



Is local food more expensive? Not always, Leopold Center study shows

If you think local foods are more expensive than their conventional counterparts, think again. A Leopold Center research project conducted last summer shows few differences in price for Iowa-grown vegetables, eggs and meat when compared to similar non-local products.

“We wanted to look at prices for some of the fresh foods that might be found in a typical Iowan’s shopping cart,” said Rich Pirog, Leopold Center associate director who collaborated with Iowa State University graduate student Nick McCann on the project. “We found that during peak season, produce items at farmers’ markets were very competitive and in several cases lower than prices for the same non-local items found at supermarkets.”

The study surveyed prices for eight

different vegetables sold at Iowa farmers’ markets in Des Moines, Cedar Rapids, Ames and Iowa City. On the same day, prices were documented for similar produce from national or international sources being sold at supermarket chains in those cities. Prices were checked on five days during July and August.

Results are outlined in a new Leopold Center report, “Is Local Food More Expensive? A Consumer Price Perspective on Local and Non-Local Foods Purchased in Iowa.” The study showed no statistical differences for local and non-local vegetables during Iowa’s peak growing season: an average price of \$1.25 per pound for locally grown zucchini, summer squash, cucumbers, string beans, cabbage, onions,

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Grazing and fire as management tools

By ALLISON SEVERSON *Communications assistant*

Where there’s smoke, there’s fire — and in Iowa fire seldom is viewed as positive, even on the southern Iowa expanses of the Grand River Grasslands.

The Patch-Burn Grazing Team, an Iowa State University restoration ecology team whose work is funded in part by the Leopold Center’s Ecology Initiative, is working to change that perception. Team members are looking at both the promise and the practice for adoption of a grasslands management technique called patch-burn grazing.

The site for their work is the Grand River Grasslands Conservation Opportunity Area, a 70,000-acre tallgrass prairie restoration landscape that straddles the Iowa-Missouri border. The research in-

cludes more than 1,000 acres managed in one of three ways for this project:

- prescribed fire only,
- grazing, then burning the entire site once every three years, and
- burning one-third of the area each year, and allowing access by cows for grazing, referred to as patch-burn grazing or fire-and-grazing interaction.

North American prairie ecosystems evolved in the context of both fire and grazing, but this practice largely has been abandoned as a management tool in recent decades. The team hopes to show nearby landowners the benefits of controlled burning and grazing.

PATCH-BURN (cont. on page 7)

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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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Research Results

On the Web: www.leopold.iastate.edu/research/topics.html

Summaries

Easy-to-read summaries are available for these recently completed projects funded by Leopold Center competitive grants. Find them on our Research Results web page.

- Leveraging student expertise to solve food production marketing problems
- Strengthening the local and regional food system in the Iowa Valley: Iowa Valley Regional Food Initiative
- Strengthening the regional and local food systems in the Iowa Valley: Enhancing the sustainability of the University of Iowa food system, a Factor-10 approach
- Investigating the feasibility of establishing food processing and distribution centers for western Iowa
- Grinnell Area Petroleum Replacement Initiative, Phase 2
- Mapping biomass markets in Iowa

Scientific Journals

Leopold Center-supported projects have resulted in these papers, recently published in peer-reviewed journals. Check at a research library or the journal's Web site for abstract or full report.

- Dermisis, D., Abaci, O., Papanicolaou, A.N. and C.G. Wilson (2010). Evaluating Grassed Waterway Efficiency in Southeastern Iowa using WEPP, *Soil Use and Management* 2009: 209. [Leopold Center Ecology Initiative special project, Impacts to the land-water-human system of rural Iowa from high intensity continuous maize production with L.Burras (ISU) and T. Papanicolaou (U of Iowa)]

Graduate students enhance Leopold Center work

Several graduate students are working directly with Leopold Center staff on a variety of projects and activities this academic year. Numerous other students, both undergraduates and graduates, are employed by university professors as part of Leopold Center research grants.

Nick McCann, second-year MBA student with a minor in sustainable agriculture: Recently completed a survey of local/conventional food prices at farmers markets, grocery stores, butcher shops and natural food stores in four Iowa cities. He also supports projects of the Small Meat Processing and Regional Food Systems Working Groups. McCann received his undergraduate degree in marketing and German from Miami University of Ohio. Prior to coming to Iowa State, he was employed by the University of Notre Dame to set up agricultural production programs in Haiti and has worked in international consulting.

Jonah Brown-Joel, first-year MBA student with a minor in sustainable agriculture: He is working with Rich Pirog and ISU College of Business professor Frank Montabon on a survey of sustainability practices used by Iowa food companies. A graduate of the University of Northern Iowa in philosophy, he has developed youth programs in the San Juan Islands and worked at Rockwell

Collins in Marion. His interest is in green technology and corporate responsibility reporting.

Phil Damery, second-year master's student in the Graduate Program for Sustainable Agriculture: Provides support for grants, communications and strategic planning in the Leopold Center Ecology Initiative. He also is helping to plan the Midwest Cover Crops conference in March. A graduate of Illinois State University in social science education, he has worked for the National Park Service. As part of his graduate work, he is working with the Iowa Meat Processors Association to develop curriculum and training materials.

Allison Severson, first-year master's student in educational leadership and policy studies: Last summer completed her professional internship at the Leopold Center for an undergraduate degree in the ISU Greenlee School of Journalism and Communication. As communications assistant, she coordinates On the Ground, a web-based video series that highlights Leopold Center ecology projects, produces monthly photo galleries and provides other support. She grew up on a small, diversified farm near Belmond and is working to set up a community garden in Ames for children in a residential treatment facility.



Q. How does the Leopold Center Policy Initiative fit with other research?

The Policy Initiative is the third focus area of the Leopold Center's overall research program. The majority of our efforts and resources are centered on the other two initiatives, Ecological Research (led by Jeri Neal) and Marketing and Food Systems (led by Rich Pirog). Approximately 95 percent or more of our resources are dedicated to these two initiatives annually, with slightly more than half of that amount invested in ecological projects.

But, we recognize that some of the alternatives studied by the other two initiatives will call for new policies or changes in existing policies in order to be successful. This led to a decision, influenced by stakeholders more than 10 years ago, to add some policy studies to the mix to better focus and integrate our work.

Q. How does the Leopold Center define its work in policy?

Policy may be defined as a definite course or method of action selected from among alternatives and in the light of given conditions to guide and, usually, to determine present and future decisions. We want to be a part of this process. We decided early on to concentrate on local and regional policy work and looked for

projects related to land use, energy and alternatives.

Objectives for the Policy Initiative are to:

- link potential local, state or regional policies to enhanced sustainability of natural resources and
- provide basic research or benchmark data analysis needed to help assess or implement possible new local or state policies and alternatives for Iowa.

We at the Center feel that it is an opportunity and our responsibility to help inform agricultural policy in Iowa. We fully realize that to a very large extent national policy drives practices and programs offered in Iowa. We also recognize that with our limited resources and staffing we cannot attempt to be a major, direct player in setting and influencing national policy.

However, we can be a voice and model for local policy elements that ultimately may be practical and useful in the national debate and process. We can provide support for basic data collection and analysis and demonstrate working models of practical utility for today's agriculture.

We look to these audiences for our work:

- State agencies
- Conservation and natural resource partners
- County boards of supervisors
- Cities/municipalities
- Iowa General Assembly, and
- Iowa legal community.

Q. What current projects are supported by the Center's Policy Initiative?

A major Policy Initiative effort is related to how Iowa's farmland is owned and managed. We are in the midst of a two-year collaboration with the Drake University Agricultural Law Center called the Iowa Landowner and Sustainable Agricultural Land Stewardship Project. It targets landowners and their awareness and interest in improving conservation practices and stewardship on their lands as they work with tenants. What tools do landowners need and how can these tools and approaches be used in everyday practices in

Iowa agriculture?

Products of the project will include a film and guides for farm owners, including a model sustainable agricultural farm leasing guide.

The Center is joining with Drake University to sponsor a national conference in Washington, D.C. on March 4-5, "America's New Farmers: Policy Innovation and Opportunities." It will identify innovative policies and projects at the federal, state, and local levels to support new and beginning farmers.

In 2009, we surveyed the boards of supervisors in all of Iowa's counties with the major assistance of the Iowa State Association of Counties (ISAC). We found that there is a substantial awareness and belief that local food systems, infrastructure, and presence at the county level may lead to greater economic development in the county. We captured ideas for supporting the supervisors to better assist them on key decision-making locally.

Mike Duffy, former Leopold Center associate director and ISU Extension economist, has been working on a paper reporting on national farmland ownership issues. He and his students are preparing crop enterprise budgets to help beginning and transitioning farmers decide what crops and livestock might be good economic choices for their operations. These will be jointly issued by the Center's Policy Initiative and the ISU Beginning Farmer Center.

Finally, we also try to integrate elements of policy in many of our other competitively funded research projects. Our work in Ecology and Marketing and Food Systems cannot always succeed independent of public policy, and we encourage our researchers to think about the policy implications of their findings.

Leopold Center Policy Initiative on the Web at:
www.leopold.iastate.edu/research/policy.htm



Leopold Center initiates new agroforestry working group

The Leopold Center is coordinating a new outreach effort that combines agriculture and forestry. The Mid-American Agroforestry Working Group held its first exploratory meeting in November at the Iowa Arboretum in Boone County.

The group is coordinated by Leopold Center Ecology Initiative leader Jeri Neal and Leopold Center program coordinator Malcolm Robertson with leadership from Michele Schoenberger, research project leader at the USDA National Agroforestry Center at the University of Nebraska-Lincoln. A steering team is developing a charter that initially will include these 15 states: Arkansas, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Oklahoma, South Dakota, Texas and Wisconsin.

“Agroforestry has enormous potential for bringing substantial economic and environmental benefit to the land,” said Neal. “We hope to coordinate and leverage an extensive collaboration of stakeholders, from agencies to researchers to producers, to boost agroforestry into the mainstream, with viable markets and rural enterprises driving adoption.”

Initial activities are to refine existing practices such as the use of riparian buffers, and to investigate design of innovative new systems. Among the many benefits of woody systems in agricultural landscapes are: high energy input:output ratios, fewer negative impacts on soil and water, and enhanced wildlife habitat and carbon sequestration. In regions dominated by row crops, forested ecosystems provide critical habitat and travel corridors for a diverse array of game and non-game species; help stabilize soils and maintain soil quality; efficiently cycle water and nutrients, and provide additional hydrological benefits ranging from protecting and enhancing aquatic ecosystems to moderating storm, peak and base flows in watersheds.

More than 20 people from eight states attended the initial gathering. They represented research and extension units at Iowa State University, University of Missouri, University of Minnesota, University of Wisconsin and the USDA Agricultural Research Service; USDA Natural Resources Conservation Service offices in several

states; and private consultants and non-governmental organizations.

The Leopold Center will facilitate and provide administrative support for the group, such as meeting coordination and posting materials on a central Web site that is under construction.

Leopold Center agroforestry work

Two current competitive grants in the Ecology Initiative relate to agroforestry:

Woody biomass: John Tyndall, ISU Natural Resource Ecology and Management, is studying the wood-based feedstock supply in Iowa, including the availability, scalability and infrastructure requirements necessary to supply fiber for bioenergy and other bio-based products.

Alternative landscape biomass: Lisa Schulte Moore, ISU Natural Resource Ecology and Management, is leading a multi-disciplinary team to compare five cropping systems for biomass production at different points in the landscape: continuous corn, conventional corn/soybean with triticale and switchgrass, sweet sorghum/triticale, and a combination of triticale and aspen or cottonwood. The project includes 75 test plots in Boone County and more than 1,000 trees.



What is agroforestry?

Agroforestry intentionally combines agriculture and forestry to create integrated and sustainable land-use systems. Agroforestry takes advantage of the interactive benefits from combining trees and shrubs with crops and/or livestock. Agroforestry practices include:

- Alley cropping (growing hardwoods and nuts alternatively with agricultural crops)
- Forest farming (growing crops such as ginseng, shiitake mushrooms and ferns under the canopy)
- Riparian forest buffers
- Silvopasture (adding forage for livestock production)
- Windbreaks (to control erosion or odors, keep roads clean of drifting snow) and
- Special applications such as practices that enhance wildlife habitat and optimize carbon storage.

Source: USDA National Agroforestry Center, www.unl.edu/nac/index.htm

 www.leopold.iastate.edu

Watch four videos about the Leopold Center-supported alternative landscape biomass research team:
www.leopold.iastate.edu/research/eco_files/biomass.html



Above left, conservation professionals survey a Loess Hills landscape that incorporates trees into the system. Above right, bushes help control erosion from wind and water [photo courtesy National Agroforestry Center].



Rethinking the politics of food

An alternative food politics means that we must begin by expanding the circle of decision-making and ensuring that multiple and varied voices are heard. This is not accomplished through symbolic events or publicity stunts. New stakeholders must participate at all levels from the local to the international...It is time for a new politics of food, one that starts from the bottom up not the top down.

— Miguel d'Escoto Brockmann, President,
63rd Session of the United Nations General Assembly

By now it is obvious to almost everyone that food politics has captured center stage. Invite best-selling author Michael Pollan to a university campus and it stirs enormous controversy. A student writes a column in the school newspaper about the influence a corporate donor has on her university's educational environment and it causes heartburn for the administration. A neighbor complains about an unintended consequence of a particular agricultural practice and it becomes a source of conflict in the community.

It is, of course, perfectly understandable that farmers, food manufacturers and industry advocacy groups are defensive. They have made huge investments in infrastructure to deliver the kind of food – “fast, convenient and cheap” – that became the culturally accepted food paradigm for almost half a century; now we criticize them because we don't like some of the unplanned consequences. They invested millions of dollars to deliver a product they thought the public wanted; perhaps we can appreciate their lack of enthusiasm about calls to design an alternative system and new way of doing business. One can be especially sympathetic toward farmers since they are an aging population – almost 30 percent are now over age 65. Who of us would be enthusiastic about making major changes in our operating system at that age?

Nevertheless, our modern food “miracle” has produced significant problems. Our heroic determination to “feed the world,” provide our country with cheap food, and “free people” from the “drudgery” of farming didn't all turn out quite the way we planned.

The laudable goal of ending hunger clearly has not been achieved. Today a billion people (roughly one-sixth of the world's population) suffer from malnutrition and 4.1 percent of U.S. citizens have very low food security. A 2007 Congressional Budget Office report entitled “The Long Term Outlook for Health Care Spending” projected that without significant changes to our health care system, all health care spending would consume 50 percent of the total U.S. Gross Domestic Product by 2080. Chronic diseases such as obesity and diabetes, which are diet-related, are a major contributor to that increase. A commonly cited figure indicates that costs associated with obesity alone already had reached \$117 billion in 2000. Major food safety issues (*E.-coli*, *salmonella*, etc.) continue to plague us.

Meanwhile, the United Nations Millennium Ecosystem Assessment Synthesis report points out that our specialized monoculture food system has played a major role in destroying biodiversity and biological health of our soil, both essential to the restoration of the ecological health of our ecosystems, the foundation of any productive agriculture. Through it all we have diminished the store of human capital (farmers) that we will need to address new questions

in the decades ahead. In the United States, only 400,000 farmers produce 94 percent of our agricultural commodities.

It is sobering to realize that we have reached this juncture at the same time that enormous food-related challenges confront us. Among them are the end of cheap energy, declining fresh water resources, more unstable climates, the loss of both biodiversity and genetic diversity, the loss of soil health, an expanding human population intent on increasing its rate of consumption, while a rising number of people live in communities where they are denied access to nutritious, affordable food.

The lesson is that we do not have time to engage in a food fight. As United Nations President Miguel d'Escoto Brockmann suggested, now is the time to

- expand the circle of decision-making to ensure that multiple voices are heard,
- bring to the forefront the voices of scientists, community activists and above all, food producers,
- represent all members of the community, and
- link to global reality.

He states that this new discourse must be grounded in the fundamental principles of food justice, food democracy and food sovereignty, so that together we can “proclaim what should have been a fundamental right in every society; the right to food.”

The Leopold Center is engaged in two experiments that encourage broad audiences to look at our food system. The first is an innovative knowledge system called “communities of practice” being used in the Value Chain Partnerships project. Wenger, McDermott and Snyder (authors of *Cultivating Communities of Practice*) define communities of practice as “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” We have found this approach particularly useful in addressing issues related to food within Iowa communities.

The other experiment taking root in urban communities is the concept of a “foodshed,” similar to a watershed (see “Foodshed Analysis and its Relevance to Sustainability” in the March 2009 *Renewable Agriculture and Food Systems*). A foodshed is a designated area in which members determine what kind of food system will best serve the needs of their community. Ideally farmers and consumers are a foodshed's “citizens” who work together to meet everyone's needs. Such a foodshed is perfectly suited for the type of discourse described by the UN president as a “dialog that emerges from the bottom up” in which “multiple and varied voices are heard.”

As part of our relationship with the Stone Barns Center for

FUTURE (cont. on page 7)

STUDY SHOWS POTENTIAL OPPORTUNITY FOR IOWA GROWERS FOR EXTENDING MARKET SEASON

Read the report, *Is Local Food More Expensive at:*

www.leopold.iastate.edu/pubs/staff/prices.html

PRICES (continued from page 1)

tomatoes and sweet corn from a farmers' market, compared to \$1.39 per pound for non-local items from a supermarket.

The lower prices for the local items can be attributed in part to competitive pricing of zucchini and summer squash at farmers' markets. A two-week supply of those eight vegetables for a family of four, based on per capita consumption, would cost \$15.03 at a farmers market, compared to \$16.91 at a supermarket.

A second part of the study looked at prices for lean ground beef, pork chops and brown eggs sold at supermarkets, natural food stores and butcher shops in those four Iowa cities in June, July and August. Pirog said it was difficult to find products with similar attributes available at all venues to make meaningful comparisons. However, they did find that locally raised lean ground beef and bone-in pork chops from butcher shops are similar in price to their non-local counterparts from supermarkets.

Pirog said the study did not look at relative freshness, taste or overall quality of local and non-local products. The study also did not examine produce or food items sold under organic certification.

"Keep in mind that this study was conducted during the height of the Iowa growing season when produce was in plentiful supply from multiple vendors at farmers' markets, and their prices were lower than at other times during the farmers' market season," Pirog said.

He added that the study also points to an obvious opportunity for growers who extend their production season by using greenhouses or high tunnels and market their harvest at competitive prices. "Given the increase in construction of high tunnels in the past two or three years, Iowa growers may be able to increase the supply of locally grown vegetables and sell to a wider array of market venues," he said.

Findings from Seasonal Survey: Is Local Food More Expensive?

	Farmers' market	Supermarket (nonlocal)	Butcher shop	Supermarket (local)
Vegetable basket [string beans, cabbage, cucumbers, onion, tomatoes, sweet corn, summer squash, zucchini]				
Average price/pound	\$ 1.25	\$ 1.39		
Total cost [one pound of each]	\$ 8.84	\$ 10.45		
Total cost [two-week supply, per capita consumption]	\$ 15.03	\$ 16.91		
Individual produce items – average price per pound				
Zucchini	\$ 0.67	\$ 1.63		
Summer squash	\$ 0.90	\$ 1.74		
Sweet corn	\$ 0.61 *	\$ 0.62		
Cucumbers	\$ 0.71	\$ 0.66		
String beans	\$ 1.90	\$ 1.51		
Cabbage	\$ 0.64	\$ 0.63		
Onions	\$ 1.35	\$ 1.26		
Tomatoes	\$ 2.17 *	\$ 2.36		\$ 2.84
Meat items – average price per pound				
Lean ground beef [>90% lean]		\$ 3.66	\$ 3.09	
Bone-in pork chop		\$ 3.12	\$ 3.20	
Brown eggs (free-range) – average price per dozen				
	\$ 2.78	\$ 2.97		

* Includes price for locally grown items at farmers' markets and supermarkets, since items are readily available at both locations.

New web site provides support for local food

Imagine one place where you can get tips on buying meat directly from a farmer, connect to local food groups in Iowa, explore postharvest handling techniques, discover ways to manage niche pork feed costs, and learn how to use goats to control weeds. Your one-stop information center is www.valuechains.org, the new Web site for Value Chain Partnerships (VCP), an Iowa-based network for food and agriculture working groups that is coordinated by the Leopold Center.

The new Web site features reports from more than 60 projects funded by the five VCP working groups during the past seven years. Projects range from multi-county surveys to gauge demand for local products to workshops on how to market niche beef. Small business owners, farmers, processors, distributors and others from across each supply chain who focus on environmental and community stewardship are part of each group. The groups focus on niche pork, local food, fruit/vegetable growers, small meat processors, and grass-based livestock.



www.leopold.iastate.edu

Watch four videos about this project: www.leopold.iastate.edu/research/eco_files/patchburn.html

PATCH-BURN GRAZING: A WAY TO CONTROL INVASIVE SPECIES, CREATE FRESH VEGETATION

PATCH-BURN (continued from page 1)

“This project uses a new method of burning called fire-and-grazing interaction, which allows animals to follow the fire that is applied to specific portions of the landscape where the fresh, new, green growth emerges,” said David Engle, a professor in natural resource ecology and management at Oklahoma State University, who began the project while at Iowa State University.

When asked about carbon output from the burning, Engle said research shows that burning grasslands is a carbon-neutral

process; released carbon is offset by carbon turnover in the soil. “There is no more sustainable agricultural enterprise than livestock grazing on perennial forage plants,” he added.

Ryan Harr, a scientist in the natural resource ecology and management department at ISU, said the purpose of using fire is to clear the landscape of old vegetation and woody debris. “The result is new vegetation that can be used for cattle production,” he noted.

Iowa grasslands are being threatened by several invasive species. *Eastern redcedar* spreads at an exponential rate in grasslands that have not been burned in more than a decade. *Sericea lespedeza* is a noxious weed unpalat-

able to cattle and can not be controlled by current herbicides.

“Both of these species could be more effectively controlled with patch-burn grazing than with traditional grazing management,” said Lois Wright Morton, sociologist and principal investigator on the project, “but bringing that knowledge into adoption and action is another challenge for our team.”

Diane Debinski, professor in the department of ecology, evolutionary and organismal biology, is studying insect responses to patch-burn grazing because of their importance as pollinators, for nutrient cycling, as food for songbirds and as predators for crop pests. “We can build a structure that looks like a grassland, but does it act like a grassland?” she asked.

A long-term goal is to develop a framework for implementing the fire-grazing model at several sites under the jurisdiction of the Iowa Department of Natural Resources and the Iowa chapter of The Nature Conservancy. “We would like to develop a model that can be used by any private landowner who wants to use the burning practice,” said Wright Morton.

Leopold Center Ecology Initiative leader Jeri Neal hopes producers will see the practical application of the patch-burn tool to make existing grazing operations more profitable, especially in southern Iowa where they compete with row-crop agriculture.

“Patch-burn grazing seems like a tool that might bridge the gaps between programs and practices on the land,” she said. “This project will help Iowans figure out if we can make this work.”



Above: Ryan Harr, Diane Debinski, Lois Wright Morton and Dave Engle at the research site in southern Iowa. Top photos show a prescribed burn in the study area.

DEMOCRATIC APPROACH NEEDED IN FOOD POLITICS

FUTURE (continued from page 5)

Food and Agriculture in New York, I am working with the Urban Design Lab at Columbia University’s Earth Institute and Manhattan Borough President Scott Stringer to explore the foodshed concept in the New York City region. We hope to create a model that can be used in other parts of the country, both rural and urban, and can demonstrate “alternative food politics” which expand “the circle of decision-mak-

ing” and ensures “that multiple and varied voices are heard.”

A democratic approach to address food and farming challenges is a much better pathway than the acrimony that now seems to accompany food politics.



“Every family needs a farmer” – USDA Deputy Secretary Kathleen Merrigan. Listen to her speech at ISU at: www.leopold.iastate.edu/news/pastevents/merrigan/merrigan.html

Hands-on experience, on-line tools give growers new perspective on postharvest handling

By Malcolm ROBERTSON Leopold Center Program Copordinator

For an increasing number of farmers who are growing fruit and vegetables for direct and wholesale markets, good postharvest handling offers competitive edge, additional profits and fewer food safety concerns.

The Value Chain Partnerships' Iowa Fruit and Vegetable Working Group conducted two July 2009 workshops that highlighted postharvest handling of vegetables, wholesale sales and preparing produce for market. The sessions were held at Rock Spring Farm in northeast Iowa and Black's Heritage Farms in central Iowa. These workshops provided an opportunity for participants to see first-hand the steps of harvesting, washing, grading, sorting and packaging as well as a chance to work on the processing line with several types of vegetables at one of the farms.

Presentations focused on the flow of postharvest handling operations and grading standards, also packing, labeling and tracking methods for fresh vegetables. Iowa State University Extension food safety specialist Sam Beattie provided guidance on food safety issues.

Developing a packing facility need not be complicated, but some basic considerations should be taken into account. Some of the key issues discussed at both workshops include start up costs and time commitment, handling systems, hygiene and food safety, and traceability.

Start-up and time commitment

Initial costs for a postharvest handling facility can be as modest as a few hundred dollars for an open-air, outside facility. Proposed food safety regulations likely will change the way that vegetable operations manage their postharvest operations, and may include additional investment to upgrade facilities.

At both farms hosting the workshops, the postharvest handling facilities have changed to accommodate growth within each operation. That growth also has enabled them to offer a better quality product. Chris Blanchard of Rock Spring Farm said new growers should not expect to enter the market with the same type of facilities that he has now. He said it takes experience, time and investment. He recently invested \$150,000 to \$200,000 in a new vegetable packing facility; when he started his business in 1999, he did all postharvest processing in a small high-tunnel structure.

Clean starts in field

At Black's Heritage Farms, Norine Black told workshop participants that they need to be thinking continually about their washing and packing system to improve efficiency, quality and food safety.

Food safety practices for fresh produce begin in the field and carry through into postharvest handling. Both growers told participants that the most fundamental aspect to food safety is laborer hygiene, and more specifically, frequent hand washing.

"Hand-washing stations need to be conveniently placed throughout the harvest-wash-pack system," Blanchard said, "and it would help if these systems were comfortable, such as having hot water for cold days so employees more readily conform to these requirements."

Another basic requirement for the packing shed is that equipment, tools and surfaces are routinely cleaned and disinfected.

Tracing is critical

The ability to trace products through the system will become more important and may be required in the near future, participants were told. Both Blanchard and Black use a tracking system with a code that is placed on the produce. Blanchard said his system allows him to track a batch of produce back to a field. Beattie explained that

the minimum requirements for traceability should include these details: date harvested, date distributed, place of distribution, and how long the product can be kept on the shelf at various retail outlets.

It was obvious from the two workshops that handling systems can vary greatly between farms for many reasons. What's the same is the need to continually evaluate postharvest operations to improve efficiency, hygiene and food safety.

Postharvest Handling Decision Tool

This on-line tool is one of the first resources created for the Iowa Fruit and Vegetable Working Group. Users can find details on handling vegetable crops after harvest: bunched greens, tender crops (excluding tomatoes, zucchini and summer squash), dry-cured alliums and bulk roots and tubers. The site also has information about equipment and packing shed considerations, and food safety.

EDITOR'S NOTE: This is excerpted from an article written for the Rodale Institute's New Farm web site: www.rodaleinstitute.org. Robertson co-leads the Iowa Fruit and Vegetable Working Group.

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Post-Harvest Handling Decision
Tool: www.valuechains.org/fruitvegetable/postharvest.htm

Photo gallery, tips from Blanchard:
www.leopold.iastate.edu/gallery/FVWG_slideshow/index.html



Above left: Participants process cucumbers during the field day at Black's Heritage Farms. Above right, Chris Blanchard at his Rock Spring Farm near Decorah.

Study compares air pollutants in swine hoops, conventional facilities

By NANCY G. Newkirk and PETER S. THORNE Guest Contributors

The Leopold Center and the Center for Health Effects of Environmental Contamination jointly funded swine air quality work recently published in the *Journal of Occupational and Environmental Hygiene* (Thorne et al. 2009). The overall goal was measure and compare airborne contaminant concentrations inside and outside upwind (100 ft) and downwind (500 ft) of hoop barns and conventional confinement buildings. The study also investigated variables influencing contaminant concentrations such as number of pigs, pig housing density, temperature, wind speed, season and humidity.

Investigators compared conventional swine confinement operations with hoop operations. Hoops are open to the environment and use a composted bedding system as opposed to the conventional method of housing pigs in buildings with slatted floors, under which pits collect their manure slurry. In conventional facilities, animals are housed without bedding and pigs eat, rest and defecate in the same area, often exhibiting aggressive behavior that can increase airborne particulate matter. In a hoop barn, animals are housed in an arched, fabric-roofed structure (resembling a half cylinder) open on one or both ends. Hoops typically have a concrete floor at the front end where pigs eat and the remaining area is covered with straw or corn stover bedding where pigs root and rest; defecation usually is confined to a corner of the building.

Air sampling was performed simultaneously at the two sites. The operations were separated by about 15 miles and no other animal feeding operations were present within one mile. Significant differences in contaminants were observed between hoops and confinement buildings and across seasons for endotoxin, odors, airborne microorganisms and hydrogen sulfide. Endotoxin levels were exceedingly high in both types of barns, averaging over 3,000 Endotoxin Units per cubic meter of air sampled (EU/m³) and ranging as high

The study focused on multiple buildings at two livestock operations in central Iowa, visited 10 times over two years to measure these variables:

- inhalable airborne particles
- endotoxin (bacteria linked to toxins)
- odors
- hydrogen sulfide
- bacteria
- fungi
- airborne microbes
- wind speed
- temperature
- humidity

as 57,800 EU/m³. This is well above the “no effect” level of 50 EU/m³ in terms of respiratory health.

Confinements had seven times more hydrogen sulfide and three times more odor concentrations than hoop barns. Averaged over the study, hydrogen sulfide levels were 150 parts per billion (ppb) in the confinements and 20 ppb in the hoops.

Odor levels in the confinements ranged from 150 to 1800 dilutions with a mean of 430 dilutions. This indicates that, on average, the odor could still be reliably detected by panelists after diluting 1 balloon-full of the barn air with over 400 balloons of pure air. Downwind 500 feet from the confinement barns, odor was reduced to 60 dilutions.

Differences by barn type, number of pigs, and, in some cases, temperature and humidity also were observed. The time of year that the sampling was done also affected contaminant levels in both systems. Whereas hoop barns had highest concentrations of endotoxin and odor in the fall, confinements showed the highest levels in the spring. Both types of swine operations produced high airborne concentrations of endotoxin, odor, hydrogen sulfide, bacteria and fungi that exceeded recommended exposure limits. Endotoxin and odors were found downwind at concentrations that have been previously associated with adverse health effects.

The amount of time a person is exposed to contaminants inside confinement buildings has been linked to increased respiratory symptoms. Swine confinement workers have an increased risk for the development of chronic respiratory symptoms such as bronchitis, occupational asthma and respiratory tract infections or disease, and their lung function can decline rapidly over time. Even so, workers represent a highly selected population and actually may be less susceptible to exposures in livestock feeding operations than the general public. People living or attending school in the vicinity of large-scale confinement facilities versus those who do not may be at increased risk of developing respiratory symptoms, diminished quality of life, depression and mood disorders.

Conclusions

This study investigated relatively small animal feeding operations that do not necessarily represent the largest facilities in the pork industry. The majority of swine operations in the United States have fewer than 5,000 hogs. However, 54 percent of U.S. pork production is from 110 larger facilities with more than 50,000 hogs, and 78.5 percent is from operations with more than 5,000 hogs. Thus, it is expected that data from this study underestimates exposures from very large livestock confinement operations, while providing reasonable estimates of the majority of swine operations.

Statistical tests that compared contaminants between hoop barns and conventional confinement buildings demonstrated significantly higher levels of hydrogen sulfide and odor in confinements and significantly higher total microbes and viable bacteria in hoops. Hoops were found to produce substantial toxicant air emissions and cannot be considered less polluting than conventional confinement operations.

This study also identified contaminant concentrations that exceed recommended exposure limits for human health including endotoxin, odor, and bioaerosols. Statistical analysis models for in-barn endotoxin, inhalable dust, odors and total microbes showed differences by barn type while season was an important predictor for endotoxin, odors, viable bacteria, and total microbes. These findings point to contaminants of concern for animal and human health and suggest the factors that govern their production and release.



Nancy Newkirk is coordinator of the Environmental Health Sciences Research Center at the University of Iowa.

Peter Thorne is professor and acting head of the Department of Occupational and Environmental Health at the University of Iowa.



Keeney lecture explores Gulf hypoxia issues

By ALLISON SEVERSON Communications Assistant

One of the scientists who has measured the size and researched the science of the oxygen-deprived “dead zone” in the Gulf of Mexico every year since 1985 shared his findings at Iowa State University in November. Eugene Turner, Distinguished Research Master for the Coastal Ecology Institute and oceanographer at Louisiana State University, presented the 2009 Keeney Distinguished Lecture series, which honors Leopold Center founding director Dennis Keeney.

Turner spoke to an attentive audience, explaining everything from why starfish are changing their habits to why Iowa’s water quality correlates with Louisiana’s fisheries. He also put forth one idea that might improve water quality at least as much as other federal efforts.

“I propose a competition, a project involving all USDA employees to see which watershed can reduce pollution the most over 10 years,” he said.

Turner is a member of the Louisiana Universities Marine Consortium that takes measurements to determine the size of the “dead zone” every summer during a week-long cruise throughout the Gulf. The area was just over 3,000 square miles in 2009. It forms when excess nutrients, or eutrophication, promote algal growth. As dead algae decompose, oxygen is consumed in the process, resulting in low levels of oxygen in the water.

Hypoxic waters have dissolved oxygen

concentrations of less than 2-3 parts per million. Turner noted that most ocean creatures try to stay out of low-oxygen areas, but some get trapped. Complicating factors are slope and ocean current.

“Starfish normally bury themselves in sediment on the ocean floor, but there is no oxygen there, and now they are pushing their way up above the surface,” Turner explained.

He reported hypoxia’s effect is most severe on diatoms, single-cell algae that are the most common types of phytoplankton and the basis of the aquatic food chain.

Turner pointed out that the nitrogen load in the Mississippi River as it enters the Gulf is directly proportional to the level of hypoxia in the Gulf of Mexico. “Nitrogen measurements in May will tell you what the hypoxia zone will be like in July. As of yet, climate is not directly playing a role,” he said.

The Gulf of Mexico has one of the world’s largest hypoxic zones and includes about 30 percent of U.S. fisheries. However, problems from excess nutrients are not confined to coastal areas and estuaries. In one study he cited, 31.8 percent of all streams in the United States are stressed by nitrogen; phosphorus was close behind at about 30 percent.

“A watershed problem requires a watershed solution. It will require a lot of people at the table, and we want that,” he said. “Louisiana will benefit or hurt directly from Iowa’s actions.”

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Turner presentation, audio:
www.leopold.iastate.edu/news/pastevents/turner/turner.html

Mississippi River Gulf of Mexico Watershed Nutrient Task Force:
www.epa.gov/msbasin/

What contributes to hypoxic zones?

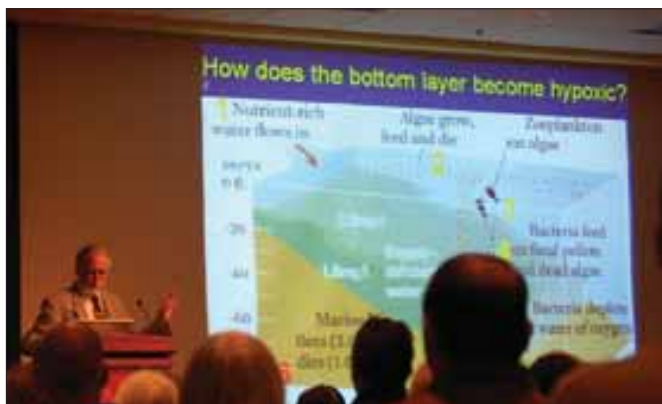
Here is Turner’s list of factors and their role in creating conditions that lead to hypoxia:

Important factors:

- Stratification
- Currents
- Winds, waves
- Nutrient-enhanced primary production
- High flux of surface carbon to the seabed
- Oxygen consumption exceeds oxygen resupply
- Directly proportional to N load sediment carbon legacy

Unimportant (or minimal) factors

- Deep-water oxygen minimum layer
- Allochthonous river carbon
- Groundwater
- Wetland erosion
- Estuarine nutrients
- Mississippi river deltaic levees
- Reduced suspended sediments
- Upwelled nutrients
- Climate (not as yet)



Above left: Marine ecologist Gene Turner explains the science behind hypoxia to an interested crowd during the Keeney Distinguished Lecture at Iowa State. Above right: ISU graduate student Laura Christiansen shares findings from her research on the effectiveness of end-of-tile bioreactors to remove nitrates (work also supported by the Leopold Center) to Turner (center) and the Leopold Center’s first director, Dennis Keeney.

Farmers as teachers as well as stewards

By ALLISON SEVERSON Communications Assistant

Francis and Susan Thicke produce skim, low-fat and whole milk in their on-farm organic dairy as well as yogurt and cheese, all of which is sold locally. They've restored their 236-acre farm near Fairfield with deep-rooted perennials and legumes and rotationally graze their Jersey cows in new paddocks twice each day.

But what impresses Jennifer Steffen the most about the Thickees is how they use their farm to teach others about sustainable agriculture.

"I'm fortunate to have shared time with Francis and Susan on several occasions, including a master conservationist program offered by Iowa State University Extension," said Steffen, who owns a farm in Van Buren County and represents the State Soil Conservation Committee on the Leopold

Center Advisory Board.

"They kindly agreed to host our students and speak about their organic dairy operation, offering thoughtful conversation on different practices," she said. "I overheard a question one of our students asked a young Radiance Dairy employee who had been helping with the tour. He was asked if he liked his job at Radiance Dairy ... his response was, 'I love my job because Francis is such a good teacher.'"

Steffen presented the 2009 Spencer Award for Sustainable Agriculture to Francis and Susan Thicke during the Iowa Organic Conference in Ames December 5. She said the couple's business success and commitment to conservation and education that goes far beyond their farm gate led to their selection for

Iowa State University recognizes DeWitt for lifetime of service

By ALLISON SEVERSON Communications Assistant

Leopold Center director Jerry DeWitt has tried to visit at least 25 farms every year during his nearly 38-year career.

"Farmers are great teachers and I've learned so much from them," he says. "Sustainable agriculture is a wonderful combination of learning and sharing and making connections between people and the land."

DeWitt is one of the newest recipients of the George Washington Carver Distinguished Service Award from the ISU College of Agriculture and Life Sciences. The award was established to honor ISU alumni and friends for outstanding achievements in the agricultural, food, environmental, social and life sciences.

An ISU faculty member since 1972, DeWitt helped establish the first tenured organic agriculture faculty position at Iowa State and at a land grant university. He also guided development of ISU's Integrated Pest Management program and has served as ISU Extension's state sustainable agriculture coordinator since 1994. He became director of the Leopold Center in 2005 and has led the Iowa Learning Farm program since 2007.

The desire to create practical knowledge to help people also was a guiding force for George Washington Carver (1864-1943), the first black student and faculty member at Iowa State University. Carver helped South-

ern farmers by developing thousands of uses for crops they could grow, such as peanuts, soybeans and sweet potatoes.

Linda O. McMurry, author of *George Washington Carver: Scientist and Symbol*, said Carver was a magnificent interpreter and humanizer of science who provided a critical link between researchers and lay audiences. "An evaluation of the true significance of his research is best reserved for the discussion of his philosophy and values," she writes.

DeWitt's passion for the land also is evident in his photographs, which can be seen in the photo galleries on the Leopold Center web site and in two books. *People Sustaining the Land* provides first-person narratives from 26 farmers, black-and-white photographs by documentary producer Cynthia Vagnetti and color photography by DeWitt. In 2003, he also was photo director for *Renewing the Countryside—Iowa* that was published as a Leopold Center special project.

"I have been changed by what I have seen, what I have heard. I have been a guest and student on a learning journey of people on the land," DeWitt said after visiting farmers throughout the United States while on a faculty improvement leave in 1998. "These are the people who have sustained their land, their lives and ultimately me."

www.leopold.iastate.edu

See photos and more from the Spencer Award presentation:
www.leopold.iastate.edu/resources/spencer/spencer.htm

the Spencer Award, given to a farmer, educator or group each year for contributions to sustainable family farms in Iowa.



Francis and Susan Thicke, with Leopold Center board chair Jennifer Steffen.



Seeing double: Here's Jerry DeWitt, on the steps of Curtiss Hall underneath a banner noting his recent Carver Award.

DeWitt was recognized in October during the annual Iowa State University Alumni Association Honors and Awards ceremony. The George Washington Carver Distinguished Service Award also went to Charles Sukup for his contributions in the engineering of grain handling and storage equipment.



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Highlight Events

More details, events

Check Leopold Center Web calendar:
www.leopold.iastate.edu/news/events.htm

Kirschenmann writings to appear in new book

Essays and other writing by Leopold Center Distinguished Fellow Fred Kirschenmann have been compiled in a book to be published in March 2010 by the University Press of Kentucky. The 392-page volume, *Cultivating an Ecological Conscience: Essays from a Farmer Philosopher*, documents Kirschenmann's evolution and contributions in a collection of writings on farming, philosophy and sustainability. He worked with New Mexico State University agricultural economist and editor Connie Falk to recount his 30-year journey toward what has been called a new agrarianism.

The book recounts Kirschenmann's personal history from childhood lessons learned on his third-generation family farm in North Dakota to development of his philosophy as a trained theologian. He presents practical advice as well as insights into the necessity for ecologically sound farming and responsible stewardship of the land.

The book is available on the publisher's Web site: www.kentuckypress.com.



February 28

Shivvers Memorial Lecture, 7 p.m., Sun Room, ISU Memorial Union, Ames, "Wisdom of the Last Farmer" by author and California peach farmer David Mas Masumoto.

March 3-4

Fifth Annual Midwest Cover Crops Council Workshop, ISU Memorial Union, Ames, hosted by the Leopold Center, ISU and Practical Farmers of Iowa.

March 4-5

The Drake Forum on America's New Farmers: Policy Innovations and Opportunities, Washington, D.C. Planned by Drake University's Agricultural Law Center and supported by the Leopold Center through the Sustainable Agricultural Land Stewardship project.

March 6

Third Annual Ames Reads Leopold, Ames Public Library, Ames: Features readings from Aldo Leopold's *A Sand County Almanac*.

April 1

Marketing and Food Systems Initiative Workshop, Gateway Conference Center, Ames, featuring results of projects funded by the Leopold Center and the Regional Food Systems Working Group.