



AG INNOVATION NEWS[®]

The newspaper of the Agricultural Utilization Research Institute

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tender beef products
from an Italian breed with
extraordinary muscles.
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15 years of ag innovations

BY EDGAR OLSON

Time has its share of clichés — it flies, waits for no man, marches on — all expressions of how quickly time goes by.

Take 1989, for example. It is hard to believe that it has already been 15 years since:

Exxon Valdez ran aground, spilling millions of gallons of crude oil.

The Berlin Wall came down,

The U.S. invaded Panama,

Driving Miss Daisy won the Oscar for best picture,

We said goodbye to Lucille Ball, Gilda Radner, Sir Laurence Olivier and Mel Blanc,

George H. Bush was president,

Rudy Perpich was the governor of Minnesota, and

AURI was established as an independent organization.

This year marks AURI's 15th anniversary. Created by the State Legislature in 1987 under the umbrella of the Greater Minnesota Corporation, AURI became

a nonprofit organization with its own board of directors in 1989.

Much has changed since. But AURI's mission has remained the same. We are still committed to improving rural Minnesota's economy through developing new uses and markets for our agricultural commodities.

That's not to say AURI is the same organization today as it was in 1989.

Like any organization with a 15-year track record, we have changed how we operate, streamlined our systems and reacted to the needs of our clients and available resources. Some changes have been difficult, but we have to adjust to the world we operate in today.

AURI has done excellent work over the past decade and a half. And more good projects are in the works. We are proud of our work to strengthen Minnesota's economy over the past 15 years and, and we are prepared to tackle the next 15 with the same commitment.



We are still committed to improving rural Minnesota's economy through developing new uses and markets for our agricultural commodities.



AURI Success Stories

Faribault Mills corn blankets to be featured on PBS

Faribault Mills and its new Ingeo corn-based fibers will be featured on the popular PBS children's

show Reading Rainbow later this year. The segment, to be televised nationwide, includes video produced by Dan Lemke, AURI communications director.

Faribault Mills is the last woolen mill in the country to process raw wool into finished products. It produces wool blankets for catalogers such as Lands End and Eddie



Bauer, and retailers such as Marshall Fields, Macy's, Bloomingdale's and Saks. Early this year, Faribault Mills started weaving blankets and throws made from Ingeo, a fiber developed by Cargill Dow from corn polylactic acid.

Central Minnesota company patents disposable hog mats

USA Solutions of St. Cloud, Minn., has patented a biodegradable mat for hog-farrowing facilities that is made from crop residues such as corn stover and other agricultural coproducts. Bio Mat prevents drafts in farrowing crates and provides young pigs a soft place to lay and feed. Many producers currently use rubber mats, which need to be cleaned and disinfected between uses. The disposable

Bio Mat is used for a week to 10 days, then composted.

The company is fine-tuning the mat before it's introduced to stores this fall. "We're going to do some evaluation in test barns to make sure we're happy with what we have," says USA Solutions President Tony Schmitt.

Alan Doering, AURI technical services specialist, helped connect USA Solutions with a Minnesota manufacturer to test different product formulations and adhesives.

"There already is interest in the Bio Mat because there are producers out there who know about the product and want it," Doering says. Suppliers are also expressing interest, he adds. Because it is made from low-value raw materials, Bio Mat is cost competitive with rubber mats. ■

ABOUT AG INNOVATION NEWS



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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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AURI ENERGY CENTER

n e w s

STORIES BY DAN LEMKE

Fueling their oats

University of Minnesota shows favorable results testing emissions

Minneapolis, Minn. — Oat hulls could soon help warm the halls of the University of Minnesota's Minneapolis campus.

U of M steam and electrical plant operators want to use more renewable fuels in their plants. The boilers in one plant are already designed to cogenerate power from coal and biofuels, as part of an energy and environmental upgrade completed five years ago. Faced with rising energy costs for 18 million square-feet of building space, officials designed more efficient systems with lower emissions at both St. Paul and Minneapolis campuses.

Wood is the only alternative fuel burned so far, as it was the only biofuel available in 1996 when the plant's emissions permit was granted. Since then, the U of M has increased its wood consumption to about 32,000 million Btu — outpacing the local wood supply that meets its cogenerator's specifications.

Because of erratic fuel supplies, fluctuating costs and original boiler-design intent, University officials have been seeking other biofuels to supplement the mix. They identified oat hulls, the outside husk of the oat kernel left after processing, as a viable fuel to evaluate.

"We had tested a number of agricultural products for Btu value," and knew that "many ag products compared favorably on cost ... compared to traditional fuels," says Alan Doering, AURI technical services specialist. "But we didn't have much information about emissions. The University has the capacity to measure emissions, so we were very interested in working together."

In early 2003, University officials negotiated a test burn with the Minnesota Pollution Control Agency to evaluate emissions using oat hulls. Emissions can vary by fuel source as well as technology and equipment used to burn them, making regulatory permitting difficult.

AURI's coproducts utilization lab in Waseca helped produce hull pellets to address potential storage, dust and handling concerns, although they were not used in the actual test burns.

In early 2004, University officials tested two fuel blends: one with 9 percent oat hulls and 91 percent coal; the other with 35 percent oat hulls. Both yielded positive results.

The 35-percent oat-hull blend reduced sulfur-dioxide, carbon-monoxide and particulate emissions by nearly two-thirds over 100 percent coal. The blend did slightly



PHOTO BY ROLF HAGBERG

The University of Minnesota is testing oat hulls as a potential fuel for its energy plant on the Minneapolis campus, which is designed to cogenerate power from coal and biofuels.

increase nitrogen-oxide emissions, but well within permitted levels. The 9-percent oat blend showed a significant reduction in sulfur-dioxide and nitrogen-oxide emissions, but a slight increase in carbon-monoxide and particulate emissions — both well under permit thresholds.

Based on the favorable test data, the U of M has applied for an MPCA permit amendment that would allow for burning oat hulls and testing of other biofuels. The application is under review.

The University estimates it could burn 15,000 tons of oat hulls per year, and with new material-handling and burning equipment, up to 30,000 tons. Officials say General Mills' two metropolitan-area plants could supply up to 60,000 tons of hulls year round.

"The emission (test) results enhance the attractiveness of oat hulls as a fuel," Doering says. "It could also be valuable information to help encourage others to take a serious look at ag-based fuels."

"Many other agricultural products have the potential to be used as biofuels. If the University can generate and share the emissions information we need, it will help improve the acceptance of ag products as viable fuels." ■

AURI awarded Xcel Energy grant

AURI has been awarded a \$760,000 grant from the Xcel Energy Renewable Development Fund to research coupling biodiesel with wind power to generate electricity. The institute will also participate in two other RDF-funded projects.

AURI's project is among 25 recommended for funding by an advisory board representing Xcel Energy and the Prairie Island Indian Community. The board reviewed more than 200 proposals. Almost \$10 million was awarded to energy-production projects and another \$12 million to renewable-energy research and development projects.

Every year Xcel collects \$16 million from customers for RDF projects. Projects selected by the advisory board are subject to final approval by the Minnesota Public Utilities Commission.

The first phase of AURI's project involves studying the economic feasibility of using biodiesel generators to power turbines when the wind isn't blowing and to offset peak demand. The project's second phase will include research on a field demonstration of wind and biodiesel electrical generation. Project partners include the Minnesota Soybean Growers, Northern Alternative Energy, Ziegler Caterpillar Services and the University of Minnesota.

The project "will be good for the wind energy industry, Xcel Energy and Minnesota

agriculture," says Max Norris, AURI director of projects and technology.

Scott Singelstad of the Minnesota Soybean Research and Promotion Council agrees it's an opportunity to "expand biodiesel beyond a transportation fuel into a whole new market."

AURI is also joining the Minnesota Center for Diesel Research and Southwest Minnesota State University to test biomass-derived oils in turbo-generators. The project will investigate the technical and market feasibility of generating electricity with raw or minimally-processed vegetable or recycled oils.

For another RDF project, AURI will provide information on Minnesota biomass supplies and opportunities to Coaltec Energy USA of Allendale, Michigan. Coaltec will use biomass such as poultry waste as solid fuel for a gasification testing facility. If tests burns are successful, the technology could be used by Xcel to benefit Minnesota's poultry industry.

"The energy-production projects will benefit Minnesota consumers by providing economic sources of renewable energy," says Dave Sparby, Xcel Energy vice president. Likewise, research and development projects will help "provide environmentally-sound and reasonably-priced energy in the future." ■



Mulch makeover



PHOTOS BY ROLF HAGBERG

Minnesota lamb and wool producers are testing a redesigned wool mulch on strawberry plots at a University of Minnesota research center in Morris.

AURI is helping sheep producers rework wool landscaping mats

BY E. M. MORRISON

Morris, Minn. — Minnesota lamb producers are not sheepish about taking a good idea back to the drawing board.

Several years ago, AURI helped the Minnesota Lamb and Wool Producers Association test a new landscaping mulch made from low-quality wool. The fabric was effective in strawberry trials at the University of Minnesota. But it had to be manufactured out of state, pricing it out of the market.

Still, wool landscaping fabric had so many advantages that the association decided to give it another try. Now AURI is helping sheep producers test a cheaper mulch made in Minnesota from low-value "card wool,"

a byproduct of textile manufacturing. The revised wool mulch could offer fruit growers an economical alternative to herbicides. And farmers could see "new opportunities for a value-added product," says Al Doering, AURI technical services specialist in Waseca.

Effective, but expensive

The original wool mulch, tested from 1999 to 2001 at the West Central Research and Outreach Center in Morris, was made from low-quality wool worth 5 to 10 cents per pound. The wool was washed and processed into a soft, felt-like fabric, using a method known as needle punching.

During three seasons of strawberry trials, the

single-ply wool mulch "nearly eliminated weeds from rows, promoted daughter-plant rooting and allowed maximum fruit yields," the research report stated. Weed control was as good or better than with conventional herbicides, and wool mulch kept the soil around plants cool and moist, leading to more robust growth, says horticulturalist Steve Poppe, who managed the research trials.

Also, the wool fabric was easy to handle, Poppe said. It could be applied with the same machine used to install plastic mulch. But unlike plastic, which can be a disposal problem after harvest, wool mulch decomposed by the end of the second season, enriching the soil with nitrogen. Wool mulch delivered similar results in tomato and

medicinal herb trials, Poppe says.

The disadvantage? Price.

The cost of collecting, washing and trucking wool to the nearest needle-punch plants in Ohio and Texas pushed the mulch price to about 42 cents per square foot. "That's too high for commercial strawberry growers," Poppe says, "though it may fit the home gardening market." (See story on page 6, "Blanketing the garden.")

Making it cheaper

Still, Minnesota sheep producers were not ready to give up on the idea, says Michael Sparby, AURI project director. "The benefits

were so good, we asked, 'How can we get the cost down?'

Sparby and Doering had worked with a Floodwood, Minn., company that makes roadside erosion-control mats out of waste agricultural fibers, such as wood and coconut. They wondered if Mat, Inc.'s fiber-mat manufacturing process could be modified for wool fibers.

The company was willing to try.

The first attempt failed. "The wool fibers were too long," Sparby says. "We needed a fiber of three-quarters of an inch or less. We were brainstorming all kinds of things — chopping the wool, pelletizing it." It was Bob Padula of Montevideo, a sheep farmer and president of the Minnesota Lamb and Wool Producers Association, who suggested using the short fibers trimmed from wool blankets made at Faribault Woolen Mills.

"The fibers are about half an inch long," Sparby says. There is a market for them, but "they are an extremely low-value product." Landscaping mulch would be a new use for the fibers, Doering adds.

After several tries, Mat, Inc. came up with a wool mulch similar to the original needle-punch mat, but lighter weight and less dense. It was also much less expensive — about one-fifth the cost of the needle-punch mulch, Sparby says.

Poppe, the horticulturist at the Morris experiment station, is also a commercial strawberry producer. He says a low-cost wool mulch would undoubtedly appeal to strawberry farmers and other specialty fruit and vegetable growers. "A lot of Upper Midwest growers ... are trying to lower their reliance on herbicides," he says.

Comparing wool and herbicides

In May, the reformulated wool mulch was installed in transplanted strawberry plots at the Morris experiment station. The two-year trials are comparing wool with conventional herbicides and hand weeding. As in the previous wool mulch experiments, the research will look at weed growth, strawberry plant vigor, number of rooted daughter plants, and fruit yield.

Weed control through the end of July 2004 was good, Poppe reports, even though the new wool mulch is thinner than the original version. More care was needed during installation to avoid tearing the mulch, he says, although it was easier to cut through for planting.

So far, he adds, the new wool mulch "is doing what it's supposed to be doing, and it's not breaking down yet. But we'll know more after next year when we see the yields." ■

AURI is helping sheep producers test a cheaper mulch made in Minnesota from low-value "card wool."



U of M horticulturist Steve Poppe compares two landscaping materials developed by the Minnesota Lamb and Wool Producers Association and tested in strawberry plots. A wool mat designed several years ago proved effective in controlling weeds without herbicides but was too expensive for commercial markets. Recently, the association developed a less-expensive mulch made from wool fibers trimmed from blankets at Faribault Mills.

Blanketing the garden



PHOTOS BY ROLF HAGBERG

PHOTOS BY ROLF HAGBERG

Sheep producer Bob Padula of Montevideo, Minn. displays a wool landscaping mat that producers developed several years ago. Although too expensive for commercial fruit and vegetable production, association members say the mat could be successfully marketed to home gardeners and have asked AURI to help find methods for collecting and processing low-value wool.

Wool landscaping fabric could be a hit with home gardeners, but logistics are a problem

BY E. M. MORRISON

Lindstrom, Minn. — Every spring, Sherry Stirling blankets her gardens and small vineyard in soft wool.

Stirling and her husband Warner Johnson raise Merino-Dorset-cross sheep. She lays sheared wool in her gardens and around her trees, shrubs and grape vines as a mulch to control weeds, retain moisture and enrich the soil.

Lots of sheep producers use the same trick, says Stirling, secretary of the Minnesota Lamb and Wool Producers Association. In fact, that's what led the grower group to develop a wool landscaping fabric several years ago. The product performed well in research trials at the University of Minnesota, but it was too expensive for the intended market — commercial fruit and vegetable growers. The association went on to develop a cheaper wool mulch, which is now being tested. (see story on page 4, "Mulch makeover.")

But the group hasn't abandoned interest in the original wool mulch, which is made with a process called needle punching. Stirling and other Minnesota sheep producers believe the needle-punch wool mat could be successfully sold as landscaping fabric for home gardeners.

The sturdy wool fabric has many advantages for yards and gardens, Stirling says: It's an effective weed barrier, biodegradable, and easy to cut and install. "It would be a locally-produced, chemical-free alternative to plastic mulch." And because home gardeners don't need huge volumes of mulch, "price is not as large a barrier," says Bob Padula, a Montevideo sheep producer and American Wool Council consultant. "It's a niche market," Stirling says, "but consumers are looking for something like this."

A successful wool mulch would offer Minnesota producers another outlet for their low-value belly and tag wool, which is worth only pennies a pound in today's markets. But

first, Stirling and Padula say, the Minnesota sheep industry needs an efficient way to collect and transport low-grade wool.

Now, most Minnesota wool moves through sheep shearers to warehouses, which distribute it to processors. Separating out the low-grade fiber from the higher-quality fleece wool could boost the prices growers receive for their good wool, Padula says. But collection costs would also jump. There are about 2,500 sheep farmers in Minnesota — most of them small producers. "When you have small volumes scattered over a large area, it's expensive to collect," Padula says.

On the other hand, he adds, Minnesota does have a wool processing industry to build on, including one of only four commercial scouring facilities in the country. "Minnesota is a logical place to do this work, as we currently have a wool textile base. Many states do not have this."

The biggest hurdle for Minnesota growers now is "collecting the wool from producers and getting it to a mill that can do the processing," Stirling says. "We've been looking to AURI for help." One idea being talked about is forming a wool cooperative to collect and pool low-value fiber, Padula says. "That's the next step for growers."

But, Stirling says: "We haven't figured out how to make it work, yet. We're still very much at the experimental stage." ■



Putting more "O" in H²O

Company is testing irrigation invention that could boost annual strawberry production in Minnesota

BY E. M. MORRISON

Water enriched with oxygen will help irrigated crops grow faster and more vigorous, a Bloomington company hopes to prove.

AquaInnovations, Inc. makes water oxygenation systems for the sport-fishing industry. The company's patented technology, used by major boat manufacturers, zoos and the Department of Natural Resources, keeps bait and live fish healthy during transportation and storage.

Now, AquaInnovations is extending its oxygenation technology to agriculture. The University of Minnesota West Central Research and Outreach Center in Morris is helping the company find out if strawberry plants absorb more nutrients when irrigation water is saturated with oxygen. That could lead to more robust growth and bigger fruit yields. AURI helped arrange the research, which is being combined with wool mulch trials. (See "Mulch makeover," page 4.)

Tiny bubbles

AquaInnovations was formed in 2002 by three water treatment industry veterans to commercialize a new method of adding oxygen to water. Rick Anderson, company president, recalls the day inventor and company co-founder Jim Senkiw first demonstrated his idea.

"He dumped the device in my coffee pot and started producing oxygen. I had not seen anything like it before," says Anderson, a 16-year veteran of the industrial water treatment field. "I knew it was significant. Right then and there, I told Jim I was in."

Unlike conventional oxygenation systems, which pump ambient air through a diffuser into the water, Senkiw's method produces 100-percent oxygen from the water itself. Using a form of electrolysis, the Pure Oxygen System separates water into its components — hydrogen and oxygen. The lighter hydrogen molecules rapidly escape into the atmosphere, while the oxygen molecules remain suspended in the water.

The micro and nano O₂ bubbles are too small to break the surface tension of the water, so they dissolve, saturating the water with oxygen, Anderson explains. He says the battery-powered Oxygenator™ is more efficient, reliable and versatile than aeration.

Sporting new uses

The Pure Oxygen System, patented in February, has a wide range of uses, Anderson says, among them: sport fishing, aquariums, aquaculture, hydroponics, fermentation, livestock and municipal wastewater treatment

and irrigation. "We've identified more than 50 possible applications."

The company, which has raised \$500,000 in investment capital of a \$2 million Series A preferred offering, focused first on the sport fishing market. It makes three sizes of portable oxygenators for boat live wells and bait buckets, plus custom oxygenators.

Anderson got an inkling of the technology's agricultural potential soon after landing his first big sport fishing order. He was visiting his relatives — who, incidentally, "thought I was crazy to leave a good career selling million-dollar water treatment systems to sell \$50 and \$100 units."

He had the bait Oxygenator running in a container of water on the kitchen table. Later, he dumped the oxygenated water on his mother's droopy African violet, "which was barely alive." A week later, the plant burst into flower for the first time in five years, Anderson says.

Breathing plants

Like animals, plants also need oxygen. Plant roots use oxygen to carry out respiration, a process that enables roots to take up nutrients — or the plants will wilt and die. But would giving plant roots more oxygen boost growth? That's the question AquaInnovations asked.

Anderson did some informal tests, growing tomato plants and germinating grass seed with regular tap water versus oxygenated water. "We saw dramatic results right away with the oxygenated water," Anderson said, "but these weren't controlled experiments."

So early this year, AquaInnovations approached the Minnesota Soybean Growers Association for help in setting up more rigorous testing. "The soybean growers were interested in this idea and referred the company to us," says Al Doering, AURI technical specialist in Waseca.

Although AURI does not do agricultural production research, staff have extensive contacts. Doering and Michael Sparby, AURI project director, put Anderson in touch with horticulturalist Steve Poppe at the Morris experiment station.

Quick-start strawberries

Poppe was immediately intrigued with the oxygenator and agreed to test it on a June-bearing strawberry plot and fall-planted annual strawberries. Trials began this spring and will continue through 2005.

The ag oxygenator fits inside an irrigation pipe, saturating well water with oxygen as it

flows into a drip line. The device can be scaled up to oxygenate large irrigation systems, up to 700 gallons a minute, and operates on standard current.

Poppe is especially interested in the oxygenator's potential for annual strawberries, which are transplanted in August and bear fruit the following spring. Annual strawberry production requires less labor and pesticides than June-bearer production, and the plants are less prone to disease, Poppe says. But because the plants have only two and a half months in late summer and early fall to become established, "we need to get a lot of growth very quickly."



Poppe is among the first researchers in the state to experiment with fall-planted annual strawberries, which could become a new commercial crop for Minnesota, Sparby says. Poppe adds: "If it works, that's where the AquaInnovations technology might shine." ■

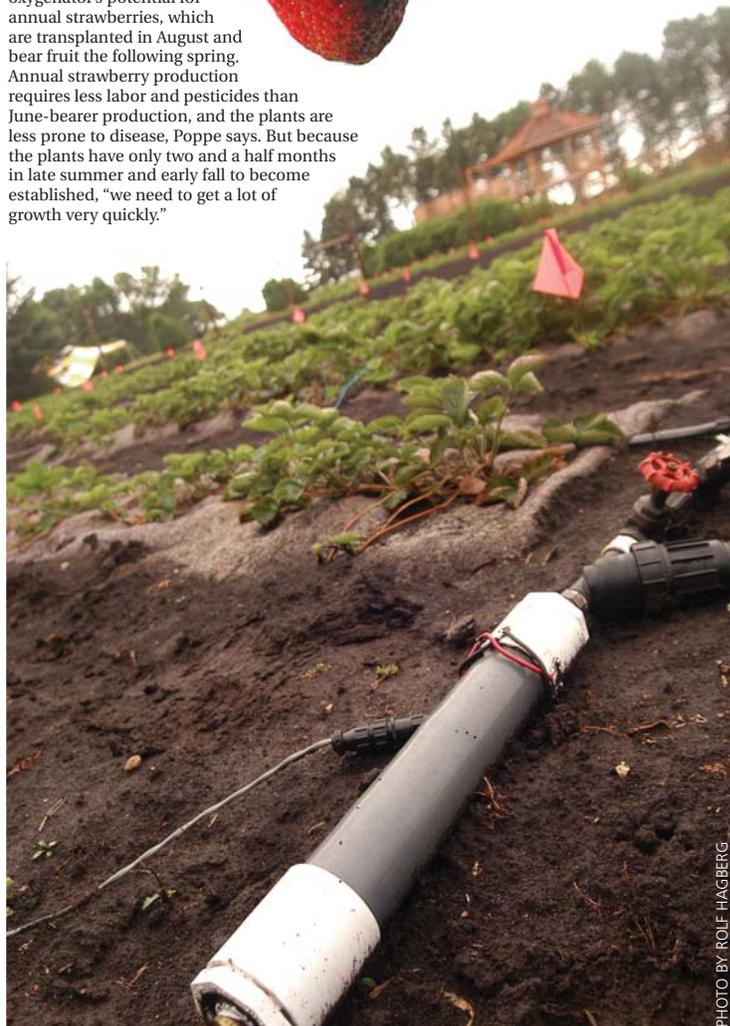


PHOTO BY ROLF HAGBERG

An oxygenator, fit into an irrigation pipe, saturates well water with oxygen at University of Minnesota test plots of fall-planted strawberries. AquaInnovations, which makes oxygenators for the sport-fishing industry, first tried the system on tomato plants and found it produced robust growth with high fruit yield.

Piedmontese

the sculpted breed

Southern Minnesota farmers are marketing lean, tender beef products from an Italian breed with extraordinary muscles.



BY CINDY GREEN

Like mascots for Lifetime Fitness, lean and ripped, the Piedmontese swagger passively about the farmyard. These are no ordinary beef cattle. The heavily-muscled breed, from the Alpine regions of Northern Italy, yields tender, lean beef with little fat or bone waste.

Randy Brandt has been raising Piedmontese on his farm south of Marshall, Minn. since 1994. In 2001, he started marketing beef sticks to a handful of stores. Now, with his new wife Donna, he is managing three companies to produce and market a variety of Piedmontese-cross beef products.

The R&P three

The Brandts production company, R&P Piedmontese Cattle Company LLC, is seeking

ranchers to raise Piedmontese half-breeds. Farmers can cross any cow with a full-blood Piedmontese bull to produce calves that can be labeled Piedmontese.

Randy is encouraging dairy farmers to use the bottom third of their herds: "They don't want their genetics, and they can breed them with Pies." R&P will pay "20 cents above market price," for feeder and finished cattle," Randy says. "It will give farmers the incentive to breed more."

The second company, R&P Gourmet Food Processing, Inc. manages product development and packaging. R&P contracts with several processing plants to make and package their beef sticks, jerky, hot dogs, brats, steak cuts and burgers. Currently, it is seeking investors to finance an on-farm facility. "We really want our own plant

because then we have quality control," Donna says.

Finally, R&P Gourmet Beef, Inc., the marketing company, distributes R&P products to almost 150 convenience and farm-supply stores in Minnesota, North Dakota, South Dakota, Montana, Nebraska, Colorado, Tennessee and Kentucky. The company is in negotiations with several major grocers to market steak cuts and burgers, and it sells a full line of products online.

The Piedmontese advantage

Nationwide, there are only about 400 Piedmontese breeders; Minnesota has about a dozen. The Brandts are the only Piedmontese ranchers in the state who produce and sell value-added products. But

the Piedmontese, which have only been in the United States for about 20 years, are just being discovered by American consumers who want lean but tender meat.

Full-bred Piedmontese, unlike British breeds such as Angus and Charolais, have few fat cells. On a hanging carcass, there is no layer of fat covering the red, sculpted, double-muscle meat.

Calves from dairy or beef cows bred with full-blood Piedmontese bulls have a little more fat. But a Pied-cross sirloin steak has less cholesterol and about half the fat of skinless chicken. Although Pies are the same size as average beef cattle, they weigh more because muscle is heavier than fat. And their bones are smaller and denser.

To show the difference, Randy holds up an R&P Gourmet T-bone the size of a large dinner plate — about twice the size of the same Angus cut. Only a thin bone separates the tenderloin from the New York strip sections of the T-bone.

With so little marbeling, is it tough? Actually, "it's more tender than other beef," Randy says, and cooks in half the time. He explains that the Pied's hyper-trophy muscles yield a fine-textured, naturally-tender meat.

A cook-out proves his point — steaks grilled only a few minutes on each side are juicy, tender and flavorful. He recommends also trying the ribs, which are "twice as meaty and not fatty like other ribs."

However, R&P is up against USDA grading standards that equate fat marbeling with quality. Prime is recognized as the top grade, but it's also the highest in fat; choice is next. R&P receives only the "standard" grade on steaks because they have little fat. "But talk to your heart specialists and they'll say... lower fat... lower cholesterol," Randy says.

Little lost to fat

Full-blood Pies have coats of hollow hair that insulate them for Minnesota winters. "And they have sweat glands, so they don't pant in hot weather," Randy says.

With lightweight skin and small bones,

even the half-bloods leave little processing waste. Slaughtered at 12 to 14 months old, a 1,100 pound Pied will yield up to 800 pounds of meat. "In the industry, 60 to 63 percent usable is considered good," Donna says. "We get at least 70 percent." Cows top out at 2,000 pounds and bulls at 2,800.

Production costs can be higher, "but the difference is minimal if you adapt feed rations to the breed," Randy says. Because Pied crosses don't have as many fat cells as Anglican breeds, feeding them corn to fatten them up "can be a waste of money," Randy says. Instead, they need high-protein feeds such as alfalfa and beet pulp.

R&P raises its animals on natural feed without hormones or antibiotics. The hot dogs and brats contain no added nitrates or phosphates. All-natural Piedmontese beef is somewhat higher priced than Angus. Tenderloins are \$23 per pound; T-bones are about \$14. Wieners, brats and hamburgers are about \$5 per pound. But little is lost in cooking.

For example, Donna says that for a fundraiser she prepared sloppy joe's with R&P ground beef alongside regular ground beef to compare. "Out of the 50 pounds of regular beef, we lost 30 pounds of fat and liquid and were left with 20 pounds. From the 50 pounds of (R&P) beef, we only lost 10 pounds and ended up with 40 pounds," Donna says. She put the drained liquid in buckets and refrigerated it. "The top four inches (of regular beef drippings) was fat. With the Pied drippings, fat barely skimmed the top ... it's great in soups or as au jus."

Arriving from Italy

The breed can be traced back 25,000 years to Italy's Piemonte region. (see accompanying story, "History of the Piedmontese") They didn't arrive in the United States until 1984. By 1994, there were 300 breeders and almost 12,000 registered Piedmontese in the country.

That's when Randy discovered Pieds. He owned a 250-acre farm and had been in and out of dairy farming since he was 19 years old. In 1992, he decided to discontinue his 100-head dairy herd operation.

"I told an old classmate who works for the DNR that I wanted to get back into raising cows that had a future. He told me he had just planted trees at a neighbor's who was into raising Pieds and said 'I really like the look of these cows; they've been raising them for seven years.' I went out and looked at the cattle the next day."

Impressed with the muscular, docile animals, "I plunged in and bought one heifer — back then they cost 300 percent more than other cows." The next year, his heifer won Reserve Grand Champion at the National Western Stock Show in Denver, Co.

He started crossing dairy cows with a Piedmontese bull, then experimented with other British crosses such as Guernseys, Jerseys, Charolais and Herefords. He analyzed growth rates, yields, leanness and tenderness. His steaks tested favorably for fat and



Donna and Randy Brandt display lean, tender cuts of steak from their Piedmontese-cross beef, sold under the R&P Gourmet Beef label.

On the cover: Brandt's daughter, Jacqueline, with a Piedmontese-cross calf.

cholesterol and he decided to invest more in what he deemed the "beef of the future."

Randy started selling steaks direct to friends and through farmers markets but realized he had to find a market for the trim. So in 2001, he contracted with a processor to make pepperoni meat sticks from his beef, blended with pork, which he marketed to local stores.

Knocking on AURI's door

Later that year, Randy decided he wanted a new all-beef recipe and more products and approached AURI's meat lab in Marshall. Former AURI meat scientist Brian Reuter experimented with various spices and natural smoke and designed Smoky Meat Sticks, which quickly became popular with R&P's customers.

Randy peddled his sticks at southern Minnesota venues, including Sponsel's Minnesota Harvest Apple Orchard in Jordan. There he met Donna, the orchard's operations manager and head chef. But Donna had little time for schmoozing during the harvest season, when the restaurant served 150,000 people in 10 weeks.

A month later, during his Sponsel stop, Donna asked if he could make brats with the orchard's home-pressed all natural apple cider. With AURI's help, he delivered. The next spring, she asked for bacon burgers. "That's what did it for me," Donna says. "On a Sunday, when we were closed, he brought a sample to my house. I had always been too busy to talk with him before."

She was impressed with the bacon burgers — and Randy. "We started dating a year ago last April, and we married in August (2003)."

In the meantime, Reuter continued to help Randy design more products at AURI's meat lab, including a fine-textured, tender, intensely flavorful pepper jerky that went on the market in January.

This spring, AURI helped Brandt develop hot dogs and brats for retail and tested all the

products for protein, fat and carbs.

"AURI has done so much for us," Randy says. "They have helped with product development, moisture testing, cooking time — everything. We know once it's developed by them, it's done right. And we get product consistency."

Meat cuts

Donna matched Randy's production experience with retail expertise, helping move R&P into the more lucrative steak market. "I knew we needed uniform packaging, and standard cuts that are individually frozen."

Now R&P is negotiating with several major grocery chains to market Piedmontese steaks. "We built a trim market first," with jerky and sausages, Donna says. "We have been stockpiling steaks," so there will be enough to meet market demands. Often, small meat processors have the reverse problem — they can easily market steaks, then have to figure out what to do with leftover trim.

With more interest in high-protein, low-fat, low-carb foods, the Brandts are expecting rapid growth, Donna says.

They intend to design pre-seasoned, microwavable steaks and are adding complementary products, such as steak seasoning. "We would like to develop 15 more products," Randy says, and they want to build an on-farm retail store.

However, "we've been trying to do it all ourselves," and R&P will need employees in production and marketing, and more farmers raising Piedmontese crosses to meet demand.

Donna says if their plans go as expected, "we'll do \$500,000 in sales this year, then one million next year, two to three (million) after that ... and it will just keep growing." ■

For more information on R&P Gourmet Beef or to order online, visit www.rpngourmetbeef.com

From Pakistan to Italy to the U.S.

History of the Piedmontese

Piedmontese cattle evolved in the Alpine regions of Italy known as the Piemonte, or "foot of the mountain," some 25,000 years ago. Brahman cattle from Pakistan migrated to the region and stayed, as they couldn't cross the Alps. They intermingled with native Auerochs, resulting in a grey-white breed with black pigmentation that became recognized as Piedmontese in the 1800s. They were raised as much for their rich milk, used for specialty cheeses, as their beef.

In 1886, the Italian Herdbook noted the appearance of "double muscling" in the cattle. More than 100 years later, it was discovered that the Myostatin gene was the reason for the bulging muscles.

Myostatin occurs naturally in all mammals and restricts muscle growth. However, the gene naturally mutated over centuries and became inactive. Without the "growth governor" to restrict muscle development, the Piedmontese developed on average 14 percent more muscle mass than cattle with functional myostatin.

The Myostatin blockade effect not only allows for more beef per carcass, it "also dramatically improves the beef tenderness, leanness and healthfulness," according to the North American Piedmontese Cattle Association Web site.

North America's first Italian Piedmontese arrived in Canada in the fall of 1979: one bull named Brindisi, and 4 females: Banana, Biba, Bisca and Binda. The next year, five more bulls arrived: Captain, Champ, Corallo, Camino and Domingo. In the early 1980s, three more sires: Instinto, Imbuto and Iose and two females: India and Gazza were imported into the United States. From this genetic base, the breed was launched and Canada and the United States formed breeder associations. Today, there are about 400 Piedmontese breeders in the United States.

Source: North American Piedmontese Cattle Association Web site: www.piedmontese-napa.com ■



Elsewhere in ag utilization

BY DAN LEMKE
CARTOONS © UNCLE HYGGLY / POUNCE.COM

Editors note: As a service to our readers, we provide news about the work of others in the ag utilization arena. Often, research done elsewhere complements AURI's work. Please note that ARS is the USDA's research arm.

Bond, bacteria, bond

The tiny, gut-dwelling bacteria that break down fiber in cows and other herbivores' diets could one day find their way into furniture and other wood products.

An ARS scientist has discovered that the sticky outer coating these microbes secrete is an ideal base for a wood "glue."

Through fermentation, the adhesive residue becomes strong enough to bind wood products such as plywood and particleboard. The biologically-based glue can withstand moisture and may replace up to 45 percent of traditional adhesives in some wood products.

One source of the bacterial residues is ethanol production.

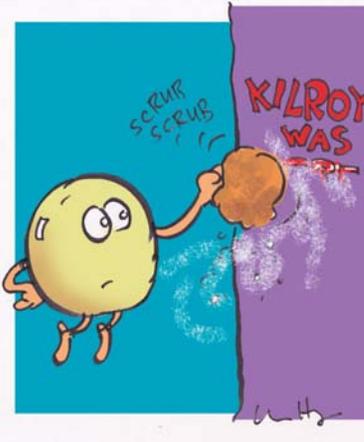
Source: USDA-ARS, July 20, 2004

Soy wipes up

Cleaning up graffiti just got a whole lot easier with a new soybean-based wipe. Soy Technologies has developed SoyGreen® Graffiti Wipes, a towlette that removes everything from lipstick to paint.

The one-sided wipes have an abrasive texture and are saturated with methyl soyate. The moderately-strong solvent is environmentally safe and the wipes are non-toxic, biodegradable and non-flammable. They may replace petroleum-based mineral spirits that are widely used in graffiti clean-up.

Source: Biobased Solutions, July 2004



Video veggies

Some elementary school students are eating more fruits and veggies because of a new computer game.

Behavioral nutrition scientists at the Children's Nutrition Research Center in Houston, Texas designed the "Squire's Quest." The game features "Kingdom of 5a lot," which is invaded by snakes and moles attempting to destroy fruit and vegetable crops. The king and queen enlist the help of student "squires" who face challenges related to drinking more juices and eating more fruits and vegetables. The squires gain points by preparing recipes in a virtual kitchen using healthy foods.

Tested on more than 1,500 fourth-graders in Houston, the computer game resulted in a one-serving-per-day increase in fruit and vegetable consumption in only five weeks.

Source: USDA-ARS, August 6, 2004

A meaty alternative

Flavor- and texture-challenged vegetarian-protein entrees have not been favored by many fine-restaurant chefs. However, a Canadian company has developed a meat alternative that it claims feels and tastes like meat.

The high-moisture, vegetable-protein "Gardein" is being received enthusiastically by several restaurants, including Rubina Grill and Tamarind in Vancouver, Canada. The veggie protein is not billed as a meat substitute on the menu, but presented on its own merits. Chef Shafeen Jamal of Rubina says the new protein is a "giant leap" for vegetarian cuisine.

Source: Soyatech, July 1, 2004

Saved by the wild spud

The wild Mexican cousins of U.S. domestic potatoes may save America's favorite veggie from its worst enemy — late blight.

ARS scientists have found a gene from the wild spud helps shrug off attacks by microbes that cause late-blight disease. Through breeding, researchers were able to identify the gene that resists the blight. The resistance gene can be hybridized with the domesticated tubers to produce potatoes less likely to be affected by the disease.

Source: USDA-ARS, August 9, 2004



Biodegradable telly

It wraps around your wrist, is waterproof, lets you make phone calls and access the internet. Best of all, it's biodegradable. Called the Tag, this flexible phone is almost market ready after years of research by NEC Designs of Tokyo. Tag is made with a biodegradable polymer that breaks down to organic matter once the phone is discarded.

Source: Sydney (Australia) Morning Herald, July 27, 2004

Hola biodiesel

Renewable-fuel production is not just a Midwestern pursuit. Two biodiesel plants are being planned in Puerto Rico that would use recycled cooking oil and grease as feedstocks. One facility is designed to produce 15 million gallons per year; the other will generate 4 to 6 million gallons.

The engineering firms designing the two plants say the island nation doesn't produce enough cooking oil to support the biodiesel capacity, so the companies will likely need to purchase raw commodities from mainland U.S. sources.

Source: Soyatech.com, August 17, 2004

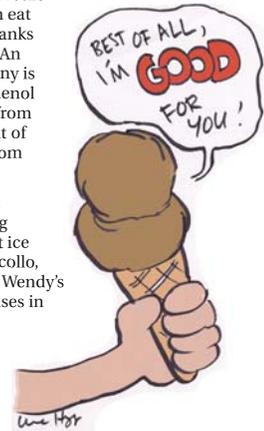
Double scoop of antioxidants

Ice cream connoisseurs "down under" can eat to their health, thanks to grape extracts. An Australian company is marketing polyphenol extracts, derived from the seeds and fruit of grapes left over from winemaking.

The nutraceutical ingredient is being added to a low-fat ice cream called Chocollo, sold at nearly 300 Wendy's Ice Cream franchises in Australia.

Polyphenols have antioxidant characteristics that have been shown to aid in heart health, cancer prevention and act as anti-inflammatory agents.

Source: Foodnavigator.com, July 26, 2004



Low-carb soy

Two snack food makers have developed products to help their companies rebound from losses because of consumers' growing appetites for low-carbohydrate foods. UTZ Quality Foods and Snyder's of Hanover have created soy-based products such as Soy-Teins and Carb-Fix Pretzel Sticks that meet Aktins and South Beach diet requirements.

Both companies felt a sales bite when consumers started shunning carbo-laden snacks such as potato chips and pretzels. Both UTZ and Snyder's plan to keep their traditional snack line in addition to the soy-based, low-carb line.

Source: York Daily Record, August 10, 2004

New appeal for feather meal

BY DAN LEMKE

Redwood Falls, Minn. — Feathers and glycerin — byproducts of livestock rendering and biofuel productions — may be an ideal match for cattle diets.

FUMPA Biofuels, a division of Farmers Union Marketing and Processing Association, has patented a process for blending feather meal and glycerin into an ingredient for cattle feed rations. AURI's coproduct utilization lab in Waseca designed a method for making pellets from the mixture.

FUMPA will use glycerin from its soon-to-be operational biodiesel production facility in Redwood Falls — and hydrolyzed feather meal from another FUMPA division in Redwood Falls: Central Bi-Products rendering plant.

"We'll be taking two byproduct streams and making them both more valuable," says Chuck Neece, FUMPA Biofuels research and development director.

Hydrolyzed feather meal has relatively low density, so shipping it long distances as a feed product is not economical. But blended with glycerin in pellet form, the meal becomes available for new market. Glycerin, chemically classified as an alcohol, is a byproduct of the trans-esterification process used to make biodiesel and is often found in soap and beauty products.

"Adding glycerin increases the energy value and density of the product," says Al Doering, AURI technical services specialist, "which makes which makes it more economical to transport ... and an attractive ingredient for livestock feed."

The blending "improves the overall nutritional profile of the product," Neece says. "It mixes well with other ingredients, is easy to use and flows easily."

The meal will be distributed to livestock feed manufacturers and used

primarily for beef and dairy rations.

While feed companies are interested, Food and Drug Administration rules are slowing the blended ingredient's move to commercialization.

However, Neece expects feather meal pellets will receive a warm reception. Cattle feed "is a very nice market for this product," Neece says. "It could even assist (feed) processors in reaching export markets." ■



PHOTO BY DAN LEMKE

Ag on the Web: bioenergy

BY DAN LEMKE

Bioenergy generates more calls and inquiries to AURI than any other topic. Whether it is biodiesel, biomass or anaerobic digesters, renewable ag-based energy questions abound. For energy-related information on the Internet, check out AURI's Web site: www.auri.org and our Center for Producer-Owned Energy site: www.mncpoe.org

We have found many other excellent sites from around the country. Here's a quick spin around the bioenergy block that should help answer nearly every energy-related question.

U.S. Department of Energy, Energy Efficiency and Renewable Energy

www.eere.energy.gov

This is a clearinghouse of information on just about every renewable energy form, including biomass, fuel-cell technologies and solar energy. The site also includes energy-efficiency information.

National Renewable Energy Laboratory

www.nrel.gov

A national laboratory of the U.S. Department of Energy, NREL develops renewable-energy and energy-efficiency technologies and practices, advances related science and engineering, and transfers knowledge and innovations to address the nation's energy and environmental goals. Everything from geothermal and solar energy to biomass and hydrogen fuel cells is addressed.

AgSTAR

www.epa.gov/outreach/agstar

Anaerobic digesters use bacteria to break down solids such as manure and give off methane gas. The gas can be collected and used to generate heat or electricity. But is the technology right for you? This site provides you with digester information, tools, resources, workshop schedules and a list of experts to contact if the site leaves any question unanswered. AgSTAR is operated jointly by the EPA and DOE.

American Coalition for Ethanol

www.ethanol.org

All things ethanol can be found at the American Coalition for Ethanol's Web site. It includes the basics in "Ethanol 101" as well as more specific news about new and alternative uses for ethanol — and coproducts such as distillers grains and carbon dioxide. More than 3 billion gallons of ethanol are expected to be used by U.S. consumers in 2004. Those who need to be convinced that ethanol is a widely accepted fuel should visit the ACE site.

National Biodiesel Board

www.nbb.org

Like ethanol, its more established counterpart, the U.S. biodiesel industry is building momentum. However, some are still skeptical about the renewable fuel. The National Biodiesel Board's comprehensive Web site explains what biodiesel is and how it benefits farmers, the environment and people who use the fuel for personal or professional purposes.

Bridging plants and trees

A consortium is investigating ag fibers' potential to help alleviate the high demand for wood



PHOTO BY DAN LEMKE

Ag fibers are being tested as possible alternatives to wood used to make paper, oriented strand board and other products. Left to right: alfalfa, corn stover, wild rice hulls and beet pulps.

BY DAN LEMKE

Cheap wood stumps are history.

In 1985, aspen stumpage sold for about \$2 a cord. Today it sells for about \$55 and can go as high as \$95 per cord, says Dentley Haugesag, forestry products expert for the Minnesota Department of Employment and Economic Development. "That's a big change in 20 years."

It's simple economics: the demand for wood fiber has gone up; the supply has gone down.

That may not be good news for manufacturers, but it could be for agriculture. At least that's the hope of the Minnesota Biofibers Consortium, a group of 40 researchers, industry experts and companies joined to investigate ag fiber as a wood-fiber alternative. AURI is a consortium member.

"We'll be looking at beet pulp, corn stover,

wheat and barley straw, those types of fibers," says Michael Sparby, AURI project director. "Even mixing a small percentage of ag products into the fiber stream would have a huge impact. AURI is looking at it as additional income for producers."

Paper-thin supplies

Minnesota forests and tree plantations supply the state's paper and lumber industries with millions of tons of wood each year. But pulp, dimensional lumber and oriented strand board are stretching the state's wood supply paper-thin.

The high-demand, high-price trend has been developing over the past two decades.

Haugesag says Minnesota's pulp and lumber industry consumes about 5 million cords of wood each year. Replacing 10 to 15 percent

with ag-fiber pulp would require as much as 200,000 dry tons of biomass.

Uniting farm and forest

The consortium will be challenged by wood fiber users' varying needs. For example, a paper-pulping plant has different raw-material specifications than an oriented-strand-board manufacturer. Part of the Biofiber Consortium's goal is to develop a catalog of ag-fiber information useful to various wood industry segments.

Haugesag says the group, formed earlier this year, is identifying potential ag-fiber opportunities that will require more specific research. The University of Minnesota Department of Biobased Products will conduct any required testing, while AURI will connect producers with emerging technologies and opportunities.

"We're trying to build a bridge between agriculture and the forestry industry," adds Haugesag. "We're not looking to replace wood, but if we can account for 10 to 15 percent of the fiber needs with ag biomass, it would help cut demand and possibly lower prices."

Economic test

The bottom line will determine whether wood and paper industries take a serious look.

"Economics will have to drive this or nothing will happen," Haugesag admits.

"But if some ag products can be used as a substitute, it may lower the cost of wood and give some of these plants room to maneuver." ■