AG INNOVATION NEWS

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BY CINDY GREEN

Barley isn't just for beer and breakfast anymore.

Research confirms that a natural enzyme in barley straw inhibits odor. "We've seen barley straw used successfully to control odor emitted from swine facilities, spread over lagoons to control odor and floated on lakes to control the spread of algae," says Marvin Zutz, president of the Minnesota Barley Growers Association.

But transporting barley straw bales to markets on the East Coast and southern states, where demand is highest, is prohibitively expensive.

So AURI project director Becky Philipp designed an initiative to connect supply with demand. In December, AURI scientist Al Doering started densifying barley straw into pellets. Various forms will be tested to see if they float while maintaining enzymes that control odor.

Talk is cheap and productive

After articles appeared about barley's odor and algae control benefits, Zutz says he, "started getting calls from municipalities, airports and the like," seeking barley to spread on city ponds and between runways. "Then they find out the cost is pretty prohibitive unless they can find it closer."

Philipp sparked the initiative to densify straw while talking to Zutz at a stakeholder meeting. "We were brainstorming how they could find new uses for barley," Philipp says.

"Traditionally, barley has been grown in northern Minnesota" … but "over the years, barley production has declined significantly," which is one of the barley association's primary concerns, Philipp says.

Zutz told Philipp about barley straw's odor and algae control properties and potential markets that couldn't be reached because transporting bales any distance isn't economically feasible.

"I said, 'you've got to be able to do something with that to meet the demands,' and asked if I could do a barley straw initiative using pellets," Philipp says.

"It's a unique idea and it's my first big initiative," since shifting to project director in March, says Philipp, who has served in AURI human resource positions for nearly a decade.

Odor trials

To make sure the barley initiative wasn't duplicating other efforts, Philipp asked AURI researcher Lea Reitmeier to conduct a literature search, which she reviewed with Doering.

"There has been research where they chopped up straw and blew it over lagoons for odor control. And there is actually a patent pending on cubing straw," Doering says. "But you can only afford to ship it so far — 100 to 150 miles."

Nobody has tried stopping odor with dense barley pellets that are easy to ship.



"When you pellet, you can make different densities so it will swell and expand rather than sink to the bottom," Doering says. "It should float, break apart and form a mat."

"But we're looking at: if you do pellet barley straw, do you change the properties or characteristics needed for odor control?"

After Doering experiments with various pellet forms, he will test them on contained water with added household ammonia. "We'll sprinkle ground barley straw over it and pellets over it, and we have instruments that can test how well it's preventing ammonia release."

Following contained-water trials, Doering will test ground and pelleted barley straw on swine manure from a hog pit to see if it contains ammonia and hydrogen sulfide, which "is what you smell from manure," he says.

Market economics

"If we learn we can pellet (barley straw) and get it to float on water and break apart and form a mat, then we have to look at the economics," Doering says.

"By densifying, we can ship it further, but we've added some expense through processing." Is it economical? "Until we start, we don't know."

"We're trying to develop a product so we can move a Minnesota commodity out to the market, and since the markets are already established, that helps," Doering says.

If barley-straw pellets are feasible and economical, "the next step will be to tie it to marketing," Philipp says. The Minnesota Barley Growers Association and AURI will identify a Minnesota commercialization partner to manufacture and market the pellets.

"Overall, it is the hope that by finding alternative uses for barley and more demand for it, producers will again consider if it is cost-effective to return to producing barley," Philipp says.

A short-season crop, barley is primarily grown in the northern plains states of Minnesota, North Dakota, Montana, Idaho, Oregon and Washington. Beside animal feed and food, it is used for malting, which has become the primary use as malt barley commands a premium price.

In Minnesota, from 2008 to 2009, barley production dropped from 125,000 to 95,000 planted acres — tiny compared to 7.6 million corn acres and 7.2 million soybean acres.

"Hopefully, by condensing barley straw into a form that can be transported more economically, it will create a new market for barley coproducts," Zutz says.

"Personally and professionally, I'm really excited about it," Philipp says. "Having been raised on a wheat and barley farm, I hope we can develop something positive out of this, so it can add to the bottom line for producers." ■

OH So GOOD

Entrepreneurial snack-mix baker turns hobby into a career

BY ASHLEY HARGUTH

Minnetonka, Minn. — Theresa Oslund began baking as a child, learning from her grandmother's expertise. As a grown-up, she developed her own specialties, including a cranberry-macadamia snack mix for gifts and special occasions.

Family and friends urged her to sell the snack and, 15 years later, it clicked. Oslund decided it was "time to do my thing" and turned her passion for baking into a career.

In 2007, she launched Special T's Oh So Good Gourmet. Besides her cranberry macadamia snack mix, she developed new flavors: blueberry almond, triple cherry pecan, smoke'n chipotle and a granola breakfast blend. Ingredients include honey, butter, flax and maple syrup from Minnesota, and heart-healthy nuts, whole grains, fruits and spices.

"This is a real food with real ingredients," Oslund says. "My mixes contain no added sugar, sodium, preservatives or trans fats." She laughs that a food show customer "couldn't believe they could pronounce every ingredient in the mixes."

Store-ready with AURI expertise

A Minnesota Department of Agriculture employee connected Oslund to AURI food scientist Charan Wadhawan. "Charan looked over my recipes and made adjustments if needed, along with shelf-life testing, nutritional label development and connecting me to wholesalers and commercial kitchen space," Oslund says. "Charan is phenomenal. She is a walking wealth of information."

Currently Oslund and Wadhawan are working on cutting fat grams in the snack mixes to meet school requirements. To appeal to students, they are also developing a nacho-flavored snack.

Special T markets

The business is steadily growing. Oslund is the only employee and enjoys "keeping the quality there and keeping the personal, hands-on situation," but relies on family and friends to help her out if needed.

This past year, Special T's Oh So Good Gourmet snacks were picked up by a distributor that delivers to Upper Midwest businesses and schools. The Hopkins school district replaced Chex Mix with Special T's snacks in its cafeterias, vending machines and concession stands.

Special T's are also sold through food co-ops, farmers markets, food shows, the University of Minnesota, a national hotel chain and gift basket companies in the United States and Canada.

Four snack mix flavors in 3 and 10 ounce bags sell for $1.95 and $5.95, and 16 ounces of granola sells for $6.95 on Special T's website: ohsogoodgourmet.com. Gift baskets are also available.

Oslund says she hopes to expand her operation, retail outlet and add more products to the Special T's line.

On her website, Oslund writes that she never tries a recipe as is. "When I decide to make something, I select many renditions of the recipe, study their commonalities and differences, and then, develop "my recipe" with "my twist."

"I am always creating and perfecting, so there will never be a shortage of new products." ■



Special T's snack mixes are made with heart-healthy nuts, whole grains, fruits and Minnesota-grown honey, butter, flax and maple syrup.

PHOTOS BY ROLF HAGBERG



AURI uses unbiased approach to determining a project's feasibility

BY DAN LEMKE

A journey of a thousand miles begins with a single step, so says an ancient Chinese proverb.

But should a second step be taken?

That's the question AURI asks of every new product and process it evaluates. As an independent examiner, AURI provides unbiased information to help Minnesota businesses and entrepreneurs decide if an emerging opportunity is truly feasible.

"No two projects are exactly the same, but one constant is the evaluation piece," says Michael Sparby, AURI senior project director. All projects are evaluated to determine if they are worthy of committing further resources — and if there is real opportunity.

Whey ahead

First District Association of Litchfield is a producer-owned dairy processing cooperative owned by its 1,100 members. Processing 3.8 million pounds of milk a day, First District produces about 400,000 pounds of cheddar cheese, whey protein concentrate, condensed whey products and lactose (milk sugar) daily.

Several years ago, First District began looking at new technology to replace 30-year-old equipment for greater efficiency and new opportunities. AURI was brought in to help determine the project's feasibility before the dairy processor made the commitment to move ahead.

"It's never been our goal to see how big we can become versus how good we can become," says First District President Clint Fall. "Our goal is to maintain the reputation and quality First District is known for.

"At the same time … we produce commodity dairy products used as food ingredients, so it is very competitive. We need to be competitive on a global basis."

After a thorough evaluation, First District Association chose to move forward with the expansion and installed a state-of-the-art whey evaporator complex. It was one of the state's first major dairy processing expansions in years.

The project created jobs for construction workers, pipe fitters, electricians and metal workers. It also increased the skilled workforce at the Litchfield facility.

"AURI played an important role in helping us to kick this project off," Fall says, by assisting with "the planning and engineering of the equipment that was installed." The engineering was followed by "construction of a multi-million dollar complex," and could lead to future expansion, Fall says.


PHOTO BY ROLF HAGBERG

Clint Fall, president of First District Dairy Association in Litchfield, called on AURI to help evaluate the feasibility of replacing 30-year-old equipment to more efficiently process milk into cheese and whey products. After AURI's review, the dairy cooperative decided to install a state-of-the-art whey evaporator complex and expand its operations.

Cellulosic opportunity

Located between corn and timber country, Central Minnesota Ethanol Cooperative in Little Falls, Minn. has a history of being progressive and identifying ways to increase efficiency or reduce costs.

It's a survival strategy.

"Central Minnesota Ethanol is a 20 million gallon plant, but we have to compete with 50 million and 100 million gallon plants," says Steve Anderson, a farmer and CMEC board president. "We have to look at new technologies to keep our cost per gallon down."

The co-op has completed a two-phase evaluation in its effort to become the state's first cellulosic ethanol plant.

"We went to AURI and explained the project," Anderson says. "What phase A brought out was, 'Are there going to be any show stoppers along the way?' AURI stepped up to help the partners who were looking at putting this together. Phase B has now been completed with a lot more detail." The second phase contained more site-specific information on engineering, analysis and logistics.

Anderson says a cellulosic plant is very expensive to build, with an initial cost of about $10 per gallon, so a proposed 10 million gallon plant would carry a $100 million price tag. Due to the current economic environment, Central Minnesota Ethanol is holding off on the cellulosic expansion, but they do have the information they need to implement the project when and if the time is right.

Knowledge to implement

Sparby says AURI staff use a business principle of generate, select and implement. AURI projects are designed to generate needed information that businesses can select and then use to implement.

"The types of evaluations may change because it could involve a technical feasibility testing or a market assessment," Sparby says. Whether the project is bioenergy, biobased products, coproduct utilization or food innovations, "what we are providing leads to knowledge and that knowledge ultimately leads to implementation,"

"Implementation is the key," says AURI Executive Director Teresa Spaeth. "Innovation without implementation is merely creativity. We work to provide sound, unbiased information that helps Minnesota businesses and entrepreneurs create real opportunities, jobs and economic activity." ■

BOLT-ON POWER





PHOTOS BY DAN LEMKE

Biodiesel and hybrid drive system tested on city truck

BY DAN LEMKE

Minneapolis, Minn. — Nearly every morning, a barely-noticed battalion of trucks crisscross the streets and alleys of Minneapolis gobbling up glass, plastic, aluminum and other recyclables from residents' curbs. The city's fleet of 14 snub-nosed, white trucks all look the same — with one notable exception.

One of the trucks has gone 'green.' It runs on biodiesel and a hybrid drive system, bolted to its drive shaft. When the truck decelerates, the motor generator produces energy that is stored in a capacitor. When the truck accelerates, energy from that capacitor gives the diesel engine a boost.

The demonstration system is intended "to reduce both fuel consumption and emissions," says Kelly Strebig, research engineer for the University of Minnesota's Center for Diesel Research, which is conducting a study on the hybrid drive combined with biodiesel.

The diesel research center started the study in July and chose a recycling truck because it starts and stops constantly.



Darrick Zarling, U of M Center for Diesel Research scientist, removes a computer used to monitor a hybrid drive system, bolted to a recyling truck's drive shaft, for an AURI-sponsored study.

Detachable systems

Besides testing the hybrid drive technology, researchers are evaluating its use with 5 and 20 percent biodiesel fuel blends. "We want to see how the system works and test how biodiesel works with this new technology," Strebig says.

The hybrid drive system, produced by Variable Torque Motors of Indiana, is designed for shuttles and school buses. Unlike vehicles manufactured with hybrid drive systems, this bolt-on technology can be added to existing vehicles by removing a section of the drive shaft. It can also be removed from one vehicle and attached to another.

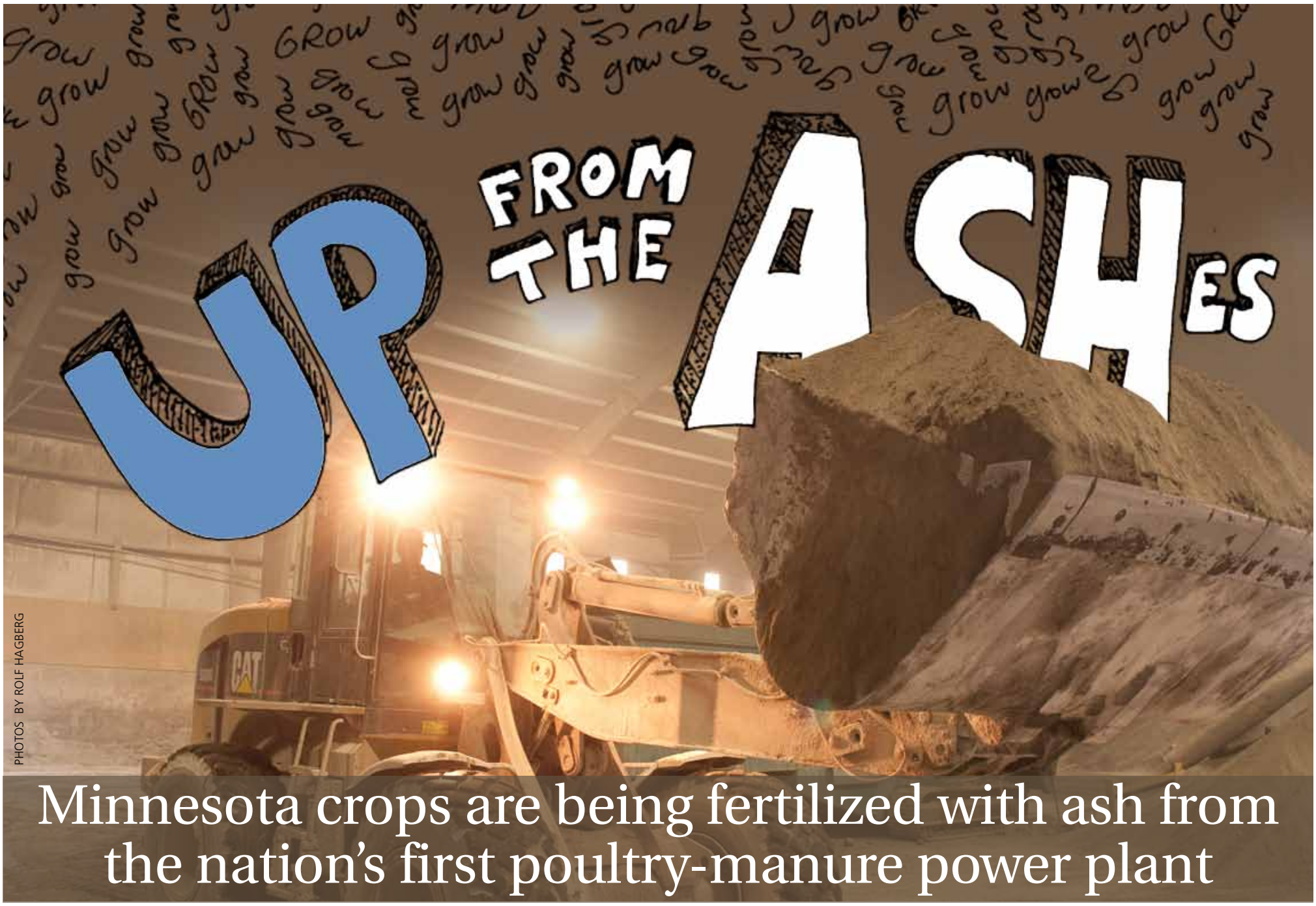
Brake light

Reduced brake wear is an added benefit, Strebig says. Since the system uses a generator to produce energy while the vehicle decelerates, the added draw slows the vehicle.

"There are times when a driver barely has to touch the brakes on their entire route," Strebig says. He expects this will save money and reduce brake dust in residential areas.

The study, supported by the Minnesota Soybean Research and Promotion Council, Minnesota Department of Commerce and AURI, should be completed by fall 2011.

Besides improving vehicle performance and reducing emissions, "we are looking at technologies … that improve the market for biodiesel," says Dennis Timmerman, AURI project director. "The hybrid drive system does all these for municipal vehicles." ■



PHOTOS BY ROLF HAGBERG

Minnesota crops are being fertilized with ash from the nation's first poultry-manure power plant



Steve Miller, general manager of North American Fertilizer LLC, holds expansion plans for the company's Benson, Minn. facility. Demand is exceeding supply for NAF's ash fertilizer, generated by the nearby Fibrominn plant, which burns poultry manure to produce electricity.

BY LIZ MORRISON

Benson, Minn. — The phosphate, potash and sulfur in NAFmicro fertilizer aren't mined overseas — they're Minnesota grown.

North American Fertilizer LLC sells 110,000 tons a year of ash fertilizer derived from incinerated poultry manure. The ashes come from Fibrominn in Benson, Minn., a 55-megawatt electricity plant fired by a half-million tons of turkey and chicken litter. The leftover ash is a good source of essential crop nutrients.

The $5 million NAF facility was built in 2007 by a group of Minnesota farmers and entrepreneurs. AURI helped the group test ash fertilizer in University of Minnesota field trials. AURI was also involved in early planning and feasibility studies for Fibrominn.

At a time when U.S. fertilizer imports are on the rise, NAFmicro represents more than $10 million in retail sales of locally-grown, renewable fertilizer.

NAFmicro has been a hit with farmers, says Steve Miller, NAF general manager. "Everything we get from Fibrominn, we've sold. And demand exceeds our supply."

Creating opportunity

Minnesota's biomass energy industry is just getting started, says Al Doering, director of AURI's coproducts lab in Waseca. As this new energy sector develops, large quantities of biomass ashes will become available, he says, opening the door for new uses and enterprises. "NAF is a perfect example. They are building a new business around this renewable product. This is what economic development and job creation are all about."

NAF employs five full-time workers and three seasonal workers, and also contracts for trucking services to ship fertilizer between its warehouses in Benson and Olivia. The company is just finishing up a $1.8 million expansion, which will increase its fertilizer storage capacity to 100,000 tons. The additional warehouse space is needed to accommodate an increasing volume of ashes from Fibrominn, Miller says.

Nutrient-rich ash

One hundred truckloads of poultry litter roll into the Fibrominn power plant daily. The mixture of turkey and chicken manure, bedding materials and other biomass is burned in a custom boiler to generate high-pressure steam. The steam drives a turbine, generating renewable electricity for Xcel Energy.

A 500-foot-long overhead conveyor transfers warm ashes from Fibrominn directly to the NAF fertilizer plant next door. There, the ashes — which look like fine, gray sand — are screened, sprayed with water for better handling, and stored in cavernous warehouses.

The nitrogen in the poultry manure is consumed during combustion, Miller explains, but the minerals in the manure remain. In addition to phosphorus and potassium — primary crop nutrients — the ashes contain other important nutrients, including sulfur, zinc, copper, magnesium and boron.

Unlike commercial fertilizers, "NAFmicro fertilizer is not a blend," Miller says. Every particle contains primary, secondary and micro nutrients, which eliminates the need for mixing and allows more uniform application, he says. "We call it 'fertilizer for dummies.' Everything you need is in there."

This past fall, more than 75,000 tons of NAFmicro fertilizer were spread on central Minnesota farm fields to feed next season's corn, soybeans, alfalfa, wheat and sugar beets. Another 30,000 to 40,000 tons will be applied in the spring. In total, roughly 150,000 acres of central Minnesota cropland will benefit from NAF's renewable fertilizer, Miller says.

NAFmicro is distributed by nine farm-supply retailers in Minnesota, Iowa and South Dakota. The retailers pick up the ash from the warehouse and deliver it directly to fields, where it is applied with GPS-guided spinner spreader rigs and later incorporated into the soil through cultivation.

Because NAFmicro has a low nutrient density, the application rate is quite high — about 1,300 pounds per acre, compared to around 300 pounds per acre for a conventional dry-fertilizer blend. Although that raises transportation and application costs, it also means you get dense, uniform coverage, Miller says. "Fertilizer particles are spaced very close together, so crop root systems can easily come into contact with it."

Currently, NAF prices the fertilizer at a discount, compared to conventional P and K, Miller says. "The higher application and trucking costs are also factored into the wholesale price." As farmers come to appreciate the advantages of NAFmicro, the ash fertilizer could command a premium, he says. NAF is also pursuing high-value specialty fertilizer markets, such as gardens and golf courses.

Grower acceptance good

Brad Aaseth is manager of Bird Island Soil Service Center in Bird Island, Minn., which sells about a third of NAF's annual output. The 240-member grower cooperative also owns a stake in the fertilizer company.

"Demand for NAFmicro is very good," Aaseth says. "It's been a well-received product with lots of repeat customers. We committed our entire allocation by August. I had to turn down some requests."

NAFmicro has no nitrogen to leach into surface waters when crops aren't growing, so it can be safely applied in the fall — an advantage for many farmers, Aaseth says. Sugar beet producers, who must limit nitrogen to maintain sugar quality, also like the ash fertilizer, he says. Two years of research by Southern Minnesota Beet Sugar Cooperative confirmed that NAFmicro produced revenues comparable to a conventional fertilizer program. "We've applied quite a bit of it ahead of sugar beets this fall."

As for performance, "we haven't seen any disadvantages," Aaseth says. "It performs about the same as commercial fertilizer. Long term, the sulfur and other micronutrients might be an advantage." ■

Ash CAN!

'U' trials test the fertilizer value of biofuel industry ashes

BY LIZ MORRISON

Ashes from two types of incinerated biomass are a good alternative to conventional fertilizer, according to recent University of Minnesota research.

The nutrient content of ashes varies by the feedstock and combustion method. AURI sponsored trials in 2008 and 2009, which compared the fertilizer value of three types of biofuel ashes on corn:

- combusted poultry-manure ashes from the Fibrominn power plant in Benson, Minn.
- combusted corn syrup ashes from the Corn Plus ethanol plant in Winnebago, Minn.
- gasified corn cob and wood chip ashes, or biochar, from the Chippewa Valley Ethanol Company in Benson.

The trials were performed at the University of Minnesota's Southern Research and Outreach Center in Waseca — on soils that are low in phosphorus.

Biochar ashes, which have very low amounts of crop nutrients, had no agronomic value for corn production, says U of M soil scientist Jeffrey Vetsch, who led the research. But both types of combustion ashes proved to be good sources of phosphorus (P) and potassium (K).

In 2008, Vetsch compared two rates of commercial and ash fertilizers — a low rate that supplied 80 pounds/acre of total P, and a higher rate that supplied 240 pounds/acre of total P. The lower rate of poultry-manure ash did not perform as well as the commercial fertilizer or the corn syrup ash, Vetsch says. That's because not all of the P in poultry manure ash is immediately available to plants, he says.

But at the high er P rate, there was no significant yield difference between any of the fertilizers, Vetsch found.

About 60 percent of the total P and K in poultry manure ash is available to plants the first year, says Steve Miller, manager of North American Fertilizer in Benson, which markets the poultry manure ash as NAFmicro. The fertilizer is priced based on first-year nutrient availability, he adds. As with manure, additional P and K may become available to plants in subsequent years as a result of biological activity in the soil, Vetsch says, although that is not yet certain.

In 2009, Vetsch looked at how the ash fertilizers affected second-year corn yields. No additional P or K was added. Results were similar to the previous year. Vetsch continued the poultry manure ash trials in 2010 at three Minnesota locations.

NAFmicro fertilizer was applied at the recommended rate of 1,330 pounds of ash/acre, which supplied 80 pounds of immediately available phosphorus — a typical rate for a corn and soybean rotation. Preliminary results indicate that NAFmicro performed just as well as commercial fertilizer, Vetsch says. The trials will be repeated next year. ■



Ash from biomass incinerated by plants that produce ethanol and heat were tested for their fertilizer value at the U of M Southern Research and Outreach Center in Waseca. Studies show the ash fertilizer delivers as much available phosphorous to soils as commercial fertilizer.

SOLD OUT

Corn Plus ash fertilizer is a hit with farmers

BY LIZ MORRISON

Corn Plus — a 40-million-gallon corn ethanol plant that runs on biomass power — sells out of its renewable ash fertilizer a year or more in advance.

"The product is really popular," says plant manager Matt Rynearson. "There's definitely a market for the ash."

The Winnebago, Minn., ethanol maker generates most of its energy needs by burning corn solubles, an ethanol byproduct that is usually sold as livestock feed. Corn Plus sends 80,000 gallons a day of syrup, as it's called, to its fluidized bed reactor, as fuel. The fine, flour-like ashes left after combustion are pelletized for easier handling and sold as fertilizer.

Corn Plus produces about 7,000 tons of ash fertilizer granules a year. The ashes contain phosphorus, potassium and sulfur, but not nitrogen, which is consumed during fermentation. AURI-sponsored research trials at the University of Minnesota found that Corn Plus's 0-14-15-4 ash performed as well as commercial fertilizer at both low and high application rates.

A group of local farmers contract for all the plant's ash, Rynearson says. The growers apply it to their own cropland and sell the excess to other farmers. The granulated product is applied with conventional spinner spreaders.

Corn Plus receives a percentage of ash fertilizer sales, Rynearson says, but the company is not really out to make a big profit from the ash. "The environmental benefits are more important to us. We're trying to be green." ■

THE DRYER



THE BETTER

AURI holds second dryer technology demonstration day

BY DAN LEMKE

Willmar, Minn. — Enquiring eyes watched with curious anticipation as the towering Micronex Kinetic Disintegration System growled into gear. The dryer system, recently installed at the Minnesota Valley Alfalfa Producers facility near Willmar, employs a new particle reduction technology that also creates heat to dry a product for processing. In MnVAP's case, it's alfalfa that will be pelleted for feed.

The MnVAP presentation culminated an AURI-sponsored dryer demonstration day on November 4, attended by more than 30 people. Because of the popularity of a similar event in May, AURI held the second demonstration to focus on drying technologies that could help processors increase efficiency and open up new biomass opportunities.

"Some processors are looking at technologies with no heat because it doesn't denature protein in what they're drying," says Kevin Hennessy, AURI scientist and dryer day organizer. "Others are looking at ways to use low-value material to power their drying needs."

Besides reducing processing bottlenecks and drying costs, Hennessy says processors are looking at technologies that could open potential markets. "For example, depending on the technology, dairy digester solids could be used as fuel or fertilizer. New markets could be opened up for processors if their drying was more efficient."

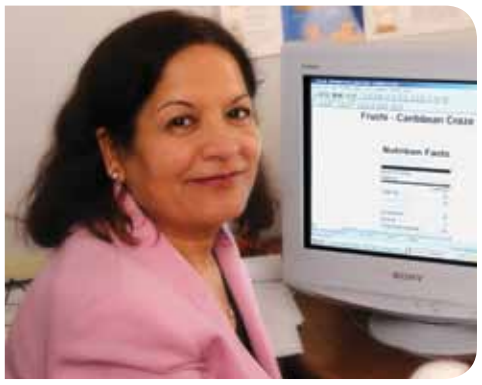
The dryer technology demonstrations also give AURI scientists an opportunity to listen.

"These events help us to identify the needs of the industry," says Alan Doering, AURI scientist. He says building a community of processors, vendors and researchers is a platform for discussing industry hurdles and ways to address them. ■



PHOTOS BY ASHLEY HARGUTH

An AURI dryer demonstration workshop featured the Micronex Kinetic Disintegration System recently installed at the Minnesota Valley Alfalfa Producers plant near Willmar. The system uses a particle-reduction technology that creates heat, which dries alfalfa so it can be pelleted for feed.



Food trends

Consumers want foods that help prevent disease and aging

BY CHARAN WADHAWAN
AURI senior scientist

While agricultural commodities have nearly endless uses, including fuel and industrial products, their primary use is still food.

Our food choices can be a reflection of heritage, local availability, income level, social beliefs or simply a matter of taste. Food is not limited to providing nutrition to support our body and life. Today many consumers want foods that heal and prevent disease and aging. Manufacturers are responding to this trend.

Eight out of the top 10 food trends are linked to health and nutrition, according to a recent report in the food journal, New Nutrition Business. Studies suggest diet is linked to many health conditions, although the relationship is often complex and more research is needed to unravel these complexities. Regardless, these trends will impact both agriculture and the food industry.



OBESITY

Obesity is rapidly increasing throughout the world and is a major underlying factor in chronic diseases such as heart disease, some cancers and diabetes. The main cause of obesity is simply eating more calories than we burn. Functional ingredients, from proteins and fatty acids to fibers and botanicals, provide tools to help consumers manage their weight.

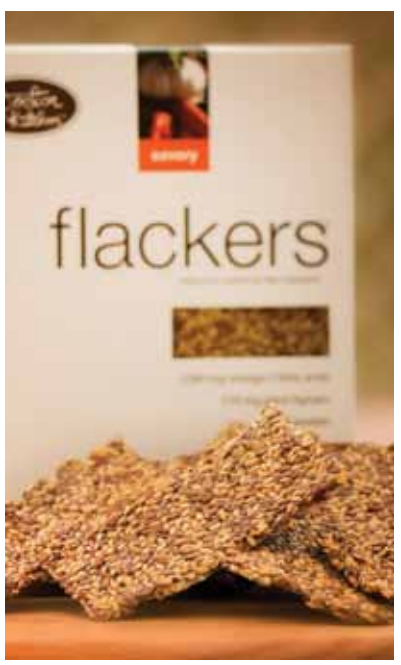
Researchers are looking at food's role in satiety — the feeling of fullness after a meal — that is a rapidly advancing trend in weight management.

GLUTEN-FREE PRODUCTS

Gluten is the common name for grain proteins that are harmful to persons with celiac disease. These proteins are in all forms of wheat, including durum, semolina, spelt, kamut, einkorn and faro, and related grains including rye, barley and triticale.

Gluten-free grains such as rice, sorghum, flaxseed and quinoa are being used to develop products with exciting new textures and flavors. AURI has provided technical services to clients creating gluten-free baking mixes.





OMEGA-3 FATTY ACIDS

Omega-3 fatty acids are considered essential. They are necessary for human health, but since the body doesn't produce them, they must be ingested through food. The U.S. National Academy of Science's Institute of Medicine estimates that the average American diet is 50 percent deficient in essential omega-3 fatty acids.

Omega-3 plays a crucial role in brain function, as well as normal growth and development, and may reduce the risk of heart disease. Research shows that omega-3 fatty acids reduce inflammation and may lower risk of chronic diseases such as heart disease, cancer and arthritis. They are highly concentrated in the brain and appear to be important for cognitive and behavioral function.

Salmon, flax seeds and walnuts are excellent omega-3 food sources. Whether fish-derived or vegetarian, omega-3 has become a household term. Supplement sales continue to grow, and more and more foods are being fortified with the healthy fatty acids. But getting omega-3 foods into the mainstream remains a challenge.

SODIUM REDUCTION

High-sodium diets are linked to an increase in blood pressure and a higher risk for heart disease and stroke. Yet, sodium has many functions in food. Sodium chloride, or salt, is a preservative that inhibits the growth of food-borne pathogens, particularly in luncheon meats, fermented foods, salad dressings and cheese products. Sodium is also an essential nutrient used to modify flavor, enhance taste and serve as a stabilizer.

But very little sodium is needed in the diet and most Americans consume more than they need. The current recommendation is 2.4 grams of sodium a day, which equals about 1 teaspoon of table salt. Major food companies are taking note and bringing reduced-sodium foods to the marketplace.





VITAMIN D FORTIFICATION

Vitamin D is a fat-soluble vitamin that is naturally present in very few foods, added to others, and is available as a dietary supplement. Most of our vitamin D intake comes from sunlight exposure. It also occurs naturally in a few foods, including fish, egg yolks and fish liver oils, and in fortified dairy and grain products.

If you shun the sun, suffer from milk allergies or adhere to a strict vegan diet, you may be at risk for vitamin D deficiency.

Vitamin D is essential for strong bones because it helps absorb calcium from the diet. Traditionally, vitamin D deficiency has been associated with rickets, a disease in which bone tissue doesn't properly mineralize, leading to soft bones and skeletal deformities.

Together with calcium, vitamin D helps protect older adults from osteoporosis. Research is also revealing the importance of vitamin D in protecting against a host of health problems such as colon, prostate and breast cancer, depression and weight loss.

Milk and many fruit juices are already enhanced with vitamin D and more food products fortified with the vitamin are expected to hit the marketplace in the coming years.

ANTIOXIDANTS

The trend in foods enriched with antioxidants will continue to grow. Antioxidants are vitamins, minerals and other nutrients that protect and repair cells from damage. Cell damage plays a role in chronic diseases such as hardening of the arteries, cancer and arthritis.

Antioxidants can help keep the immune system strong, enhancing the body's ability to ward off colds, flu and other infections. They are also considered anti-aging compounds.

Besides vitamins and minerals, antioxidants are in food compounds such as carotenoids and polyphenols. Some are identified by their distinctive colors — the deep red of cherries and tomatoes, the orange of carrots, the yellow of corn, mangos and saffron, the blue-purple of blueberries, blackberries and grapes. The best-known food components with antioxidant activities are vitamins A, C and E, beta carotene, selenium and lycopene. ■



BY DAN LEMKE
CARTOONS BY UNCLE HYGGLY

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. Please note that ARS is the USDA's research division.

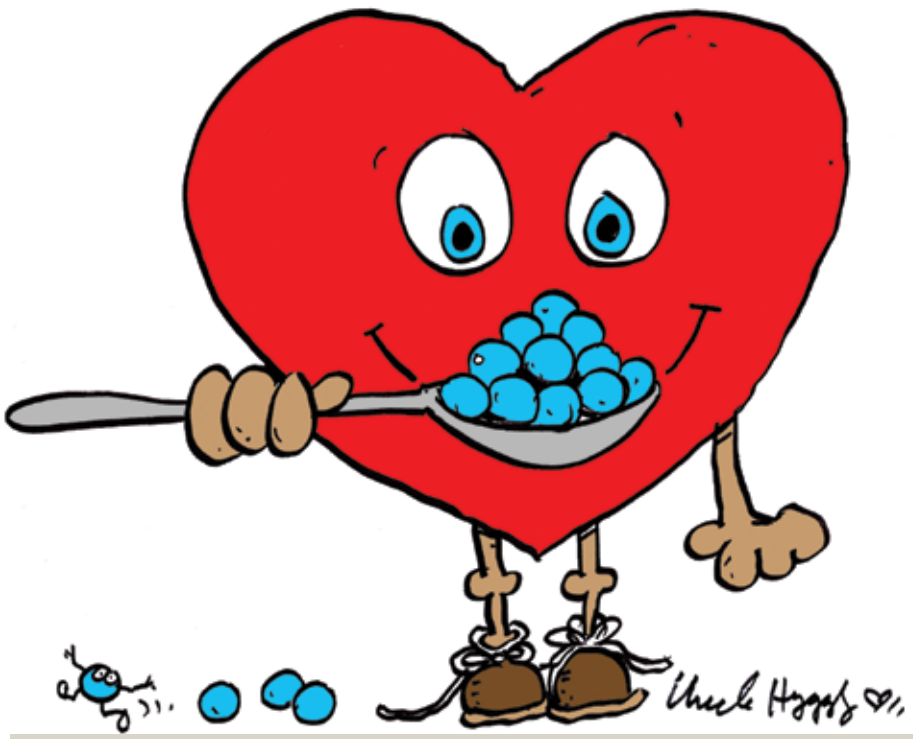
Berry good for the heart

If you eat blueberries, your heart may thank you. A recent USDA study shows that the little berry may put up a big fight against atherosclerosis, known as hardening of the arteries.

Atherosclerosis is the leading cause of heart attacks and strokes — two forms of cardiovascular disease, which is the number one killer of Americans.

The study compared the size of atherosclerotic lesions in laboratory mice. Those fed a diet that included blueberry powder had lesions that were 39 to 58 percent smaller than those fed diets without blueberries. The tested blueberry powder was equivalent to about a half cup of fresh berries per day.

From: USDA-ARS
September 29, 2010



Roof-top soy

An integrated roofing system that uses several soy-based products is becoming an attractive option for builders. Designed by Green Products, LLC of Romeoville, Illinois, the roofing involves six-layer construction with two adhesives made from soy, as well as a soy-based, solar-reflective coating. The multi-layered system blends biobased products with traditional roofing materials.

From: Biobased Solutions
September 2010



No-nuisance fuel

A common roadside weed may become more popular as a biofuels feedstock, according to a USDA study. Field pennycress is in the same family as canola, camelina and other oil-seed producers. ARS scientists tested oil from wild-field pennycress in both biodiesel and glycerol. With some refinement, researchers say the previously problematic weed could become a commercial commodity.

From: USDA-ARS
November 4, 2010



Comedy night at the Sand Bar

Fishy plastic

Natural gelatin, extracted from the skin of the ocean fish Pollock, could one day be used in the biomedical field. USDA-ARS scientists are developing pliable films by blending the fish gelatin with corn-based bioplastics made from polylactic acid. Researchers say the films could potentially repair injured bone or cartilage.

From: USDA-ARS
November 8, 2010

Soy stoppers

Genistein, a natural chemical in soy, may prevent the spread of prostate cancer. In a randomized study, Northwestern University researchers in Chicago found that giving genestein to men with localized prostate cancer, one month before surgery, had a beneficial effect on cancer cells. A second phase will test whether the non-toxic drug can prevent cancer cells from moving within the body.

From: Soyatech.com
November 8, 2010



A food-makers guide to omega-3

AURI releases instructive manual on making fatty acid claims

BY DAN LEMKE

Marshall, Minn. — Omega-3 fatty acids are popular with health-savvy consumers. Research shows they help reduce inflammation and may lower risk of chronic diseases such as heart disease, cancer and arthritis.

But for a food processor, it's confusing to know what omega-3 claims can be made on a food label.

To help, AURI has collected information on omega-3 and developed a claims guide. "There's been increased interest in omega-3 fatty acids from food processors who are looking for ways to make healthier products," says Carissa Nath, AURI meat scientist. "We put this together to help Minnesota businesses that want to make claims know what they can and can't say."

Omega-3 fatty acids are essential — necessary for human health. But since the human body doesn't make them, they have to enter the body through food. The fatty acids are found in fish, such as salmon, tuna and halibut, and in some plants and oils such as flax. A polyunsaturated fat, omega-3 plays a crucial role in brain function as well as normal growth and development.

AURI's Omega-3 Claims Guide contains general information about the fatty acids, what the potential health benefits are, requirements for health claims, recommended daily intake, and foods that are supplemented with omega-3.

The guide is available on AURI's web site: www.auri.org. ■



AURI EXECUTIVE DIRECTOR'S COLUMN



Bringing brainpower together

BY TERESA SPAETH

Anyone who has been part of an athletic team, debate club or theater performance realizes that it takes more than one person to achieve success. While there may be individual stars on the team or in the cast, they don't get far without support and efforts from the rest.

AURI takes that approach with agricultural innovations.

Providing scientific and technical assistance to Minnesota industries and entrepreneurs is AURI's sole focus. We generate economic activity in Minnesota communities by helping businesses take advantage of innovative opportunities in food, renewable energy, coproduct utilization and biobased products.

We provide a broad range of services to expand markets, develop new uses and improve processes. We've done that successfully for more than 20 years.

But we haven't done it alone.

AURI long ago recognized the value of collaborating with other organizations —from university researchers to economic developers to businesses. With limited time and staff, we are more effective when combining the resources and ideas of our partners with our own. Collaboration is possible when all parties realize they have something to gain by brining brainpower together.

For example, executive directors and staff from many of the state's agricultural organizations recently met to discuss issues we all face. By connecting groups with mutual interests and concerns, we can develop action plans to address those concerns and promote mutual understanding.

Working together has helped entire industries move forward. Minnesota's Renewable Energy Roundtable has brought together more than 500 individuals representing over 120 organizations. As a result, renewable-energy curriculum is now offered at several Minnesota colleges and universities, tools have been developed for regions to assess their available biomass resources, and ventures have been linked to resources they need to grow.

In a state with a long history of cooperatives, the spirit of collaboration remains alive and well. ■

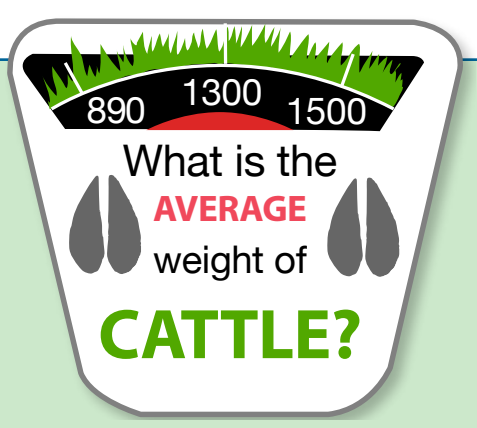
AURI AG QUIZ

1) What ag-based product is being tested for odor control in ponds?
- a. Chicken manure
- b. Barley pellets
- c. Biodiesel

2) What type of truck has been outfitted with a new hybrid drive system?
- a. Beer truck
- b. School bus
- c. Recycling truck

3) How much ash fertilizer does North American Fertilizer sell annually?
- a. 110,000 tons
- b. 1 million tons
- c. 47,000 pounds

4) What does Corn Plus burn to generate most of its thermal energy needs?
- a. Corn solubles
- b. Corn silage
- c. Corn flakes



5) The average market weight of cattle in 1975 was 1,100 pounds. What is it today?
- a. 890 pounds
- b. 1,300 pounds
- c. 1,500 pounds

6) How many of the top food trends are related to health and nutrition?
- a. 8 out of 10
- b. 4 out of 10
- c. 1 out of 10

7) What is a major roadblock to widespread commercial biomass use?
- a. supply
- b. efficient drying methods
- c. lack of interest

8) What Oh So Good snack ingredient isn't Minnesota-grown?
- a. Honey
- c. Butter
- c. Spice

9) Beside Ag Innovation News and our website, where else can you find AURI news?
- a. Twitter
- b. Facebook
- c. YouTube
- d. All of the above

ANSWERS: 1) b 2)c 3)a 4)a 5)b 6)a 7)b 8)c 9)d

ABOUT AG INNOVATION NEWS

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SERVICES

A nonprofit corporation created to strengthen rural Minnesota's economy, AURI helps businesses respond to market opportunities with new and value-added uses for agricultural goods. The Institute builds working partnerships with business innovators, agricultural groups and researchers, and provides technical support to clients conducting new product research and development.

AURI programs are available to legally-organized businesses or cooperatives with projects that have the potential to create new uses or new markets for Minnesota agricultural commodities. AURI assistance is designed for the early stages of a product's life cycle, while an element of feasibility is yet to be determined.

Project proposals are evaluated on the following criteria:
- Innovation/uniqueness
- Market viability
- Use of Minnesota commodities
- Number of farmer-producers impacted
- Amount of value added from further processing
- Economic impact
- Cost savings

Programs are designed to assist with:
- Identifying emerging value-added opportunities
- Developing innovative commodity-based products
- Developing production processes for feasible products
- Promoting products developed with AURI technical assistance
- Providing resources to bring new products and processes to the marketplace

Assistance may include:
- Access to AURI's scientific and business staff
- Access to laboratory and pilot plant facilities
- Product development and feasibility testing
- Process evaluation and improvement
- Technology transfer and applied research
- Business needs evaluation
- Links to available resources
- Potential for grant funds to qualifying applicants

AURI provides resources proportionate to the project's impact. Smaller-impact projects may be eligible for technical assistance only, while projects with industry-wide impact may be eligible for financial assistance.

AURI Facilities

AURI operates several laboratories:
- Coproducts Utilization Laboratory and Pilot Plant, Waseca
- Fats and Oils Laboratory, Marshall
- Meat Laboratory, Marshall
- Product Development Lab, Crookston
- Fermentation and Chemistry Lab, Crookston

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Beefing up

AURI trains students on meat industry trends

BY DAN LEMKE

Marshall, Minn. — Consumer tastes that constantly change are a challenge for most retailers, marketers and product developers. But those who understand their customers gain more of the retail dollar.

The beef industry gets it.

To keep beef on the dinner menu in a health-conscious market, AURI and the Minnesota Beef Council are collaborating to inform consumers and processors on beef-industry trends. They are holding workshops and demonstrations on alternative merchandising, value-added beef cuts, food safety and nutrition, and are training post-secondary agriculture students on industry trends.

"We want these students … who will be on the front lines of consumer questions and concerns … to be well informed going into their careers," says Colleen Zenk, director of nutrition and consumer information for the Minnesota Beef Council. "Most consumers are so disconnected from where their food comes from, and there is a lot of misinformation out there."

This fall, AURI meat scientist Carissa Nath trained students from Minnesota West Technical College in Worthington on nutrition, food safety and alternative beef merchandising at AURI's meat lab in Marshall.

Nath says the average cattle market weight has increased from 1,100 pounds in 1975 to nearly 1,300 pounds today, through efficient management and improved genetics. Heavier carcasses yield more large-muscle cuts that consumers don't always want.

"You often get larger portions when there are a growing number of consumers who want smaller ones," Nath says. "We're trying to educate processors about cutting techniques to optimize the beef carcass and still offer what many health-conscious consumers want."

Trends also show consumers are eating out less but want high-quality cuts at home, Nath says. Retailers are responding by offering more convenience cuts. ■



PHOTO BY ROLF HAGBERG