



# Ag Innovation News

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The newspaper of the Agricultural Utilization Research Institute



## Entrepreneurs Move PEAS into a Whole New Field

PAGES 6-7

PHOTO BY ROLF HAGBERG



Pies Infused with Minnesota Alcohol Make For Tippy Treats  
Pages 4-5



Harnessing Green Ammonia and the Hydrogen Economy for the Ag Industry  
Pages 8-9



Tackling Minnesota's Co-packer Conundrum  
Page 10



MDA Offers Resource for Minnesota's Emerging Farmers  
Page 11



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## Spring Means Changes at AURI

BY SHANNON SCHLECHT  
AURI EXECUTIVE DIRECTOR

Greetings and welcome to spring! For those of us in Minnesota and the upper Midwest region, this is a time of new growth. After a long winter, the grass starts greening up, flowers begin to bloom, trees start to bud, and the change in the weather inspires many of us to explore and seek something new—be it new ideas, new approaches or new experiences.

In that spirit, AURI has some new faces to start 2021 as board elections were held in January. I'm pleased to announce three new individuals joined AURI's Board of Directors. They include Senator Gene Dornink, Representative Mike Sundin and Erin Heitkamp who fills an agribusiness seat.

Senator Dornink is from the Preston area of southern Minnesota and is in his first term in the Senate, while Representative Sundin lives in Esko and was reelected to his 5th term. Ms. Heitkamp comes to AURI as the vice president of impact at Pipeline Foods. In the coming months, you will get a chance to learn more about each of them through the Ag Innovation News' ongoing Board Q&A column. We begin this edition with Ms. Heitkamp.

I hope you will join me in welcoming these extraordinary individuals to AURI's Board of Directors!

Another big change, which you may have heard about earlier this year, is AURI's active participation in the new Ag Innovation Campus in Crookston, Minn. The purpose of this new campus is to increase economic opportunities for farmers by helping them maximize crop value through new value-added processing and research and take advantage of market prospects in biodiesel, soybean oil, soybean meal and niche/novel oilseed crops.

In continuing AURI's 30-plus year presence in Crookston, we plan to open a new office and lab facility on the campus to capitalize on the synergies of its goals and AURI's mission to foster long-term economic benefit to Minnesota through value-added agricultural products.

These are just a couple of examples of recent and upcoming changes at AURI that I believe will lead to increased innovation. I'm excited to see what 2021 has in store for AURI's expert staff and knowledgeable Board of Directors.

In the meantime, I invite you to read on and learn about all the exciting work AURI is involved with in the areas of food, coproducts, biobased products and renewable energy. In this edition, AURI brings you stories about two current clients, Sarah's Topsy Pies and Pea Pawd, as well as a feature on the potential agricultural and energy opportunities for green ammonia. Regardless of your interests, I guarantee you will find these articles to be both interesting and educational.

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”



BY AURI

This quarter, Ag Innovation News highlights one of its newest board members, Erin Heitkamp. In addition to her role on the Board of Directors, Heitkamp is also the senior vice president of impact at Pipeline Foods. Read on to learn more about her background and goals for the future.

AIN

**Please tell our readers a little about your background.**

EH

Currently, I'm Senior Vice President of Impact at Pipeline Foods. Immediately prior to joining Pipeline, I led the sustainability consulting practice at Wenck, an employee-owned Minnesota-based environmental consulting company. My years at Wenck were preceded by a nearly 15-year career at Delta Air Lines and Northwest Airlines, during which I led the development and execution of environmental and sustainability policy and strategy and held positions in the areas of environmental regulatory oversight, fuel and fuel services purchasing, and corporate real estate.

AIN

**How did you first hear about AURI?**

EH

When I was at Wenck, I worked on a number of multi-stakeholder projects, including among them advanced alternative/biofuel projects, where AURI was frequently mentioned as a potential partner. Then, when I joined Pipeline Foods, it seemed every time I turned around someone was saying, "you have to get connected with AURI."

AIN

**What are your goals as a new board member?**

EH

As a new board member, my first goal is to get acquainted with the other board members, the staff, and the facilities and projects, so that I can contribute in an informed, meaningful way to the development of organizational strategy and project execution. AURI's thirty years of success and future potential cannot be taught or visioned overnight, so I'm trying to be patient with myself!

AIN

**What do you think is the biggest challenge faced by the food and agricultural ecosystems today?**

EH

My entire career has been grounded in moving businesses and industries to more sustainable models. Without a doubt, agriculture and food can do better. Environmental pollution in the form of nutrient runoff is rendering unhealthy our waterways and drinking water and posing unacceptable health

and welfare risks and losses. We know which farming practices reverse these trends. We just need to find ways to support farmers in adopting them.

AIN

**Which agribusiness-related issues are most important to you?**

EH

Facilitating transparency and integrity across the entire food supply chain is paramount to meeting consumer demand for information about how, where and when food is grown, transported, stored, processed and packaged. In supporting increased supply chain transparency and integrity, we give the farmers who grow our food visibility and credit for their hard work, an opportunity to realize incentives for farming more sustainably, and the potential for more equitable value sharing across the value chain.

AIN

**How can Minnesota best support its food innovation industry?**

EH

Minnesota can do more of what AURI does every day. In providing expertise, testing facilities, and financial and partner resources, AURI is meeting a critical need. In my experience, it is a bit of unicorn in that it is state funded, very commercially-oriented, and highly networked to meet stakeholder needs.

I would love to see more investment in facilities like the new Ag Innovation Campus that will be constructed in Crookston - facilities that serve the triple purpose of research, education and processing capacity to fill the infrastructure gap between proof of concept and commercial scale production.

AIN

**What do you want to achieve as a new board member?**

EH

As a member of the leadership team of a young, innovative, sustainable supply chain and food ingredient company, I closely follow trends and successes in the food and agriculture industries. I'm also very well networked in the regenerative and organic space and have an extensive background in advanced biofuels. As an AURI board member, I will work to bring those areas of expertise and relationships to bear to evolve and support the AURI mission.

Handmade in Minnesota:

# SARA'S TIPSYPY PIES

The evolution into retail for the alcohol-infused pies made famous at the Minnesota State Fair

BY AURI

In 2015, Sara's Tippy Pies made waves at the Minnesota State Fair with their boozy pastries. Their signature fruit pies infused with Minnesota-made beers, wines and spirits became a not-to-miss stop for State Fair foodies.

Created by Sara Hayden, a Minnesota mom turned professional baker, the first tippy pies started with her mother's pie crust recipe. About five years before showcasing Sara's Tippy Pies at the Minnesota State Fair for the first time, Hayden was focused on figuring out the next chapter in her life as her youngest children started school.

"The opportunity pretty much just fell into my lap through a family friend who owned a bakery," says Hayden. "He pretty much just brought me in and said let's try to create a company for you that you could walk away with someday."

Hayden took her love of baking into this shared commercial kitchen, where she learned to transition homestyle recipes into large batches of baked goods to sell. Adding alcohol to the pie fillings was just an unexpected bit of inspiration taken from a recipe she discovered with a beer-based filling.

Hayden's recipes allowed her to build relationships across Minnesota with some of the state's premium alcohol makers including Lift Bridge Brewing Co., 7 Vines Vineyard and Saint Croix Vineyards. She then launched the "Pie with a Purpose" campaign, a cause inspired by her daughter Madi, which donates a portion of the proceeds from all pies made with Finnigans Beer to The Down Syndrome Association of Minnesota, the Valley Friendship Club in Stillwater and Jack's Basket.

By the time Hayden applied to sell pies at the State Fair, the business had grown to a point where she felt she had reached the edge of her business expertise.

## Transitioning to Retail

The year Sara's Tippy Pies debuted at the Minnesota State Fair, a social media post sparked a connection between Jerry's Food and Sara's Tippy Pies, eventually bringing four of the company's dessert creations to retailers in the Twin Cities. The product lineup included their Boozy Blueberry Lemon, Carousig Caramel Apple, Irish Whisky Pecan and Razzzy Apple Raspberry pies.

"I met with the Jerry's reps and had no idea what I was supposed to do. I just put it [the pie] in a bag and



In 2016, Sara's Tippy Pies made waves at the Minnesota State Fair with their alcohol-infused pastries. Their signature fruit pies infused with Minnesota-made beers, wines and spirits became a not-to-miss stop for State Fair foodies.

heat sealed it and put a label on there with nothing that was necessary. I mean, it's pretty awful now," says Sara Hayden. "There wasn't a nutritional panel on there, just an ingredient list and that was it."

To accommodate the business's growth Sara reached out for help, eventually finding her current vice

president and general manager, Hugh Williams. A former General Mills employee, Williams spent the previous 15 years working mostly in marketing and brand management for the Fortune 500 company.

"I've always known my strengths and weaknesses and the whole numbers game is not mine," says

Hayden. “It’s not my thing at all, so he [Hugh] was definitely that numbers person and had such amazing experience with General Mills.”

At the time, Hugh was working as a consultant for small to mid-sized packaged food and beverage companies. He was looking for an opportunity that allowed him to have a larger stake in the game and to act on ideas instead of just providing advice.

“It’s not easy to find someone where you believe in their products, their brand and most importantly in them as a leader, and that person has to believe in you as well,” says Williams. “After meeting with Sara I think we saw the potential for all of that, but you never really know until you start working together. So we said let’s not worry about a contract right away, let’s just work together for a while and see if it’s a good fit. I was impressed with her work ethic and integrity. She must have felt similarly, and over several months we formalized the agreement in writing.”

As a company officer, Hugh jumped in by tackling the retail business, specifically the products selling at grocery stores. Hugh and Sara figured out that turns were not where they needed to be, distribution was at risk and some changes had to be made. Packaging was completely redesigned, the pies were up-sized for better value, and the State Fair’s best-selling flavor, Boozy Blueberry Lemon, was brought to retail.

Turns improved dramatically and distribution grew as a result. By late 2020, Sara’s Tippy Pies could be found in over 130 grocery stores in the Twin Cities including Cub Foods, Lunds & Byerlys, Jerry’s Foods, Festival Foods and County Market.

## Incorporating Clean Labels

Transitioning Sara’s Tippy Pies’ products to clean labels was the next step in their evolution in retail.

“There were a couple of initiatives that we were looking at where we needed some technical help or food expertise,” says Williams. “And first was on our dessert pies, which are the products that we have in grocery stores now. We wanted to make some progress in cleaning up our label.”

A consumer-led trend, a “clean label” is generally understood to provide transparency of a product’s ingredients. For a clean label, the product requires ingredients that are easy for consumers to identify and may be perceived to be healthier or more natural alternatives to traditional ingredients like additives, preservatives, emulsifiers and sweeteners. For example, a clean label baked good might contain raisin juice concentrate instead of propionates or sorbates to inhibit mold growth.

For Sara and Hugh, the first step was seeking out the technical experts to help transition to clean labels.

“We have a crust co-packer, Gregory Foods, and they had made some progress with our crust formulation. A big challenge with pie is that it uses shortening in the crust, which tends to have some non-natural ingredients in it,” says Williams.

Along with finding a solution for removing trans fats from the crust recipe, Sara and Hugh wanted a clean-label solution that included the dessert pie fillings and toppings. They reached out to the Agricultural Utilization Research Institute’s (AURI) food team for assistance.



Sara Hayden took her love of baking into a shared commercial kitchen, where she learned to transition homestyle recipes into large batches of baked goods to sell.

A couple AURI food team members, including Food Scientist Lolly Occhino and Business Development Director Jason Robinson, worked with Sara’s Tippy Pies to find alternatives to ingredients.

“Our science-based approach helped to define an applicable set of product claims for Sara’s Tippy Pies,” says Jason Robinson. “It is important to embrace where you are in the market and use the clean label to make the ingredients accessible to the consumer.”

It was important to remember that the pies landed within the comfort food market. Substituting too many ingredients had the potential to alter the end-product and degrade the culinary experience that put the pies on the Minnesota State Fair map.

AURI worked with Hayden to find appropriate ingredient alternatives that cleaned up the label and allowed Sara’s Tippy Pies to add a label of “No artificial flavors, colors or preservatives” to their products. Robinson and Occhino also worked with Hayden and Williams to better understand the industry narratives around the different product ingredients so accurate marketing claims could be made to promote the clean label.

## Introducing Savory Pies

Beyond the transition to clean labels for the dessert pies, Hayden and Williams wanted AURI’s assistance on their new line of savory pies.

“We sold our first savory pie four years ago at the State Fair. It was our Brown Ale Onion and Gouda pie and right out of the gate it was a huge success. We sold more Onion Goudas than all of our sweet flavors combined in that first year,” says Williams.

“We had made what we thought were enough,” agrees Hayden. “And by day two, we realized that we were going to be out by day three.”

The savory pie completely blew past the best sales numbers from previous State Fairs. Hayden and her staff started 24-hour production to meet the unexpected demand. At the end of the State Fair that year, Sara’s Tippy Pies upgraded to a new location to reflect the success of the new savory pie.

“The State Fair is a great incubator to try out new flavors and see what sells. Once we saw the success of Onion Gouda, we could see the potential of savory pies as a line and we wanted to translate that into the retail environment,” says Williams.

AURI worked with Hayden and Williams to source ingredients and develop nutritional labels. Along the way, Occhino worked with Hayden to transition her recipes from a traditional baker’s formulation standard to a weight-based formulation standard.

“Changing the measurements of ingredients like blueberries from volume (i.e., tablespoons and cups) to weight (i.e., ounces and pounds) is part of the transition of products into professional food manufacturing,” says Occhino.

The system Occhino created included a spreadsheet that lists all the ingredients for each recipe broken down by volume measurements and weights that translate it into nutritional labels.

When it came time to find a copacker for the savory pies, this spreadsheet was a timesaver. It allowed the copackers to get right to work. Now, Hayden and Williams plan to launch the new savory pie product line sometime in 2021.

## Continuing to Evolve

Working with AURI was a valuable step in Sara’s Tippy Pies’ evolution into retail, but it is not the end. Beyond the new product line, Hayden and Williams hope to continue growing.

“We have a ‘handmade in Minnesota’ flag on our package and we pride ourselves on being a Minnesota company and being a force for good in the Minnesota community through charitable efforts, by selling other local products at our storefront bakery in Stillwater, and just by sharing our experiences with others in the community so we can all learn from each other,” says Williams.

Readers can find Sara’s Tippy Pies in retailers around the Twin Cities, at the Minnesota State Fair, and at their store front location in Stillwater, Minn.

## What is a ‘clean label?’

Today’s average consumer is more health-conscious than ever and desires an increasing amount of information around their food purchases. More than ever before, they scrutinize ingredient declarations on foods to avoid artificial ingredients and foods containing ingredients with long, chemical sounding names. Many consumers want products with ingredients that can be found in their pantries.

No universal definition of a “clean label” currently exists. Clean-labeled foods have been associated with a plethora of food categories or phrases including “natural,” “organic,” or “minimally processed.” However, there is no industry-wide definition of the term or regulation of its use.

So, where do you start and what are your options? The food processors’ number one goal should always be to create a safe product for human consumption. It is important to remember that taste is the main factor driving repeat purchases. Therefore, it is very important to keep in mind the effect alternative ingredients have on both the safety and taste of the product.

In the clean-label-ingredient marketplace, many alternative options exist for processors. Check out AURI’s “Clean Label Guide” for an overview of available substitutes at: [auri.org/guides/clean-label-guide](http://auri.org/guides/clean-label-guide)



# Entrepreneurs Move PEAS into a Whole New Field



PHOTOS BY ROLF HAGBERG

Chad Blaser and Wayne Olson formed Poplar River Products, LLC to develop a field pea-based cat litter. The product eventually became: Pea Pawd.

BY DAN LEMKE

Chad Blaser was irritated—the pea chips that he bought to feed his lambs were attracting an unwanted farm animal. The chips drew barn cats to the feed bunks not to eat, but to use as litter boxes.

“Every day when I went out, the cats had used the bunks as litterboxes,” Blaser recalled. “At first it was just frustrating having to clean out cat feces. After a while it wasn’t such a big deal because the peas clumped up really well, so it wasn’t that tough to get them out.”

After dealing with cats in the feed day after day, Blaser joked with his wife about getting rid of the sheep to pursue making litter from the peas because the farm cats liked using it so much.

Little did Blaser realize how prophetic that statement would be.

## Unexpected Turn

In July 2019, Blaser was diagnosed with Guillon-Barre Syndrome, an auto-immune disorder in which the body’s own immune system attacks the nerves, trying to kill a perceived virus or some other phantom invader.

“It came on quick,” Blaser said. “In 48 hours, I went from being at work to being essentially paralyzed.”

Blaser spent time in the hospital and in-patient rehabilitation recovering. During that time, neighbor and childhood friend Wayne Olson, who dealt with

a similar bout as a teenager and knew what Blaser was going through, frequently visited Blaser in the hospital and at his home while Blaser worked his way back to health.

Confined to a wheelchair, Blaser pondered what he could do since he was not able to return to work as a fermentation operator in Fosston. During Olson’s many visits, the two men talked about a variety of entrepreneurial ideas. One day an old thought resurfaced.

“I called Wayne and explained my cat litter idea. I knew it clumped well, but I wasn’t sure about odor control because the cats were in the barn and I hadn’t tested anything,” Blaser said.

Olson was intrigued, so he and Blaser decided to pursue the idea. They formed Poplar River Products, LLC, and got more serious about producing field pea-based cat litter.

## Adding Value

Largely grown in northern Minnesota and the Dakotas, field peas can improve soil health and serve as livestock feed. Some pet foods also utilize field peas, while pea powder protein is an ingredient in some protein drinks and plant-based meat alternatives.

During the pea splitting process, the outer hull is peeled off and some fragmentation of the pea

happens. The splits and fragments were what Blaser and Olson aimed for as they needed to reduce the particle size for their litter anyway.

Blaser said he and Olson bought some pea chips from a local pea processor and started using the pea pieces in litterboxes inside Blaser’s barn to see how cats responded. The men also did some odor control testing because they did not know how effective the pea products would serve in that function.

Results were encouraging, so Blaser and Olson bought some small equipment, purchased a tote full of peas and made litter. They took samples to the Humane Society shelter in Crookston, Minn. to see what workers and animals at the facility thought of the prototype. The pea-based litter received rave reviews as the best cat litter some staff at the shelter had ever used. Cats readily used the litter, and it did a remarkable job of removing odor.

With those favorable reviews, Blaser and Olson started working on perfecting their process. They soon realized they could use some help with testing and refining their product development and reached out to the Agricultural Utilization Research Institute (AURI).

“It took a lot more work than we thought. We narrowed the focus and that’s when we contacted AURI,” said Olson. “AURI could replicate our process, help us hone in on what we needed to do to get a product into a bag and into the market.”

## Lab Testing

AURI's senior scientist for coproducts, Alan Doering, has worked with nearly every kind of ag processing coproduct in Minnesota. AURI worked with Blaser and Olson to test various forms of their pea-based litter to identify what type of processing and particle sizing provided the optimum level of sorbency, clumping and other desired performance qualities. AURI conducted additional testing to evaluate odor control as well as clumping capability and durability.

"Clump durability is important, as many cat owners know, the preference is to remove a clump that remains intact from the litter box rather than having it fall apart," said Doering.

In addition to ease of handling, solid clumps help prevent the removal of excess litter.

Dust is also a concern with pet litter, so AURI scientists evaluated product formulations to assure a low level of fine dust when pouring or handling the litter. The minimal level of dust produced by the Pea Pawd litter is a positive attribute that helps differentiate it from some clay-based litters, said Doering.

"With this being pea-based, there isn't silica dust so that is one of the selling points for us," said Olson. "Plus it's sustainable and renewable."

During the research, AURI utilized a synthetic product to simulate pet urine and focused on liquid temperature to replicate real world situations. That pilot lab testing helps AURI clients decide if their product is ready for market or if it needs further refinement.

The pea-based litter controlled odor well and made a durable clump, said Doering. An added benefit to Pea Pawd is that it adds value to a renewable agriculture coproduct.

"One of the key benefits of Pea Pawd litter is the sustainability of the product because it is natural and utilizes a coproduct of field pea production," Doering explained.



During the pea splitting process, the outer hull is peeled off and some fragmentation of the pea happens. The splits and fragments were used to reduce the particle size of the litter.

## RCDG Support

Efforts to develop the pea-based litter were supported by the U.S. Department of Agriculture's Rural Cooperative Development Grant (RCDG) program. The RCDG program aims to improve the economic condition of rural areas by helping individuals and businesses start, expand or improve rural cooperatives and other mutually owned businesses through cooperative development centers.

AURI has operated its Rural Cooperative Development Center since 2011, helping existing cooperatives remain vital elements of the agriculture industry while supporting their ability to grow. AURI also works



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with newly created cooperatives and organizations operating in a cooperative manner to launch new businesses and plan for long-term viability.

The goals of the Center are to use cooperative development as a strategy to maintain or improve economic conditions of rural areas while continuing to grow a collaborative, integrated approach of delivering cooperative development services while utilizing the appropriate expertise.

"The Pea Pawd litter project is a classic example of how the RCDG program can provide technical and business assistance to rural businesses to get those value-added products on the shelf and into the marketplace to create rural wealth," said AURI's Commercialization Director Michael Sparby.

Sparby added, "This wouldn't be possible without the Minnesota Legislature's support of AURI, as the organization is able to tap into these types of federal programs to leverage state dollars to benefit more Minnesota businesses."

## Heading to Market

With a process and product in hand, Blaser and Olson moved from the concept to the marketing stage. Pea Pawd cat litter is now on the shelves in a variety of pet and grocery stores across northern Minnesota.

"We did kind of a soft start, focusing on local stores," said Olson. "We're looking for distributors. We're working with one in Minneapolis that deals with pet boutique-type stores, which is where I think this would fit the best, but we're still seeking other distributors for the product."

Negotiations are also taking place to get the product into stores in the Fargo area as well as making it available on Amazon.

The process of moving from concept to having litter in stores only took about nine months—a relatively short timeframe for most businesses. While Olson

and Blaser have growth goals in mind, they know it is important to not get overextended.

"We wanted to crawl before we walked or ran," said Olson, "and I think that was a good move. We started fast, but we wanted to just try it, not go full bore."

Olson said the company has made inroads with stores in the local area and the interest in Pea Pawd is growing. However, the COVID-19 outbreak has thrown some cold water on efforts to expand distribution.

"It's been hard this year because there are no trade shows," Olson explained. "We have a lot of one-on-one conversations. It's hard to get through the iron curtain that separates us from buyers. We're not going to trade shows talking to a hundred buyers."

"Marketing has been a challenge. We're in a number of local stores, but once you get beyond the people you know would be receptive to putting it into their stores, you start running into roadblocks," said Blaser. "Part of it is the coronavirus because no one is in their offices, they won't take meetings, so that's been a hurdle. All you can do is keep doing the legwork. We just have to be persistent."

Olson said customer feedback on the Pea Pawd litter has been positive, which bodes well for growth and helps spur them on.

## Looking Ahead

Blaser and Olson have opened a small manufacturing plant in Fosston to produce the litter and they source the field peas from a processor near Crookston. Pea Pawd is Poplar River Products' first entry into the marketplace, but it may not be its last. Blaser and Olson have some other products in mind. They are likely to seek AURI's assistance again to help move those concepts forward.

"We're probably going to be adding another item. It would be great to work with AURI again to help guide us on that journey," said Olson. "We couldn't be happier with AURI."

Blaser knows it will take time and effort to make Pea Pawd and any future products successful in the marketplace. He still has not been cleared to return to his off-farm job due to the Guillon-Barre Syndrome, but he and Olson are making the most of a difficult situation to pursue their entrepreneurial venture.

"If not for the illness, we probably would have never started this business. I'd have kept going to work every day and never really given it too much more thought," said Blaser. "A lot of different things happened at the same time and all came together for us."

Blaser and Olson are proof that inspiration and opportunity can be found even in unusual and challenging circumstances.



# AURI is Working to Harness the Benefits of **Green Ammonia & the Hydrogen Economy** for Region's Ag Industry

BY AURI

The concept of “Green Ammonia” and “Green Hydrogen” refers to the production of ammonia and hydrogen that is 100 percent renewable and carbon free. These emerging technologies are exciting due to their potential to reduce greenhouse gas emissions from farming operations and provide farmers another way to earn revenue from emerging carbon markets.

The market also has significant economic potential for the Upper Midwest's agricultural industry. As green ammonia and green hydrogen gain traction in the coming decade, supporters envision a connected network of stations and power plants dotting the area bringing new jobs and investment into local communities.

Green ammonia has many uses as an energy source – it can run grain dryers, light and heat homes as well as commercial buildings. Another option is turning it into a fuel to power a tractor or vehicle. Lastly, it can be drop-in fertilizer replacement for farmers.

## **New Opportunities for the Ag Industry**

The Agricultural Utilization Research Institute's (AURI) goal for participating in the green hydrogen and green ammonia space is to look for opportunities for the agriculture industry to benefit and to add

value back to the state's producers, said Rod Larkins, AURI's senior director of science and technology.

In addition to practical applications, there are environmental benefits. Green ammonia can help the agriculture sector significantly reduce its carbon footprint. Nitrogen fertilizer production represents about 1 percent of all global greenhouse gas emissions. According to the Minnesota Pollution Control Agency's 2018 greenhouse gas emissions data, the forestry and agriculture industries in Minnesota are the third largest emitter of greenhouse gas emissions, responsible for 20 to 25 percent of the state's greenhouse gas emissions. Using data from the 2016 crop year, the University of Minnesota West Central Research and Outreach Center estimates that up to 75 percent of the fossil energy footprint could be reduced by using green ammonia as fertilizer, fuel for grain drying and for electricity generation.

There are many groups around the world working on developing green ammonia and green hydrogen for commercial purposes. Europe, Canada and parts of Asia are far ahead of the U.S. in both technology and commercial investment. Public-private partnerships are developing across the world on a significant commercial scale. The country of France, for example, has invested \$8.3 billion into clean hydrogen energy uses in industrial and transport sectors with aggressive plans to cut the country's carbon dioxide

output by 2030 by the equivalent of the annual emissions of the city of Paris.

The Upper Midwest has all the necessary factors to be a significant player in the market – a robust infrastructure and high demand for anhydrous ammonia and nitrogen fertilizer in the region. Plus, groups like the University of Minnesota and others have been doing cutting-edge research with hydrogen and renewable energy for decades.

What has been missing up until this point is a connecting place for the parties working in different areas of this field to ask questions, share knowledge and incubate ideas. This is where AURI comes in. AURI has been working closely with a handful of organizations across the region to spearhead a collaborative approach to advance opportunities in this space.

AURI has been exploring green ammonia and the hydrogen economy for a few years, said Stanislawski, one of AURI's business development directors. Recently, momentum around the topic has accelerated, he said. More federal grant money is available, and in January 2021 the Minnesota Public Utilities Commission hosted a planning meeting focused on Minnesota's hydrogen economy. Now is the time to get serious about participating, Stanislawski said.

**Biomass is organic material** which includes agriculture crop residues, forest residues, special crops grown specifically for energy use, organic municipal solid waste, and animal wastes.

This renewable resource can be used to produce hydrogen, along with other byproducts, by gasification.



“Through a collaborative effort, we are trying to find a significant role for ag to play as this effort takes off in the next few years,” Stanislawski said. “Opportunities are across the board in anaerobic digestion, conversion of biomass to useful fuels and many other areas. But for us, it is imperative to have a seat at the table in these discussions. We have taken some very good first steps already.”

## Researching Renewable Energy

Mike Reese is a member of the working group and the director of renewable energy at the University of Minnesota’s West Central Research and Outreach Center in Morris, Minn. About two decades ago, he worked to secure funding to install a wind turbine at the research center. The station supplies power to farmers and residents of the local communities.

Recently, Reese began to explore opportunities to use the power station in the hydrogen field. In 2013 his group received funding to open the first pilot plant in the world that converts wind energy into anhydrous ammonia that is then separated and turned into fertilizer. The group is now exploring further uses for ammonia in energy storage to produce electricity and fuel for transportation.

“At some point, the reduction of greenhouse gas emissions in agriculture will become market driven,” said Reese. “Hydrogen and green ammonia provide the clearest path forward to do so than any technology we have right now. Plus, it has uses in industrial applications, chemical industries and even cosmetics. There is more investment in this area right now than at any time since I started working in this industry. And the University of Minnesota is a global leader in this research. We want the benefits of the work that we have been doing to positively impact our home state.”

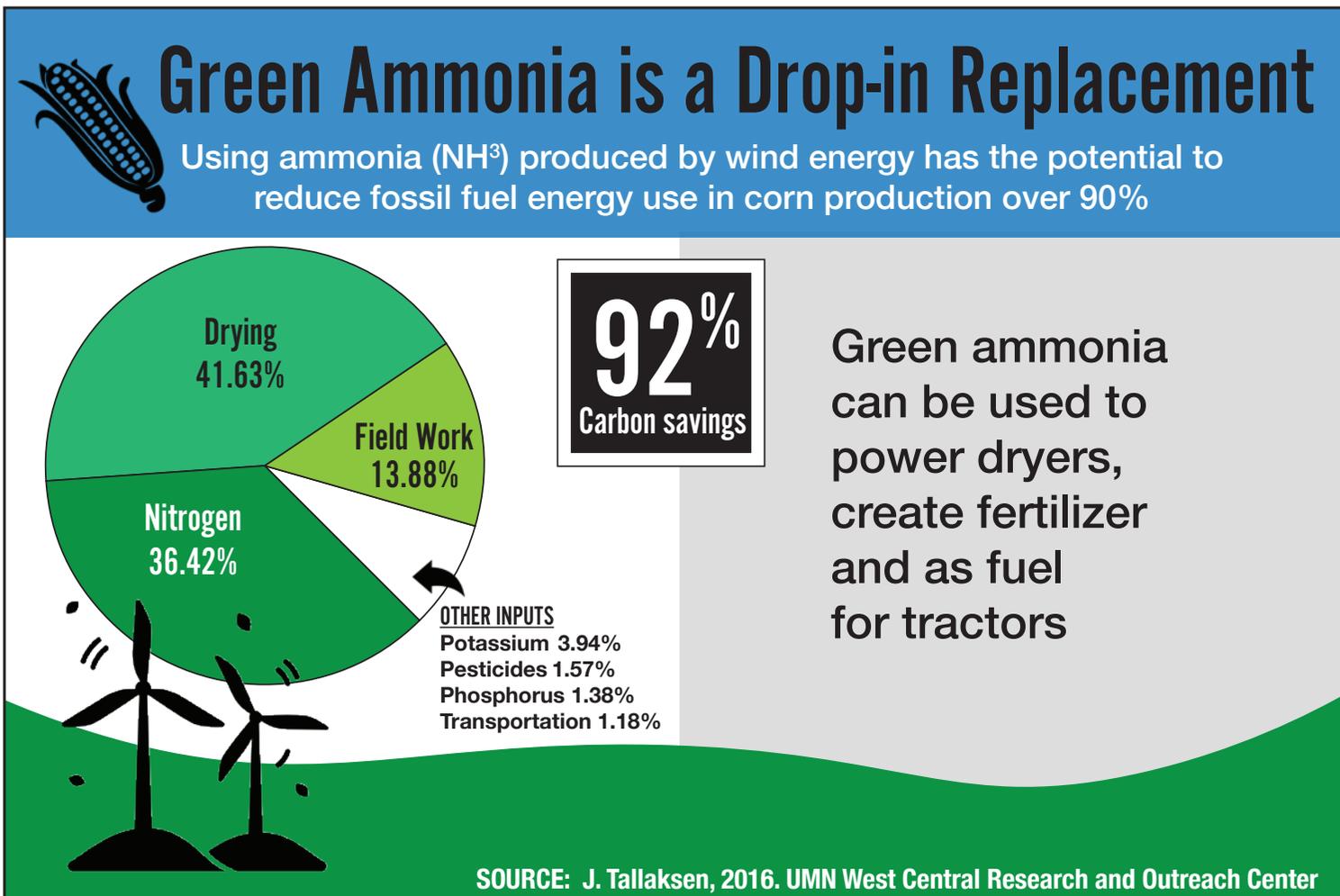
Reese envisions a regional power plant that could one day be used to make fertilizer in the spring when farmers need it for planting, and energy generation in the summer when there is high demand on the system.

“My hope is that one day we could have something like the ethanol industry for hydrogen and ammonia. Farmers and other partners join together to produce green ammonia locally, with local ownership and local job creation,” he said. “We have validated that this can work on a smaller scale, but it is not economical yet. To scale these technologies up, we need to invest funding in the technology.”

## Minnesota’s Utility Companies

CenterPoint Energy plans to be one of the first gas utilities to blend renewable hydrogen into its natural gas supply later this year. There are plans for two more hydrogen blending projects that have been submitted to the Minnesota Public Utilities Commission for consideration.

CenterPoint Energy and all Minnesota utility companies are guided by two mandates. To deliver energy in a cost-effective and reliable manner to customers, and to embrace conservation and renewable energy technology.



Erica Larson, a regulatory analyst for CenterPoint Energy, said that hydrogen presents an exciting opportunity to achieve both goals. The renewable hydrogen blending project will be able to produce enough energy for about 140 homes annually and avoid 1,200 tons of carbon dioxide emissions.

“Hydrogen is a safe and versatile energy source, but the whole industry is just now getting started on discovering all the possible uses,” said Larson. “We are committed to a cleaner energy future by reducing carbon emissions. There is so much potential for hydrogen to play a key role in that process. Through projects like our pilot, we will be able to test, learn and gain valuable experience.”

## Ammonia as Fuel

Another exciting area for future development of ammonia is transportation fuel. Will Northrop, a professor of mechanical engineering and the director of the University of Minnesota’s Thomas E. Murphy Engine Laboratory, recently designed a tractor that runs on a blend of diesel fuel and ammonia. The project was funded by the Legislative-Citizen Commission on Minnesota Resources, a committee of legislators and citizens that makes funding recommendations on projects that benefit Minnesota’s environment and natural resources.

Northrop said the combustion system his team designed can replace half the diesel fuel that is needed to power a tractor. The Fuel Cell Hydrogen & Energy Association says that hydrogen could meet 14 percent of the country’s energy demand by 2050, the largest share would be in transportation.

Northrop’s laboratory is a leader in ammonia combustion in the U.S., and the project is part of his group’s work to reduce the carbon footprint in agriculture.

“Renewable ammonia has the potential to significantly reduce the carbon footprint in ag. It has a significant benefit over a carbon-based fuel system, plus we are storing so much of it already,”

he said. “But these concepts require research to make them practical and feasible. Through a more collaborative approach, I hope we can establish a community in this critical area. By putting together the right people already working on the different applications, we can make the necessary connections to advance this work.”

“There are significant implications for our ag commodities and growers as the hydrogen economy continues to grow and gain traction. It is too big of an opportunity for us to ignore,” said Rod Larkins. “Creating significant economic opportunity, capital investment and new jobs will take root and the question is how does our region capitalize on this movement? The answer, we think, is by taking a collaborative approach and working with public utilities, private businesses, universities, producer groups, policymakers and financial providers.”

**“At some point, the reduction of greenhouse gas emissions in agriculture will become market driven.”**

**– Mike Reese**

University of Minnesota’s West Central Research and Outreach Center

# Tackling Minnesota's Co-packer Conundrum

BY AURI

Minnesota is home to many emerging food and beverage businesses that are ready to take the next step in their development. These small and medium-sized companies create jobs and revenue as well as bring investment capital into the state. They also benefit related sectors like Minnesota's agricultural economy.

A key issue has emerged, however, that threatens to minimize the positive economic impact in the scale up potential of the state's flourishing food and beverage sector: access to right-sized manufacturing.

## Capacity and Access

A perception among many companies is that Minnesota lacks capacity for and access to affordable, right-sized manufacturing options. When businesses are ready to grow, many small food brands struggle to find establishments that can affordably manufacture their products, also known as a co-packer, in Minnesota. When it is time to ramp up production and reach new markets, homegrown businesses are often forced to move production to wherever they can find affordable manufacturing capacity, oftentimes moving out-of-state as a result. Others even forego new revenue and business potential by not scaling up even when demand exists.

Meanwhile, co-packers are under pressure to maintain positive profit margins by ensuring their operations are efficient as possible. As a result, manufacturing for a small food brand with low volume requirements often is not feasible or profitable.

The COVID-19 pandemic further exacerbated the issue. Today, consumers are buying more food at grocery stores. As a result, large food manufacturers are competing for capacity in the contract manufacturing sector to keep up with demand.

## Researching the Challenges and Opportunities

To identify and quantify this issue, the Agricultural Utilization Research Institute (AURI) in partnership with the Minnesota Department of Agriculture (MDA), commissioned a report to study the underlying challenges and opportunities.

The goal of the report is to identify and describe both the current state of Minnesota's small food and beverage business contract manufacturing, and the state's "manufacturing lease" infrastructure. The research also intends to catalogue the frequency of businesses leaving the state to find manufacturing partners and quantify the underutilized and untapped manufacturing capacity in Minnesota that could be harnessed by food and beverage businesses. The report also provides recommendations on which actions the state and other industry supporters should explore to expand local processing opportunities for scaling Minnesota food and beverage companies.

When published, the report will not only recommend specific programming and policy action steps that can address these issues and support further economic development, but also quantify the impact of investment in Minnesota's food and beverage manufacturing sector.

AURI contracted the Region Nine Development Commission to complete the report. As part of the research, Region Nine interviewed several large and small business owners and food innovation ecosystem support agencies. AURI hosted a webinar



Watch the "Discussing Food and Beverage Manufacturing in Minnesota" webinar at [auri.org/webinar-wednesday](https://auri.org/webinar-wednesday)

in February 2021 highlighting preliminary findings of this work along with insight from MDA and perspectives from Sunil Kumar who leads a scaling food business. A recording of the webinar is available on the AURI website.

## The Purpose of the Assessment

"What we hear from businesses is that when they are ready to move to the next step and start ramping up production, they run into issues. Either they can't find a manufacturing partner that fits with their business model, or they can't meet the minimum order quantity the manufacturer requires. So, they look for a co-packer in another state, or they stay where they are in terms of production and don't take advantage of new market opportunities," said Jason Robinson, AURI's business development director-food. "The purpose of this assessment is to highlight those pain points and really understand the problem we need to solve because ultimately we want to keep those businesses growing in Minnesota and even attract and support new ones."

The assessment is important work. Financial investment in this space creates a positive financial ripple effect. According to the assessment, Minnesota sees a greater return on GDP tied to investment in food and beverage manufacturing than in any other industry in the state.

The state of Minnesota has also been studying this topic for many years. The MDA has already compiled and published an online directory of the state's co-packers on its website to assist food and ag businesses. More work is needed to make connections and help the industry, said Brian Erickson, the new markets program manager at MDA. There are many avenues to explore as part of the overarching discussion, Erickson said. The report will hopefully provide guidance on the most effective next steps.

## Working Towards Solutions

"There is no easy solution to this problem," said Erickson. "We are not expecting this report to be the silver bullet and answer all of [the] questions. What it will do is provide all of us who are supporting these businesses with a series of concrete recommendations and additional questions we need to be asking, and places that we can provide some resources to help further support this industry."

"Both food businesses and co-packers have a vested interest in this research and the associated solutions," Robinson said. "Creating an environment in which right-sized manufacturing is a profitable business model benefits everyone, from the consumer to the retailer to the brand. For AURI, this work is well-aligned with our mission to foster long term economic benefit for Minnesota."

"Notably, this problem is not specific to Minnesota, but with the right public and private partnerships, Minnesota has a chance to lead the nation forward on this issue," Robinson said.

Minnesota's Co-Packer Directory from the Minnesota Department of Agriculture can be found at [mda.state.mn.us/minnesota-co-packer-directory](https://mda.state.mn.us/minnesota-co-packer-directory)



# Resources for Emerging Farmers



BY AURI

Three years ago, the average age of a Minnesota farmer was 56.5 years old according to the Census of Agriculture. As our farmers continue to age, there is an increased need to support the next generation of agricultural producers in the state.

In February 2020, the Minnesota Department of Agriculture (MDA) released an important report about the barriers new and potential farmers face in Minnesota. The 37-page “Emerging Farmers in Minnesota” report explored the questions: who are emerging farmers, what are the barriers to entry, and what actions is Minnesota taking to support the future of agriculture in the state?

Conducted through six listening sessions with more than 200 participants, the report defines “emerging farmers” as individuals entirely new to farming as well as generational farmers who have been outside the scope of traditional state and federal agricultural support programs. This categorization focuses on historically underserved communities including women, veterans, persons with disabilities, Native American/Alaska Native, communities of color, young and beginning farmers, and LGBTQ+ farmers.

The report also laid out recommendations to support and cultivate this next generation of farmers. And in November 2020, the Minnesota Legislature appointed seventeen Minnesotans to an Emerging Farmers’ Working Group.

“Many Minnesotans are interested in agriculture and looking for a pathway to succeed at farming, only to encounter numerous barriers when entering the field,” Lt. Governor Peggy Flanagan says about the launch of the working group. “I’m excited about the trail-blazers and risk-takers who are lending their abilities and perspectives to this effort to make agriculture more inclusive.”

The group focuses on advising the MDA and Minnesota Legislature on ways to advance the success and sustainability of farmers who traditionally face barriers to the resources necessary to build profitable agricultural businesses. All the group’s meetings are open to the public and currently held virtually.

The MDA also carved out space on its website to consolidate resources for emerging farmers. The



“MDA Resources for Emerging Farmers” page includes the following resources for beginning, emerging and retiring Minnesota Farmers.

## FarmLink

The FarmLink program brings together retiring farmers and landowners who want to see their farms or farming operations continue with beginning farmers who are looking for land, farming operations, or mentors. It also provides users with a list of available land and livestock operations that are for sale or rent.

## Farm Business Management (FBM) Scholarships

The Beginning Farmer Farm Business Management Scholarship is available to eligible farmers in Minnesota who want to learn business management strategies that will lead to profitable farming operations. FBM scholarships are available through eight Minnesota State Colleges and Universities. Each scholarship pays up to 50 percent of tuition for up to 40 credits.

## Beginning Farmer Tax Credit

The Minnesota Beginning Farmer Tax Credit provides tax credits for the rent or sale of farmland or a variety of farm assets for beginning farmers. This includes

incentives for the sale of farmland. To qualify for the tax credit, a recipient must be a Minnesota resident who is seeking entry, or entered into farming, within the last 10 years.

## Agricultural Microloan Program

The Pilot Agricultural Microloan Program assists non-traditional farmers by providing lending capital while developing their farm business towards traditional agricultural credit. Farmers can borrow up to \$10,000 for working capital (annual inputs such as seed, feed, fertilizer, land rent, etc.) or equipment and other farm asset purchase with a common useful life of 10 years or less.

## MDA Grants, Loans and Financing

The MDA has many grant and loan programs to help farmers improve and expand their current operations. Programs include support for new equipment, changes to farm management practices, expansion of a farm, or more. A complete list of the MDA’s grant and loan programs is available on its website.

All of MDA’s current resources for new and emerging farmers can be found at [mda.state.mn.us/mda-resources-emerging-farmers](http://mda.state.mn.us/mda-resources-emerging-farmers)

Find resources for emerging farmers at [mda.state.mn.us/mda-resources-emerging-farmers](http://mda.state.mn.us/mda-resources-emerging-farmers)

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# I-29 Moo University's Dairy Podcast

BY AURI

The I-29 Moo University Dairy Consortium launched a new podcast in 2020. Created for dairy producers along the I-29 corridor and across the United States, the podcast shares industry-specific insights from the Consortium's Extension Dairy Specialists.

"The podcast discusses current issues faced by dairy producers from economics and animal health, to forage, labor and farm programs," said Kim Clark, Nebraska Extension dairy educator, and one of three regular hosts for the program.

The I-29 Moo University Dairy Consortium is a collaboration of land-grant University Extension specialists from Iowa, Minnesota, Nebraska, North Dakota and South Dakota as well as representatives from the dairy industry with complementary expertise and knowledge of dairy production and management in the region. Minnesota-based partners in the Consortium include the University of Minnesota Extension, the Minnesota Dairy Initiative and the Minnesota Milk Producers Association.

The consortium's mission is to advocate for a sustainable dairy community through education. The twice-monthly podcast offers a new medium for outreach by featuring commentary by dairy specialists in conversation with other dairy industry experts. The podcast hosts include Kim Clark, Jim Salfer, Minnesota Extension Dairy Educator and Fred M. Hall, Northwest Iowa Extension Dairy Specialist.

"Podcasts give dairy producers another avenue to receive timely, relevant dairy-related information such as production practices, financial management



Subscribe to the  
**'I-29 Moo U Dairy Podcast'**  
on iTunes, Spotify or any  
podcast platform.

and practical strategies, and they don't have to attend a workshop or be in front of their computer," said Jim Salfer.

Past podcast topics to-date include the Coronavirus Food Assistance Program (CFAP), heat stress, forage preservation and sampling, feeding strategies, animal activism, silage safety, risk management tools, reproduction, and quality assurance programs, as well as value-add ag opportunities.

"The podcast is geared toward dairy producers of all sizes from 20 cows to 10,000 cows," Hall said. "We hope that producers will interact with questions and comments that can help us develop more programs specific to what they need to know."

Each episode is about 30 minutes and is available on the I-29 Moo University website at [feeds.captivate.fm/i-29-moo-u](https://feeds.captivate.fm/i-29-moo-u), as well as on each state's Dairy Extension website. Producers can also subscribe to the "I-29 Moo U Dairy Podcast" on iTunes, Spotify or any podcast platform. Past episodes are archived and available for review at any time.

The Dairy Business Innovation Alliance (DBIA), a partnership between the Center for Dairy Research (CDR) and Wisconsin Cheese Makers Association (WCMA), distributes grants to dairy based farms and processors in Illinois, Iowa, Minnesota, South Dakota and Wisconsin. Applications for grants up to \$50,000 are being accepted through April 30, 2021.

To learn more, go to [cdr.wisc.edu/grant-program](https://cdr.wisc.edu/grant-program)

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