Growing Minnesota's Economy

ANNUAL REPORT

Fiscal Year 2015

auri
Agricultural Utilization Research Institute

auri.org

Letter from the Executive Director

In 2015, the Agricultural Utilization Research Institute (AURI) saw change and growth. I am honored to lead an organization dedicated to serving Minnesota's agricultural clients and stakeholders to foster long-term economic benefit for Minnesota through value-added agricultural products.

AURI works with clients throughout the entire state to develop new processes and bring new agricultural products to market. The partnership with these entrepreneurs expands industries and strengthens Minnesota's economy, in turn supporting and creating jobs. AURI also conducts carefully selected initiatives to introduce new ideas, as well as an Innovation Networking Program to foster discussion among Minnesota's vibrant entrepreneurial community.

AURI helps Minnesota find new uses for traditional, unexplored or overlooked resources. Whether through hands-on assistance, applied research or innovation networking, AURI helps companies turn ideas into reality to positively impact the state.

In this annual report, you will read fascinating stories about just a few innovative successes occurring right here in Minnesota, including the success of four entrepreneurs and the outcomes of their work with AURI. In reality, there are dozens more like them. In fact, the **amount of client projects increased roughly 50 percent** from fiscal year 2014 to 2015 (July-June) and the demand for services continues to grow.

As mentioned earlier, AURI works collaboratively on initiatives impacting entire industries. Here, you will also read how a research project and subsequent report help to define opportunities in an emerging industry.

Being part of Minnesota's agricultural innovation environment is exciting, but finding new uses to increase the utilization and value of Minnesota's commodities does not happen overnight. Throughout 2015 and over AURI's 25 years, many businesses have realized success due to their commitment, innovative thinking – and the assistance provided by AURI.

I look forward to developing many more successful partnerships with Minnesota's agricultural and business innovators in 2016 and beyond.

Sincerely,

Shannon Schlecht, AURI Executive Director

Photo credit: Rolf Hagberg Photography

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2015 Board of Directors:

Ron Obermoller, *Chair*
Minnesota Soybean Research & Promotion Council

John Gilbertson, *Vice Chair*
Minnesota Farm Bureau Federation

John Goihl, *Secretary/Treasurer*
Agri-Nutrition Services – Agribusiness

Art Brandli
Minnesota Wheat Research & Promotion Council

Jerry Hasnedl
Minnesota Farmers Union

Kim Hintz
AgriBank – Agribusiness

Rep. Debra Kiel
Minnesota House of Representatives

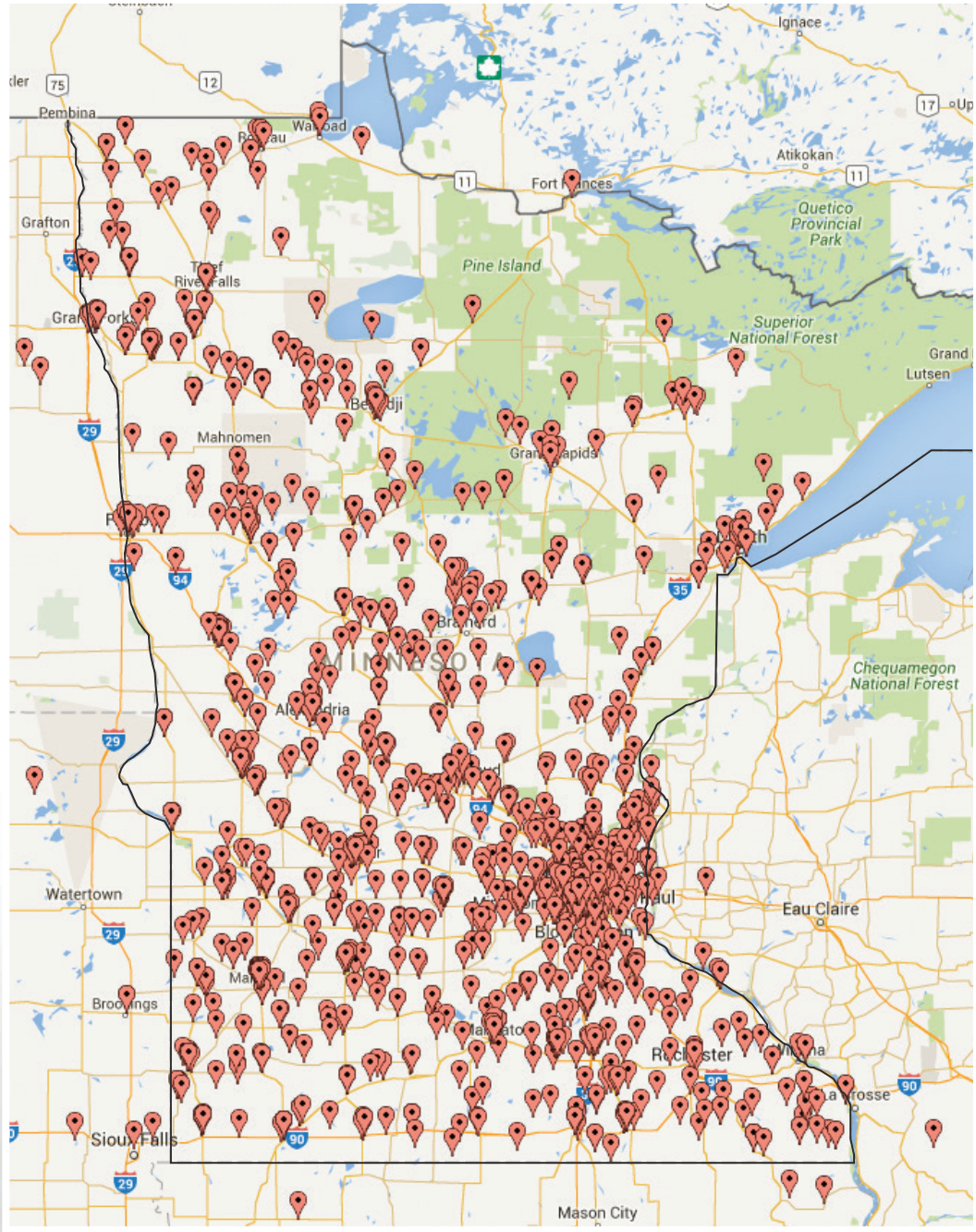
Richard Peterson
Minnesota Corn Research & Promotion Council

Sen. Matt Schmit
Minnesota Senate

Statewide Reach:

Serving Clients Throughout Minnesota

Agricultural Utilization Research Institute (AURI) clients through December 2015 shown below.



Mission:

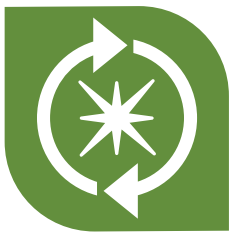
Foster long-term economic benefit for Minnesota through value-added agricultural products.

Photo credit: Rolf Hagberg Photography

AURI Services

To develop ag-based innovations, AURI provides hands-on scientific technical assistance, applied research services, product development assistance and innovation networking to foster value-added development, commercialize new products and realize process refinements.

Focus Areas



Renewable Energy

Research uncovers ways to use agricultural products to power transportation, as well as provide heat or electricity.

Food

Industry projects develop new products and markets, as well as meet consumer needs and food safety education.

Coproducts

Work seeks to find new uses and significant revenue streams for agricultural processor byproducts.

Biobased Products

Use agricultural components to replace traditional petroleum-based ingredients in materials such as plastics, films, building materials, lubricants, sealants and more.

Establishing a Research Residency Program

Approximately two years ago, Goutham Vemuri, a credentialed scientist, approached AURI with an innovative idea for using a byproduct stream to produce high value bioproducts. He needed laboratory space and equipment to prove the feasibility of his process. AURI stepped in to assist.

"Our technology takes carbon from agricultural byproducts and converts it into high value chemicals," said Goutham. AURI offered access to lab space, basic lab technology and chemicals. The partnership allowed Goutham to seek financial support from state and federal agencies.

"Although leveraging both biological and chemical conversions in product development is not necessarily unique, the end result certainly is," said Rod Larkins, AURI senior director of science and technology.

AURI microbiologist, Jimmy Gosse, Ph.D., emphasized how this partnership is groundbreaking for AURI. "This first-of-its-kind endeavor helped AURI establish the framework for a research residency of sorts," said Gosse. He explained that due to the success of the partnership thus far, AURI plans to replicate the process in the coming years with other entrepreneurs.

The project allowed AURI to fully map out which resources can be allocated to help support entrepreneurs in the agricultural sector. AURI played a key role in providing the space and the infrastructure necessary to transform Goutham's ideas into a reality.

This project aims to introduce a biobased product into the market. "This project will spread awareness of the merits of biobased technology, which is capable of converting agricultural byproducts into useful chemicals," said Goutham. "Not only will it create jobs through the conversion of agricultural products into value added sales in the chemical sector, it will also mobilize and strengthen rural communities."

RESULTS:

AURI'S INVOLVEMENT HELPED A

NEW TECHNOLOGY

PROVE ITS FEASIBILITY AND SCALE-UP POTENTIAL, ENABLING THE PROJECT TO SECURE MORE FUNDING

R&D Services Help Commercialize New Product

Midwest Ag Enterprises, founded 13 years ago as a commodities-driven organization, now sees increased profitability from manufacturing and exporting specialty livestock feeds.

Around three years ago, Midwest Ag Enterprises began to develop a value-added soy product. The company appealed to AURI to support product development and opportunity identification.

John Pollock and Jim Moline lead Midwest Ag Enterprises, the company that manufactures NutriVance™ soybean meal feed.

Given the decline in fish populations, a need exists to replace the fishmeal typically fed to piglets, poultry and aquaculture with a new, sustainable protein source. While soybean meal has long been recognized as a more economical alternative to fishmeal, these animals do not easily digest the sugars in soybeans.

Midwest Ag Enterprises convened a team to devise and evaluate the refining process in order to remove most of the indigestible sugars and fiber and break the protein molecules in soybean meal into more digestible pieces.

"We had ideas for this process, we just needed help with the R&D to verify the potential of this soy product," said Jim Moline, president of Midwest Ag Enterprises. "We brought in AURI for scientific lab testing and for assistance in securing funds to continue developing the proprietary process. The best thing about working with AURI was their open communication and willingness to look at ideas overall."

RESULTS:

MIDWEST AG ENTERPRISES EXPECTS TO PRODUCE

2,000 tons

OF NUTRIVANCE™ PER MONTH UTILIZING **MORE THAN 100,000 BUSHELS OF SOYBEANS**

Photo credit: Rolf Hagberg Photography

Now, the process successfully produces a high protein (close to 60 percent), more digestible soybean meal. Additionally, adding the indigestible sugars, a byproduct of the refinement process, to beef cattle rations creates less waste and additional revenue.

Commercial production of the soybean meal launched last spring under the name NutriVance™. Domestic and international swine starter and co-dry markets received the first shipments. AURI enabled the manufacturing process by providing input on plant design and conducting equipment evaluation.

"In two to three years we would like to be a volume supplier, particularly in specialized markets. We see tremendous growth opportunities in aquafeed and we're pleased research points to expansion opportunities in these markets," said Moline. AURI and the Minnesota Soybean Research & Promotion Council are currently sponsoring livestock feeding trials and nutrition studies.

Businesses like Midwest Ag Enterprises impact animal health, open new markets for Minnesota crops and create job opportunities throughout the production process.

> AURI helped us become more profitable, identify new markets for our soybean meal product, and create jobs throughout the production process.
>
> Midwest Ag Enterprises

Photo credit: Rolf Hagberg Photography

Redesign Leads to Company Expansion

Casey Webber knew he wanted to operate his own business. One day, his aunt sent him a batch of her cookies and he realized these were a perfectly-sized, wholesome snack.

Webber and his aunt, Ella Redmond, decided to launch their own cookie business. While researching packaging and shipping options, a local food company put Webber in touch with AURI.

"When we initially started selling our Heavenly Hunks product it was hard to get them into grocery stores because of the two day shelf life," said Webber. "We basically baked the cookies ourselves and put them into a saran wrap type packaging. Working with AURI allowed us to design baking and packaging methods to reach a 60-90 day shelf life."

AURI helped Webber and Redmond change the baking method in a way that did not compromise the natural ingredients, many of which are Minnesota grown, and preservative-free recipe. The food scientists made recommendations for new packaging that considered the materials used, as well as the air inside, so the package contained the proper amount of oxygen to preserve freshness.

Led by Donna O'Connor, AURI scientists contributed to E&C Snacks' success with formula development, compliance evaluation, shelf-life testing and packaging design. The improvements allowed the company to expand distribution by shipping farther from their Minnesota base and by making the product more appealing to retailers, who incur less financial risk with a shelf stable product. E&C Snacks launched three years ago, but in the last few months has seen exponential growth, with product in nearly 400 retail outlets.

In addition to distribution, the company expanded from three employees to a broad outside sales team, production facility staff, brokers and more. "There's probably about 30 people who play a part in producing each batch of Heavenly Hunks now," said Webber. "When E&C Snacks first launched, a production run consisted of baking a couple thousand cookies. The current production facility produces 250,000 Heavenly Hunks during a run."

RESULTS:

E&C SNACKS EXPECTS TO PRODUCE

5 Million Cookies

PER YEAR, SELLING TO NEARLY 400 RETAIL OUTLETS

"The best part of working with AURI was Donna and her ability to answer our questions. Her responsiveness and ability to solve problems got us to the next stage of our business," said Webber. "Whatever the question, she could point us in the right direction for an answer."

In February 2016, Webber will lead E&C Snacks in the launch of its second product line, a granola/cookie hybrid. "AURI's support on our Heavenly Hunks product gave us the tools to start correctly from square one in the formulation, development and distribution of our new product Hunkola," said Webber.

> AURI's support on our Heavenly Hunks product allowed us to start correctly from square one in the formulation, development and distribution of Hunkola.
>
> E&C Snacks

Photo Credit: E&C Snacks

Evaluating the Impact of Biomass Heating

In September 2015, William Koenig's Viking Company installed an Even Temp Biomass wood chip furnace (courtesy of Jim Eiynck, distributor) in its Albany poultry farm to assess the cost effectiveness of biomass heating technology, cold climate energy savings and other potential benefits.

Previously, AURI had formed a research initiative to study the concept of utilizing biomass derived heat in poultry and greenhouse facilities. AURI presented key findings to poultry producers and green house operators, and published a Biomass Heating Feasibility Guide. The initiative needed a producer willing to install a biomass system when Koenig offered his facility.

Over a two-year timeline, 12 boiler flocks will rotate through a biomass-heated test barn and a control barn to assess cost savings and the impacts on production. According to Al Doering, AURI senior associate scientist – coproducts, this research phase will attempt to meet five goals:

- Calculate the cost effectiveness of biomass heat;
- Measure performance and operability of wood chip fired furnace technology;
- Assess flock health and potential improvements;
- Conduct an environmental assessment of ash byproduct application to area farmland; and
- Establish a host site event to inform industry on how a biomass heating technology performs in northern climates.

Typical propane heating involves inside combustion, creating a moist environment that could negatively affect flock health. Alleviating moisture in the poultry facility may prevent wet bedding, which reduces ammonia burns and sores on the animals' feet, decreases respiratory issues and could improve growth rates.

RESULTS:

FIRST BIOMASS HEATING LIVESTOCK DEMONSTRATION SITE TO EVALUATE ECONOMIC FEASIBILITY AND FLOCK HEALTH

Photo credit: Dan Lemke

Propane heating requires more output to maintain the desired temperature in winter, due to increased ventilation requirements to control environmental conditions in the barn, which drives up costs. Biomass uses a sustainable fuel source and also produces its own monetary output. AURI will evaluate the nutrient composition of the biomass ash to determine its suitability as a fertilizer, thus reducing the cost of commercial fertilizer for crop farmers.

The development of this project was a collaborative effort of AURI, Fritz Ebinger (University of Minnesota Extension's Clean Energy Resource Teams), Kevin Hennessy (Minnesota Department of Agriculture), Jim Eiynck (Even Temp Biomass distributor and owner of Becker Fireplace Center) and Bruce Jones (Minnesota State University Mankato). According to Doering and Becky Philipp, AURI project manager, without William Koenig's poultry farm facility, his interest and commitment, the project would not have come to fruition.

"Overall, this project fits with AURI's mission and innovation strategy, while focusing on research along the way," said Doering. "AURI generates ideas for value-added agriculture; selects the best ideas that have the potential to create the greatest return for the existing ag industry; and implements these ideas in the marketplace to grow Minnesota's economy."

AURI plans to continue education outreach through broad dissemination of the research results.

> This project could lead to increased market opportunities for the biomass industry resulting in job creation and industry growth.
>
> AURI Staff

Photo credit: Dan Lemke

Industry Initiative:

Guiding Bioplastics Innovation

Much like renewable energy, experts believe the rapidly expanding bioplastics industry will not only protect the environment but also create a large number of jobs. To help guide this expanding industry, AURI conducted extensive research regarding the opportunities and challenges inherent to the industry and compiled the results into a one-stop resource.

This initiative involved many project partners, including the Minnesota Corn Research & Promotion Council and the Minnesota Soybean Research & Promotion Council. AURI also leveraged the expertise of consultant Jim Lunt to draft the report.

AURI microbiologist, Jimmy Gosse, Ph.D., explained that the development of this resource was partly prompted by changing consumer sentiments. "While interest in these products is not necessarily a recent trend, growing willingness to purchase them is," Gosse mentioned. Now more than ever before, consumers will pay slightly more for a bioplastics product.

Randy Hilliard, AURI project manager, added that both consumers and researchers may hear about alternatives to plastics products and later look for an exhaustive summary of the work that's been

Photo credit: Rolf Hagberg Photography

completed thus far or a list of products currently available. He explained, "AURI developed the bioplastics report to answer the queries of those working within the biopolymer space."

Gosse described the bioplastics report as a dictionary of sorts. The report allows individuals with a background in the topics to learn more about subjects of interest.

One way to understand the impact of this report is through the lens of worker efficiency. As researchers and scientists learn more about bioplastics, their capacity to apply this knowledge to research and development similarly increases. Using bioplastics in new projects will lead to economic benefits for Minnesota as development continues to be streamlined, creating jobs and revenue through product sales.

Experts project consumer interest in bioplastics products will continue to grow, necessitating additional research initiatives. When this happens, future researchers will reference AURI's bioplastics report, which can be viewed online at auri.org/research-reports/marketplace-opportunities-plastics/.

Photo credit: Rolf Hagberg Photography

Impact: Client Satisfaction

Percentage of clients who agree with the following statements, as reported in the 2015 AURI Satisfaction Survey.

81%

AURI SIGNIFICANTLY HELPED ADDRESS OUR BUSINESS CONCERNS.

75%

AURI CONNECTED US TO VALUABLE RESOURCES/ ORGANIZATIONS.

73%

AURI HAS IMPROVED MY PRODUCT/PROCESS SIGNIFICANTLY.

77%

BECAUSE OF MY WORK WITH AURI, MY BUSINESS IS MORE SUCCESSFUL.

70%

AURI ENABLED MY PRODUCT/ PROCESS TO BE SOLD COMMERCIALLY.

74%

AURI'S PROGRAMS AND SERVICES HAVE BEEN VITAL TO GROWING MY BUSINESS.

Fiscal Year 2015

AURI is a 501(c)3 nonprofit corporation created by the Minnesota State Legislature to help develop new uses for agricultural products. As a state created independent non-profit corporation, AURI is partially funded through a direct appropriation from the Minnesota State Legislature. Each biennium, AURI seeks funds through the state budgeting process.

AURI Revenue During Fiscal Year 2015

REVENUE SOURCE	REVENUE PERCENTAGE	TOTAL REVENUE
Interest & Miscellaneous Income	**2.7%**	**$ 126,824**
State Appropriations	**77.6%**	**$ 3,643,000**
Grants & Outside Sources	**7.0%**	**$ 328,404**
Collaboration & Partnerships	**12.7%**	**$ 596,384**
Total Revenue		**$ 4,694,612**

AURI Expenses During Fiscal Year 2015

EXPENSE AREA	EXPENSE PERCENTAGE	TOTAL EXPENSE
Operations *Institute-Wide Expenses, IT, Board of Directors, Insurance*	**11.6%**	**$ 533,482**
Institutional Advancement *Communications / Strategy*	**12.7%**	**$ 585,942**
Program Support *Administration and Support Staff*	**18.6%**	**$ 856,191**
Programs & Services *Project Expenses/Innovation /Applied Research*	**57.1%**	**$ 2,628,041**
Total Expenses		**$ 4,603,656**

Revenue in excess of expenses is allocated to the organization's reserves.

auri
Agricultural
Utilization
Research
Institute

Crookston
510 County Road 71
Suite 120
Crookston, MN 56716
218.281.7600
800.279.5010

Marshall
1501 State Street
Marshall, MN 56258
507.537.7440

St. Paul
University of Minnesota
Biological Sciences Center
1475 Gortner Avenue
St. Paul, MN 55108
612.624.6055

Waseca
PO Box 251
Waseca, MN 56093
507.835.8990

auri.org