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WHAT'S NEXT FOR AURI?

July 1st marks the beginning of a new fiscal year for AURI. So, as I write this letter to the devoted readers of the Ag Innovation News, my thoughts are very much focused on the future. What will the coming year bring for AURI? What innovations will AURI's dedicated staff investigate and help commercialize? Above all, how will this 30+ year-old organization continue to achieve its mission of fostering long-term economic benefit for Minnesota through value-added agricultural products?

These are all important questions.

Over the course of the coming year, I project AURI will undertake well over 100 projects and initiatives to advance value-added agriculture opportunities to benefit producers, entrepreneurs, the agriculture industry and the state economy. Notably, we will expand the number of projects and initiatives related to meat, livestock and new innovations in the traditional protein space with new staff capacity, support from the Minnesota legislature and agreements with the USDA to empower local and regional meat processing. In addition, we have plans in place to undertake efforts related to renewable natural gas and nutrient recovery and resiliency, including anaerobic digestion and green ammonia applications for the agriculture sector. Also, AURI will continue its outreach and educational efforts via the AURI Connects program, which hosts a variety of special webinars on all things related to value-added agriculture.

While these are just a few examples of the important work AURI will conduct over the next 12 months, I'd like to share some details about them with you.

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Anaerobic Digestion

There has been an increased focus on renewable natural gas through state programs, including Minnesota's Natural Gas Innovation Act, which creates new opportunities for renewable natural gas and anaerobic digestion as a method to create value from agricultural products produced in the state.

While anaerobic digestion has typically focused on larger operations due to the capital cost requirements, part of AURI's effort will be to look at collaborative or community models to determine if new models can be economically feasible in the current environment. Additionally, AURI has been exploring funding opportunities to conduct a collaborative study to highlight areas in Minnesota where critical masses of consistent feedstocks exist along with infrastructure needs to identify areas where investment in anaerobic digestion may make sense to further explore across the state.

To that end, AURI has been working with industry thought leaders to ensure both the business and technical aspects align for de-risking opportunities and adding new value streams for ag products produced in the state.

Meat Science and Innovation

Last year, AURI advanced its support of the meat and livestock industries through legislative support to fund a new meat scientist position for the organization.

This allowed AURI to begin discussions with the USDA to partner on new programs, resulting in hiring not just one but two new staff members with a primary focus to empower local and regional meat processors and livestock producers through business development efforts and technical support. AURI is working on a regional program to support the local and regional meat processing industry as a result, which includes capital tools, a resource map, training and short courses and business and technical assistance.

Additionally, AURI is working to update its meat lab inspection in Marshall, Minn to make this resource available to processors. A significant element of this is to have the lab obtain a grant of inspection from the USDA and finalize the HACCP plans, which will allow AURI and others to use the space beyond its research function currently.

AURI Connects Program

The AURI Connects program is the platform we use to educate and build connections among various stakeholder groups for the purpose of continued innovation in value-added agriculture. Events range from webinars, to focus groups, to large in person events such as our New Uses Forum.

Looking forward, AURI plans to continue hosting monthly online discussions via its Webinar Wednesday platform, as well as host several in-person events for the Fields of Innovation program. I know many readers have already participated in past events and I hope you will continue to enjoy them as we move into the new fiscal year. Finally, AURI will launch a podcast in the coming months to further highlight opportunities and hear from state, regional and national experts working in the value-added agriculture space.

In closing, there's a lot to be excited about at AURI in the coming year and I hope you will follow along to learn more about all the great work being done to support Minnesota's agricultural sector.



By AURI

This quarter, Ag Innovation News highlights Board Secretary and Treasurer, Carolyn Olson. Olson has a long history in the agriculture industry. She raises corn, soybeans, small grains and alfalfa with her husband on a farm near Cottonwood. In this edition of AIN's Board Q&A, she shares her thoughts on why she wanted to be part of AURI and her vision for the organization.

AIN How did you become involved with AURI?

CO The Minnesota Farm Bureau has a seat on the AURI Board. It was previously held by John Gilbertson, who gave updates on AURI at our MFBF board meetings. When John retired from the Farm Bureau board, he recommended that I take his place, knowing that AURI's mission and work would be something I enjoyed.

AIN What goals do you have for the organization?

CO As a board, our job is to direct and protect the organization. One goal is to make sure staff has what they need, including the time to complete projects. Growth at the expense of employees is not sustainable.

AIN What is your vision for AURI over the next three years?

CO We have a lot of positive things happening at AURI, and I see that only getting better over the next few years. As AURI becomes more visible, our opportunities increase across our project areas, leading to growth in project scope along with hiring additional staff to ease the workload that comes with growth. I also see us expanding our footprint in a few of our lab locations, which is needed.

AIN How would you describe your leadership style?

CO I am a people person who likes for every board member to feel like they add value to meetings. While many things need to be discussed in a serious manner, I also believe there is room for a little fun. Building relationships to foster board cohesion is important for good, honest discussion.

AIN Why did you decide to run for board secretary and treasurer?

CO I was looking for an opportunity to give more to the AURI board, so when approached about the secretary/treasurer position, I took a leap and ran for the spot. I have enjoyed working with Shannon and Adam on the financial elements of the organization.

AIN What role do you expect AURI to play in the future of MN's value-added ag?

CO AURI will continue to be an important part of Minnesota's value-added agriculture landscape. One of the great things about being a part of this organization is seeing projects that are a solution to an issue you had no idea existed, or projects that have a unique way of using coproducts to create new foods. As long as there are dreamers who need ingredients grown by Minnesota farmers, AURI will have a reason to be.



MAKING THE CASE FOR NUTRIENT RECYCLING IN AGRICULTURE AND ENERGY

Due to the rising cost of natural gas and increased production costs to secure essential materials, the cost of fertilizer has skyrocketed around the world, leading to higher production costs and financial headaches for farmers.

Nitrogen, phosphorous and potassium are the three critical components in fertilizers used in crop production. According to the International Food Policy Research Institute, prices for these essential materials increased 125 percent from January 2021 to January 2022. Prices jumped another 17 percent from January 1, 2022 through the end of April 2022, before falling 30 percent by the end of May 2022 due to a decline in consumer demand. These increases are the result of several factors. Including the fact that most countries source the raw materials to make fertilizer through a global network. Thus, the price is heavily influenced by global events.

For example, China, which typically provides 24 percent of the world's phosphates, 13 percent of nitrogen and two percent of its potash, halted fertilizer exports last year.

Russia is another significant contributor of all three essential ingredients to the global fertilizer market, and its invasion of Ukraine has disrupted the global supply chain and the flow of input materials as well as food. Further, natural gas is used as both a feedstock and an energy source to produce nitrogen-based fertilizer. The price of natural gas has risen significantly worldwide over the past two years.

These market swings have significant implications for Minnesota's producers and agribusinesses. Realizing the significance of these developments, the Agricultural Utilization Research Institute (AURI) began focusing on ways to recapture and recycle nutrients such as nitrogen, phosphorous and potassium from various processing streams. In addition, AURI has started exploring ways to develop and refine innovative approaches to recover these materials from agricultural byproducts and reuse them in future production. Shortening the supply chain

and revisiting value propositions for byproduct streams can be a win-win approach by providing lower cost options for farmers while adding value to byproduct streams produced by Minnesota agribusinesses, and at the same time, providing supply chain resiliency and reducing the carbon intensity of crop production.

In May 2022, AURI hosted a webinar highlighting some of the work conducted previously in Minnesota to advance the recycling of essential nutrients in agricultural production and agri-processing streams to reuse these materials as inputs in crop production.

Reusing these materials shows positive outcomes both environmentally and economically, said Dr. Luca Zullo, AURI's Senior Director of Science and Technology.

Nutrient recovery creates brand new value-chains for the agriculture sector. All of this is part of a larger movement to decarbonize the fertilizer production cycle and make the system more resilient to these global shocks, he said.

AURI works in both nutrient recovery and recycling, and there are many opportunities of exploration to accomplish these goals and conduct further research. AURI staff have also worked to find ways to incorporate byproducts like corn stover into soil during the next planting season. These byproducts contain nitrogen, phosphorous and potassium. Additionally, work focuses on utilizing food processing byproducts as a nutrient source for crop production. For example, in 2008, AURI conducted research utilizing ethanol solubles from ethanol production as a nutrient source for growing corn.

Ethanol production from corn is a significant industry in Minnesota. In the fermentation and distillation process, large quantities of a slurry byproduct are produced. This coproduct, referred to as ethanol solubles, is rich in nutrients, containing 70 to 80 pounds of nitrogen, 80 to 100 pounds of phosphate, 60 to 70 pounds of potash and seven to nine pounds of sulfur per 1,000 gallons. Reusing these solubles creates significant value. Most ethanol plants spray solubles onto distillers grains to add nutritive value to the dry distillers grains solubles. The resulting product is Dried Distillers Grain with Solubles (DDGS). The DDGS is used as a livestock protein, fiber and energy source, and also has potential use as a liquid feed for beef and swine.

AURI partnered with the Minnesota Corn Research and Promotion Council on this 2008 study to evaluate the performance of ethanol solubles when used as a fertilizer. The study objective was to determine how nitrogen, potassium and phosphorous applied via the liquid solubles versus a typical fertilizer application impacted corn yields. Research was conducted by the University of Minnesota Southern Research and Outreach Center in Waseca.

The results were positive, showing nitrogen availability at 21 percent in the first year with an increase in soil phosphorous and potassium as well. AURI is currently exploring methods to remove the nutrients and process them in a solid form versus liquid. Having a safe, easily transportable solid material that is rich in nutrients stimulates many new markets, said Alan Doering, AURI's Senior Scientist, Coproducts.

"This is an incredible opportunity. Recovery and recycling of one to possibly three major nutrients has a direct impact on the fertilizer carbon cycle," said Doering. "If we can recapture these ingredients and find efficient and safe ways to transport them locally to be used in fertilizers, it will significantly reduce the transportation costs and expand the area of distribution."

AURI is also working on research that recovers nutrients from the waste streams generated by livestock manure application to fields. Doering said this technology can reduce runoff and save farmers money. Farmers have

also learned that animals often need less phosphorus than was once industry practice and have made strides in reducing the practice of overfeeding animals this mineral. Reducing the amount of phosphorous in animal feed and even recovering it from the manure before it is field applied is another promising area of exploration.

Recovering nutrients from wastewater treatment facilities and ag processing streams through anaerobic digestion is another intriguing opportunity area. An example of this work is in St. Cloud, Minn. The city owns and operates the St. Cloud Wastewater Treatment Facility shared with the cities of St. Augusta, St. Joseph, Sartell, Sauk Rapids and Waite Park. The facility treats an average flow of 13 million gallons per day, generated from a population of over 120,000 people.

It also recycles and reuses nutrients in the wastewater stream and turns them into a liquid nitrogen and solid phosphorus fertilizer product distributed to farmers throughout central Minnesota. On site biofuel storage helps optimize the fuel produced for the biofuel generator. The facility runs almost 100 percent on energy produced on site through renewable sources, generating revenue for St. Cloud.

Overall, the facility generates about 1,700 tons of Ostara Pearl (magnesium ammonium phosphate/struvite) per year by recovering the nutrients from wastewater. This fertilizer component is shipped and utilized in the Red River Valley. The facility also generates approximately 7 million gallons of Class A liquid biosolids fertilizer that is injected into area farmland.

In addition to the fertilizer production, the St. Cloud wastewater facility also generates energy through a biogas generator. The process of anaerobic digestion reduces the wastewater organic pollutant load and converts the waste feedstocks into renewable natural gas and ultimately to electrical energy.

"We are taking a product with enormous amounts of nutrient value and energy value and reusing it. We aren't sending it through the [treatment system] which would be increasing our carbon footprint," said Tracy Hodel, Public Services Director for the city of St. Cloud.

Plus, by taking materials from local industries like breweries and other manufacturers, the city is saving local businesses money. Without the St. Cloud treatment center, they would have to build their own treatment facility or pay to haul the waste to another facility and incur expensive tipping fees, Hodel said.

"A lot of people ask why we are doing this. They think that going green and green energy is expensive. But our experience to date has been that this [wastewater treatment program] has exceeded our expectations for energy efficiency and savings. We discovered that green is cheaper and that helps us stabilize our taxes and our utility rates in the city," said Hodel. "It has also helped our local businesses reduce operation and maintenance costs and allowed those companies to expand and add jobs. We are excited to continue looking into and exploring green technologies and being a leader in this area."



TAKING PRIDE AND MAKING STRIDES IN LOCALLY PRODUCED TURKEY

When Land O'Lakes announced in 1988 that it would be closing its turkey processing plant in Thief River Falls, Minn. at the end of the year, growers who supplied birds to the plant were left with few viable options to market their birds. Rather than accept defeat, 19 turkey growers from northwestern Minnesota and northeastern North Dakota banded together, formed a cooperative and purchased a facility.

By: Dan Lemke

More than 30 years later, the spirit that drove the creation of Northern Pride, Inc., is still on full display as the co-op responds to changing markets and shifting consumer demands.

Minnesota is the nation's top turkey producing state, raising between 40-42 million birds per year, according to the Minnesota Turkey Growers Association. Turkey production has been a part of northwestern Minnesota's agricultural economy for decades.

"Currently, we have 18 owners, of which most are now second, third and even fourth generation growers," says Troy Stauffenecker, Northern Pride general manager. "We also have six non-owners who supply their live turkeys to us."

Stauffenecker says Northern Pride processes 2.5 million turkeys each season from mid-April to the end of November, handling about 20,000 birds per day.

"We focus on whole birds for the Thanksgiving market, but have started producing items for year-round consumption," Stauffenecker says. "We are a co-packer for most major retailers, meaning we pack the turkeys in the retailer's label versus our own Northern Pride label. We also export to Mexico and a few other countries across the globe."

Northern Pride produces whole birds, bone-in breasts, split breasts, half turkeys and tray pack parts sold into retail markets, as well as various turkey products sold to others for additional processing.

Adapting to Change

As with most areas of agriculture, turkey production has changed over the years. Stauffenecker says that in 1989, the majority of growers supplying turkeys for Northern Pride raised their birds free range. Today, nearly 100 percent of the birds are raised in environmentally controlled barns.

“We have seen genetics improve, so we have gone from raising mainly toms to hens,” Stauffenecker explains. “We are now able to get our hens as big as the toms were 30 years ago.”

Changes have not only occurred in genetics and husbandry, Northern Pride also adapted how it markets the birds. Stauffenecker says the cooperative entered the organic and raised-without-antibiotics markets as those sectors expanded in the past decade.

Changes in demographics and other social factors impelled the cooperative to expand its product offerings.

“There has been a change in markets toward buying smaller portion items with smaller family gatherings due to COVID,” Stauffenecker says. “Seeing this need, we started producing split breasts, half turkeys and most recently, tray pack parts to meet the need for smaller portions. This was in response to requests from our customers to supply items other than whole birds as they had needs that were not being met.”

AURI Assistance

For more than a decade, the Agricultural Utilization Research Institute (AURI) has operated the Rural Cooperative Development Center, funded through the U.S. Department of Agriculture (USDA) to support and assist cooperatives in their ability to grow. AURI's Center, along with the Northwest Regional Development Commission and the City of Thief River Falls, began working with the Northern Pride cooperative in 2016, helping them navigate the process of accessing Value-Added Producer Grants offered through the Minnesota Department of Agriculture (MDA). While initial efforts to receive the awards were unsuccessful, subsequent attempts yielded grants which have helped Northern Pride expand its capabilities.

“In 2018, we assisted them with capitalization efforts for business expansion,” says AURI Project Manager Becky Philipp. “This allowed them to leverage their funds to upgrade their bagging and packaging equipment to increase efficiencies and processing to tap into another market opportunity.”

In 2021, AURI's Center again worked with Northern Pride through the Rural Cooperative Development program on a USDA Value-Added Producer Grant.

“We helped them secure a federal Value-Added Producer grant, which needed a feasibility study,” explains AURI Business Development Director Harold Stanislawski. “In order to apply for that grant, AURI's Center provided funding and business development assistance to help them get through the process of that comprehensive program so that they could be eligible, and they were successful.”

“AURI's Center has assisted us with business development efforts to secure several grants that we have been eligible for,” Stauffenecker says. “These funds have helped us purchase new or upgrade processing equipment that has allowed us to be more efficient as well as expand our processing capabilities. AURI's Center provided their expertise and resources to assist with business development steps in the application process, which we were awarded in all of our applications.”

“We recently purchased an adjacent property to our original facility and renovated that space into a further processing facility that allowed us to expand into other markets and provide our customers with a full line of turkey products, which has been very exciting for us.”

Rural Impact

Philipp says working with Northern Pride to help them with capitalization efforts to grow its operation is an example of how the Rural Cooperative Development program is supposed to work.

“It's nice to see AURI being good stewards of the Rural Cooperative Development funding that we receive because it's funding that's doing what it's intended to do,” Philipp says. “It's helping us strengthen rural co-ops and the communities they're in.”

The Northern Pride facility may be physically located in Thief River Falls but receives turkeys from growers scattered across the region. Success of the cooperative means the economic ripples spread to a much broader area.

“It's good to see that community and all the growers in northwest Minnesota that serve the Northern Pride plant benefit,” Stanislawski says. “That benefit even extends to my area here in Otter Tail County because we have turkey growers that belong to that Thief River Falls business and market their birds there. It's been extremely gratifying for AURI's Center to work with Northern Pride because it's boots on the ground type impacts. They got the project up and running. There's a brand-new, renovated facility up there. It's fantastic.”

“It's great to see businesses like Northern Pride growing in the community and creating more jobs,” Philipp says. “It's definitely a win-win.”

About the Rural Cooperative Development Center

Since 2011, AURI's Rural Cooperative Development Center has helped agriculture cooperatives remain vital and grow. AURI's Center also works with newly created cooperatives and organizations operating in tandem to launch new businesses and plan for long-term viability.

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

The Center helps with a variety of services, including product assessment, feasibility assessment, market analysis, project management and more.

AURI's Rural Cooperative Development Center services and assistance are available to co-op members, groups that want to form a cooperative, group-owned businesses and mutually owned rural businesses.

The Center is supported by funds from the Minnesota state legislature and the USDA's Rural Development agency.

Learn more about the AURI Rural Cooperative Development Center by visiting:

auri.org/access-auri-services/partnerships/rural-cooperative-development-center/
or call 218.281.7600.



TRADITIONAL, CREATIVE CAPITAL SOURCES FOR GROWING FOOD AND AG BUSINESSES ABOUND IN MINNESOTA

In March, the Agricultural Utilization Research Institute (AURI) hosted the fourth annual News Uses Forum in partnership with Compeer Financial and Georgetown University's Rural Opportunity Initiative. The conference explored the intersection of sustainability, innovation and investment in food and agriculture.

One of the many highlights of the two-day event was an extended discussion on the public and private funding streams available to help launch new businesses and create jobs in the agriculture sector and rural America. Dr. Karama Neal, the administrator of the United States Department of Agriculture's (USDA) Rural Business-Cooperative Service, gave a keynote address on the USDA's various financial resources and grants available to help agriculture producers and small business owners. Following her discussion, a panel of industry experts explored additional alternative capital sources for entrepreneurs and agribusinesses.

Dr. Neal said the USDA's Rural Business-Cooperative Service offers programs that help provide capital, training, education and entrepreneurial skills to assist those living in rural areas start and grow businesses or find jobs in agricultural markets and in the biobased economy. The service prioritizes programs that combat climate change, improve food security, build stronger communities, build resilient agriculture markets and address past inequities in USDA programs. A recent focus of the service has been programs to help rural America recover and adjust from the economic hardships created by the COVID-19 pandemic.

The USDA has invested \$4 billion to strengthen critical food supply chains through the American Rescue Plan. Funding is available for projects in four categories: production, processing, distribution and markets. The USDA hopes these efforts will strengthen the food system, create new market opportunities, help communities recover, create and foster well-paying jobs and combat climate change.

As a result, the USDA started the Food Supply Chain Guaranteed Loan program in late 2021. Through this program, funding is available for investments in facilities, working capital, equipment and other investments. The guaranteed loan program is directed at the "middle of the food supply chain" and projects that improve food aggregation, processing, manufacturing, storage, transportation, wholesale and distribution.

"We welcome and encourage participation in this program from a variety of lenders to help promote access to these funds," Neal said.

A high priority of the USDA, Neal said, is making a more fair, competitive and resilient meat and poultry supply chain. One example of how the federal government is working toward that goal is the Meat & Poultry Processing

Expansion Program. Through this program, funding is available to start or expand meat and poultry processing operations to increase capacity nationally. "This is one of many actions that the USDA is taking to increase and enhance local and regional food systems and support economic systems where wealth is created and retained in rural areas," Neal said.

Another funding source available to producers and businesses is the Healthy Food Financing Initiative (HFFI). This initiative works to improve access to healthy foods in underserved areas. Grants are available to health food retailers and cover the higher costs associated with doing business in traditionally underserved areas.

The Value-Added Producer Grants, designed for ag producers in both rural and urban centers, expand value-added activities that process and market new products. These grant dollars can generate new income, products and opportunities.

"This is one of our most popular programs. It is often used for food products, but these grants can be used very broadly for nonfood value-added products, like wool or leather," Neal said.

Rural Energy for America Program (REAP) grants are good examples of how the USDA assists small, rural businesses and agricultural producers while not actively funding production. These dollars are used for energy audits, renewable energy development assistance and providing support for renewable energy systems to make efficiency improvements.

There is also a REAP Guaranteed Loan program used by entities like solar farms, dairy farms and traditional ag producers to install energy efficient equipment and systems at production and processing facilities.

Additionally, there are general funding programs non-specific to food and agriculture that have agriculture applications. The Business & Industry Guaranteed Loan program is one example. It offers loan guarantees up to \$25 million to rural small businesses. Successful applicants frequently use these funds for post-production agriculture activities, Neal said.

The USDA provides smaller loans through nonprofit lenders in the Intermediary Relending Program (IRP). Selected financial partners receive up to \$2 million from the federal government to lend to small businesses in the form of long-term, 30-year, low interest loans. The IRP is specifically designed to improve economic conditions and create jobs in rural communities.

The federal dollars available through the USDA play a significant role in helping food and agriculture business start and grow. However, federal dollars do not meet every need in this emerging sector.



Following Neal's keynote address, a panel discussed some of the alternative capital sources available for entrepreneurs and agribusinesses. Aaron Knewtson, vice president of food and agribusiness at Compeer Financial, moderated the discussion. The panelists were Jeff Ochs, CEO at the Venn Foundation, Tim Penny, president and CEO of the Southern MN Initiative Foundation, Neela Mollgaard, executive director of Launch Minnesota and Andrea Yonah, director of business development at the Binational Industrial Research and Development (BIRD) Foundation. Neal also participated in the panel.

Compeer naturally receives many inquiries from entrepreneurs looking for capital, and Minnesota has a host of options and a broad network of talented people available for them, including the Venn Foundation, the USDA and Bread and Butter Ventures, Knewtson said.

“A lot of times people are ready to go from the idea stage to a proof of concept or from simply having a product to creating a business, but they aren't far enough along in the journey for the type of capital we [at Compeer] provide. Minnesota is incredibly fortunate to have many other capital and technical assistance providers like AURI and Launch Minnesota that are willing to help,” Knewtson said.

One avenue for those entities in the very early stage of a business idea are Program-Related Investments (PRI), said Ochs. A PRI is an investment that a private foundation or public charity makes to advance a charitable mission. However, PRIs are not grant or donation dollars. Instead, financial terms of the investment must be “below market” rate, and when the investment is repaid, the donor can re-deploy it in a new venture. PRIs are a good tool for ag businesses looking for alternative sources of capital, said Ochs.

“For-profit investors would stay away from these terms because they are too low, and most philanthropists don't know what PRIs are. We are working hard to make these investment vehicles more mainstream,” he said.

The BIRD Foundation's mission is to stimulate, promote and support industrial research and development to the mutual benefit of the United States and Israel. The foundation provides matchmaking support between U.S. and Israeli companies, as well as funding covering up to 50 percent of project development costs. BIRD has supported many projects in agriculture, as well as renewable and alternative energy, said Yonah. A U.S. and Israeli company must apply jointly to be eligible for grants.

Yonah said there is exciting innovation occurring throughout the food and ag space involving Israeli and American companies.

“Adapting AI technology to the food and ag space and autonomous systems are two areas that we are really excited about right now, especially in this tight



The Southern Minnesota Initiative Foundation (SMIF), a donor-supported foundation, invests for economic growth in south central and southeastern Minnesota to the tune of about \$5 million annually. Through a SEED Fund, SMIF invests up to \$25,000 to support start-up businesses that need capital and business expertise. Additionally, companies use SEED Fund dollars for research, patent opinions and filings and product testing. Through the Southern Minnesota Equity Fund, SMIF provides financial capital and expertise to early stage and start-up companies. The fund partners with other organizations and individual investors to leverage capital and expertise to grow innovative companies that will provide economic opportunities for Southern Minnesota.

Launch Minnesota is an initiative spearheaded by Minnesota's Department of Employment and Economic Development to help grow Minnesota's start-up ecosystem. It accomplishes this by cultivating a collaborative start-up culture, bringing together talent and improving access to capital for start-ups.

Launch Minnesota awards innovation grants to support business operations and help entrepreneurs. Thus far, 11 percent of the businesses awarded grants have ties in the ag tech sector, 14 percent in biotech and six percent in clean energy. 21 percent of the grant recipients reside in greater Minnesota.

“We have seen that a connected and coordinated ecosystem helps drive change. What we are trying to do is ensure that individuals and communities are educated about the value of engaging in [investing] and the impact it has on our agriculture economy and rural communities,” said Mollgaard. “The states and cities focusing on innovation are the ones that are growing and separating themselves from those who are not. We want to make Minnesota one of the best places in the country to start and scale new ventures.”

For more information on these organizations and their programs, please visit each entities website or contact AURI to see if a program is a fit to advance your business and accelerate an innovative idea to the market.



Flying High with Sustainable Aviation Fuel

Across the United States and around the world, there is a growing focus on renewable energy—energy collected from sources that can be more quickly replenished. Driving this trend is a focus on reducing carbon emissions and strengthening the global energy supply chain, making it shorter and more resilient. One major component of this trend is interest in sustainable aviation fuel (SAF).

SAF is a biofuel used to power aircraft. It has similar properties to conventional jet fuel, but a smaller carbon footprint. Depending on the feedstock and technologies used to produce it, SAF can greatly reduce life cycle greenhouse gas (GHG) emissions. It is a safe, reliable and low carbon alternative to standard jet fuel.

“The aviation industry is a huge energy consumer, so it is also a very large player in carbon being released into the atmosphere,” said Ron Obermoller, a member of the Agricultural Utilization Research Institute’s Board of Directors (representing the Minnesota Soybean Research and Promotion Council). “To be greener, they either need to buy credits or use fuels with better carbon scores.”

On a national scale, the U.S. Department of Energy is working with the U.S. Department of Transportation, the U.S. Department of Agriculture and other federal government agencies to develop a comprehensive strategy for scaling up new technologies to produce sustainable aviation fuel commercially.

To further emphasize a commitment to renewable energy, these agencies launched in 2021 the Sustainable Aviation Fuel Grand Challenge (Grand Challenge) in an effort to reduce the cost, enhance the sustainability and expand the production of and use of SAF, while accomplishing two main goals: (1) Achieving a minimum 50 percent reduction in life cycle greenhouse gas emissions compared to conventional fuel, and (2) Meeting a goal of supplying sufficient SAF to meet 100 percent of aviation fuel demand by 2050.

A regional example of this work is the Commercial Aviation Alternative Fuels Initiative (CAAFI), launched in 2006, which is working to enhance energy security and environmental sustainability for aviation using alternative jet fuels. CAAFI is a coalition of airlines, aircraft and engine manufacturers, energy producers, researchers, international participants and U.S. government agencies. Together, they lead the development and deployment of alternative jet fuels for commercial aviation.

Steve Csonka, Executive Director of CAAFI, says the organization’s goal is to promote the development of alternative jet fuel options that offer equivalent safety and reasonable costs compared to petroleum-based jet fuel, while offering environmental improvement and energy supply security for the aviation industry.

According to CAAFI, volatility in petroleum prices caused fuel to become the single largest component of U.S. airline operating costs for the first time in history in 2006. Csonka states that while U.S. commercial aviation consumes about three percent of the United States’ total energy use, it drives about six percent of the U.S. gross domestic product and just under nine percent of national employment. “Secure and sustainable fuel sources are essential for its continued prosperity to the benefit of the American people,” he said.

Through chemical and biochemical processes, renewable jet fuel is derived from a variety of natural sources, including oils, greases, sugars, starches, waste streams and byproducts. The market size in the U.S. is 26 billion gallons per year, while the worldwide market size is 97 billion gallons per year. According to Csonka, jet fuel demand is expected to increase 3-5 percent per year for the foreseeable future, following a rebound from the COVID-19 pandemic.

CAAFI believes aviation is international in scope, highly integrated in its fuel supply chain and, because of a significant ability to align and coordinate within the industry, well positioned to pursue alternative fuels.

CHALLENGES

The biggest challenge to the production and commercialization of SAF is cost, with current sources costing twice as much as standard jet fuel, and with additional sources (in their infancy) costing more. Additionally, the projected cost of synthetic fuels using carbon-capture are even higher.

Reducing these costs will require investment in advanced technologies to process feedstocks more efficiently at a greater scale, as well as investment in the development of sustainable and scalable feedstock options.

BENEFITS

According to Air bp, sustainable aviation fuel delivers greenhouse gas reductions of up to 80 percent over the traditional jet fuel it replaces, providing additional environmental benefits. CAAFI indicates there are SAF production pathways that can deliver more than 100 percent reductions (carbon negative fuels) when incorporating renewable power, renewable hydrogen and carbon capture and sequestration. Therefore, SAF plays a significant role in the airline industry’s carbon reduction targets.

Sustainable aviation fuel is a benefit to farmers by utilizing their crops and biomass production, and if cash cover crops are utilized, they provide the added benefit of helping reduce nutrient loss and improving soil quality.

In addition to reducing carbon emissions, biomass crops and cash cover crops that produce oil seeds (e.g.: pennycress, carinata, camelina) help control erosion and improve water quality. They also provide biodiversity and store carbon in the soil. Currently, the aviation industry recognizes seven processes for the production of SAF, with several more being evaluated for approval. These processes already enable the use of fats, oils, greases, starches, sugars, biomass and circular-economy byproducts and waste streams for use in SAF.

In addition, producing SAF from municipal solid waste and wet wastes, like manure and sewage sludge, reduces pollution, while also keeping methane gas out of the atmosphere.

MAKING STRIDES

The aviation industry and governments around the world are working to foster, catalyze, enable and facilitate the production and commercialization of sustainable aviation fuel by removing barriers and identifying pathways for fully synthetic SAF (50 percent max blend), as well as by enhancing the SAF value proposition by enabling deeper net-carbon reductions. They are also pursuing commercial agreements fostered by policy and other unique approaches.

While there is a great commitment to reduce carbon emissions, it will take even more work by governments and researchers to accelerate the growth of SAF. The CAAFI, AURI, public and private researchers and other local, state and national agencies continue to make headway in this growing industry.

“Think about the magnitude in front of us. It’s [SAF] a 100 billion gallon per year market and this past year as an industry we produced 8 million gallons, so we have a lot of runway in front of us,” said Csonka.



Q&A with Gwen Williams, owner of Artisan Naan Bakery

AURI Connects: Fields of Innovation Innovator Profiles is a Q&A series with Minnesota entrepreneurs who have partnered with AURI to build capacity and successfully commercialize new and emerging crops.

AURI: What is your involvement with the Agricultural Utilization Research Institute (AURI)?

GW: AURI introduced Artisan Naan Bakery to Kernza® perennial grain and the vast world of perennial crop research. We worked with AURI on a Kernza Naan pilot project selling our freshly baked Kernza Naan to retail stores and at St. Cloud farmers markets from May-August 2021. Throughout the process, we provided written and verbal feedback to AURI about working with Kernza flour and selling our Kernza Naan. In return, AURI fielded our many questions about Kernza and small grain processing from “field to flour sacks.” AURI also created an online survey to gather information on attitudes and interest in Kernza products among general consumers. Overall, the pilot project was a great success.

AURI: What innovative ag pathway(s) are you blazing?

GW: We believe the ultimate commercial success of the intermediate wheatgrass grain, Kernza, intertwines with its acceptance as a grain used for baking bread.

Baking bread with Kernza enabled our bakery to expand and diversify its fresh bread products. Our Kernza Naan is our first whole-grain Naan to find committed, repeat customers. It’s also one of the vegan (non-dairy) Naans we bake, enabling us to offer more choices to our vegan customers.

In June 2021, we began the planning process of selling Kernza Naan to our wholesale customers in the Twin Cities metro. By August 2021, we delivered our first batches of freshly baked Kernza Naan to four food cooperatives in Minneapolis. From there, we started producing our bakery’s pita pockets using Kernza perennial grain flour. They’re now sold in eight select Lunds & Byerlys stores. We believe we are the first Minnesota bread bakery to place any Kernza bread on grocery store shelves.

AURI: What are the challenges presented and opportunities offered?

GW: The challenges we face with baking and selling our Kernza breads are the same challenges we have always faced as a bakery— production and distribution. And as a local, from-scratch bakery, we have an additional challenge in finding skilled bakers of our breads, as well as interested apprentices who would like to learn the skills of bread making.

An opportunity to grow our business is to scale in a modular or franchise manner, thereby creating a small network of decentralized fresh flatbread bakeries. Or we could develop a new distribution arrangement with a local distributor who is interested in and willing to work with the short shelf life of freshly baked breads so that they can be delivered the very next day.

AURI: Do you or have you collaborated with other small businesses? If so, in what way?

GW: We’re now in our 8th year of business and throughout our run we have worked with other small businesses as a buyer and a producer. We purchase whole milk from Stony Creek Dairy in Melrose, Minn. and extra virgin sunflower oil from Smude Sunflower Oil in Pierz, Minn. Every Naan and pita pocket we make has at least one of those ingredients in it. And every dairy Naan we make contains our in-house yogurt produced with Stony Creek Dairy whole milk.

AURI: How can AURI readers and supporters purchase your products, connect with your business online and help your business thrive?

GW: For a complete, up-to-date listing of our products, visit our website artisannaan.com.

While we primarily wholesale to grocers and food cooperatives in Minnesota, we provide direct sales at our storefront in St. Cloud. You can order online for in-store pickup or have products shipped.

As of January 2022, our Twin Cities metro wholesale customers include: Lunds & Byerlys, Wedge Community Co-Op, Eastside Food Co-op, Linden Hills Food Co-Op, Seward Community Co-Ops and Lakewinds Food Co-Ops. In central Minnesota our products are at Good Earth Food Co-Op in St. Cloud, Minnesota Street Market in St. Joseph and City Center in Princeton.

We also welcome you to follow us on Instagram and Facebook to learn more about our products and discover what’s next.

**This interview has been edited for length and clarity.*

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2022 Winter Oilseeds Supply Chain Field Day

On May 18, the Agricultural Utilization Research Institute (AURI) and the University of Minnesota's (UMN) Forever Green program hosted a unique field day at AURI's facilities in Waseca, Minn.

The event showcased efforts underway to develop supply chains and market demand for new winter-hardy annual oilseeds, with a focus on winter camelina and domesticated pennycress. Both crops show great promise as viable cash cover crops for growers to improve soil health and water quality, and increase profitability. Industry interest in these crops for food, biofuel, feed, bioplastic and protein uses is growing rapidly, with companies from across the state and country partnering with the UMN and AURI to explore scaling acreage, optimizing processing capacity and testing product applications.

The agenda featured sessions on Breeding and Agronomy, Eco-systems Services, post-harvest handling, cleaning and pressing and more. In addition, attendees learned about the benefits of winter camelina and pennycress and explored current and future product applications for the crops. They also had a chance to network and hear directly from industry leaders who share an interest in supporting the development of these new crops.

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