from Iowa Caret representatives and
Report to Iowa Senators and
Representatives
in the United States Congress

FEBRUARY 2011

COUNCIL FOR AGRICULTURAL RESEARCH, EXTENSION AND TEACHING

IOWA STATE UNIVERSITY
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**WHAT IS CARET?**

The Council for Agricultural Research, Extension and Teaching (CARET) is a national grassroots organization created in 1982 by the Division of Agriculture, which is part of the Association of Public and Land-grant Universities (APLU). CARET’s mission is to enhance national support and understanding of the land-grant university system’s food and agricultural research, extension and teaching programs to achieve a better standard of living for all people. CARET delegates are chosen by land-grant universities to be representatives of their states’ land-grant programs.

**Agriculture is the centerpiece of Iowa’s economy and society. The future of the state depends on a strong agricultural economy. Iowa State University is a committed resource for Iowa’s future. Through research, extension and teaching in agriculture, Iowa State is becoming the best at fulfilling the mission of the land-grant university.**

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**ON THE FRONT COVER:** Agronomy professor Andrew Manu, right, and students Lily-Love Topar and Nathan Anderson dig into a soil pit at the Agronomy Farm. Manu leads a hands-on soils course that serves as an introduction to the subject for more than 400 agronomy, horticulture and landscape architecture students each year.
LEOPOLD CENTER DEVELOPS LOCAL FOOD AND FARM PLAN

The Leopold Center for Sustainable Agriculture proposed a new statewide plan to boost the local food economy and increase opportunities for those who want to buy or sell Iowa-raised meat, poultry, eggs, dairy, fruit, vegetables and other crops in local and regional markets. The recommendations are part of the Iowa Local Food and Farm Plan, which was submitted in January 2011 to the Iowa Legislature. The plan’s 34 recommendations include creation of a state-level local food and farm program, education and training for producers and local food businesses, changes in state policy to benefit local food businesses and data collection to track growth of local food sales.

SOYBEAN ASSOCIATION AND ISU PUBLISH WEED FIELD GUIDE

The Iowa Soybean Association and Iowa State have developed a new resource to help soybean growers recognize and manage weed problems. The Weed Identification Field Guide includes images and descriptions of 56 broadleaf weeds and 19 grass and grass-like weeds. The 104-page booklet aids in accurate weed identification as well as weed lifecycle and herbicide management and stewardship information.

RESEARCH HELPS PRODUCERS FEED ETHANOL CO-PRODUCTS

Iowa State is at the forefront of studying the feeding of co-products from corn milling operations. The growth of the state’s ethanol industry has accelerated this focus. Most research projects involve seeing how much of the corn in a typical ration can be replaced with ethanol plant co-products. Researchers are studying the possibility of taking all the corn out of a beef cattle ration, and supplementing distillers grains with corn stalks or chopped grass hay. This alternative might help producers remain profitable despite increasing corn prices.

RESEARCH IMPROVES SEED HEALTH

Scientists are working to obtain a better understanding of the complex interaction between genes, physiology and seed quality. The knowledge generated in a freeze injury study helped Iowa seed companies make science-based business decisions following an early frost in the fall of 2009. The expected results and goal of the work are to increase efficiency and cost effectiveness of crop establishment.

GENETIC TESTING TO BOOST DAIRY COWS WELL-BEING

Dairy cows devote so much energy to milk production they can’t consume enough feed to meet the needs of production resulting in negative energy balance. Researchers are studying how negative energy balance might contribute to fertility problems and affect other ‘fitness traits’ that influence cows’ well-being. The research involves determining the cow’s genotype across 50,000 locations of the cow’s genome and calculating a breeding value to rank cows based on the energy balance trait.

ENSURING PROFITABLE PRODUCERS

A new, free, online tool to help farmers make better-informed operational decisions has been developed by software experts at Iowa State. The program, called I-FARM can be found at i-farmtools.org. It assists farmers, bankers, extension, cooperative employees and anyone else interested in finding out more about farm management and in understanding how to get more out the land at the least cost.

FREE, ONLINE TOOL HELPS FARMERS EARN MORE

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FREE, ONLINE TOOL HELPS FARMERS EARN MORE
A biofuel systems research project compares the agronomic and environmental performance of corn, soybean and plots of perennials composed of mostly native prairie species. Ultimately the project will assess the economics of how much the farmer would make if the corn and biomass were converted to ethanol, but also what a farmer might receive if compensated for carbon storage, improvements in water quality and reductions in greenhouse gas emissions.

Biofuels research is examining algae as a source for biofuels, but a lack of understanding of the genomes of most algae is delaying the potential of stacking traits to make them produce more oil, offer better thermal resistance or any of the other characteristics needed. A $4.37 million grant from the U.S. Department of Energy intends to develop a micro-algal platform that will allow micro-algae to be treated as a crop. Martin Spalding, professor and chair of genetics, development and cell biology, is working with the one type of alga that has been genetically mapped.

Two years into a study looking at methods of using a cover crop between corn rows shows that yield can be maintained at high levels using environmentally friendly practices. Researchers are testing between-row cover grasses as part of research looking at ways to reduce soil runoff and keep vital nutrients in the soils while crop residue, called stover, is removed from farm fields to produce biofuels. With U.S. government targets requiring a 30 percent displacement of petroleum consumption with fuels made from biomass by the year 2030, agronomy researchers are studying methods of harvesting more and more stover, which previously was left on the field.

Research is seeking to develop biofuels from forest-based lignocellulose and to produce new ingredients useful in fiber-based composites. The overall goal is to enhance the use of wood and the development of sustainable and environmentally appropriate solutions to national energy problems. Methods for pre-treatment of biomass for biofuels production have been improved. Work is progressing to commercialize formaldehyde-free adhesive formulations for wood composites manufacturing.

Analyses by the Center for Agricultural and Rural Development (CARD) are used by policymakers in making decisions about farm policy, land use and trade negotiations, by other agencies with stakes in these issues, and by researchers. Investment in developing a biofuels model, which captures the interaction between energy and agriculture, has enabled CARD to meet continued strong demand for objective biofuels-related analysis and data from policymakers, commodity groups, agribusiness, environmental advocates and other significant stakeholders in the biofuels sector.

The viability of corn-based bio refineries rests upon production of multiple products with a range of values. Iowa State is investigating protein-based products for material properties that can be used in surfactants, anti-fouling coatings, self-assembling films and fibers, adhesives and strong gel formers. One example is collagen, a natural protein that combines a potential pharmaceutical market with being widely used as a food product. Another is a small designer protein with biodegradable surfactant properties.

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Impact, Jobs and Consumers

**Council for Agricultural Research, Extension and Teaching**

**Impact, Jobs and Consumers**

**FOOD CHAIN LINKS GATE TO PLATE**

<table>
<thead>
<tr>
<th>CONGRESSIONAL DISTRICTS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>STATE TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ag-related employment</strong>*</td>
<td>66,912</td>
<td>66,281</td>
<td>45,817</td>
<td>83,023</td>
<td>104,732</td>
<td>396,588</td>
</tr>
<tr>
<td><strong>Total employment</strong></td>
<td>374,368</td>
<td>406,980</td>
<td>473,948</td>
<td>350,579</td>
<td>345,768</td>
<td>1,951,644</td>
</tr>
<tr>
<td><strong>Ag-related as percent of total employment</strong></td>
<td>17.9</td>
<td>16.3</td>
<td>9.7</td>
<td>23.7</td>
<td>30.3</td>
<td>20.3</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>591,567</td>
<td>616,136</td>
<td>638,190</td>
<td>595,530</td>
<td>566,433</td>
<td>3,007,856</td>
</tr>
</tbody>
</table>

*The sum of economic impact values for the five congressional districts does not equal the state total. The state and district values are obtained from a unique input-output model built specifically for that region. The figures include the direct employment and value added produced within these industries, plus the related spinoff activity that they stimulate in the remainder of Iowa’s economy, from crop farming, cattle ranching and farming, dairy cattle and milk production, poultry and egg production, hog and other animal production, forest, fur, furs and other animal products, loggers, loggers and lumberers, logging, fishing, fur farming and trapping, support activities for agriculture and forestry, food and beverage manufacturing, ethanol and other basic organic chemical manufacturing, farm machinery and equipment manufacturing, and other agricultural machinery and equipment manufacturing.

**LINKS TO IOWA STATE UNIVERSITY**

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<th>4</th>
<th>5</th>
<th>STATE TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>2,302</td>
<td>2,389</td>
<td>4,776</td>
<td>5,922</td>
<td>3,059</td>
<td>18,448</td>
</tr>
<tr>
<td><strong>Extension</strong></td>
<td>19,619</td>
<td>18,050</td>
<td>9,710</td>
<td>17,801</td>
<td>28,501</td>
<td>93,681</td>
</tr>
<tr>
<td><strong>Alumni</strong></td>
<td>8,763</td>
<td>10,862</td>
<td>26,316</td>
<td>28,960</td>
<td>10,645</td>
<td>85,546</td>
</tr>
</tbody>
</table>

*Most undergraduate and graduate students enrolled at Iowa State come from Iowa. Total enrollment was 28,682.

Iowa State has nearly 220,000 alumni around the world, and more than 19,000 College of Agriculture and Life Sciences alumni living in Iowa. About 70 percent of College of Agriculture and Life Sciences graduates stay in Iowa for their first job.

Based on July 1, 2009 estimates from the U.S. Census Bureau.
IsU EasEs Loan aCCEss foR Iowa EnTREpREnEURs

Nationally, Iowa ranks near the bottom in business startups partly because small entrepreneurs had difficulty accessing loans of less than $50,000 and connecting with Iowa technical assistance networks. As a result, the Iowa Foundation for Microenterprise and Community Vitality (IFMCV) was organized as a nonprofit corporation. The foundation was supported by a $500,000 grant from the Northwest Area Foundation and Community Foundation of Greater Des Moines and by technical assistance and $50,000 in annual funding from Iowa State’s Community Vitality Center. An experienced lending administrator was hired and the foundation became a statewide intermediary with an SBA $750,000 revolving microloan fund. Eligibility requires submission of previous credit and denial letters for conventional loans. In its first 30 months, IFMCV established eight partnerships, reviewed 120 applications, approved 30 business loans, received $1 million in operating and technical assistance grants, and established $8 million in microloan capacity.

RESEARCH SEeks QuICKer SALMONELLA DETECTION

Using technology available through a local company, Byron Brehm-Stecher, food science and human nutrition, is working on a faster method to detect and genetically identify salmonella from contaminated foods. The new approach can provide DNA sequencing-like results in hours rather than days.

RESEARChERS STuDY FOoD CHOICES AND HEALTHe

The food system is changing dramatically to meet the needs of consumers and to take advantage of new technologies and science related to food processes, control of food safety risks and knowledge about the links between food and health. Researchers are working to increase knowledge and improve understanding of factors that determine food choices, behaviors and health-related outcomes and related public policies.

FOoD SAfETY EFFoRTS STaRT ON THE FaRM

The Food Safety Consortium, a partnership of the University of Arkansas, Kansas State University and Iowa State, has been working to improve the safety of meat in the United States. The efforts begin on the farm, helping livestock producers grow healthier animals with fewer food-borne disease organisms. The Food Safety Consortium to Protect Beef, Pork and Poultry from contamination addresses potential threats to food safety during the production of the live animal, processing, distribution and consumption.

EXtEnSIoN TRAINIng PROVIDES SAFEr MEEt

Improper animal handling and inadequate food safety can have serious negative consequences on our food supply. West Liberty Foods and Iowa State developed a program that trains meat plant employees in proper food safety and assists producers, animal transporters and plant delivery-site personnel in implementing animal handling and quality assurance procedures.

PRoJECT SEeks BOoST FOR RURaL COMMUnITIES

Many rural communities need innovative strategies to improve their economies and quality of life. Iowa State research is examining the prospects, problems and impacts of entrepreneurship and self-employment as strategies for social and economic development of rural communities. The abilities of the self-employed and entrepreneurs to recognize opportunities and motivations for starting new ventures will be evaluated along with the types of support needed and received by founders of new businesses.

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Pork producers are establishing vegetative environmental buffers with the help of the Iowa Pork Industry Center, Iowa State faculty and the Coalition to Support Iowa Farmers. The buffers, consisting of trees and shrubs, are designed to provide windbreaks and wildlife habitat; improve soil, water and air quality; and conserve on-farm energy use.

Feed additives proven to improve air quality
Iowa leads the nation in egg production with close to 60 million laying hens at 65 locations around the state. A feeding demonstration showed reductions in the ammonia coming from those operations. A research team affiliated with ISU’s Egg Industry Center tested how two alternative diets affect ammonia output. Preliminary findings showed about a 21 percent reduction from feeding a diet with 10 percent dried distiller’s grain with solubles (DDGS) and approximately 42 percent using a commercial feed additive called EcoCal.

New outreach project provides research
Conventional tillage systems and row crops management can have great impact on soil organic matter and soil quality. Iowa State research has documented the value of conservation practices in increasing soil carbon sequestration. No-till practices led to an increase of soil carbon by a half ton an acre per year. The findings helped increase awareness of farmers in Iowa to adopt conservation practices and the development of a new outreach project, called the Iowa Learning Farm, for promoting conservation practices.

Team finds safer way to extract soybean oil
Iowa State researchers developed an environmentally friendly way to extract soybean oil for food or biodiesel uses. The team partnered with enzyme manufacturer Genecor International and soybean processor West Central Cooperative to develop and commercially adopt the new processing technology. The process uses water and enzymes to replace petroleum-derived hexane, a highly flammable, expensive and hazardous pollutant.

Small changes help reduce nutrient loss
Recent findings showed that by planting switchgrass and using certain agronomic practices, farmers can significantly reduce the amount of nitrogen and nitrates that leach into the soil. The researchers also found that phosphorus runoff into Iowa’s rivers, streams and lakes can be slowed by farmers changing how they plant and fertilize their crops.

Researcher develops bio-based fuel additive
A new green, bio-based method for producing a much-used fuel additive and industrial chemical that is currently made from petroleum products has been developed by an ISU researcher. Thomas Bobik, professor of biochemistry, biophysics and molecular biology, invented a process for manufacturing isobutene by identifying a new, natural enzyme that produces the chemical organically.
Preparation tomorrow’s leaders

Students Learn Development in Ugandan Schools

The Center for Sustainable Rural Livelihoods engages ISU faculty, staff and students in outreach, training and research activities that enable rural people in the developing world to produce sufficient food, earn sustainable incomes and encourage good health. Iowa State students in the center’s service learning program teach primary school students in Uganda to raise their own food in gardens at school and at home. The gardens provide food for their schools and families as well as potential income from sales of excess production.

Biorenewables Education Open to Undergraduates

Iowa State University established the first graduate program in biorenewable resources, and now undergraduates can get in on the action. A USDA Higher Education Challenge Grant helped create a 20-credit undergraduate certificate in biorenewables and entrepreneurship. The certificate provides a way for students to receive formal recognition of focused study in this specialized area.

Academic Departments

- Agricultural & BioSystems Engineering
- Agricultural Education & Studies
- Agronomy
- Animal Science
- Biochemistry, Biophysics & Molecular Biology
- Ecology, Evolution & Organismal Biology
- Economics
- Entomology
- Food Science & Human Nutrition
- Genetics, Development & Cell Biology
- Horticulture
- Natural Resource Ecology & Management
- Plant Pathology
- Sociology
- Statistics

Centers, Institutes and Initiatives

- Agricultural Entrepreneurship Initiative
- Agricultural Marketing Resource Center
- Beginning Farmer Center
- BioSafety Institute for Genetically Modified Agricultural Products
- BioCentury Research Farm
- Brenton Center for Agricultural Instruction and Technology Transfer
- Center for Agricultural and Rural Development (CARD)
- Midwest Agribusiness Trade Research and Information Center (MATRIC)
- Food and Agricultural Policy Research Institute (FAPRI)
- Center for Agricultural Law and Taxation
- Center for Corps Utilization Research (CCUR)
- Center for Integrated Animal Genomics
- Center for Sustainable Rural Livelihoods
- Community Vitality Center
- Corn and Soybean Initiative
- Egg Industry Center
- Food Safety Consortium
- Iowa Beef Center
- Iowa Grain Quality Initiative

Regional Centers

- North Central Regional Aquaculture Center
- North Central Regional Plant Introduction Station
- Rural Policy Research Institute (RUPRI)

ISU Extension Programs

- Agriculture and Natural Resources
- Center for Industrial Research and Service
- Communities
- Continuing Education and Communication Services
- Families
- 4-H Youth Development

Simulation Software Has BioRefinery Lesson

Educational modules of undergraduate and graduate engineering and technology course work are being developed to teach the operation, troubleshooting and optimization of bio refineries. The new curriculum will be centered on the development of a virtual reality simulation software package that will look and feel like a real biofuel facility allowing students to gain experience with a life-like system.

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