



Ag Innovation News

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The newspaper of the Agricultural Utilization Research Institute



A GUIDE FOR SHELF LIFE

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New AURI website
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PHOTO BY ROLF HAGBERG



BY SHANNON SCHLECHT
AURI EXECUTIVE DIRECTOR



Innovation is essential to Minnesota. It's a major contributor to the state's economy as well as its reputation as being a place where the brightest minds launch revolutionary ideas that benefit the world. Innovation comes from all different corners of the state, Fortune 500 companies, private entrepreneurs, commodity groups, producers, universities or organizations like AURI.

These entities all play unique roles in developing and commercializing innovation in Minnesota, but may not overlap in their efforts for various reasons. Considering all they accomplish individually, the potential to heighten our impact through creation of a shared space for innovation is vast. That very consideration lead AURI to partner with MBOLD to develop the Bold Open Reverse Pitch platform in collaboration with nearly 20 other entities from throughout Minnesota.

The Bold Open brings together producer groups, small to medium sized agribusinesses and some of the world's largest and most influential food and agricultural companies to present "reverse pitches" to an audience of producers, researchers, entrepreneurs, innovators and subject-matter experts. The businesses talk about distinctive industry challenges they face and invite a global audience of innovators to propose partnership solutions.

Due to the concentration of agricultural and food businesses here and the range of challenges and opportunities facing Minnesota's ag and food industries, the growing entrepreneurial ecosystem, and the high caliber research underway at the state's research institutions, it was compelling to collaborators to come together in one place and under one platform to broadcast these challenges to the widest audience possible. In this way, new relationships could be formed, attracting new solutions and opportunities for innovative proposals to these challenges.

The goal of the Bold Open is to help companies and entrepreneurs accelerate the commercialization of innovative solutions in a wide range of fields. In doing so, Bold Open enhances Minnesota's long history and global reputation as an innovation center in food and agriculture. Through this unique collaboration, I hope Bold Open collaborators will uncover novel approaches and solutions to a variety of opportunities, from ingredient and product development to sustainable agricultural solutions.

I am excited about this extraordinary collaboration of leading Minnesota entities and look forward to launching the Bold Open event this summer. For more information, please visit auri.org or boldopenmn.com



I AM EXCITED

ABOUT THIS

EXTRAORDINARY

COLLABORATION OF

LEADING MINNESOTA

ENTITIES AND LOOK

FORWARD TO

LAUNCHING THE

BOLD OPEN EVENT

THIS SUMMER.



Board Spotlight

Q&A with Jeff Grev



BY AURI

This quarter, Ag Innovation News highlights its newest board member, Jeff Grev. He is AURI's second Director-at-Large and has extensive experience in consumer products marketing and new product development thanks to his 25 year career. In this interview, Mr. Grev shares his thoughts on AURI, the food sector and what he sees in the future for both.

AIN

Please tell our readers a little about your background.

JG

I grew up in Shakopee, Minnesota and my parents were the first generation off the farm which led to frequent visits with relatives still operating farms. I was fortunate to join Hormel Foods after graduating from the University of Minnesota -Carlson School of Business. I found the down-to-earth culture and people at Hormel were a great match for me. I've had multiple career experiences; starting out with 5 years in sales & sales training, moving to 15 years of more in depth experience in consumer products marketing and new product development, followed by about 10 years in new business development & acquisitions, and finally 5 years in Government Affairs.

AIN

Which food-related issues are most important to you?

JG

Honesty and transparency in food marketing is important to me. Utilizing science based guidance and regulations to keep consumers appropriately informed is just common sense which we should take to heart.

AIN

What motivated you to join the AURI board of directors?

JG

I have a high interest in innovation related to food products and adding value to agricultural commodities through convenience & improved attributes which differentiate them in the marketplaces. I worked extensively in marketing and new product development for Hormel Foods earlier in my career and enjoyed the challenge. I hope to provide evaluation and insights that are helpful to AURI and the entrepreneurs and innovators they assist.

AIN

How did you first hear about AURI?

JG

A few years ago, Hormel Foods was contacted about collaborating with AURI on new initiatives by Executive Director Shannon Schlecht.

AIN

What are your goals as a new board member?

JG

My primary goal is to make AURI as effective and efficient as possible in helping entrepreneurs bring new products/ businesses to the market that meet a need and are successfully sustained.

AIN

How can Minnesota best support its food innovation industry?

JG

Make Minnesota an attractive home base for new business with friendly tax systems, laws & regulations; and continue to provide resources, such as AURI, to provide the assistance and stimulation to encourage entrepreneurialism. Also, it's important to continue supporting the great universities and colleges that provide world class programs in areas of study that are critical to the food industry.

AIN

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

JG

Growing enough food to feed everyone while protecting the environment. We need to achieve a balance that encourages increasing agricultural productivity and protection of our natural resources.

AIN

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

JG

Successfully collaborate with the rest of the AURI board and other entities to maintain and improve Minnesota's leadership in the food and agriculture space.

An Exploration of Food Industry Trends and Opportunities

Consumer pressure for wholesale changes to the U.S. food system has never been higher than it is today. From clean labels to protein alternatives and sustainable packaging, consumers are contemplating and examining their food purchases in new ways. Vocal advocates are raising more questions about the food they consume, demanding more transparency and a desire for healthier food options.

BY AURI



We're edging toward a time when people provide a blood sample, and technology offers an eating plan customized for you and your personal metabolism needs

In collaboration with the Dutch Embassy in Washington D.C. and the Dutch Consulate General in Chicago, the Agricultural Utilization Research Institute (AURI) developed a report on emerging trends, gaps and opportunities that may lead to impactful innovation for the food industry. As part of the Netherlands efforts to address issues in global food and agricultural sectors, the report summarizes discussions across three focus groups in the key Midwest cities of Chicago, Minneapolis-St. Paul and St. Louis between October 9, 2019 and November 23, 2019. Individual participants represented different sectors of the food and ag industry, government and academia.

The *Dutch Consulate Focus Group Narrative* report explored six key industry trends: foods, farm of the future, processing and manufacturing, packaging, food distribution and food waste through in-depth focus group discussions. These trends were originally outlined in the *Food Tech in Midwest Report* published in 2019. A total of 34 experts and three Dutch Consulate members provided insight that highlighted consumer values and preferences, current gaps and emerging opportunities in relation to these six trends.

Such insights include how “younger generations seek differentiation and health benefits in their food choices along with traceability, security and sustainability and have a deeper emotional connection with food and purchase decisions.”

DID YOU KNOW?

The Netherlands' Agriculture and Food Sector

- Focused on sustainable and healthy foods
- World-leading exporter of agriculture and food products
- Renowned research and infrastructure around agrifood technology
- Diverse sector including livestock, plants, dairy, greenhouses, etc.
- Visit <http://www.hollandtradeandinvest.com/key-sectors/agriculture-and-food> for more information.

Consumer Trends in Consumer Driven Personalized Nutrition and Alternative Proteins

Consumer trends drive product development in the food industry by highlighting gaps and opportunities. Interestingly, while the values consumers express define industry trends, purchase decisions are not always driven by these values. For example, focus group experts noted that an individual's financial resources often determines how close their actual purchase history aligns with their values. Consumers are also learning that the food ecosystem incorporates a series of checks and balances that is manifested by their preference for supply chain transparency (both origin and environmental impact) and impact on personal health outcomes.

Perceived consumer values have manifested into two leading trends in the industry: personalized nutrition and alternative proteins. Industry experts see consumers wanting personalized nutrition options as a means to be healthier while also reducing time spent in the kitchen. As families face a variety of diets practiced by individuals in their own homes, such as gluten-free or vegan, making a family meal is becoming a bigger challenge. One solution on the rise is the creation of meal kits or options that allow an entire meal to be built from a single base item. For example, using brown rice as the base of the meal and engaging the rest of the family in selecting different ingredients for the dish that meet individual dietary requirements.



Consumer's demand more sustainable packaging, an increase in production of specialty food and beverage products and educating consumers on product labels

A future, potential outcome in personalized nutrition is the concept of a completely customizable diet plan based on an individual's genetic makeup. This approach would allow consumers to obtain information about their nutritional needs and make dietary decisions driven by a scientific understanding of their DNA and metabolism. The technology is currently available in limited markets and as the technology gains scale, this trend has the potential to seriously disrupt the diet industry.

One member of the focus group noted, “We're edging toward a time when people provide a blood sample, and technology offers an eating plan customized for you and your personal metabolism needs.”

At the same time, consumers are demanding less processed and clean label foods. This is especially relevant when it comes to the trend in proteins. While consumers prefer less processing, perceptions of food manufacturing and technology determine consumers' acceptance of new food products. For example, consumers interpret cellular agriculture products, such as lab grown proteins, as more sustainable and ethically processed while on the other hand despite plant-based proteins rise in popularity consumers express concern about the level of processing needed to make meat analogue products.



Consumers have requested the integration of sensors or QR codes into packaging to show how a food item is produced

Current Gaps in Food Waste and Consumer Education

Focus group participants offered insights into a few common gaps in the current food ecosystem. Industry professionals' greatest concerns include the consumer's demand for more sustainable packaging, an increase in production of specialty food and beverage products and educating consumers on product labels.

As consumers become more vocal in their demands for more sustainable approaches to their food systems, there is also an increase in demand for compostable or recyclable packaging. Unfortunately, simple replacement of conventional packaging materials with more sustainable options fails to address the lack of community level recycling infrastructure necessary to support this change. Industry professionals must weigh their options and decide where best to meet the consumer needs. Time can be invested in developing more sustainable packaging solutions that may positively impact shelf life, but may not be supported by the current recycling infrastructure, or they can bypass consumer preference for improved sustainability and utilize trusted and traditional packaging materials that meet basic product quality requirements.

Additionally, food brand owners and manufacturers are concerned about timely implementation of food safety regulations and scalability issues of emerging food and beverage products, such as CBD (a compound extracted from industrial hemp for use as a food ingredient). The Food and Drug Administration's 2014 Food Safety and Modernization Act (FSMA) has cast a huge spotlight on food safety. Producers are struggling to navigate food safety compliance measures and best practices in a rapidly changing environment.

Further widening the gap between the consumer and industry is a disconnect in standards and language. Consumers often misunderstand or are skeptical about terms such as fresh, organic, local, sustainable and clean label. They rely on unverified, online resources for definitions and information. Meanwhile, industry professionals express concern about consumer misunderstanding of scientific standards and food research. Focus group participants expressed a need for more universal definitions and consumer education.

Opportunities for Innovation in the Food Industry

Ultimately, the trends and gaps in the food industry offer producers a wealth of opportunities to meet changing consumer demand. From joining the trend in alternative proteins to filling the gap in sustainable packaging, the focus group participants discussed possible intersections between technology, food, food waste and product packaging. While consumer demand focuses on better health and increased sustainability, the current food system is not well equipped to rapidly shift to changing consumer demands.

According to focus group participants, consumers have requested the integration of sensors or QR codes into packaging to show how a food item is produced. Consumers want to know where their food is coming from and are eager to see innovative approaches by companies to share this information.

As one participant stated from the perspective of the consumer, “I want to know how it came to be and how it got to me.”

This attention to the individual components that make up a food product is further reflected in the consumers demand for simpler, clean label foods. Beyond transitioning to clean labels and the demand for innovative new products, consumers are looking for food-based solutions to their health concerns. They also show some conflicting desires, such as products with more global flavors while preferring local and more sustainable food.

Beyond the sustainability of the food and the packaging, there is a growing awareness by consumers on food waste. This is a multifaceted problem with multiple points at which food is ultimately going to waste, ranging from the farmer's fields to the consumer's kitchen. Focus group participants noted that a circular system, one where a company will both release a product and accept the return of a product at the end of its usefulness, is on the rise. Solutions offered included implementing both a “BEST if Used By” and “USE By” date to reduce consumer-driven waste, food waste collection systems for supermarkets that repurpose items into compost and exploring approaches to upcycle food waste into sellable products.

AURI Observations for the Food Industry

AURI has a 30-year history assisting a wide range of small to medium sized businesses with applied scientific expertise and commercialization assistance. AURI staff have worked with producers, businesses, entrepreneurs, industry and several other organizations to bring ideas to reality for the purpose of



As younger generations build wealth and have more access to information than ever before in human history, they have a deeper emotional connection to food and make purchase decisions based on social and economic values

increasing commodity utilization, product viability and market expansion. Based on the AURI teams' observations in the food ecosystem in Minnesota and the adjacent states, it is clear that emerging consumer demands are changing the food ecosystem. As younger generations build wealth and have more access to information than ever before in human history, they have a deeper emotional connection to food and make purchase decisions based on social and economic values. Another observation notes scalability challenges, including “right-sizing” manufacturing based on business need. Finally, despite increasing consumer demand for alternative proteins, it was noted that animal-based protein consumption in the United States is rising.

Overall, the *Dutch Consulate Focus Group Narrative* highlights how consumers drive trends, revealing industry gaps and creating space for growth opportunities. Consumer demands for clean label foods, sustainable approaches to packaging and food waste, and the innovation of emerging foods and beverages, ultimately focus around a growing preference for health and sustainability. As demand for more transparency and innovation increases, food production systems will need to become more aligned with these trends in order to remain viable in the future.



BY AURI

AURI PUBLISHES SHELF LIFE GUIDE THROUGH AG INNOVATION PARTNERSHIP

Ag Innovation Partnership Program

On every bag of almonds, granola bars and box of crackers for sale at a grocery store is a date stamped on the side of the packaging.

That “Sell By,” or “Best if Used By” date, can be confusing to both entrepreneurs trying to break into the food business and consumers filling a shopping cart at the grocery store. The date is not an estimate or afterthought—rather it is reflective of the scientifically determined food product shelf life with significant implications for the bottom line of food businesses.

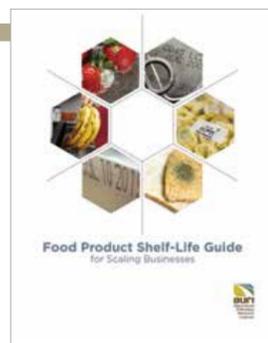
To provide food businesses with a baseline understanding of what shelf life is, and the underlying science and supply chain ramifications, the Agricultural Utilization Research Institute published a shelf life primer. The project was part of AURI’s Ag Innovation Partnership (AIP) program and was conducted with the assistance and expertise of Clutch, a Minneapolis-based acceleration firm.

A shelf life guide was selected as a project to pursue through the AIP program for a variety of reasons, said Jason Robinson, AURI’s Project Development Director for Food.

“We see a lot of confusion around shelf life. It is a common stumbling block for many of the early stage discussions we have with people. Many clients come to AURI with a, ‘Here is my product, now what is its shelf life’ perspective.” Robinson said. “And that is not how a shelf life works. The goal of this guide is to address many of the common questions and misconceptions. And then armed with that knowledge, an entrepreneur could talk with staff at AURI, a vendor or a service provider and have a much more productive conversation.”

The guide is divided into four sections. The first provides a detailed definition of shelf life. The second focuses on the factors that determine a food product’s shelf life. The third section is an introduction to testing for shelf life. The guide concludes with a discussion of some of the business considerations involved in a product’s shelf life.

In the food industry, shelf life is defined as the time period a food manufacturer expects a product will deliver the desired experience to the consumer. Once the date is set, the assumption is that a food product consumed before the end of the shelf life will taste the same way it did on day one. It does not mean that food is unsafe to eat after that date. It is the responsibility of the producer to set the shelf life date, not a government agency.



SECTIONS OF THE GUIDE:

Explanation of what a shelf life is

Factors that determine the shelf life

Testing for shelf life

Business considerations involved in a product’s shelf life

Food products lose their desired quality experience at different rates. Accurate determination of a shelf life date requires testing and knowledge of the product’s ingredients.

A product’s “mode of failure” is key to understanding how to accurately determine a shelf life. The mode of failure equates to what attribute in a product will fail first and will therefore negatively affect the consumer’s experience. When the product reaches the mode of failure it can taste stale, rancid or soggy.

Crackers, granola bars, and barbecue sauce have different shelf lives and different modes of failure. By correctly diagnosing a product’s mode of failure through testing, food producers may be able to devise a plan to address the problem and lengthen the shelf life.

In the second section, the guide explains the shelf life testing process and what variables can negatively and positively affect the mode of failure. A key point for food producers is the importance of building safety protocols into the design and manufacturing of food products. Products must be created and stored using Good Manufacturing Practices.

“The ingredients in the product, the design and packaging can all affect a product’s shelf life. So too can the amount of moisture, humidity and oxygen content that interacts with a product while it is packaged and sitting on a shelf,” said Robinson. “One of the messages for food producers is to spend time understanding how all those factors work together.”

Lolly Occhino, a scientist of food and nutrition at AURI, said another important message of the guide is that producers should consider shelf life throughout the life cycle of product development. Changes made to packaging, labels and distribution can affect the shelf life without changing the ingredients of the product.

“For food producers, it is so important to build strategies into the product from day one rather than try to fix something when you have already invested in the wrong packaging or the wrong ingredients,” she said.

Shelf life is also a business decision with economic and consumer considerations. It is much more complex than simply stating a product is good for six months. Retailers have rules on length of shelf life before agreeing to sell products which affect distribution, inventory and production. Consumers also have certain expectations based on a product’s shelf life, and not all of those expectations are accurate.

“Ultimately, setting a shelf life is a business decision that is determined by how a product performs over time,” Robinson said. “The level of detail a business puts into defining that shelf life can be a very intense and expensive process. That’s why it is important to connect with people who understand the level of detail truly needed to set an effective and accurate date.”

“Typically, we hear a desire from businesses to obtain the longest shelf life possible,” Occhino said. “The truth is a long shelf life can be a disconnect for some products, especially those that are marketed as “natural”. Consumers don’t expect to see long shelf lives on those products. It is important to consider the length of shelf life and how it matches up with a company’s brand and identity.”

Dave Miller, the director of food business for Clutch, said the end goals of the shelf life project aligned well with his company’s expertise. Clutch specializes in helping agriculture and food businesses grow and realize their peak potential and has worked with AURI on previous AIP research. Miller said Clutch brought an understanding of marketing and working with retailers to the project that partnered well with AURI’s food science capabilities.

“We are very supportive of the work AURI is doing with food entrepreneurs. This shelf life guide was an opportunity to do our part to advance AURI’s mission,” he said. “This is an issue where there was a need to clear up some confusion and offer a resource to businesses. We have the background in this area, so it was the right opportunity for us to do our part to help make some important information available to the people who need it.”

Miller said the guide will be most beneficial for two groups: entrepreneurs on the cusp of scaling up their businesses and groups in the early stages of exploring a business idea.

“For the first group, the rules of the road change when you go from the farmer’s market to a grocery store. For the second group, AURI’s resources are best spent with people past that ‘beginning phase’ that are a little closer to launch,” Miller said. “To be able to refer people in both categories to a shelf life guide will help AURI really concentrate where it can do the most good.”

Another part of the shelf life discussion involves consumers. The average grocery store shopper does not understand how the code date on a food package relates to a product’s shelf life, according to Miller.



Lolly Occhino, scientist of food and nutrition at AURI

“It is important to

consider the length

of shelf life and how

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a company’s brand

and identity.”

“The hope is that someday we are at a point where consumers, producers and retailers are all using the same terminology,” he said. “Almost 80 percent of food waste happens after a product leaves the manufacturing center. If we could educate consumers and entrepreneurs on this topic, so they know what a shelf life and a ‘sell-by date’ is, that would go a long way to reducing our food waste.”

Ag Innovation Partnership Program

AURI’s AIP program is a competitive process. Each year AURI puts out a call for submissions and businesses, researchers, entrepreneurs and producers are encouraged to submit a proposal. A panel of AURI staff members review and select projects based on the submissions that most align with AURI’s mission of supporting innovation and creating long-term economic impact. Projects are also selected based on how they meet a need in the agriculture sector.

The selected projects receive AURI’s resources, funding and support to help businesses turn their ideas into reality and catalyze innovation in the state’s agriculture industry. AURI provides expertise in accounting for diverse funding sources, managing and communicating project activities, monitoring goals and progress, and tracking and reporting successes, among other services.

Each selected project aligns with one of AURI’s core focus areas: biobased products, renewable energy, co-products and food. The information generated from each project is made publicly available to help producers, entrepreneurs, businesses and agriculture processors.

Past AIP collaborations have produced research studies, guides and tools to help businesses utilize Minnesota’s agriculture products.

The shelf life guide is a free online resource and is included in AURI’s Food Entrepreneur Toolbox, along with the clean-label food guide.

To view this guide go to:

www.auri.org/guides/packaging-guide-for-scaling-food-businesses/

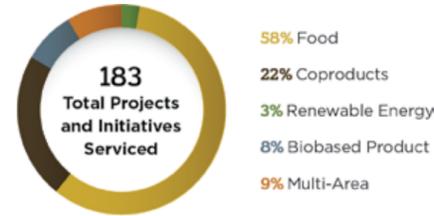
ANNUAL REPORT RECAP BY AURI

Earlier this year AURI released its latest annual report, which provides information about the organization's operational and fiscal results for Fiscal Year 2019 (FY19).

Overall, FY19 was a successful period for the organization, thanks to the dedication of the staff and board of directors, as well as the support of AURI's many partners. What follows is a recap of the report for a high-level understanding of the organization's achievements.

With regard to project activity, AURI's dedicated staff worked on 183 different projects across the organization's four focus areas (food, coproducts, biobased products and renewable energy), with 84 new projects opened during the year. AURI staff also provided many additional hours of non-project consultation and support to Minnesota businesses.

Food projects continue to comprise the largest segment of our overall services, with this area representing 61 percent of new projects and 58 percent of total projects serviced.



702
Estimated # of Jobs Created and Retained

As in the past, AURI's project work made a significant impact on clients and Minnesota's overall economic health. During a five-year period ending with the close of FY19 (June 30, 2019), AURI's work contributed to the creation and retention of more than 700 jobs across the state and nearly \$133 million in new capital investments. In addition, the work during the past five years resulted in \$261 million in new gross annual sales by clients and the use of an additional 323,000 tons of Minnesota grown commodities per year. Not only are these great numbers to report regarding AURI's

contribution to the industry and economy, but also because they are proof of the entire organization's dedication to its mission and creating tangible business outcomes to benefit the food and ag industry.

That said, it is important to note that client project work represents only one area of the many benefits AURI provides to the food and agriculture ecosystem. In addition to the FY19 project work, AURI took specific and deliberate steps to achieve its organizational vision. For example, staff and leadership engaged together in ecosystem growth throughout the state, by playing an active role in a variety of high-profile events. Most notable among them were Food | Ag | Ideas Week, FEAST, and MN Cup.

Throughout the year, AURI's team contributed to these events by providing competition judges, recommending speakers and thought leader topics, as well as being guest speakers and panelists. In fact, AURI was asked to collaborate over 40 times during FY19 by ecosystem organizations to further opportunities for the agricultural industry and Minnesota's economy.

At the same time, AURI stepped up its efforts to host exciting new events that brought together some of the region's top innovative minds and most active contributors across the agriculture sector. One great example would be the first-ever Open Innovation Reverse Pitch event, which turned the traditional entrepreneurial innovation pitch model on its head by inviting leading food and ag companies to share challenges in need of solutions from producers, entrepreneurs, researchers and innovators. Another example is the Nexus of Food & Health event, which drew attention to the important role food plays in health and how food's functional properties can have a restorative effect.

Food Highlights:

AURI worked extensively in the food industry with clients in greater Minnesota that were ready to expand and take the next step in their businesses.



323,108
Estimated Tons of Commodities Utilized Per Year

One example is the Food Team's work with Two Harbors, Minn. based Ruth's Vegetarian Gourmet. The company turned to AURI for assistance to meet the United States Department of Agriculture (USDA) accreditation requirements for inclusion in public school meal plans. Earning USDA accreditation for school meal plans is technical and expensive. In recent years, AURI has specifically added capabilities and expertise in this area to help guide clients through the process.

Coproducts Highlights:

The AURI Coproducts Team was proud to partner with the University of Minnesota's Forever Green Initiative to support the development of new cash cover crops. As part of the collaboration, AURI investigated new methods for seed cleaning of cash cover crops like pennycress, camelina, as well as perennial crops like Kernza™. AURI did significant pilot lab research to press and filter oilseed cover crops. Scientists on the Coproducts Team also conducted research and analysis on the protein and nutritional content of Kernza™ to determine its potential uses as a food ingredient in baking.

In FY19, AURI partnered on a project with the Minnesota Turkey Growers Association and



\$434.5 Million
Estimated Potential Future Capital Investment

the Minnesota rye grass producers through Northern Excellence Seed LLC. The goal of the project was to determine if rye grass can be used as poultry bedding. As part of the research, AURI monitored ammonia levels and overall bird health in a trial using rye grass screenings and straw as a bedding at the Ferndale Market in Cannon Falls. Minnesota is one of the largest producers of both turkeys and rye grass seed in the country and identifying new uses for rye grass coproducts throughout the agricultural economy is an exciting and important venture.

Biobased Products Highlights:

New Starch Solutions partnered with AURI's Biobased Team on the development of a new packaging material made from corn starch. The Plymouth, Minn. based company is a manufacturer and distributor of sustainable packaging products made from starch that are used in a variety of different markets and applications. Their products cushion shipments and often replace expanded polystyrene. Starch-based packing peanuts are an environmentally friendly, reusable and cost-effective alternative to traditional packing foam.

AURI worked with New Starch Solutions across multiple areas, including business development, sourcing and pelleting various materials. AURI also helped the company with grant applications to obtain additional funding.



\$261 Million
Estimated New Gross Annual Sales

Renewable Energy Highlights:

Throughout FY19, AURI's Biobased and Renewable Energy Team supported and assisted the relaunch of the Midwest Biomass Exchange website. This free, online resource is a marketplace designed to connect buyers and sellers of woody and agricultural biomass for heating fuel and power generation.

The website helps buyers and sellers connect, while increasing the visibility of biomass fuel suppliers and enhancing the availability of information about potential sources of biomass. In doing so, this project helps those considering biomass-fired heat or energy systems to better understand the network of fuel providers across Minnesota and the region.

Financial Highlights:

In FY19, AURI generated \$4,445,934 in revenue and expended \$4,675,841, showing a deficit of (\$229,907) at year-end.

AURI ended the fiscal year within five percent of breaking-even on its statement of activities (income statement) and utilized a portion of its reserve account to off-set the deficit spend for FY19. This was needed to maintain critical programs and secure longer term asset needs.

Overall, AURI's short-term financial outlook is positive. The organization is steadily increasing revenue levels in fee-for-service, project fees, grants, sponsorships and federal funds to leverage state dollars and maximize their impact. Long-term, increasing revenue from additional funding streams and maintaining positive stakeholder and client relationships is key to AURI's financial health and success.



\$133 Million
Estimated New Capital Invested

Fiscal Year 2019 Revenue
\$4,445,934

Fiscal Year 2019 Expenses
\$4,675,841

POWERFUL PELLETING PROCESS BOOSTS BIOFUEL EFFICIENCY

BY AURI

Mankato based Attis Innovations Research and Development Team is leading the charge in developing renewable energy from plant-based materials and agricultural byproducts. One of the processes that Attis is cultivating, in cooperation with the Natural Research and Resource Institute (NRRI) at the University of Minnesota-Duluth, is a pelleting polymer from the pre-treatment of wood prior to producing cellulosic ethanol.

The Agricultural Utilization Research Institute (AURI) assisted Attis with the development of this new Polymer called ONYX as a pelleting aid. The goal was to improve pelleting efficiency by generating greater volume, while using less horsepower during the pelleting process. This low-cost additive improves BTU values, greatly improves water resistance and provides for several additional processing advantages. It also provides increased potential for applications involving plastics, composites, carbon fiber coatings and binders. Due to the unique characteristics of the ONYX polymer, Attis, NRRI and AURI evaluated the polymer as a potential solution to improve pelleting efficiency for wood pellets and other ag based materials that are hard to densify.

One of the key services AURI provided via the AURI Coproduct Pilot Lab was the ability to conduct densification trials using a 60-horsepower pellet mill. The goal of these trials was to identify the optimum preprocessing that various materials require, the appropriate pellet die size to utilize, the appropriate steam conditioning needed, final pellet quality, as well as pellet durability and density. The ONYX polymer was evaluated to identify the potential improvement in pelleting efficiency.

The ONYX polymer is produced as a coproduct from a novel third generation biorefinery technology which provides economic viability for cellulosic biofuels. In the past, previous cellulosic biofuels technologies had serious limitations and problems both economically and technically. Attis has changed this dynamic by providing an economically viable process technology that proves the viability of cellulosic ethanol and valued coproducts.

Attis Innovations is in the process of engineering, with the intent to build, multiple plants in the United States and abroad. Attis has met with various groups in Minnesota looking to build a facility to provide both cellulosic ethanol, biopolymers and binders as well as various biochemicals. Attis has also partnered with Lignetics, the largest wood pellet production and sales company in the United States to integrate the Attis binder into production.

AURI's research with this Attis polymer has indicated that these new high performance energy pellets provide both improved characteristics and greater energy concentrations. Pelletizing is the process of compressing or molding a material into the shape of a pellet or sphere. Pelletizing improves the density and effective performance of a livestock feed or wood pellet fuel. There is significant interest in burning biomass pellets for energy that contain waterproof characteristics created by mixing wood and agricultural fibers with the ONYX polymer while delivering a higher energy content. The continued partnership between AURI and NRRI seeks to explore "green bio-coal" with higher loadings of the Attis biopolymer binder. Coal typically is around 10,000 BTU per pound while wood and agricultural fibers have a lower BTU per pound rating of approximately 8,000 BTU. With the Attis binder having a BTU rating of higher than 11,000 BTU per pound, a high loading of Attis binder with various wood or agricultural fiber material could lead to a new generation of carbon neutral bio-coal.

AURI continues to see new developments and ideas in pelleting aids which in the long run will help to increase process efficiency and advance the quality of the end product. Support projects in this area continue to improve producer profitability. Currently Attis Innovations is working with various large manufacturers to integrate this new biopolymer within their products and processes.

AURI is available for hands on testing and development of various products at the Coproducts Utilization Laboratory. To learn more about the work AURI does with Coproducts, visit the AURI website under Coproducts facilities and resources.

AURI Unveils New Website

BY AURI

AURI's online presence just got a whole new look at www.auri.org. Along with the complete redesign to a modern look and feel, the new website retains the same organizational layout while integrating important new features along side more robust content. The new website offers clear access to the various capabilities and programs AURI undertakes, focusing on both current and past partner projects, publications, research-based initiatives and important events. Many considerations were at work when creating this fresh look. From better functionality to strong visuals, the website redesign was a necessary upgrade from the previous site.

One of the main goals for the update was to create a site that better acknowledges and shares the innovations AURI's client work supports. This was done by developing a user-friendly navigation system that allows visitors to the website an easy way to find information about AURI's client work and research.

AURI's commitment to collaboration is at the heart of its success and continues to drive AURI's search for industry partners of all sizes. That is why the new site includes a prominent partners section.

"The partner section is a new feature of the site that will highlight projects that fall under our partnerships," said Erik Evans, Director of Communications at AURI. Along with this new section, new responsive features and shortcuts to key information provide partners and users better access to AURI's content on mobile devices.



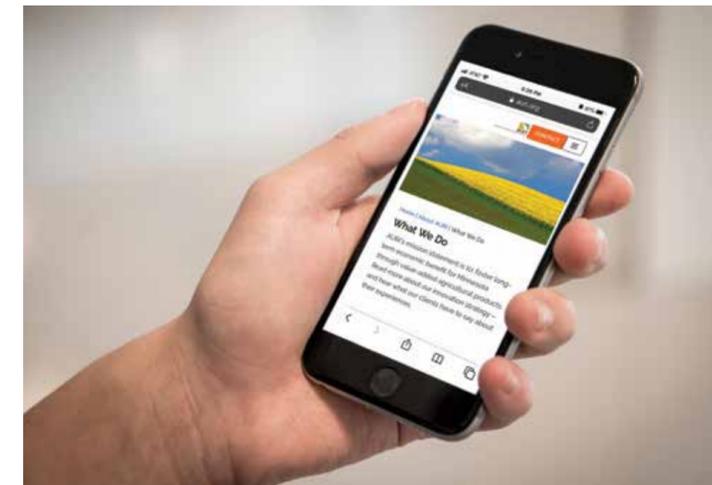
The updated website also allows visitors to easily view past reports and projects. Providing AURI's audience easy paths to vital information was an important objective to the redesign. "The user experience was a top consideration. Navigability was also very important to easily move around within the site to reach relevant information. We wanted the site to feel fresh, uncluttered and enticing," said Lisa Gjersvik, Senior Director of Strategy Management.

The new site offers many new features including enhanced visual elements that incorporate the use of large photographs with a modern layout. Along with this new look, changes to the layout provide users with an intuitive and straightforward way to navigate the website faster and easier.

Finally, more effective and powerful search capabilities have been incorporated to bring users directly to the subject matter of their choice.

This new sleek and contemporary website is representative of AURI as an innovative brand and a forward-looking organization. "We definitely want the user to see AURI as innovative, and web experience is one of the first points of entry in many cases for a potential client and follower," said Shannon Schlecht, Executive Director of AURI. One of the top priorities of the redesign was better curating the pages and reducing clutter. The former site needed an update not only to its graphics but an overall cleaner look.

The updated website brings a new life to the AURI brand. The ability for a mobile-friendly experience, improved user experience to access information, and improved search capabilities were the main objectives achieved in the redesign. Many within the organization along with external collaborators and other stakeholders were involved in providing feedback. The result: a positive experience for users seeking information and resources related to the agricultural industry including value-added innovations and opportunities.



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AURI CELEBRATES 30TH ANNIVERSARY



BY AURI

As you may know, AURI was created by the Minnesota Legislature in the late 1980s during the farm crisis, and in hopes of mitigating its effects on farmers throughout the state. To mark this milestone, AURI celebrated its 30th anniversary earlier this year, on January 16, with a special event for current and past supporters.

The evening event, which followed AURI's Annual board meeting, started with a welcome by AURI Board Chair Ron Obermoller. This was followed by remarks from Governor Tim Walz, during which he congratulated AURI on its longevity and underscored the importance of organizations, like this, to Minnesota's economy and its reputation as an innovation hotbed.

This was followed by comments from Minnesota Department of Agriculture Commissioner Thom Petersen, who discussed AURI's importance to ag producers and his experiences with AURI over the years.

After Commissioner Petersen, AURI Board Member Jeanne Poppe presented Executive Director Shannon Schlecht with a House Resolution congratulating AURI on its 30th anniversary. This was definitely a surprise honor for most of those in attendance and made for another reason to celebrate the occasion.

This presentation was followed by Senator Rich Draheim's discussion of AURI's impact on his district and what he described as AURI's unique position to support Minnesota farmers.

Next, Senator Roger Moe provided a historical context and summary of AURI's formation at the legislature in the 1980s and the goals and objectives for the organization at that time.

The evening's festivities closed out with comments from past board members and a current client sharing their experiences of working with AURI over the years and the impact the organization has made on both personal and professional levels.

To mark the occasion, AURI also created a number of displays for the event from throughout its history. These included memories from long-time staff members, who shared their experiences and reflections on the organization and how it evolved over three decades. Another display included samples from many of AURI's clients throughout its past. The samples ranged from soil amendment products to foods and beverages, which have been available to consumers at different points throughout AURI's 30 year lifespan.

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