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INSET PHOTOS BY ROLF HAGBERG

PHOTO COURTESY OF TETRAKO

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Heating with biomass

Research helps Minnesota businesses evaluate biomass as a heating alternative



PHOTO BY ROLF HAGBERG



PHOTO FROM LARA DURBEN

BY AMANDA WANKE

Yes, this winter was a mild one. But there are plenty of years when heating costs can be painful, especially to operators of large business operations such as greenhouses and turkey producers. As consumers look for alternative, renewable energy, one source AURI has been examining closely is biomass.

Biomass refers to any product from agriculture or forestry that can be fed into a combustor and burned to generate heat. It can come in bulk form such as straw bales, wood chips, and sawdust, or in a densified form such as pellets and cubes.

To further examine the use of this value-added, renewable energy, AURI recently facilitated two projects with different scopes. The Minnesota Biomass Heating Feasibility Guide aims to help turkey producers and greenhouse operators evaluate the feasibility of using biomass for heating. The Midwest Biomass Inventory Assessment is a compilation of the biomass resources within the Midwest.

Minnesota Biomass Heating Feasibility Guide

The Minnesota Biomass Heating Feasibility Guide, conducted by DLF Consulting, aims to help turkey producers and greenhouse operators in rural areas to understand the feasibility of using biomass for heating. Why the focus on turkey producers and greenhouse operators?

“The objective of this project was to help the turkey and greenhouse industries reduce their heating costs, thereby improving their competitiveness and profitability and hopefully leading to further growth and economic activity for these industries in Minnesota,” explains AURI Project Development Director Randy Hilliard, who was the team leader for the feasibility guide project.

“Part of AURI’s role is to help these industries stay competitive and grow in Minnesota, and we hope this research gives them some options to do just that,” says AURI Scientist Al Doering.

Minnesota has a tremendous wealth of biomass inventory—around 25 million tons each year—as well as suppliers, so the state is poised to grow this industry as demand grows.

The feasibility guide serves as a resource on the following topics:

- Biomass resources – agricultural and forestry
- Biomass fuel suppliers in Minnesota
- Biomass fuel handling examples
- Biomass heating system suppliers and products
- Biomass heating system components
- Biomass heating system costs and financial implications
- Financial sensitivity analysis

“This guide shows the positive economics and return on investment of using a biomass boiler for thermal heat, specifically when competing against propane,” says Doering. “The guide shows that the system will pay for itself in six years in fuel savings alone.”

Midwest Biomass Inventory Assessment

The Midwest Biomass Inventory Assessment, which came out of AURI’s involvement with the Heating the Midwest with Renewable Biomass Initiative, provides a snapshot of potential biomass resources within the Midwest. As part of the assessment work, a regional biomass inventory database of previously completed state-level assessments and datasets was also developed. The report presents inventories of crop residue, energy crops and hay, and forest and mill residue in seven Midwestern states: Illinois, Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin.

“Agriculture residue, such as straw, corn stover, and turkey litter, offer the largest quantity of biomass potential,” says Doering. “The amount of wood residue isn’t growing, so it’s really the crop residue that offers the largest supply. However, we caution people to realize the difference between supply ‘inventory’ and ‘availability.’”

Biomass inventory includes all of the biomass that exists. Biomass availability is what can be collected feasibly and economically without detrimental effects on the land.

“This inventory can serve as a platform to begin the development of biomass-related projects,” says Becky Philipp, AURI team leader for the project.

The inventory was conducted by David Ripplinger and Ridhima Katyal with North Dakota State University’s Department of Agribusiness and Applied Economics.

“Biomass can play a role in offering affordable, renewable energy options that consumers are looking for,” says Philipp. ■

Find both reports at www.auri.org.

** A special thanks to our funding partners on these projects: Greater Bemidji, Minnesota Power, Southwest Clean Energy Resource Team, Southern Minnesota Initiative Foundation, and Southwest Minnesota Initiative Foundation.*

What is the Heating the Midwest Initiative?

The Heating the Midwest Initiative aims to: “Advance biomass thermal heating in the Midwest for a more sustainable future, while improving the economic, environmental and social well-being of the region.” The initiative is comprised of a group of volunteers representing industry, government, nonprofit, university and tribal organizations with a serious interest in growing awareness and usage of agricultural and woody biomass and dedicated energy crops for thermal fuel for heat in the Midwest United States.

Since Heating the Midwest’s inception, AURI Project Development Director Becky Philipp has been actively involved as the team leader for the initiative’s Biomass Resources Action Team. AURI’s goal was to partner in raising awareness around biomass-fueled thermal energy, and to collaborate on related activities that contribute to the overarching goal of future economic prosperity, job creation and energy security in the Midwest through the use of agricultural biomass and woody biomass feedstocks.



Minnesota's Candy Bar



Cake and candy combination is a hit

BY AMANDA WANKE

Cake? Candy? Put the two together and you have Minnesota’s newest candy bar: Cakedy. The idea for the new food item is the brainchild of Ryan Taylor, a business management consultant who is turning his love for cake into a new business.

“I love cake. Each weekend, I’d go to Cub Foods and get a piece of marble cake; it was my guilty pleasure,” says Taylor. “I’m a very creative guy. My mind is always going to different places, so I thought, how could I turn this into a cake-candy bar?”

Taylor recruited his sister, Krystal, to help with the idea. “She’s always been the family cake-baker for holidays,” he says. Krystal is also “very helpful and very task-oriented. I knew I was going to need someone to take the business where it needed to go. Those traits she displayed since she was young made her the prime candidate.”

In late 2010, the two started trying various cake and candy combinations to find the right recipe. “It was really trial and error,” says Taylor. In March 2011, the duo incorporated Cakedy. They began with three flavors:

Peanutter

Peanut butter cake nougat mixed with butterscotch chips and covered in a chocolate shell

Red Head

Strawberry cake nougat mixed with strawberry chips and covered in a vanilla shell

Choco Chocatus

Chocolate cake nougat mixed with chocolate mint chips and covered in a chocolate shell

“We did a lot of market testing. We did a test on Nicollet Avenue and had lots of family and friends trying [what we made],” says Taylor, who has his MBA and undergrad degree from Gardner-Webb University in Boling Springs, North Carolina.

When it came to some of the technical parts of creating the Cakedy product, such as working on shelf-life stability and nutritional labeling, Taylor recently turned to AURI Food Scientist Charan Wadhawan.

“Her work with the nutritional labeling and the shelf-life has been incredibly helpful. We ask her questions, and she always gives us the right answers,” says Taylor, who connected with AURI through Kindred Kitchen, a “food business incubator” in North Minneapolis that provides clients with the tools and resources needed to grow and stabilize their food business.

Wadhawan completed the nutritional analysis on the Cakedy product and recommended preservatives and suppliers to help increase the shelf-life; a complete shelf-life study is in process.

Hitting a homerun

“We hit a homerun in terms of what we thought the market response would be,” says Taylor. “Feedback has been overwhelmingly positive, and people like the price point for what is essentially a gourmet candy bar.” Retailers sell the candy bar for approximately \$1.49, while other gourmet candy bars often sell for \$2-3.

The baseball reference is a good fit, as Cakedy was sold this spring at the Minnesota Twins spring training games and will also be sold this summer at the Saint Paul Saints’ Midway Stadium.

Minnesota’s candy bar is also sold at small markets around the Twin Cities and in a few outstate locations. “We wanted to start with places where it’s easy to get in contact with the decision maker, and it’s helpful because they’re small business people, too,” says Taylor. “They give us advice as to how bigger manufacturers will do things and how you can get your product noticed.” ■



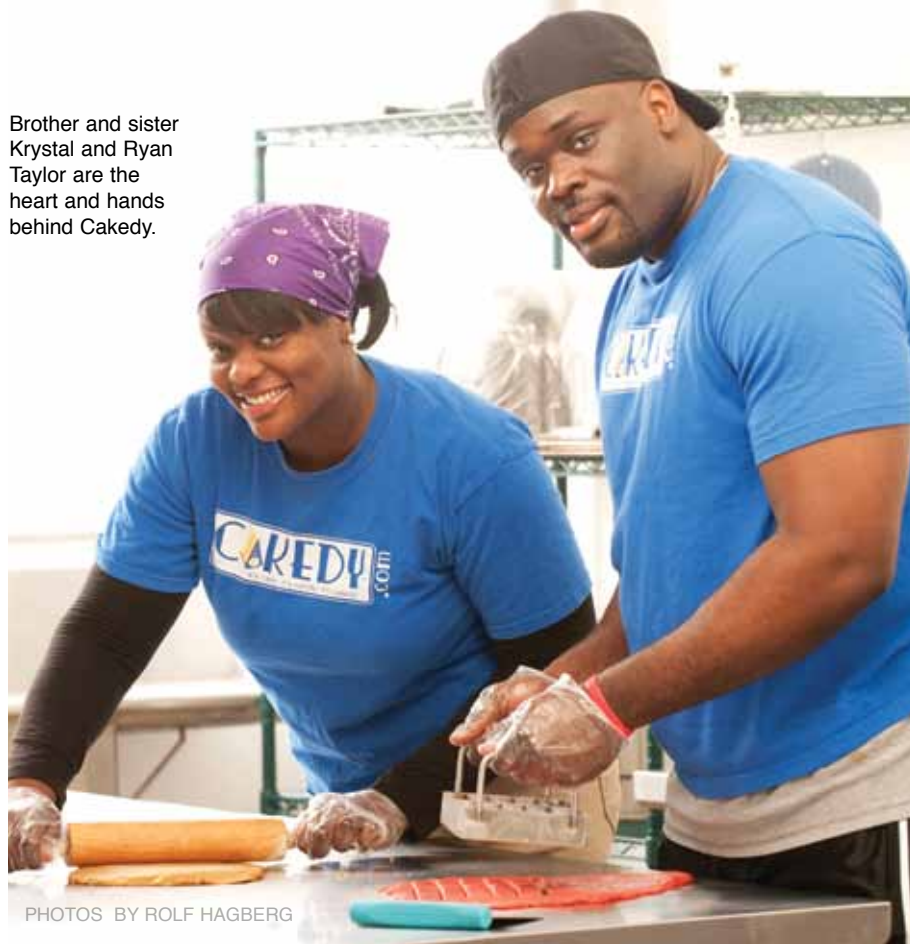
AURI and Cakedy

Idea to opportunity: Cakedy needed help with shelf-life stability and nutritional labeling to bring their product to market.

Outcomes: AURI Food Scientist Charan Wadhawan completed the nutritional analysis, recommended preservatives and suppliers, and is working on a shelf-life study that is essential to Cakedy’s product development.



Brother and sister Krystal and Ryan Taylor are the heart and hands behind Cakedy.



PHOTOS BY ROLF HAGBERG

Locations

Minneapolis

Local D’Lish
Sentryz Liquor and Supermarket
Bryn Mawr Market
Louisiana Famous Fried Chicken
House of Hanson (Dinkytown)
Avenue Eatery

Saint Paul

Tim and Tom’s Speedy Market
Korte’s Super Market Inc.
Midway Stadium (Saint Paul Saints)
Cooper’s Grocery

Brooklyn Park

Seek 1st Urban Retailer

Outstate

Kocian’s IGA, Bigfork
Radermacher’s Supermarket, Le Sueur

Stopping utility pole rot with

Biodiesel



Research finds biodiesel-based preservative compares well with petroleum-based product

BY JONATHAN EISENTHAL

Most people don't give a second thought to the wooden poles that line the roads from town to town, carrying phone, cable and power lines to our homes and businesses. And that's because they're so well made.

"Utility poles should last 30 years—they take a lot of punishment out in the elements so they need a top-performing preservative," explains Hoon Ge, CEO of MEG Corp, a fuel consulting company that provides technical expertise to all segments of the diesel industry.

For the past five years, a national utility pole manufacturer has used biodiesel as the base or carrier for the active ingredient pentachlorophenol, which is used as a wood preservative, in order to address odor problems caused by the petroleum base. Because the biodiesel-based treatment hadn't been thoroughly tested, they faced questions in the industry about the quality of the product; AURI and the Minnesota Soybean Research & Promotion Council partnered to underwrite the needed research.

"We wanted to preserve an important market for biodiesel, and one that has a lot of growth potential," says Dennis Timmerman, senior project development director with AURI.

MEG Corp worked on the research with one of the premier timber industry laboratories—Michigan Technological University in Houghton, Michigan. Experts there tested the durability of wood treated with the biodiesel-based product, and they also investigated claims that biodiesel would cause chemicals to leach into the environment, affecting water quality.

Biodiesel passes tests with flying colors

First, researchers looked at how well the biodiesel treatment stopped rot. "We used treated blocks, which were put in a jar and inoculated with the fungus," explains Glenn Larkin, one of the Michigan Tech scientists who conducted the research. "We looked at brown rot fungi, which affects pine—the wood we were concerned with here."

The inoculated blocks were subjected to these conditions for 12 weeks, and then Larkin and his team compared the final weight to the initial weight. Weight loss greater than five percent indicates thriving fungal infection, and the more the weight loss the worse the rot.

"The performance of the bio substitute was comparable to the petroleum-based preservative system," says Larkin. "In this study, there was no apparent disadvantage in substituting biodiesel."

Competitors have also challenged the new biodiesel wood preservative on the basis of leaching, claiming that water flowing over the wood would leach chemicals into the ground and impact the environment. So MEG Corp brought this question to Michigan Tech, as well.

"In our leachability test we looked at a harsh leaching scenario, much harsher than if it were in the real world," said Larkin. "We used treated blocks that were the same size as the ones used in the decay test, and we basically drowned them in water for 2 weeks. The water was sampled and tested for the pentachlorophenol, and this was done at a number of intervals over the two-week period. Each time we sampled, we changed the water with fresh water. At the end of the test we combined all of the collected water samples for each of the preservative systems to measure the total amount of pentachlorophenol leached from the blocks. We compared the leachability of the two carrier systems [biodiesel- and petroleum-based preservatives]. Here again the performance was comparable."

Utility pole market could grow demand for biodiesel

The biobased wood preservative uses B20—a 20 percent blend of biodiesel and 80 percent conventional #2 diesel.

"AURI and Minnesota Soybean hope to test higher levels of biodiesel in the preservative treatment," says Ge. "Our testing at Michigan Tech found no issue with blends up to B50."

At its current rate of consumption, the utility pole manufacturer uses 400,000 gallons of B20 a year. Conservative estimates for the wood preservative market potential, at B20, would be 8 million gallons, and at B50, utility pole manufacturers might require 20 million gallons a year. Minnesota currently produces about 63 million gallons of biodiesel, so 20 million gallons represents significant market growth.

"It makes sense to look at replacing the whole spectrum of petroleum-based products with plant-based products," concludes Timmerman. "Products like biodiesel are environmentally friendly, renewable and they come from our own farm economy—there are a lot of positive attributes to consider." ■

** A special thanks to our funding partner on this project: Minnesota Soybean Research & Promotion Council.*



PHOTOS BY ROLF HAGBERG

www.auri.org



MEG Corp staff and experts from Michigan Technological University compared a biodiesel-based wood preservative with the petroleum-based product.

PHOTOS BY ROLF HAGBERG

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BY LIZ MORRISON

The fire starts as a small yellow flame licking up from a pile of debris in an old wooden garage. Soon, orange flames are leaping high as black smoke fills the structure. A few seconds later, a bank of flames rolls along the ceiling and boils out the open door.

The entire structure is engulfed in flames and smoke when firefighters hit the blaze with a new corn-based fire-suppressant gel, called TetraKO™. With a few blasts from the fire hose, the flames disappear, and a dense cloud of billowing steam fills the building. In seconds, the fire is out. The firefighters have used just 16 gallons of water mixed with TetraKO to quench the roaring blaze.

The demonstration burn, recorded on video, shows the firefighting power of TetraKO, a biodegradable water enhancer made by the South St. Paul, Minnesota, startup EarthClean Corporation. TetraKO changes plain water into an adhering gel that knocks down fires faster than water or foam — without harming the environment or wildlife. EarthClean, founded by veteran Minnesota entrepreneur Doug Ruth, launched TetraKO this year into the \$6 billion global fire-protection market.



EarthClean's TetraKO, in the middle of this wood sample, provides a thick blanket of fire protection that releases a cooling steam, which helps smother the fire and dramatically cuts the risk of rekindling.

HOW IT WORKS

Patented TetraKO is a powdered concentrate composed of cornstarch and proprietary thickening agents, explains Doug Root, AURI analytical chemist, who has worked with the company on bench tests. TetraKO is mixed directly into fire truck water tanks, where it turns water into a gel the consistency of hand sanitizer. The gel converts to a free-flowing liquid when it's pumped under pressure through standard firefighting equipment.

After TetraKO leaves the fire hose nozzle, it reverts to a gel, which “sticks and stays” to walls, ceilings, roofs and other surfaces, providing a thick blanket of fire protection that doesn't run off like water or foam. When heated by flames, TetraKO releases a cooling steam, which helps smother the fire and dramatically cuts the risk of rekindling.

On wildland fires, TetraKO clings to bushes, trees, and grasses for hours without falling to the ground, creating a fire barrier that can be applied from the air, trucks or backpack sprayers.

FIRE POWER

TetraKO “could revolutionize fire department operation,” says Nyle Zikmund, chief of the 60-member Spring Lake Park-Blaine-Mounds View Fire Department, which has been field testing TetraKO for more than a year.

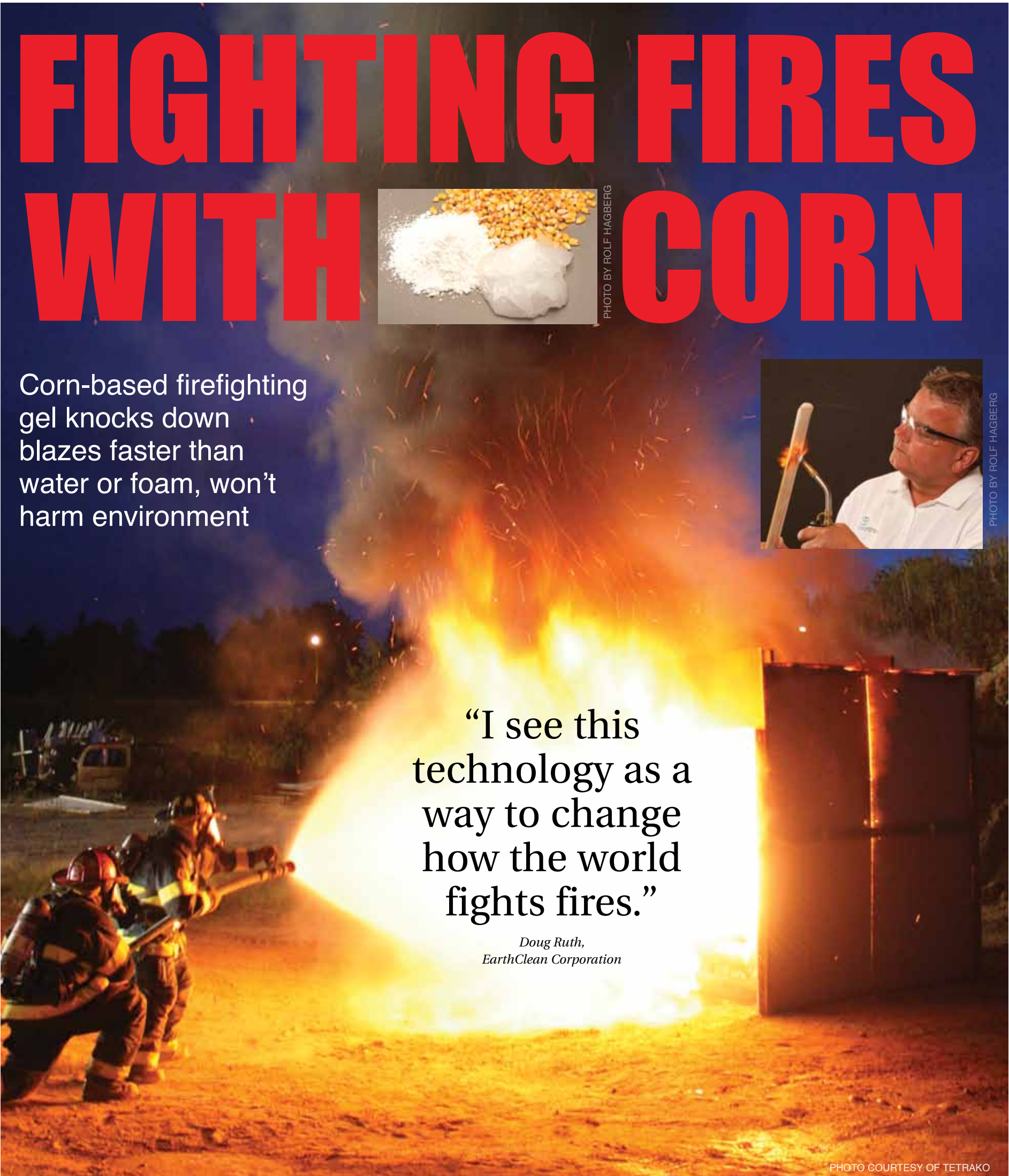
Firefighter safety is the number one benefit, says Chief Zikmund, who also serves on the board of the International Association of Fire Chiefs (IAFC). Independent tests performed by EFI Global, an engineering and fire investigation service, found that TetraKO was 91% more effective in knocking out structure fires than water alone, and 86% more efficient than foam. This improved knockdown power lets firefighters attack the fire defensively, from a much safer position outside of the building.

It also cuts firefighting costs, Zikmund says: “Smaller trucks, smaller crews, less time on the scene, lower labor costs and less potential for injuries.” It takes significantly less water to put out fires with TetraKO, too, he says. That minimizes water damage to buildings. And the cost per gallon of mixed solution of TetraKO is about half that of firefighting foams, Ruth says.

NON-TOXIC FIRE SUPPRESSANT NEEDED

TetraKO was invented and patented by three retired Minnesota engineers and a firefighter. EarthClean bought the rights to the new technology in 2009 and founded EarthClean to commercialize the invention.

Before investing in TetraKO, Ruth spent months researching the market for fire suppressants. Firefighters today use foams, retardants and additives to improve water's effectiveness, but these products come with serious drawbacks, including high costs and negative environmental consequences.



Corn-based firefighting gel knocks down blazes faster than water or foam, won't harm environment

“I see this technology as a way to change how the world fights fires.”

Doug Ruth,
EarthClean Corporation



Above left: Doug Ruth founded EarthClean Corporation, a South St. Paul, Minnesota, start-up that launched TetraKO. Above right: TetraKO is a biodegradable water enhancer that changes plain water into an adhering gel that knocks down fires faster than water or foam.

By contrast, TetraKO doesn't use toxic chemicals and won't corrode equipment. It's been independently certified as non-toxic to plants, fish and mammals, according to National Fire Protection Association standards (NFPA) and higher European standards. The technology has been independently tested to the EPA Office of Prevention, Pesticides and Toxic Substances (OPPTS) standard and verified to be as “ready biodegradable,” EPA's top rating. Unlike other firefighting gels, TetraKO doesn't contain super absorbent polymers, which don't biodegrade. In fact, it's the first fire suppression tool to receive the Environmental Protection Agency's Design for the Environment (DfE) certification, which recognizes environmentally safe chemical products.

Ruth's market research convinced him that TetraKO was very different from anything else currently available to fight fires. “I saw an opportunity to bring a new fire suppressant to the market.”

THE ROAD TO COMMERCIALIZATION

Under Ruth's leadership, EarthClean has raised \$4.2 million in equity capital. The startup worked with Aveka Group, a particle processing and research company in Plymouth, Minn., to finish product development and testing. Now, TetraKO is being field tested by about a dozen Minnesota fire departments.

The firefighting gel was also tested last fall by Texas A&M's Engineering Extension Service (TEEX) at the internationally-recognized Brayton Fire Training Field. The tests included aerial drops on simulated wildland fires, and side-by-side comparisons with water and foam on structure fires.

The Texas demonstrations prompted a white paper from the Technology Council of the International Association of Fire Chiefs, which concluded that “TetraKO has the potential of not only increasing the effectiveness of both wildland and structural firefighting, but doing so in a more environmentally friendly manner — a true win-win for the fire service.”

AURI is currently working to help EarthClean develop TetraKO as a Class A fire retardant and obtain USDA Forest Service certification, which will allow TetraKO to be used on federal wildland fires. The next phase is for AURI and EarthClean, with the help of the Minnesota Corn Research

& Promotion Council and Minnesota Soybean Research & Promotion Council, to develop and certify a Class B or Class A and B fire retardant.

AURI staff are also helping the company develop a liquid version of TetraKO, which could be proportioned at the hose as needed. A liquid concentrate would be more acceptable to municipal fire departments than the current batch mix product, Chief Zikmund says.

A PASSIONATE ENDEAVOR

TetraKO is being manufactured in Minnesota through multiple toll-blending manufacturers. EarthClean, which employs eight people, is now building a distribution network and projecting first year sales of about 40,000 pounds of concentrate.

“Starting a new company is a daunting task,” Ruth says. “As an entrepreneur, you have to be totally passionate about what you're doing. I was interested in finding technology that makes a positive difference. I see this technology as a way to change how the world fights fires.” ■

To see TetraKO in action, go to:
<http://tetraKO.com/index.php/video/photos/>.



AURI and EarthClean

Idea to opportunity: EarthClean needed certification by the USDA Forest Service in order to use their corn-based firefighting product TetraKO to fight forest fires. The company also wanted to develop a liquid version of TetraKO that would work better for municipal fire departments

Outcomes: With testing and product development help from several AURI scientists, EarthClean plans to have commercial quantities of TetraKO powder available for the 2012-13 wildfire season, and work on the liquid version of the firefighting product is well underway.

Funding Partners: A special thanks to our funding partners Minnesota Corn Research & Promotion Council and Minnesota Soybean Research & Promotion Council.

No link between distillers grains and E. coli

Findings important for both beef and ethanol industries



BY LIZ MORRISON

Feeding corn distillers grains to beef cattle does not lead to higher levels of a harmful pathogen, *E. coli O157:H7*, in the animals' digestive systems. That's according to two new studies sponsored by AURI and the Minnesota Corn Research & Promotion Council

The *E. coli O157:H7 (ECO157)* organism, which is common in healthy cattle, can contaminate meat during slaughter, causing illness in humans. Earlier research had suggested a possible link between distillers grains in the diet and a higher incidence of *ECO157*, says University of Minnesota Professor of Animal Science Alfredo DiCostanzo. However, the two Minnesota studies found that including corn distillers grains in beef cattle rations had no effect on the prevalence of *ECO157*, says DiCostanzo, who led the research trials.

The results are good news for Minnesota cattle producers, who frequently include distillers grains in the feed, says Denny Timmerman, AURI project director and a former beef producer. "There's been a lot of controversy about distillers grains and *ECO157*," he says. "This research shows that the feeding practices beef producers use don't cause disease."

The ethanol industry also welcomes the research findings, Timmerman says. Cattle are the largest market for distillers grains, a coproduct of ethanol manufacturing; beef cattle consume 40% of U.S. annual DDGS output, which topped 32 million metric tons in 2010.

Cattle producers need answers

Distillers grains are an economical, high-protein feed that's been widely adopted by the Minnesota beef industry.



According to research, there is no link between distillers grains (pictured above) and the incidence or prevalence of *E. coli O157:H7*.

"Ethanol plants and cattle producers create a symbiotic relationship," Timmerman says. On the ethanol side, distillers grains sales account for as much as one-third of distillery revenues, according to the USDA. On the producer side, "The use of wet and dry distillers grains in beef cattle rations provides significant improvement in feedlot performance."

But research in 2008 at Kansas State University raised questions about the safety of distillers grains in cattle feed, suggesting a higher incidence of *ECO157* in the manure of healthy animals that eat the feedstuff.

Although the Kansas research created a storm of publicity, the findings were not conclusive, the U of M's DiCostanzo says. The relationship between feed ingredients, beef production practices, and *ECO157* is extremely complicated, he says. Other variables, such as housing, bedding material, climate, season of the year, and feed processing may also affect pathogen levels.

All these complexities left Minnesota cattle producers searching for guidance, prompting the recent trials, which were carried out at the University of Minnesota's cattle facilities.

Distillers grains trials

Two feeding trials were performed — one on calves that were artificially inoculated with the *ECO157* pathogen, and one on naturally infected calves. Both trials looked at whether distillers grains in the diet affected the prevalence of *ECO157* in the animals' manure.

In addition, the trials with artificially inoculated calves looked at whether three other feed ingredients — steam flaked corn, dry rolled corn, and soy glycerin — when fed in combination with distillers grains, affected *ECO157* levels.

This combination of dietary treatments was designed to tease out potential interactions between feed ingredients, DiCostanzo says. The aim was to "conclusively determine" if feeding distillers grains stimulates *ECO157* in the digestive systems of cattle. The same experiments are now being repeated at Kansas State University.

By the end of the Minnesota feeding trials, "We found no relationship between dietary ingredients of any type and the incidence or prevalence of *ECO157*," says DiCostanzo. That means Minnesota cattle producers can continue to feed distillers grains with confidence, he says.

Glycerin boosts growth

In an unexpected finding, the Minnesota experiments showed that adding 10 percent crude soy glycerin to beef finishing diets boosted growth rates by about 15 percent, a significant improvement. Preliminary results from the Kansas State University trials confirm those findings, DiCostanzo says.

Minnesota's three biodiesel plants generate about 60 million gallons of crude soy glycerin a year. DiCostanzo encourages cattle producers to include glycerin in the feed, if it's available. In addition to generating higher returns, liquid glycerin also improves feed handling, he adds. ■

** A special thanks to our funding partner on this project: Minnesota Corn Research & Promotion Council.*

AURI working to assure safe meat supply

The meat packing industry has made great strides in preventing harmful pathogens, such as *E. coli O157:H7*, from contaminating meat products during slaughter and processing, says AURI meat scientist Carissa Nath.

AURI and the University of Minnesota assist Minnesota meat processors in this effort by offering Hazard Analysis and Critical Control Point (HACCP) training workshops.

Every meat processor is required to have an HACCP plan, which identifies critical points where food safety dangers, or hazards, could occur. "The HACCP plan puts control measures in place to prevent these hazards from happening," says Nath. "HACCP is really a proactive and preventative measure to protect consumers."

AURI will offer two HACCP sessions in fall 2012: September 27-28 in Marshall and November 15-16 in St. Paul. For more information, contact Nath at 507.537.7440 or cnath@auri.org. Nath also does in-house food safety training with individual meat processors.

"Food safety is the number one priority for all food processors," Nath says.

AURI client wins beef award

McDonald's Meats, an AURI client, was recently honored with the Minnesota Beef Backer Award, awarded by the Minnesota Beef Council. The award recognizes food companies for extraordinary leadership in marketing beef.

McDonald's Meats, a family owned retail meat and butcher shop that has been operating in the small town of Clear Lake, Minnesota, for 97 years, won the award in the category of Independent Retailer.

AURI scientists Ranae Jorgenson and Charan Wadhawan have worked with McDonald's Meats to generate nutritional labels for various products including jerky, snack sticks and summer sausage.

"We strive every day to bring our customers great customer service and exceptional quality beef products", said Jennifer Dirkes, general manager of McDonald's Meats. "We are always trying to create new innovative beef items like our beef bacon. We are providing small local farmers a way to private label their beef and bring them to a wider audience throughout the state through reselling at co-ops and farmers markets."



BY CARISSA NATH
AURI MEAT SCIENTIST

Organic. Hormone-free. Preservative free. Today's consumers are paying closer attention than ever to where their food comes from and how it's made. And they want natural food that is free of ingredients they can't pronounce, even though many of those ingredients are critical to food safety and have no proven detriments.

This consumer desire has resulted in a clean labeling trend. What is a clean label? There's no hard-and-fast definition, but this is a broadly used term for a food label that contains only ingredients the consumer wants to see. Often this means a label that contains minimal ingredients and ones that are primarily found in nature. While the desires for clean labels may be more of an emotionally-driven decision than a scientific one, the desires of the family grocery shopper in trying to choose the healthiest possible food is one that food processors need to embrace to stay competitive.

At AURI, we are helping processors understand clean labels and reformulating their foods to use alternative, natural ingredients. For example, meats that are labeled "natural" or "organic" can't have nitrate or nitrite in them, which are chemicals critical for food preservation. So, some processors are trying alternatives such as vegetable juice powder to cure the meat. In addition, we're also seeing natural anti-oxidants that extend the shelf-life of products, such as rosemary extract and cherry powder instead of commonly-used preservatives such as BHA and BHT.

Consumers' taste preferences offer challenges for food and meat processors. Often, buyers want products to look and taste the same, but want them to be minimally processed. For example, many producers and processors have tried to reduce sodium in their products. However, people's palates have evolved over time to prefer saltier foods, so in taste tests higher-sodium products are usually preferred over low-sodium options.

Even with these challenges, processors are working hard, and must continue to do so, to come up with alternative ingredients that are appreciated by the consumer. We at AURI are here to help those small- and medium-sized agri-processors meet marketplace opportunities and challenges just like these so that they can stay competitive. One tool we've created to do that is the *Natural and Organic Meat Processing Guide*, which guides through natural alternatives for curing meat. ■

For a copy of the guide, please go to www.auri.org and search "organic meat processing" or call AURI at 507.537.7440.





BY TERESA SPAETH
AURI EXECUTIVE DIRECTOR

This June, I was pleased to help celebrate BioPlastic Solutions as AURI’s 2012 Ag Innovator of the Year. This recognition, which has been awarded annually since 2002, recognizes an innovator who has contributed to Minnesota’s economy by creating a unique product or process using agriculture commodities.

AURI’s 2012 Ag Innovator of the Year: BioPlastic Solutions

BioPlastic Solutions, LLC, led by CEO Gary Noble, calls their products the “the environmental alternative to petrochemical-based plastics.” The plastic components manufacturer converted to cornstarch-based polylactic acid (PLA) nine years ago and is one of the first in the nation to use renewable polymers in plastic profile extrusion. Plastics extrusion is a manufacturing process in which raw plastic material is melted and formed into a continuous profile for items such as piping and tubing, window frames, trimming, edging, deck railing, and more.

AURI partnered with BioPlastic Solutions to help bring their idea to reality, offering our services in hands-on scientific assistance to conduct product testing and development in our labs. In addition, resource networking is a critical part of the innovation process. AURI connected BioPlastic Solutions to NDSU researchers that led to a network of resources such as the University of Minnesota, state

universities in Winona and Mankato, Southern Minnesota Initiative Foundation, and Minnesota manufacturer, including a window company that is interested in BioPlastic Solutions’ product.

BioPlastic Solutions product line now includes their trademark BioBest® resin, BioEdge® edgebanding, BioBead™ corner bead, BioBest MSDS, and rolling walls and dividers. Currently a nine-man shop, owner Gary is optimistic that these products will lead to at least three more jobs by the end of the year.

We are proud of the work Gary and his team have done to offer environmentally-friendly products, adding value to Minnesota’s agriculture and helping to grow our economy.

Congratulations to Gary and the entire BioPlastic Solutions team! ■



PHOTO BY ROLF HAGBERG

ELSEWHERE IN AG INNOVATIONS

Editor’s note: As a service to our readers, we provide news about the work of others in ag utilization. Often, research done elsewhere complements AURI’s work.



Biobased materials make Ford vehicles greener

When you take a seat in a Ford, you may be sitting on soy- and other biobased seat cushions and seatbacks. Ford vehicles are now 85 percent recyclable by weight. The Ford Taurus is the eleventh Ford vehicle to feature biobased seat cushions and seatbacks. Ford also has biobased foam in more than two million vehicles and is looking to convert 100 percent of their fleet to it in the future.

In addition, Ford is working with recycled polymeric materials to combine discarded tires with biorenewable content from soy to make environmentally friendly seals and gaskets. More than 2.2 million pounds of rubber from recycled tires has been made into RPM seals and gaskets with more than 210,000 used tires being recycled. In addition, more than 150,000 pounds of soy has been used to create the materials.

From: www.biobasednews.com; AgWeek
April 2010; April 2012

Paper bottle wine to become a reality

There’s bottled wine and boxed wine; what about paper bottle wine? The company GreenBottle is making that idea reality. Their paper bottle has a reduced carbon footprint of 90% compared to glass bottles and weighs less, too, coming in at 55g compared to 500g for a glass bottle. The paper bottle will also cut down on the waste in landfills where glass bottles can take up to 500 years to decompose. GreenBottle hopes to launch the paper wine bottles by mid-2012.

From: Food Production Daily
November 14, 2011

Soy compounds may boost cancer treatment effectiveness

Adding an oral supplement with soy isoflavones could help make radiation treatment of lung cancer tumors more effective while also helping to preserve normal tissue, says a new research report published in Radiation and Oncology. Researchers report that soy isoflavones enhanced the destruction of lung tumors by radiation while also reducing vascular damage, inflammation, and fibrosis caused by radiation injury to normal lung tissue. The research team said their findings suggest a complementary approach that could be applied to the treatment of patients with advanced lung cancer.

From: Nutraingredients.com
December 21, 2011

Soy protein has brain-boosting benefits

According to a new study published in Nutrition, peptides from soybeans may influence the immune system and hormones linked to emotion, and ultimately boost brain function. The soybean peptides are also associated with a decrease in adrenaline levels and an increase in dopamine levels. The study adds to a large body of science that supports the potential benefits of soy consumption, including cholesterol reduction, reduced risk of heart disease, and reduced severity of menopausal symptoms.

From: Nutraingredients.com
January 20, 2012



AURI’S CORE FOUR QUIZ

How much do you know about AURI’s core four areas: food, renewable energy, coproducts, and biobased products? Take the below quiz.

Food Products

Q What are the four “C”s of food safety?

Answer: Cleaning, cooking, cooling, cross contamination

Biobased Products

Q This material, made from fermented corn, can be used to make clothing, blankets and even building materials. What is it?

Answer: Polylactic Acid or PLA

Renewable Energy

Q Dairy digester solids are left once dairy manure has been digested. Name two potential uses for the solids.

Answer: Fertilizer, growing media (potting soil), fuel

Coproducts

Q North American Fertilizer markets NAFMicro Fertilizer made from the ash of what combusted ag-based leftover?

Answer: Poultry litter

ABOUT AURI

The Agricultural Utilization Research Institute (AURI) helps develop new uses for agricultural products through science and technology, partnering with businesses and entrepreneurs to bring ideas to reality. AURI staff are skilled to walk clients through the entire development journey of bringing a new product or process from idea to reality.

Service Areas: What We Provide

Applied Research and Development

Through practical, applied research we identify emerging opportunities to add value to agriculture products. This information is publicly available in order to help entrepreneurs and businesses generate ideas for new products and processes.

Innovation Networks

When deciding the feasibility of a new product or process, it is critical to have access to industry experts and a science-based network of people. With a broad range of networks, AURI can help bring together the right people at the right time.

Hands-on Scientific Assistance

Scientists are available to provide consulting and technical services in the areas of:

- Product and process development
- Product evaluation and testing
- Sourcing materials, equipment and services

Labs are available to clients for hands-on testing and development.

Learn More

- Contact one of the AURI Offices to speak with a project development director about your business.
- Visit www.auri.org to see the latest research and learn about upcoming events.
- Sign up to receive the Ag Innovations Newspaper or the AURI electronic newsletter to stay informed about AURI projects and clients.
- Follow AURI on Facebook and Twitter to get notices about new research, upcoming events, where to find AURI at tradeshow and much more.

Contact Us

www.auri.org

Crookston
PO Box 599
Crookston, MN 56716
800.279.5010

Waseca
PO Box 251
Waseca, MN 56093
507.835.8990

Marshall
1501 State St.
Marshall, MN 56258
507.537.7440



PHOTO BY ROLF HAGBERG

ABOUT AG INNOVATION NEWS

Amanda Wanke, managing editor
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Address correspondence or subscription requests to:

Ag Innovation News
P.O. Box 251
Waseca MN 56093
507.835.8990
awanke@auri.org

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BY LIZ MORRISON



It's often said that small businesses are the engine of job creation. AURI helps fuel that engine by offering hands-on scientific assistance to small businesses, along with access to research and resource networks. The goal is to help Minnesota entrepreneurs bring

innovative, ag-based products to market, generating economic activity — and new jobs.

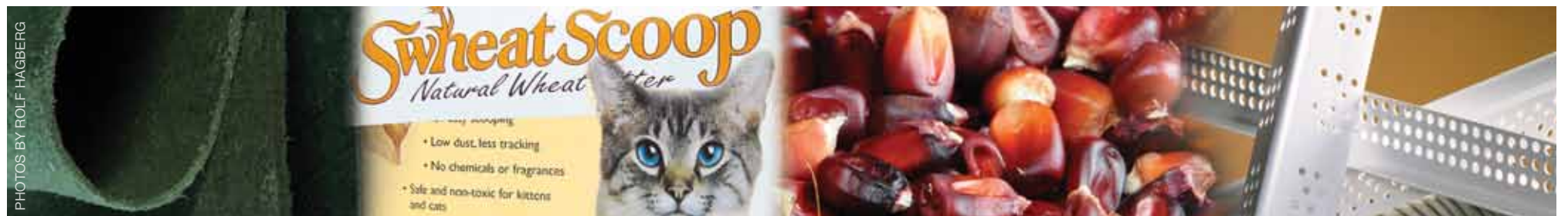
Small firms provide about half of all private sector jobs, according to the U.S. Census Bureau. And small companies provide the greatest share of net new jobs, according to the Small Business Administration's Office of Advocacy.

Still, the rate of new business startups fell in 2010 to the lowest point on record, the Census Bureau reported in May. New companies as a percentage of all businesses dropped below 8%, from a peak of 13% in the 1980s.

One of the problems: startups have a hard time finding the expertise and resources

needed to bring their new ideas to market, says Jennifer Wagner-Lahr, AURI innovation director. That's where AURI can help, working with entrepreneurs on the nuts and bolts of product development and testing, processing, materials sourcing, market analysis, and business planning. Here are just a few AURI clients who are helping create jobs:

new IDEAS LEAD TO new JOBS



PHOTOS BY ROLF HAGBERG

USA Solutions

Tony Schmidt and Daryl Metcalfe worked with AURI's coproducts lab in Waseca to develop biodegradable, cornstalk-fiber swine farrowing mats as an alternative to rubber mats in nursery pig barns.

- By the numbers: Sold 320,000 Compost-A-Mats in 2011. USA Solutions' contract manufacturer, Mat, Inc., employs six workers to produce the mats.
- On the horizon: Working on a deal with a South Korean distributor that could double mat sales and further boost manufacturing jobs in Minnesota.

Pet Care Systems

AURI helped entrepreneurs Mike, Vonnice and Mark Hughes develop their idea for Swheat Scoop, a renewable, flushable cat litter made from naturally-clumping wheat.

- By the numbers: A \$20 million business; employs 24 full-time workers and a national sales force of eight.
- On the horizon: Pet Care Systems is completing a \$4.25 million expansion of its Detroit Lakes manufacturing plant, which will add another four jobs, says Don Davis, president of Farmers Union Industries, which now owns Pet Care Systems.

Suntava

Suntava has commercialized its purple corn and natural red food colorants, supplying Illinois-based Axiom Foods with its purple grain for Mystic Harvest Purple Corn Tortilla Chips as well as other grain and color applications.

- By the numbers: Employs eight people in administration, sales, and product development; contracts with about a dozen Minnesota farmers who grow the company's patented non-genetically modified purple corn.

BioPlastic Solutions

Bio-Plastic Solutions manufactures BioBest® bioplastic parts for doors, windows, wall trim and office furniture. The proprietary plastic, developed with the help of AURI, is 80 percent renewable carbon.

- By the numbers: Currently a nine-man shop, owner Gary Noble expects this effort to lead to at least three more jobs by the end of the year. ■