



AG INNOVATION NEWS

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PAGES 2-3



Serving rural co-ops

Corn cover-up

AURI helps formulate
bio-tarp to protect grain piles

PAGES 6-7

PAGE 5



Waste suited to digestion

PAGE 8



Enterprising kitchen

PHOTOS BY ROLF HAGBERG





BY CINDY GREEN

ILLUSTRATION BY BARB ETZKORN

With USDA grant, AURI expands capacity to offer services to rural cooperatives

AURI is launching Minnesota's first Rural Cooperative Development Center, with help from a \$225,000 U.S. Department of Agriculture grant. The AURI Center will "help start-ups or existing cooperatives understand the feasibility of starting a new operation or creating an enterprise," says Dennis Timmerman, AURI project director.

The AURI Cooperative Development Center will provide technical and business services to renewable-energy, dairy, livestock feed and food-processing cooperatives and to local food marketing and distribution co-ops. Timmerman says there are more than 450 ag-related cooperatives in Minnesota.

For more than two decades, AURI has helped cooperatives with developing products, improving processing, finding raw materials and converting byproducts to income streams. But it has not had a formal program focused on rural cooperative enterprise development. "It aligns very nicely with our mission," Timmerman says.

Funds from the USDA Rural Cooperative Development Grant will expand AURI's capacity to evaluate cooperative business structures, marketing and business plans, finances and equity development. All cooperatives served by the Center will benefit rural areas and be located in communities under 50,000 in population.

The first year, "we are partnering with other CDCs to provide these services to cooperatives because we don't have the expertise within AURI yet, but we are acquiring it," Timmerman says.

Grant funds are helping procure services from CDC consultants such as Win Curtiss of the Wisconsin Cooperative Development Services in Madison, who is knowledgeable in board governance and strategic planning. Also, St. Paul attorney Lois Josefsen is contributing expertise in cooperative business planning and development, and conducting market and feasibility assessments.

When named a CDC site, AURI joined CooperationWorks!, a network of 24 centers across the country that intend to revitalize communities through cooperative enterprise development. The national organization offers intensive training in cooperative business development, finance, law, governance and management. AURI project directors Timmerman, Randy Hilliard and Bruce Stockman are participating in CooperationWorks! training programs.

"When we went to Wisconsin (for training), everything from the taxi cab we rode in to a coffee roasting company and grocery store we visited to the credit union we talked financing with," was a cooperative, Stockman says.

PHOTO BY ROLF HAGBERG



Bruce Stockman (above) is one of three AURI project directors being trained in enterprise development for AURI's Cooperative Development Center. The new program is serving rural cooperatives of all sizes — from large dairy, livestock and grain co-ops to small community businesses such as Spiral Natural Foods in Hastings, Minn. managed by Suzie Chavie (at left).

Cooperative history

Midwesterners are rooted in cooperative history, Stockman says. "When we first settled in North America, Europeans brought the co-op concept over. A lot of producers were able to survive — especially in agriculture — because of cooperative ownership" of grain elevators, banks, dairy plants and other value-added ag businesses.

Stockman, who grew up in Kansas, says like many in the rural Midwest, he's been "involved with cooperatives most of my life. Our farming-ranching operation did business with co-ops and later I worked for a company that served Credit Unions." Before coming to AURI a year ago, he was executive director of the Minnesota Corn Growers Association and "many of the value-added businesses we worked with were co-ops."

"I think that the trend and the opportunity is growing again in our country."

Over time, cooperatives have become more than "just a place to do business together, with most profits going back into investments." Today's "new-age" cooperatives, such as ethanol plants, "are an investment that actually pays you back rather than just being a cooperative means of survival." They are more business savvy and spin-off "LLCs and C Corps but still the co-op owns the majority of shares," Stockman says. It's a way to take advantage of the (business and tax) benefits all three have to offer."

AURI equipped to serve

Minnesota's Cooperative Development Center has a head start with existing AURI laboratories, scientists and technical staff who provide testing and analysis of food, renewable fuels and byproducts. Staff will help formulate products, develop recipes, source feedstocks, identify distributors, analyze the economic and technical feasibility of new products and processes, provide sensory testing for food products, source raw materials, and evaluate technologies the co-ops are considering.

Besides providing services, AURI will refer cooperatives to potential partners, such as producer groups, food industry representatives, and local and regional economic development partners.

AURI's Center will serve cooperatives in various stages of development — from early formation to expansion. Along with large dairy, livestock and grain cooperatives, AURI is helping small community businesses like Spiral Natural Foods in Hastings, Minn., founded in 1978.

"The little food co-op was struggling and is making a turn around — with better marketing, promotion, management," Stockman says. "They need help to both expand their markets and go through a planning process to move and expand their space, so they can grow in members and products."

AURI Cooperative Development Service will help Spiral Natural Foods through the "catch 22" problem of ordering enough product to attract and increase buyers but not too much to lose inventory. "There is quite a bit of loss in fresh produce."

"We will help them transition — with expansion, business development, marketing and increasing their membership base."

As a Cooperative Development Center, AURI has identified other ventures it may be assisting including:

Identifying high-value uses for dairy processing byproducts.

A southern Minnesota dairy cooperative that produces cheese, butter and sauces wants to turn waste products into high-value coproducts, such as livestock feed. AURI analytical laboratories will analyze byproduct composition, conduct technical reviews, identify potential coproducts uses, analyze technical and economic feasibility and assist with product development.

Developing a local foods cooperative.

AURI will assist Farmers Union in developing a producer-owned marketing and processing cooperative that could distribute local produce to food companies. Currently, small producers direct market most of their dairy and meat products, vegetables, fruit and flowers in the Twin Cities. Working collaboratively, rural producers could increase their marketing efforts to food service providers, distributors and large retailers. AURI will provide business and technical assistance on co-op development, policies, governance structure, processing development and market and feasibility studies.



PHOTOS BY ROLF HAGBERG

Expanding value-added turkey product line.

A grower-owned turkey company, with more than 200 employees, wants to expand its product line. The co-op processes 40 million pounds of turkey annually as whole turkeys, bone-in turkey breasts, and tray-pack and bulk-commodity turkey parts for private label, retail and distributor markets across the United States. AURI may provide sensory panel and shelf-life testing, and assistance with product, process and coproduct development, food safety certification/compliance and business development.



Starting an apple co-op.

A central Minnesota winery intends to produce apple wine but doesn't have enough produce. The winery wants to find producers interested in forming a marketing cooperative to sell apples. AURI may assist with apple wine product development, feasibility assessment, product testing, quality control, and assist with the apple cooperative's business development.



Turning corncobs into plastic.

A central Minnesota ethanol cooperative is interested in extracting xylose syrups from corncobs to produce a polymer resin. While xylose syrups are being imported from China for polymers, supplies are inconsistent and costly. If producing xylose from local cobs is proven economically feasible, AURI's fats and oils lab in Marshall will test xylose extraction and separation methods and technical staff will help develop a system to collect and deliver cobs.



Pelletizing buckwheat meal.

The Buckwheat Growers Association is interested in pelletizing buckwheat meal for livestock feed and, potentially, biomass energy after oil is extracted. AURI laboratories in Waseca and Marshall would assist with processing development and product testing. ■





PHOTOS BY ROLF HAGBERG

GLYCERIN'S GLOWING RESULTS

By Ashley Harguth

It was worth a second look.

A 2007 Kansas study found that adding distillers grains, an ethanol byproduct, to cattle feed could increase the prevalence of *E. coli* in beef. But updated research finds that's not true, and adding a soy biodiesel byproduct actually improves the feed's performance.

AURI decided to retest the Kansas State University study and Dennis Timmerman, AURI project director, worked with beef cattle nutrition scientists Alfredo DiCostanzo of the University of Minnesota and Jim Drouillard, of Kansas State University, who was part of the original study. The updated two-part trials were conducted in both states.

"We felt that it was important to have both Kansas State and the University of Minnesota look at and retest this issue because of how we feed cattle differently in Minnesota and Kansas," Timmerman says. "In Minnesota, beef producers feed whole or cracked corn, while in Kansas they feed steam-flaked corn."

Researchers also tested soy glycerin feed additive as an intervention agent to see if it would lower *E. coli* O157-H7. The bacteria is naturally present in cattle, but it can pose a health risk if people consume undercooked meat or unwashed produce.

Trials were conducted at the University of Minnesota's beef feedlot and research facilities in Rosemont from August 2010 to February 2011. The second set of trials started at Kansas State in April 2011.

Restarting in Minnesota

The two-phased trials started with testing 48 cattle; half already had naturally-occurring *E. coli* in their gastrointestinal track. Trial rations of zero and 10 percent glycerin and with zero and 35 percent distillers grains were fed to the cattle, with a total of four combinations. The ration percentages were chosen because of recent studies showing that more than 10 percent glycerin can negatively affect cattle performance and 35 percent distillers grains is commonly included in feed. All rations included steam-flaked corn, hay and protein, vitamin and mineral supplements.

Test cattle were fed individually for 172 days, fecal sampled and weighed about every 14 days and at harvest. As the feeding trial continued, *E. coli* populations declined and disappeared with all four ration combinations, Timmerman says. The trial was repeated with the same results.

Minnesota research confirmed that distillers grains do not cause *E. coli* populations to increase and that glycerin can

successfully replace up to 10 percent of corn in steam-flaked corn rations. "The findings were really interesting," DiCostanzo says. "I expected to retain at least the 50 percent (*E. coli*) infection rate but it actually all cleared up."

"We discovered something we weren't looking for with the glycerin," Timmerman says. "We started feeding it to some of the cattle in the trial thinking it might help lower *E. coli* populations and also found that it greatly increased overall cattle performance." DiCostanzo says that while distillers grains can cause cattle to have a slightly less efficient rate of gain, glycerin counters by improving performance.

Updated studies show renewable fuel byproducts in livestock feed **DO NOT** promote *E. coli* and **IMPROVE** cattle performance

Trials take 2

The trial's second phase involved inoculating 28 young Holstein steers with high *E. coli* levels. Researchers evaluated the difference between steam-flaked and dry-rolled corn and zero and 10 percent glycerin. All cattle were fed distillers grains, hay and supplements.

Researchers hypothesized that feeding glycerin would have no effect on *E. coli* but feeding steam-flaked corn would result in a higher prevalence. Calves in an isolation barn were fecal sampled. Samples with *E. coli* were plated and incubated to measure actual amounts of the bacteria.

There was no significant difference in fecal *E. coli* shedding with different diet treatments and the bacteria significantly decreased over time in all the test groups. Researchers concluded that shedding artificially-inoculated *E. coli* was not affected by soy glycerin or corn-processing methods.

The trials were duplicated in Kansas and results are not yet complete, but Timmerman says "the glycerin results are looking fairly consistent to what DiCostanzo found in the Minnesota trials." The research suggests other environmental factors may impact *E. coli* populations and more research will have to be done, Timmerman says.

AURI staff, DiCostanzo and other University of Minnesota researchers are evaluating cattle carcasses and beef from the first trial to see if feeding glycerin has an effect. A similar test, feeding glycerin to swine, found meat and fat quality improved, Timmerman says. He expects beef trials will yield similar results.

DiCostanzo says distillers grains can increase fatty acids in meat that promote oxidation (rancidity), which can reduce shelf life, but glycerin could potentially reduce the negative effects of those fatty acids.

"We didn't realize that feeding glycerin was going to have that kind of impact; we were very surprised by the outcomes," Timmerman says. "Glycerin is a benefit to beef producers; cattle perform better and overall production and performance increase."

DiCostanzo said he was not shocked that studies didn't find a correlation between corn rations and *E. coli*. But he was surprised by the positive results of replacing corn with glycerin and hopes producers will incorporate them into their feeding rations. ■

PROJECT SNAPSHOT

AURI and feed trials

AURI project director Dennis Timmerman (above center) worked with beef cattle nutritionists from Kansas State University and the University of Minnesota to test feed with added distillers grains and glycerin — both byproducts of renewable fuel processing.

Idea to opportunity: Retest an earlier Kansas State study that showed adding distillers grains to cattle feed could increase prevalence of *E. coli* in beef.

Outcome: Not only was no link found between distillers grains and *e. coli*, the updated two-part trials showed glycerin (upper left) added to feed improves cattle weight-gain efficiency.

Feasibly digested

Study inventories feedstocks

BY DAN LEMKE

Crookston, Minn. — Like farm animals, anaerobic digesters perform best when fed the right diet. An AURI initiative is giving northwest Minnesota processors a better idea of what's on the menu.

Conducted by University of Minnesota-Crookston student Becky Johnson, an AURI-sponsored study inventoried northwest Minnesota feedstocks. Animal waste, food processing leftovers, yard waste and other feedstocks could potentially feed the region's anaerobic digesters, which produce methane to generate energy.

"There are companies and communities evaluating digesters for waste handling and methane gas production," says Jennifer Wagner-Lahr, AURI project director. "We are looking to see how we can boost gas production by incorporating something else that is a problematic waste."

For example, American Crystal Sugar, based in Moorhead, Minn., processes sugar beets and produces mass quantities of processing leftovers, which could be used to fuel a digester. In fact, Crystal Sugar has a pilot-sized digester in Moorhead powered by beet tailings. The waste tailings are sugarbeet chips, too small to process, and vegetation that mixes in with beets during harvest.

The company has been considering an additional full-scale unit if it's economical. However, Crystal Sugar only processes beets about nine months out of the year. The digester would essentially be idle the other three months unless other feedstocks could be found to fuel it.

"Having other available feedstocks may be key to viability," says Dave Malmkog, American Crystal Sugar economic analysis director. "If we are able to identify two or three significant items we could add, it could be a game changer in terms of economic feasibility."

After several months taking inventory of potential fuel streams, Johnson has determined there is enough feedstock supply to meet potential demand. "If (processors) are truly dedicated, they could find a way. It would be a matter of getting the right contacts and finding synergies, but there are enough resources."

The feedstock inventory is the first phase of AURI's initiative to evaluate biogas production potential. Subsequent efforts include testing AURI's small-scale digester in Waseca to determine how well the feedstocks can be digested, verify how much gas they produce, and identify the proper ratio for blending available fuels.

"We're taking a stab at a really big question by focusing on a smaller region," Wagner-Lahr says. "By the time we are done with this project, hopefully we'll be able to answer questions about what the methane production is from combinations of these feedstocks, then suggest best practices for how they could be co-digested."

The Northwest Minnesota Methane Digester Feedstock Inventory report is available on AURI's website: www.auri.org. ■

PROJECT SNAPSHOT

AURI and biogas feedstocks

AURI project director Jennifer Wagner-Lahr led a study to identify available feedstocks for biogas production in northwest Minnesota.

Idea to opportunity: Use processing waste as main ingredient or part of a blend to produce biogas through anaerobic digestion. Inventory available materials that could be used to produce biogas

Outcomes: Feedstocks identified and will be tested in digesters to determine gas output.



ILLUSTRATION BY BARB ETZKORN

Brainstorming a BETTER



Doug Kavanaugh, operations manager at Glacial Plains Cooperative in Murdock, says every fall the elevator has to cover a two-million-bushel grain pile with a four-ton plastic tarp – a tough job requiring 10 brawny men. After waking up in the middle of the night with dreams of a spray-on cover, Kavanaugh and the co-op's general manager approached AURI for help designing a bio-tarp.

BY LIZ MORRISON

They mushroom every fall — great domes of grain covered with immense sheets of plastic. Millions of bushels of newly-harvested corn, soybeans and wheat are stored outdoors at elevators all over the Midwest, an emblem of modern agriculture's stunning bounty — but also a major vexation.

“Every fall we have to put tarps on our grain piles,” says Doug Kavanaugh, operations manager at Glacial Plains Cooperative in Murdock, Minn., which handles more than 20 million bushels of corn a year. “Every co-op does. It's a very common practice.”

But covering a two-million-bushel corn pile with a 200 x 400-foot plastic tarp is an expensive, back-breaking job. It takes eight or 10 brawny men an entire day of sloggng over the slippery hill of grain, lugging a four-ton, \$40,000 tarp into place. Then the seams have to be taped and the edges secured. The weather during this operation is often cold and windy, adding to the misery and danger.

Once the tarp is in place, aeration fans must run continually to keep the cover from blowing off. Tarps often tear, letting in moisture. And when it's time to move the grain in the spring, the single-use tarps have to be cut up and hauled to a landfill. It all adds up to a boatload of labor, expense and hassle.

A couple of years ago, after a day of tarp wrangling, Kavanaugh woke up in the middle of the night and thought, “There has to be a better way — maybe a spray-on cover.” He mentioned his 3 a.m. brainstorm to Tom Traen, Glacial Plains general manager. “Tom said, ‘That's a good idea, and I know who to call for help!’ ”

Kavanaugh and Traen sat down with Michael Sparby, AURI project director, and AURI chemists Doug Root and Ranae Jorgenson to hash out the concept. That was the genesis of an ag-based, sprayable “bio-tarp,” designed to shed water and protect grain and silage piles all winter.

“We recognized an exciting idea,” Root says. Although spray-on organic coverings are used in other settings, such as waste lagoons and sugar beet piles, “there doesn't seem to be anything like this on the market.”

The patent-pending product, called “E-Z-Tarp,” was formulated and bench-tested at AURI's fats and oils lab in Marshall, followed by small-scale trials at the Murdock co-op. Now it's ready for commercial scale-up and final testing. Kavanaugh and Traen, both grain-industry veterans, are seeking investors.

Development by trial and error

It took about two years to develop the E-Z-Tarp formula, says Ranae Jorgenson, AURI analytic chemist. The product had to be made of 100 percent food-grade materials. It had to form a waterproof barrier durable enough to last through the winter without cracking, yet crumbly enough to mix easily into the grain or silage pile after storage. Finally, it had to be sprayable in cold weather using existing mixing and application equipment.

The first two bio-tarp formulations failed in outdoor tests. The third formula was tested on small corn and haylage piles during the fall and winter of 2009-2010. “It held together all winter,” Kavanaugh says. The corn piles remained dry, and periodic aeration didn't disturb the covering, he says. The haylage piles “continued to ferment under the bio-tarp, just as they were supposed to do,” he says.

“We think we're pretty close to the final formula,” Jorgenson says. The next steps will be testing the bio-tarp on commercial-size grain piles and identifying the most efficient mixing, pumping and spraying equipment. The material, a water-based emulsion like latex paint, has a syrupy consistency. The bio-tarp ingredients are mixed and heated to 140 degrees, then pumped while still warm. As the emulsion cools, it hardens into a solid waxy sheet, creating a waterproof cover in about four hours.

The optimum application rate also needs to be refined, Jorgenson says. Three application rates were tested in 2009-2010. A layer 1/8 to 2/8 inches thick appeared to work the best, Kavanaugh says, but that needs to be confirmed in trials on larger piles.

Kavanaugh and Traen have invested considerable time and money in E-Z-Tarp, much of it to obtain a patent. “We expect that it will take about \$100,000 to scale up and finish testing,” Kavanaugh says. They've identified a Wisconsin dairy producer who is interested in trying the bio-tarp on silage piles. The two grain merchants are looking for an equity partner to help them complete testing this fall and bring the bio-tarp to market.

Seeking better cover for outdoor corn piles led entrepreneurs to AURI and bio-tarp



AURi chemist Ranae Jorgenson (right), worked for two years on formulating a grain cover made from 100 percent food-grade ingredients (center), which are mixed and heated to 140 degrees and sprayed over a grain pile. As the emulsion cools, it hardens into a solid waterproof cover that can be crumbled into the grain when it's sold. The first two formulas failed field tests but the third formula sprayed on test piles of corn and haylage (left) held up through the winter. The next step is commercial-scale testing.

Better performance, labor savings

E-Z-Tarp offers both performance and economic advantages over standard polyethylene covers, Kavanagh and Traen say.

Plastic tarps rely on the suction created by aeration to hold the cover against the grain pile. When power outages take the fans off line, tarps can lift up and rip or blow away. "We've had that experience quite a few times," Kavanagh says. With the E-Z-Tarp, by contrast, "if there's a power outage, you still have protection."

The bio-tarp also lets you run aeration only as needed, rather than continuously, saving energy dollars, he says. In addition, the undisturbed parts of the pile will remain covered as grain is picked up, unlike plastic tarps, which are generally removed all at once, leaving the pile open to rain or snow during loading.

"I see this as a huge advance in preserving the quality of commodities," Traen says.

But the biggest advantage of E-Z-Tarp is labor savings, Kavanagh says. Installation will take just a couple of operators and require none of the heavy lifting that can lead to worker injuries. An application rig — similar, perhaps, to a small fire ladder truck — would be used to spray grain piles. Kavanagh envisions a custom service that would travel around to elevators and livestock farms in the fall.

E-Z-Tarp would also eliminate tarp disposal costs, Kavanagh says. Instead of paying 5 cents a pound to landfill the plastic every year, "you could actually get paid for the bio-tarp." That's because grain may contain up to three percent foreign matter, so the bio-tarp could simply be incorporated into the final product after storage. "It's all food-grade and would be minimal in weight," Kavanagh says. For livestock producers, the bio-tarp ingredients "would increase the feed value," he adds.

"We see a lot of concepts and ideas come through our doors at AURi," says Michael Sparby. "This one hit pretty high on the 'cool' factor." ■

PROJECT SNAPSHOT

AURi and E-Z-Tarp

AURi scientists Ranae Jorgenson and Doug Root worked with two grain marketing veterans to develop a new covering for grain stored outdoors.

Idea to opportunity: Develop a spray-on biodegradable, food-grade covering for grain and silage piles, replacing plastic tarps.

Outcomes: Prototype successfully developed and tested at AURi's Marshall laboratory; being tested this summer on large scale.

TARP



Business incubator
provides
hands-on
training for food
entrepreneurs



Terese Hill (above) manages Kindred Kitchen, a food incubator in north Minneapolis that offers entrepreneurs a fully-licensed commercial kitchen space and workshops, including a nutritional analysis and labeling session by AURI food scientist Charan Wadhawan. Food entrepreneurs that Wadhawan has assisted include, from the left: Amy Peterson, owner of the Dipp Shop; Phil Kaiser of Philly's Snacks and Shashank Dhadphale of Taste Blends. Peterson and Kaiser are pictured exhibiting their products at a food show held at the end of Kindred Kitchen's "Know Your Plan" workshop series.

PHOTOS BY ROLF HAGBERG

BY ASHLEY HARGUTH

Minneapolis, Minn. — Kindred Kitchen gives aspiring entrepreneurs a chance to try out their food product idea in a commercial kitchen before plunging into the marketplace. The food business incubator offers workshops throughout the year and rental space for north Minneapolis food entrepreneurs.

Kindred Kitchen was developed by Catalyst Community Partners, a nonprofit that purchases and renovates buildings to bring jobs, businesses and revenue to North Minneapolis. The nonprofit surveyed community members and found a need for commercial kitchen space and technical assistance for food entrepreneurs. The fully-licensed commercial kitchen space, completed in November 2010, offers classes and space to more than 40 clients. Kindred Kitchen awards 20 scholarships annually for reduced-rate kitchen rental and workshops.

Terese Hill, Kitchen Operations Manager, says Kindred Kitchen offers two workshop series: "Know Your Product" includes sessions on food safety, nutritional analysis and labeling, packaging, market research, catering, sales, distribution and a field trip to Minneapolis food businesses. The "Know Your Plan" series focuses on business plan development, financing, contracts and food-show preparation. The series concludes with a buyer's fair and food show attended by industry professionals who provide feedback on food products.

In February, one session included a two-hour presentation on labeling, nutritional analysis and AURI services by Charan Wadhawan, AURI food scientist. "Charan has been an invaluable resource ... she is great for the technical (food analysis) side that Kindred Kitchen isn't able to help with,"

says Hill, who holds a B.S. in foods & nutrition and business from Saint Catherine's University. Since the presentation, Wadhawan says she has received numerous phone calls and is providing 10 of Kindred Kitchen's clients with AURI technical assistance. "This is a great opportunity for the north Minneapolis area," Wadhawan says.

Kindred Kitchen's weekly tours have given more than 250 people the opportunity to see the space, learn about licensing and food certification and speak with a business consultant. Eventually, Hill says she wants the nonprofit Kindred Kitchen to expand into a larger space with more workshop topics such as social media and financial bookkeeping and offer classes taught by local chefs. ■

For more on Kindred Kitchen, visit www.kindredkitchen.org.

PROJECT SNAPSHOT

AURI and Kindred Kitchen

AURI scientist Charan Wadhawan provided technical support and instruction to clients of this north Minneapolis business incubator.

Idea to opportunity: Provide space and resources to start-up food businesses to support business growth and job creation through food entrepreneurship.

Outcomes: At least 10 food entrepreneurs have received AURI assistance since Wadhawan provided training to Kindred Kitchen clients.



Valuable leftovers

Scientists at AURI coproducts lab never use the word “waste”

BY KEVIN HENNESSY

AURI associate scientist

For years, most businesses considered ag processing leftovers nothing more than waste. Now some of those businesses are looking at novel ways to capture revenue from those “waste” streams.

Here, at AURI’s coproduct utilization lab in Waseca, “waste” has been stripped from our vocabulary. Byproducts with low or even negative value now can become an additional revenue stream.

AURI provides support and expertise to evaluate opportunities for agricultural processing leftovers.

Biogas and biodigestion

A wide range of companies are interested in generating biogas through various technologies, including anaerobic digestion. Despite current low natural gas prices, many businesses are pursuing innovative ways to produce biogas. Fuel prices traditionally rise and fall. Rather than wait for critical situations, having technology and information in hand when natural gas prices rise again could make biogas more attractive.

Energy production is not the only reason anaerobic digestion systems are installed. Some enterprises, such as dairy farms, use digesters to manage manure. For agricultural processors, it could be an opportunity to use low or even negative-value products (those that have disposal costs) to produce something positive, like biogas.

AURI has experience with several anaerobic digestion projects. And we are developing our own digester, larger than bench scale, to test biomass and other materials for biogas potential.

Dewatering technology

Water is essential for life, but for most biomass applications, water is the enemy. Emerging dewatering technologies could drastically reduce biomass moisture, making it easier to handle. The new methods are cheaper than thermal drying.

Some efficiency claims made by dewatering system manufacturers have yet to be substantiated independently. However, if they are proven to be efficient and low cost, dewatering technologies could improve biomass combustion and gasification efficiencies and lower biomass transportation costs.

Drying technology

AURI has held several events for Minnesota processors, highlighting drying technologies that are currently available. Whether for an ethanol plant, food product manufacturer or feed processor, drying biomass material can be a significant expense. Finding an efficient system that matches the needs of a processor can improve material handling and save money. A report on these dryer events and the demonstrated technologies is available at www.auri.org.

AURI will continue to evaluate and disseminate information to processors about drying technologies that could be applied to their operations. Processors and drying companies are encouraged to get involved through our on-line discussion board: <http://tech.groups.yahoo.com/group/auribiomassdryerdiscussion>

Granulation

Handling and processing biomass — whether baling, grinding, pulverizing or pelleting — is important to any venture. AURI recently increased its capacity to support biomass granulation processes for developing products.

Much like AURI’s current pelleting capacity, AURI can now assist in developing granulation blends for fuel, fertilizer or other value-added applications. ■

Kevin Hennessy is associate scientist for coproducts at AURI’s Waseca laboratory. He holds a master’s degree in biosystems and agricultural engineering from the University of Minnesota and a bachelor’s degree from Goshen College in Goshen, Indiana. Hennessy taught science, math and reading in Minnesota public schools for 17 years. He has been with AURI since 2008.



PHOTO BY DAN LEMKE

AURI scientist Kevin Hennessy has led several AURI dryer technology demonstration days for Minnesota processors. Drying biomass can add significant expense to an operation and AURI is investigating emerging technologies that could help processors be more efficient and save money.

ELSEWHERE IN AG INNOVATIONS

BY DAN LEMKE
CARTOONS BY UNCLE HYGGLY

Editor's note: As a service to our readers, we provide news about the work of others in ag utilization. Often, research done elsewhere complements AURI's work.



Syrup power

University of Rhode Island researchers have discovered a maple syrup compound called quebecol, named for the Canadian province that leads the world in maple syrup production. Extracts have shown antioxidant, antimutagenic and human cancer-fighting properties. Quebecol is not present in maple tree sap, but studies suggest it is formed during processing or extracting maple syrup. The phenolic compound could have functional food and medication applications.

Source: Journal of Functional Foods
February 4, 2011



Muscular fish oil

Fish oil supplements may help prevent muscle loss in breast cancer survivors, according to University of Queensland research. Chronic inflammation, which causes a breakdown in muscle tissue, may cause muscle loss. Fish oil interferes with the inflammation, reducing its effect.

Source: Medical News Today
April 12, 2011

Protecting plants with venom

A scorpion's sting should be avoided, we all know. But Michigan State University researchers are tapping into the venom to create insecticides that protect plants from bugs. Scorpion venom attacks various channels and receptors that control their prey's nervous and muscular systems. Identifying how and which channels the venom attacks could help researchers develop insecticides that control pests, particularly those resistant to other pesticides.

Source: Medical News Today
April 28, 2011



Switchgrass lite

A native perennial grass strain could become a feedstock for ethanol production. Samuel Roberts Noble Foundation researchers produced a switchgrass variety with reduced lignin. The new strain is more easily converted to biofuels and requires fewer costly additions during fermentation than conventional switchgrass. Oak Ridge National Laboratories tests showed the new strain produced about one-third more ethanol.

Source: Biobased News
February 2011

Frosting on the canola

Eat your cake and feel good about it. Richardson Oilseed Limited of Winnipeg has developed icing shortening made from canola, which has the lowest saturated fat among vegetable oils. Ice-It is a non-hydrogenated shortening for icings, cake fillings, decorations and other ready-to-use confections. The company previously introduced canola-based popcorn popping oil, toppings and margarine.

Source: Soyatechnews.com
May 2, 2011

Pass the bamboo

Known for its fiber and industrial uses, bamboo could be the new health food. Researchers at Punjab University in India found that young bamboo shoots are rich in nutrients, mainly proteins, amino acids, carbohydrates, minerals and fiber. Low in fat and sugar, bamboo may also have antioxidant and cancer-fighting attributes. Worldwide, more than 2 million tons of bamboo shoots are consumed annually, primarily in Southeast Asia.

Source: Nutraingredients.com
May 2, 2011





It's all about experience

BY TERESA SPAETH

The older we get, the more we realize there is no substitute for experience. Reading or hearing about something is a poor substitute for doing it. Hands-on experience is difficult to replicate.

As parents, we try to impart years of experiences and wisdom on our children to help them avoid road bumps. But sometimes they learn the hard way. And while it's difficult to watch mistakes, the lessons have more impact.

AURI's greatest strength is wisdom from years of experience. Our staff of scientists, project directors and administrators have worked for decades to develop innovative uses for agricultural products, improve processes and identify trends. Their understanding comes from working hands-on with agri-processors, businesses and

entrepreneurs who are in the field, forging new enterprises and opportunities. Not all have been successful, but each venture yields knowledge.

AURI has worked with thousands of businesses in hundreds of Minnesota communities to create economic activity through innovative agriculture. The knowledge we have gained makes us better able to assist with the next opportunity that comes along.

Our experience has taught us many things, but it hasn't dampened our desire to learn more. Circumstances and opportunities change so it always feels like the learning curve is on an upward track. That is a good thing because the more we learn the better able we are to help lead agricultural innovation from idea to reality. ■

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



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

Project proposals are evaluated on the following criteria:

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

Programs are designed to assist with:

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

Assistance may include:

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

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

AURI Facilities

AURI operates several laboratories:

- Coproducts Utilization Laboratory and Pilot Plant, Waseca
- Fats and Oils Laboratory, Marshall
- Meat Laboratory, Marshall
- Product Development Lab, Crookston
- Fermentation and Chemistry Lab, Crookston

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AURI AG QUIZ

1. AURI's Rural Cooperative Development Center can help co-ops in communities under what population?

- a. 2,500
- b. 100,000
- c. 50,000

2. About how many acres of Minnesota farmland benefit from NAFMicro fertilizer?

- a. 150,000
- b. 10,500
- c. 99,000

3. What kind of technology could provide a big boost to biomass utilization?

- a. Degerming
- b. Dewatering
- c. Denaturing

4. About how many ag-related cooperatives exist in Minnesota?

- a. 45
- b. 100
- c. 450

About how long has it taken to develop E-Z Tarp from idea to marketable product?

a

9 MONTHS

b

3 WEEKS

c

2 YEARS

5. While conducting cattle feed trials related to E. coli, what unexpected results came from adding glycerin to feed?

- a. Beef tasted like chicken
- b. Cattle performance improved
- c. Cows lost weight

7. About how long has it taken to develop E-Z Tarp from idea to marketable product?

- a. 9 months
- b. 3 weeks
- c. 2 years

8. What does it cost to dispose of E-Z Tarp when it is finished protecting grain piles?

- a. 4 cents a pound
- b. Nothing because it is food-grade
- c. \$10 a ton

9. What two workshops does Kindred Kitchen offer to help north Minneapolis food entrepreneurs?

- a. Know Your Current Events and Know Your Cuts of Meat
- b. How to Succeed in Business Without Really Trying and Grapes of Wrath
- c. Know Your Product and Know Your Plan

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

ABOUT AG INNOVATION NEWS

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Demand is soaring for Benson company's ash fertilizer



BY DAN LEMKE

Benson, Minn. — North American Fertilizer is AURI's 2011 Ag Innovator of the Year. The award was presented at a June 16 AURI board of directors luncheon in Benson.

AURI annually honors a Minnesota company that has used AURI services for an innovative product or process, uses significant amounts of agricultural commodities or coproducts and has achieved marketplace success.

North American Fertilizer annually sells more than 100,000 tons of NAFMicro, an ash fertilizer. NAFMicro is derived from poultry manure incinerated at nearby Fibrominn, a 55-megawatt electricity plant powered by a half-million tons of turkey and chicken litter.

Steve Miller (at left), North American Fertilizer general manager, says the Benson company annually sells more than 100,000 tons of ash fertilizer, applied to 150,000 acres of Minnesota farmland. The ash is derived from nearby Fibrominn, an electrical plant powered by poultry litter.



While nitrogen in the litter is consumed by combustion, other nutrients and minerals remain in the ash, including sulfur, zinc, copper, magnesium and boron. These micronutrients provide a local fertilizer source.

"NAFMicro is the only product of its kind in the U.S.," says Steve Miller, North American Fertilizer general manager. Because it is a unique product, "one of the initial challenges was to instill confidence in the dealer and end user that the product was everything it claimed to be."

AURI assisted with testing the fertilizer that now generates more than \$10 million in annual retail sales, and is applied to roughly 150,000 acres of Minnesota farmland. Because of repeat customers and limited quantities, demand for NAFMicro has outpaced supply.

Miller attributes the company's success to investing in nutrient analysis and daily quality control tests and working with respected, knowledgeable companies. NAF had to develop the handling, distribution and application process from scratch because there was no model to follow.

NAF's "innovative spirit" and paying attention to detail earned it the Ag Innovator of the Year award, says Teresa Spaeth, AURI executive director. "North American Fertilizer is a great example of a company taking an ag-processing coproduct and turning it into a business that is creating jobs and economic activity in rural Minnesota."

"We present this award to draw attention to the contribution innovative ag-based companies are making," Spaeth says, "not only to agriculture, but to the economy of the whole state."

"With so many great companies working tirelessly to create whatever edge they can," Miller says, "to be considered as Ag Innovator of the Year is indeed an honor." ■

PHOTOS BY ROLF HAGBERG