groundbreaking of the Minnesota Soybean Processors biodiesel refinery near Brewster, Minn. The 30-million gallon facility is expected to begin operating in early 2005.

Soy co-op named AURI 'Ag Innovator of the Year'

Minnesota Soybean Processors has been named the 2004 Ag Innovator of the Year by AURI's board of directors. The award

was presented at a June 17 luncheon.

The annual award recognizes a Minnesota business that has made a significant contribution to value-added agriculture with an innovative product or process, uses significant amounts of commodities, has achieved market success, and received AURI assistance.

Minnesota Soybean Processors operates a 100,000 bushel-

a-day processing plant near Brewster and is constructing a biodiesel refinery to convert raw soybean oil into renewable fuel. More than 2,300 producers own the plant.

In selecting the Ag Innovator of the Year award, "it's always interesting and encouraging to look at all the value-added activities going on in the state," says Edgar Olson, AURI executive director. "Minnesota Soybean Processors is an

excellent example of what can be done when producers work together, recognize a market opportunity and then take the initiative to grasp that opportunity. That's why we've chosen to honor them."

Minnesota Soybean Processors is the third recipient of the Ag Innovator of the Year Award. Pet Care Systems of Detroit Lakes received the award in 2002 and Mississippi Topsoils of Cold Spring was selected in 2003. ■

Energy Center launches first projects

Projects are developing under the new Center for Producer-Owned Energy, designed to help producers turn renewable agricultural products into power. While several projects are still at the proprietary stage and details can't be divulged just yet, a few are highlighted here to show the Energy Center's potential to positively impact Minnesota agriculture.

Biofuel and wind: A good marriage

Wind energy is one of Minnesota's fastest-growing renewable-power sources. Massive blades pinwheel in the breeze converting wind to electrical energy in dozens of communities across northern, western and southern Minnesota. Power companies and producers work to harvest an invisible alternative crop.

But there are days when the wind doesn't blow and other energy sources are needed to power the turbines. The Energy Center is sponsoring a project to use renewable sources such as biodiesel, biomass or biogas for extra power on calm days and during peak demand times.

"The peak energy demand is typically in July, August and January — times when wind velocities often lull," says Dennis Timmerman, AURI project development director. "If we are able to supply extra energy at those times by marrying the wind turbine to a biomass burner, turbine or diesel engine, we'll have a completely renewable system that provides power at a time when it is at a premium."

The project, involving an energy company, will

focus on economic feasibility and other factors related to combining wind electrical generation with another power source. It will also examine how cogeneration is affected by the economic climate, including public policy and renewable energy credits.

Ethanol: Let it flow, let it flow, let it flow

Minnesota's 14 ethanol plants produce about 300 million gallons of the corn-based fuel each year. Through the ethanol-making process, those same plants generate thousands of tons of coproducts, such as distiller's dry grains. Some is marketed as livestock feed, but the grains also contain higher-value components.

An Energy Center project with one of Minnesota's producer-owned ethanol plants, is using a new technology to remove coproduct components that could be valuable in the marketplace.

"This project will be very exciting," says Alan Doering, AURI technical services specialist. "It will definitely impact the producers involved by creating high-value product made from raw materials that are typically lower valued."

Doering is also working with the ethanol plant to evaluate and perhaps change the physical form of the distiller's grains. Due to their composition, distiller's grains tend to pack tightly when shipped long distances in trucks or rail cars. Manipulating the form would allow the coproducts to be shipped greater distances to reach new markets, adding revenue to the plant's bottom line. ■

Energy Center announces new programs

The Center for Producer-Owned Energy is now open for business.

Established earlier this year by AURI and a \$1 million USDA grant, the Energy Center will help Minnesota producers develop renewable-energy related business ventures.

To meet that mission, the Energy Center is launching two programs: the Renewable Technology Assessment Program and the Green Field Energy Program.

Renewable Technology Assessment Program

This technical services program, available to existing producer-owned organizations, will evaluate the market and technical feasibility of technologies related to renewable energy and coproducts. The Energy Center will offer services on a cost-share basis through a network of specialized technical-assistance providers.

Eligible projects must develop a process or product that uses an agricultural commodity, is energy-related, and involves a legally-organized group of 10 or more producers who will share in economic returns.

Projects will be evaluated on the technology used, commodities consumed, number of producers impacted, value-added benefit, economic impact, cost savings and job creation or retention.

Green Field Energy Program

The Green Field Energy Program will help establish producer-owned entities that don't currently exist or were only recently organized. A network of specialized technical assistance providers, working in concert with the Energy Center, will provide core services on a cost-share basis. Eligible projects must have needs related to market feasibility and business development. The program is intended to assist projects where feasibility is yet to be determined.

Eligible applicants may be a steering committee or other group composed of at least five independent agricultural producers who are organizing a value-added business that will be owned and majority-controlled by producers.

The process or product must

use an agricultural commodity, be related to renewable energy production or coproducts, and producers involved must participate in the project's economic returns. Projects will be evaluated on the technology used, commodities consumed, number of producers impacted, value-added benefit, economic impact, cost savings and job creation or retention.

Core Services

Core services provided to qualifying organizations and projects under the Renewable Technology Assessment and Green Field Energy programs include:

Technical assistance: Projects that focus on new or improved process technologies or value-added energy products will receive product development assistance, pilot plant/laboratory services and

engineering services.

Business assistance: The Energy Center will provide initial business assessment and evaluation. Through a network of cooperating organizations, the center will also provide market assessments, market development assistance and business planning.

Organizational outreach and development assistance: Services include cooperative development assistance and board training for producer-owned cooperatives.

For more information on the Center for Producer-Owned Energy and available programs, program guidelines can be downloaded directly from www.mncpoe.org ■



PHOTO BY ROLF HAGBERG

Cracking kernels of profit

A new corn milling process could make Minnesota ethanol plants more efficient and profitable

BY E. M. MORRISON

Golden Valley, Minn. — A Minnesota company has come up with a new corn milling process that could turn ethanol plants into nature's "chop shops."

Biorefining Inc.'s patent-pending corn fractionation technology separates the corn kernel into its component parts — hull, germ and starch — before ethanol manufacturing begins. The process aims to make ethanol plants more profitable by boosting ethanol yields, cutting manufacturing costs, and creating additional coproducts.

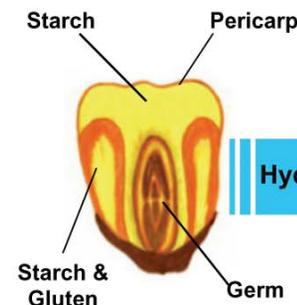
This summer, AURI will help Biorefining demonstrate its new Biomilling Process™ on a commercial scale. If the results confirm previous smaller trials, the company hopes to begin licensing the technology to ethanol plants this fall.

Cracking the corn kernel

Currently, most ethanol plants grind up the entire corn kernel, sending the non-fermentable corn oil, protein and fiber to the distillery along with the starch. These components, which make up a third of the kernel, remain after the starch is converted to alcohol. Usually, they are dried and sold as distiller's grains for animal feed.

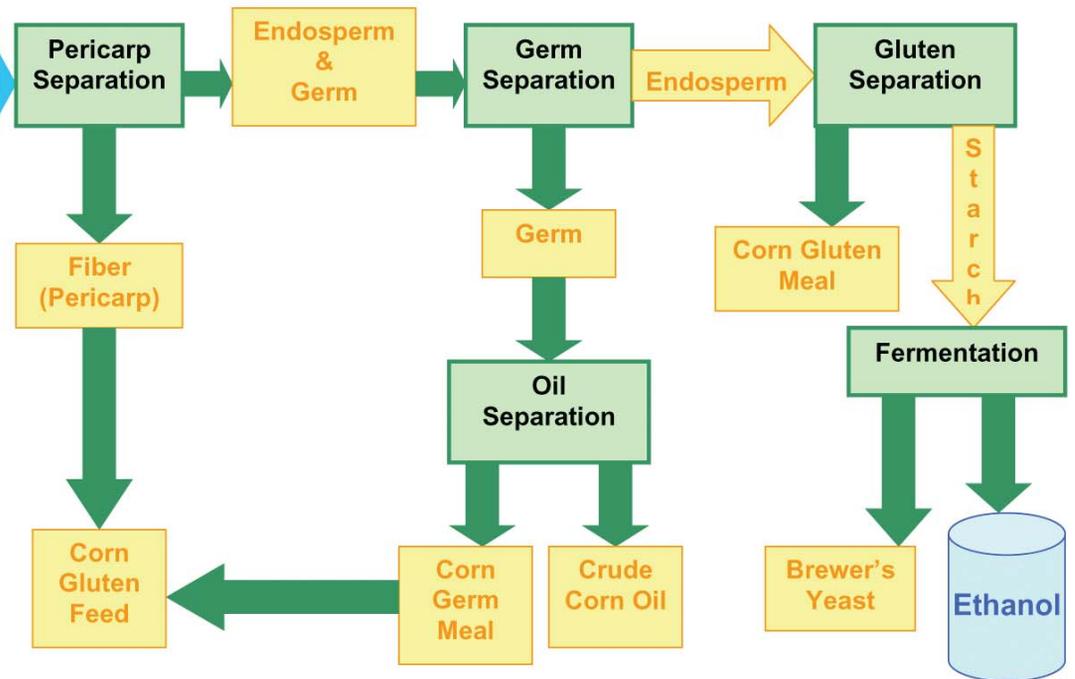
By contrast, the Biomilling Process sends only the starch to the fermentor. The hull and germ are then available to be processed into crude corn oil and corn-gluten meal and feed.

Biorefining has applied for four patents on the milling process, which uses little heat and no chemicals. Because the process allows each part of the corn kernel to be separated from the whole and refined separately, Doug Van Thorre, Biorefining's president and co-founder, likes to call it "nature's chop shop."



Hydration

BIOMILLING™ PROCESS FLOW



PHOTOS BY ROLF HAGBERG



More profitable ethanol plants

The Biomilling Process offers ethanol producers several advantages over conventional dry milling, says Thom Menie, vice president of sales and marketing. Using a "virtually pure-starch feedstock" makes fermentation more efficient, he says, and produces another coproduct: brewer's yeast. "We estimate a 17 percent gain per batch in conversion of starch to ethanol."

More efficient fermentation also reduces

energy expense, Menie says. Biomilling saves on the cost of drying leftover distiller's grains and cuts offensive drying odors. The company estimates the process could lower an ethanol plant's total energy use by 5 to 10 percent.

On the revenue side, Biomilling coproducts are more valuable than distiller's dry grains, Menie says. Corn oil, dried brewer's yeast, and corn-gluten meal and feed sell for up to 10 times the price of distiller's grains, bringing as much 41 cents a pound, compared to about 4 cents a pound for distiller's dry grains, Menie estimates.

Further, Biorefining will guarantee ethanol producers a market for coproducts generated from Biomilling, Menie says. In January, the company signed a preliminary sales agreement with Scoular Co., a \$2.3 billion feed and food distribution company based in Omaha, to buy and resell the commodities.

"We'll bring ethanol producers not only the process and the technology, but the market for the coproducts, as well,"

says Menie, 53, a former marketing executive for Johnson & Johnson and Pillsbury who also managed more than 40 marketing campaigns for small companies.

All of this adds up to improved profitability for ethanol plants, Menie says. The company claims that using the Biomilling Process could boost a dry mill's bottom line two to five times. A 40-million-gallon ethanol plant could be retrofitted with a Biomilling facility for about \$10 million — one-tenth the cost of current corn wet-mill technology, Menie says. Based on increased manufacturing efficiency, reduced energy consumption, and added



Thom Menie



Doug VanThorre

revenue from Biomilling coproducts, “we estimate a one-year payback on the capital investment,” he says.

Prove it!

Biorefining’s new technology is attracting a lot of attention, says Max Norris, an AURI scientist who has worked with the intellectual property company since its inception in 2000. But so far, he observes, ethanol producers are taking a show-me attitude: “There’s interest, certainly, but the ethanol plants are saying, ‘Prove it!’”

That’s where AURI is playing a role. This month, with AURI’s technical help, Biorefining will begin running the process at commercial volumes in a leased manufacturing plant in Minnesota. “This will be a real-life prove-up of the technology,” Menie says. The eight to 10-week demonstration will provide detailed data about the manufacturing process, coproduct characteristics and economic feasibility. With that information in hand, “we hope to have a licensing deal on the table this year,” Menie says.

Part of biorefining trend

Besides its front-end milling process for ethanol plants, Biorefining is moving forward with two other corn-refining technologies. The company’s patented Bio-Extraction Process produces specialty sugars from corn fiber for nutraceutical products; its Bio-Conversion Process makes rare sugars used in drugs. (For more on this technology, see *Ag Innovation News*, Jan. 2003)

The company, which has raised \$2.4 million in private capital since 2000, broke ground last fall on a joint venture with Ace Technologies called Ace-Biorefining, LLC. Early next year, the \$22-million Wisconsin facility will begin extracting L-arabinose and other sugars from corn distiller’s grains. In 2006, Biorefining hopes to build a \$6-million Minnesota facility to produce rare sugars from corn fiber.

Biorefining’s efforts reflect the advances now being made in converting renewable plants into energy and industrial products, Norris says. Menie agrees, echoing the view of many in agriculture today: “We’re going to be a bio-based society some day, instead of a petroleum-based society.”

Already, the renewable ethanol industry is growing rapidly, spurred by federal and state environmental mandates. The country’s 75 ethanol plants are expected to produce 3.3 billion gallons of fuel this year, up from 2.8 billion gallons last year, and the industry will add 550 million gallons of production capacity. Still, ethanol is not price competitive with gasoline, Menie says, and the industry continues to rely on government supports to stay afloat.

Biorefining wants to help change that by making ethanol plants more profitable, Menie says. “A biorefinery wrapped around an ethanol plant — now you have something that can compete with petroleum.” ■

Ag on the Web: summer events



BY JENNIFER PENA

This is a busy summer for agricultural enthusiasts, with a vast array of events throughout Minnesota. From big commercial shows to small events on the farm, there is much to choose from. We’ve selected a few that sound interesting to keep your calendar full until fall. While you’re busy surfing the Net, don’t forget to check us out at www.auri.org to see what we’ve got cooking this summer

North Creek Community Farm

www.chibardun.net/~kstout

Located in the Hay River Valley, 75 miles northeast of the Twin Cities, the North Creek Community Farm offers plenty of summer activities. Click on “2004 Information” to view their Festival schedule, including the Garlic Harvest in July, a two-day “Corn Feed, Science Day and Overnight” in August, and a Harvest Festival in September. North Creek is a community-supported farm; they welcome visitors to collect produce or just learn, work and have fun. Farm-share subscriptions are available through their Web site.



FarmFest 2004

www.farmshows.com/Farmfest

What would a summer be like without Minnesota’s FarmFest? This year, the event will be held near Redwood Falls from Tuesday, August 3, through Thursday, August 5. Exhibitors are already in place and education demonstrations such as livestock handling, harvesting and spraying are scheduled throughout the three-day show. A handy toolbar on the left gives you fast links to everything you need to know about 2004’s FarmFest, including an exhibitor list and layout, show hours, admission prices, directions and more. Check out AURI’s tent at lot 612 on your way through the grounds.



Morgan Creek Vineyards

www.morgancreekvineyards.com

Morgan Creek Vineyards has been building a reputation for delicious wines and a beautiful vineyard since its first harvest in 1998. Located near New Ulm, it has become a southern Minnesota tourist attraction. The “Calendar of Events” section lists what the vineyard has planned for this summer, including wine tasting from May to December, summer Jazz Nites and even gourmet cooking. Morgan Creek visitors report it’s worth the trip.

Minnesota State Fair

www.mnstatefair.org



The “Great Minnesota Get Together” site includes an abundance of information on every event happening during the fair’s 12-day run, including livestock shows, competitions and special days. Agricultural visitors will want to take special note of the “competition” section, featuring 4-H, livestock, FFA, Ag-Hort-Bee, horse shows and judging schedules.

DakotaFest

www.farmshows.com/Dakotafest

For those interested in traveling just outside Minnesota, DakotaFest 2004 may be the show to visit. Like FarmFest, information is located on farmshows.com, with easy, quick links to demonstrations, new products, show hours, admission and much more. DakotaFest 2004 is located on the Schlaffman Farm in Mitchell, SD, and runs from Tuesday, August 17 to Thursday, August 19.



Seventh International Conference on Precision Agriculture

www.precision.agri.umn.edu/Conference

The Seventh International Conference on Precision Agriculture offers a forum on precision agriculture research and applications. This year’s conference, to be held July 25-28 in Minneapolis, promises to be the largest ever, with over 280 papers presented by attendees from throughout the United States and 35 countries. The forum will include oral and poster presentations, discussions and exhibits. Web site visitors can register for the conference, get information on hotel and travel, and read about past conferences.

AgriSurf AgCalendar

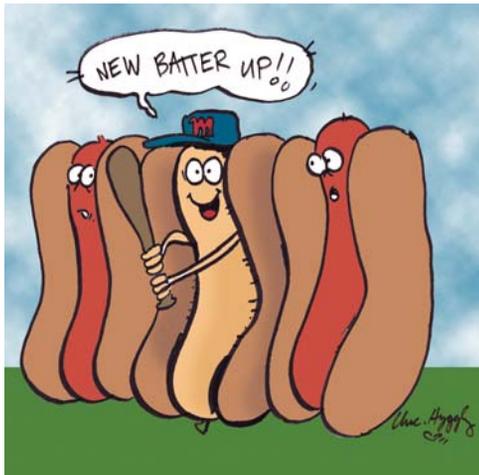
www.agrisurf.com/agrisurfcalendar/main.asp

If you have an upcoming event to share with the ag community, AgriSurf is a great place to post it. There is a quick link to “AgCalendar” where visitors can view scheduled events or add one their own. Click on “add a new event,” then create an account for yourself and complete your calendar. Check back often as events are scheduled regularly.

Elsewhere in ag utilization

BY DAN LEMKE
CARTOONS © 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.



Baseball, soy dogs and apple pie

Eleven Major League Baseball stadiums are offering a vegetarian alternative to the traditional ballpark fare. Soy-based veggie dogs are now on the menu at Oakland, San Francisco and San Diego stadiums, among others. Mintel Consumer Intelligence says sales of soy-based meat alternatives have been growing at 15 to 20 percent per year, reaching \$600 million in 2003.

Source: Soyatech.com, April 13, 2004

Sweet plastic

Procter & Gamble Chemicals and a Japanese firm are commercializing Nodax H, a biodegradable plastic fiber that will be used in packaging and non-woven materials. The fiber is made from fermented sugars of corn and sugar beets and palm-oil-based fatty acids. It can be readily converted into coated paper, films and molded items. Researchers say the plastic is compatible with other biodegradable polymers, including polylactic acid, to produce composites.

Source: Soyatech.com, April 12, 2004

Crude manure

University of Illinois researchers are attempting to convert hog manure into crude oil that could be refined to heat homes or generate electricity.

A thermochemical conversion process uses intense heat and pressure to break down the molecular structure of manure to make oil. It's similar to the natural process that turns organic matter into oil over centuries. The laboratory process takes about half an hour.

Researchers have been able to convert only

small batches of manure into crude oil and admit more extensive research is needed. However, the project's lead scientist predicts that one day a reactor the size of a home furnace could process manure generated by 2,000 hogs at a cost of about \$10 per barrel of oil.

Source: Agri-News, April 26, 2004

Come fly with soy

Purdue University scientists are working to power airplanes with soy oil; their goal is to reduce petroleum fuel use that drives global warming. By adding soy oil blends to jet fuels, planes emit less carbon dioxide, the principal "greenhouse effect" culprit.

Soybean plants suck CO² out of the atmosphere as they grow, and when the soy is converted and burned as fuel, the carbon dioxide is released — with no net CO² gain in the environment. Commercial air traffic has been identified as one of the fastest-growing sources of carbon dioxide pollution.

Source: New Scientist, March 26, 2004

Sunflowers go to school

Sunflower seed butter is now eligible to be served in schools under the USDA's reimbursable meals program. An affordable protein source, sunflower butter is an alternative to peanut butter, which causes an allergic reaction in some students.

Source: Soyatech.com, February 23, 2004



Spicing up insulin

Several compounds isolated from cinnamon may someday find their way into a new generation of blood-sugar-lowering products. Studies shows that polyphenolic polymer compounds increase sugar metabolism in fat cells twenty fold. Millions of people have impaired sugar and fat metabolism that can

lead to Type 2 diabetes and cardiovascular disease. The extracted compounds increase insulin sensitivity by activating enzymes that stimulate insulin receptors, while inhibiting enzymes that deactivate those receptors.

Source: USDA-ARS, April 19, 2004



Not a happy Camp(ylobacter)

Proteins from harmless microorganisms have been shown to reduce campylobacter and other pathogenic bacteria in poultry. ARS researchers used bacteriocins proteins to reduce campylobacter in bird intestines by more than 99 percent. Bacteriocins could be an effective alternative to antibiotics that the poultry industry uses to control pathogenic bacteria.

Food-borne bacterial infections are responsible for billions of dollars in poultry industry losses every year. Campylobacter is a major cause of diarrhea in the United States and is transmitted primarily through poultry, according to the U.S. Center for Disease Control and Prevention.

Source: USDA-ARS, April 28, 2004

A milky way to reduce cholesterol

Cholesterol-lowering milk is now available to consumers in Great Britain. Research shows that Flora Pro-Activ milk drink is an effective way to deliver phytosterols — anti-cholesterol components that actively remove cholesterol from the body.

The low-fat milk showed a 16 percent reduction of "bad" cholesterol in a volunteer group asked to test several different products. Study group members consumed



bread, breakfast cereals, milk or yogurt, all enriched with phytosterols. All the volunteers saw a reduction in cholesterol levels, but those consuming milk had the biggest effect.

Source: NewsEdge Corporation, April 24, 2004



Paper or corn?

Japanese shoppers may soon be carrying ag-based fashion statements. Three Japanese companies plan to sell high-quality biodegradable shopping bags to women's clothing stores and high-end supermarkets. The bags feature handles made from polylactic resin derived from corn starch. One set of handles can be made from about 15 kernels of corn. The bags will break down naturally by microbes if buried in soil, and they can be safely incinerated without producing harmful gases. Companies expect that young Japanese women will use the eco-friendly ware as second handbags that display their favorite fashion brands.

Source: Soyatech.com, April 16, 2004

Offal-ly

important



PHOTO BY DAN LEMKE

Karen Fennern trims a beef quarter at her Lucan Locker plant in southwest Minnesota. Fennern is among hundreds of small and medium-size Minnesota meat processors who could benefit from collectively marketing coproducts such as tallow.

of-fal

Function: *noun*

Etymology: Middle English, from *of* + *fall*
1: the waste or by-product of a process: as
a: trimmings of a hide b: the by-products of milling used especially for stock feeds c: the viscera and trimmings of a butchered animal removed in dressing



AURI part of tri-state effort to help small meat processors

BY DAN LEMKE

Lucan, Minn. — Small business owner Karen Fennern's approach to managing expenses is simple: "Anything that costs me less or makes me money is a benefit."

As a meat locker owner in a small southwest Minnesota town, Fennern runs a tight ship, paying attention to every revenue source and expense. Last year business was good — she custom processed about 300 cattle and hogs in her state-inspected plant.

But because her plant is small, she can't capture some of the extra byproduct revenue that larger plants enjoy.

Fennern disposes of her plant's offal — bones, fat, organs, blood — that can be valuable if sold to renderers and pet food companies. At one time she could sell the bones and tallow, but now companies want bulk supplies. Only her beef hides are marketable, but she gets cleaning charges for the paunches, which offsets some of the profit. Hundreds of other processors like Fennern receive nothing for their offal.

To increase small- and medium-size processors competitiveness, the USDA Federal State Marketing Improvement Program (FSMIP) has funded an effort by Minnesota, Iowa and Wisconsin to help businesses tap into coproduct markets.

Typically, 60 percent of an animal's live weight ends up as commercial meat cuts. The remaining 40 percent is coproducts. Individually, small-scale processors don't have enough offal to interest buyers, but collectively they might.

"There is a large market in the pet food industry for organ meat, plus there are markets for pork and beef hides," says Dennis Timmerman, AURI project development director. "We're working to match the needs of pet-food producers with the needs of meat processors."

Timmerman and AURI are researching offal markets to determine the quality and quantity needed by Minnesota manufacturers. Then they will determine what the state's meat processors have available and how they could collectively meet offal market demands.

Similar efforts are taking place in Iowa and Wisconsin. The three-state FSMIP project includes product development assistance, which AURI is providing for Minnesota.

According to the Minnesota Association of Meat Processors, the state has about 500 small processors, which often connect local livestock producers to consumers. The facilities provide farmers with a facility for slaughtering animals for personal use or to sell to other local residents.

"A lot of small livestock producers market their livestock through these processors," Timmerman says. "The processors' success can affect the producers' bottom line."

In Minnesota, direct meat sales totaled more than \$41 million in 2001, according to a Minnesota Department of Agriculture survey. Since then, sales have likely grown as more producers are direct-marketing traditional or value-added meat products.

For locker plants, such as Fennern's Lucan Locker, anything that adds to the bottom line is a welcome change. Years ago, when she worked for another meat processor, "our rendering check used to pay the electric bill. It was an extra \$100 or more a month, and when you're running freezers, coolers and a retail case, it's not a small deal."

Timmerman hopes to have market and processor information gathered later this summer and begin outreach efforts late fall. ■



PHOTO BY ROLF HAGBERG

Pocket of Opportunity

Central Minnesota farmers get serious about soy-crushing facility

BY DAN LEMKE

Perham, Minn. — Central Minnesota farmers are turning up the heat on plans that have been simmering for years to build a soybean-processing facility.

“We started talking several years ago, looking for ways to add value to our soybeans,” says Terry Wagenman, a member of the Central Minnesota Soybean Processors.

With 27 million bushels of soybeans produced in the eight-county area and a large concentration of livestock facilities that need soybean meal, producers are in a “pocket of opportunity,” Wagenman says. The idea “went to sleep for a few years, but now we’re to the point of looking into feasibility.”

Wagenman chairs the co-op’s five-member steering committee that is investigating a 2-million-bushel-per-year facility. About 50 to 100 producers would be needed to supply the soy-crushing plant, which would separate oil and meal.

Using advanced processing technologies, the cooperative would produce high-protein and full-fat soybean meal for livestock, and may also process organic soybeans.

The region around Otter Tail County has a fairly high concentration of livestock — hogs, dairy, poultry — all potential

markets for soybean meal. With no crushing facility in the area, most of the meal has to be brought in.

At the same time, most soybeans grown here are shipped out by train and processed elsewhere. A local facility would keep more value close to home, Wagenman says.

Central Minnesota Soybean Processors members have met with potential end users and determined there is interest in the local marketplace, Wagenman says.

“We’re confident we have a niche market ... we need to do the feasibility work to get the full feel for the marketplace.”

While the co-op “isn’t looking at being world leaders in soy processing,” says Michael Sparby, AURI project development director, it “has done a good job identifying who potential end users are because (members) know where some of their products would go.

“There is a fairly large concentration of livestock in the area and it’s one of the farthest concentrations from a crush facility. Hopefully they can take advantage of lower costs for transportation.”

Wagenman expects the feasibility analysis to be completed after the fall harvest. If the results are favorable and investors are attracted to their plan, construction could begin in the spring of 2005. ■