



# AG INNOVATION NEWS<sup>®</sup>

The newspaper of the Agricultural Utilization Research Institute



## Home grown

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PHOTO BY ROLF HAGBERG

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# Chow down

## High corn prices and abundant biofuel coproducts spark interest in feed-corn substitutes

BY E. M. MORRISON

The cost of chowing down is going up.

High corn prices — driven by exploding ethanol demand — have pushed up livestock feed costs. That's prompting farmers to look for more economical alternatives.

At the same time, the biofuels industry is producing lots of distiller's grains and glycerin, processing byproducts that can replace a portion of corn in livestock diets.

These developments are sparking research and innovation designed to boost renewable-fuel coproduct use in livestock diets. Grower groups, livestock-nutrition companies and university scientists are working on new ideas. AURI is taking a lead and planning to test more than a dozen alternative feeds, says Al Doering, associate scientist at AURI's coproducts lab in Waseca. "There are terrific opportunities for both livestock and renewable-fuel producers."

### Glycerin a new alternative

One alternative-feed ingredient being studied is glycerin, a coproduct of biodiesel manufacturing. Crude glycerin, a liquid, provides nearly the same dietary energy as shell corn, Doering says.

"There's a lot of interest in it," says Larry Risty, marketing director for Central Bi-Products, a division of Farmers Union Industries, LLC, which operates a 3-million-gallon biodiesel plant in Redwood Falls. He says livestock farmers "are looking for any energy feed source, and glycerin could be a major one."

Current U. S. biodiesel manufacturing capacity is nearly 900 million gallons. Another 1.7 billion gallons of capacity is under construction, according to the National Biodiesel Board. The industry's glycerin capacity will also grow — to more than 200 million gallons — since glycerin production equals 10 percent of biodiesel production. The coproduct, now used in pharmaceuticals and cosmetics, will need more market outlets, says Chuck Neece, FUI research director.

Already, mounting supplies have weighed on glycerin prices. In the past year, prices have dropped by half and as low as three cents a gallon for unrefined glycerin with more than 150 parts per million methanol, Neece says. That's about \$60 per ton — half the price of corn, Doering says.

### Glycerin research starting

Land-grant universities are just beginning to evaluate glycerin in livestock diets. The University of Arkansas and Iowa State

University have tested glycerin in broiler and swine diets, and South Dakota State University has done some dairy trials.

This summer, with AURI's support, the University of Minnesota will study glycerin in turkey diets, which are typically about 65 percent corn. "We'll be looking at glycerin inclusion rates up to 10 percent" in both mash and pelleted feed, says U of M livestock scientist Sally Noll, who is leading the research. The trials will examine growth rates, feed conversion, carcass quality and economics. "We'll also get experience in using the product and handling it." Another U of M study will evaluate a glycerin-DDGS combination in turkey diets.

In addition, AURI is seeking funding to test crude glycerin in the diets of lactating sows, growing pigs, feeder cattle, calves, broilers and laying hens.

Private companies are also working on glycerin-feed products. With AURI's support, Central Bi-Products developed Gro-Mor Hi-Torque, pelleted cattle feed that combines glycerin and feather meal. "The work we did with that product led us to look at combining glycerin with other grain byproducts, such as rice hulls, soy hulls and DDGS," Neece says.

"The main thing we need now," he adds, "is to have the appropriate university research and testing to gain broader acceptance."

### Using more DDGS

Researchers are also exploring new ideas for using distiller's grains — the corn-kernel portion left after starch is converted to ethanol.

Distiller's grains provide energy and protein. The United States produced more than 8 million tons of distiller's grains last year, and North American supplies will grow to about 30 million tons by 2012, according to Commodity Specialists Company of Minneapolis, which markets distiller's grains for 23 U.S. ethanol plants.

The feedstuff has been used successfully in cattle diets for decades and is gaining acceptance in swine and poultry diets. As corn prices climb, livestock producers "that have the ability to switch to DDGS are doing it," says Sean Broderick, a Commodity Specialists Company grain merchant.

Still, "not as much is being used as we think could be used," says Wayne Hansen, AURI project director.

DDGS challenges include nutrient variability, handling problems, transportation costs and effects on meat quality, Hansen says. Also, growers need a significant DDGS price



PHOTO BY SHAUNI

advantage to offset the quality risks and extra management time, says U of M economist Brian Buhr.

### Separate but equal

Separating ethanol coproducts into component parts — known as fractionating — could make it easier to precisely incorporate them into animal diets, Doering says. AURI hopes to test "designer distiller's" in dairy

cattle, swine and poultry rations. Currently, AURI is doing similar research on feeding fractionated-soybean meal to turkeys.

These trials are essential to maintain and expand profitable livestock and renewable-fuel industries in Minnesota, Neece says. Through innovation, "animal feeders and biodiesel and ethanol producers can reach a point of synergy." ■

### DDGS prices are strong, discouraging use by swine and poultry producers

Month	DDGS	Corn	Soybean Meal
Jan-02	\$86.00	\$75.00	\$154.00
Jan-03	\$83.50	\$84.00	\$168.00
Jan-04	\$125.00	\$95.00	\$253.00
Jan-05	\$71.00	\$71.00	\$159.00
Jan-06	\$87.60	\$76.00	\$183.00
Jan-07	\$118.00	\$124.24	\$190.00
Mar-07	\$131.00	\$131.02	\$205.00

Source: Dr. Brian Buhr, University of Minnesota; USDA-ERS

### COW CHOW: Cattle consumed nearly 90 percent of distiller's grains last year

Year	Metric Tons of DDGS produced	Percent Estimated Use by Livestock Sector:			
		Beef Cattle	Dairy Cattle	Swine	Poultry
2002	3.6 million	35%	45%	15%	5%
2003	5.8 million	39%	46%	11%	4%
2004	7.3 million	37%	44%	16%	3%
2005	7.8 million	37%	45%	13%	5%
2006	8.0 million	42%	46%	9%	3%

SOURCE: Commodity Specialists Company



### POULTRY PUNCH:

#### High livestock feed costs are having the greatest effect on the poultry sector

Expected change*	Beef Cattle	Swine	Poultry
Feed Cost	+6%	+18%	+27%
Production	-0.8%	-3.27%	-4.8%
Producer Income	-\$1.1 billion (-3.7%)	-\$0.94 billion (-7.7%)	-1.1 billion (-6.5%)
Consumer Cost	+1.0 billion	+1.3 billion	+3.9 billion
Retail Prices	+1.1%	+2.5%	+13.4%

Source: Dr. Brian Buhr, University of Minnesota

\* Assumptions: Historic corn/soybean meal prices of \$2.15/\$192.48; Current average corn/soybean costs of \$3.46/\$166.77.

### GLYCERIN POTENTIAL: Minnesota livestock could potentially consumer more than 1 million pounds of glycerin, an alternative feedstuff, in place of cars.

Livestock	Dietary Inclusion Rate	Potential Glycerin Use
Dairy Cattle	2.2 lbs/day	361 million lbs
Hogs	5%	530 million lbs
Turkeys	3%	71 million lbs
Layers	5%	52 million lbs
Broilers	5%	15 million lbs

Source: 2007 AURI estimate

## Ethanol-fueled corn prices squeezing livestock sector

BY E. M. MORRISON

Today, animal agriculture is the largest U.S. corn consumer. But as ethanol production rises in the coming decade, corn processing for fuel and sweeteners will surpass livestock feed, according to John Lawrence, Iowa State University livestock economist.

Strong corn demand is lifting prices, which have climbed about 80 percent since last fall. "And when corn prices go up, soybean prices go up to maintain acres," says Wayne Hansen, AURI project director, "so protein costs rise, too. If you're in the livestock industry, it means higher costs for you."

Eventually, Hansen says, consumers will pay more for animal products. "Growers won't raise livestock for nothing."

Feed is usually a livestock enterprise's largest production expense, and corn is typically half that cost. Higher feed expense will hit the poultry industry hardest, says Brian Buhr, a University of Minnesota economist. Since last fall, broiler feed costs have risen 27 percent over the previous five-year average, according to Buhr's March 2007 estimates. Swine feed costs are up about 18 percent, dairy up 11 percent, and beef-cattle feed up 6 percent.

The increases will cost poultry, swine and beef producers more than \$3 billion in annual profits, Buhr projects. Livestock production will shrink as a result, and consumers will pay an additional six billion dollars at the grocery store for meat, poultry and eggs, he estimates.

The cost of alternative-feed ingredients is up, too. Whey prices, for example, "are through the roof," Buhr says.

Likewise, distiller's grains have followed corn prices up, despite ever-growing supplies. Values are averaging about 80 percent of corn, says Sean Broderick, a grain merchant with Commodity Specialists Company in Minneapolis, which markets several million tons of DDGS a year.

"I don't expect them to drop lower than 75 percent or so" of corn values, Broderick says. Part of the reason is strong exports, which rose 55 percent from 2004 to 2006, according to a recent CSC report. And Broderick expects future demand for DDGS to stay strong. "Some plants are looking at burning DDGS and picking up carbon credits."

Other alternative-energy feed sources, such as rendered fats and restaurant grease, will be increasingly diverted for fuel, says U of M livestock scientist Sally Noll. So high livestock feed prices and tight margins are likely to persist. "There's nothing you can substitute to bring feed costs down to the levels of eight or nine months ago." ■



# Eagle soars in home heating

BY DAN LEMKE

Plainview, Minn. — City inspectors in Austin, Minn., were suspicious. The gas meter at one home didn't register any natural gas use. Assuming the meter was faulty, they visited the home to inspect.

The culprit, it turned out, was Sue Kruger and her renewable fuels company. With her husband Tom, Sue operates Eagle Bio-Fuels from her southeast Minnesota farm, providing shelled corn, corn-wood blends and biomass-pellet blends in bags and bulk for home and business heating.

Business has been brisk for a venture that has only been around since August 2006. "We have about 70 retail customers and 16 dealers who market our products," Kruger says. "Last year we marketed about 10,000 bushels of corn as fuel. It's really catching on. I'm going about as fast as I can to keep up."

## Giving pellets a try

Months before launching Eagle Bio-Fuels, the Krugers kicked around the idea of marketing their corn and other ag products for fuel. At a local county fair, they heard encouraging comments from pellet-stove dealers and decided to give it a try.

With a background in marketing, Sue searched out stove and fireplace manufacturers and dealers. She sent letters and brochures telling companies about her products and delivery service. Those that called back, she visited. But she also wasn't afraid to cold call dealers.

Besides direct marketing, the Krugers invested in targeted advertising, a website, and ads painted on their delivery trucks. Soon the Krugers' business was growing.

Today Eagle Bio-Fuel's customer base stretches from Mason City, Iowa to Wausau, Wis. to Bemidji, Minn.

The Krugers practice on their farm what they advocate to customers. An outdoor pellet stove not only heats their home, garage and a large storage building, it produces all the farm's hot water.

## Attention to detail

The Krugers know that not all fuels are equal. Each batch of shelled corn can produce varying results, depending

on moisture and foreign matter. So the Krugers invested in state-of-the-art drying and grain-cleaning systems to deliver consistent 12-percent-moisture corn with no foreign matter.

"Clean, dry corn burns better and causes less wear and tear on the stove," Sue says. "A lot of stoves say they can burn anything, but if you want them to last, good fuel is important."

Clean corn is nature's own pellet fuel. One bushel provides the Btu equivalent of 5 gallons of liquid propane, 3.5 gallons of fuel oil and 140-kilowatt hours of electricity.

Eagle Bio-Fuels also markets corn blended with hardwood pellets and with ag-based pellets in various ratios. Sue says they have found that blended fuels produce fewer clinkers, or unburned kernels, and boost Btu output.

Eagle Bio-Fuels is working with some of the nation's top stove manufacturers to evaluate which fuel blends work most efficiently in each stove model.

The small fuels company is "definitely paying attention to detail with their corn and fuel blends and in the work they're doing with the stove manufacturers," says Alan Doering who heads AURI's coproducts lab in Waseca. Doering provided fuel analysis for Eagle Bio-Fuels.

"They've made the commitment to this business and are finding a way to add value to their own corn."

The Krugers say the fuel business keeps equipment, family members and employees busy during non-farming months. The corn and pellets are stored, blended and bagged on their Wabasha County farm.

But the venture means more to the family than just economic activity.

"We chose to use an eagle in our logo because the eagle symbolizes liberty," Sue says. "By heating with clean corn-fuel blends, we make a step toward liberating ourselves from petroleum products." ■

For more information on Eagle Bio-Fuels, visit [www.eaglebio-fuels.com](http://www.eaglebio-fuels.com)

Sue Kruger's company, Eagle Bio-Fuels, distributes shelled corn, corn-wood blends and biomass-pellet blends to homes and businesses for heating fuel.



PHOTO BY DAN LEMKE

# Up in smoke

Testing glycerin as a combustion fuel yields unenthusiastic results



PHOTO BY SLOBIO

BY DAN LEMKE

*Marshall, Minn.* — A new product idea can only succeed if the research bears it out. Glycerin, as a renewable fuel, didn't pass the test.

Rose Patzer, a chemist who recently left AURI to be a renewable fuels instructor at Minnesota West Community College in Granite Falls, has been testing glycerin as a combustion fuel since early this year.

Supplies of crude glycerin, the primary byproduct of biodiesel production, have outpaced demand since Minnesota mandated a 2-percent biodiesel blend. It was an intriguing idea to use glycerin as a boiler fuel, and it generated national and international interest. But the results weren't encouraging.

"Because of its lower energy value, crude glycerin just doesn't have enough available energy to support a flame on its own," Patzer says.

Tests were conducted in Redwood Falls at the Central Bi-Products plant, which is permitted to burn yellow grease in boilers. The plant is a division of Farmers Union Industries, LLC. FUI also operates FUMPA Biofuels, which produces 3 million gallons of biodiesel annually.

Crude glycerin contains more than 6,000 Btu per pound. Minnesota biodiesel refineries produce about 600,000 gallons of crude glycerin annually. With this additional supply on the

market, glycerin prices have dropped to just a few cents per pound, sparking interest in finding new uses for the thick liquid.

Refined glycerin is an ingredient in hundreds of products, from soap to cosmetics. But no Minnesota biodiesel facility has the equipment to refine crude glycerin for those markets.

Patzer says glycerin has high levels of ash, metal, chlorine and water, but not enough energy to work as a stand-alone fuel. She said a blend of 10 percent glycerin and 90 percent yellow grease could power a boiler, but it caused a significant buildup in the burners, resulting in more clean-up downtime.

"This demonstration was very specific to (Central Bi-Products) boiler and fuel parameters," Patzer says, "but it could be a guide. Boilers are made to run on certain fuels, so modifications would be necessary. While 100 percent glycerin didn't work in this case, individual results may vary."

Due to the poor performance, low-energy value, emissions concerns and buildup on internal parts that could cause wear and tear on expensive equipment, straight glycerin may have flamed out as a boiler fuel.

Such is the nature of research. ■

*To obtain a final report on the glycerin combustion study, contact AURI's Marshall office at (507) 537-7440.*

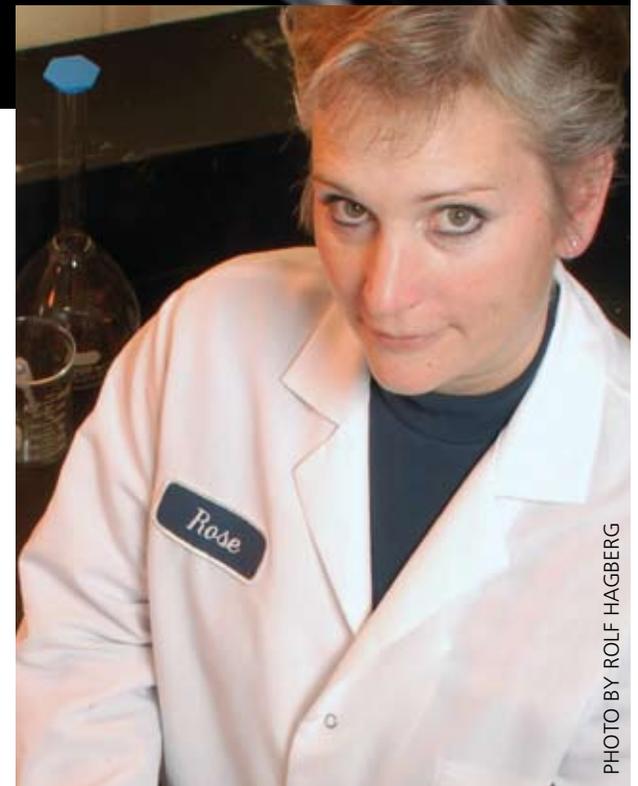


PHOTO BY ROLF HAGBERG

Chemist Rose Patzer has not been encouraged by test results of burning glycerin, an abundant biodiesel coproduct, as a combustion fuel.

# Eat fresh — eat

Organics are going mainstream, but consumers are increasingly concerned about the energy costs of trucking produce cross-country

Terry VanDerPol, a farmer and Land Stewardship Project program organizer who is active in local food-producer groups.

BY CINDY GREEN

**I**t takes energy to serve up a good, healthy meal. You may have chemical-free beef, broccoli and potatoes on your plate, but petroleum likely helped them to the table.

"Americans are starting to question, if you have organic food that's produced in California and you ship it across the country, is that a good thing? ... Not only is it not as fresh, you're using a lot of fossil fuels to do this," said U.S. Rep. Collin Peterson at the "Home Grown Economy" conference held April 2 at the University of Minnesota-Morris.

"You can see there is a lot of interest and activity going on," in local foods, said Peterson, who was recently named House Agriculture Committee Chair. "This isn't something that somebody dreamed up. This is something that the American people are looking for and are asking for ... there is a market out there."

The fact that "big guys" like Wal Mart and Safeway are getting into organic food sales, has heightened the interest in foods produced by small, local farms, said Peterson, who sponsored the conference with UMM.

"The average food item in the U.S. travels 1,500 miles from the farmer to the consumer," said Ken Meter, a conference presenter who analyzed west central Minnesota's food economy (see story, page 8). "The U.S. spends about \$139 billion each year paying for the energy used to bring food to our tables."

Furthermore, Meters says, the United States is becoming a net food importer, according to the Wall Street Journal. Five chains, with Wal-Mart and Sam's Club as the top two, sell 49 percent of groceries."



Peterson.

## Conference draws home-grown interest

The huge turnout for the "Home Grown Economy" conference testifies to the burgeoning interest in local food and energy. "We started, thinking we'll have 50 or 60 people; 320 showed up," says AURI's Michael Sparby, one of the event organizers.

"It's been coined that local foods are the new organics," Sparby says. "Organics have almost turned into a commodity."

Beside farmers and sustainable-agriculture advocates, the conference drew bank directors, economic development specialists and elected officials. "The fact that it was sponsored by Collin Peterson drew in people that we couldn't otherwise have drawn in," says Terry VanDerPol,



Sparby.

a farmer and Land Stewardship Project's community based food systems program director.

"Peterson's economic development staff person, Toni Merdan, continues to be excited about the potential of local foods and is meeting with people around the region. She can open doors that, quite frankly, the rest of us can't."

## Prairie naturals

VanDerPol grew up farming and, for the past seven years, has grazed cattle on about 80 acres she owns and leases along the Minnesota River, near Granite Falls. She currently has 41 head.

The 16 to 18 beef cattle VanDerPol sells per year are 100-percent grass fed, with no hormones or antibiotics. She markets under "Red Tail Farm," along with business partner Dean Nordaune of Wood Lake. They distribute most of their beef through Pastures A Plenty, her brother Jim's family business, which markets naturally-raised pork and chickens to grocery stores, co-ops and direct to consumers.

# Local



PHOTO BY ROLF HAGBERG

VanDerPol is also active in Pride of the Prairie, a collaborative initiated by more than 40 farmers, the Land Stewardship Project, UMM, Sustainable Farming Association of Minnesota, West Central Sustainable Development Partnership, West Central Research and Outreach Center and Prairie Renaissance. The farmers market a wide variety of locally-produced foods, including beef, bison, poultry, pork, grains, cheese, butter, eggs, honey, fruits and vegetables.

Pride of the Prairie is attempting “to raise awareness of, and begin developing a brand for, locally-produced foods in western Minnesota,” VanDerPol says. “We were able to get local foods in the U of M-Morris cafeteria,” and in several local restaurants and grocery stores.

“There are a number of groups throughout the state that have local and regional food initiatives,” Sparby says, such as the Northwest Minnesota Sustainable Development Partnership, the Sustainable Farming Association and Food Alliance Midwest, which awards FAM certification seals to foods that are local, environmentally friendly and socially responsible.

The interest extends nationally. “A number of companies across the country have adopted local food policies,” such as Google, Carlson Companies and Cisco, Sparby says.

“Ultimately the concept is not necessarily organic, but you’re buying and eating foods in season, so your lettuce isn’t traveling 1500 miles. It’s the “eat fresh – eat local” concept.

## AURI keeps it local

AURI is working with several organizations to promote local foods including FAM, the Farmers Union and its “Minnesota Cooks” program at the state fair, and a local culinary food program at Southwest State University in Marshall.

One AURI project is looking at economic considerations, including what farmers can expect over the cost of production. “We’re looking at, what are the price points and format that food needs to be in for institutions?” Sparby says. For example, “you can’t deliver a quarter beef to a restaurant. You have to be able to match up the form that’s usable to them.”

The project will also look at local foods’ impact on the local economy. “Let’s say you want to get local foods into a school district, and you’re competing against a subsidized food program. (Local foods) would cost more, but if you show you’re going to have a multiplier effect with those local foods to the tax base, would it be enough to turn the decision?”

AURI’s primary role in promoting local food production, however, is “to further process or value-add to stretch out the season,” Sparby says.

## Support from the top down

Peterson says his House ag committee will be “trying to take away the barriers for people who want to get into this business.” He has already added two new subcommittees: organics and energy. “Energy is something everyone is interested in ... 80 percent of Americans want to produce more renewable fuels.”

But Peterson said he did get “a little bit of flack” over the organic subcommittee as some view it as a fringe area. “But that’s fairly well dissipated

and ... a lack of understanding about what is going on in the marketplace.”

With high land prices, getting access to enough land is one problem. “There are marketing opportunities every day but people can’t get enough product to fill their markets,” Peterson says.

Also, farmers transitioning to organics can face financial difficulty for the three years they must quit using chemicals before being certified organic. Peterson says the ag committee may consider giving Conservation Security Program payments to farmers during that transition.

Besides federal action, “a lot can be done at the local level,” VanDerPol says, “like zoning and giving economic tax incentives to farmers.”

“Family farms trade downtown and use the local bank, stores, feed mill, and they generate local processing. It’s a way to keep wealth at home and revitalize the rural economy from the inside out,” VanDerPol says. “Instead of chasing smokestacks, look at what we have locally and build on it.”

Farmers could capitalize on growing consumer interest in sustainable farms by promoting agritourism, VanDerPol says. She has been talking with Merdan of Rep. Peterson’s Detroit Lakes office and the Rural Economic Development Commission in Appleton, Minn. about doing bus tours. “Food-producing farms could all have open houses on the same weekend — and encourage people to go from farm to farm,” VanDerPol says. “We are talking about doing a pilot later this summer, then see if we can build a bigger event.

“Southern Minnesota has the gorgeous Minnesota River Valley ... and food-producing farms are part of the local fabric that urban dwellers are yearning for.”

“From a human community point of view, we’re seeing a real rural renaissance.” ■

For more on the Home Grown Economy conference, visit the Web site: [morris.mn.edu/greencampus](http://morris.mn.edu/greencampus)

## Links to local foods

[foodalliance.org](http://foodalliance.org)

[foodroutes.org](http://foodroutes.org)

[landstewardshipproject.org](http://landstewardshipproject.org)

[localfoods.umn.edu](http://localfoods.umn.edu)

[www.mda.state.mn.us/food/minnesotagrown](http://www.mda.state.mn.us/food/minnesotagrown)

[prairiefare.com](http://prairiefare.com)

[prideoftheprairie.org](http://prideoftheprairie.org)

[sfa-mn.org](http://sfa-mn.org)

[superiorgrown.org](http://superiorgrown.org) (NE MN)

[sustainablefarmingcentralmn.org](http://sustainablefarmingcentralmn.org)

[wholefarmcoop.com](http://wholefarmcoop.com)

# more! Eat fresh – eat local

## Buying local could profit region

West central Minnesota study shows buying home-grown could have a big impact on local farm economy

BY CINDY GREEN

As west central Minnesota's population steadily declines, so do farm profits. In 2002, 34 percent of the farms reported net losses, even with federal subsidies.

But if the region's consumers spent one food dollar out of five on home-grown meats, dairy, grains and produce, it would add enough in new farm income to match almost half what farmers now receive in federal subsidies.

That was Ken Meter's message to more than 300 attending the "Home Grown Economy" conference on April 2 at the University of Minnesota-Morris (see article, page 6). U.S. Rep. Collin Peterson and UMM sponsored the conference; Michael Sparby, AURI project director, was one of the organizers.

Meter, president of Crossroads Resource Center in Minneapolis, taught U.S. agriculture economics at the U of M and has been conducting economic analyses of local food systems across the country.

He studied a 12-county region in west-central Minnesota, defined by Traverse, Grant and Douglas on the north, Renville and Yellow Medicine on the south, and Pope and Kandiyohi counties on the east.

"We have very good data from the USDA about commodities and farms. But we often lack the sense of, what happens to the people who actually raise our food and the people who eat our food?" Meter said at the conference.

"We can't write good farm policy; we can't have good local economies ... without measuring communities."

West-central Minnesota includes more than 10,000 farm families, 12 percent of the state's farms and 17 percent of farm acreage. The area produces \$1.4 billion of food annually and raises roughly a quarter of the state's sugar beets, corn

and soybeans and 14 percent of livestock. "Only one-half of one percent is locally purchased. The other 99.5 percent is going into a commodity stream," Meter says.

"Even hogs are likely to leave the state to go to a processing plant. ... They come back in cardboard boxes," and consumers pay retail prices for "what we produced in wholesale prices."

"Farmers have reduced their costs ... for the last 20 years. Farmers are managing as well as they can, but return from farming has steadily decreased ... farmers struggle to produce food at a loss," — averaging about a \$153 million loss annually.

Production costs keep rising and every year the region's farms purchase \$600 million in inputs. To cover losses, farm families annually collect \$167 million in federal supports and earn \$80 million in other farm-related income.

Promoting local foods is an important strategy for making farming more profitable and our diets healthier, Meter says. He contends that if the region's consumers spent just 20 percent of their \$354 million annual food budget on local foods, farm revenue would increase by \$70 million — equal to 40 percent of what is now collected in subsidies.

"There is clearly a lot of room to grow — as we move to more local systems." ■



Meter.



*Promoting local foods is an important strategy for making farming more profitable and our diets healthier, Meter says.*

PHOTO ILLUSTRATION POUNCE.COM

# Intensity in density

## AURI evaluates cubing, pelleting and other densification methods that make biomass easier to transport

BY DAN LEMKE

Waseca, Minn. — Being called “dense” is not a compliment — unless you’re biomass.

Interest in biomass energy is growing nationwide. Power plants are evaluating corn stover, native grasses, straw and other crop residues to be burned for energy. The U.S. Department of Energy has provided more than \$200 million to help build six cellulosic ethanol plants around the country.

That’s because agricultural biomass contains significant energy. An AURI analysis shows that corn stover contains more than 7,700 Btu per pound, wheat straw generates more than 7,300 and miscanthus, a tall, dense grass, contains more than 7,800 Btu per pound. In comparison, shelled corn contains about 8,100 Btu per pound.

But biomass also presents more challenges than most other fuel sources

“In most cases biomass is bulky, light and has some handling, storage and transportation considerations,” says Al Doering, associate scientist at AURI’s coproducts lab in Waseca.

“There is usually a small harvest window for biomass, plus the moisture content can vary greatly.” A large straw bale, for example, “will start to deteriorate if it’s exposed to the elements for very long.”

Processing the biomass into smaller, more concentrated forms such as pellets, cubes or blocks could significantly impact biomass fuel use.

“Densification is potentially the big breakthrough for biomass,” says Bill Lee, general manager of the Chippewa Valley Ethanol Cooperative in Benson. CVEC is installing a gasification system that Lee expects will be operating by the end of the year. “A lot of effort has been focused on the technology for converting biomass, but not



PHOTO BY BERCA

nearly enough on how to move it from the field to the facility. Until we do, it’s difficult to see how we are going to have wide-scale use.”

So AURI is partnering with university researchers, commodity groups and industry to identify the best processes and technologies for densifying biomass.

“There are a lot of reasons to look at densification options,” Doering adds. “It can reduce cost and improve storage, it makes it more economical to transport, reduces losses from deterioration from the elements, makes handling easier and more easily standardized and increases combustion efficiency.”

The AURI initiative will be conducted in two phases. First, various densification technologies will be evaluated such as pelleting, cubing and making briquettes.

Phase two will include scale testing and validating the most promising technologies.

Given the interest in biomass, densification information will likely have widespread use. Doering says the potential to use agriculturally-based biomass for cellulosic ethanol, gasification, co-firing with other fuels or for pellet-fuel production, depends on the ability to collect, transport and store the feedstock economically.

Lee says identifying breakthrough technologies is vital to developing multiple markets with fuel providers and end users, as well as addressing fuel-efficiency, transportation, storage and retention concerns.

Densifying raw commodities will add cost to the process, Doering says, but “you’ll likely make up for those costs through increased efficiency, reduced transportation costs and end up with a product that is more easily stored and handled than bulk biomass.”

Doering expects to complete the first phase of the initiative later this fall. ■

# A WIDE-REACHING WEB

## AURI web site reaches national and global audience

BY DAN LEMKE

Waseca, Minn. — The information age is thriving in the agricultural industry, as evidenced by traffic surges to [www.auri.org](http://www.auri.org).

“Every month there are tens of thousands of visitors to the site looking for information on everything from corn burners to meat goats,” says Sue Rosenau, AURI communications assistant.

A May AURI Web site traffic report showed 145,000 hits, and the average user stayed onsite for almost 20 minutes.

May browsers also downloaded 1,500 copies of Ag Innovation News, AURI’s quarterly publication distributed to more than 13,000 subscribers. The most popular downloaded reports were on oilseeds, Omega 3s and meat goats.

While about 80 percent of AURI Web traffic originates from the United States, browsers from Canada, the United Kingdom, Brazil, Germany, Australia and India find the site regularly. In May, more than 100 user sessions originated in Singapore.

On the domestic front, Minnesota surprisingly does not have the most AURI Web viewers. Virginia does, followed by California, Massachusetts, Connecticut, Tennessee and Colorado. Minnesota ranks eighth.

“The information we’re providing and the work AURI does is of interest to a lot of people beyond Minnesota,” Rosenau says. “We try to keep the information as updated as possible because there is interest all over the world in value-added agriculture.” ■



PHOTO BY DOUBLE VISION

# Elsewhere in ag innovations

BY DAN LEMKE  
CARTOONS © UNCLE HYGGLY

Editor's note: As a service to our readers, we provide news from around the globe on new uses for agricultural products. Please note that ARS is the research arm of the USDA.

## Fish wrap

Frozen foods may soon be protected by a nearly-invisible fish coating. Made from gelatin extracted from skins of seagoing fish, such as Alaskan Pollock, the coating can help seal in moisture in a frozen dish, protecting taste and quality. Despite its marine origin, the coating has no seafood taste or odor. Scientists at ARS and several U.S. universities are collaborating on gelatin studies. Beside food coatings, the fish extract could be used as an ingredient in other food products.

From: USDA-ARS, April 24, 2007



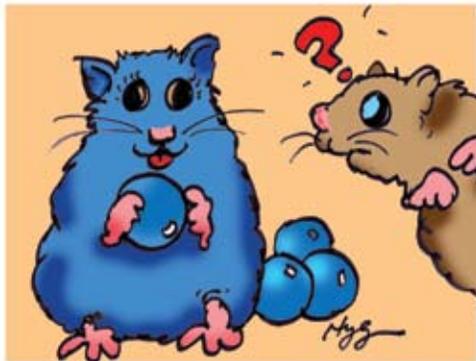
## Tipping the scale

A new environmentally-friendly ingredient for laundry and dishwashing detergents has been developed by ARS and the Alabama company Folia. The cornstarch-based product helps prevent "scale," crusty deposits that can cause clothing discoloration and cloudy dishes and can diminish dishwasher's and washing machine's performance. The biodegradable cornstarch derivative helps to soften water, making detergents work better.

From USDA-ARS, April 2, 2007

## Cholesterol blues

Berries may give cholesterol the blues, ARS researchers in Mississippi have found. Scientists fed hamsters high-cholesterol diets — some supplemented with dried blueberry



skins. The hamsters eating blueberry-enhanced diets had significantly lower blood-cholesterol levels than those that didn't eat the skins, and somewhat lower levels than hamsters fed a lipid-lowering drug.

From: USDA-ARS, March 26, 2007

## Do it all biomass

A research consortium from the United States, major universities in the United Kingdom, Asia and Africa and an international charity are working on a three-in-one biomass powered appliance called SCORE (Stove for Cooking, Refrigeration and Electricity). They expect it will take five years to create a single device that people in developing countries can use to cook, refrigerate and produce electricity. It could be a boon to rural areas where refrigeration and electricity are nonexistent but biomass is plentiful.

From: www.nature.com, May 14, 2007

## Got plastic?

Researchers have discovered a process for mixing dairy-whey protein with starch to create biodegradable plastic that can be blended with polyethylene to make molded utensils.

Researchers at ARS and the Japanese National Food Research Institute formed the blend using whey protein, cornstarch, glycerol, cellulose fiber, acetic acid and the milk protein casein to make the pliable plastic.



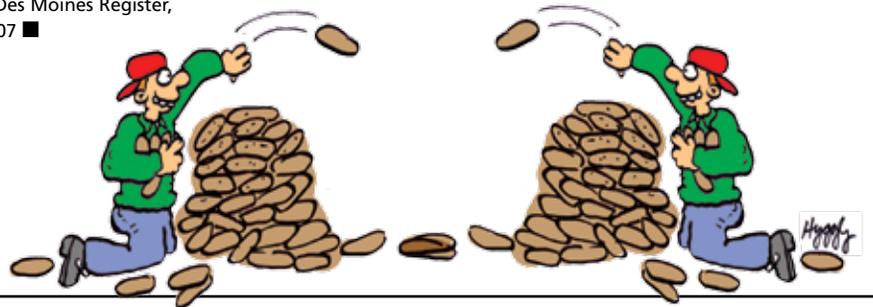
The bioplastics can only replace about 20 percent of polyethylene, but researchers are applying this process to polylactic acid, which could result in a completely-biodegradable bioplastic.

From: USDA-ARS, May 1, 2007

## Cob grabber

After 10 years of tinkering, Nebraska twin brothers Ty and Jay Stukenholtz invented a device that harvests corn cobs during combining. The device fits any combine and uses a series of sieves and fans to separate the cobs and store them in a separate hopper. Cobs are becoming increasingly valuable as a biomass fuel.

From: The Des Moines Register, May 13, 2007 ■



## Cow pie power

University of New Hampshire students who invented MOR-2007, which can convert cow manure directly into electricity using an open-air microbial fuel cell, won the prestigious International Environmental Design Contest held at New Mexico State University in April. MOR-2007 is designed to reduce maintenance, operational difficulty, odor and phosphorous while minimizing manure impact on air and water quality.

From: www.fosters.com, May 15, 2007

# 2007 Ag Innovator awarded

St. Joseph, Minn. — USA Solutions, designer of cornstalk-based hog mats, was presented the 2007 Ag Innovator of the Year Award by the AURI Board of Directors on June 21.

Founded in 2004 by Darryl Metcalfe and Tony Schmitt, the St. Joseph company produces Compost-A-Mat, a biodegradable mat used in swine nurseries and farrowing facilities.

The fibrous mat, an alternative to rubber, provides a comfortable bed that improves growing conditions and decreases mortality rates for baby and weaned pigs. Compost-A-Mats also add value to corn fibers.

"This is a win-win situation," says Alan Doering, AURI associate scientist in Waseca. "They are using an ag-based material to make a new product that is beneficial to the livestock industry."

The Ag Innovator Award is presented annually to an AURI client with an innovative product that has achieved market success and uses a significant amount of agricultural commodities. The 2007 award was presented at a luncheon in St. Joseph.

USA Solutions is the sixth recipient of the award, joining Pet Care Systems of Detroit Lakes, Mississippi Topsoils of Cold Spring, Minnesota Soybean Processors of Brewster,

SoyMor of Glenville and FUMPA BioFuels of Redwood Falls.

Compost-A-Mats are marketed across the United States, Canada and Australia. Schmitt and Metcalfe hope to double last year's sales of \$1 million by the end of 2007. ■

# Rural innovation

BY TERESA SPAETH

Need fosters innovation — whether it's approaching a problem from a different perspective or creating something new.

Innovation in large companies generally comes from research and development divisions that generate new ideas, then develop and test prototypes for technical and economic viability. Most small companies do not have that luxury and rely on their regular staff to generate solutions to problems.

Innovation can happen anywhere. It doesn't have to come from Fortune 500 corporations or international companies. It can and does come from Main Street Minnesota. Sometimes a new idea alone can be the basis for a new business.

Ideas like cornstalk-based hogs mats — designed by USA Solutions, AURI's 2007 Ag Innovator of the Year — translate into jobs, economic activity and new uses for ag products. One person working in the swine industry had an idea for doing things a better way. The idea became Compost-A-Mats and a thriving business in St. Joseph, Minn.

At AURI we are proud that we have helped develop ag-based innovations for nearly 20 years. Hundreds of ideas have come through our doors, and some of those have developed into products for the food, personal-care, animal, industrial and renewable-energy markets. The ideas have come from real people hoping to capitalize on an innovative opportunity.

Innovation has come from inside AURI as well. We have undertaken dozens of industry-

wide initiatives to develop promising opportunities that we and our partners have identified. Working in this environment, our staff is conditioned to look for emerging possibilities. Whether it is testing glycerin as a possible boiler fuel or evaluating ethanol coproducts as fertilizer, AURI is constantly on the lookout for the next innovation.

It can happen anywhere. ■



Spaeth.

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

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For staff e-mail addresses, visit AURI on the Web: [www.auri.org](http://www.auri.org)

## AURI Ag Innovation Quiz

- One bushel of corn roughly equals how much energy?  
A. 5 gallons of liquid propane  
B. 3.5 gallons of fuel oil  
C. 140-kilowatt hours of electricity  
D. All of the above
- How much DDGS was produced in the U.S. in 2006?  
A. 800,000 tons  
B. 8 billion pounds  
C. 8 million tons
- What agri-processing coproduct was tested as a boiler fuel?  
A. Chicken fat  
B. Glycerin  
C. Corn gluten meal
- About how far does the average food item travel from producer to consumer?  
A. 1,500 miles  
B. 150 miles  
C. 75 miles
- About what percentage of agricultural commodities are purchased by local consumers?  
A. 3 percent  
B. 0.5 percent  
C. 17 percent
- What is a key challenge impacting large-scale biomass use?  
A. Energy values  
B. Color  
C. Density
- USA Solutions produces the Compost-A-Mat for what industry?  
A. Sporting goods  
B. Automotive  
C. Swine



Answers: d, c, b, a, b, c, c, c

PHOTO ILLUSTRATION POUNCE.COM

## ABOUT AG INNOVATION NEWS

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# In between

*AURI looks at biomass-pellet fuel's potential for on-farm and light-industrial uses*

By Dan Lemke

*Waseca, Minn.* — Biomass-pellet stoves are popular with home owners and with large industrial complexes. But another opportunity lies somewhere in between.

Many light-industrial or on-farm uses may be ideal for pelleted-biomass fuels. Grain drying and heating for livestock buildings, farm shops and greenhouses could potentially be biomass powered.

"Most farmers have some sort of biomass on hand — corn, crop residue or straw — that they could use to offset some of their operation's energy costs," says Alan

Doering, AURI associate scientist. "But there hasn't been much attention given to burners that would be suited for farm or light-industrial use."

An AURI initiative identified U.S. and Canadian manufacturers that produce industrial burners with energy output from 8,000 to 500-million Btu. The evaluation also detailed what fuels the burners could combust, their capacity, heat delivery and intended applications.

Evaluation results are available on AURI's Web site: [auri.org](http://auri.org); click on the "biomass burner initiative" button. The report includes general biomass information and contact information for Minnesota burner manufacturers.

"Each burner may have some specific requirements for biomass feeding and handling," Doering says. "But even with those considerations, using corn could reduce heating costs by 35 to 45 percent compared to propane. That could be very significant when you are considering heating barns or a machine shed." ■