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.

IOWA CARET REPRESENTATIVES

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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.

IOWA STATE UNIVERSITY

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ISU RESEARCHERS HELP SEQUENCE CORN, SOYBEAN AND SWINE GENOMES
data

Iowa State scientists were part of the teams that completed sequencing the corn, soybeans and swine genomes. The three separate efforts represent the principal crops and livestock raised in Iowa.

• The researchers on the soybean genome team reported that having access to all the hereditary material that controls all the traits in soybean enables the ability to make directed improvements, such as disease and aphid resistance, production stability in an unpredictable climate, low iron tolerance, nutritional composition and tolerance to flooding and drought.

• The corn genome work identified other problems." Other new pig genome should translate into enormous opportunities for treating human diseases than the pig. A deeper understanding of the pig genome may yield new information important to human health. You can't pick a better model system for studying human diseases than the pig genome. He said the first draft of the pig genome sequence has extra meaning for Iowa, the nation's leading producer of pigs. "But ultimately, it's consumers who'll benefit," Rothchild said. "Besides improved pork products, the sequence, or DNA structure, of the pig genome may yield new information important to human health. You can't pick a better model for studying human diseases than the pig. A deeper understanding of the pig genome may yield new information important to human health." A device that would sense the effective radiant temperature in an animal pen and turn heaters off and on would save fuel and ensure healthy animals. Researchers created simulated young pigs, dubbed Sim-Pigs, from rain gutter downspout sections. Temperature sensors were installed inside each Sim-Pig, which then were filled with fiberglass insulation. Ten Sim-Pigs were used to sense the heating zone. While this experiment used simulated young pigs as the subject, the sensing system could be used for any young animal that needs a controlled microclimate, according to researchers. The company funding the research, Raydot Inc. of Cokato, Minn., has developed a commercially available sensor based on the prototype.

FARM ENERGY SAVINGS FOCUS OF CHECK-UP PROGRAM
Data

Iowa's agricultural producers are feeling the pinch as energy and fuel costs increase. ISU Extension partnered with Iowa Farm Bureau Federation and Consumers Energy with a program to promote energy-use awareness, and reduce fuel and energy costs. The Farm Energy Check-Up program is a whole-farm energy audit program designed to highlight potential ways Iowa's livestock and crop producers can lower their energy costs and improve conservation and efficiency. A series of meetings in December 2009 showed participants easy things crop and livestock producers could do quickly and inexpensively. Producers received a free pre-audit assessment form, a requirement to enter the program, learned about grant opportunities available through the USDA's Energy Efficiency and Renewable Energy Program, and had a chance for face-to-face counseling about on-farm energy use in their operations.

WEB RESOURCE HELPS PRODUCERS DO ON-FARM RESEARCH
Data

A new Internet resource developed through Iowa State is available to help extension specialists, crop advisers, agribusinesses and growers plan and execute scientifically sound on-farm research. The collection of webcasts detailing design and data collection for different types of on-farm research are posted on the Plant Management Network (http://www.plantmanagementnetwork.org/), a nonprofit, online publishing website managed jointly by a network of university partners, agribusinesses and agriculture-focused science societies. The project was funded jointly by Iowa State's Corn and Soybean Initiative and the North-Central Integrated Pest Management Center.

Ensure profitable producers
The growing interest in finding renewable products that can be substituted for petrochemicals is tempered by the questions whether biobased plastics are economically viable and whether biobased plastics are economically viable in specific applications. That fact led Iowa State researchers to develop a software program that can help determine the economic viability of a proposed biobased product. The software considers the direct energy of a proposed biobased product. The three-year study looks at how removing residue at different rates affects soil productivity, nutrient cycling and greenhouse gas emissions in no-till and chisel-plow fields. They also want to find the optimal nitrogen, phosphorus and potassium fertilization rates needed to supplement nutrients lost from residue removal.

Iowa State agronomy researchers may soon shed light on these questions. A three-year study looks at how removing residue at different rates affects soil productivity, nutrient cycling and greenhouse gas emissions in no-till and chisel-plow fields. They also want to find the optimal nitrogen, phosphorus and potassium fertilization rates needed to supplement nutrients lost from residue removal.

A comprehensive new study by Iowa State Biopolymers and Biocomposites Research Team at the International Plastics Exposition in June. The team also exhibited samples of plastics, composites, adhesives and coatings; they have made from vegetable oils and proteins, plus flower pots and golf tees created from some of the materials they have developed.

**STUDY INVESTIGATES STOVER HARVEST EFFECTS ON YIELD, SOIL, CLIMATE**
Corn stover has been used for many years as bedding and food for livestock, as well as to nourish and protect soils. In recent years, the stalk, leaf and cob residue of corn plants left in fields after harvest has found a new market: as a potential source for cellulosic ethanol production. But harvesting the stover — which, when left in place, halts erosion and returns nutrients to the soil — could have unintended consequences, from lowering the fertility of fields to affecting productivity, soil and water quality and even climate.

A comprehensive new study by Iowa State University's biopolymers and biocomposites research team at the International Plastics Exposition in June. The team also exhibited samples of plastics, composites, adhesives and coatings; they have made from vegetable oils and proteins, plus flower pots and golf tees created from some of the materials they have developed.

**BIOCENTURY RESEARCH FARM INTEGRATES PRODUCTION AND PROCESSING**
The BioCentury Research Farm is the first fully integrated biomass production farm and processing facility in the nation. It was completed in 2009 to study biomass feedstock production; harvesting, storing and transporting of feedstocks; changes in land use arising from harvesting corn stover and other plants; new ways to process a variety of feedstocks into bioproducts; and the socioeconomic impacts on Iowa agriculture. ISU faculty and industry partners to develop advanced biorenewable fuels, biobased products and industrial chemicals from grain, agricultural residues and cellululosic crops. The farm combines biorenewables with food crops.

**NEW PROCESS PRODUCES FUEL FROM BIOMASS**
A team of ISU researchers was presented an invention award from R&D Magazine for their work using a microscopic fungus to produce biodiesel from plant processing wastes. The special biodiesel they developed, being commercialized as Mycofuel™, is made from the lignocellulosic biomass. The process involves treating switchgrass, corn stover or forestry wastes with ammonia and naturally occurring white-rot fungi to degrade the cellulose. The resulting sugars are used to grow a different fungus — mold that’s about 60 percent oil. The oil is released using an ultrasonic treatment, which causes the fungal cells to explode. The oil is then recovered by extraction with an improved organic solvent system. A catalyst — along with some added ethanol or methanol — aids in rapid transformation of the oil into a biodiesel fuel. A byproduct of the leftover fungal biomass can be used as a high-protein animal feed. The water can be reused in the fermentation process. This method of producing biodiesel is green, sustainable and doesn’t compete with food crops.

**TAPPING RENEWABLE ENERGY AND PRODUCTS**

**IOWA STATE BIOPOLYMERS SOFTWARE TESTED AT INTERNATIONAL PLASTICS SHOW**

The software was introduced by ISU’s plastic parts from different materials. It allows users to compare various costs of raw materials and processing. The software program that can help determine the economic viability of a proposed biobased product. The software considers the direct energy of a proposed biobased product.
Most undergraduate and graduate students enrolled at Iowa State come from Iowa. Total enrollment was 27,381.

Impact, Jobs and Consumers

Council for Agricultural Research, Extension and Teaching

CONGRESSIONAL DISTRICTS

<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>Ag-related employment*</td>
<td>66,834</td>
<td>58,739</td>
<td>37,942</td>
<td>83,664</td>
<td>102,616</td>
<td>366,777</td>
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<tr>
<td>Total employment</td>
<td>384,707</td>
<td>414,567</td>
<td>479,358</td>
<td>361,551</td>
<td>353,749</td>
<td>1,993,934</td>
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<tr>
<td>Ag-related as percent of total employment</td>
<td>17.4</td>
<td>14.2</td>
<td>7.9</td>
<td>23.1</td>
<td>29.0</td>
<td>18.4</td>
</tr>
<tr>
<td>Population</td>
<td>589,520</td>
<td>612,893</td>
<td>634,689</td>
<td>596,917</td>
<td>568,536</td>
<td>3,002,555</td>
</tr>
</tbody>
</table>

Based on July 1, 2008 estimates from the U.S. Census Bureau.

FOOD CHAIN LINKS GATE TO PLATE

Includes 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 nurseries; forest products and timber tracts; logging; fishing; hunting and trapping; support activities for agriculture and forestry; food and beverage manufacturing; ethanol and other basic organic chemical manufacturing; fertilizer manufacturing; pesticide and other agricultural chemical manufacturing; and farm machinery and equipment manufacturing.

The sum of economic impact values for the five congressional districts does not sum to the state total. Each region’s values are obtained from a unique input-output model built specifically for that region.

The Iowa State University provides access to the state’s high performance computing resources and expertise to help solve complex engineering and computational science problems.

Iowa State has more than 200,000 alumni around the world, and about 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 jobs.

EDUCATION

Most undergraduate and graduate students enrolled at Iowa State come from Iowa. Total enrollment was 27,381.

LINKS TO IOWA STATE UNIVERSITY

ISU Extension serves families, producers and businesses throughout Iowa. One example is the numbers shown here of rural and urban youth who participate in 4-H.

EXTENSION

Alumni

In Iowa State has more than 200,000 alumni around the world, and about 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 jobs.
Researchers have determined that naturally occurring nitrate is not present in the organic products at the same level as nitrate in conventionally cured products. But the level of concentration isn’t the only factor that affects the products’ ability to fight off pathogens. The researchers are testing various plant and animal food materials to determine whether they have antimicrobial or prebiotic properties. Antimicrobial compounds can be used to destroy or inhibit the growth of microorganisms, such as those that cause foodborne illnesses. Prebiotics are indigestible fibers that enable the growth of probiotic microorganisms, such as those that promote the survival and growth of probiotics in the human gut. Probiotics are live microorganisms, such as those present in yogurt, that can be used to combat pathogenic microorganisms and the diseases they cause.

**NEW LAB AVAILABLE FOR TESTING FOOD COMPOUNDS**

A new lab at Iowa State that enables quick identification of beneficial compounds in food is available to researchers working on improving spoilage, improving food quality, controlling foodborne pathogens and enhancing the growth of probiotic bacteria. The Discovery Lab allows researchers to test various plant, microbial or animal food materials to determine whether they have antimicrobial or prebiotic properties.

**IOWANS BENEFIT FROM EXTENSION AND OUTREACH PROGRAMS**

Nearly 76,000 Iowans participated in 300 nutrition education workshops. In a sample survey, 85 percent reported improving their diet; 48 percent increased their minutes of physical activity.

- Some 9,690 Iowans participated in ISU Extension financial management programs in 2009. In a sample survey, 64 percent reported reducing debt and 81 percent reported increasing their contributions to an employer-based retirement plan.
- Last year 7,900 Iowa high school students enrolled in the High School Financial Planning Program, building skills they’ll use as students and later as workers. ISU Extension offers the program with the Iowa Credit Union League and the National Endowment for Financial Education.
- The Center for Agricultural Law and Taxation provides timely, objective information to producers, professionals and agribusinesses about important developments in the law and is a primary source of professional educational training in agricultural law and taxation. Last year, about 1,500 lawyers, legislators, real estate and insurance professionals, farmers and rural landowners, tax preparers, financial planners and agribusiness professionals attended seminars presented by the center.

**PLANT AND INSECT DIAGNOSTIC CLINIC HELPS IOWANS IDENTIFY DISEASE AND PESTS**

The ISU Plant and Insect Diagnostic Clinic — a full-time, professionally staffed facility — has for years helped identify what is making plants sick.

- ‘It’s a tremendous resource for the state,” said Ralph Conner, arborist with Perficut Lawn & Landscape in Ankeny.
- ‘Homeowners can go through extension, but outside the clinic there’s not a good resource for arborists to verify or identify insects or diseases from a lab standpoint.” In 2008, trees accounted for 27 percent of the clinic’s samples. Insects made up another 28 percent.
- The clinic also analyzes soil samples, field crops, fruits, vegetables, turf grasses and ornamental plants, and identifies plant and insect species for clients. Timely replies are one way the clinic nurtures its client relationships.

**IMPROVING NUTRITION AND ENHANCING FOOD SAFETY**

Ready-to-eat, organic processed pork products look similar to conventionally cured meats, but they’re not exactly alike. One key difference is that the organics may contain vegetable-based nitrate which makes the organic pork product look and taste as it was traditionally cured. The problem is that the organic products, lacking the nitrite, don’t have the same level of built-in protection against pathogens such as Clostridium perfringens, Clostridium botulinum and Listeria monocytogenes. Researchers have determined that naturally occurring nitrate is not present in the organic products at the same level as nitrate in conventionally cured products. But the level of concentration isn’t the only factor that affects the products’ ability to fight off pathogens. The researchers are testing various plant, microbial or animal food materials to determine whether they have antimicrobial or prebiotic properties. Antimicrobial compounds can be used to destroy or inhibit the growth of microorganisms, such as those that cause foodborne illnesses. Prebiotics are indigestible fibers that enable the growth of probiotic microorganisms, and the diseases they cause.

**EXTENSION HELPS CHILD CARE CENTER STAFF PROVIDE QUALITY CARE**

ISU Extension’s New Staff Orientation gives new child care worker orientation program that can be initiated immediately, on site, and with director supervision and input. About 50 percent of all Iowa child care centers are required to implement the program, and in the past year ISU Extension provided 16,240 hours of training for more than 1,000 new early childhood staff.

- The ISU Extension’s New Staff Orientation gives new child care center and preschool staff a complete educational orientation program that can be initiated immediately, on site, and with director supervision and input. About 50 percent of all Iowa child care centers are required to implement the program, and in the past year ISU Extension provided 16,240 hours of training for more than 1,000 new early childhood staff.
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**HELPING RURAL IOWANS PROSPER**

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EXTENSION PROVIDES INFORMATION ON SAVING THE ENVIRONMENT AND MONEY

Helping livestock producers become better stewards of the land has been an important and long-time focus of Iowa State University Extension. Through its programs and publications on manure management, air and water quality and preserving wildlife habitat, Extension provides information on these green issues:

• A series of publications on manure management showed producers that “going green” can earn them more money. A collaborative effort of ISU Extension groups produced five money . A collaborative effort of ISU on these green issues:

• Field specialists with the Iowa Beef Center have provided cattle producers with the tools to manage wildlife habitat in grazing areas through a variety of summer pasture walks, on-farm demonstrations and a special session on the topic at a statewide conference, Optimizing Grazing and Enhancing the Environment .

• The Iowa Pork Industry Center has worked with campus faculty and the Coalition to Support Iowa Farmers to provide information to pork producers on establishing vegetative environmental buffers. These buffers, consisting of trees and shrubs, are designed to provide windbreaks and wildlife habitats; improve soil, water and air quality; and conserve on-farm energy use.

PORTFOLIO OF CROPPING SYSTEMS TESTED FOR BIOFUEL FEEDSTOCKS

Cellulosic feedstocks for biofuels show potential advantages compared to grain-based systems, including reduced energy and nitrogen inputs, higher rates of energy return, utilization of more complex species mixes, greater soil carbon sequestration, reduced greenhouse gas emissions and enhanced environmental benefits. It is unlikely, however, that a single cellulosic biomass source will deliver all of these advantages. A portfolio approach to bioenergy feedstock production is needed with potential systems being developed, tested and compared to conventional production systems before they can be recommended for implementation. A research project underway seeks to develop such a portfolio of biomass cropping systems that will include systems that are productive, profitable and mitigate the negative effects of annual crops on soil, water and air quality. Several alternative biomass-cropping systems are being tested and compared to a conventional continuous corn system. Alternative cropping systems were chosen because of their potential to provide: superior biomass yields (sweet sorghum/triticale), some biomass yield while mitigating some negative environmental impacts (corn-soybean-triticale/soybean and corn/switchgrass), or some short-term biomass yield and superior long-term yield while strongly mitigating negative environmental impacts (trees/triticale).
“This year our students will analyze soils in Ghana, inventory wildlife in Costa Rica, explore agricultural technology adoption in Brazil, debate animal welfare issues in the United Kingdom, work with the United Nations Food and Agriculture Organization in Rome, teach agriculture, nutrition and science to elementary school children in rural Uganda and much more,” Taylor said.

MASTER OF SCIENCE IN AGRONOMY DISTANCE EDUCATION PROGRAM EXPANDS OPPORTUNITIES
Marla Bogner isn’t a typical graduate student in the College of Agriculture and Life Sciences. He has a full-time job, lives in Walnut, Ill., where he and his wife have two children under the age of two. He’s a student in ISU’s Master of Science in Agronomy Distance Education Program. The college’s distance education program provides the flexibility he needs to pursue a master’s degree in agronomy. He’s also a runner and a morning person, which he says helps him stay on track with his graduate work. “The M.S. in Agronomy program fits with what I do in the workplace and it’s bolstered my knowledge in my job,” said Bogner, who is a soybean research associate at Pomer Hi-Bred International Inc. Currently 110 students are enrolled in the Master of Science in Agronomy Program.

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
- Busadity Institute for Genetically Modified Agricultural Products
- BioCentury Research Farm
- Brennon 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 Crop 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

STUDY ABROAD OFFERS CHANCE TO LEARN AND SERVE
This year more than 200 college students will expand their academic expertise, build their professional competencies and help them add a global dimension to their student experience. Courses offered abroad during the 2009–2010 academic year include 13 courses taught in 11 countries by faculty in nine departments. Shelley Taylor, director of Ag Study Abroad, says students understand the necessity of preparing themselves for the global marketplace and the college’s professors have developed tremendous learning opportunities outside U.S. borders.

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

Iowa State University