



# Ag Innovation News

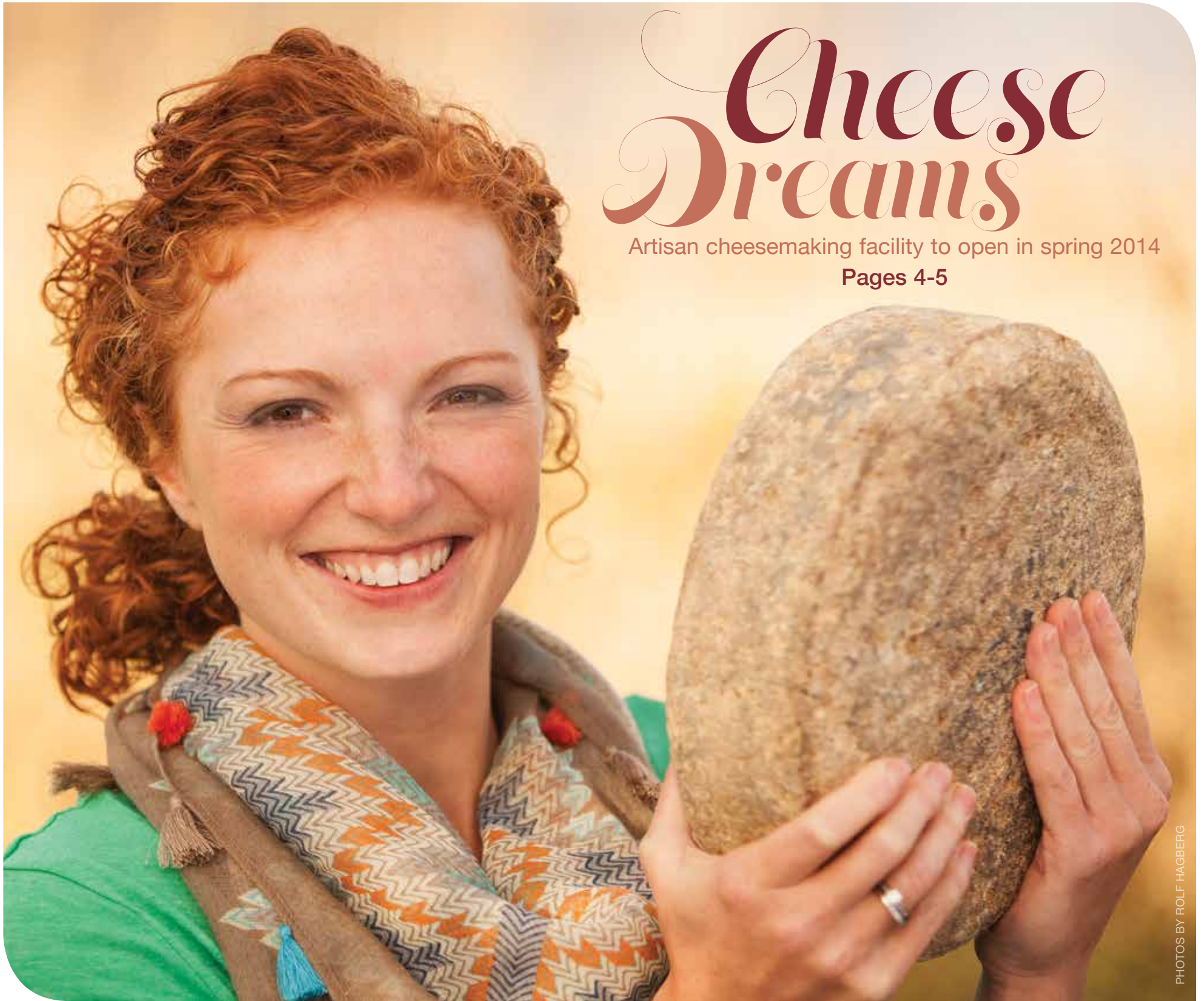
Jan-Mar 2014, Vol. 23, No.1

The newspaper of the Agricultural Utilization Research Institute

## Cheese Dreams

Artisan cheesemaking facility to open in spring 2014

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PHOTOS BY ROLF HAGBERG

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Pigs fed wet distillers grains in liquid diets performed well

# BETTER WETTER

Findings benefit both pork and ethanol industries

BY LIZ MORRISON

In the old days, pigs were fed slops, a watery slurry of kitchen scraps and grain. Now, “slops” — or liquid feeds — are coming around again, as pork producers seek new ways to use low-cost ethanol coproducts.

A recently completed study, sponsored by AURI, the Minnesota Pork Board and the Minnesota Corn Research & Promotion Council, examined the effects of feeding pigs liquid rations containing wet distillers grains and solubles. The trials found that pigs fed liquid diets grew just as well as pigs fed conventional dry feed.

The research could help both hog farmers and the ethanol industry save money, says Denny Timmerman, AURI senior project development director. Hog producers could feed less-expensive wet ingredients without sacrificing performance. The ethanol industry could gain a larger market for wet coproducts, cutting energy use and drying costs.

The project also demonstrated the use of a versatile liquid feed system — new to Minnesota — which allows producers to handle lower-value wet feedstuffs.

## DDGS an important swine feed

Dried distillers grains with solubles, or DDGS, are a common ingredient in swine rations. About 12% of the nation’s 32 million metric tons of distillers grains were fed to pigs last year, according to the Renewable Fuels Association.

Cattle producers often feed wet distillers grains, which typically cost about one-third as much as the dried product, says Trevor Kallop, a merchandiser for Renewable Products Marketing Group, Shakopee, Minn. Most U.S. hog farmers aren’t set up to handle high-moisture feedstuffs, but interest is growing as pork producers cope with tight profit margins, says Alan Doering, AURI coproducts scientist.

Past research suggests that liquid feeding can increase feed intake and growth in newly-weaned baby pigs, leading to improved health, says Sam Baidoo, a livestock scientist at the University of Minnesota, who led the research trials. “Pigs are slop eaters!” And in hot weather, pigs eat liquid feed more readily than dry feed.

Liquid feed also has environmental advantages. It reduces nitrogen excretion and cuts the amount of dust in the barn, a respiratory benefit for both pigs and workers.

Liquid swine feeding does pose challenges, Baidoo says. The nutrient content of alternative feed ingredients often varies more than dry feeds. Wet feeds are more perishable, complicating logistics and storage. And the ratio of dry matter to liquid in the ration must be carefully controlled to make sure pigs get enough nutrients for optimum growth.



A new study compared three liquid diets with three dry diets in wean-to-finish pigs.



University of Minnesota Livestock Scientist Sam Baidoo examines swine using the liquid feeding system.

## Six diets tested

The recent AURI feeding trials were performed at the University of Minnesota Southern Research and Outreach Center in Waseca. The study compared six diets — three dry and three liquid — on 480 wean-to-finish pigs. Treatments included:

1. Conventional corn and soybean diet
2. Dry diet with 30% dried distillers grains and solubles
3. Dry diet with 30% spray-dried concentrated distillers solubles
4. Liquid diet with 30% concentrated distillers solubles
5. Liquid diet with 30% wet distillers grains
6. Liquid diet with 30% wet distillers grains with solubles.

Guardian Energy, a 100-million-gallon ethanol plant in Janesville, Minn., supplied the ethanol coproducts. A modified Big Dutchman liquid feeding system was used to mix the rations with water and pump the thin slurry to individual feeding troughs.

The research found that “liquid feeding of ethanol byproducts did not negatively affect performance and carcass characteristics of wean-to-finish pigs,” Baidoo says. Key profitability measurements — including average daily gain, gain-to-feed ratios, and meat quality — were similar for all six treatments, he says.

## Cost savings the main benefit

An economic analysis of the diets is not yet available. However, the liquid formulations offer “significant feed cost savings with no performance penalty,” AURI’s Doering says.

The cost savings could extend to liquid diets containing other alternative feedstuffs, too, Baidoo says. In Canada, for example, swine facilities are often located near dairy plants to take advantage of cheese or yogurt processing byproducts such as liquid whey.

Likewise, ethanol plants could cut drying costs if demand for wet coproducts rises, Timmerman says. Currently, “the market for wet cake is very quickly saturated,” Kallop says. At Guardian Energy, for example, “We dry everything here because there hasn’t been a market for wet distillers grains,” says Dean Reder, chief financial officer. “If a market opened up, we’d be interested in looking at that.” ■

## ETHANOL COPRODUCTS

**Wet distillers grains:** Also called “wet cake.” The portion of the corn kernel that’s left after the starch is removed and fermented for ethanol. Wet distillers grains contain protein, fiber, fat, and about 35% moisture. The product has a shelf life of four or five days. It is fed primarily to cattle.

**Concentrated distillers solubles:** The concentrated residue remaining after fermentation. Distillers solubles are about 70% moisture and contains nutritious solids. They may be sprayed on wet distillers grains to produce distillers

grains with solubles (DGS) and can also be dried to produce dried distillers solubles (DDS). The market for distillers solubles is limited.

**Dried distillers grains with solubles:** Wet distillers grains that have been dried along with the concentrated distillers solubles to about 12% moisture. Dried distillers grains with solubles (DDGS) have a long shelf life and can be packaged and traded as a commodity.



PHOTOS BY ROLF HAGBERG



A modified Big Dutchman liquid feeding system was used to mix the rations with water and pump the thin slurry to individual feeding troughs.



### AURI and swine liquid feed trials

**Idea to reality:**

U.S. hog producers use large amounts of dried distillers grains with solubles (DDGS) in swine rations. There's interest in using liquid swine feeding systems, which would enable farmers to feed less-expensive wet or liquid ethanol coproducts. Farmers needed to know if feeding liquid ethanol coproducts would affect pigs' growth or meat quality.

**AURI's role:**

AURI sponsored feeding trials at the University of Minnesota Southern Research and Outreach Center in Waseca, Minn., which compared the performance of pigs fed liquid and those fed dry diets containing ethanol coproducts.

**Outcomes:**

Feeding ethanol coproducts in liquid diets did not reduce swine growth or meat quality. The research will help hog producers make informed decisions on the use of liquid ethanol coproducts. It will also help the ethanol industry expand markets for wet products, thereby cutting energy use and feed drying costs.

**Partners:**

University of Minnesota Southern Research and Outreach Center, Minnesota Corn Research & Promotion Council, Minnesota Pork Board, and Guardian Energy, Janesville, Minn.

## RESULTS OF LIQUID FEED TRIALS

The first of several AURI-sponsored liquid swine feed trials at the Southern Research and Outreach Center in Waseca found that:

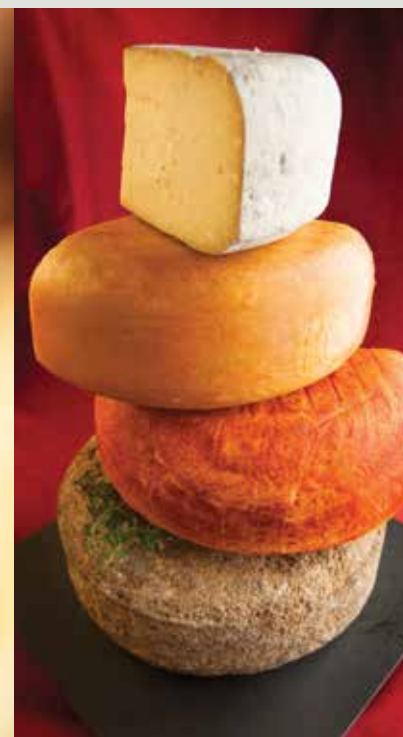
- Pigs that ate liquid feed gained just as much weight each day as pigs that ate conventional dry feed.
- Carcass weight and meat quality were similar for all the diets.
- Gain-to-feed ratios were similar for all the diets. (The gain-to-feed ratio is the amount of food an animal must eat to gain one pound.) However, subsequent trials at Waseca have shown a significant gain-to-feed advantage for liquid diets, says University of Minnesota livestock scientist Sam Baidoo, research leader. That lowers the cost of producing a pound of pork.
- Nursery pigs fed wet distillers grains and solubles gained more weight per pound of feed during the critical first two weeks after weaning than nursery pigs fed a dry diet.
- Pigs on the liquid diets consumed about half a gallon more water per day than pigs fed a dry diet.
- Pigs fed a liquid diet had healthier intestinal tracts.
- There was less spillage and wasted feed in the liquid feed groups.

“This research will help producers make informed decisions on the use of liquid coproducts in their wean-to-finish swine diets.”

— Dennis Timmerman, AURI

# Cheese Dreams

BY JONATHAN EISENTHAL



*Couple creates artisan cheesemaking facility on family farm*



PHOTOS BY ROLF HAGBERG



Alise Sjostrom (pictured above, left) has dreamed of owning a creamery since high school. Today she, her husband Lucas, and parents Jerry and Linda Jennisen (pictured above, right) are making that dream a reality.

Alise Sjostrom visited a creamery for the first time as a high school sophomore; she came home and said,

**“DAD, THIS IS WHAT I AM GOING TO DO WITH MY LIFE.”**

His response, “Keep working towards it.”

She did. In spring 2014, she and husband Lucas expect to begin production at their artisan cheese making plant in Brooten, Minn. Their business is called Redhead Creamery, after the predominant hair color of Alise and her sisters.

“Our facility will turn out 60,000 pounds of cheese a year, a combination of fresh cheddar cheese curds and aged cheddar cheese,” explains Alise. “It’s very exciting. And it’s kind of scary. We know exactly how much we have to sell to keep this thing going.”

They’ll make their product distinct with their own spice rub formulations. Eventually, they will also produce washed rind cheese varieties like Brie.

You couldn’t come up with a better place to launch a dream to be a cheesemaker—Alise grew up on her parents’ dairy farm. Jerry and Linda Jennisen own Jer-Lindy Farms, which has 170 cows and just over 200 acres of crops, allowing them to feed the herd with their own land. The cheese plant will be just 150 feet from the Jer-Lindy dairy barn.

In college, Alise continued to share her dream with all the important people in her life. As a freshman, Alise ran for Princess Kay of the Milky Way, the contest to represent the dairy industry, and suddenly signs popped up all over Stearns County, reading “Cheese Alise!”

“That was right when we started dating,” explains Lucas. “I barely knew this girl, but the whole county knew that she was ‘Cheese Alise’ and knew that she had this dream. At the time, I told her ‘It’s a great dream, but don’t get your heart set on it.’”

But then he watched her really go after it. She graduated with a dairy food quality degree and went to work at Grafton Village Cheese, a highly renowned American cheddar maker in Vermont. When Alise and Lucas moved to Wisconsin—he pursued his career in communications at Hoard’s Dairyman: “*The National Dairy Farm Magazine*” — she worked at Crave Brothers Farmstead Cheese, and while working there, completed a certificate with the Vermont Institute for Artisan Cheese.

“She’s well on her way to becoming a top dog in the cheese world,” enthuses Lucas. “The cheese plant is our investment for the future.” ■



# Entrepreneurs find creative **WAYS TO CONNECT** with potential funders and customers



## Redhead Creamery

*Online Kickstarter campaign*

## Nots! Snacks

*State and national competitions*



Lucas and Alise Sjostrom, Redhead Creamery, with their daughter Lucy

Entrepreneurs discover that inventing their own unique pathway to success is part of inventing their business. They draw inspiration from the tales of other unusual business successes, and in turn become inspirations for the next great ideas.

Redhead Creamery has been the dream of Alise Sjostrom since she was 16 and toured a creamery for the first time. At 28, she and husband Lucas are due to break ground this winter on their own cheesemaking facility, thanks in part to a successful Kickstarter campaign ([kickstarter.com](http://kickstarter.com)). The Sjostroms earned \$42,000, about 10 percent of their startup costs, although there are also expenses that came with the campaign.

The idea started when Lucas read a *New York Times* article about Kickstarter and thought, "This is genius!"

"I thought that if we ever did start this business, Kickstarter would be the perfect thing for us," Lucas says. "In the meantime, I did a lot of research about what a campaign would look like and how many people we would need. We were surprised by how successful it was. We reached our goal eight days early. I got almost exactly how many people I thought we would. I set a goal of 500 contributors, and we reached 499. We were very pleasantly surprised."

The site of the future creamery is the farm site where Alise grew up and the young couple now lives with their daughter Lucy; Alise's parents, Jerry and Linda Jennisen, continue to operate the dairy farm.

"The beautiful thing about a Kickstarter campaign is that we didn't need to give up any equity," says Lucas. "We thought about an investor model at first. During the Kickstarter campaign, we even got offers from people willing to contribute in order to own part of the creamery, but the problem is that we have the house, then 150 feet away from that we'll have the creamery and 50 feet away from that we'll have the barn. To have part owners of all of those things just didn't seem right."

Kickstarter allows entrepreneurs to exchange products that aren't created yet for the financial contributions. Contributors gave money in exchange for an assortment of gifts, including cheese boards and knives, parcels of cheese curds or aged cheddar to be delivered once production has begun. Those at a higher giving level earned a dinner on the farm.

"Crowd funding is a great way to get started because we know there's demand out there before we take on a huge amount of debt," explains Lucas. ■



Rob Fuglie, founder of Nots! Snacks

There seem to be as many ways of raising a business' public profile as there are businesses. Nots! Snacks — a gluten-free, non-nut snack with the crunch and savor of nuts — was a semifinalist in the Minnesota Cup contest ([breakthroughideas.org](http://breakthroughideas.org)). The contest offers cash prizes in six categories, as well as a \$40,000 grand prize, to support and accelerate the development of breakthrough business ideas.

"Getting that far in the Minnesota Cup offered validation—proof of concept. If you get local experts agreeing that you've

got a good model and that you are on the right path, it's a real boost," explains Rob Fuglie, the founder of Nots! Snacks. "But even more importantly, the people who have invested in you and support you see that business experts believe in what you are doing."

In addition to the Minnesota Cup competition, Fuglie discovered the Intuit Small Business Challenge, a contest run by the accounting software company. The prize: a commercial during the Super Bowl for your small business. In between production runs, Fuglie spent 10 hours crafting a video for the contest entry.

"People ask me all the time if I am going on 'SharkTank' — I guess that says something about the public's interest in the product and our development," says Fuglie, speaking of a popular TV show where small business owners pitch a group of potential investors who can take their business to the next level.

Scrappy, do-what-it-takes stories like these become tools at AURI as they advise other clients.

"They came up with the idea of using these incredible tools on their own," explains Becky Philipp, AURI project manager, about Redhead Creamery and Nots! Snacks. "But going forward, we'll make use of these stories. Once a project has received approval assistance from AURI, we offer networking and other ideas in our toolbox to help move their work plans forward. So when we hear about really cool things our clients are doing, we take these stories and pass the ideas along where they make sense." ■

"There are about 10 different crowdfunding options like Kickstarter out there," according to Jen Wagner-Lahr, AURI's senior director of innovation and commercialization. "Crowdfunding makes sense for a company that has an interesting story to tell or a unique marketing angle — those types of things go well with Kickstarter. The entrepreneur has to be out there talking about it, getting it moving."

More resources on crowdfunding can be found at [entrepreneur.com/article/228534](http://entrepreneur.com/article/228534).

# New milk meter

## Faster, cheaper lactose test benefits dairy processors

BY LIZ MORRISON

A cheap, reliable test for monitoring blood sugar in diabetics is being put to a new use — measuring milk sugar.

Research sponsored in part by AURI has made it practical for dairy processors to use blood glucose meters to test the lactose content of milk products. Lactose, a type of sugar, affects dairy food characteristics and quality. The new rapid test replaces a slow, expensive lab test, saving processors significant time, money and training.

“Anything we can do to help milk processors improve profitability is an advantage for agriculture,” says Jen Wagner-Lahr, AURI senior director of innovation and commercialization. Dairy products are Minnesota’s fourth largest agricultural commodity. And many of Minnesota’s 39 dairy processing plants are farmer-owned, Wagner-Lahr adds.

The rapid lactose test was developed at the Midwest Dairy Foods Research Center at South Dakota State University in Brookings. The Research Center, supported by checkoff dollars, is a consortium of food scientists from Minnesota, South Dakota, Iowa, Nebraska, Missouri and Kansas. The Center’s industry-focused research program is driven by the real-world needs of milk processors, Wagner-Lahr says.

Dairy processors routinely test for lactose, a major component of milk. Accurate lactose measurement is important in the manufacture of cheese and whey products, as well as lactose-free products, says dairy scientist and Center Director Lloyd Metzger, who led the research. The industry has been using complex lab tests that require skilled technicians and expensive instruments. “The dairy industry wanted a simple, quick and cost-effective method that could be done at the processing level, rather than in the lab.”

“Getting applied research and new technology like this into the hands of processors is critical to a strong future for the dairy industry,” explains Mary Wilcox, Midwest Dairy’s vice president for business development-manufacturing and research. “We’re excited to give processors a reliable, faster and more affordable option for this critical testing.”

### Tech transfer

Blood glucose meters for diabetics — developed after decades of extensive research and clinical trials — are inexpensive and reliable. They are also user friendly, quick, and need only a small sample. Metzger reasoned that a device for measuring sugar in blood — a very complex fluid — could also measure sugar in milk.

The dairy industry has borrowed other tools from the medical sector, Metzger says, such as the membrane filters used to separate and concentrate milk proteins. “It’s a matter of adapting the technology for use in the dairy industry.”

In a series of trials, Metzger and his colleagues developed a simple enzymatic process to convert milk lactose into glucose. Then they used a ReliOn Ultima blood glucose meter and test strips from Wal-Mart to measure the glucose concentration in the sample. Metzger also developed a standardized chart to convert the glucose reading back to lactose.

The new method — validated in subsequent trials — is simple and requires minimal training to perform, Metzger says. It costs less than \$0.50 per sample, and the results are available in a few minutes.

That’s a huge savings in time and money over the standard lab tests, says Suvash Kafley, research director of Eden Prairie-based Milk Specialties Global, which makes milk protein and whey-based food ingredients. Milk Specialties operates dairy processing facilities in Minnesota, Wisconsin and other states.

The company’s dairy plants generally don’t have on-site labs, so they send samples to an outside lab, then wait 7 to 14 days for the results. The cost can run as high as \$140 per sample, he says. Even processors with an in-house lab spend a significant amount on lactose tests — about \$15 per sample, not counting the cost of the lab and instruments — and wait several hours for results, Metzger says. Because of this time delay, those test results can’t be used to monitor or adjust the current batch of dairy products, a big disadvantage for process control.

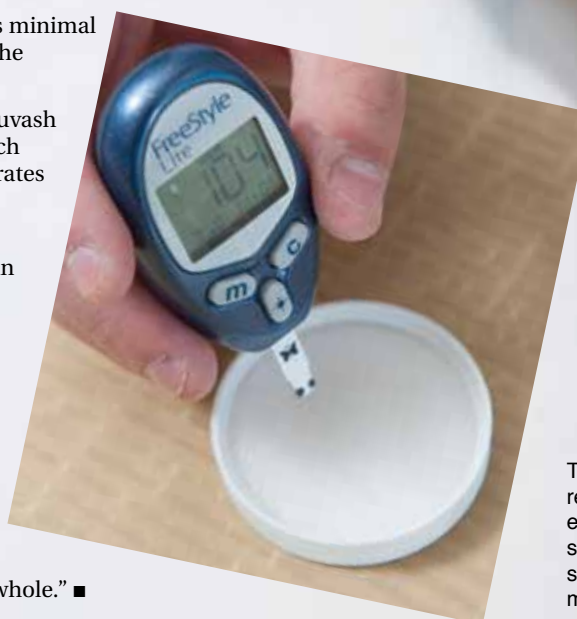
Milk Specialties is now testing the rapid glucose method in some of its plants, and eventually expects to use it in all its facilities. The new test has the capacity to improve both product quality and processing efficiency, Kafley says.

“We see a lot potential, not just for our company, but for the industry as a whole.” ■



A blood glucose meter can now be used to test the lactose content of milk products.

104 mg/dc  
 $\frac{104 \text{ g}}{1000} / 100 \text{ mL}$   
= .104%



The new rapid test replaces a slow, expensive lab test, saving processors significant time, money and training.

PHOTOS BY ROLF HAGBERG



PHOTOS BY ROLF HAGBERG



## Research aids Minnesota's dairy manufacturing

AURI has worked with the Midwest Dairy Foods Research Center on a variety of research to improve the safety, quality and profitability of processed dairy products, including:

- Low-salt cheese for school lunch programs.
- Technology to pasteurize whey beverages.
- Manufacturing techniques for making extruded puffs and crisps from high-calcium nonfat dry milk.
- New ways to clean and maintain the membrane filters used in cheese processing.
- Natural antifungal substances to deter mold growth in shredded cheese.

## Minnesota's dairy industry at a glance

Minnesota, the seventh largest dairy producing state, has 3,952 licensed dairy herds and 39 dairy processing plants. The state's dairy sector annually produces:



**460 MILLION**  
pounds of food-grade dry whey



**670 MILLION**  
pounds of ice cream



more than  
**1 BILLION**  
gallons of milk



**\$1.8 BILLION**  
in annual milk sales



**4.7 BILLION**  
pounds of cheese

Sources: Minnesota Agricultural Statistics Service, Midwest Dairy Association



Kyle Kramer with Milk Specialties Global works on the new lactose test, using a simple enzymatic process to convert milk lactose into glucose; Kramer then uses a standardized chart to convert the glucose reading back to lactose.



### AURI and Midwest Dairy Foods Research Center

**Idea to reality:**

Dairy processors needed a faster, cheaper way to determine the lactose content of milk.

**AURI's role:**

AURI partnered with the Midwest Dairy Foods Research Center to develop a rapid lactose test using an inexpensive blood glucose meter.

**Outcomes:**

The new test procedure will save dairy manufacturers time and money and will improve product quality and processing efficiency. It is now being used in commercial plants.



# Implementation is key to seizing opportunity

BY TERESA SPAETH  
AURI EXECUTIVE DIRECTOR

The artist Pablo Picasso once said that "Action is the foundational key to all success." The *Minnesota Agbioscience Strategy* report by the world-renowned Battelle Technology Partnership Practice (see story on pg. 9) makes it clear that there is opportunity and capacity for our state to be a global leader in agbioscience (agriculture and the associated biosciences), resulting in high-paying jobs, a revitalized rural sector and continuing prosperity and growth. However, action is necessary to take advantage of this opportunity.

Over the years, there have been many reports by reputable organizations as to various opportunities the state and region could seize. But too often these reports have ended up sitting on shelves, or have committees formed to discuss the reports, but no progress is seen. At AURI, we have a laser-focus on implementation. It's how we help our clients take their ideas through to reality. It's how we ensure that research is applied in the marketplace. And we're going to apply that experience in implementation to this strategy recommended by Battelle.

So what does implementation look like? The exact shape of how we make these ideas reality is still taking shape, but a few things are clear.

## COLLABORATION,

which is a critical component to the success of so many projects, will be instrumental to this implementation. For Minnesota to take full advantage of the recommended strategy, it requires far more than AURI can do alone. This is why we're having conversations with policymakers, farm organizations, commodity groups, higher education and many others as to their roles in the implementation.

## NETWORKING

Battelle pointed out that there are many great things happening in the agbioscience arena in Minnesota, but to capture the potential, activities and information should be better coordinated and shared. Collaboration and networks of people will be essential; therefore, AURI has contracted with Minnesota Rural Partners to conduct a network mapping survey focusing on roles and connections that individuals and organizations currently have in agbioscience in Minnesota.

## LEADERSHIP

AURI's strategic leadership team is looking at how AURI can align our focus and priorities with the platforms and opportunities identified by Battelle, so that we can best position our work to help Minnesota succeed.

## MEDIA

We will continue to share updates on the implementation via this newspaper, our website ([auri.org](http://auri.org)), Facebook, Twitter and more. I want to thank the report's steering committee members, whose input has been essential in getting us to a final report, and many of whom are committed to helping see us through to implementation. The steering committee list is at the end of this column.

As Picasso said, action is key to success. And at AURI, we are dedicated to helping ensure Minnesota's future as an agbioscience leader. ■

### BATTELLE'S AGBIOSCIENCE STRATEGY REPORT STEERING TEAM

- Farmers Union Industries
- First Green Partners
- Fredrickson-Byron
- Glenmore Consulting
- Midwest Dairy Association
- Midwest Dairy Foods Research Center
- Minnesota Agri-Growth Council
- Minnesota Corn Research & Promotion Council
- Minnesota Department of Agriculture
- Minnesota Office of Department of Employment and Economic Development
- Minnesota Office of Higher Education
- Minnesota Soybean Research & Promotion Council
- MnSCU
- Minnesota Turkey/Chicken and Egg Association of Minnesota
- University of Minnesota
- USDA Agricultural Research Service



PHOTO BY ROLF HAGBERG



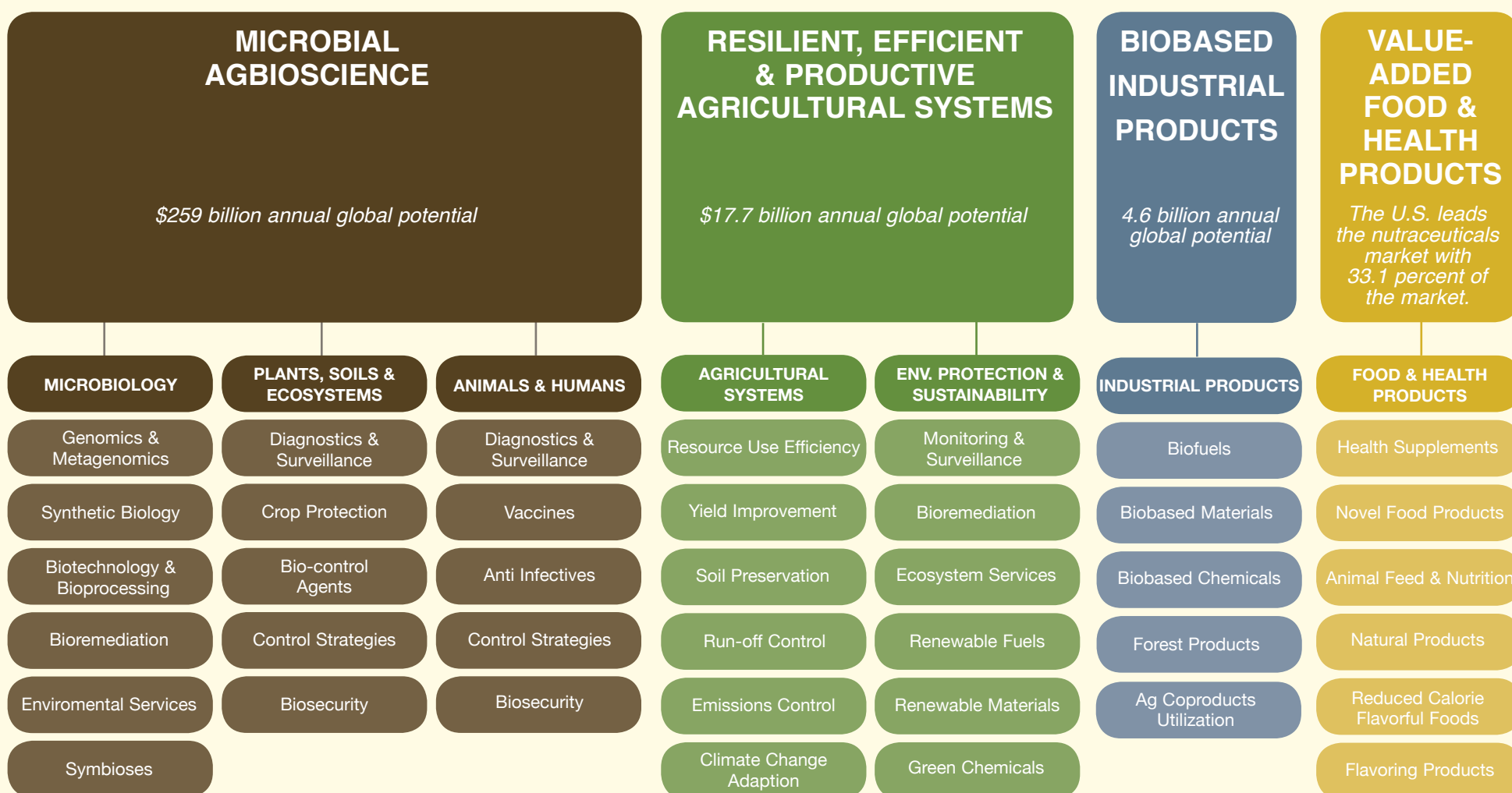
# Transforming “WHAT IS” into “WHAT’S NEXT”



A new report out shows that Minnesota's economic future may well be rooted in its historic leadership in agricultural production. *Agbioscience as a Development Driver: Minnesota Agbioscience Strategy*, was done by the world-renowned Battelle Technology Partnership Practice and includes an assessment of Minnesota's key capacities and opportunities in agricultural research and a suggested strategy for the state. The study was commissioned by AURI, the Minnesota Corn Research & Promotion Council and Minnesota Soybean Research & Promotion Council.

“This initiative is about creating a vision and strategy to transform Minnesota's fundamental strength in agriculture into leading-edge innovation and economic growth for the state,” says AURI Executive Director Teresa Spaeth. “This is an honest and detailed assessment of the critical resources we already have in place in Minnesota—and how we can leverage them into agbioscience leadership both nationally and internationally, resulting in economic growth and new jobs in the state.”

Battelle interviewed more than 100 individuals across Minnesota including university faculty, researchers and research administrators as well as professionals in applied research, technology transfer and economic development. The Battelle study identified four key ag-based bioscience research platforms for Minnesota:



For the identified technology platforms, a more detailed strategic investment plan will be developed, involving:

- Research and development enhancements required, including specific niches to pursue and types of faculty to be recruited;
- Technology infrastructure investments; and
- Specific “connecting” activities to bring industry and research players together.

AURI is now working with the University of Minnesota, MnSCU, the state's 14 research and promotion councils and other stakeholders to identify the most promising agricultural research needs, and begin aligning the people and places necessary to capitalize on these opportunities.

“By having a strategic and targeted approach to agbioscience development in Minnesota, we can make better use of resources, create collaborative public-private partnerships, attract more research and grant dollars

into the state, and accelerate the transfer of research into commercialization,” Spaeth says. “Ultimately, this initiative will lead to new businesses and economic growth for Minnesota—all founded in our state's proven success in agriculture.” ■

To read the full report, visit [auri.org](http://auri.org).



# Biobased Generations

BY DOUG ROOT, PH.D., SENIOR SCIENTIST OF BIOMASS & RENEWABLE PRODUCTS TECHNOLOGIES



Fifty years ago many of the toys and presents under the Christmas tree were made of wood, cotton, wool and other familiar materials. Stacking blocks, baseballs, small log houses, rag dolls, knitted sweaters, and stuffed animals were largely composed of materials grown or produced on the land, often referred to as biobased materials. Just a few years later, we saw a rapid change to toys and other products made from modern plastics using petroleum and minerals extracted from under the land.

Today, the growing excitement is around the second generation of biobased materials produced by modern chemistry and using agricultural and forestry products. The modern vision is for biobased materials that are less expensive, better performing, and more durable than the petroleum-based materials that currently dominate the marketplace. There are several successful modern biobased materials including rayon and polylactic acid. Each of these has found profitable uses in today's marketplace, and both have significant Minnesota connections.

Rayon has been around in a useful form for more than 100 years. The viscose process that is used to make rayon from wood pulp has caused significant environmental concerns,

and the alternative processes have been even greater sources of concern. Most of the world's rayon is produced in Southern and Southeastern Asia. However, wood pulp for the viscose process is now grown and processed in Cloquet, Minn., where more than 1,000 tons per day comes from the Sappi Fine Paper plant.

Polylactic acid (PLA) has more modern origins. In the 1980s and 90s, Cargill established a pilot plant in Savage, Minn., for PLA, which is created by converting corn starch into a useful polymer; the plant produced 500 metric tons of PLA per year while the applications and markets for this new material were developed. Full-scale production moved to a much larger facility in Nebraska in 2002, and additional plants are expected to come on line in Asia in the coming years.

AURI has found many entrepreneurs creating new biobased materials in our state. Most of the concepts have solid research foundations and are facing the difficult task of bringing new materials into commercial manufacturing and consumer markets. Similar efforts to bring new materials from new "green" chemistry are underway around the world.

Biobased products are one of four areas of focus for AURI, where a small team meets regularly to look forward to the next generation of biobased materials and to identify opportunities to assist those entrepreneurs working to develop these materials in Minnesota.

We still use that first generation of biobased materials—wood, wool, cotton, linen, and many other products of agriculture. And the plastics and petroleum-based chemicals that we currently use will not disappear, but, gradually, we will find more opportunities to create fabrics, paints, solid goods and more from agricultural materials. AURI has the "best seat in the house" to recognize the new materials at the earliest opportunity and to assist in bringing the "greenest," least costly and most functional materials into the products we use every day. ■

## ELSEWHERE IN AG INNOVATIONS

BY ASHLEY HARGUTH

*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.*



### Eye-tracking technology

The National Pork Board has conducted eye-tracking research to determine what consumers look at while buying meat and for how long. The research also identified which images and messages resonate best with shoppers.

The results show that images of whole cuts of pork attract consumers' attention quickly. Consumers also prefer signs that don't include people, as it distracts them from focusing on the meat image. Based on the approximately three seconds of attention that signs get in grocery stores, the meat image may never be looked at when people are included in the photograph. Additionally, clear call-to-action taglines fared better than brand taglines in terms of participant preference.

meatingplace.com, July 2013



### Making ice cream more nutritious

Meat industry leftovers can contain animal proteins and lipids that have, until now, been underutilized. Turning the lipids into biodiesel has proven too expensive and currently only 22 percent of the proteins are converted into feed. A process that uses enzymes to digest food leftovers and convert them into proteins known as hydrolyzates is being further looked into in Europe. This technology is being tested in a Belgian food company. They are hoping to enhance the nutritional quality of those protein hydrolyzates, already sold in dietary, health and sports food supplements. One of the project partners, Mobitek-M, which is a Russian company that specializes in production of protein-enriched food stuffs, is also planning on including these products in ice cream.

Sciencedaily.com, May 2013



### Follow the way with soy-based traffic paint

Next time you see fresh, white traffic stripes on the road, it might be BECKOSOL Traffic Paint, made with soy oil. Researchers recently developed this water-based paint that offers ease of application, high gloss, excellent flow and leveling, and durability similar to traditional traffic coatings.

United Soybean Board, May 2013

### Stopping wheat loss

A common problem in wheat is preharvest sprouting (PHS) and researchers at Kansas State University and the USDA-ARS are working to combat that problem. The researchers found and cloned a gene in wheat that prevents the plant from sprouting too early.

The finding will be most beneficial to white wheat production, which loses \$1 billion annually to preharvest sprouting.

Soyatech.com, August 2013

## AURI'S CORE FOUR QUIZ

How much do you know about AURI's core four areas: food, renewable energy, coproducts, and biobased products? Take the below quiz.

### Food Products

About how many eggs does Minnesota produce each year?

- a. 2.9 billion
- b. 2.6 million
- c. 98 million
- d. 8.2 billion

Answer: a

### Renewable Energy

This process produces gas from carbon-based materials by reacting with the material at high temperatures without combustion, with a controlled amount of oxygen.

- a. Digestion
- b. Carbonization
- c. Gasification
- d. Oxygenization

Answer: c

### Coproducts

Glycerin is a byproduct of what type of production?

- a. Ethanol
- b. Milk
- c. Corn syrup
- d. Biodiesel

Answer: d

### Biobased Products

Swheat Scoop cat litter is made from what agricultural commodity?

- a. Camelina
- b. Wheat
- c. Corn
- d. Alfalfa

Answer: b

## ABOUT AURI

The Agricultural Utilization Research Institute (AURI) helps develop new uses for agricultural products through science and technology, partnering with businesses and entrepreneurs to bring ideas to reality. AURI staff are skilled to walk clients through the entire development journey of bringing a new product or process from idea to reality.

### Service Areas: What We Provide

#### Applied Research and Development

Through practical, applied research we identify emerging opportunities to add value to agriculture products. This information is publicly available in order to help entrepreneurs and businesses generate ideas for new products and processes.

#### Innovation Networks

When deciding the feasibility of a new product or process, it is critical to have access to industry experts and a science-based network of people. With a broad range of networks, AURI can help bring together the right people at the right time.

#### Hands-on Scientific Assistance

Scientists are available to provide consulting and technical services in the areas of:

- Product and process development
- Product evaluation and testing
- Sourcing materials, equipment and services

Labs are available to clients for hands-on testing and development.

#### Learn More

- Contact one of the AURI Offices to speak with a project development director about your business.
- Visit [auri.org](http://auri.org) to see the latest research and learn about upcoming events.
- Sign up to receive the *Ag Innovations News* or the AURI electronic newsletter to stay informed about AURI projects and clients.
- Follow AURI on Facebook and Twitter to get notices about new research, upcoming events, where to find AURI at tradeshow and much more.

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PHOTO BY ROLF HAGBERG

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*Ag Innovation News* is published quarterly by the Agricultural Utilization Research Institute to inform the food, agriculture and business communities and the general public about developments in innovative agriculture.

Electronic pdf copies of current and previous *Ag Innovation News* issues are available on the website: [auri.org](http://auri.org).

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## New fundraiser features **MINNESOTA** products



it was made in Minnesota, and it was the healthy side of things, too," says Smude, who is the owner of Smude's Sunflower Oil.

"We met so many [other entrepreneurs] at all the shows we've done, and everyone has the same story—how do you get people to know about your product?" Smude thought this would be a good opportunity for those small businesses, and contacted each of those he had met. In addition, the focus is on dry products so organizations don't have to worry about keeping products cold. The fundraiser now includes a variety of products, from food and lotions to fishing lures and notecards.

Breaking into the fundraising market can be a challenging one as there are several "big fish" that have a corner on the market, but Smude is relying on the strength of a unique product that resonates with people who like to have their money stay in the state. He has had his first clients this fall, which included Boy Scouts and FFA chapters, and he has heard positive reviews. One customer told him: "That's so neat; the money stays within the state."

*Learn more at [mnfundraiser.com](http://mnfundraiser.com).*

Fundraisers seem to be a part of Minnesota culture; from schools to extracurricular clubs to volunteer firefighters, the tradition is a necessary part of funding models for many nonprofit organizations.

Entrepreneur Tom Smude, who created Smude Oil, thought that Minnesota-made products may be intriguing to consumers. "We thought people would appreciate that



Smude's Fundraiser features all Minnesota-made products.