Report to Iowa Senators and Representatives
IN THE UNITED STATES CONGRESS

FROM IOWA CARET REPRESENTATIVES AND
IOWA STATE UNIVERSITY
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 National Association of State Universities and Land-Grant Colleges, or NASULGC. 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 does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, gender identity, sex, marital status, disability or status as a U.S. veteran. Inquiries can be directed to the Director of Equal Opportunity & Diversity, 3210 Beardshear Hall, (515) 294-7632.
Researchers at three universities, including Iowa State, have designed a new way to make plants resistant to the root-knot nematode, a microscopic, parasitic worm that is one of the world’s most destructive plant pathogens. The nematodes attack nearly every food and fiber plant grown, including many common vegetables, fruit trees and ornamentals. They induce damaging galls on roots, impacting the quality and quantity of yields. Four major species are responsible for about 95 percent of agricultural infestations.

In their research, the scientists turned the nematode’s biology against itself. They fed the gluttonous worm a piece of double-stranded RNA to knock out a specific parasitism gene in the nematode. Knocking out this gene disrupted the nematode’s ability to infect plants. Research over the next year or two should reveal whether comparable strategies work for soybean cyst nematode.
Tapping renewable energy and products

**CORN FIBER COULD BOOST ETHANOL PRODUCTION**

Iowa State researchers are investigating ways to boost ethanol production by using a fungus to convert corn fiber that is typically used for animal feed into ethanol. That could increase ethanol production by about 4 percent or 160 million gallons a year. So far, the researchers have demonstrated they have a process that can convert corn fiber — a byproduct of the wet milling process that produces corn syrup — into fuel-grade ethanol on a very small scale. With additional research, they’d like to at least double the amount of ethanol their process produces. They would like to try it on a larger scale and on other byproducts of corn processing. The next step is to see how the process works on distillers dried grains, a byproduct of the dry milling process that’s typically used to convert corn kernels into ethanol.

**ULTRASONIC TREATMENT INCREASES ETHANOL PRODUCTION BY 30 PERCENT**

The conventional dry-milling process that’s used to make ethanol doesn’t convert all the starch in corn kernels into the simple sugars that can be fermented into ethanol. A team of Iowa State researchers has demonstrated that pre-treating milled corn with ultrasonics can break the corn pieces into even finer particles. That exposes more of the corn’s starch to the enzymes that convert starch to simple sugars. The research team also plans to see if ultrasonics release some sugars from the fibrous, cellulosic material in corn. Ultrasound treatment in laboratory experiments has increased corn’s release rates of sugars by nearly 30 percent.

**USING ETHANOL CO-PRODUCTS IN FORAGE-BASED BEEF SYSTEMS**

Iowa State is helping beef producers use ethanol co-products efficiently in their operations. The objective of one demonstration program is to evaluate the feeding of various corn co-products in cow-calf grazing operations. On-farm demonstrations at two southern Iowa farms were conducted in 2006. A demonstration in Lucas County involved three herds. A demonstration in Union County involved two herds. Similar feeding trials will begin in 2007 at the ISU McNay Research and Demonstration Farm near Chariton and will include treatments with higher feeding levels of co-products, and stocking rate adjustments based on level of supplementation.

**IOWA STATE SCIENTISTS STUDY ALTERNATIVE CROPS FOR FUEL PRODUCTION**

Crops not routinely found on Iowa farms — switchgrass, Indiangrass, big bluestem, eastern gamagrass, sweet sorghum, triticale, kenaf — all failed recent research plots on an Iowa State farm west of Ames. The goal is to provide realistic alternatives for Iowa producers to diversify their cropping systems. Besides developing alternative crops, researchers are also developing uses for the new crops. For instance, emerging markets for liquid fuels and other industrial products made from crop biomass offer opportunities.

**RESEARCHERS DEVELOPING MACHINERY TO HARVEST CORN STALKS AND LEAVES**

Iowa State agricultural engineers have adapted a combine to harvest the entire corn plant. While dumping the corn kernels into the combine’s hopper, it blows the plants’ stalks, cobs and leaves — called corn stover — into a trailing wagon. The stover could be the source of plant fiber that feeds the next generation of ethanol plants. The researchers ran their latest version of a stover harvester through about 50 acres of corn near Ames last fall. Although tests with the prototype machine have been successful, there is more development work to do on harvest speed and capacity, transporting and storing the stover, and fertility issues because stover contributes significant organic matter to the soil and protects it from winter erosion.

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Most undergraduate and graduate students enrolled at Iowa State come from Iowa. Total enrollment was 25,462.

Impact, Jobs and Consumers

Council for Agricultural Research, Extension, and Teaching

**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>Total food chain employment*</td>
<td>66,260</td>
<td>64,921</td>
<td>56,534</td>
<td>78,340</td>
<td>83,587</td>
<td>348,112</td>
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<tr>
<td>Total employment</td>
<td>373,085</td>
<td>407,286</td>
<td>442,365</td>
<td>386,314</td>
<td>343,979</td>
<td>1,935,029</td>
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<tr>
<td>Food chain as a percent of total employment</td>
<td>17.76%</td>
<td>15.94%</td>
<td>12.78%</td>
<td>21.27%</td>
<td>24.30%</td>
<td>17.99%</td>
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<tr>
<td>Population</td>
<td>586,509</td>
<td>596,689</td>
<td>614,920</td>
<td>606,156</td>
<td>562,060</td>
<td>2,966,334</td>
</tr>
</tbody>
</table>

*Based on the 2005 estimates from the U.S. Census.

**LINKS TO IOWA STATE UNIVERSITY**

<table>
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<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>Education</td>
<td>2,393</td>
<td>2,123</td>
<td>4,131</td>
<td>6,078</td>
<td>3,236</td>
<td>17,961</td>
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<tr>
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<td>22,116</td>
<td>13,575</td>
<td>24,964</td>
<td>38,425</td>
<td>126,078</td>
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<tr>
<td>Alumni</td>
<td>7,995</td>
<td>10,033</td>
<td>23,181</td>
<td>28,106</td>
<td>9,476</td>
<td>78,791</td>
</tr>
</tbody>
</table>

*includes employment in farms; agricultural services; forestry; fishing; etc.; farm machinery and equipment dealers; farm supply wholesalers; wholesale farm commodity marketers; farm machinery/equipment manufacturers; ag chemical and fertilizer manufacturers; food processing manufacturers; wholesale food distributors; grocers and other food stores; restaurants and other eating establishments.

Iowa State has more than 206,000 alumni around the world, and about 17,000 College of Agriculture alumni living in Iowa. About 66 percent of College of Agriculture graduates stay in Iowa for their first jobs.
NEW SOYBEAN VARIETIES IMPROVE PRODUCTION OF HEALTHY OILS
Soybean farmers in 2007 can select from new Iowa State soybean varieties that will promote the production of healthy oils for consumers. ISU researchers developed the varieties with support from the Iowa Soybean Association and the United Soybean Board to increase the production of oils desirable for human health. Three of the new varieties will enhance the production of an oil with 1 percent linolenic acid. Low levels of linolenic acid in soybean oil increase its shelf life. Demand for the oil from the food industry has been high because of its excellent frying and flavor stability without the hydrogenation process that creates trans fats.

NUTRITION EDUCATION PROGRAM SAVES EIGHT TIMES THE INVESTMENT
The Expanded Food and Nutrition Education Program (EFNEP) is a proven, cost-effective nutrition education program. EFNEP helps youth and young, low-resource families develop the knowledge, skills, attitudes and behavior needed to improve their diets. ISU Extension administers the program in Iowa. A study of the costs and benefits of Iowa EFNEP shows that for every $1 spent to deliver nutrition education in Iowa, $8.03 is saved in future health care costs. The $8.03 in health care savings occur because participants learn safe food handling practices, thus having fewer foodborne illnesses; eat better during pregnancy, resulting in fewer low birthweight babies; are more likely to breastfeed their babies; resulting in fewer childhood diseases; and improve their overall diets, resulting in delay or prevention of chronic diseases.

IRRADIATION COULD STOP E. COLI IN PRODUCE
Irradiation of produce could be a possible solution to outbreaks of E. coli, according to an Iowa State researcher who is in charge of the university’s Linear Accelerator Facility, a commercial-sized irradiation facility. “If the spinach that contained E. coli O157:H7 in the outbreak last September and October had been irradiated, there would not have been 199 cases of illness, 102 hospitalizations and three deaths,” said Dennis Olson, professor of animal science. Although the Food and Drug Administration approved using irradiation to destroy insect in fruits and vegetables 20 years ago, the same technology can’t be used on those foods to control pathogenic bacteria. “A petition, which would permit the use of irradiation for bacterial control of fruits and vegetables, has been under review with the FDA for more than seven years,” he said.

AIR QUALITY PART OF NEW CURRICULUM
A National Comprehensive Nutrient Management Plan (CNMP) Development Core Curriculum has been completed by Iowa State, in a collaborative extension education effort with University of Tennessee, Michigan State University, Purdue University, University of Idaho and the Natural Resources Conservation Service. Air quality is one of the 10 curriculum modules. The module includes presentations and learning exercises on air quality concerns and technologies. The $200,000 project was funded by a USDA/CSREES Extension Education Water Quality grant.

IOWA STATE UNIVERSITY OFFERS MASTER’S IN SEED TECHNOLOGY AND BUSINESS
Iowa State will offer a master’s degree in seed technology and business beginning this year. The interdisciplinary degree will integrate coursework from the colleges of Agriculture and Business. It will combine scientific and technical subjects relating to seed and genetic improvement with business courses similar to those in the first year of a master’s of business administration program. The objective of the new degree is to develop decision-making skills that will prepare students for roles in the seed industry.

ISU GETS HIGH SCHOOLERS EXCITED ABOUT SCIENCE
High school students who attended two events at Iowa State last year left with a better understanding of the scientific world and career opportunities that exist in science. They also learned how attending Iowa State can help them pursue the scientific careers that appeal to them. The day-long workshops organized by the College of Agriculture have been held for about 20 years.

IOWA STATE UNIVERSITY PREPARES TOMORROW’S LEADERS
Improving nutrition and enhancing food safety

IOWA STATE UNIVERSITY
POULTRY MANURE FERTILIZER GOOD FOR ENVIRONMENT
Nine years of research data at Iowa State shows poultry manure is an effective fertilizer that, when applied properly, also is environmentally friendly. The study began in 1998 to evaluate the impact of poultry manure applications on crop production and on surface and groundwater quality. The key finding is that poultry manure applied at the 150-pound-per-acre rate resulted in lower nitrate and phosphate concentrations in subsurface drainage water when compared with equivalent application rates of commercial nitrogen fertilizer.

FEEDLOT CATTLE CALCULATOR ASSISTS WITH NUTRIENT EXCRETION
The Iowa Beef Center worked with the Iowa Renewable Fuels Association, Iowa Catleman's Association, Iowa Department of Natural Resources and Natural Resources Conservation Service to develop management tools, and conducted meetings to educate ethanol plants, agribusiness nutritionists, agronomists and producers about managing the higher phosphorous concentrations in distillers grains. A feedlot cattle phosphorus and nitrogen excretion calculator was developed to help estimate manure nutrient implications of feeding distillers grains. It is available online.

POULTRY PLANT PLACEMENT COULD HELP FARMERS AND THE ENVIRONMENT
Can strips of prairie plants amid Iowa cropland reduce erosion, improve water quality and restore native wildlife? An Iowa State research team is testing the placement of prairie strips in row-crop systems at the Neal Smith National Wildlife Refuge. The 10-year study will measure the amount of water that flows out of the watershed as well as nutrients and sediment in the water. The effects of prairie strips on the number and variety of plants and wildlife, including beneficial insects that control crop pests also will be measured. Social scientists will assess farmers' willingness to adopt the practices and the public's willingness to pay for improvements in water quality and biodiversity. The project expands the help of prairie plants to maintain crop productivity.

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ATTORNEY HELPS CONTROL POULTRY ODOR
A team of Iowa State agricultural engineers and chemists recently conducted laboratory studies that found adding zeolites to poultry manure reduces odors and the release of ammonia and some volatile organic compounds. Zeolites are minerals that have a micro-porous structure and can be mined from abundant low-cost deposits. The Iowa State researchers evaluated the effectiveness of zeolite as a manure additive by analyzing gases and the resulting odor.

4-H PROGRAM WELCOMES HISPANICS TO IOWA
Not all 4-H after-school programs are offered just for students. In Page County, extension 4-H Youth Development offers after-school programming for Hispanic youth and their parents at the Shenandoah Hispanic Center. These monthly after-school activities led to extension involvement in youth programs at the local Hispanic health fair and a farm safety experience for the children.

EXTENSION PROVIDES EXPERTS FOR LOCAL BUSINESSES
Running a food-processing business with 100-plus employees that handles more than half a million pounds of product a week is complex. Many medium-size operations like Mary Ann's Specialty Foods Inc. have neither the time nor the expertise to explore options for dealing with all of its issues. So they call on ISU Extension's Center for Industrial Research and Service (CIRAS), which provides manufacturers with services tailored to their critical needs, ranging from process improvements and worker training to business practices and applications of information technology. Mary Arnt's Specialty Foods of Webster City produces its own Kor-Bert products as well as processed pork, beef, chickens and turkey products for other labels. The company contacted CIRAS when it was dealing with waste treatment issues, questions about plant renovations and communication concerns related to its largely Hispanic workforce.

NEW FARMS PROJECT BRINGS DAIRY FARMERS TO IOWA
The New Farms Project involves seven counties in northeast and northwest Iowa. Each has a steering committee of volunteers that helps new immigrant dairy farm families establish dairy farms in Iowa. ISU Extension has helped the steering committees organize and hold public meetings to determine if this project is feasible in a county or community, coordinate formal tours for prospective farmers, review possible sites, provide technical assistance, assist in the development of job descriptions and many other management needs of new dairies. One new dairy farm started in November 2005 and four more began operation in 2006. A total of 1,570 cows were retained or added to Iowa's cow population with these five new dairy farms. It's estimated that one dairy cow in a community has a $15,000 total economic impact annually.

HELPING RURAL IOWANS PROSPER
Protecting natural resources

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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 AND INSTITUTES
• Agricultural Marketing Resource Center
• Beginning Farmer Center
• Biosafety Institute for Genetically Modified Agricultural Products
• Center for Crops Utilization Research (CCUR)
• Center for Agricultural and Rural Development (CARD)
• Midwest Agribusiness Trade Research and Information Center (MATRIC)
• Food and Agricultural Policy Research Institute (FAPRI)
• Center for Integrated Animal Genomics
• Center for International Agricultural Finance
• Center for Sustainable Rural Livelihoods
• Community Vitality Center
• Food Safety Consortium
• Iowa Beef Center
• Iowa Pork Industry Center
• Institute for Food Safety and Security
• Leopold Center for Sustainable Agriculture
• Plant Sciences Institute*
• Seed Science Center

REGIONAL CENTERS
• North Central Regional Aquaculture Center
• North Central Regional Center for Rural Development
• 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