



Alternative, renewable energy: A long-running role for the Leopold Center

By JERI NEAL *Ecology Initiative leader*

Concerns about the impact of climate change, a turbulent economy and dwindling supplies of fossil fuels all have played a role in making alternative and renewable energy a hot issue in the United States and abroad. Iowa State's College of Agriculture and Life Sciences (CALS) recently dedicated new facilities and an adjoining 1,000 acres as part of a BioCentury Research Farm to meet an expected growth in research and development of biomass for energy.

At the Leopold Center, however, research on energy use in agriculture has been a priority since day one. We have invested significant resources in this area since our inception in 1987. Some of our earliest work was in alternative cropping

systems that could be converted for use as energy.

Our vision is one of improved linkages between agriculture (humans), energy, economy and the environment. We have looked at specific questions about the impacts of our nutrient management, crop and animal management systems. Most recently we've turned attention toward biobased systems and the question of what these investments mean for our natural resources and our communities. To do this, we are supporting work in life cycle analysis, energy use in multi-year cropping systems, and performance of perennial/annual mixes for a carbon-competitive future.

ENERGY (cont. on page 8)

Fairfield dairy couple to receive Spencer Award

The owners of a Jefferson County organic dairy farm and on-farm processing plant are the 2009 recipients of the annual Spencer Award for Sustainable Agriculture. Francis and Susan Thicke, who own and operate Radiance Dairy near Fairfield, will receive the honor December 5 at the 2009 Iowa Organic Conference in Ames.

The Thicques manage 236 acres where 60 paddocks are used to feed their herd of 80 Jersey milk cows. The herd is rotationally grazed, moving to a new paddock twice daily. In their on-farm processing plant, they produce skim, lowfat and whole milk, as well as yogurt and cheese, all of which is sold locally.

Until they bought the farm in 1996, the land was used for corn and soybean

production. They have installed a solar-powered system to supply water from a pond to each paddock. The pond also has a geothermally-heated water tank for use in the winter.

The Thicques will be the sixth recipients of the Spencer Award, established in 2002 to honor farmers, educators or researchers who have made a significant contribution toward the stability of mainstream family farms in the state. The award includes a \$1,000 stipend and is one of Iowa's largest awards in sustainable agriculture.

Elisabet Humble, local foods coordinator

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LEOPOLD CENTER

LEOPOLD LETTER MISSION

The mission of the *Leopold Letter* is to inform diverse audiences about Leopold Center programs and activities; to encourage increased interest in and use of sustainable farming practices and market opportunities for sustainable products; and to stimulate public discussion about sustainable agriculture in Iowa and the nation.

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The Leopold Center for Sustainable Agriculture seeks to identify and reduce adverse socioeconomic and environmental impacts of farming practices, develop profitable farming systems that conserve natural resources, and create educational programs with the ISU Extension Service. It was founded by the 1987 Iowa Groundwater Protection Act. The *Leopold Letter* is available free from the Leopold Center at 209 Curtiss Hall, Iowa State University, Ames, Iowa 50011-1050; (515) 294-3711.



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Four finalists named in Center director search

Four finalists were named in the search for a new Leopold Center director. They are Heather Karsten, associate professor of crop and soil sciences at Pennsylvania State University; Frank Louws, professor of plant pathology at North Carolina State University; Ricardo Salvador, a program director in the Food, Health and Wellbeing program of the W.K. Kellogg Foundation; and David Wedin, professor of plant and ecosystem ecology at the University of Nebraska-Lincoln.

Each candidate visited campus for a

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Watch seminars presented by each candidate:
www.leopold.iastate.edu/candidates.html

two-day interview that included a public seminar and meetings with various stakeholders. The search committee has representatives from ISU as well as the Leopold Center's advisory board, which will recommend not more than three candidates to Iowa State President Gregory Geoffroy for appointment.

News & Notes

Iowa Farmer's Union presented its 2009 Friend of the Farmer Education Award to Leopold Center Director Jerry DeWitt during their annual state convention August 28-29 in Marshalltown. The award acknowledges DeWitt's outstanding contribution of working with farmers to solve problems and move toward a sustainable agriculture.

The technology that filters nitrates in runoff coming from Iowa's tile-drained crop fields might help improve water quality in Hungary. At least that's what an associate professor at the University of Pannonia hopes will happen. He recently contacted Alok Bhandari, ISU agricultural biosystems and engineering, who leads research funded by the Leopold Center Ecology Initiative on the design and effectiveness of denitrifying bioreactors. The Hungarian scientist wants to see whether bioreactors could prevent nitrate leaching

into one of his country's largest freshwater lakes from the site of a new golf course under construction.

The Leopold Center's FY2008 annual report, *Water*, received a top award among all annual reports entered in an annual competition conducted by the National Agricultural Alumni and Development Association (NAADA). Leopold Center Outreach and Policy Coordinator Mary Adams wrote and edited the report; Juls Design of Ankeny did the layout and design for the annual report.

The Leopold Center's quarterly newsletter also was recognized by the Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences. The newsletter received a third-place award in the newsletter category of the group's annual Critique & Awards program.

PASSIONATE SUPPORTERS OF SUSTAINABILITY

SPENCER (continued from page 1)

for Hometown Harvest of Southeast Iowa, nominated the Thickes for the award, noting that their farm has been the site of many tours. "The knowledge Francis brings to visitors on his farm helps them

understand the importance of sustainable agriculture and how it works with ecology," Humble said. "I consider him one of the greater assets to our community ... very passionate in his efforts to create sustainability in our food systems."

"The story of food, farming and fossil fuels is very terrifying ...but the story does not need to have an unhappy ending."

— Peak-oil author Richard Heinberg in his September 24 lecture at ISU. Listen to it at: www.lectures.iastate.edu/lecture/19156

q&a

A conversation with Director Jerry DeWitt

Q. How does the Leopold Center remain relevant to Iowa agriculture?



Iowa agriculture in 2009 is far different from what it was some two decades ago when the Leopold Center was created by the Iowa Groundwater Protection Act. When the Leopold Center opened its doors for business in 1988, Iowa agriculture was represented by the “Big Four” – corn, soybeans, cattle and hogs. These are still the mainstays of Iowa farming, but with many adjustments in production, technology and practice.

Our farms are larger, our farmers fewer. Our cattle numbers have declined, and we do not have as many pork producers. We have invested in precision technology and GMOs permeate production agriculture. Our machinery gets bigger and so do our fields when fence posts and fence rows are pulled out.

But we still watch the soil move from our fields and into our waterways, lakes and rivers, creating hypoxic zone problems thousands of miles away. Many farm families struggle with their anguish over the loss of sons and daughters who grow up and do not return to the farm to supply another generation on the land.



The mandate for the Leopold Center 22 years ago was to identify and study those agricultural practices that degrade Iowa’s natural resources and impair profitability of its farm families. We also were charged to find practical alternatives that can retain profit and protect the state’s soil and water.

So, why am I asking the question about the relevance of the Leopold Center today? These comments are my response after I became aware of an opinion expressed recently by members of an Iowa farm organization. The observation was that “the Leopold Center is irrelevant.”

This statement certainly caught my attention! And I began to ponder our role, our progress in helping farmers and what we have learned after investing nearly \$18 million in more than 420 competitive grant-funded research projects.

For more than 20 years we have looked at Iowa agriculture and asked: What can we do? What changes are possible? How can we make a difference? What have Iowa farmers gained from our work?

A few relevant observations

It only takes a visit to our Web site, a review of our publications, or a trip to a field day by one of our partners to discover that the work of the Leopold Center is very, very relevant to Iowa agriculture. I offer the following observations:

- The landscape has changed, thanks to research and demonstrations showing riparian areas and strategically-placed buffers strips around corn and soybean fields. Our research confirms that Iowa farmers can dramatically reduce nitrate and soil loss in fields while still growing corn and soybeans.
- Iowa pork producers can compete financially by finishing pork in low-cost hoop structures. More than 5 percent of Iowa pork is produced in alternative systems, and Iowa has more than 2,500 hoop structures, thanks to Leopold Center studies and demonstrations.
- One of the current research projects that we are funding discusses ways to tie up residual amounts of atrazine to

prevent it or its metabolites from migrating out of crop fields into the state’s waterways.

- Another funded research project has provided new insight: cattle grazing in or around streams spend less than 2 percent of their time in the water. We now know that harmful bacterial contamination of the water from cattle wading in the stream is not a major factor affecting water quality.
- We are funding work to evaluate and improve the design of biofilters at the end of tile lines in corn and soybean fields. These simple structures can remove nitrates from tile drainage water before it leaves the field and enters surface waters and streams.
- We also see the need to help young families enter dairying. We have been supporting work in northeast and southeast Iowa to retrofit confinement facilities for grass-based dairy operations, and promote other strategies for profitability.
- Years of research early in our history demonstrated that nitrogen use can be reduced by using the late-spring soil test and more efficient application methods.

Relevance in Center goals

These are just a few ideas that come to my mind when I am asked, “Is the Leopold Center still relevant to Iowa agriculture?”

My response to my good friends in conventional agriculture in Iowa is this: We at the Leopold Center passionately work to reduce nitrogen loading in our water, to save soil, to place young families (your sons and daughters) on the land, to lessen the hypoxic zone, to help return profit to the farm, to embrace new technologies that enhance sustainability, and to honor and build a resilient Iowa agriculture.

Those goals seem mighty relevant to farming in 2009. Do you really know the Center and what it does? Tell me how we can be more relevant. I will listen.

Project seeks winning combo for DDGs, grazing operations

By MARY SWALLA HOLMES *Special to the Leopold Letter*

To some, it's a simple formula. As demand from the biofuels industry increases the demand for corn, corn acres go up and pasture acres go down.

For individual farmers, it's a more complicated equation. They always are looking for ways to maximize the economic potential of their farming operations while retaining the long-term sustainability of their land. So Ron Dunphy, who grazes beef cows on 600 acres in Union County, was happy to participate in on-farm trials that supplemented his pasture-fed cattle with dried distiller's grains (DDGs).

"As it happened, that year we'd had lots of rain and the pasture was in great condition. We had two groups of cows, one that was supplemented with cubes of DDGs and one group that was only on pasture. In the end, there was no difference in scores for condition or the number of pregnancies for the two groups. In that particular year, under those conditions, supplementing added costs and did not improve pasture conditions," said Dunphy. "But this year, it has been very dry here, and the pasture is short, so in these conditions, it would make sense to supplement with DDGs."

Dunphy went on to say that the form and cost of the DDGs makes a big difference. "A cubed product such as I used in the on-farm trial was easy to use. I picked it up at the local elevator weekly and delivered it to the cows daily. But if it is in the bulk form, which is finely ground and dry, it is difficult to handle and the costs in labor add up quickly. You also have more loss in the pasture, due to wind and trampling."

Dan Loy of the Iowa Beef Center and ISU Extension beef specialist Joe Sellers led the three-year research project funded by the Leopold Center Ecology Initiative. They explained that through the course of the study, the availability, packaging and cost of DDGs changed quite a bit.

Many products tested

"We were able to evaluate several different types of products," Sellers said. "When we first started the research, cubes were available, but they didn't hold together well because the oil content was too high. By the second year, the cubes had gone up in price and the only cost-effective product was the dry DDG meal. This form was difficult to work with in a pasture situation. It works fine in feedlots with bunkers, and

was getting a lot of use there, but we were interested in supplementing cows on pasture.

"Then, some of the new generation ethanol plants began using 'fractionation', which means that they pull out the oil content of the corn seed, as well as the starch. Once the oil is gone, then the DDGs can be pelleted and cubed in a cost-effective manner, so we used that product for the last year of the study," he said.

Research leads to new materials

A new summary of the research details the three on-farm demonstrations that evaluated systems of feeding and delivering DDGs to beef cows in pasture and in corn stalk grazing situations. Researcher Loy noted other factors for producers to consider.

"These demonstrations show the feasibility, palatability and practicality of using co-products to provide additional nutrients to beef cows in grazing-based production systems," he said. "Of course, every production system is different, and each producer needs to assess their pasture situation and weigh the costs of labor and fuel, along with the form and cost of the DDGs. Distance from an ethanol plant can be a factor, too. Inclement weather can be a limitation in getting it to the field or pasture."

In addition, two stocker grazing trials at the ISU McNay research farm evaluated the level of supplementation on pasture substitution and stocking rates. These studies established that levels of supplementation must be greater than .5 percent of bodyweight in order to reduce pasture consumption. At lower supplementation rates, cows simply increased their overall intake, increasing nutrient consumption and gaining extra condition, but consuming pasture at their normal rate.

"At the lower supplementation rates, the cows just consumed additional calories, and there was no improvement to the condition of the pasture, so that was neither a financial nor an environmental gain in that case," explained Sellers. "It makes the most sense when pasture is limited, either in acres or because of condition."

He warned that many

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New Iowa Beef Center publications:
Supplementing Distillers' Grains to Beef Cattle Grazing on Pasture

Grazing Corn Residue: Using Resources and Reducing Costs
www.iowabeefcenter.org
[search by title]

pastures this year have had trouble with fescue toxicosis. "Fescue can become infected with an endophytic fungus *Acremonium coenophialium*, which in turn affects the palatability and the rate of gain for the cows," he said. "In a pasture with infected fescue, supplementing with DDGs this fall would help a lot to dilute the effects of the toxins and improve the rate of gain."

As the biofuels industry continues to grow in Iowa, availability of DDGs likely will increase and prices decrease. This new research will provide a useful tool for farmers with cows on pasture or grazing cornstalks as they weigh the benefits and costs of supplementing with DDGs.



Results were shared at several field days.



The supplemental DDGs worked well on Henry Langstradt's farm when his pastures were in poor condition.



Future

TOWARD A SUSTAINABLE Can we afford the future?

...we actually have the technology today to enable a 75 percent reduction in energy and (some) material consumption (e.g. Weizacker et al. 1997) while improving quality of life in the first world and increasing general well-being in the developing countries. Remember, too, that, on average, people in wealthy countries were actually happier with half and less of today's average per capita income.

— Ecological footprint developer William E. Rees

In a recently published book, *Can We Afford the Future? The Economics of a Warming World*, economist Frank Ackerman makes a compelling case for rethinking how we respond to one of the most important challenges in the history of the human species – climate change.

Ackerman argues that using traditional cost-benefit analysis to determine our response to climate change is like using it to determine whether or not we should buy fire insurance for our homes. He points out that the number of residential fires in the United States is about 0.4 percent of the number of housing units. “Why don’t these statistics inspire you to cancel your fire insurance?” It’s because we want to insure ourselves against worst-case scenarios. Ackerman argues that we must take a similar approach to climate change.

As with home fires, there are many uncertainties involved in climate change. Climatologists seem quite certain that we will experience much more unstable climates and eventually a radically changed global climate, which will make life very challenging for humans on the planet. But there is no way to predict exactly what kinds of changes will take place in any particular ecosystem or during a specific time frame – Earth’s systems are simply too complex to make such predictions.

Following the fire example, Ackerman says it is in our own best interest to approach the problem from a worst-case scenario and purchase insurance to protect ourselves from climate change. Plus, we need to make changes now to prevent damage from additional global warming.

In the larger scheme of things, this cost would not be prohibitive. Ackerman estimates that we could curb global warming by spending approximately 1 percent of world output per year for “some decades.”

For example, he calculates that if we exempt people throughout the world who live below the \$9,000 annual income poverty line from paying any premium, and adjust the premiums for the rest of us based on each country’s annual average per capita income, it would cost American citizens about \$800 per year, \$400 in Europe, \$140 in China and \$50 in India. He points out that “the total cost to the U.S., just over \$200 billion per year, is comparable to the annual U.S. military spending for the wars in Iraq and Afghanistan as of 2007.” Seems like a reasonable insurance policy to avert a worst-case disaster.

The potential cost of more hurricanes each year, and/or the melting of the Greenland ice sheet (which could raise sea levels by as much as 23 feet causing most of the world’s coastal cities to be destroyed by flooding), would be much higher than any kind of insurance premium we pay now. That should be reason enough for all of us to buy insurance!

The impact of climate change on agriculture is, of course, complex. Some areas could benefit (at least in the short term) and other impacts are disputed, but climatologists agree that we should expect more unstable climates – more droughts, floods and severe weather events. As every farmer knows, success in agriculture depends on weather more than any other factor. A future with more droughts, floods and severe weather events does not bode well for farmers, especially within our highly specialized monocultural systems that need stable climate conditions. According to the National Academy of Sciences we have enjoyed “abnormally” stable climates for the past century. The Academy argues that those unusually stable climates during the past 60 years played at least as much of a role as our new technologies in achieving increased yields.

We should be skeptical of assurances from seed companies that the development of drought-resistant seeds can solve the problem. As Ohio State University soil scientist Rattan Lal reminds us, drought-resistant seeds cannot extract moisture from soil that has no moisture in it. Consequently, restoring the health of our soils so that they absorb and retain more moisture may well be an important part of the “insurance” we need to take out for our future.

Of course, there are still a few people who assert that climate change is a hoax because we experienced one of the coolest summers on record. Apparently, these people failed to read the weather reports from Oregon, China, Texas and many other parts of the world. In any case as climatologists have consistently reminded us, global warming will not bring us consistently warmer temperatures on the ground. It will increase global atmospheric temperatures while producing more unstable climates throughout the world.

It is encouraging to note that according to a recent survey by the Center for Climate Change at George Mason University, 51 percent of American citizens are either “alarmed” or deeply “concerned” about climate change.

We need to move quickly from alarm and concern to action: take out insurance against worst-case scenarios and make the changes we already know are necessary to “insure” a better world for ourselves, our children and our grandchildren. As Bill Rees reminds us, “Sustainability may yet be within our grasp. Humanity, that wondrous ‘work in progress,’ may yet have an opportunity to pull itself up another rung on the evolutionary ladder.” But time will soon run out for all of us, unless we’re current on our insurance premium.

Leopold Center develops two new local food resources

The Leopold Center's Marketing and Food Systems Initiative has produced two new resources that are designed to answer many questions related to the sales of local foods and where to get support and assistance in this growing area of interest.

Learning About Local: A Resource Guide to Iowa Organizations and Programs Supporting Local and Regional Food Systems is a directory of 64 organizations, programs, funders and consultants that offer various forms of assistance for Iowa producers, processors, food retailers and communities interested in local and regional food systems.

"Iowa has a large, diverse network of organizations, programs, funders and consultants working in the local food arena," said Leopold Center Associate Director Rich Pirog. "This will be the first comprehensive list of those organizations and programs that serve Iowa."

Pirog produced the directory with assistance from Ross Baxter, Drake Agricultural Law Center intern, and Andy Larson, a specialist with Iowa State University Extension's Small Farm Sustainability program.

The second resource answers common questions from people interested in selling at farmers markets in Iowa. *Frequently Asked Questions on Food Regulations for Small Market Food Producers* was compiled with the help of food safety experts and Iowa food regulatory officials.

The report provides answers to 13 common questions about direct sales. All information was reviewed by the Iowa Department of Inspections and Appeals Food and Consumer Safety Bureau and two Iowa State University Extension food safety specialists. The report also lists Web sites where readers can find more information on specific topics.

Pirog said the report does not offer legal advice on Iowa food regulations and food business operations. He advised that any specific questions should be directed to the Department of Inspections and Appeals Food and Consumer Safety Bureau at (515) 281-6538.

The Leopold Center is providing copies of the reports to all regional ISU extension offices and Resource Conservation and Development offices throughout Iowa.

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Learning About Local:
www.leopold.iastate.edu/resources/guide/guide.pdf

Local food sales FAQ:
www.leopold.iastate.edu/resources/foodregs.html



Liebman at research plot near Ames.

Documenting benefits from extended crop rotations

Longer crop rotations could result in fewer weed seeds, according to research recently published in the journal *Weed Research*. The research was supported by a grant from the Leopold Center Ecology Initiative, "Establishment of a field school for weed ecology and management." The project looked at multi-year cropping systems, two of which were low-external-input systems with longer rotations. Principal investigator was agronomist Matt Liebman, Henry A. Wallace Endowed Chair for Sustainable Agriculture.

Watch new "On the Ground with Leopold Center" video:

www.leopold.iastate.edu/research/eco_files/ground/systems.html

Summary of the project on the Leopold Center Web site:

www.leopold.iastate.edu/research/grants/2009-1/E2004-06.pdf

Leopold Center Director Jerry DeWitt talks about the importance of residue at the campaign launch.

On the Web:
residuematters.org



Partnership launches campaign to help farmers save time, money, soil

Residue matters. A new campaign aims to show Iowans why, informing farmers about the importance of what's left over after harvest.

Call it stover, residue, cobs or stalks – crop residue plays an important role in building soil quality, reducing soil erosion, improving water quality, saving time and increasing long-term profitability.



"In these volatile economic times, knowledge is key for crop producers to make the right decisions for both short and long-term profitability," said Bill Northey, Iowa Secretary of Agriculture. "Knowledge about residue's value and its management can help producers make the right choices for their operation."

Northey kicked off the Residue Matters campaign during opening day of the Clay County Fair in Spencer. Twelve public and private partners developed the campaign. Leopold Center Director Jerry DeWitt, who also coordinates the Iowa Learning Farm, serves as co-chair of the campaign representing Iowa State University.

The campaign goal is to increase the acres of conservation tillage in 15 northwest Iowa counties by 25 percent within the next five years. Producers are encouraged to get more information from their local USDA-Natural Resources Conservation Service office, Iowa State University Extension office, or the campaign Web site.

Partners in the campaign include: Ag Partners, Agribusiness Association of Iowa, Conservation Districts of Iowa, Iowa Certified Crop Advisors, Iowa Corn Growers Association, Iowa Department of Agriculture and Land Stewardship-Division of Soil Conservation, Iowa Department of Natural Resources, Iowa Environmental Council, Iowa Farm Bureau Federation, Iowa Soybean Association, Iowa State University and the USDA Natural Resources Conservation Service.

Learning community workshop shines national spotlight on Leopold Center, Iowa partners

By LAURA MILLER *Newsletter editor*

Here's a diverse group: a South Dakota meat goat producer, an inner-city community organizer, a meat scientist from Missouri, and an extension educator who works with the nation's largest Amish settlement in Indiana.

What could they possibly have in common, and why would they spend two days together in Des Moines?

These four people, plus nearly 60 others from 17 states, were looking for a way to bring together a variety of players around common interests in networks to accomplish specific goals. One such networking approach is to set up a community of practice, the topic of a two-day workshop planned and presented by the Value Chain Partnerships (VCP) project led by Leopold Center Associate Director Rich Pirog.

The VCP project has been using the community of practice model since its inception in 2002 and has documented its success in building networks that address

challenges across the food system.

Currently, the project supports five working groups – also called communities of practice – organized around niche pork, local and regional food systems, fruit and vegetables, small meat processors and grass-based livestock. Each group involves producers and others from throughout the value chain from processing, retail, regulators, local government, and the business and educational communities. Groups meet regularly to exchange knowledge and results of small development projects they fund as a group.

Working groups participate

Leaders and members of the five working groups shared their experiences, frustrations and insight on the first day of the workshop. On the second day, workshop participants sat in on one of three working group meetings, and met with farmers involved in case studies of the Midwestern dairy cooperative Organic Valley and Country Natural Beef based in Oregon.

All workshop attendees were interested in building local food systems but their personal backgrounds and skill sets ranged from youth development, programs for beginning farmers and immigrant communities to hunger and poverty programs, urban revitalization and microenterprise loan funds. The workshop was presented as a professional development program and funded by the USDA's Sustainable Agriculture and Research Education (SARE) North Central Region.

"This model really can help farmers in a very practical way," said Terry VanDerPol from Minnesota's Land Stewardship Project. "On the ground I can see how farmers can plug in very quickly to what may already be going on in a region."

Patty Cantrell works in a six-county area of northern Michigan and was interested in the workshop because existing structures and organizations have not been effective in building local food systems.

"I see these needs coming from a lot of directions – consumers, farmers, others trying to connect around food systems and good food," Cantrell said. "So networking and connecting people with new systems and structures needs to happen."

Another unique perspective came from Bobby Turner, vice president of purchasing

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More about
Communities of Practice,
workshop materials:
www.valuechains.org



This workshop participant enjoys an Iowa apple and checks out posters explaining the Value Chain working groups.

for 32 Whole Foods stores in the Midwest. "At many different levels we need to set up forms of communities of practice to make sure we're using innovative ways to share knowledge," he said. "What brought me here is to learn more about the local movement and how a grocer retailer like ourselves can be more involved in getting regional food systems to work better."

Linda Kleinschmit administers the North Central SARE professional development program for educators and producers, and was pleased to see participants from all 12 states in the region represented at the workshop.

"I think we've been given a good blueprint for what works with the understanding that your efforts need to be local and you have to deal with the culture and work with the resources in each community," she said. As a grassfed beef producer in northeast Nebraska, she wants to organize a regional group for marketing grassfed livestock products.

Karen Lehman represents the Fresh Taste Initiative, a group of organizations that fund projects to improve access to local foods in Chicago and the region.

"I probably have been part of a community of practice in the past without knowing it, but I feel that the Leopold Center has done groundbreaking work in the intentionality around these working groups and documenting their work," she said. "I was interested in bringing people from Illinois here to experience what you've learned and perhaps to inspire some to help them in their work."

A definition

Here's the definition from two California social learning and educational theorists, who developed the model in 1990: *Communities of practice* are groups of people in organizations who come together to share what they know, to learn from one another regarding some aspects of their work, and to provide a context for that work.

The working groups in the Value Chain Partnerships project have found that communities of practice function as:

- *Catalysts* for cooperation among diverse interests to create solutions
- *Hubs* that create, capture, document and leverage knowledge as technical assistance to help value chain partners
- *Magnets* to attract funds to leverage for research and development efforts
- *Scouts* to identify emerging opportunities in the value chain.

Impact

The Value Chain Partnerships project has brought \$1.3 million to Iowa from the W.K. Kellogg Foundation, Wallace Center at Winrock International and other partners. In turn, VCP has leveraged more than \$2 million in additional funds during the past seven years.

NEW FARM ENERGY WORKING GROUP TO LINK PEOPLE ACROSS SUPPLY CHAIN TO RESOURCES

ENERGY (continued from page 1)

Our current work in energy covers a broad range of topics. All are related to function and performance, both economic and environmental, of our current and alternative food and agriculture production and supply systems. In-progress research ranges from the implications of corn stover harvest to carbon performance of low-external-input multi-year rotations to finding tools to assess energy and greenhouse gas comparisons of food and livestock systems.

In addition to such research projects, the Leopold Center also is supporting the formation of a Farm Energy Working Group. This group consists of farmers, key organizations, and other individuals interested in meeting on-farm energy needs with renewable on-farm resources while considering the broader systemic implications of such endeavors.

Here are a few of our recent projects related to alternative and renewable energy.

Low-external-input rotations

Matt Liebman, ISU Agronomy: This multi-year project has compared the fossil fuel inputs required for a conventional two-year corn and soybean rotation and a low-external-input four-year multi-crop rotation. Findings indicate that relative to the four-year system, the two-year rotation requires over twice the fossil fuel input while overall profitability is nearly equivalent. [E2007-09]

Functionality and sustainability in Iowa biofuels industry

Rick Cruse, ISU Agronomy: The goal of this one-year project is to coordinate the needs of the developing cellulosic biofuel industry with the ability Iowa farmers to supply biomass. [P2009-06]

Woody biomass

John Tyndall, ISU Natural Resource Ecology and Management: A two-year competitive grant researching the wood-based feedstock supply in Iowa, including the availability, scalability, and infrastructure requirements necessary to supply fiber for bioenergy and other biobased products. [E2009-26]

Bioconversion of biofuel waste products

Rob Anex, ISU Agricultural and Biosystems Engineering: This special project

tracked plant nutrients from feedstock to pyrolysis to biochar to field, characterizing the carbon, energy and nutrient balance of the technology.

Canola as oilseed crop

Mary Widenhoeft and Stefans Gailans, ISU Agronomy: A three-year grant assessing the economic and ecological impacts of growing canola, including how it might work in a crop rotation and as a winter cover crop. [E2009-21]

Soil activity in biofuel systems

Thomas Sauer, USDA-ARS National Laboratory for Agriculture and the Environment: A three-year grant, part of a larger CALS project with funding from Conoco-Phillips. This work examines organic matter, root, and soil-water interactions as part of a larger effort to understand the development of sustainable biofuel feedstock systems. [E2009-18]

Alternative biomass cropping systems

Lisa Schulte-Moore, ISU Natural Resource Ecology and Management: This three-year project consists of 75 test plots in Boone County designed to produce biomass from five different systems: continuous corn; conventional corn/soybean with triticale and switchgrass; sweet sorghum/triticale; and a combination of triticale and aspen or cotton wood. The project includes more than 1,000 trees. [E2008-24]

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Go to Research Results, grant summaries by topic:
www.leopold.iastate.edu/research/topics/energy.html
Or use project numbers for a search.

Feeding ethanol by-products in forage-based beef systems

Dan Loy, Iowa Beef Center: This three-year project investigated low-cost and convenient delivery methods and supplementation programs using distillers' feeds in forage-based beef production. [E2006-12]

Read about this project, page 4.

Energy use and nutrient cycling in pig production systems

Mark Honeyman, ISU Research Farms, and Pete Lammers, former student, Animal Science and Sustainable Agriculture: This two-year project quantified the energy use and flows in both conventional and alternative Iowa pig production systems. [E2003-07]

Corn stover harvest and erosion

This project used the Water Erosion Prediction Project (WEPP) model to estimate the effects of harvesting corn residue on soil erosion. The study found that high rates of stover removal are possible on gentle slopes with no-till management or extended crop rotations that include perennial crops. On steep slopes, more intensive tillage systems (moldboard plow or even minimum tillage) are not sustainable in corn-bean rotations regardless of biomass removal rates. [E2003-07]



This research team is working on the biomass cropping systems research at the ISU Uthe Farm in Boone County. The project involves faculty and staff from four academic departments at Iowa State.

The bioeconomy: New technology from an old idea

By RICH DANA Guest Columnist

EDITOR'S NOTE: The bioeconomy is one of six core issues that help guide the work of the Leopold Center and clarify our role and response in critical areas. We asked Rich Dana, an energy specialist for the National Center for Appropriate Technology, to give us a bird's-eye view of this issue.

In Iowa, we all know that ethanol can be made from corn, and biodiesel from soybeans, but using plant- and animal-based oils and fiber to produce fuel, solvents, adhesives and other high-tech materials is not a new idea. As far back as the 1930s, Henry Ford was building concept cars that ran on 100 percent ethanol and had plastic bodies and upholstery made of plant fiber. Recent high oil prices and unstable politics in the Middle East again have led people to see the advantages of biobased products. The question before us now is: Can we make these products in a way that is both economically and environmentally sustainable?

What are bioproducts?

Today we get most of our plastics and chemicals from petroleum. The ability to produce a wide range of products other than gasoline is what allows the petrochemical industry to be so profitable. Currently, the biofuels industry is limited to making transportation fuels (ethanol and biodiesel) and their by-products such as dried distiller's grains.

Researchers at Iowa State University's Biomass Energy Conversion (BECON) facility believe that a "biorefinery" model could help create a more efficient bioproducts industry by mimicking a petroleum refinery. By breaking down biomass (which could include food crops, wood, perennial grasses and even municipal waste) into chemical components, the process could produce everything from insulation and anti-freeze to plastic and gel for toothpaste.

A short history

Agriculturally-based products have long dominated the marketplace. Hemp, flax

and other crops were grown for oil and fiber during our nation's early history. George Washington taxed foreign hemp products to encourage domestic production, and by the time Abraham Lincoln signed the Emancipation Proclamation by the light of a hemp-oil lamp, it had become the leading fiber and oil crop in the nation. In 1870, John Wesley Hyatt trademarked "Celluloid," a plant-based product that was the first thermoplastic material, what we now simply call "plastic." In 1895, Rudolph Diesel ran the first diesel engines on peanut oil, and in 1905 Henry Ford built the first Model T powered by ethanol.

Unfortunately for America's farmers, widespread use of agriculturally-based chemicals waned in the early 20th century. The 1901 "Spindletop Gusher" in Pennsylvania marked the start of the petrochemical era and a rapid rise to economic and political power for companies such as Standard Oil and DuPont. In 1919, Prohibition ended on-farm ethanol fuel production, and in 1937, the federal government taxed and regulated hemp out of production, one year after DuPont patented nylon.

Agricultural products enjoyed a brief comeback during World War II oil shortages, but it was not until the OPEC oil embargo in the 1970s that people began to consider alternatives to Middle East crude. Brazil began subsidizing ethanol from sugar cane and currently leads the United States in ethanol production. Archer Daniels Midland (ADM) has grown to become the largest U.S. producer of ethanol.

However, with last year's plunging oil prices and crashing credit market, ADM has idled 21 percent of its capacity. The industry is again in free-fall, despite mas-

sive government support and a growing demand for "green" products.

Their future in Iowa

Many people believe that corn-based ethanol and soy biodiesel are just the first steps toward an integrated approach to building a more energy efficient, economically viable biofuels industry. New technologies suggest that perennial grasses can become high-yielding sources for cellulose-based ethanol. Critics feel that cellulosic technology is problematic and expensive, and that the promises simply may be an excuse to increase the market share for conventional agriculture.

Aldo Leopold recognized that "there are two spiritual dangers in not owning a farm – one is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace." Some in the sustainable agriculture movement have been slow to recognize that energy is integral to a holistic farming system. We must make energy production part of a sustainable and diversified farm operation.

Biofuels and other bioproducts need not be the bugaboo of the environmentally-minded. High-sugar crops such as beets and sorghum, oilseed crops such as sunflowers and camelina, and hemp all potentially can be grown and processed into fuel right on the farm. From there it is not a large leap for small farms to set up production of "value-added" raw materials for pharmaceuticals, cosmetics and other industrial uses.

Although the future of a large-scale bioproducts industry is uncertain in the current economic and political climate, a wide range of opportunities have opened for small-scale and diversified farms. During times like these, necessity can lead to innovation, and community-based projects can begin to overcome the "economy of scale." However, after spending nearly a century lost in the shadow of cheap petroleum, it will take widespread commitment to move us away from our dependence on foreign oil and back to the technologies that will enable us to rely on diversified, renewable and locally grown raw materials.

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Read more about the Leopold Center's core issues:
www.leopold.iastate.edu/about/core.html



Rich Dana is based in NCAT's new Midwest office in Des Moines. His areas of focus include solar technologies and farm-scale fuel production. He currently is working with the Leopold Center to identify energy efficiency and renewable energy opportunities for Iowa's small farmers. He lives with his wife Ericka on their small organic farm near Victor. Contact him at richd@ncat.org, or (319) 530-6051.

Finding sustainable weed control for Iowa vineyards

By ALLISON SEVERSON *Communications Assistant*

 www.leopold.iastate.edu

AVA wine regions:
www.leopold.iastate.edu/research/grants/2007/2005-M14.pdf

Not only do Iowa vineyards produce great wine, but in the future, Iowa-grown grapes may be among the most sustainably grown in the country. The question is: how can Iowa grape growers reduce their chemical use and control weeds while still producing top yields and high-quality fruit? Iowa State University horticulture professor Gail Nonnecke is researching sustainable solutions to this problem.

The latest grape-growing project funded by the Leopold Center and led by Nonnecke looks at weed control alternatives to herbicides and pesticides in Iowa vineyards.

"It's an exciting time in Iowa, the grape industry is growing, there are so many new growers and new vineyards, and also many educational opportunities for grape growers in Iowa," she said.

Nonnecke noted that many vineyards are already using some sustainable practices, such as growing perennial grasses between the rows. "Often though, the missing link is the three-foot-wide bare strip of exposed soil under the trellis row," she said.

"Quality is always important, but it is critical in producing grapes since the fruit quality affects the quality of the wine," Nonnecke explained. "To produce excellent grapes, controlling weeds while keeping yields and fruit quality high is vital, and finding a way to do this that also

keeps the soil healthy and productive is central to our project."

To find a way to effectively control weeds while not leaving soil exposed, Nonnecke and Lisa Wasko, graduate student in horticulture and soil science, are comparing four weed control methods: herbicides, cultivation, mulch and living mulch.

The conventional herbicide and cultivation treatments leave the ground bare, exposing soil to erosion and possibly compromising its productivity. The cultivation method also seems to decrease yield more than other methods of weed control.

Straw mulch is effective and often used in organic vineyards. The straw controls the weeds, but also retains more moisture than other methods and can lead to constant wet roots and problems for the vines.

For the living mulch treatment, Nonnecke planted creeping red fescue (*Festuca rubra*), which prevents weeds from appearing and grows around grape vines to serve as a ground cover. Creeping red fescue is dense, which blocks the weeds and preserves the biological attributes of the soil.

Nonnecke's viticulture research began at Pennsylvania State University, where she earned her bachelor's and master's degrees, and at Ohio State, where she received a Ph.D. "I grew up on a farm with a large diversity of crops, and I've been interested

in viticulture for some time," she said. "It's exciting that Iowa is starting to see more vineyards and grape growers."

"We need a weed management system that maintains soil quality, provides excellent growth and development and provides high fruit quality. If we can have this practice and provide it to Iowa grape growers, that would be an excellent addition," she added. "By using practices that enhance soil quality of the vineyard, we can increase the sustainability of the vineyard in the long-term."

New designation to help Iowa grape growers

A Leopold Center-funded project several years ago may pay big future dividends to Iowa grape growers. Work on that project was instrumental in establishment of the first American Viticultural Area (or AVA) in Iowa, recently approved by federal regulators.

The new region, the Upper Mississippi River Valley AVA, includes 18 counties in northeast Iowa and is the largest in the United States. A two-year Leopold Center grant helped Limestone Bluffs RC&D in Maquoketa start the application process in 2005. The result was the valued AVA designation that recognizes unique grape-growing regions and opens new markets for quality Iowa wine.

Since 2001, the Leopold Center has invested \$238,000 in research and development of the Iowa grape and wine industries. The investment includes support of producer workshops and the Midwest Grape and Wine Industry Institute at ISU, and five competitive grants for research on vineyard management, economic feasibility, alternatives to pesticide use, and resources for people interested in starting a vineyard or winery.

In 2000, the Center issued a widely-cited "Grape Expectations" report about historical grape production and potential for redevelopment of the industry in Iowa.



Lisa Wasko, an Iowa State graduate student in horticulture and soil science, shows how a living mulch of creeping red fescue serves as a ground cover, keeps weeds away from vines and preserves the biological attributes of the soil. She has found that straw mulch retains more moisture than other methods and can cause problems. Above left is the Marèchal Foch grape variety. The research vineyard is at the ISU Horticulture Farm in Story County.

Keys to success for Radiance Dairy: Using nature as model and guide

By ALLISON SEVERSON *Communications Assistant*

Jersey cows at Radiance Dairy Farm are milked and enjoy a fresh grassy area to graze twice a day. For owners Francis and Susan Thicke, the tasks of moving fences, milking and making cheese are all in a day's work.

In December the couple will be honored with the Spencer Award for Sustainable Agriculture, named for long-time Iowa farmers Norman and Margaretha Spencer, who believed that it was the obligation of each generation to leave this world a better and healthier place for the next generation. A look at the Thickest farm shows how firmly they subscribe to this belief.

"We don't really own the land, the land owns us," says Francis Thicke, talking about sustainability and the need to care for the land in an ethical way.

Using ecological systems as their model, they own and operate Radiance Dairy with on-farm processing of milk, yogurt and cheese from their 80 grass-fed Jersey cows.

They purchased the farm near Fairfield in 1996, at which point they converted it, farm from a full-scale corn and soybean production to solely perennial grasses and legumes. The perennial forages and manure have helped restore the hilly fields to lush pastures with healthy soil. The perennials have deep root systems, which easily absorb rain. They also have planted trees: walnuts, hybrid hazelnuts, white pines and a variety of fruit trees.

"It's about the entire system," he says. "When we rely on nature to guide us, instead of us dominating nature, things go more smoothly."

The 236-acre farm is divided into 60 paddocks, and they use portable fencing to give the cows a new area to graze twice a day. Manure from the cows improves soil quality, and since the animals spread their manure while grazing, there is no need to haul manure. "This saves a lot of time and energy. I don't have additional input costs because the cows do it for me," he added.

In spring and early summer when pastures produce more forage than the cows can eat, hay is baled for use in winter. They supplement by feeding each cow about six pounds of small grains in the spring, summer and fall, and about 10 pounds in the winter. The Thickest grow some of their own small grains, but the rest is purchased from local, organic growers.

Balancing the benefits

Francis Thicke acknowledges that their Jerseys produce a modest amount of milk, about 35 pounds daily, compared to 70 to 100 pounds by Holsteins used in larger, industrial operations. But gains are seen in other ways.

"When cows are on pasture and eating a natural forage diet they are healthier and have a longer productive life," he explained. "Last year, we had no veterinary bill. We have to think about net profitability over the long term, instead of only immediate returns."

Although the dairy industry as a whole is suffering, Radiance Dairy fills a niche market that has not felt the pinch. All their dairy products are marketed locally, Francis says, "so our prices don't go up and down with the fluctuations of national markets."

Each grazing area has water supplied by a solar-powered system, installed with help from the Environmental Quality Incentives Program of the National Resources Conservation Service. Solar panels power a pump that moves water from a pond to a 4,000-gallon tank on the highest point of the farm. The water then flows through buried pipe to tanks in each paddock. The



Francis Thicke offers grain in one of the grassy paddocks; milk processed in their on-farm dairy is sold at a local store; Francis and Susan Thicke with part of their Jersey dairy herd.



same pond has a geothermally-heated water tank, used when cows overwinter in that area.

The Thickest are planning to install several other renewable energy devices, including a second geothermal watering tank for another area of the farm, a solar system to preheat hot water for the dairy and processing plant, and an on-farm wind turbine.

Both also take active roles in the community. They happily offer tours of their operation for customers and other dairy producers. Susan Thicke helps with the organization and planning for the Buy Fresh Buy Local campaign in Fairfield, and is very involved in promoting local artists.

Francis Thicke often writes letters to the editor and guest columns for local and statewide newspapers. In 2007, he testified before the U.S. Senate Committee on Agriculture, Nutrition and Forestry about priorities for agricultural research.

In addition to farming, Francis Thicke has built an impressive resume in other ways. He has served as a Policy Fellow for the W.K. Kellogg Foundation Food and Society program, and before he returned to farming he was the National Program Leader for soil science for the USDA-Extension Service in Washington, D.C. He currently serves on the board of directors of the Organic Farming Research Foundation, is a member of the USDA State Technical Committee, and is campaigning to become Iowa's Secretary of Agriculture (he was chosen for this award in June, prior to announcement of his candidacy).

Francis and Susan Thicke also teach others about land management, gladly offering to share their story as well as their cheese with visitors. They have hosted field days for people interested in starting a dairy operation, and are active members of Practical Farmers of Iowa.

The Thickest' hard work will leave 236 acres of healthy, organic soil for future generations, but for now, they are busy doing what they can for the current generation.



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More than 100 people participated in the two-day Iowa Grazing Conference held at Honey Creek Resort near Moravia and Gibbs Ranch near Promise City. Featured speaker was Fred Provenza, Utah State University, on ecology, genetics, chemistry and animal behavior. At the field day, Jim Russell and his Iowa State research team discussed findings from their most recent Leopold Center-supported work that shows the relative lack of negative impacts when cattle graze on and near riparian areas.

October 20

“The Future of American Agriculture,” Lecture by Kathleen Merrihan, U. S. Deputy Secretary of Agriculture, 8 p.m., Great Hall, ISU Memorial Union, Ames.

October 27

“The Environmental Significance of Biodiversity in Managed and Unmanaged Ecosystems: From China to Sub-Saharan Africa, the Great Plains and Iowa,” 2009 Pesek Colloquium for Sustainable Agriculture Lecture by Shahid Naeem, Columbia University, 8 p.m., Great Hall, ISU Memorial Union, Ames.

November 12

“Mississippi River Water Quality: Policy, Farm Landscapes and Hypoxia,” 2009 Keeney Lecture by Eugene Turner, Louisiana State University, 8 p.m., Sun Room, ISU Memorial Union, Ames.

December 5

9th Annual Iowa Organic Conference, Scheman Building, Ames. Keynote by Jerry DeWitt, “Lessons from Farmers in the Field” and presentation of the 2009 Spencer Award for Sustainable Agriculture.

January 13

“A Culture of Conservation: The Tools We Need to Grow,” Workshop, Gateway Conference Center, Ames. Keynote by George DeVault, Seed Savers Exchange, and Leopold Center Director Jerry DeWitt on telling stories with images.