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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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) 294-7612.
NEW DAIRY FARM TO ADVANCE IOWA’S DAIRY INDUSTRY
The new Iowa State dairy farm represents a huge advance in dairy teaching, research and extension for the state. It replaces the Ankeny dairy, that was more than 50 years old. The farm is a training ground for dairy professionals, students in animal and dairy science and those studying veterinary medicine who will handle herd health matters. Scientists from the U.S. Department of Agriculture’s National Animal Disease Center in Ames will conduct research at the facility. The farm’s research and outreach programs will help sustain the current growth in the state’s dairy industry. The Iowa Dairy Coalition, which Iowa State helped organize, has set a goal of increasing Iowa’s share of national milk production to 2.8 percent by the year 2010. The new dairy farm will be a key component in bringing this about.

ISU RELEASES SWINE GENETIC MARKER TECHNOLOGY
Genetic markers for growth, leanness and meat quality discovered at Iowa State have been made available to pork producers in the United States. The Iowa State University Research Foundation has signed a licensing agreement with GeneSeek Inc. of Lincoln, Neb. The license permits GeneSeek to use the technologies as markers to identify hogs that have the potential to improve economics of hog producers operations’ and enhance pork quality for the consumer. “This offers a unique opportunity to use molecular genetics to improve pigs’ growth, leanness, feed conversion and meat quality for all breeds typically seen in the U.S.,” said Max Rothschild, C.F. Curtiss Distinguished Professor in Agriculture and director of the Center for Integrated Animal Genomics.

BIOENGINEERED PLANTS FOIL ONE OF WORLD’S WORST PATHOGENS
Root-knot nematodes are microscopic, parasitic worms that attack nearly every food and fiber plant grown. Iowa State plant pathologists, working with researchers at two other universities, designed a new way to make plants resistant to one of these destructive plant pathogens. The scientists fed the worm a piece of double-stranded RNA to knock out a specific parasitism gene, disrupting its ability to infect plants. The resistance technique works for all four major species of root-knot nematode and has no harmful effects on plants. The research should lead to new strategies to make host plants resistant to nematodes. The research team also has been making progress in a similar project to disrupt parasitism by the soybean cyst nematode, a major threat to soybean yields in Iowa.
BREEDING SOYBEANS FOR DISEASES, PESTS AND STRESS RESISTANCE

Plant breeders at Iowa State are working to improve genetic resistance of soybeans to diseases, pests and stress. Genetic resistance is the most durable, environmentally friendly and self-sustainable means of protecting the soybean, its yield and the economic returns to soybean growers. This research is of important because soybean cultivars in the United States possess a narrow genetic base, making the plant vulnerable to pests and other threats. The research team has produced new germplasm and cultivars that are used by seed companies in their breeding programs, and by growers in their commercial operations. The work continues and more public releases are expected in the near future.

RESEARCH SHEDS LIGHT ON ASIAN SOYBEAN RUST INFECTION

The highly infectious Asian soybean rust can devastate a crop. In countries where it is common, the fungus can wipe out 80 percent of yields. An extensive analysis of molecular changes that occur while a plant is being infected by the Asian soybean rust fungus reveals new information that could lead to a soybean variety with broad-spectrum resistance. ISU researchers conducted the largest molecular study of the interaction of soybean and Asian soybean rust. The project pointed the scientists to genes involved in defending the soybean plant, narrowing the field from 37,500 genes to just a few hundred. Now they are studying those genes to understand their roles in limiting the growth of the pathogen. The data generated by the research team is a significant genomic resource available online for researchers worldwide.
NEW CENTURY FARM TO CREATE LIVING BIORENEWABLE LABORATORY

Iowa State is creating the first-of-its-kind integrated and sustainable biofuel and bioproducts feedstock production system. The “ISU New Century Farm,” will include harvest, storage, transportation, handling and biomass processing facilities. Biomass crops destined for use as bioenergy and bioproducts will be grown on the New Century Farm and other area Iowa State research farms. “The farm will serve as a living laboratory for developing and testing sustainable biomass systems by integrating agronomic, environmental and socio-economic research,” said Joe Colletti, senior associate dean in the College of Agriculture and Life Sciences. “It will be directly linked to molecular and traditional plant sciences as well as to advanced processing research and engineering.” Basic and applied research will be conducted to achieve short-term and long-term advances in biorenewable fuels and biobased products. The New Century Farm also will provide a needed venue for education and training.

STUDY SHOWS POULTRY DIETS CAN CONTAIN HIGH LEVELS OF DDGS

The increased use of corn for ethanol production has contributed to a sharp increase in corn prices, translating into higher feed costs for livestock and poultry producers. A research project showed laying hen diets can be formulated with high amounts of dried distillers grains with solubles (DDGS), a corn ethanol byproduct, without adversely affecting egg production and egg quality. DDGS contain all the nutrients found in the corn kernel, except most of the starch, which has been fermented to ethanol and carbon dioxide. Laying hens in the project were fed a diet with up to 69 percent corn DDGS. Egg production decreased as more DDGS was included in the ration. Yet egg weight increased, so there was no significant change in overall egg output. Feed consumption increased with higher levels of corn DDGS, which led to an increase in nitrogen and dry matter manure excretion.

PROCESS IMPROVED TO PRODUCE ADHESIVES FROM SOY PROTEIN

Researchers at Iowa State have worked for years to find ways to use Iowa-grown crops to manufacture new products, with adhesives being a major focus. Scientists developed a new enzymatic process to produce soy protein hydrolysate from soy protein flour, which can be combined with phenol and urea formaldehyde for wood adhesives. The new process is safer and more efficient using less time, less heat and fewer corrosive chemicals with a minimum of variation between batches. The hydrolysate also has a cream color which is easier to coat. Changing the enzymes used could produce hydrolysates optimized for specific adhesive applications.
ULTRASOUND TECHNOLOGY IMPROVES BIORENEWABLE FUEL PRODUCTION
Producing ethanol at the lowest possible cost is important to ensuring the future of this alternative fuel. An Iowa State research team has pioneered the use of ultrasound technology to improve the efficiency of ethanol production from not just corn, but crop residues and other types of biomass. The researchers are using ultrasonic pretreatment of corn slurry for the dry-grain mill process. This results in both reduced corn particle size and enhanced release of fermentable sugars. The team has done work that suggests using ultrasonic pretreatment of biomass, such as switchgrass, helps break down the materials for more efficient ethanol production. The researchers also have shown that ultrasonic energy can increase the biogas production potential of animal wastes, plus it can enhance the conversion rate of soybean oil to biodiesel.

BIO DIESEL PRODUCTION PROVIDES NEW LIVESTOCK FEED SOURCE
Soybean biodiesel production also yields crude glycerin or glycerol, which is commonly used in soaps, cosmetics and numerous other products. Expanded biodiesel production has made it available as a potential feed ingredient for the livestock industry. Since energy values for feeding crude glycerol in animal diets did not exist, ISU animal nutritionists then meat scientists teamed with U.S. Department of Agriculture scientists to study the issue. They fed glycerol to growing swine, laying hens and broilers and measured performance which, include growth rate, feed efficiency and meat quality. The researchers found glycerol was used by swine and poultry with high efficiency and at levels up to 10 percent of the diet. Feed intake, growth and feed efficiency for pigs did not differ from that of typical corn-soybean diets.

NEW MACHINERY DEVELOPED TO HARVEST CORN STALKS AND LEAVES
Researchers at Iowa State are working on the development of harvesting and transportation systems to efficiently and economically move large quantities of material from the field to biomass processing facilities. The idea is to design, build and test machinery that will harvest corn stover — the stalks, cobs and leaves — when farmers bring in their grain. This research is crucial to the development of a viable, cost effective feedstock supply chain to meet biorenewable energy goals. A second generation, single-pass harvest system has been developed and tested in field trials. The system has the potential to increase field productivity of the biomass harvester to that of a conventional grain harvest. Patents and licensing agreements are being negotiated.
Most undergraduate and graduate students enrolled at Iowa State come from Iowa. Total enrollment was 26,160.

The Council for Agricultural Research, Extension and Teaching (CARET) includes employment on 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 200,000 alumni around the world, and about 17,000 College of Agriculture and Life Sciences alumni living in Iowa. About 71 percent of College of Agriculture and Life Sciences graduates stay in Iowa for their first jobs.

Based on July 1, 2006 estimates from the U.S. Census Bureau.

**FOOD CHAIN LINKS GATE TO PLATE**

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<td>17.06%</td>
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**LINKS TO IOWA STATE UNIVERSITY**

**Education**

Most undergraduate and graduate students enrolled at Iowa State come from Iowa. **Total enrollment was 26,160.**

**Extension**

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.

**Alumni**

Iowa State has more than 200,000 alumni around the world, and about 17,000 College of Agriculture and Life Sciences alumni living in Iowa. About **71 percent** of College of Agriculture and Life Sciences graduates stay in Iowa for their first jobs.

* includes employment on 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.
### Congressional Districts

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### Links to Iowa State University

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EDUCATING WORKERS HELPS PREVENT FOOD-BORNE ILLNESSES

Protecting the public against food-borne illnesses takes vigilance and education. Ongoing programs to train foodservice workers are a key part of the process. Researchers wanted to learn the type and extent of understanding of scientific principles relevant to preventing food-borne illnesses that trained and certified foodservice workers possess. The study confirmed that neither managers nor workers were able to convey an understanding of food cooling beyond routine practices associated with on-the-job training. The results explained, in part, the poor retention of conventional training. Recommendations include increasing employees’ motivation to learn scientific concepts by tapping their desire to be better cooks, plus increasing problem-solving abilities involving all employees in food safety educational experiences.

NEW PROCESS SEPARATES SOY PROTEIN INTO HEALTHFUL COMPONENTS

Scientists in Iowa State’s Center for Crops Utilization Research developed a new process for separating soybean protein into valuable components for foods. The process separates soy protein into substances that are rich in two major components, glycinin and β-conglycinin. The desirable gelling properties of glycinin are well-suited for nondairy cheese substitutes and processed meat products. The β-conglycinin has solubility properties desired in nondairy milk and soy-based beverages, and is linked to lowering blood cholesterol levels and reducing the incidence of certain cancers. It contains high concentrations of isoflavones, which are attributed to promoting good bone health and reducing osteoporosis. The process recovers a higher yield of the valuable components, which also are more functional than products recovered by alternative processes. Work is underway with a private partner to commercialize the research.

FOOD SAFETY WEB LOG GIVES PRACTICAL ADVICE

The Iowa State Food Safety Project has launched a blog http://www.extension.iastate.edu/mt/foodsafety/ for consumers looking for practical information to keep their food safe. Bloggers cover a variety of specialties involving food production and preparation. They include registered dietitian and certified food safety professional who has worked in foodservice; a microbiologist who is the ISU Extension Consumer Food Safety specialist; a microbiologist who has worked extensively with food processors; an animal scientist who studies effective meat processing systems; and a veterinarian who has studied quality assurance in livestock production.
IOWA STATE PLAYS MAJOR ROLE IN REBIRTH OF IOWA'S WINE INDUSTRY

During the early 20th century, Iowa was the nation's sixth-largest grape producer, but the industry declined as a result of Prohibition, the growing market for corn and soybeans, damage to grapevines caused by herbicide drift and a devastating freeze in 1940. Now a rebirth of Iowa's wine industry is underway and Iowa State is playing a major role with its Midwest Grape and Wine Industry Institute. The institute is in the College of Agriculture and Life Sciences and focuses on research, teaching and outreach that support the Midwest's evolving grape and wine industry.

Iowans consume about 3 million gallons of wine each year, yet Iowa wineries produce just 250,000 gallons annually. An estimated 340 commercial wine grape vineyards exist in Iowa, along with 70 bonded wineries and 20 more being developed. This past summer a wine laboratory was set up at Iowa State. Iowa wineries can submit samples for analysis of sugar, acids, alcohol content and a host of other factors that can show how to improve it.

PUTTING THE BITE ON MOSQUITOES

Researchers at Iowa State's Medical Entomology Lab are working to reduce mosquito-induced diseases. Working in cooperation with the Iowa Department of Public Health and the University of Iowa's Hygienic Lab, the ISU lab has been monitoring mosquito activity, virus activity in mosquito populations and instances of mosquito-borne illness. Iowa State scientists also are involved in an international team that has been studying the immune systems of tropical disease transmitting mosquitoes, which has led to the identification of 350 immune system genes in the mosquitoes. The research has advanced the knowledge of how insect immune systems evolved, giving scientists new insight into how humans respond to infection, and potential new methods to control infection and disease transmission.

NEW SOYBEAN VARIETIES BOOST PRODUCTION OF HEALTHY OILS

Iowa State strives to produce soybean varieties that increase crop yields and carry other agronomic traits farmers consider important. New varieties that aim to increase the production of healthier soybean oils have been developed by Iowa State, with the support and cooperation of the Iowa Soybean Association and the United Soybean Board. Each of the three new varieties, which were made available to farmers in 2007, aid in the production of oils with low levels of linolenic acid, which will extend the oil's shelf life. One particular variety is aimed at the production of low-saturated-fat soybean oil. The variety will increase the yield of soybeans necessary for oils with only one gram of saturated fat per tablespoon, making it equal to the fat content of canola oil. The new varieties are intended for use in consumer oil products.
CONSERVATION BUFFER RESEARCH
NATIONAL MODEL FOR WATER QUALITY
Seventeen years ago Iowa State began research in the Bear Creek Watershed in north-central Iowa to understand the role of conservation buffers in reducing nonpoint pollution of local rivers and streams. This research has shown that conservation buffers can stabilize stream banks, reduce surface runoff and provide habitats for local wildlife. The research also has shown that the buffers may potentially provide raw material for use in making biofuels. The results of the ongoing study at Bear Creek Watershed has led to recommendations that have been incorporated into standards on both state and national levels. At its inception the Bear Creek Watershed project worked with farmers in north-central Iowa; however, the project now stretches into watersheds throughout Iowa and northeast Missouri. The project has continued to maintain its USDA designation as a National Restoration Demonstration Watershed.

PRESERVING AND RESTORING
WATER QUALITY IN IOWA
Iowa State economics professors have compiled a report that supports two long-standing assumptions: Iowans want improved water recreation areas, and the state could attract new residents by highlighting these recreational facilities. The Iowa Lakes Valuation Project has been able to provide hard evidence to back-up these assumptions. The project surveyed Iowans to determine their opinions on such topics as water odor, clarity and bacteria levels; proximity to lakes, park recreation areas; and general views about lake restoration. The surveys revealed that water quality, followed closely by lake proximity and park facilities were the largest factors in an Iowan’s choice of lakes for recreation. The surveys also showed that the largest concerns among water quality are safety — as in low bacteria levels — followed by water clarity. The Iowa Department of Natural Resources is using information collected in the report to help prioritize lake restoration, ensuring that the spending is focused on the most valued projects.

HELPING BUTTERFLIES AND BEES
RESTORE PRAIRIES IN IOWA
Iowa State researchers are learning more about how to restore prairies. “Prairie remnants,” the small areas of land that often reside along roadsides, in corners of crop fields and in filter strips, provide valuable information about the best methods for large-scale prairie restoration. It has long been known that restoration is aided by pollinating insects, such as bees and “prairie specialist” butterflies. New research done in the prairie remnants has revealed that these two particular insects have their preferences of plants. Generally, the butterflies are much more abundant in the large-scale restoration efforts, whereas...
the bees tend to prefer smaller and more isolated areas of growth. The population of pollinating insects also is directly affected by the width, height and density of the plant life within the restoration area. The information gives researchers and leaders of prairie restoration projects new insight into how to attract desired pollinators to a specific area.

**MODIFYING HEN’S DIETS REDUCES EGG FACILITY EMISSIONS**

Reducing air emissions from Iowa egg facilities can produce positive environmental effects; good news considering that Iowa is the nation’s top egg producer, with more than 55 million egg-laying hens. A field study showed that a modification of diets for egg-laying hens can decrease the ammonia in production facility emissions. The dietary portion of the yearlong study involved reducing the intake of crude protein and increasing fiber. All methods used were discovered to be beneficial in reducing the air emissions from production facilities by up to 40 percent, without affecting the egg production abilities of the hen. In one diet, a reduction of 1 percent in protein produced a 10 percent reduction in ammonia emissions. Another particular diet used dried distillers grain, which has the added benefit of using a byproduct of corn ethanol production.

**COMMUNITY APPROACH AIDS DECISIONS FOR SWINE SITES**

Hog facilities can have an impact on surrounding communities, because of the potential for negative environmental and aesthetic consequences. Livestock producers often take special considerations when examining locations for a new production facility. To aid producers, Iowa State agricultural engineers developed the “Community Assessment Model for Odor Dispersion.” This model uses data to make predictions about the local impact of a hog facility, based on weather patterns and information about the proposed facility, including size, number of animals, ventilation systems and proximity to other production facilities. The model not only evaluates the impact the facility will have on the local community, but also to help producers answer any questions that may arise within the proposed surrounding community. The model has been applied on a voluntary basis to help more than 100 hog facilities in the state.
IOWA STATE PROFESSOR PRESENTED TEACHING HONOR

Iowa State horticulture Professor Gail Nonnecke was selected the 2007 Iowa Professor of the Year by the Carnegie Foundation for the Advancement of Teaching and the Council for the Advancement and Support of Education. “Rarely do I encounter an individual who is so engaged and committed to such a variety of roles related to serving students,” said Corly Brooke, director of Iowa State’s Center for Excellence in Learning and Teaching. Nonnecke was noted for her work with the horticulture learning community, which groups students with similar interests to help acclimate them to the university; mentoring professors; and her study abroad experiences. The last two summers, Nonnecke has led a team of students that helped develop a school garden for teaching agriculture in rural Uganda. Nonnecke has been at Iowa State for 24 years. The award is part of the U.S. Professors of the Year program, which salutes the most outstanding undergraduate instructors in the country. It is the only national program to recognize excellence in undergraduate teaching and mentoring.

SCIENCE WITH PRACTICE PROGRAM PROVIDES REAL-WORLD EXPERIENCE

Since 2005, Science With Practice has provided students in the College of Agriculture and Life Sciences a semester-long experiential learning program that allows them to earn academic credit and spending money. It crosses all disciplines from biological sciences to social sciences and can expose students to experiences ranging from research in laboratories to administration in academic departments and college units. Students are paired with faculty and staff who serve as mentors. Progress visits, end-of-experience professional poster presentations and formal evaluations provide real-world feedback. Students can acquire technical agriculture skills; explore the linkages between their upper level course work, research and the world of work; develop skills related to organizing, planning and conducting research; or consider graduate education and research as a potential career.

TEACHING AGRICULTURE’S IMPORTANCE OUTSIDE THE INDUSTRY

A challenge for the agriculture industry is educating those outside the industry about its impact on society. Despite the natural assumption, Iowa State research indicates that students from rural areas do not have increased knowledge of agricultural practices and issues. The conclusion is based on studying agricultural knowledge of those in rural areas and the methods of teaching agriculture in classrooms across Iowa. The study indicated agricultural concepts do not occupy a predominant place within the curriculum. Teachers stated that the best way to increase the use of agricultural materials in the curriculum is to provide workshops that will provide methods to help incorporate the materials instead of sending curriculum materials by mail.
Agricultural Research, Extension and Teaching at ISU

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 Agricultural Law and Taxation
- Center for Agricultural and Rural Development (CARD)
  - Midwest Agribusiness Trade Research and Information Center (MATRIC)
  - Food and Agricultural Policy Research Institute (FAPRI)
- Center for Crops Utilization Research (CCUR)
- 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
- Midwest Grape and Wine Industry Institute
- Plant Sciences Institute*
- Seed Science Center
- U.S. Pork Center of Excellence

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

*affiliated institute