



# Ag Innovation News

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The newspaper of the Agricultural Utilization Research Institute



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PHOTO BY ROLF HAGBERG



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# AURI announces new board directors

## NEW AURI BOARD MEMBERS

BY ASHLEY HARGUTH

The board of directors of the Agricultural Utilization Research Institute welcomed two new directors at its regularly scheduled February meeting. The new directors are:



### John Schafer

Minnesota Beef Council

Schafer raises Hereford cattle and crops in Buffalo Lake, Minnesota. "I'm honored to be elected to serve on AURI's board of directors. AURI's resources are vital to nurturing rural Minnesota's future economic growth. I look forward to doing what I can to help AURI fulfill its mission," said Schafer.



### Jill Zullo, Ph.D.

Agribusiness

Zullo is the technical director for corn milling at Cargill. Her responsibilities include: leading the development and execution of the technology strategy across corn milling product lines, managing and coordinating the technology enabled project portfolio including both high performance and customer-focused innovation projects, and providing functional leadership for corn milling technical talent to build a high performing technical organization. Zullo graduated from the University of Minnesota with a bachelor's degree in biology and received her Ph.D. in Food Technology from Iowa State University.

## ADDITIONAL AURI BOARD MEMBERS



### Ron Obermoller, Chair

Minnesota Soybean Research & Promotion Council

Obermoller is the fourth generation to run his family's 900-acre corn and soybean farm near Brewster, Minnesota. He is active in the Nobles County Corn and Soybean Growers Associations and is a member of the Minnesota Corn Growers, National Corn Growers and Minnesota Soybean Growers Associations.

Over the years, Obermoller has also held various positions and served on boards with Green Prairie Cooperative, Minnesota Soybean Processors, American Coalition for Ethanol, Minnesota Agriculture and Rural Leadership and the National Biodiesel Board.

"After being on the board, I've been impressed with all the different ideas and dreams in Minnesota, and I believe AURI can make a positive difference," said Obermoller.



### Art Brandli

Minnesota Wheat Research & Promotion Council

Brandli has chaired several boards throughout Minnesota including a university advisory board, a local supply cooperative board, a statewide farm marketing cooperative board, the Wheat Research and Promotion Council, and a regional foundation. In addition, he chaired the national Wheat Foods Council and served on the U.S. Wheat Associates board. He also serves on a multi-state biotechnology board.

"I am impressed with the quantity and quality of support that AURI provides to stakeholders. AURI is a unique organization, staffed with highly talented individuals and a dedicated board. As a director, I appreciate the continuing challenge to help create value-added products for Minnesota agriculture," said Brandli.



### Rep. Debra Kiel

Minnesota House of Representatives

Kiel was born and raised on the family farm, south of Crookston, Minnesota. Along with her husband, Lon, they own and operate a wheat, soybean and sugar beet farm in Hammond Township. Rep. Kiel is currently serving her third term in the Minnesota House of Representatives. She is the Vice Chair of the Agriculture Finance Committee and also serves on the Aging and Long-Term Care Policy, Greater Minnesota Economic and Workforce Development Policy, and the Mining and Outdoor Recreation Policy committees.

Kiel stated, "What has really inspired me is the excitement and possibilities of what AURI can do with byproducts in Minnesota. As a commodity rich state, it's exciting to see all of the new ideas-from food products to ag-based fire retardants. AURI is helping businesses do their best."



### John Goihl, Secretary/Treasurer

Agribusiness

For more than 40 years, John Goihl has been a nutritionist and owner/president of Agri-Nutrition Services, a direct service company serving feed manufacturers, larger livestock producers, ranchers, and vendors to the feed and livestock industry. He also does nutritional consulting throughout the U.S. and world.

"Applied research has been part of my career interest since I was a 4-H and FFA member," said Goihl. "Using basic and applied nutrition research results and applying them to livestock production is part of being a livestock nutritionist. When the opportunity came along to represent agribusiness in Minnesota on the AURI board, I could visualize AURI being that vehicle to continue my interest in research and to assist different agriculture-related enterprises and/or small businesses in rural Minnesota."



### Sen. Matt Schmit

Minnesota Senate

Schmit is serving his first term in the Minnesota State Senate, serving District 21. He serves as vice chair of the Jobs, Agriculture and Rural Development Committee, and serves on the following committees: Capital Investment; Environment and Energy; and Finance-Environment. He earned his MPP from the University of Minnesota and a B.A. from St. John's University.



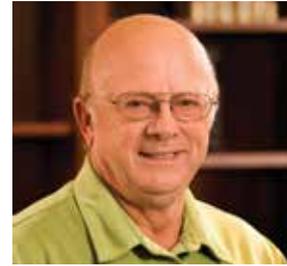
### Jerry Hasnedl

Minnesota Farmers Union

Hasnedl, a member of the Minnesota Farmers Union, resides on his 3,200 acre family farm in St. Hilaire, Minnesota. Hasnedl earned his degree in agricultural economics from Northland Community College before serving

in the U.S. Air Force. He served on the CHS (formerly Harvest States) Board of Directors from 1995-2014.

Hasnedl says, "In the short period of time that I have served on the board, I have been very impressed with the professionalism and passion of AURI employees. My assessment is confirmed every time an AURI client as they express or reflect on what AURI means to them and how we have played an important role in their business. As AURI helps these clients grow, we continue to fulfill our mission."



### John Gilbertson, Vice Chair

Minnesota Farm Bureau Federation

Gilbertson is from Puposky, Minnesota. Today, he, his son and grandchildren operate a cow-calf and backgrounding Angus herd.

"I wanted to serve on the AURI board because of who AURI'S clients are. I believe it is so important in this day and age to have an organization that works with agricultural entrepreneurs. I am excited about the changes that will be taking place because of consumer demands and the new opportunities they will create for agriculture," said Gilbertson.

**REDUCED-FAT  
DISTILLERS  
GRAINS...**

**A NEW WAY  
TO GROW A  
DAIRY HEIFER**

BY JONATHAN EISENTHAL

Research sponsored by Minnesota Corn Research & Promotion Council (MCRPC) and AURI indicates rations high in reduced-fat distillers grains (the high protein ethanol coproduct) fill the bill as a feed for young dairy heifers. It's economical, it's efficient, and dairy producers end up with a sturdy, lean replacement heifer.

Jill Anderson, a dairy scientist at South Dakota State University, Brookings, conducted a study with graduate student Angela Manthey in which they fed 48 dairy heifers three different levels of distillers grains rations: 30 percent, 40 percent and 50 percent. The remaining diet was a simple mixture of grass and hay, with added vitamins and minerals. Rations were limit-fed to target required nutrient intakes. The heifers were fed for the four months critical in the development of a dairy cow: from six-and-a-half months to ten-and-a-half months old.

"We found that by increasing the level of distillers grains and using this feeding strategy we were really able to increase the feed efficiency of these heifers," says Anderson. "We also improved the digestibility—they had higher digestibility of the proteins and dry matter as inclusion of distillers grains increased. Although we did cause some shifts in metabolic profile, the heifer's body condition did not change. One big thing, however, is that we didn't change the heifer's body condition—this is very important. Even though we were feeding the animals more distillers grains we didn't cause the animals to get over conditioned. With dairy heifers, you don't want them to put on fat, you want them to put on lean muscle and frame size. It's kind of exciting because we were able to do that with these diets, which were fairly simple diets."

The interest in the fat level of the distillers grains derives from the increasingly common ethanol industry practice of drawing oils from the distillers grains to sell as a separate value-added product. This reduces the fat content from a high range of 10 to 15 percent down to a middle range of five to ten percent. It may become more common to offer distillers grains below five percent fat, says Anderson.

Anderson sees her findings as a win-win—demonstrating that ethanol plants can grow this particular market for their feed products, while livestock producers get a simple, low-cost, effective feed ration.

"Jill Anderson's research is valuable for Minnesota's corn producers," says Paul Meints, director of research for Minnesota Corn Research & Promotion Council. "Jill produced some very good results, and this will help farmers develop better markets for their corn."

"The project is a perfect example of the collaboration between AURI and Minnesota's corn organizations," says Randy Hilliard, who acted as the AURI project manager for Anderson's research project. This project fits our core mission at AURI.

Anderson sees her findings as a win-win—demonstrating that ethanol plants can grow this particular market for their feed products, while livestock producers get a simple, low-cost, effective feed ration.

*continued on page 12*



**AURI and  
MCR&PC**

**Idea to reality:**

Could dairy producers feed reduced-fat distillers grains to dairy heifers and still get the type of replacement heifer they want?

**AURI's role:**

AURI assisted the MCR&PC with review and selection of projects from their request for proposal process. AURI also provided project management services.

**Outcomes:**

These findings demonstrate that ethanol plants can grow feed markets for their coproducts and provide livestock producers a low-cost and effective feed option.

**Partners:**

Minnesota Corn Research & Promotion Council and South Dakota State University





# AURI helps launch food and ag finance working group

BY BRITTANY GILBERTSON

Those dedicated to state economic growth have begun formulating a plan to improve investment access in the food and agricultural areas for Minnesota's entrepreneurs. Filling this key piece of the entrepreneurial ecosystem depends on broad support from different stakeholders, which is why AURI convened the inaugural meeting from among its partners and connections.

"In convening the working group to address the barriers to financing and commercialization, we see a new arena for AURI to support clients through connections to these potential resources," said Shannon Schlecht, AURI executive director.

## NEED FOR INVESTMENT ACCESS

Each stage of product development requires capital. Often, entrepreneurs struggle through early stage phases by financing the project on their own, often draining savings and soliciting funds from friends and family.

State resources designed to support new company growth have not provided the intended impact on agricultural companies. It's a trend that has puzzled politicians, economic development officials, private sector, the investment community and entrepreneurs.

While discussing the limited participation of Greater Minnesota companies in Minnesota's Angel Tax Credit, Representative Tim Miller inquired about the extent to which AURI connects clients to financing. Realizing a larger issue was at stake, AURI convened a working group to determine what entrepreneurial and funding resources existed, and whether improving funding access depended on raising awareness of existing resources or exploring new programs.

"Based on our conversations with clients, there have been more commercialization delays and financing failures than there should be," said Rod Larkins, senior director

of science and technology. "AURI's goal has always been to help clients turn their idea to reality. We launched the working group after recognizing a need to connect entrepreneurs to necessary resources as they compete for cash at each stage of the innovation process."

## KICK-OFF CONVERSATIONS

Initial working group sessions were held in December 2015 and January 2016. The first meeting hosted about 20 individuals representing a cross section of agency officials, association representatives, angel investors and venture capitalists. Turnout increased during January, drawing primarily from the same groups, and interest continues to grow.

"We're excited that people from various sectors are engaged in this effort," said Dan Skogen, planning and government relations director for AURI. "We've successfully brought together these individuals and organizations to look for solutions that enable more agricultural products and processes to get to market."

Right now, working group members are forming subcommittees to explore the planning process as well as identify funding opportunities and needs. The working group solutions will be inclusive enough to address multiple issues inhibiting investments in ag-based projects.

For example, the group will look for ways to prepare entrepreneurs to meet the rigors of product commercialization, endowing them with the business acumen and presentation skills to answer investors' questions and confidently convey the business potential.

AURI expects its industry connections will facilitate the necessary interactions between clients, stakeholders and the investment community to help move innovative ideas through the planning and development process.

## POTENTIAL FOR MINNESOTA

"We want to attract ag companies from all over the world to Minnesota because this is where things are happening now," said working group member David Russick, founder and managing director of Gopher Angels.

The effort intends to create a vibrant investment community in Minnesota, one that functions as an incubator for new agricultural and rural businesses.

"We'd like to see Minnesota positioned as an innovation hub for food and agriculture, attracting the best talent and in turn attracting the dollars that fuel industry growth," said Russick. "This activity brings tremendous benefit to Minnesota and I am proud to be part of the collaboration making it happen. To succeed, we need lots of support throughout the state."

Meeting entrepreneur needs will encourage more innovation in the state, specifically the ag-based industries.

"The working group will help spur discussion to facilitate the movement of innovative food and agriculture ideas forward," said Schlecht. "The members assembled represent the needed expertise to plan and execute strategies to enable the flow of financial resources to Minnesota's food and agricultural entrepreneurs."

If you are interested in participating in the working group, please contact Dan Skogen at 218-639-3405 or email [dskogen@auri.org](mailto:dskogen@auri.org) for more information and future meeting dates.



PROC  
DEVELOPMENT



SCALE  
UP



COMMERCIALIZATION

“WE’D LIKE TO SEE MINNESOTA  
POSITIONED AS AN INNOVATION  
HUB FOR FOOD AND AGRICULTURE,  
ATTRACTING THE BEST TALENT AND  
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THAT FUEL INDUSTRY GROWTH.”

*David Russick, founder and managing director of Gopher Angels.*

# Alternative crops could offer **overla**

BY DAN LEMKE

Introducing a new crop to Minnesota isn't easy. A wide range of plants can grow in the state's fertile soils, but crops also need to deliver value before farmers will plant them. AURI researchers and scientists at the University of Minnesota are taking a closer look at two crops that show promise to produce both added revenue and environmental benefits.

Pennycress is in the mustard family. Similar to canola, it produces small seeds in flat pods. The seeds can be pressed to produce oil. It's native to the Mediterranean region of Europe and Asia, but was reportedly grown in the United States as far back as the 1700s.

Camelina is sometimes known as false flax. It too, is an oilseed crop, generating oil that can be used for food or industrial purposes.

Pennycress and camelina are garnering attention because of their potential to be grown in relay with the state's staple crops, such as corn, soybeans or sugar beets. Because they are winter annuals, camelina and pennycress can be planted in the fall immediately after primary crops are harvested.

Relay crops overlap with the growing seasons of primary crops. Both plant varieties establish quickly and are winter hardy, greening up again early in the spring. Crops like sugar beets or soybeans can be planted directly into the pennycress or camelina stands. The relay crops are harvested in the spring, typically by mid-June, before negatively impacting the development of primary crops.

## Keeping it green

AURI Senior Director of Science & Technology Rod Larkins says satellite images of Minnesota show that most farmland is only green from May through August. The rest of the time fields are mainly brown or black.

"Minnesota's current crop production systems are dominated by summer annual crops that only provide complete living cover of Minnesota's agricultural landscape for three months during the summer, leaving the land bare and brown for nine months of the year. Without active plant root systems to hold the soil in place and absorb water, fields are vulnerable to wind and water erosion, and nutrient leaching," said Don Wyse, co-director of the Forever Green Initiative.

The Forever Green Initiative is part of the University of Minnesota's Center for Integrated Natural Resources and Agricultural Management. Wyse says the Initiative is working toward the next generation of crops, specifically winter annuals and perennials, that can fill the so-called "brown period."

"We are interested in pennycress and camelina because we're not looking at plants that just fill the brown period, but crops that have economic opportunity for farmers," Wyse says.

Cover crops are gaining traction in the Midwest as a way to reduce erosion and promote soil health. In most cases, the cover crops themselves have little economic value, though some farmers graze cattle on the cover crops for winter forage. Relay crops like camelina and pennycress offer environmental benefits with the potential for an accompanying economic boost.

"We are trying to take advantage of the world's need for a wide range of products including green energy and biobased products by linking them to Minnesota agriculture so farmers can take advantage," says Nick Jordan, co-director of the Forever Green Initiative and U of M professor. "We want to grow the total pie of agricultural production by growing crops that supplement and complement summer annuals."

Wyse says pennycress and camelina cultivars have been developed that will grow and thrive in Minnesota's climate. The specific varieties that will be planted will depend on where market opportunities emerge.

## Identifying uses

While both plants can be grown here, success will depend upon uses for the crops. AURI is working to determine the feasibility of incorporating pennycress and camelina into a farmer's rotation. AURI's roles is the identification of uses, and market opportunities for the crops and the meal and oil.

"Jet fuel is one very enticing possibility from the oil," Larkins says. "The meal can be used for livestock feed. There is also potential for extracting higher-value chemicals."

Both camelina and pennycress could provide sustainable sources for biofuels like biodiesel. Camelina contains 35 to 38 percent oil and are high in omega-3 fatty acids, which makes the oil and the meal an option for livestock feed.

AURI and partnering organizations convened several meetings with farm groups to discuss the crops. While there is interest among groups and some entrepreneurs, hurdles must be cleared before camelina appear across the landscape.

"We need a stable supply, a stable demand and the infrastructure to handle the crops. We're looking for innovation in systems, innovation in marketing and innovation in the supply chain to carry that out in a coordinated way."

Larkins says processing looks to be fairly straight forward with the oil extracted from camelina and canola processing.

In addition to working as potential relay crops, pennycress and camelina could provide other benefits. Established stands should help reduce soil erosion, protect water quality and support wildlife and pollinators.

"These crops provide potential options to achieve conservation results and a way to improve the farm process," adds Larkins.

Larkins acknowledges it could take five years or more to get all the pieces in place, including details, processing logistics and the identification of uses and markets. If those factors are met and pennycress and camelina show economic viability, growers are likely to give them a try.

"If we can show it's profitable, farmers will be interested," Wyse says.

“If we can show it's profitable, farmers will be interested.”

Don Wyse,  
co-director of the Forever Green Initiative.



CAMELINA

# Mapping opportunity

URI is part of a group  
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# PENNYCRESS

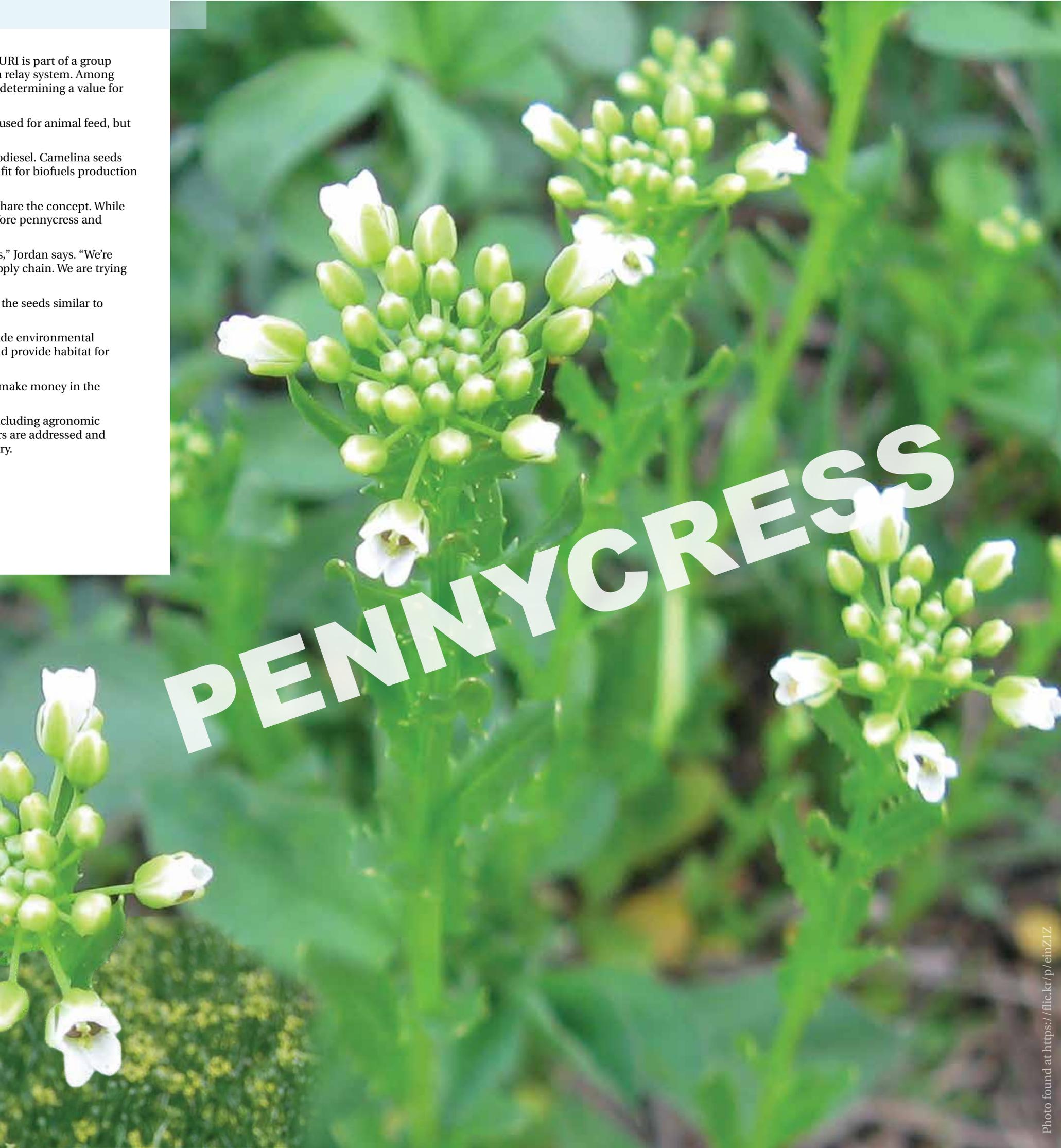


Photo found at <https://flic.kr/p/eimZ1Z>

# ASK AN EXPERT

## A recipe for success

### AURI tapping into food industry experts

BY DAN LEMKE

From multinational corporations to individual entrepreneurs, Minnesota is home to a broad range of food companies. A 2010 report from the University of Minnesota's Food Industry Center showed the state had more than 2,300 food businesses. The economic contribution from those companies is well into the billions of dollars.

Having that number of companies, many of which rely upon Minnesota-grown commodities and ingredients, presents several challenges and opportunities. To help AURI and its clients learn more about what it takes to succeed and to identify opportunities, AURI collaborates with experts from some of the state's leading food businesses.

The AURI Food Industry Thought Leaders team consists of food industry experts who are dedicated to exploring market opportunities and industry challenges. Thought Leaders influence AURI research initiatives, help identify solutions and opportunities as well as provide staff and entrepreneurs with a network of a diverse cross-section of Minnesota's food industry.

"We've conducted research on innovation networks, like the food industry thought leaders to bring people together to work for the greater good," says Nan Larson, director of AURI innovative networks. "We recognize industry networks can positively influence the food area."

AURI pulled together leaders from a broad spectrum of food businesses for an initial gathering nearly a year ago. Larson says AURI was looking for at least 10 committed leaders to join the team and to provide insight. That mission has been accomplished.

Bill Aimutis is the global director of external innovation for Cargill, Inc., and is part of the Food Industry Thought Leaders team. He says the group can help support AURI on food trends, provide

advice on market niches, how to enter the supply chain, and provide educational resources on food processing and food safety.

"The food industry is in an interesting evolution as consumers seek less processing, cleaner labels, and more localized production of their food," Aimutis says. "Small start-up companies will have many opportunities to serve these consumers, but they often lack the knowledge on food processing, food safety and distribution into the supply chain that large companies have developed over many years."

Food Industry Thought Leaders members include researchers, grocery providers, small food companies, global food manufacturers as well as meat and dairy providers. This broad expertise helps AURI identify opportunities while providing valuable information to the organization's many food-based clients.

"This group helps AURI meet the needs of the industry and share valuable information with our clients," Larson adds.

Minnesota has a strong agricultural and food industry presence. Tapping into the expertise of the state's food industry leaders gives entrepreneurs and AURI clients a valuable local ingredient.

"The mission AURI is undertaking with small food start-ups is important to stimulate the state's economy, provide opportunities for entrepreneurs and provide a safe product to the public," Aimutis adds. "At the end of the day, this contributes to our need to double our food supply by the year 2040 to meet a growing global population's need for food."

The Food Industry Thought Leaders team is another way AURI helps the state's food businesses and entrepreneurs position themselves for success.

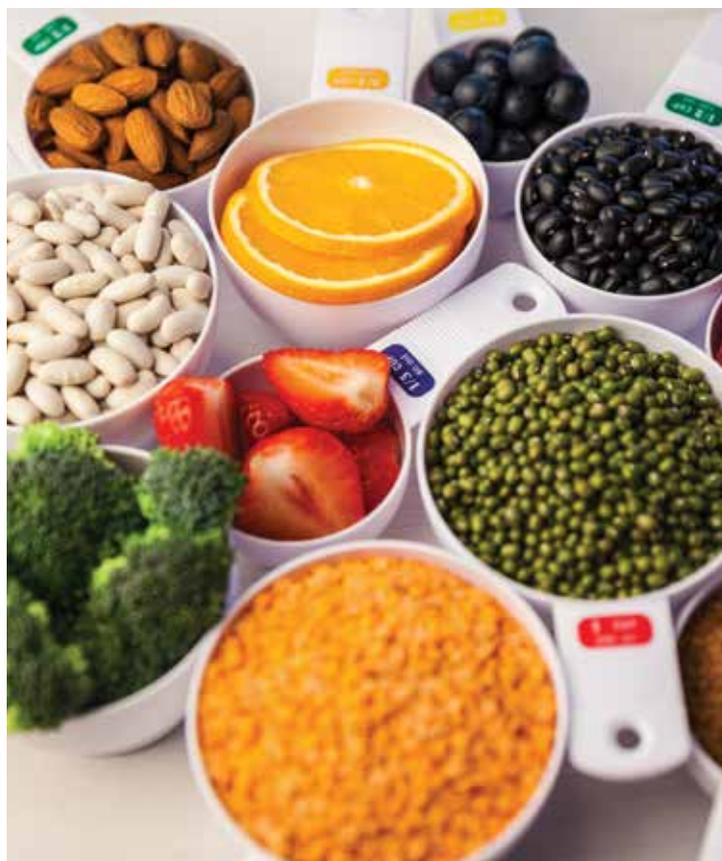




PHOTO BY ROLF HAGBERG

# Little things could make big impact

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

What if mustard seed was used to not only make prepared mustard, but also the bottle that contained the condiment sitting on the grocery store shelf? Emerging processes and feedstocks may make this a reality and provide new opportunities for agricultural products and coproducts to enter exciting arenas.

Some of the world's largest agricultural companies and foremost chemical companies are now working together to expand the list of materials produced from agricultural sources. But it's more than just new products, it's the way those products can be derived. Many biological processes being developed in research labs today are designed specifically to utilize agricultural feedstocks.

New processes for making chemicals from agricultural materials rely upon biological systems of yeasts, bacteria and enzymes. Traditional processes for producing plastics rely on chemistry and usually involve high pressures, high temperatures and expensive catalysts. Emerging alternative biotechnology processes may be just around the corner. For example, biological processes may allow materials such as polylactic acid (PLA), used to create bioplastics and even clothing, to be produced from gases, such as methane.

What is exciting for AURI scientists is that this increased role of biological processing will create new opportunities for the utilization of agricultural commodities, coproducts and possibly even production of new crops.

One example of a biologically-derived platform ingredient is furan dicarboxylic methyl ester (FDME). It's a mouthful of a chemical name and it's the target of a new technology partnership between DuPont and ADM. FDME can be produced from fructose (as in high fructose corn syrup) and is an intermediate along the path toward clear packaging films and replacement of the polyethylene terephthalate (PET) soda bottles many consumers find objectionable. A proposed pilot plant in Decatur, Illinois will produce 60 tons of FDME per year.

Improvements in fuel ethanol production efficiency, biodiesel processing, butanol production and PLA production have already been realized as a result of biotechnology applications to those industries. It's likely there will be on-going improvements in the efficiency and utilization of agricultural feedstocks for many more years.

One frequently mentioned goal of biological processes is the utilization of non-food feedstocks for fuel and chemical production. Some inedible relatives of the mustard plant, pennycress, and camelina are well suited to the production of bio-jet fuel and other chemicals. These crops could provide farmers with an alternative crop that has environmental and economic potential.

Large scale biological processing is still years away and may never fully replace traditional processes. However, innovative companies and researchers are proving that it can be done and success will also be dependent upon economic factors.

It is an exciting time with several indicators showing the times are changing. Agricultural commodities and coproducts may be well positioned to benefit from these changes.

## AURI GUEST COLUMN



# Consumers demand simple ingredients

BY JULIE SIMONSON

*Editor's note: As part of the Food Industry Thought Leaders (see article page 8), AURI will feature a guest column in Ag Innovation News to provide updates or interesting information from the food industry.*

Meeting consumer demand for foods with familiar ingredients is one of the biggest trends in food today. A recent Harris Poll survey indicates that 70 percent of consumers look for foods and beverages with a short list of easily recognizable ingredients.

Many companies, all the way from entrepreneurs to large companies, respond to this consumer demand. Since 2014, more than two dozen companies have publicly committed to eliminating certain ingredients from their food products, including food manufacturers, retailers with private-label brands and restaurant chains. All of these businesses target ingredients such as artificial food dyes, high-fructose corn syrup and other "chemical-sounding" ingredients.

The Schwan Food Company made a commitment to eliminate unfamiliar ingredients and provide an experience consumers increasingly demand. As a leader within frozen foods, the goal is to offer quality foods with ingredients found in your own kitchen. As a result, Schwan eliminated partially hydrogenated oils and artificial food dyes from all food made by its manufacturing subsidiary. Over the next two years, high fructose corn syrup and artificial flavors will also be removed. This effort is increasingly essential to compete in the market place with ingredient-conscious consumers.

Today, the food industry is in the midst of a huge cultural shift in how consumers view and care about what is in their food, and the food industry MUST actively respond through new innovative efforts to meet this consumer trend.



# Making our mission about impact

BY SHANNON SCHLECHT  
AURI EXECUTIVE DIRECTOR

I'm excited to formally unveil a refined mission statement that will guide AURI's future innovation efforts. Through several discussions, the board of directors arrived at an overarching statement that conveys the existence and intended impact of AURI's work:

Foster long-term economic benefit for Minnesota through value-added agricultural products.



During the planning phase, I was reminded of a fantastic quote by Stephen Covey, author of the *Seven Habits of Highly Effective People*. He said, "A mission statement is not something you write overnight...you will want to review it regularly and make minor changes as the years bring additional insights or changing circumstances. But fundamentally, your mission statement becomes your constitution, the solid expression of your vision and values."

AURI provides applied research services and hands-on scientific assistance, works with clients on product and process development, provides cost-share funds, undertakes industry initiatives and creates innovation networks. We take on these activities to improve economic opportunities across the state.

More than 25 years ago, state leaders created AURI as an independent nonprofit organization after recognizing the need to strengthen rural Minnesota's economy

and utilize surplus grain supplies from increased production and difficult export markets. Conducting research, establishing new products and uses, expanding markets and providing facilities for various entities were the key elements directed to AURI at its inception to "...achieve maximum results for Minnesota agriculture."

When the state created AURI in response to the grain surplus, it also positioned the organization to address needs in an evolving industry. Economic dynamics and new technologies may have shifted our services, but never our intent.

The revised mission statement clearly acknowledges AURI's founding goals, while guiding future efforts in this ever changing industry. We look forward to engaging with more innovators, entrepreneurs and businesses and to supporting emerging industries utilizing agricultural commodities and products to create the maximum economic benefit for Minnesota.

## 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.



### Slow melting ice cream

Researchers from the University of Edinburgh and the University of Dundee, both in the United Kingdom, discovered that a protein called BsIA can be used as an ingredient to keep everything combined in ice cream and result in slower melting. The typical ingredients in ice cream don't want to mix together and an emulsifier needs to be added to prevent separation. When using BsIA instead of common ice cream emulsifiers, the ingredients are bound tightly together and the ice cream melts much more slowly. Emulsifiers are typically fatty elements, but since they're being replaced with a protein, that means less fat and fewer calories for ice cream lovers.

October 2015 livescience.com



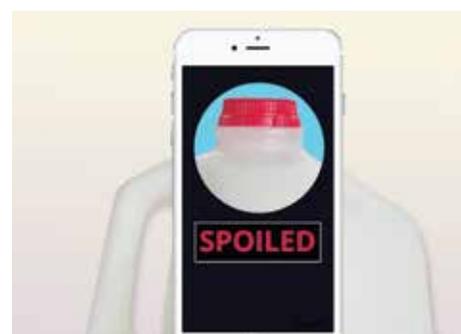
### Bringing up biofuel

USDA scientists have advanced a process to produce bio-oil, a crude liquid from agricultural waste with a mobile reactor. Crude bio-oil is produced by pyrolysis—a process that chemically decomposes plant and other organic matter using very high heat. The modified technique, called "tail-gas reactive pyrolysis," or TGRP, holds promise for improving the bio-oil that is ultimately processed into finished biofuels.

The raw biomass material includes non-food-grade plant matter procured from agricultural or household waste residue such as wood and switchgrass, and animal manures. Using these materials, bio-oils are produced at an accelerated rate using a new high-output mobile processing unit. Instead of shipping large amounts of agricultural waste to a refinery plant at high cost, the mobile reactor allows conversion of the biomass into energy-dense bio-oil right on the farm.

The goal of using TGRP on the farm is to yield a higher quality bio-oil that is more marketable to biofuel producers than bio-oil made from traditional pyrolysis methods. TGRP is an important step toward the ultimate goal of producing cleaner bio-oils that can be distilled at existing petroleum refineries.

January 2016 USDA-ARS



### Smart covers for food

Accidentally drinking spoiled milk might become a thing of the past. Engineers from the University of California Berkeley and Taiwan's National Chiao Tung University are developing technology that allows electrical components to be embedded in 3D-printed plastics. They have used this technology to create a smart milk carton cap, which monitors signs of spoilage. Once fitted, the container can be tipped upside-down to quickly test for changes in electrical signals that accompany high levels of bacteria. "This 3D-printing technology could eventually make electronic circuits cheap enough to be added to packaging to provide food safety alerts for consumers", said Liwei Lin, a senior author on the paper describing the discovery. "You could imagine a scenario where you can use your cellphone to check the freshness of food while it's still on store shelves."

July 2015 Tech Radar



### Wine grape flours

USDA-Agricultural Research Service chemist Wallace Yokoyama and colleagues are working to learn more about flours made from wine grape seeds. Along with potential health benefits, it would offer a new market for wine grape seeds that traditionally go to feed, composts or landfills.

Initial tests on hamsters have shown lower cholesterol levels and reduced weight gain. Research, now being conducted at Mayo Clinic, will determine whether the benefits will also occur in humans. Yokoyama is doing further research with rats to see if changes in the kind and amounts of bacteria in the gut are affected. Gut bacteria may play a role in controlling obesity or reducing risk of type 2 diabetes.

September 2015 USDA-ARS

## 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

What percent of all milk produced in the U.S. is for ice cream production?

- a. 9%
- b. 22%
- c. 63%

Answer : a

### Renewable Energy

How many gallons of biodiesel were used in the U.S. in 2015?

- a. 945,000 gallons
- b. 1.2 million gallons
- c. 2.1 billion gallons

Answer : c

### Coproducts

What percent of daily U.S. newspapers are printed with soybean oil-based ink?

- a. 8%
- b. 50%
- c. 67%

Answer : b

### Biobased Products

Approximately how many gallons of petroleum per year are displaced by use of biobased products (equivalent to taking 200,000 cars off the road)?

- a. 125,000
- b. 300 million
- c. 525 million

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 at walking clients through the entire development journey of bringing a new product or process from idea to reality.

### Service Areas: What AURI Provides

#### Applied Research

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.

#### 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

#### 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 to help bring new products and processes to market.

#### 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.
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Agribusiness

# REDUCED-FAT DISTILLERS GRAINS, A NEW WAY TO GROW A DAIRY HEIFER.

*continued from page 3*

“The big thing I learned from this research is there is a lot more flexibility in using distillers in heifer diets, than maybe most dairy producers realize,” says Anderson. “You can really tailor it to feeds you have on hand. Traditionally, people have said, ‘Oh, you don’t feed more than 10 or 20 percent distillers grains in the diet of dairy animals,’ but this research blew the roof off that previous inclusion rate recommendation. This research shows that you can go to 30 or 40 or 50 percent. If I were making recommendations to a producer I would say, go with 40 percent. It’s a good level to feed. We get concerned with the nitrogen load when you get up to the 50 percent distillers diet—but you can still feed it at 50 percent in a lot of circumstances—if you have a year when you don’t have a lot of forage on hand.”

“This project fits the core mission at AURI - developing new uses and new markets for agricultural products,” said Hilliard.



“We found that by increasing the level of distillers grains and using this feeding strategy we were really able to increase the feed efficiency for these heifers”

— Jill Anderson  
Dairy Scientist at South Dakota State University

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