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2005

IANR SUCCESSES

IMPACT

University of Nebraska
Institute of Agriculture and Natural Resources
Extension, Research and Teaching

Submissions to
Land-Grant/USDA
Image Enhancement Project
National Database



About IANR Successes

These impact statements represent some of the many research, extension and teaching efforts under way in the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln. This information was developed for the Land-Grant/USDA impact database. The national database is part of an ongoing effort to enhance the visibility, awareness and appreciation for land-grant university and USDA programs. This database is used in a variety of ways to provide information to members of Congress, their staffs and other decision-makers.

Writers in Communications and Information Technology prepared these impacts in cooperation with IANR faculty and administration. These are deliberately brief, focused on public benefits and written to be easily understood by non-scientists. A single-paragraph summary follows each impact statement. The main impact statements were submitted to the national database. The single-paragraph summaries were written for local use, primarily in communications/marketing efforts on behalf of IANR's programs. Some impacts appear in more than one category. You are welcome to use this information to promote your research, programs and activities.

This is not a comprehensive listing of IANR accomplishments, but highlights some ongoing efforts. The national impact database contains previous years' submissions and is on the Web at: <http://www.csrees.usda.gov/newsroom/impacts/impacts.html>. At this site, you can search for impact information on various subjects or view the National Science and Education Impact Summaries. The 2005 impact database should be open for public use in a few months.

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* Denotes an update of an impact statement used in 2004.

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** Denotes an update of an impact statement used in 2004.*

Enhance Economic Opportunities for Agricultural Producers

Topic: Boosting Soybeans' Omega-3 Levels

Issue:

Wild salmon, tuna and sardines are rich in omega-3 fatty acid, which is believed to be important in preventing heart disease, cancer and other ailments. However, many Americans don't get enough of this beneficial fat in their diets.

What has been done:

University of Nebraska plant scientists are using biotechnology to modify the soybean DNA to develop plants with improved nutritional characteristics, such as abundant omega-3 in the bean. Researchers identified genes from other plants, inserted these genes in soybean cells and produced plants high in gamma-linolenic acid and stearidonic acid, the building blocks for omega-3. Next they'll transfer genes from a harmless plant fungus into cells from these soybeans cells to induce production of omega-3. The research should take about a decade to commercialize. Eventually it should lead to soybeans high in omega-3 that could be fed to farm-raised fish or poultry to boost the omega-3 content of their meat.

Impact:

Consumers who eat the meat or eggs from fish or animals fed soybeans rich in omega-3 could improve their nutrition without changing their daily eating habits. Producing these specialty soybeans also should bring a premium for growers.

Funding:

Nebraska Research Initiative
Nebraska Soybean Board
University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Many Americans don't get enough beneficial omega-3 in their diets. Fish such as wild salmon, tuna and sardines are rich in omega-3, which is touted for helping prevent heart disease, cancer and other ailments. IANR plant scientists are using biotechnology tools to develop soybeans with enhanced nutritional properties such as abundant omega-3 fatty acids. They've already inserted plant genes and produced soybean plants with more of the building blocks of omega-3. Next they need to add genes from a harmless fungus to induce omega-3 production. This complex long-term research eventually should lead to soybeans high in omega-3 that could be fed to farm-raised fish or poultry to boost the omega-3 content of their meat. Consumers who eat the meat or eggs from fish or animals fed these enriched soybeans could improve their nutrition without changing their daily eating habits. Producing specialty soybeans also could bring a premium for growers.

Enhance Economic Opportunities for Agricultural Producers

Topic: Corn Kernels' Feed Value

Issue:

Nebraska is among the nation's top cattle feeding states, and feed is the largest single cost for the state's beef industry. Anything that improves feed efficiency helps bolster producers' profits.

What has been done:

University of Nebraska animal scientists studied the nutritional value of seven commercial corn hybrids to identify what specific characteristics provide the best bang for the buck as cattle feed. Feedlot trials revealed significant feed efficiency differences among the hybrids. Researchers found larger, softer kernels with a greater proportion of soft starch content produced the best feeding performance. There was a 9 percent difference in feed efficiency – how effectively an animal converts feed into gain – between the best and worst performing hybrids. Feeders historically have preferred harder corn because of its higher test weight, but this research showed test weight is a poor indicator for animal performance.

Impact:

This research demonstrated that selecting hybrids with favorable chemical and physical traits could dramatically improve feed efficiency. Researchers hope hybrids eventually will be labeled as hard or soft endosperm content. Feeders could use that information to select corn that is best for cattle. Corn growers could target the feed market niche with specialized hybrids.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act
Nebraska Corn Board
J.C. Robinson Seed Co.

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Summary:

When it comes to corn and cattle feed efficiency, what's inside the kernel could significantly reduce feed costs, IANR animal science research shows. Research comparing the feed performance of seven different commercial hybrids revealed that larger, softer kernels with a greater proportion of soft starch content produced the best feed performance. Feeders historically have preferred harder corn with a higher test weight, but this research demonstrates that test weight is not a good indicator for feed performance. Researchers found that selecting hybrids with favorable chemical and physical traits could dramatically improve feed efficiency. Since feed is the largest single cost for feedlots and Nebraska is among the nation's top cattle feeding states, these findings eventually could add up to major savings.

Enhance Economic Opportunities for Agricultural Producers

Topic: Cost-Effective Grasshopper Control

Issue:

Continued drought created near perfect conditions for destructive grasshopper infestations on hundreds of thousands of acres of central and western Nebraska rangeland in recent years. Heavy infestations must be treated to protect scarce, much-needed forage grass but conventional treatments are costly.

What has been done:

University of Nebraska Cooperative Extension educated producers about the Reduced Agent and Area Treatments System. Under this system, insecticide is sprayed from planes at lower-than-conventional rates in 100-foot alternate swaths instead of spraying the entire area. Applications are timed to optimize residual control. Grasshoppers in the untreated swaths come in contact with the insecticide when they move to treated areas, making treatment nearly as effective as conventional approaches that cost far more and use more than twice as much insecticide. Extension staff promoted this approach through media, publications, educational meetings and individual consultations. The system was used on nearly 360,000 Nebraska acres in 2003. In 2004, only 200,000 acres were treated because grasshoppers were less widespread. Extension teamed with USDA's Animal Plant and Health Inspection Services, the Nebraska Department of Agriculture and landowners on this control effort.

Impact:

This system uses less than half the insecticide of conventional grasshopper controls, and far less fuel and time are needed to apply it. In Nebraska, this approach reduced treatment costs for landowners from \$5 to \$8 per acre to \$1.50 to \$2 per acre, a roughly 70 percent decrease on average. Treatment costs in 2003 were \$1.7 million less than in 2002. In 2004, this system saved nearly \$950,000 in treatment costs compared to conventional methods.

Funding:

University of Nebraska Cooperative Extension
USDA Animal and Plant Health Inspection Service
Nebraska Department of Agriculture
Smith-Lever 3(b) & (c)

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Summary:

Continued drought has brought heavy grasshopper infestations to some central and western Nebraska rangeland in recent years. University of Nebraska Cooperative Extension educated producers about an alternative grasshopper treatment approach that reduced treatment costs roughly 70 percent for a two-year savings of about \$2.6 million. The system requires less than half the insecticides used for conventional controls. Extension educated producers about the Reduced Agent and Area Treatments System. This system involves aerial spraying insecticide at lower-than-conventional rates in alternate swaths instead of spraying the entire area. Applications are timed to optimize residual control. Grasshoppers in the untreated swaths come in contact with the insecticide when they move to treated areas, making treatment nearly as effective as conventional approaches. The system was used on nearly 360,000 Nebraska acres in 2003, saving about \$1.7 million, and on 200,000 acres in 2004, saving nearly \$950,000 in treatment costs compared to conventional methods.

Enhance Economic Opportunities for Agricultural Producers

Topic: Developing Lighter Replacement Heifers

Issue:

Feed is the single biggest cost for cow-calf operations. Anything that reduces feed expense without hurting the herd's performance improves the operation's bottom line.

What has been done:

Ranchers typically equate lighter weight replacement heifers with poor pregnancy rates and calving difficulty. However, University of Nebraska animal scientists found no difference in reproductive performance between spring-born replacement heifers developed to traditional and lighter weights. Ranchers typically develop replacement heifers to 60 percent or 65 percent of mature weight. This study found no reproductive differences in heifers developed to 53 percent and 58 percent of mature weight. Researchers tracked the lighter heifers through their fourth pregnancy and these cows remained lighter weight.

Impact:

This lighter weight approach significantly reduces costs during the heifer development period from fall weaning until the next summer's breeding season. Feeding heifers to 53 percent of mature weight costs \$22 per head less during the development period than feeding to traditional replacement weights. In a 500-cow operation with 15 percent of heifers replaced annually, that represents a \$1,650 annual savings.

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Funding:

University of Nebraska Agricultural Research Division
Hatch Act

Summary:

Feed is the biggest single cost for cow-calf producers. IANR animal science research shows that developing replacement heifers to lighter-than-traditional weights significantly reduces feed costs without hurting reproductive performance. Ranchers typically equate lighter-weight replacement heifers with poor pregnancy rates and calving difficulty but this research may change traditional thinking about weight requirements for young heifers. Traditionally, ranchers develop replacement heifers to 60 percent or 65 percent of mature weight. This three-year study found no reproductive problems or differences in heifers developed to 53 percent and 58 percent of mature weight. Feeding heifers to 53 percent of mature weight costs \$22 per head less during the development period than feeding to traditional replacement weights. In a 500-cow operation with 15 percent of heifers replaced annually, that represents a \$1,650 annual savings.

Enhance Economic Opportunities for Agricultural Producers

Topic: Employee Management in Production Agriculture

Issue:

Hiring, training and keeping quality employees can make or break an agricultural operation, yet most busy farmers, ranchers and feedlot operators don't have much time for extensive human resources training.

What has been done:

In 2003 and 2004 University of Nebraska Cooperative Extension offered Employee Management in Production Agriculture workshops in cooperation with Integrated Resource Management and the Nebraska Cattlemen's Cow/Calf Council. Participants in the workshops learned how to find the right employees in a tight market, fire the wrong employees, and work with varied communication and personality issues. Workshops also covered labor management issues and how to assess total employee compensation. More than 150 agricultural managers attended the six workshops over two years. They were responsible for managing a total of 1,324 employees at 95 operations.

Impact:

Most participants said they would make management changes based on what they learned at the workshops including revising employee job descriptions, orientation programs and training of new managers.

Participants said the information is practical and beneficial. One participant said: "It's material (we) could implement tomorrow and it's well worth the time (we) spend away from the operation." Another said she used the training within a week of the workshop to change how she described the job, communicated with and trained a new employee.

Funding:

University of Nebraska Cooperative Extension
Registration fees
Smith-Lever 3(b) & (c)

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Summary:

Hiring, training and keeping quality employees is a key to profitability for many agricultural operations. A University of Nebraska Cooperative Extension workshop – Employee Management in Production Agriculture – trained agricultural managers how to find and keep good employees. More than 150 managers participated in six workshops in 2003 and 2004 that extension conducted in partnership with Integrated Resource Management and the Nebraska Cattlemen's Cow/Calf Council. Participants learned about labor management, communication and compensation packages. Most participants indicated they would make management changes based on knowledge gained. Participants indicated the information was practical and easily implemented in their operations.

Enhance Economic Opportunities for Agricultural Producers

Topic: Higher-Value, Alternative Crops for the Panhandle

Issue:

Alternative, higher-value crops can broaden crop options for farmers and bolster regional economies, but new crops also are risky. Farmers need information about producing unfamiliar crops under local conditions as well as their market potential.

What has been done:

University of Nebraska agricultural scientists and Cooperative Extension staff have identified and are educating producers about promising alternative crops for the Nebraska Panhandle's arid high plains climate. The effort focuses on alternatives with higher value potential for growers and the region's economy. Studies have revealed how best to plant, manage and harvest several new crops. Scientists identify existing varieties best suited to local growing conditions or breed new varieties for the region and explore a new crop's market potential. New crops being grown in the Panhandle as a result of these efforts include: proso and foxtail millet and sunflowers for birdseed; chickpeas for human food; turf and forage grass seed, and chicory. Brown mustard and canola for environmentally friendly biodiesel production are among the latest crops being studied.

Impact:

New crops have expanded farmers' production options and added millions of dollars to the region's economy. Birdseed crops now grow on 250,000 Panhandle acres and birdseed production is a \$20 million a year industry, including several processing plants that extension staff helped attract to the region. Panhandle growers produce about 1,500 acres of grass seed valued at \$1 million annually. The region's 900 acres of chicory, valued at \$1 million annually, are processed at the nation's only chicory processing plant at Scottsbluff, which opened in 2001. The Panhandle now produces 10,000 acres of chickpeas, and with 80 percent of U.S. chickpeas imported, there's room to grow.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act
University of Nebraska Cooperative Extension
Smith Lever 3(b) & (c)
Nebraska Department of Agriculture Value-Added Program
SARE-USDA

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Summary:

IANR's commitment to developing new crops for the Panhandle's arid, high plains climate is paying off for farmers and the region's economy. Scientists and Cooperative Extension staff have identified promising new higher-value crops, and IANR studies provide critical information growers need to successfully plant, tend, harvest and market newcomers. These newcomers expand farmers' production options and add millions of dollars to the region's economy. For example, birdseed crops now grow on 250,000 Panhandle acres and birdseed production is a \$20 million a year industry, including processing plants that IANR staff helped attract to the region. Panhandle growers produce about 1,500 acres of grass seed annually, valued at \$1 million. The region's 900 acres of chicory, valued at \$1 million annually, is processed at the nation's only chicory processing plant at Scottsbluff, which opened in 2001.

Enhance Economic Opportunities for Agricultural Producers

Topic: Hybrid-Maize Software

Issue:

Each year, farmers face complex decisions about how best to match corn management decisions with that season's unique growing conditions. Hard-to-predict variables such as weather, precipitation, availability of irrigation water or planting dates all affect corn performance and management.

What has been done:

To help farmers make more informed decisions, University of Nebraska agronomists developed a user-friendly computer program that simulates corn growth and performance under different conditions. This software, called Hybrid-Maize, lets users combine field-specific information with current and historical weather data. Users can manipulate variables, including planting dates, rainfall or irrigation, fertilizer rates, soil types, hybrid selection and plant density, to see how weather or management choices influence yields. The software lets users assess risk factors and evaluate for themselves a wide range of crop management options.

Impact:

This powerful new tool became available to farmers and crop consultants in 2004 from the university. It allows corn growers to more precisely adjust irrigation, nitrogen and other factors to boost profits, conserve limited water during drought and protect the environment by matching chemicals and fertilizer to crop needs.

Funding:

University of Nebraska Agricultural Research Division
Nebraska Corn Board
Fluid Fertilizer Foundation
USDA Consortium for Agricultural Soil Mitigation of Greenhouse Gases
Phosphate and Potash Institute
Foundation for Agronomic Research
High Plains Regional Climate Center
Hatch Act

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Summary:

A new user-friendly computer program that simulates corn growth and yields is now available to help farmers make complex corn management decisions. IANR scientists developed this software, called Hybrid-Maize, which is available on CD or the Web. This software combines field-specific information with current and historical weather data to predict corn yields under different conditions. Users can change variables to see how weather or management changes influence crop performance. This software helps growers fine-tune management practices to reduce costs and maximize production while protecting the environment and conserving irrigation water.

Enhancing Economic Opportunities for Agricultural Producers

Topic: Improving Planter Accuracy

Issue:

Accurately dropping seeds into a row may seem routine but seeds can go astray in even the best planters. Improving the seed placement accuracy is critical to maximize yields and quality for most crops.

What has been done:

University of Nebraska biological systems engineers are working to improve planter accuracy by identifying which planter components most affect seed placement. Using a sophisticated seed sensor that one of the researchers invented, they found that wear on sugar beet planter seed tubes can cause seeds to hesitate, bounce or scatter, significantly altering seed placement. They found seed coatings can affect seed placement. They also used the sensor at Cooperative Extension clinics to measure accuracy and performance of sugar beet planters brought in by producers.

Impact:

This research has improved planter accuracy, which should improve yields and sugar beet quality. At extension clinics, the sensor showed that more than 90 percent of individual planter rows required replacement parts to achieve original seed spacing performance. Seed spacing accuracy was improved 19 percent on 69 planters tested and repaired in 2003. It is estimated this accuracy improved yields and reduced harvest loss by 1 ton per acre, resulting in an estimated \$1.5 million additional income for growers in Nebraska, Colorado and Wyoming.

Funding:

University of Nebraska Agricultural Research Division
University of Nebraska Cooperative Extension
Western Sugar Grower Joint Research Committee
CNH Global
Hatch Act
Smith-Lever 3(b) & (c)

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Summary:

Accurately dropping seeds into a row may seem routine but accurate placement is critical to maximize yields and quality for most crops. IANR biological systems engineers are working to improve planter accuracy with the help of a sensor one of them developed. In research to identify which components most affect planter accuracy, they found that wear on sugar beet planter seed tubes can significantly affect seed placement. Using the sensor at Cooperative Extension clinics helped identify potentially yield-robbing problems with planters used by sugar beet growers. The sensor showed that more than 90 percent of individual planter rows required replacement parts to achieve original seed spacing performance. Seed spacing accuracy was improved 19 percent on 69 planters tested and repaired in 2003. It's estimated this accuracy improved yields and reduced harvest loss by 1 ton per acre, resulting in an estimated \$1.5 million additional income for growers in Nebraska, Colorado and Wyoming.

Enhance Economic Opportunities for Agricultural Producers

Topic: On-the-go Sensors for Precision Ag

Issue:

The more farmers know about their soil, the better for their profits and the environment. Precision agriculture tools can provide site-specific information farmers need to better match crop nutrient needs to varying soil conditions.

What has been done:

A University of Nebraska biological systems engineer is developing soil sensors to help farmers better assess physical and chemical characteristics of soil across a given field. He's devising sensors that detect and map soil properties on-the-go, as they are pulled across fields. These new sensors provide more precise information and should cost less than conventional methods of gathering this information, such as extensive soil sampling of fields. Some of this technology already has been patented and commercialized.

Impact:

On-the-go sensors will more accurately detect physical and chemical soil characteristics across a field and provide cheaper, more accurate information than traditional soil sampling. Farmers can use this information to make better crop and soil management decisions. Ultimately, farmers will be able to more precisely match crop needs to varying local conditions, which should result in more effective use of agricultural chemicals.

Funding:

Hatch Act

University of Nebraska Agricultural Research Division

USDA/NASA Application of Geospatial and Precision Technologies Program

U.S. Small Business Administration – Small Business Innovation Research Program

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Summary:

The more farmers know about their soil, the better for their profits and the environment. Precision agriculture tools can give farmers the information they need to better match crop nutrient needs to varying soil conditions. A University of Nebraska biological systems engineer is testing soil sensors that will allow farmers to better predict different physical and chemical soil characteristics. Sensors will detect and map soil properties as they are pulled across fields. Some of this technology already has been patented and commercialized. Sensors will better predict different physical and chemical soil characteristics and provide cheaper, more accurate information than traditional soil sampling. Eventually, the on-the-go soil sensors will offer solid technical information for better informed crop management decisions.

Enhance Economic Opportunities for Agricultural Producers

Topic: Republican River Basin Irrigation Management Project

Issue:

Faced with continued drought and looming water restrictions, making the most of every drop of irrigation water can literally make or break many southwest Nebraska farmers.

What has been done:

University of Nebraska Cooperative Extension launched the Republican River Basin Irrigation Management Project to demonstrate research-based irrigation management strategies in farmers' fields and provide practical information for implementing these practices. The project features year-round educational presentations on water conservation and tours of demonstration sites, which give producers and crop consultants a firsthand look at how these water-saving practices work. In 2004 alone, 180 people attended six tours.

Impact:

Program participants estimate the knowledge gained from this program will save them an average 2.2 inches of water per acre, a 10 percent to 15 percent savings over typical irrigation use in the area. Based on the number of participants in 2004 and the acres they irrigate, that amounts to more than 45,000 acre-feet of water annually – enough water to cover 45,000 acres of land with a foot of water. Participants also estimated the knowledge gained through this program is worth an average of about \$16,500 per operation or, conservatively, \$2 million annually.

Funding:

University of Nebraska Cooperative Extension
U.S. Bureau of Reclamation
Smith-Lever 3(b) & (c)

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Summary:

The Republican River Basin Irrigation Management Project is helping farmers in water-short southwest Nebraska learn research-based techniques for conserving irrigation water. Cooperative Extension demonstrates research-based irrigation management strategies in farmers' fields, offers field tours and provides year-round educational presentations on water conservation. In 2004 alone, 180 people attended six tours. Program participants estimate the knowledge gained from this program will save them 2.2 inches of water per acre, a 10-15 percent savings over typical irrigation use in the area. Based on the number of participants and the acres they irrigate, that totals more than 45,000 acre-feet of water annually. They also estimated the knowledge gained through this program is worth an average of about \$16,500 per operation or, conservatively, \$2 million annually.

Enhance Economic Opportunities for Agricultural Producers

Topic: Calculating Modern Ethanol's Energy Balance

Issue:

Farming practices and corn ethanol conversion technologies have become significantly more efficient over the past two decades. Yet corn ethanol's energy efficiency still gets a bad rap, mainly because assessments are based on out-dated data from the 1980s and early 1990s. To make national policy choices, decision-makers need information on modern ethanol production efficiencies.

What has been done:

To calculate a more up-to-date energy balance for corn ethanol, a team of University of Nebraska agricultural scientists examined on-farm energy consumption and ethanol yield for today's progressive corn management systems and modern, higher efficiency ethanol plants. This analysis shows today's ethanol has a positive energy balance – it yields more energy than is used to produce it. Today's ethanol is about 30 percent ahead energy-wise. Converting irrigated corn to ethanol has an energy output to energy input ratio of 1.3-to-1; for dryland corn it's 1.4-to-1.

Impact:

Having accurate, current information about modern ethanol's energy balance should help decision-makers make better informed national energy policy choices. Both farmers and the environment should benefit. Turning corn into ethanol creates an important market for farmers and a renewable, clearer burning alternative to fossil fuels. In Nebraska 23 percent of all corn is used for ethanol and is an important new industry for rural economies.

Funding:

U.S. Department of Energy

USDA

University of Nebraska Agricultural Research Division

Hatch Act

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Summary:

Ethanol made from corn has a positive energy balance, meaning it yields more energy than is used to produce it. That's the conclusion of new University of Nebraska research that calculated the energy balance of modern ethanol production. Institute of Agriculture and Natural Resources researchers assessed how much fossil fuel is needed to grow corn, transport it, process it into ethanol, blend it with gas and get it to the pump. They found that today's ethanol is about 30 percent ahead energy-wise. Converting irrigated corn to ethanol has an energy output to energy input ratio of 1.3-to-1; for dryland corn it's 1.4-to-1. These findings on modern ethanol production are especially important because most studies used to assess ethanol's potential have been based on 10- to 20-year-old data that doesn't reflect farming and production efficiency gains made during the past two decades. This more accurate data should help policy-makers make better informed national energy policy choices.

Enhance Economic Opportunities for Agricultural Producers

Topic: Developing Dicamba-Tolerant Broadleaf Crops

Issue:

Dicamba, sold under trade names such as Banvel and Clarity, is widely used to control broadleaf weeds in corn, wheat and other grassy crops. But it's off-limits for broadleaf crops such as soybeans, vegetables and canola because it doesn't distinguish broadleaf good guys from bad guys in the field.

What has been done:

University of Nebraska biochemists discovered how to genetically modify broadleaf crops so they can tolerate dicamba spraying. The Institute of Agriculture and Natural Resources researchers identified a soil bacterium that easily breaks down dicamba and then isolated the gene responsible for dicamba inactivation. They devised a method for inserting this gene into tobacco, their model plant, and soybeans. Their experimental dicamba-tolerant soybeans withstood spraying at much higher-than-normal treatment rates. They also plan to work on developing other tolerant crops, such as canola and cotton. The university is patenting their technology.

Impact:

Dicamba-based herbicides are relatively inexpensive and easy on the environment because the chemical disappears quickly in plants and soil. Developing dicamba-tolerant broadleaf crops will make it easier for farmers to manage broadleaf weeds in these major crops and to make fewer trips across the field.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act
Consortium for Plant Biotechnology Research
ConAgra
United AgriProducts

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Summary:

Dicamba herbicide, sold under trade names such as Banvel and Clarity, has long helped control broadleaf weeds in corn, wheat and other grassy crops but it's been off-limits for broadleaf crops such as soybeans and vegetables. Discoveries by IANR biochemists are likely to change that. They have found a bacterial gene that basically instills herbicide resistance and developed a way to use it to genetically modify broadleaf crops so they can tolerate dicamba spraying. Their experimental dicamba-tolerant soybeans withstood spraying at much higher-than-normal application rates in field tests. The university is patenting their technique. These Nebraska discoveries eventually should allow farmers to use dicamba-based herbicides, which are inexpensive and environmentally benign, on broadleaf crops.

Enhance Economic Opportunities for Agricultural Producers

Topic: Livestock Odor Prediction Tool

Issue:

Concerns over livestock odors are growing. Disputes often pit livestock producers against neighbors and sometimes divide communities. Finding science-based solutions to help minimize odors and conflicts is especially important in Nebraska, a leading livestock producing state.

What has been done:

University of Nebraska biological systems engineers are developing a computer tool to predict how often there will be annoying odors in areas surrounding a livestock facility. Called the Nebraska Odor Footprint Tool, this software illustrates how far a livestock operation needs to be from neighbors in different directions to avoid odor-related conflicts. It incorporates weather records and livestock operation characteristics specific to Nebraska along with site-specific information. This tool will be used primarily to advise producers planning to expand existing facilities or build new ones. Livestock producers tested a prototype of the new tool at fall 2004 workshops. Researchers continue to enhance the tool and make it easier to use. The tool also will help planners and communities make more informed decisions about the placement of livestock operations. Researchers will test it in a rural community this summer. The target is to make the tool available for use by individuals in 2006.

Impact:

This tool should replace some of the emotion and guesswork often associated with decisions about where to locate livestock facilities with research-based information based on Nebraska and site-specific information. Better-informed choices about the location of livestock operations should reduce conflicts and improve environmental quality.

Funding:

University of Nebraska Agricultural Research Division
University of Nebraska Cooperative Extension
Nebraska Pork Producers Association
National Pork Board
Nebraska Department of Agriculture
USDA National Research Initiative
Hatch Act
Smith Lever 3(b) & (c)

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Summary:

Livestock odor is an increasingly contentious and emotional issue that can divide communities. IANR biological systems engineers are developing a research-based computer tool to predict how often annoying odors will exist in areas surrounding a livestock operation. Called the Nebraska Odor Footprint Tool, the modeling software illustrates how far a livestock operation needs to be from neighbors in different directions to avoid odor-related conflicts. The tool incorporates specific information about Nebraska weather conditions and livestock operations. It should help communities, planners and producers make better-informed decisions about where to locate livestock operations to reduce conflicts and improve environmental quality. The target is to make the tool available for use by individuals in 2006.

Enhance Economic Opportunities for Agricultural Producers

Topic: Sandhills Calving System

Issue:

Diarrhea is a leading cause of illness and death in beef calves. In some herds, nearly all young calves get diarrhea and 5 percent to 10 percent die of related illnesses. Treatment and performance and death losses can cost individual ranchers thousands of dollars annually.

What has been done:

University of Nebraska veterinary scientists developed a calving system to reduce calf scours on ranches in Nebraska's Sandhills. The system manages cow herds during calving season to prevent transmission of diarrhea-causing germs. In field tests, the system drastically reduced calf illness and treatment costs and eliminated calf deaths from scours on two Sandhills ranches under different calving schemes. For example, one 900-head ranch that lost 7 percent to 14 percent of its calves to scours before adopting the system had no scours deaths since. Because few calves developed scours, ranchers also greatly reduced use of medications needed to treat sick calves. This scours prevention system can be adapted to a variety of calving situations in the Sandhills and beyond. The team is teaching veterinarians and ranchers how to adopt this strategy.

Impact:

Ranchers who have adopted this system report significantly reducing calf sickness, death and antibiotic use. The system also aids labor efficiency during busy calving season. The owner of the 900-head ranch estimates saving up to \$50,000 annually since adopting the calving system because of improved calf performance, greatly reduced treatment costs and having more calves to sell. As a result of knowledge gained through extension education on how to adopt this system, 80 percent of participants said they either would or probably would use the system in the future. This represents a major change in calving management practices.

Funding:

University of Nebraska Agricultural Research Division
University of Nebraska Cooperative Extension
Hatch Act
Pfizer Animal Health
Sandhills Veterinary Hospital
Smith-Lever 3(b) & (c)

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Summary:

Diarrhea is a leading cause of death and sickness in beef calves but ranchers have a new tool to combat this costly threat. University of Nebraska Institute of Agriculture and Natural Resources veterinary scientists designed and successfully tested a calving system that greatly reduces scours outbreaks by managing cow-calf pairs and pregnant cows to minimize calf contact with diarrhea-causing germs. Since few calves get sick, this system also significantly reduces the need for antibiotics and labor needed to treat sick calves. The owner of a 900-head herd estimates savings of up to \$50,000 annually since implementing the calving system because of improved calf performance, greatly reduced treatment costs and having more calves to sell. The team is training ranchers and veterinarians how to adopt the system.

Enhance Economic Opportunities for Agricultural Producers

Topic: Turning Cornhusks into Textiles

Issue:

Developing new uses and markets for corn, Nebraska's leading crop, is a true pocketbook issue for farmers and rural economies.

What has been done:

A University of Nebraska textiles scientist has found a way to turn cornhusks into textiles. He has developed a process that efficiently, inexpensively converts cellulose in cornhusks into textile fibers that can be made into fabric. The university is patenting his invention. Initial research shows cornhusks produce a high-quality textile with good performance characteristics using this process. Natural off-white cornhusk fiber is attractive, more comfortable than many synthetics and easy to dye. More work is needed, but the Nebraska team already has made a sweater from cornhusk yarn – dyed Husker red, of course – to demonstrate the cornhusk textile's potential.

Impact:

Corn is Nebraska's largest crop. The economic impact of turning husks, which now blow out the back of combines, into textiles could be significant for the state and nation. The United States produces about 20 million tons of cornhusks annually. If all of that were used to produce textiles, it could make at least 2 million tons of fibers worth about \$4 billion annually. And the textiles industry is huge so there's a ready market for new, functional natural products. The environment might benefit, too, because corn requires fewer chemicals to grow than cotton or linen plants, the primary sources of U.S. fabric fibers.

Funding:

University of Nebraska Agricultural Research Division
UNL College of Education and Human Sciences
Hatch Act
Nebraska Corn Board

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Summary:

Turning cornhusks into textiles might someday create a new, higher-value market for Nebraska's leading crop. A University of Nebraska textiles scientist has developed a process that efficiently, inexpensively converts cellulose in cornhusks into textile fibers that can be made into fabric. The university is patenting his invention. Initial research shows cornhusks produce a high quality textile with good performance characteristics using this process. There's much more work to do before cornhusk fabric becomes available but the economic potential is impressive. The nation produces about 20 million tons of cornhusks annually, which could produce at least 2 million tons of fibers worth about \$4 billion annually.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: 4-H Youth-Adult Partnerships

Issue:

The future of many rural Nebraska communities depends on their success in developing young people who can become leaders and encouraging a sense of community ownership.

What has been done:

The 4-H Building Nebraska's Future With Youth-Adult Partnerships program through University of Nebraska Cooperative Extension encourages young people to become leaders through partnerships and participation in community organizations and local government. Youth-adult participation teams were created in Stromsburg, Hayes Center, Hartington and Wakefield. In each community young people worked with business leaders and government officials to secure support for a community betterment project, including requests for funding. The program was so successful that it was held up as a model program by its national sponsors, the Land O' Lakes Foundation and the National 4-H Council. These community projects will serve as models as extension encourages similar projects in other Nebraska communities.

Impact:

Youth participants say they gained leadership skills and a new sense of belonging to their communities. The youth-adult partnership refurbished a neglected park and encouraged many participating youths to seek leadership positions in city government or with a community service organization. In Wakefield, students who were asked to help with the city library's summer reading program eventually took charge of managing and promoting the program.

Funding:

University of Nebraska Cooperative Extension
Land O' Lakes Foundation
National 4-H Council

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Summary:

The future of Nebraska's rural communities depends on developing a new generation of leaders. The 4-H Building Nebraska's Future With Youth-Adult Partnerships program through University of Nebraska Cooperative Extension encourages young people to become future leaders through partnerships and participation in community organizations and local government. Youth-adult participation teams in Stromsburg, Hayes Center, Hartington and Wakefield paired young people with local leaders in fundraising and hands-on community projects. Projects such as refurbishing a park in Hartington encouraged young people to participate in community leadership and instilled a new sense of ownership. The projects will serve as models as extension expands the program to serve other rural communities.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Business Sense Helps Youth Launch Businesses

Issue:

Many teenagers have a marketable talent and an interest in making extra money but need skills to turn their talents into a going business.

What has been done:

University of Nebraska Cooperative Extension 4-H offers Business Sense, a curriculum that teaches business and entrepreneurial skills. 4-H'ers learn how to write a business plan, determine customer needs, relate to customers, determine overhead costs and set prices. More than 600 Nebraska 4-H'ers have taken the curriculum, taught for the last four years by extension educators and 4-H leaders. Participants use the business and life skills gained through this program to land part-time jobs or to turn their interests, hobbies and talents into part-time businesses.

Impact:

Business Sense program leaders report that the program gives participants an edge over their peers when they compete for jobs or start as an entrepreneur. Teens say they are better prepared to make decisions about marketing, budgeting and public relations. For example, a Utica, Neb., teen said the course taught her about bookkeeping and organization and enabled her to start a business buying and selling antique tractors over the Internet. In 2004 she sold eight tractors and made \$500 to \$1,000 per tractor.

Funding:

University of Nebraska Cooperative Extension

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Summary:

Teenagers with an interest in business are learning those skills through University of Nebraska Cooperative Extension 4-H's Business Sense curriculum. 4-H'ers learn business and life skills including how to write a business plan, determine customer needs, relate to customers, determine overhead costs and set prices. Students have used what they learned from this program to turn their interests, hobbies or skills into part-time businesses. For example, a Utica, Neb., teen used her new skills to start a business selling antique tractors over the Internet. In 2004, she sold eight tractors and made \$500 to \$1,000 per tractor.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Consumer Preference and Economic Leakage Program

Issue:

Better understanding what customers want is one of the best ways for small-town retailers to keep people shopping locally, attract new customers and compete with stores in larger communities.

What has been done:

A University of Nebraska Cooperative Extension program helps small rural businesses better understand what consumers want, improve communications with customers and identify ways to improve their operations. Surveys identify local consumer shopping preferences as well as what and why they buy locally vs. elsewhere. Typically, 25 or more local businesses and hundreds of consumers are involved when extension works with a community. Extension provides survey results, facilitates discussions about strengths and weaknesses of local retailers and offers ideas about how to better meet customer needs. Since 1997, more than 600 small businesses and 6,000 consumers have participated in this program in nearly 30 Nebraska and Colorado towns. Extension collaborates with the university's Nebraska Rural Initiative on this program to reduce economic leakage in rural communities.

Impact:

Evaluations show business owners use survey findings to improve their businesses, including employee training, product selection and marketing strategies. One western Nebraska community formed a committee to address concerns and improve the downtown shopping environment. Several businesses have expanded or opened additional enterprises based on this information.

For example, a small town dress shop owner said the information gave her a clearer picture of local customers. "We plan to implement changes based on results. We can't always compete with the big stores on price or volume, but they can't offer our level of service."

Funding:

University of Nebraska Cooperative Extension
University of Nebraska Rural Initiative
The Nebraska Lied Main Street Program
Community-based business and economic development agencies
Smith-Lever 3(b) & (c)

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Summary:

Cooperative Extension's consumer preference and economic leakage program is strengthening small town economies by working with retailers to identify ways to keep customers shopping locally. Extension works closely with local businesses on the program, which includes a consumer preference survey, analysis and discussions so small businesses understand what consumers want and identify ways to improve their operations. Since 1997, more than 600 small businesses and 6,000 consumers have participated in this extension effort in nearly 30 Nebraska and Colorado towns. Business owners use survey findings to improve their businesses, including employee training, product selection and marketing strategies. One western Nebraska community formed a committee to address concerns and improve the downtown shopping environment. Several businesses have expanded or opened additional enterprises thanks to this information. Extension collaborates with the university's Nebraska Rural Initiative on this program to reduce economic leakage in rural communities.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: EDGE Program Aids Entrepreneurs

Issue:

Sparking economic growth in Nebraska's small towns is essential to their survival. A University of Nebraska Cooperative Extension program is giving some rural entrepreneurs the skills they need to successfully create or expand businesses.

What has been done:

The Nebraska EDGE – Enhancing, Developing and Growing Entrepreneurs – program is the umbrella organization for rural entrepreneurial training programs hosted by local communities, organizations and associations. The program offers skill-based training for people who want to start or expand a business, including agricultural operations, or improve their business skills. Participants learn legal structures, market strategies, financial statements, bookkeeping, cash flow, financing and how to manage growth. More than 100 training courses have been offered from Scottsbluff to Omaha resulting in new business start-ups, business expansions and local and community economic development since the program began in 1993.

Impact:

Since 1993, Nebraska EDGE has helped nearly 2,000 Nebraskans transform their ideas into viable business opportunities, creating full- and part-time jobs across the state. In a recent survey, more than 70 percent of program participants said they had increased their business volume thanks to EDGE, while 33 percent hired additional employees. One recent EDGE participant said the program helped his business survive and is “a fundamental need in the small business community.” Another said the training is a very effective way to boost rural economy. “Strengthening existing businesses gets more results than bringing in new business.”

Funding:

University of Nebraska Cooperative Extension
Nebraska Department of Economic Development
Nebraska Microenterprise Partnership Fund
USDA Rural Development
Numerous community-based businesses and organizations

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Summary:

Sparking economic growth in Nebraska's small towns is essential to their survival. A University of Nebraska Cooperative Extension program is giving some rural entrepreneurs the skills they need to successfully create or expand their businesses. The Nebraska EDGE – Enhancing, Developing and Growing Entrepreneurs – program is the umbrella organization for rural entrepreneurial training programs hosted by local communities, organizations and associations. Since 1993, Nebraska EDGE has helped nearly 2,000 Nebraskans transform their ideas into viable business opportunities, creating full- and part-time jobs statewide. A recent survey showed more than 70 percent of participants had increased their business volume since participating in EDGE, while 33 percent had added employees. One recent participant said EDGE helped his business survive and is “a fundamental need in the small business community.” Another said the training is a very effective way to boost the economy of rural areas by strengthening existing business and encouraging entrepreneurs.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Food Entrepreneur Assistance Program

Issue:

Food manufacturing is Nebraska's largest manufacturing segment. Training and supporting prospective food processing entrepreneurs is critical to economic development statewide.

What has been done:

The University of Nebraska-Lincoln's Food Processing Center's popular From Recipe to Reality seminar gives prospective entrepreneurs an overview of what's required to start a successful food business. In one day, participants gather information that would take months or years to learn on their own. The center's Food Entrepreneur Assistance Program, which started in 1989, offers these seminars five times a year. Topics include market research, product development and introduction, packaging, labeling, pricing, legal and business structure issues, promotion and food safety. After completing the seminar, participants can enter the From Product to Profit phase of the program, which offers individualized help from university food scientists and business consultants.

Impact:

In the past decade alone, more than 1,300 entrepreneurs have taken one or both seminars. Participants have started more than 100 food companies after completing both phases of the program and more than 70 percent of these companies remain in business. An example of the seminar's many successes is The Heartland's Finest of Lincoln, whose owner began selling barbecue sauce after attending a seminar in 1995. The owner, who quickly learned how to turn a homemade recipe into a marketable gourmet product, said she could not have succeeded without the expertise she gained from the seminar.

Funding:

Fees charged to seminar participants
University of Nebraska Cooperative Extension

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Summary:

Food is big business in Nebraska and creative new food-related enterprises are vital to the state's economic development. The University of Nebraska-Lincoln's Food Processing Center's From Recipe to Reality seminars train and support new entrepreneurs in launching new food-related businesses, teaching participants key aspects of starting a food business. Those who complete the seminar can continue their training in the From Product to Profit phase of the program, which offers individual consultations with university food scientists and business consultants. In the past decade alone, more than 1,300 entrepreneurs have taken one or both seminars. Participants have started more than 100 food companies after completing both phases of the program and more than 70 percent of these companies remain in business.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Higher-Value, Alternative Crops for the Panhandle

Issue:

Alternative, higher-value crops can broaden crop options for farmers and bolster regional economies, but new crops also are risky. Farmers need information about producing unfamiliar crops under local conditions as well as their market potential.

What has been done:

University of Nebraska agricultural scientists and Cooperative Extension staff have identified and are educating producers about promising alternative crops for the Nebraska Panhandle's arid high plains climate. The effort focuses on alternatives with higher value potential for growers and the region's economy. Studies have revealed how best to plant, manage and harvest several new crops. Scientists identify existing varieties best suited to local growing conditions or breed new varieties for the region and explore a new crop's market potential. New crops being grown in the Panhandle as a result of these efforts include: proso and foxtail millet and sunflowers for birdseed; chickpeas for human food; turf and forage grass seed, and chicory. Brown mustard and canola for environmentally friendly biodiesel production are among the latest crops being studied.

Impact:

New crops have expanded farmers' production options and added millions of dollars to the region's economy. Birdseed crops now grow on 250,000 Panhandle acres and birdseed production is a \$20 million a year industry, including several processing plants that extension staff helped attract to the region. Panhandle growers produce about 1,500 acres of grass seed valued at \$1 million annually. The region's 900 acres of chicory, valued at \$1 million annually, are processed at the nation's only chicory processing plant at Scottsbluff, which opened in 2001. The Panhandle now produces 10,000 acres of chickpeas, and with 80 percent of U.S. chickpeas imported, there's room to grow.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act
University of Nebraska Cooperative Extension
Smith Lever 3(b) & (c)
Nebraska Department of Agriculture Value-Added Program
SARE-USDA

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Summary:

IANR's commitment to developing new crops for the Panhandle's arid, high plains climate is paying off for farmers and the region's economy. Scientists and Cooperative Extension staff have identified promising new higher-value crops. IANR studies provide critical information growers need to successfully plant, tend, harvest and market newcomers. These newcomers expand farmers' production options and add millions of dollars to the region's economy. For example, birdseed crops now grow on 250,000 Panhandle acres and birdseed production is a \$20 million a year industry, including processing plants that IANR staff helped attract to the region. Panhandle growers produce about 1,500 acres of grass seed annually, valued at \$1 million. The region's 900 acres of chicory, valued at \$1 million annually, is processed at the nation's only chicory processing plant at Scottsbluff, which opened in 2001.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Retailing Pull Factor Research

Issue:

Rural communities face increasing challenges in maintaining diverse retail businesses that contribute to a healthy local economy.

What has been done:

University of Nebraska agricultural economists have tracked retailing trends in Nebraska for 15 years by examining retail pull factors, which measure the relative strength of a community's retail sector. This research shows many rural communities are losing retail sales to larger towns and retailers because of population declines and greater mobility of consumers. Researchers identify communities and counties that defy this broader trend. Analysis of these successful rural retailers provides insights about what might help other towns buck the trend. For example, this research indicates maintaining a diverse mix of retail stores, working jointly to promote unique retail qualities, such as personal service and convenience, and focusing on niche markets can enhance retail sales.

Impact:

This long-term trend information helps rural communities better understand local retail strengths and weaknesses relative to other towns. Businesses and communities can use these findings to decide which strengths or qualities to emphasize through future marketing and investment.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Although larger urban areas continue to pull dollars away from Nebraska's small town retailers, collective and niche marketing can help smaller communities hold on to more dollars, according to IANR agricultural economic research. Researchers have analyzed pull factors, which measure the relative strength of a community's retail sector, for 15 years and concluded that some rural communities could enhance their retail sector by building strong leadership and maintaining a critical mass of businesses that are willing to work together and promote niche products. Communities can use these findings to better understand local retail strengths and weaknesses relative to other communities and to decide which strengths or qualities to emphasize through future marketing and investment.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Rural Women's Concerns

Issue:

The outcomes of public policy choices, including welfare reform, can be quite different in rural than in urban areas. Policy-makers sometimes lack information on those differences.

What has been done:

As part of a national three-year study on welfare reform and rural women, University of Nebraska family scientists asked 42 rural women of all incomes about child care, transportation and medical services in their communities as well as their jobs, incomes, expenses and spending habits. They wanted to determine what concerns rural women share regardless of income as well as differences based on income. Rural women tend to worry most about transportation, access to medical services and limited child-care options regardless of income. For example, a lot of women must drive at least two hours to receive medical services. While 80 percent of women reported being employed, many go in and out of the work force due to transportation and child care. Future research will include more in-depth studies comparing Nebraska women with women in other states, and the Nebraska survey has been expanded.

Impact:

Child care, transportation and health care are just a few things rural women worry about, regardless of income. Results of the College of Education and Human Sciences study will provide information about the impact and consequences of welfare reform on rural women as well as general economic information to help policy-makers assess rural impacts of future public policy decisions.

Funding:

University of Nebraska Agricultural Research Division
UNL College of Education and Human Sciences
Hatch Act

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Summary:

Child care, transportation and health care are just a few things rural women worry about, IANR research shows. As part of a national three-year study on welfare reform and rural women, College of Education and Human Sciences family scientists asked 42 rural women about child care, transportation and medical services as well as their jobs, incomes, expenses and spending habits. Research has been expanded and results will provide information about the impact and consequences of welfare reform on rural women. Findings also will offer general economic information to help policy-makers assess the rural impact of future policy decisions.

Support Increased Economic Opportunities and Improved Quality of Life in Rural America

Topic: Turning Cornhusks into Textiles

Issue:

Developing new uses and markets for corn, Nebraska's leading crop, is a true pocketbook issue for farmers and rural economies.

What has been done:

A University of Nebraska textiles scientist has found a way to turn cornhusks into textiles. He has developed a process that efficiently, inexpensively converts cellulose in cornhusks into textile fibers that can be made into fabric. The university is patenting his invention. Initial research shows cornhusks produce a high-quality textile with good performance characteristics using this process. Natural off-white cornhusk fiber is attractive, more comfortable than many synthetics and easy to dye. More work is needed, but the Nebraska team already has made a sweater from cornhusk yarn – dyed Husker red, of course – to demonstrate the cornhusk textile's potential.

Impact:

Corn is Nebraska's largest crop. The economic impact of turning husks, which now blow out the back of combines, into textiles could be significant for the state and nation. The United States produces about 20 million tons of cornhusks annually. If all of that were used to produce textiles, it could make at least 2 million tons of fibers worth about \$4 billion annually. And the textiles industry is huge so there's a ready market for new, functional natural products. The environment might benefit, too, because corn requires fewer chemicals to grow than cotton or linen plants, the primary sources of U.S. fabric fibers.

Funding:

University of Nebraska Agricultural Research Division
UNL College of Education and Human Sciences
Hatch Act
Nebraska Corn Board

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Summary:

Turning cornhusks into textiles might someday create a new, higher-value market for Nebraska's leading crop. A University of Nebraska textiles scientist has developed a process that efficiently, inexpensively converts cellulose in cornhusks into textile fibers that can be made into fabric. The university is patenting his invention. Initial research shows cornhusks produce a high quality textile with good performance characteristics using this process. There's much more work to do before cornhusk fabric becomes available but the economic potential is impressive. The nation produces about 20 million tons of cornhusks annually, which could produce at least 2 million tons of fibers worth about \$4 billion annually.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Agricultural Biosecurity Plans

Issue:

Cuming County is Nebraska's leading beef-feedlot county and among the top beef producing counties nationwide. A biosecurity threat could be economically devastating in a county where livestock represents more than 88 percent of agricultural income so farmers and officials alike need to be prepared.

What has been done:

University of Nebraska Cooperative Extension worked with local officials and livestock producers to better prepare the county for a possible biosecurity threat, whether from agroterrorism or an accidental outbreak of a contagious disease. Extension helped organize meetings with extension, county leaders, local emergency management staff, producer groups and veterinarians to discuss biosecurity preparedness issues and design response plans. The county was divided into territories and every livestock operation was identified to aid response.

Statewide, extension is working with the Nebraska Department of Agriculture to provide up to 60 daylong emergency response training sessions to help counties develop biosecurity response plans. Cuming County's plan is outlined in these sessions.

Impact:

Quick response is critical to minimizing and controlling biosecurity threats. Thanks to the plan, Cuming County officials and livestock producers know what steps are needed if the unthinkable happens. Their preparedness plan should reduce economic losses to the county's \$525 million per year livestock industry. Nebraska's lieutenant governor, also the state director of homeland security in Nebraska, praised the coordinated, cooperative effort behind the plan. Nebraska's state veterinarian said such planning also is important for preventing and preparing for the spread of common diseases.

Funding:

University of Nebraska Cooperative Extension
Smith-Lever 3(b) & (c)

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Summary:

Cuming County's status as the top feedlot county in Nebraska and one of the top beef producing counties in the country puts it at risk for potential bioterrorism threats. A biosecurity problem would economically devastate the county, where more than 88 percent of the agricultural income comes from livestock. University of Nebraska Cooperative Extension worked with local officials and livestock producers on a biosecurity response plan. Quick, coordinated response is critical to minimizing any biosecurity problem. Thanks to this effort, emergency responders and producers know what to do if the unthinkable happens. Cuming County's plan earned praise from state officials. It offers a model for other counties that want to plan a response. Statewide, extension also is working with the Nebraska Department of Agriculture to train counties how to develop emergency response plans.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Evaluating Foot-and-Mouth Disease Tests

Issue:

No one wants to imagine the consequences of a foot-and-mouth disease outbreak in the United States. Yet in this era of heightened security concerns, officials also must prepare for an outbreak they hope never materializes – by accident or terrorism.

What has been done:

University of Nebraska veterinary scientists helped federal animal health officials assess the effectiveness of foot-and-mouth-testing tools. Nebraska scientists evaluated the effectiveness of commercial test kits used internationally to distinguish cattle vaccinated against foot-and-mouth from those infected with the disease. Such tests could be used after emergency vaccinations following an outbreak to see if cattle were exposed to the virus after vaccination. Nebraska veterinary scientists tested the kits in Argentina on samples collected during a real-life outbreak. Back in Nebraska, colleagues analyzed the field data on each kit's performance. This was the first comprehensive evaluation of these tests by U.S. scientists. Results identified differences among tests and were shared with federal animal health officials.

Impact:

Foot-and-mouth is the world's most economically devastating livestock disease and it's estimated a U.S. outbreak would cost the economy billions. Federal officials will use Nebraska's findings about test performance to improve biosecurity preparedness.

Funding:

USDA-Agricultural Research Service
University of Nebraska Agricultural Research Division

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Summary:

No one wants to imagine the consequences of a foot-and-mouth disease outbreak in the United States. Yet amid heightened security concerns, officials must prepare for an outbreak they hope never materializes – by accident or terrorism. IANR veterinary science research is helping federal animal health officials assess the effectiveness of foot-and-mouth-testing tools. Researchers evaluated the effectiveness of commercial test kits used internationally to distinguish cattle vaccinated against foot-and-mouth from those infected with the disease. They tested the kits in Argentina on samples collected during a real-life outbreak. This international research was the first comprehensive evaluation of these tests by U.S. scientists and revealed differences among the tests. Nebraska scientists have shared their findings with federal animal health officials who are using this information to improve biosecurity preparedness.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Nebraska Tractor Testing Lab

Issue:

Today, farmers worldwide take for granted that their tractors will perform as manufacturers promise. That wasn't always the case and modern tractor reliability is due in part to 85 years of testing at a Nebraska laboratory.

What has been done:

In the early days of tractors, performance was anything but predictable. Manufacturers made all sorts of performance claims and farmers often discovered after the sale that their new machines didn't deliver as promised. To assure tractor performance, the Nebraska Legislature in 1919 passed legislation creating the Nebraska Tractor Testing Lab at the University of Nebraska to test a representative model of every tractor sold in Nebraska. Today, the Nebraska Tractor Test Lab is the United States' only tractor testing station and tests tractors according to internationally recognized standards. Under a 29-nation agreement, tractors are tested in the country where they are made so Nebraska's lab tests U.S. tractors for performance, including horsepower and fuel consumption. The lab has tested more than 1,840 different tractor models in the past 85 years.

Impact:

Large or small, a tractor is a big investment. Thanks to the Nebraska lab's objective tests, farmers worldwide can buy U.S.-made tractors with confidence, knowing they will perform as claimed.

Funding:

Testing fees

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Summary:

Farmers assume that their tractors will perform as manufacturers promise. That wasn't always the case. Modern tractor reliability is partly due to 85 years of objective, standardized performance testing at the Nebraska Tractor Test Laboratory at the University of Nebraska. Today, this lab is the United States' only tractor testing station and tests tractors according to internationally recognized standards. Under international agreement, Nebraska's lab tests U.S.-made tractors for performance, including horsepower and fuel consumption. The lab has tested more than 1,840 different tractor models in the past 85 years. Results assure that farmers worldwide can buy U.S.-made tractors with confidence, knowing they will perform as claimed.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Partnerships in Food Safety Education

Issue:

A better appreciation of science for both teachers and students also has a practical side. By studying microbiology and seeing the rapid spread of germs, student learning is more enthusiastic – plus they better understand the relationship between food handling, bacteria growth and illness.

What has been done:

The University of Nebraska-Lincoln's Department of Food Science and Technology launched the Partnerships in Food Safety Education project for K-12 teachers in 2004 with help from a USDA grant. The program prepares teachers to help students understand the importance of microbiology as potential careers and in their daily lives. During the five, two-day statewide workshops, 103 teachers learned hands-on, age-appropriate techniques for teaching food safety and safe food handling topics, including bacteria growth. Teachers received ready-to-use materials referenced by Nebraska Science Standards, and have access to a food safety Web site especially designed for teachers and students. The workshops continue in 2005.

Impact:

Participants gave the workshop high marks for usefulness. Nearly all evaluation respondents said they plan to use at least half of the workshop materials in their classrooms within the next two years. Wrote one teacher: "... I thoroughly enjoyed both days and learned (and relearned) many important concepts!"

Funding:

USDA Integrated Research, Education and Extension Competitive Grants Program

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Summary:

Students and adults often don't understand and appreciate science. But when a field such as microbiology is seen and described in terms of something tangible, such as how rapidly bacteria multiply and cause disease, students and adults are more aware of personal hygiene and safe food-handling practices. To prepare K-12 teachers to educate students, UNL's Department of Food Science and Technology in 2004 launched the Partnerships in Food Safety Education project funded by a USDA grant. The project included five, two-day statewide workshops that taught 103 teachers techniques they can use in their classrooms to teach students about preventing bacterial growth. Participants received educational materials ready for classroom use and have access to a Web site for more resources. Participants gave the workshop high marks for usefulness. Nearly all evaluation respondents said they plan to use at least half of the workshop materials in their classrooms within the next two years. The workshops continue in 2005.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Understanding Antibiotics' Fate in Soil

Issue:

Farmers long have fertilized fields and pastures with livestock manure, which enriches soil and puts waste to good use. Today, manure may contain traces of antibiotics used in livestock production and there's growing interest in knowing what happens to antibiotics in the environment.

What has been done:

To learn more about what happens to antibiotics in soil, University of Nebraska agricultural scientists teamed with a USDA Agricultural Research Service scientist and others on several years of field studies. Traces of oxytetracycline, an antibiotic commonly used in livestock, were detected in topsoil for 17 months after manure application. Two years of testing found no oxytetracycline in water collected 8 feet under test plots. Manured plots also contained significantly more tetracycline-resistant bacteria in the topsoil than commercially fertilized plots for five months after application. Levels declined over time with no difference after five months. Further research is needed to determine whether the increase in resistant bacteria originates in the manure or develops in natural soil bacteria.

Impact:

Little has been known about the fate of antibiotic residues in soil. These results provide one of the first overviews of what happens when manure is applied to irrigated cropland. Findings lay the scientific foundation for further research to understand the potential health and environmental implications.

Funding:

University of Nebraska Agricultural Research Division
University of Nebraska Foundation
Hatch Act

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Summary:

There's growing interest in the fate of antibiotics in the environment. IANR research is providing information about what happens to antibiotic residues in manure when it's applied to irrigated cropland. In field studies at North Platte, scientists detected traces of oxytetracycline, an antibiotic commonly used in livestock, in topsoil for 17 months after manure application. Manured plots contained significantly more tetracycline-resistant bacteria in the topsoil than commercially fertilized plots for five months after application. Levels declined over time with no difference after five months. Scientists don't know whether the increase in resistant bacteria originates in the manure or develops in natural soil bacteria. There's much more to be learned but these findings lay the scientific foundation for further research to better understand potential health and environmental implications.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Tests, Training Protect People with Food Allergies

Issue:

For the 6 million to 7 million Americans with food allergies, grocery shopping can be time-consuming and a bit scary. To avoid potentially deadly allergic reactions, they must scrutinize food labels. Even that sometimes isn't enough. Foods manufactured on shared equipment sometimes inadvertently contain ingredients that aren't on the label.

What has been done:

Research by food toxicologists in the University of Nebraska's internationally recognized Food Allergy Research and Resource Program has produced fast, simple, accurate tests food processors can use to check for traces of allergenic foods on food or equipment. The Nebraska-developed tests for peanut, eggs, almonds and milk are commercially available; others are in the works. The team also educates food manufacturers on broad food allergy issues, including labeling laws, recalls, allergen controls and using test kits. These two-day sessions attract industry representatives from across North America and also have been offered internationally.

Impact:

Food allergies are a worldwide health concern and cause as many as 200 deaths and countless allergic reactions each year in the United States alone. The Nebraska-developed tests and training are helping the food industry protect allergic consumers and reduce product recalls. The 30-minute tests replace procedures that took days to complete in a laboratory. Companies that use the tests can be confident that their products contain only the ingredients listed on the label. Training sessions also pay off. Thanks to what they learned at one session, 100 industry representatives changed a manufacturing practice and estimated avoiding potential recall costs averaging \$500,000 each.

Funding:

USDA

Food Allergy Research and Resource Program member food companies

University of Nebraska Agricultural Research Division

University of Nebraska Cooperative Extension

Smith Lever 3(b) & (c)

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Summary:

Food allergies are a worldwide concern and cause as many as 200 deaths and countless allergic reactions annually in the United States. Research and training by toxicologists in the University of Nebraska's internationally recognized Food Allergy Research and Resource Program are helping the food industry protect the nation's 6-7 million allergic consumers. The food industry uses the team's fast, accurate tests to detect traces of allergenic foods on food or equipment. Companies that use the tests can be confident that their products contain only the ingredients listed on the label. The IANR team also trains food manufacturers nationwide on food allergy issues. At one training session, 100 industry representatives changed a manufacturing practice and estimated avoiding potential recall costs of \$500,000 each.

Enhance Protection and Safety of the Nation's Agriculture and Food Supply

Topic: Tularemia Research

Issue:

Tularemia, a disease known mainly to hunters as rabbit fever, has taken on new, potentially diabolical dimensions in the post-9/11 world. Biosecurity officials fear terrorists might try to turn the naturally occurring bacterium that causes tularemia into a biological weapon.

What has been done:

Francisella tularensis is one of six organisms classified as Class A, or leading, bioterrorism agents, but scientists know little about how it causes disease. In nature, tularemia primarily infects wild animals. People typically get it from skin contact with infected animals or ticks. A rare, potentially deadly inhaled form, called Type A, worries homeland security officials because it kills up to 60 percent of people who become infected. University of Nebraska Institute of Agriculture and Natural Resources and the university's medical center scientists are collaborating to better understand this organism and to learn why some subspecies cause disease while others don't. Such differences could lead to development of new control strategies. IANR microbiologists have identified some genetic differences among different *F. tularensis* strains and are examining whether these differences are important to the disease process.

Impact:

The nation needs scientific information to prepare for the possibility that terrorists might try to use tularemia as a weapon. Unraveling the genetic links to the disease-causing process is a critical step toward protecting people. These discoveries also could point the way for developing vaccines or antibiotics to prevent or treat tularemia.

Funding:

Nebraska Tobacco Settlement Biomedical Research Development Fund
University of Nebraska Agricultural Research Division

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Summary:

Tularemia, a disease known mainly to hunters as rabbit fever, has taken on new, potentially diabolical dimensions in the post-9/11 world. Biosecurity officials fear terrorists might try to turn the naturally occurring bacterium that causes tularemia into a biological weapon. University of Nebraska Institute of Agriculture and Natural Resources and the university's medical center scientists are collaborating to better understand this organism and learn why some subspecies cause disease while others don't. IANR microbiologists have identified some genetic differences among different strains of this bacterium and are examining their importance to the disease process. Unraveling the genetic links to the process is a critical step toward protecting people. These discoveries could point the way for vaccines or antibiotics to prevent or treat tularemia.

Improve the Nation's Nutrition and Health

Topic: Boosting Soybeans' Omega-3 Levels

Issue:

Wild salmon, tuna and sardines are rich in omega-3 fatty acid, which is believed to be important in preventing heart disease, cancer and other ailments. However, many Americans don't get enough of this beneficial fat in their diets.

What has been done:

University of Nebraska plant scientists are using biotechnology to modify the soybean DNA to develop plants with improved nutritional characteristics, such as abundant omega-3 in the bean. Researchers identified genes from other plants, inserted these genes in soybean cells and produced plants high in gamma-linolenic acid and stearidonic acid, the building blocks for omega-3. Next they'll transfer genes from a harmless plant fungus into cells from these soybeans cells to induce production of omega-3. The research should take about a decade to commercialize. Eventually it should lead to soybeans high in omega-3 that could be fed to farm-raised fish or poultry to boost the omega-3 content of their meat.

Impact:

Consumers who eat the meat or eggs from fish or animals fed soybeans rich in omega-3 could improve their nutrition without changing their daily eating habits. Producing these specialty soybeans also should bring a premium for growers.

Funding:

Nebraska Research Initiative
Nebraska Soybean Board
University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Many Americans don't get enough beneficial omega-3 in their diets. Fish such as wild salmon, tuna and sardines are rich in omega-3, which is touted for helping prevent heart disease, cancer and other ailments. IANR plant scientists are using biotechnology tools to develop soybeans with enhanced nutritional properties such as abundant omega-3 fatty acids. They've already inserted plant genes and produced soybean plants with more of the building blocks of omega-3. Next they need to add genes from a harmless fungus to induce omega-3 production. This complex long-term research eventually should lead to soybeans high in omega-3 that could be fed to farm-raised fish or poultry to boost the omega-3 content of their meat. Consumers who eat the meat or eggs from fish or animals fed these enriched soybeans could improve their nutrition without changing their daily eating habits. Producing specialty soybeans also could bring a premium for growers.

Improve the Nation's Nutrition and Health

Topic: Genetic Predisposition to Obesity

Issue:

America has a weighty problem. Nearly 65 percent of U.S. adults are overweight, including 30 percent who are obese, according to the U.S. Centers for Disease Control and Prevention.

What has been done:

University of Nebraska animal scientists are studying the genes that predispose some people to obesity, which is a complex genetic trait. Each person or animal inherits hundreds of genes that interact with each other and the environment to create a unique predisposition for obesity. Scientists are comparing genes from several mice strains specially bred to burn either fewer or more calories. They're studying the difference in gene expression between the fat and normal mice to isolate obesity predisposition genes. They've found early clues to this complex puzzle. For example, they know the genes they're seeking are involved in energy regulation – the balance between calories consumed and calories burned.

Impact:

Better understanding the genetic underpinnings of obesity predisposition someday should lead to new tools to diagnose and manage obesity. Livestock production also should benefit. Identifying key genes could lay the foundation for producing leaner animals.

Funding:

National Institutes of Health
Nebraska Tobacco Settlement Biomedical Research Development Fund
University of Nebraska Agricultural Research Division

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Summary:

Nearly 65 percent of U.S. adults are overweight, including 30 percent who are obese, according to the U.S. Centers for Disease Control and Prevention. IANR animal scientists are studying the genes that predispose some people to obesity. They're comparing genes from several mice strains specially bred to burn either fewer or more calories to identify genetic differences between the fat and normal mice to isolate obesity predisposition genes. This long-term basic research should expand knowledge about the genetic underpinnings of obesity predisposition. That someday could lead to new tools to diagnose and manage obesity. Livestock production also should benefit. Identifying key genes could lay the foundation for producing leaner animals.

Improve the Nation's Nutrition and Health

Topic: N-Lighten Nebraska

Issue:

About 58 percent of Nebraska adults are overweight or obese and 29 percent have no physical activity during their leisure time, according to the most recent Nebraska Behavioral Risk Factor Report. Physical activity and weight control are important in preventing and controlling diseases.

What has been done:

University of Nebraska Cooperative Extension's Nutrition, Health and Food Safety team collaborated with the Cornhusker State Games and Nebraska Health and Human Services System on the N-Lighten Program to encourage physical activity and weight loss. In the 2004 program, more than 750 teams consisting of two to 10 people participated statewide. Teams tracked physical activity and received information about nutrition, exercise and health. Nearly 6,000 people tracked how far they walked, ran, swam or bicycled and logged miles into a Web site. Medals were awarded at the Cornhusker State Games in July for adult and youth teams with the most physical activity and adult teams that lost the most collective weight.

Impact:

N-Lighten provides Nebraskans training on how to start and maintain a physical activity program. More than 80 percent of the N-Lighten participants said they planned to continue their exercise after completing the program. The nearly 6,000 participants in 2004 lost more than 16,500 collective pounds and logged more than 1.77 million physical activity miles. The winning weight-loss team lost an average of 32 pounds per member or 18.36 percent of their beginning weight. The winner in the accumulated activity division swam an average of 12.27 miles per member per day. A youth team from Lincoln won by logging an average of four miles per person per day.

Comments such as this were typical: "It was motivation to get me started exercising — lost 19.5 inches and 16 pounds!"

Funding:

University of Nebraska Cooperative Extension
Cornhusker State Games

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Summary:

The Nebraska Behavioral Risk Factor Report shows 58 percent of Nebraska adults are obese and 29 percent don't participate in physical activity during their leisure time. University of Nebraska Cooperative Extension teamed with the Cornhusker State Games and Nebraska Health and Human Services System on the N-Lighten Program to encourage youths and adults to exercise more and lose weight by forming teams and logging daily exercise. The program provides a Web site and information about nutrition, exercise and health. In 2004, more than 750 teams representing nearly 6,000 people took the challenge to increase and track their activity in hopes of winning medals at the Cornhusker State Games in July. Participants in 2004 lost more than 16,500 collective pounds and logged more than 1.77 million physical activity miles. More than 80 percent said they planned to continue their exercise after the program.

Improve the Nation's Nutrition and Health

Topic: Ozone Cleans Munitions-Polluted Soils

Issue:

The soil around former bomb-making plants often is contaminated with toxic compounds that can wind up polluting groundwater and public drinking water supplies. Conventional methods of removing these contaminants from the soil, such as digging it up and incinerating it, are expensive, labor intensive and environmentally invasive.

What has been done:

Research by a University of Nebraska soil environmental chemist and environmental engineering graduate student shows that ozone effectively cleans carbon-based explosives residues, such as RDX and TNT, from soil. They found that injecting ozone into soil as a fumigant turns the contaminants into harmless carbon dioxide. Ozone is commonly used to treat drinking water, but less was known about how it works to break down these compounds in soil. Lab tests on soil from a Texas bomb plant site show ozone can be 100 percent effective at eliminating carbon-based residues. Scientists are perfecting their lab-scale technique for use with existing technology and equipment to pump ozone through the soil on a large scale. Ozone injection should be simpler and less expensive than conventional soil cleanup methods that involve digging up, removing and incinerating soil.

Impact:

Large-scale ozone injection should make it easier and less costly to eliminate munitions contaminants from soil to prevent the toxic residues from polluting groundwater that often is a source of drinking water.

Funding:

U.S. Department of Energy
University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Polluted soil around former bomb-making plants often threatens to pollute water supplies. IANR soil scientists are working on similar, cheaper and less environmentally disruptive ways to remove toxic munitions compounds from soil before they leach into groundwater. School of Natural Resources researchers found that ozone effectively removes carbon-based explosives compounds such as TNT or RDX, when it's injected into soil. Ozone is widely used to clean polluted water but less was known about how it worked in soil until this study. These laboratory findings indicate ozone injection should work on a large scale using existing technologies and equipment. The technique should make cleanup easier, less costly and more environmentally friendly than digging up and incinerating contaminated soil.

Improve the Nation's Nutrition and Health

Topic: Promising New Cholesterol-Fighter

Issue:

Animal fats are widely considered dietary pariahs but University of Nebraska research shows certain saturated fats actually can lower cholesterol. Harnessing that cholesterol-fighting power could benefit the more than 140 million Americans whose blood cholesterol levels put them at risk for heart disease.

What has been done:

A University of Nebraska nutrition scientist has developed a promising new cholesterol-fighting compound using homegrown ingredients. He developed a way to combine stearic acid from beef tallow with plant sterols from soybeans. The result is a potent cholesterol-lowering compound that could be used as a dietary supplement or a food additive. Animal studies showed this new compound packs far more cholesterol-lowering power than commercially available plant-based food additives. Preliminary research also suggests it works at least as well as widely prescribed cholesterol-lowering statin drugs. The new compound is an outgrowth of Nebraska research on fats' role in heart disease, which revealed that stearic acid, a saturated fat in beef tallow, actually lowers cholesterol. The university is patenting this technology and the team is further testing its effectiveness and exploring how best to commercialize it for consumers' benefit.

Impact:

Medical experts agree that controlling blood cholesterol is critical to reducing major health problems, including stroke and heart attack. This Nebraska-developed compound should provide a powerful new tool for managing cholesterol. In animal studies, it lowered LDL, or bad cholesterol, by about 70 percent, compared with 10 percent for commercially available plant-based food additives.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Beef tallow is a key ingredient in a promising new cholesterol-fighting compound. An IANR nutrition scientist combined stearic acid from beef tallow with plant sterols from soybeans to create a potent cholesterol-lowering compound that could be used as a dietary supplement or a food additive. It outperformed commercially available plant-based food additives in animal studies. Preliminary research also suggests it works at least as well as widely prescribed cholesterol-lowering statin drugs. This is an outgrowth of earlier research by this College of Education and Human Sciences scientist who found that stearic acid, a saturated fat in beef tallow, actually lowers cholesterol. The university is patenting this technology, which could provide a powerful new tool for managing cholesterol. That's a national health concern because more than 140 million Americans' cholesterol levels put them at risk for heart disease, according to the American Heart Association.

Improve the Nation's Nutrition and Health

Topic: Soy Oil Allergenicity

Issue:

People who are allergic to soybeans have to carefully check food ingredients and face limited food choices because soy is used extensively in foods worldwide.

What has been done:

University of Nebraska food scientists collaborated with physicians to test 30 refined soybean oils from around the world on soy allergic people in North America and South Africa. This study by the university's Food Allergy Research and Resource Program found that refined soybean oil does not trigger reactions in soy-sensitive people. The vast majority of soy oils are refined. Findings don't apply to cold-pressed soy oil, which contains more protein and can cause reactions. Researchers said allergic people don't react because refined oil contains only minuscule amounts of protein, the culprit in allergic reactions.

Impact:

These findings expand the safe food choices for soy allergic people. If refined oil is the only soybean ingredient in a food product, allergic consumers now know it's safe to eat. Food manufacturers are using these findings to ensure their products are safe for soy-allergic consumers.

Funding:

United Soybean Board
Private food companies
University of Nebraska Agricultural Research Division

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Summary:

Refined soybean oil does not trigger reactions in soy-sensitive people, IANR research shows. That's welcome news for allergic consumers and food processors since soy oil is used extensively in foods worldwide and soy is among the most common food allergens. IANR food scientists studied 30 refined soy oils from around the world and tested soy sensitive people internationally to determine refined oil doesn't cause problems. These findings expand the safe food choices for soy allergic people since most soy oil used in food manufacturing and cooking oil is refined. If it's the only soy ingredient in a food product, sensitive people now know it's safe to eat. Findings also are helping food manufacturers ensure products are safe for soy-allergic consumers.

Improve the Nation's Nutrition and Health

Topic: Vitamin Deficiency in Pre-Schoolers

Issue:

Getting enough key vitamins is important to good health, especially for children whose bodies are growing. Low-fat diets that many adults favor may leave children short on key fat-soluble vitamins.

What has been done:

A University of Nebraska nutrition scientist studied preschool-age children in Lincoln, Neb., to evaluate the National Academy of Sciences' dietary recommendation for vitamin E in children, which is 6 mg daily for 1- to 3-year-olds and 7 mg daily for 4- to 8-year-olds. She found the recommendations are appropriate. This study also revealed that two-thirds of pre-schoolers don't consume enough vitamin E and one-third don't get enough vitamin C. Interviews with parents about their children's dietary intake indicated that young children who share their parent's low-fat diet may get inadequate vitamin E. Based on this research, she recommends children regularly consume whole milk, nuts and seeds, regular salad dressings, and whole-grain cereals fortified with vitamins plus plenty of citrus fruits and juices for vitamin C. She is expanding her study to include more children, especially in rural areas.

Impact:

This research highlights the importance of preparing healthy snacks and meals that provide adequate vitamins to meet children's needs. Parents and day care providers can use this information to ensure children are consuming enough vitamins.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Some pre-schoolers aren't getting enough vitamins E and C, IANR research shows. A College of Education and Human Sciences nutrition scientist's study of Lincoln pre-school children found that two-thirds of these 2- to 5-year-olds don't consume enough vitamin E and one-third don't get enough vitamin C. Interviews with parents about their children's dietary intake indicated children who share their parent's low-fat diet often don't get enough vitamin E. Based on this research, this scientist recommends children regularly consume whole milk, nuts and seeds, regular salad dressings, and whole-grain cereals fortified with vitamins plus plenty of citrus fruits and juices for vitamin C. Her findings highlight the importance of healthy snacks and meals for children at home and in day care to ensure children get enough vitamins. She is expanding her study to include more children, especially in rural areas.

Improve the Nation's Nutrition and Health

Topic: Lead Reduction Protects Children's Health

Issue:

Lead paint and lead-contaminated soil contribute to childhood lead poisoning, a serious health threat, particularly for kids under age 6. Children who regularly inhale or ingest even small amounts of lead may develop learning and behavior problems as well as hearing problems, nervous system damage and reduced IQs.

What has been done:

Nearly all houses in older parts of Omaha, the state's largest city, were built before 1978, when lead paint was banned. In one older northeast Omaha neighborhood, 42 percent of children tested positive for lead from 1992 to 1998. The U.S. Environmental Protection Agency has designated about 20 square miles of east Omaha as a Superfund cleanup site due to lead-contaminated soil. To help neighborhood residents cope, University of Nebraska Cooperative Extension teaches classes in English and Spanish that teach residents how to reduce the risk of lead poisoning from lead in their homes and yards. Living Safely With Lead: Reducing the Risk includes housekeeping, nutrition and landscaping lead poisoning prevention information. Living Safely With Lead: Maintenance of Older Homes teaches people how to reduce lead exposure during remodeling or when doing simple home repairs. In 2004, eight classes were taught in English and three in Spanish, with 75 families participating. Extension collaborates with the city of Omaha, the county health department and local resources to inform people about the classes. Information also was distributed to Spanish-speaking residents via media and a health fair, and to child care providers, who sent it home with children in their care.

Impact:

These programs are helping residents reduce the risk of lead poisoning in and around their homes. A follow-up survey showed 70 percent of Reducing the Risk participants changed their lifestyles or management of their homes and landscapes to protect against lead poisoning thanks to knowledge gained in the class. One participant reported she had her children tested for lead poisoning as a result of attending the program.

Funding:

University of Nebraska Cooperative Extension
Smith-Lever 3(b) & (c)
City of Omaha
USDA/CSREES

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Summary:

Lead poisoning causes serious physical and mental health problems in children, particularly those under age 6. Lead paint is a leading cause of childhood lead poisoning. Nearly all the homes in the older part of Omaha were built before 1978, when lead paint was banned. In one older northeast Omaha neighborhood, 42 percent of children tested positive for lead from 1992 to 1998. University of Nebraska Cooperative Extension teaches classes in Omaha in English and Spanish on how to reduce lead poisoning through housekeeping, nutrition and landscaping, and during common home maintenance projects. In 2004, 75 families participated in eight classes taught in English and three in Spanish. Thanks to what they learned, 70 percent of participants made changes to reduce the risk of lead poisoning.

Improve the Nation's Nutrition and Health

Topic: Nutrition Education Programs

Issue:

Low-income Nebraskans need reliable information about basic nutrition, food safety and food management to assure their families eat healthily within tight budgets.

What has been done:

University of Nebraska Cooperative Extension nutrition programs offer education on everything from good budgeting and meal planning to food safety and nutrition to help low-income families become more self-sufficient and healthier in their eating habits. The Expanded Food and Nutrition Education Program offers nutrition education programming to children, parents of young children and pregnant or already parenting teens in three regions – Douglas/Sarpy counties, Adams/Hall/Buffalo counties and Lancaster County. Programs cover basic nutrition, food safety and food management. More than 85,000 Nebraska families have participated since 1969, 78 percent of which are at or below the poverty line. Extension also offers the Food Stamp Nutrition Education Project, which has reached nearly 22,000 families in 28 counties since 1994.

Impact:

Evaluations from 2003-04 graduates of both programs found that about 80 percent improved in one or more nutritional practices; 74 percent improved in at least one food resource management practice; and about 54 percent improved in at least one food safety practice. A 2000-02 study found that Nebraska's Food Stamp Nutrition Education Project generates \$2.07 in benefits for every dollar spent. Savings are a result of increased consumption of nutrients, which reduces disease risk.

Funding:

University of Nebraska Cooperative Extension
USDA Food and Nutrition Services
Smith-Lever (3d)

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Summary:

University of Nebraska Cooperative Extension nutrition programs offer education on everything from good budgeting and meal planning to food safety and nutrition to help families become more self-sufficient and healthier in their eating habits. The Expanded Food and Nutrition Education Program reaches children, parents of young children and pregnant or already parenting teens in Douglas/Sarpy counties, Adams/Hall/Buffalo counties and Lancaster County. Extension also offers the Food Stamp Nutrition Education Project, which encourages participants to make changes in their eating habits. Evaluations from 2003-04 participants in both programs found significant improvements in nutritional, food management and food safety practices. A 2000-02 study showed Nebraska's Food Stamp Nutrition Education Project generates \$2.07 in benefits for every dollar spent. Savings are a result of increased consumption of nutrients, which reduces disease risk.

Improve the Nation's Nutrition and Health

Topic: Reducing or Eliminating Arsenic from Public Drinking Water Systems

Issue:

New U.S. Environmental Protection Agency limits reduce the amount of arsenic allowed in drinking water from 50 to 10 parts per billion. More than 80 small public water systems across Nebraska could have trouble complying with this new federal requirement by the 2006 deadline because traditional cleanup methods are expensive.

What has been done:

University of Nebraska-Lincoln water scientists are evaluating the occurrence of arsenic in the water supplies of small Nebraska communities to find ways to reduce arsenic in groundwater that cost less than drilling new wells or traditional approaches to removing the contaminant. Arsenic occurs naturally and is linked to some cancers and other health problems. One method scientists are considering is removing arsenic within the aquifer before pumping the water. This approach uses iron oxides, similar to rust, to attract and bond with the arsenic to remove it from the water. Researchers also are helping communities improve their well water sampling procedures to better assess arsenic levels in their water. The goal is to develop recommendations to help public water supplies meet the 2006 deadline.

Impact:

It's estimated that complying with the new EPA standard could easily total more than \$120 million for small community water systems statewide if they use conventional methods to reduce arsenic levels. This Nebraska research should provide practical recommendations that could save small water systems thousands of dollars on arsenic cleanup costs.

Funding:

University of Nebraska Agricultural Research Division
U.S. Environmental Protection Agency
U.S. Geological Survey

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Summary:

University of Nebraska-Lincoln water scientists are working to help Nebraska's small communities meet a new, lower federal limit for arsenic in their drinking water. More than 80 small public water systems statewide could have trouble meeting the 2006 compliance deadline. Researchers are developing arsenic cleanup alternatives that cost less than drilling new wells or using traditional arsenic removal methods. The goal is to provide recommendations to help public water supplies meet the deadline. It's estimated that compliance using traditional methods could cost small water systems statewide more than \$120 million. Results of this research could significantly reduce those costs. Researchers also are working to ensure local water system operators use well water sampling procedures that provide an accurate assessment of arsenic in their drinking water.

Improve the Nation's Nutrition and Health

Topic: Tularemia Research

Issue:

Tularemia, a disease known mainly to hunters as rabbit fever, has taken on new, potentially diabolical dimensions in the post-9/11 world. Biosecurity officials fear terrorists might try to turn the naturally occurring bacterium that causes tularemia into a biological weapon.

What has been done:

Francisella tularensis is one of six organisms classified as Class A, or leading, bioterrorism agents, but scientists know little about how it causes disease. In nature, tularemia primarily infects wild animals. People typically get it from skin contact with infected animals or ticks. A rare, potentially deadly inhaled form, called Type A, worries homeland security officials because it kills up to 60 percent of people who become infected. University of Nebraska Institute of Agriculture and Natural Resources and the university's medical center scientists are collaborating to better understand this organism and to learn why some subspecies cause disease while others don't. Such differences could lead to development of new control strategies. IANR microbiologists have identified some genetic differences among different *F. tularensis* strains and are examining whether these differences are important to the disease process.

Impact:

The nation needs scientific information to prepare for the possibility that terrorists might try to use tularemia as a weapon. Unraveling the genetic links to the disease-causing process is a critical step toward protecting people. These discoveries also could point the way for developing vaccines or antibiotics to prevent or treat tularemia.

Funding:

Nebraska Tobacco Settlement Biomedical Research Development Fund
University of Nebraska Agricultural Research Division

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Summary:

Tularemia, a disease known mainly to hunters as rabbit fever, has taken on new, potentially diabolical dimensions in the post-9/11 world. Biosecurity officials fear terrorists might try to turn the naturally occurring bacterium that causes tularemia into a biological weapon. University of Nebraska Institute of Agriculture and Natural Resources and the university's medical center scientists are collaborating to better understand this organism and learn why some subspecies cause disease while others don't. IANR microbiologists have identified some genetic differences among different strains of this bacterium and are examining their importance to the disease process. Unraveling the genetic links to the process is a critical step toward protecting people. These discoveries could point the way for vaccines or antibiotics to prevent or treat tularemia.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Be Yard Smart

Issue:

Grass clippings, leaves and brush take up lots of precious landfill space. To extend the useful life of the local landfill, the City of Lincoln and University of Nebraska Cooperative Extension teamed up to improve waste management and recycle landscape waste.

What has been done:

Lincoln contracted with Nebraska Cooperative Extension in Lancaster County to provide educational programs to encourage people to compost landscape wastes. The Be Yard Smart program teaches participants how to use organic wastes from the landfill or how to compost and use their own materials on their property. Since the program began in 1995, 1,400 citizens have participated in the composting education classes and learned about the benefits of using organic wastes. Participants also are encouraged to reduce and recycle yard waste through mulching and leaving grass clippings on lawns. Commercial turf management firms also are encouraging their clients to recycle clippings.

Impact:

The city recycles 20,000 tons of grass, leaves and wood chips into compost each year, which is available to the public as LinGro Compost. With this diversion of grass, leaves and brush, Lincoln has added another three years to the life of its sanitary landfill and saved taxpayers nearly \$557,000. One participant said, "I don't think I'll ever throw away another leaf."

Funding:

City of Lincoln
University of Nebraska Cooperative Extension
Smith-Lever 3(b) & (c)

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Summary:

Grass clippings, leaves and brush take up a lot of space at city landfills. The City of Lincoln and University of Nebraska Cooperative Extension teamed up on the Be Yard Smart program to minimize yard waste by improving waste management and recycling landscape waste. Cooperative Extension in Lancaster County provides educational programs that encourage people to use landscape wastes for compost. Since the beginning of the program in 1995, 1,400 citizens have participated in the composting education classes and learned about the benefits of using organic wastes. The city now recycles 20,000 tons of landscape waste annually and makes it available to the public as LinGro Compost. With this diversion of grass, leaves and brush, Lincoln has added another three years to the life of its sanitary landfill and saved taxpayers nearly \$557,000.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: CNMP Training Program

Issue:

Manure can be an ideal fertilizer or a troublesome waste. If properly managed, it provides phosphorus and nitrogen crops can use, and organic matter that improves soil quality and reduces chances that nutrients will pollute ground-water and surface water.

What has been done:

A team of 20 University of Nebraska Cooperative Extension specialists and educators teaches livestock managers to comply with state and federal manure environmental regulations. Program participants learn how to apply for federally required Waste Control Facility Permits and to implement state Comprehensive Nutrient Management Plans when using manure to fertilize crops. Extension provides workbooks, spreadsheets, software and kits, and teaches how to calibrate equipment and take samples. Nearly 400 producers who studied manure management with extension between 2001 and 2004 managed hundreds of thousands of cattle, pigs and poultry. About 165 crop and livestock consultants and agency personnel participated in manure management training in 2003-04.

Impact:

Nebraska is a leading livestock-producing state so proper manure management has environmental and economic benefits. According to extension figures, the nitrogen and phosphorus produced annually from 1,000 head of cattle or 1,000 head of hogs is worth \$18,000 and \$6,500, respectively. Participants in this training report that they are better able to use manure as a resource while protecting water quality. One feedlot manager said the program "makes our planning very simple" and that the biggest benefit was learning the proper amounts of liquid manure to apply through center pivots for crop use.

Funding:

University of Nebraska Cooperative Extension
CSREES Water Quality Grant program
Nebraska Environmental Trust Fund
National Pork Board
Smith-Lever 3(b) & (c)

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Summary:

Properly using manure as a resource provides valuable fertilizer for crops and prevents its nutrients from polluting water. A team of 20 University of Nebraska Cooperative Extension specialists and educators teaches livestock managers to use manure as a resource, to develop plans for proper manure use and to comply with state and federal environmental regulations. The nearly 400 producers who learned better manure management from extension between 2001 and 2004 manage thousands of cattle, pigs and poultry. One feedlot manager said extension's program "makes our planning very simple" and that the biggest benefit was learning the proper amounts of liquid manure to apply through center pivots for crop use.

Protect and Enhance the Nation's Resource Base and Environment

Topic: Cost-Effective Grasshopper Control

Issue:

Continued drought created near perfect conditions for destructive grasshopper infestations on hundreds of thousands of acres of central and western Nebraska rangeland in recent years. Heavy infestations must be treated to protect scarce, much-needed forage grass but conventional treatments are costly.

What has been done:

University of Nebraska Cooperative Extension educated producers about the Reduced Agent and Area Treatments System. Under this system, insecticide is sprayed from planes at lower-than-conventional rates in 100-foot alternate swaths instead of spraying the entire area. Applications are timed to optimize residual control. Grasshoppers in the untreated swaths come in contact with the insecticide when they move to treated areas, making treatment nearly as effective as conventional approaches that cost far more and use more than twice as much insecticide. Extension staff promoted this approach through media, publications, educational meetings and individual consultations. The system was used on nearly 360,000 Nebraska acres in 2003. In 2004, only 200,000 acres were treated because grasshoppers were less widespread. Extension teamed with USDA's Animal Plant and Health Inspection Services, the Nebraska Department of Agriculture and landowners on this control effort.

Impact:

This system uses less than half the insecticide of conventional grasshopper controls, and far less fuel and time are needed to apply it. In Nebraska, this approach reduced treatment costs for landowners from \$5 to \$8 per acre to \$1.50 to \$2 per acre, a roughly 70 percent decrease on average. Treatment costs in 2003 were \$1.7 million less than in 2002. In 2004, this system saved nearly \$950,000 in treatment costs compared to conventional methods.

Funding:

University of Nebraska Cooperative Extension
USDA Animal and Plant Health Inspection Service
Nebraska Department of Agriculture
Smith-Lever 3(b) & (c)

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Summary:

Continued drought has brought heavy grasshopper infestations to some central and western Nebraska rangeland in recent years. University of Nebraska Cooperative Extension educated producers about an alternative grasshopper treatment approach that reduced treatment costs roughly 70 percent for a two-year savings of about \$2.6 million. The system requires less than half the insecticides used for conventional controls. Extension educated producers about the Reduced Agent and Area Treatments System. This system involves aerial spraying insecticide at lower-than-conventional rates in alternate swaths instead of spraying the entire area. Applications are timed to optimize residual control. Grasshoppers in the untreated swaths come in contact with the insecticide when they move to treated areas, making treatment nearly as effective as conventional approaches. The system was used on nearly 360,000 Nebraska acres in 2003, saving about \$1.7 million, and on 200,000 acres in 2004, saving nearly \$950,000 in treatment costs compared to conventional methods.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: FarmLink Helps Protect Water Quality

Issue:

Erosion is a big concern on Northeast Nebraska's rolling cropland and that erosion can cause water quality concerns. Flooding of Shell Creek frequently caused damage along its length and in three adjacent towns. Concerned individuals wanted to alleviate these problems.

What has been done:

University of Nebraska Cooperative Extension works closely with the Shell Creek Watershed Group. Using USDA funding, extension's FarmLink coordinates educational efforts to encourage conservation buffers along the creek and its tributaries. Conservation buffers are typically plantings between fields and streams that catch runoff and sediment before they enter the stream. FarmLink hires local producers and watershed group members to explain to their neighbors the need for buffers and other conservation practices. The FarmLink approach has been expanded and is being used as a model in three other projects to improve stream quality in Boone, Colfax, Madison, Platte and Saunders counties. Partners in these projects include several Natural Resources Districts, Pheasants Forever, the Nebraska Department of Environmental Quality, the Natural Resources Conservation Service, the U.S. Environmental Protection Agency and others.

Impact:

As a result of contacts with more than 40 landowners through FarmLink, contracts were signed to establish 19 different conservation buffers. These include 45 acres of streamside buffers and more than 21 acres of grassed waterways or similar plantings. In aggregate, these practices converted nearly 72 acres of cropland to grass, which will reduce soil erosion by an estimated 350 tons per year, and create excellent wildlife habitat. The streamside buffers will physically protect 3.3 miles of stream bank and filter the runoff from approximately 2,200 up-slope acres, while the grassed waterways will help filter and control the runoff from another 250 acres. Direct payments to the landowners will provide more than \$84,000 within the local area over the life of these contracts.

Funding:

University of Nebraska Cooperative Extension
USDA-CSREES
Smith-Lever 3(b) & (c)

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Summary:

Farming the rolling terrain typical in northeast Nebraska can result in flooding, soil erosion and surface water quality concerns. To alleviate these problems, University of Nebraska Cooperative Extension's FarmLink works with the Shell Creek Watershed Group to educate landowners about the benefits of conservation practices such as buffers between fields and streams. Landowners have signed 19 contracts to establish buffers on more than 71 acres of farmland that will help filter runoff from more than 2,400 acres in the watershed. The program is a model to improve water quality in other parts of the region.

Protect and Enhance Nation's Natural Resource Base and Environment

Topic: Hybrid-Maize Software

Issue:

Each year, farmers face complex decisions about how best to match corn management decisions with that season's unique growing conditions. Hard-to-predict variables such as weather, precipitation, availability of irrigation water or planting dates all affect corn performance and management.

What has been done:

To help farmers make more informed decisions, University of Nebraska agronomists developed a user-friendly computer program that simulates corn growth and performance under different conditions. This software, called Hybrid-Maize, lets users combine field-specific information with current and historical weather data. Users can manipulate variables, including planting dates, rainfall or irrigation, fertilizer rates, soil types, hybrid selection and plant density, to see how weather or management choices influence yields. The software lets users assess risk factors and evaluate for themselves a wide range of crop management options.

Impact:

This powerful new tool became available to farmers and crop consultants in 2004 from the university. It allows corn growers to more precisely adjust irrigation, nitrogen and other factors to boost profits, conserve limited water during drought and protect the environment by matching chemicals and fertilizer to crop needs.

Funding:

University of Nebraska Agricultural Research Division
Nebraska Corn Board
Fluid Fertilizer Foundation
USDA Consortium for Agricultural Soil Mitigation of Greenhouse Gases
Phosphate and Potash Institute
Foundation for Agronomic Research
High Plains Regional Climate Center
Hatch Act

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Summary:

A new user-friendly computer program that simulates corn growth and yields is now available to help farmers make complex corn management decisions. IANR scientists developed this software, called Hybrid-Maize, which is available on CD or the Web. This software combines field-specific information with current and historical weather data to predict corn yields under different conditions. Users can change variables to see how weather or management changes influence crop performance. This software helps growers fine-tune management practices to reduce costs and maximize production while protecting the environment and conserving irrigation water.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Landslide Research

Issue:

While they are seldom spectacular, landslides occur regularly in Nebraska, causing sometimes costly damage to roads, homes and other structures. Areas where soil is disrupted by road construction or other development are especially vulnerable so engineers and builders need information to help anticipate or repair problems.

What has been done:

To help highway engineers and developers better understand and plan for landslides, a University of Nebraska-Lincoln research geologist extensively researched, mapped and photographed more than 300 slides in Nebraska. His findings help predict where and under what circumstances landslides are most likely. This research provided a better understanding of the potential for landslides in residential developments built on bluffs or slopes near rivers and streams. This information has been integrated into a geographic information system and the computerized results are available in print and online.

Impact:

This information is helping Nebraska developers, planners and engineers make more informed decisions about where to build to avoid landslides. For example, findings help the Nebraska Department of Roads better plan where to route or reroute stretches of road and how best to control, stabilize and repair damage from landslides. Officials estimate that Nebraska landslides have cost federal, state and local agencies an estimated \$4.7 million in the last 20 years. Using these findings to plan roads and development could prevent most of these losses in the future.

Funding:

Nebraska Department of Roads
U.S. Geological Survey

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Summary:

An IANR research geologist's extensive research on Nebraska landslides is helping road engineers and builders make more informed decisions about where to build to avoid potential landslides. The researcher examined, photographed and mapped more than 300 Nebraska landslides over the past 25 years to better understand this little understood phenomenon. The results are available in print or online. They provide a better understanding of where and under what circumstances landslides are likely to occur throughout Nebraska. This information helps the Nebraska Department of Roads reduce costs of landslide damage. The department uses results to better plan where to route or reroute roads and how best to control, stabilize and repair landslide damage. It's estimated that Nebraska landslides have cost federal, state and local agencies an estimated \$4.7 million in the last 20 years.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Ozone Cleans Munitions-Polluted Soils

Issue:

The soil around former bomb-making plants often is contaminated with toxic compounds that can wind up polluting groundwater and public drinking water supplies. Conventional methods of removing these contaminants from the soil, such as digging it up and incinerating it, are expensive, labor intensive and environmentally invasive.

What has been done:

Research by a University of Nebraska soil environmental chemist and environmental engineering graduate student shows that ozone effectively cleans carbon-based explosives residues, such as RDX and TNT, from soil. They found that injecting ozone into soil as a fumigant turns the contaminants into harmless carbon dioxide. Ozone is commonly used to treat drinking water, but less was known about how it works to break down these compounds in soil. Lab tests on soil from a Texas bomb plant site show ozone can be 100 percent effective at eliminating carbon-based residues. Scientists are perfecting their lab-scale technique for use with existing technology and equipment to pump ozone through the soil on a large scale. Ozone injection should be simpler and less expensive than conventional soil cleanup methods that involve digging up, removing and incinerating soil.

Impact:

Large-scale ozone injection should make it easier and less costly to eliminate munitions contaminants from soil to prevent the toxic residues from polluting groundwater that often is a source of drinking water.

Funding:

U.S. Department of Energy
University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Polluted soil around former bomb-making plants often threatens to pollute water supplies. IANR soil scientists are working on similar, cheaper and less environmentally disruptive ways to remove toxic munitions compounds from soil before they leach into groundwater. School of Natural Resources researchers found that ozone effectively removes carbon-based explosives compounds such as TNT or RDX, when it's injected into soil. Ozone is widely used to clean polluted water but less was known about how it worked in soil until this study. These laboratory findings indicate ozone injection should work on a large scale using existing technologies and equipment. The technique should make cleanup easier, less costly and more environmentally friendly than digging up and incinerating contaminated soil.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Reducing Urban Erosion

Issue:

Erosion and runoff aren't just rural issues. Exposed soil around new construction sites in urban areas is especially vulnerable to erosion. Sediment that runs off such sites pollutes lakes, streams and rivers.

What has been done:

University of Nebraska Cooperative Extension coordinates educational seminars to help the building industry better understand how to reduce urban soil erosion and sediment pollution, and to comply with new federal storm water management regulations. Seminars are offered in the Omaha area, Nebraska's largest metro area, where the issue is especially important because of extensive new construction, its proximity to the Missouri River and housing developments around several lakes. Seminars in 2003 and 2004 taught architects, engineers, contractors and others about storm water management requirements and best management practices such as ground cover and erosion control dams to prevent soil around construction sites from washing into surface waters. Seminars drew more than 140 people each year.

Impact:

An average of 94 percent of building industry professionals surveyed in both years said they would apply the knowledge they gained at the seminar to better control urban erosion. In the long run, better erosion control will reduce the costs and problems associated with cleaning sediment and pollution from lakes and streams.

Funding:

University of Nebraska Cooperative Extension
Nebraska Department of Environmental Quality

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Summary:

Sediment erosion from new construction sites in the Omaha area is a major pollutant in metropolitan lakes, streams and the Missouri River. University of Nebraska Cooperative Extension's seminars in 2003 and 2004 helped architects, engineers, contractors and others better understand ways to reduce soil erosion and pollution, and to comply with federal regulations. More than 140 people participated in each year's sessions. An average of 94 percent of building industry professionals surveyed said they would apply what they learned at the seminar to better control urban erosion in their daily work around Nebraska's largest metro area.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Republican River Basin Irrigation Management Project

Issue:

Faced with continued drought and looming water restrictions, making the most of every drop of irrigation water can literally make or break many southwest Nebraska farmers.

What has been done:

University of Nebraska Cooperative Extension launched the Republican River Basin Irrigation Management Project to demonstrate research-based irrigation management strategies in farmers' fields and provide practical information for implementing these practices. The project features year-round educational presentations on water conservation and tours of demonstration sites, which give producers and crop consultants a firsthand look at how these water-saving practices work. In 2004 alone, 180 people attended six tours.

Impact:

Program participants estimate the knowledge gained from this program will save them an average 2.2 inches of water per acre, a 10 percent to 15 percent savings over typical irrigation use in the area. Based on the number of participants in 2004 and the acres they irrigate, that amounts to more than 45,000 acre-feet of water annually – enough water to cover 45,000 acres of land with a foot of water. Participants also estimated the knowledge gained through this program is worth an average of about \$16,500 per operation or, conservatively, \$2 million annually.

Funding:

University of Nebraska Cooperative Extension
U.S. Bureau of Reclamation
Smith-Lever 3(b) & (c)

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Summary:

The Republican River Basin Irrigation Management Project is helping farmers in water-short southwest Nebraska learn research-based techniques for conserving irrigation water. Cooperative Extension demonstrates research-based irrigation management strategies in farmers' fields, offers field tours and provides year-round educational presentations on water conservation. In 2004 alone, 180 people attended six tours. Program participants estimate the knowledge gained from this program will save them 2.2 inches of water per acre, a 10-15 percent savings over typical irrigation use in the area. Based on the number of participants and the acres they irrigate, that totals more than 45,000 acre-feet of water annually. They also estimated the knowledge gained through this program is worth an average of about \$16,500 per operation or, conservatively, \$2 million annually.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Understanding Antibiotics' Fate in Soil

Issue:

Farmers long have fertilized fields and pastures with livestock manure, which enriches soil and puts waste to good use. Today, manure may contain traces of antibiotics used in livestock production and there's growing interest in knowing what happens to antibiotics in the environment.

What has been done:

To learn more about what happens to antibiotics in soil, University of Nebraska agricultural scientists teamed with a USDA Agricultural Research Service scientist and others on several years of field studies. Traces of oxytetracycline, an antibiotic commonly used in livestock, were detected in topsoil for 17 months after manure application. Two years of testing found no oxytetracycline in water collected 8 feet under test plots. Manured plots also contained significantly more tetracycline-resistant bacteria in the topsoil than commercially fertilized plots for five months after application. Levels declined over time with no difference after five months. Further research is needed to determine whether the increase in resistant bacteria originates in the manure or develops in natural soil bacteria.

Impact:

Little has been known about the fate of antibiotic residues in soil. These results provide one of the first overviews of what happens when manure is applied to irrigated cropland. Findings lay the scientific foundation for further research to understand the potential health and environmental implications.

Funding:

University of Nebraska Agricultural Research Division
University of Nebraska Foundation
Hatch Act

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Summary:

There's growing interest in the fate of antibiotics in the environment. IANR research is providing information about what happens to antibiotic residues in manure when it's applied to irrigated cropland. In field studies at North Platte, scientists detected traces of oxytetracycline, an antibiotic commonly used in livestock, in topsoil for 17 months after manure application. Manured plots contained significantly more tetracycline-resistant bacteria in the topsoil than commercially fertilized plots for five months after application. Levels declined over time with no difference after five months. Scientists don't know whether the increase in resistant bacteria originates in the manure or develops in natural soil bacteria. There's much more to be learned but these findings lay the scientific foundation for further research to better understand potential health and environmental implications.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Vegetation Response Drought Index

Issue:

Drought is the costliest natural disaster in the United States, with an annual impact of \$6 billion to \$8 billion that belies its slow, creeping nature. Accurate monitoring and predictions of drought are key to helping control its effects.

What has been done:

About five years after it launched its now widely used Drought Monitor in collaboration with the U.S. Department of Agriculture and National Oceanic and Atmospheric Administration, the University of Nebraska-based National Drought Mitigation Center has developed the Vegetation Response Drought Index in collaboration with the U.S. Geological Survey's Earth Resources Observation System Data Center in Sioux Falls, S.D. The index, now being tested in a seven-state region, complements and improves on the earlier Web-based drought monitor, whose scope is limited by the incomplete geographical coverage of weather stations. The new index incorporates satellite data from EROS. That satellite data allows for an analysis of drought square mile by square mile by picking up differences in the temperatures of vegetation.

Impact:

Climate data such as rainfall amounts are key indicators of drought trends, but nothing captures drought's impact as directly as plant stress. Plants under stress will have higher leaf temperatures than those that are not. By capturing that information and displaying it in a map similar to the Drought Monitor, the Vegetation Response Drought Index is more precise in detecting drought's presence and severity. As this index's use is expanded nationwide, it will help federal, state and local officials better plan to reduce drought's devastating impact.

Funding:

University of Nebraska Agricultural Research Division
U.S. Geological Survey
National Drought Mitigation Center
High Plains Regional Climate Center

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Summary:

Drought is the costliest natural disaster in the United States, with an annual impact of \$6 billion to \$8 billion. Accurate monitoring of drought helps reduce that impact. The Vegetation Drought Response Index, developed by the University of Nebraska-based National Drought Mitigation Center and the U.S. Geological Survey's Earth Resources Observation System, incorporates satellite data from the USGS to give a more detailed look at drought's scope and severity than current tools such as the Drought Monitor. The index, now being tested in a seven-state region, captures changing temperatures in vegetation; the higher a plant leaf's temperature, the more drought stress it is under. This precision could allow federal, state and local officials to more specifically target drought-mitigation efforts.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Water-Thrifty Buffalograsses

Issue:

Everyone loves a lush lawn but traditional turfgrass usually requires lots of water, chemicals and maintenance.

What has been done:

Two decades of University of Nebraska turf science research has transformed buffalograss, a tough, drought-tolerant prairie grass, into improved water-thrifty grass well-suited for lawns, golf courses, parks and other turf. Nebraska is the nation's leader in turf buffalograss research and improvement. Since 1990, nine turf buffalograsses developed by Institute of Agriculture and Natural Resources scientists have been commercialized. Private companies grow and sell these improved buffalograsses as seed or sod under university agreements. Royalties support ongoing buffalograss research, and these improved buffalograss varieties create new sales potential for turf producers in Nebraska and elsewhere as demand for buffalograsses grows.

Impact:

Demand for these grasses is growing nationwide, but especially in areas hardest hit by drought and water shortages. These turf-type buffalograsses require half the water and far less fertilizer and maintenance than conventional turf. Royalties have topped \$1 million. One Nebraska turf producer now produces buffalograss sod on 165 acres in seven states and sells sod from these IANR-developed varieties in 49 states and internationally.

Funding:

University of Nebraska Agricultural Research Division
Hatch Act
United States Golf Association
Industry partners

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Summary:

Descendants of a tough prairie grass are providing water-thrifty, sustainable turf options, thanks to IANR turf science research. Researchers have developed improved turf-type varieties well-suited for lawns, golf courses, parks and other uses. Since 1990, the university has commercialized nine IANR-developed turf buffalograss varieties. These improved buffalograsses are an increasingly popular alternative to traditional turfgrass, especially in dry, water-short areas. IANR buffalograsses require half the water and far less fertilizer and maintenance than conventional turf. Private companies grow and sell these improved buffalograsses under agreements with the university. Royalties have topped \$1 million, which helps support ongoing buffalograss research. Nebraska seed and turf sod companies are among those companies that have licensed IANR's buffalograsses. For example, one Nebraska turf producer now produces buffalograss sod on 165 acres in seven states and sells sod from these IANR-developed varieties in 49 states and internationally.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Calculating Modern Ethanol's Energy Balance

Issue:

Farming practices and corn ethanol conversion technologies have become significantly more efficient over the past two decades. Yet corn ethanol's energy efficiency still gets a bad rap, mainly because assessments are based on out-dated data from the 1980s and early 1990s. To make national policy choices, decision-makers need information on modern ethanol production efficiencies.

What has been done:

To calculate a more up-to-date energy balance for corn ethanol, a team of University of Nebraska agricultural scientists examined on-farm energy consumption and ethanol yield for today's progressive corn management systems and modern, higher efficiency ethanol plants. This analysis shows today's ethanol has a positive energy balance – it yields more energy than is used to produce it. Today's ethanol is about 30 percent ahead energy-wise. Converting irrigated corn to ethanol has an energy output to energy input ratio of 1.3-to-1; for dryland corn it's 1.4-to-1.

Impact:

Having accurate, current information about modern ethanol's energy balance should help decision-makers make better informed national energy policy choices. Both farmers and the environment should benefit. Turning corn into ethanol creates an important market for farmers and a renewable, clearer burning alternative to fossil fuels. In Nebraska 23 percent of all corn is used for ethanol and is an important new industry for rural economies.

Funding:

U.S. Department of Energy
USDA
University of Nebraska Agricultural Research Division
Hatch Act

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Summary:

Ethanol made from corn has a positive energy balance, meaning it yields more energy than is used to produce it. That's the conclusion of new University of Nebraska research that calculated the energy balance of modern ethanol production. Institute of Agriculture and Natural Resources researchers assessed how much fossil fuel is needed to grow corn, transport it, process it into ethanol, blend it with gas and get it to the pump. They found that today's ethanol is about 30 percent ahead energy-wise. Converting irrigated corn to ethanol has an energy output to energy input ratio of 1.3-to-1; for dryland corn it's 1.4-to-1. These findings on modern ethanol production are especially important because most studies used to assess ethanol's potential have been based on 10- to 20-year-old data that doesn't reflect farming and production efficiency gains made during the past two decades. This more accurate data should help policy-makers make better informed national energy policy choices.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Livestock Odor Prediction Tool

Issue:

Concerns over livestock odors are growing. Disputes often pit livestock producers against neighbors and sometimes divide communities. Finding science-based solutions to help minimize odors and conflicts is especially important in Nebraska, a leading livestock producing state.

What has been done:

University of Nebraska biological systems engineers are developing a computer tool to predict how often there will be annoying odors in areas surrounding a livestock facility. Called the Nebraska Odor Footprint Tool, this software illustrates how far a livestock operation needs to be from neighbors in different directions to avoid odor-related conflicts. It incorporates weather records and livestock operation characteristics specific to Nebraska along with site-specific information. This tool will be used primarily to advise producers planning to expand existing facilities or build new ones. Livestock producers tested a prototype of the new tool at fall 2004 workshops. Researchers continue to enhance the tool and make it easier to use. The tool also will help planners and communities make more informed decisions about the placement of livestock operations. Researchers will test it in a rural community this summer. The target is to make the tool available for use by individuals in 2006.

Impact:

This tool should replace some of the emotion and guesswork often associated with decisions about where to locate livestock facilities with research-based information based on Nebraska and site-specific information. Better-informed choices about the location of livestock operations should reduce conflicts and improve environmental quality.

Funding:

University of Nebraska Agricultural Research Division
University of Nebraska Cooperative Extension
Nebraska Pork Producers Association
National Pork Board
Nebraska Department of Agriculture
USDA National Research Initiative
Hatch Act
Smith Lever 3(b) & (c)

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Summary:

Livestock odor is an increasingly contentious and emotional issue that can divide communities. IANR biological systems engineers are developing a research-based computer tool to predict how often annoying odors will exist in areas surrounding a livestock operation. Called the Nebraska Odor Footprint Tool, the modeling software illustrates how far a livestock operation needs to be from neighbors in different directions to avoid odor-related conflicts. The tool incorporates specific information about Nebraska weather conditions and livestock operations. It should help communities, planners and producers make better-informed decisions about where to locate livestock operations to reduce conflicts and improve environmental quality. The target is to make the tool available for use by individuals in 2006.

Protect and Enhance the Nation's Natural Resource Base and Environment

Topic: Reducing or Eliminating Arsenic from Public Drinking Water Systems

Issue:

New U.S. Environmental Protection Agency limits reduce the amount of arsenic allowed in drinking water from 50 to 10 parts per billion. More than 80 small public water systems across Nebraska could have trouble complying with this new federal requirement by the 2006 deadline because traditional cleanup methods are expensive.

What has been done:

University of Nebraska-Lincoln water scientists are evaluating the occurrence of arsenic in the water supplies of small Nebraska communities to find ways to reduce arsenic in groundwater that cost less than drilling new wells or traditional approaches to removing the contaminant. Arsenic occurs naturally and is linked to some cancers and other health problems. One method scientists are considering is removing arsenic within the aquifer before pumping the water. This approach uses iron oxides, similar to rust, to attract and bond with the arsenic to remove it from the water. Researchers also are helping communities improve their well water sampling procedures to better assess arsenic levels in their water. The goal is to develop recommendations to help public water supplies meet the 2006 deadline.

Impact:

It's estimated that complying with the new EPA standard could easily total more than \$120 million for small community water systems statewide if they use conventional methods to reduce arsenic levels. This Nebraska research should provide practical recommendations that could save small water systems thousands of dollars on arsenic cleanup costs.

Funding:

University of Nebraska Agricultural Research Division
U.S. Environmental Protection Agency
U.S. Geological Survey

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Summary:

University of Nebraska-Lincoln water scientists are working to help Nebraska's small communities meet a new, lower federal limit for arsenic in their drinking water. More than 80 small public water systems statewide could have trouble meeting the 2006 compliance deadline. Researchers are developing arsenic cleanup alternatives that cost less than drilling new wells or using traditional arsenic removal methods. The goal is to provide recommendations to help public water supplies meet the deadline. It's estimated that compliance using traditional methods could cost small water systems statewide more than \$120 million. Results of this research could significantly reduce those costs. Researchers also are working to ensure local water system operators use well water sampling procedures that provide an accurate assessment of arsenic in their drinking water.

Society-Ready Graduates

Topic: 4-H Tech Team

Issue:

In today's high-tech world, gaining technical knowledge can give students a leg up. And small towns are hungry for help with technical challenges.

What has been done:

University of Nebraska Cooperative Extension 4-H in 1999 started the Tech Team for high school students who want to learn about technology and share their knowledge to help others. About 50 students have participated. Once a year the university's Rural Initiative and 4-H sponsor a weekend workshop for high school students that expands their tech skills and teaches them to share those skills to promote rural economic and community development. As a result, the team members are volunteering to help their communities in a variety of ways.

Impact:

Students are learning marketable skills while Nebraska towns are tapping their expertise for community enhancement. Some students have been able to take leadership positions in their schools and counties. One member said she used the knowledge gained through the tech team to teach members of her community. She organized and taught an Internet class to senior citizens and also used her skills to promote 4-H and the use of technology in her area.

Funding:

University of Nebraska Cooperative Extension
University of Nebraska Rural Initiative

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Summary:

Some Nebraska high school students are enhancing their technical knowledge and putting it to work in their hometowns thanks to University of Nebraska Cooperative Extension's 4-H Tech Team. Since 1999, about 50 students have learned about technology and shared that know-how with others. The university's Rural Initiative and 4-H annually sponsor a weekend of workshops for team members. Some members have used their skills in leadership roles in schools and communities. One member says she is using the skills she learned to teach senior citizens in her community about the Internet.

Society-Ready Graduates

Topic: 4-H Youth-Adult Partnerships

Issue:

The future of many rural Nebraska communities depends on their success in developing young people who can become leaders and encouraging a sense of community ownership.

What has been done:

The 4-H Building Nebraska's Future With Youth-Adult Partnerships program through University of Nebraska Cooperative Extension encourages young people to become leaders through partnerships and participation in community organizations and local government. Youth-adult participation teams were created in Stromsburg, Hayes Center, Hartington and Wakefield. In each community young people worked with business leaders and government officials to secure support for a community betterment project, including requests for funding. The program was so successful that it was held up as a model program by its national sponsors, the Land O' Lakes Foundation and the National 4-H Council. These community projects will serve as models as extension encourages similar projects in other Nebraska communities.

Impact:

Youth participants say they gained leadership skills and a new sense of belonging to their communities. The youth-adult partnership refurbished a neglected park and encouraged many participating youths to seek leadership positions in city government or with a community service organization. In Wakefield, students who were asked to help with the city library's summer reading program eventually took charge of managing and promoting the program.

Funding:

University of Nebraska Cooperative Extension
Land O' Lakes Foundation
National 4-H Council

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Summary:

The future of Nebraska's rural communities depends on developing a new generation of leaders. The 4-H Building Nebraska's Future With Youth-Adult Partnerships program through University of Nebraska Cooperative Extension encourages young people to become future leaders through partnerships and participation in community organizations and local government. Youth-adult participation teams in Stromsburg, Hayes Center, Hartington and Wakefield paired young people with local leaders in fundraising and hands-on community projects. Projects such as refurbishing a park in Hartington encouraged young people to participate in community leadership and instilled a new sense of ownership. The projects will serve as models as extension expands the program to serve other rural communities.

Society-Ready Graduates

Issue: 4-H Youth in Governance Program

Issue:

Teenagers often are interested in local or state government but usually don't know how to get involved. Many rural communities need to nurture and develop potential community leaders for the future.

What has been done:

A grant from the National 4-H Council helped University of Nebraska Cooperative Extension launch 4-H Youth in Governance programs to give teens firsthand experience with government. Teens and adults work together to identify community issues and problems and make decisions to address them. The program is offered in Butler and Scotts Bluff counties, the Sandhills and the Winnebago Tribe in Thurston County. Nearly 150 Nebraska teens have been involved in local projects and governance activities through this program since it began in 2003.

Impact:

The program is creating win-win situations for small towns and participating teens. Youth get a voice in local affairs, recognition of their efforts and experience that grooms them for future leadership roles. Communities benefit from the young people's perspectives, energy and assistance. For example, teens in the Butler County Youth Council researched, wrote and testified on a legislative bill to allow teenagers with a school driving permit to drive to extra-curricular activities. In the Sandhills, teens are working with a local community foundation on a survey to identify potential new businesses needed in the area. One participant said the program helped her realize she can make a difference in her community.

Funding:

University of Nebraska Cooperative Extension
USDA CSREES Rural Youth Development grant
National 4-H Council

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Summary:

Teens are getting more involved in government and their communities through University of Nebraska Cooperative Extension's 4-H Youth in Governance programs. These grant-funded programs support youth-adult partnerships and governance opportunities for youth in Butler and Scotts Bluff counties, the Sandhills and the Winnebago Tribe in Thurston County. Teens and adults work together to identify community issues and problems and make decisions to address them. It's a win-win situation for small towns and the teens. Youth get a voice in local affairs, recognition of their efforts and experience that grooms them for future leadership roles. Communities benefit from the young people's perspectives, energy and assistance. One participant says the program helped her realize she can make a difference in her community.

Society-Ready Graduates

Topic: Ag Awareness Festival

Issue:

Agriculture is Nebraska's leading industry, but with two-thirds of the state's population living in metropolitan areas, many young people know little about agriculture.

What has been done:

Ten Nebraska public agencies and industry associations formed the Agriculture Awareness Coalition to help young people learn about agriculture's importance. Since 1996, the coalition has offered ag festivals annually at the University of Nebraska's Agricultural Research and Development Center near Mead and the Lancaster Event Center in Lincoln. The ARDC hosted more than 800 fourth-graders from Douglas, Sarpy and Saunders counties over four days in the fall of 2004. The event center hosted about 350 children from the Lincoln area over two days in the spring. The children participated in hands-on educational activities that taught them about agriculture, food production and environmental stewardship.

Impact:

Since 1996, more than 6,800 children have learned about agriculture's importance to food production through these programs. Teacher evaluations indicate participants increased their agricultural knowledge as a direct result of the festival. Specifically, teachers report students gained knowledge in areas such as beef and dairy, food safety and grain production.

Funding:

University of Nebraska Cooperative Extension
University of Nebraska Agricultural Research and Development Center
Nebraska Beef Council
American Dairy Association/Dairy Council of Nebraska
Nebraska Corn Board
Nebraska Soybean Board
Omaha Agri-Business Club
Pioneer Hybrid International Inc.
Smith-Lever 3(b) & (c)

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Summary:

With two-thirds of Nebraskans living in metropolitan areas, many young people know little about agriculture's importance. To enhance understanding of agriculture and food production, a group of agencies and associations, including University of Nebraska Cooperative Extension, launched the Agriculture Awareness Coalition in 1996. The coalition sponsors annual Ag Awareness Festivals at the University of Nebraska's Research and Development Center near Mead and the Lancaster Event Center in Lincoln. The festivals have educated more than 6,800 urban fourth-graders about agriculture. Teachers say the festivals increase their students' knowledge of agriculture through hands-on educational activities and exhibits.

Society-Ready Graduates

Topic: Business Sense Helps Youth Launch Businesses

Issue:

Many teenagers have a marketable talent and an interest in making extra money but need skills to turn their talents into a going business.

What has been done:

University of Nebraska Cooperative Extension 4-H offers Business Sense, a curriculum that teaches business and entrepreneurial skills. 4-H'ers learn how to write a business plan, determine customer needs, relate to customers, determine overhead costs and set prices. More than 600 Nebraska 4-H'ers have taken the curriculum, taught for the last four years by extension educators and 4-H leaders. Participants use the business and life skills gained through this program to land part-time jobs or to turn their interests, hobbies and talents into part-time businesses.

Impact:

Business Sense program leaders report that the program gives participants an edge over their peers when they compete for jobs or start as an entrepreneur. Teens say they are better prepared to make decisions about marketing, budgeting and public relations. For example, a Utica, Neb., teen said the course taught her about bookkeeping and organization and enabled her to start a business buying and selling antique tractors over the Internet. In 2004 she sold eight tractors and made \$500 to \$1,000 per tractor.

Funding:

University of Nebraska Cooperative Extension

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Summary:

Teenagers with an interest in business are learning those skills through University of Nebraska Cooperative Extension 4-H's Business Sense curriculum. 4-H'ers learn business and life skills, including how to write a business plan, determine customer needs, relate to customers, determine overhead costs and set prices. Students have used what they learned from this program to turn their interests, hobbies or skills into part-time businesses. For example, a Utica, Neb., teen used her new skills to start a business selling antique tractors over the Internet. In 2004, she sold eight tractors and made \$500 to \$1,000 per tractor.

Society-Ready Graduates

Topic: Partnerships in Food Safety Education

Issue:

A better appreciation of science for both teachers and students also has a practical side. By studying microbiology and seeing the rapid spread of germs, student learning is more enthusiastic – plus they better understand the relationship between food handling, bacteria growth and illness.

What has been done:

The University of Nebraska-Lincoln's Department of Food Science and Technology launched the Partnerships in Food Safety Education project for K-12 teachers in 2004 with help from a USDA grant. The program prepares teachers to help students understand the importance of microbiology as potential careers and in their daily lives. During the five, two-day statewide workshops, 103 teachers learned hands-on, age-appropriate techniques for teaching food safety and safe food handling topics, including bacteria growth. Teachers received ready-to-use materials referenced by Nebraska Science Standards, and have access to a food safety Web site especially designed for teachers and students. The workshops continue in 2005.

Impact:

Participants gave the workshop high marks for usefulness. Nearly all evaluation respondents said they plan to use at least half of the workshop materials in their classrooms within the next two years. Wrote one teacher: "... I thoroughly enjoyed both days and learned (and relearned) many important concepts!"

Funding:

USDA Integrated Research, Education and Extension Competitive Grants Program

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Summary:

Students and adults often don't understand and appreciate science. But when a field such as microbiology is seen and described in terms of something tangible, such as how rapidly bacteria multiply and cause disease, students and adults are more aware of personal hygiene and safe food-handling practices. To prepare K-12 teachers to educate students, UNL's Department of Food Science and Technology in 2004 launched the Partnerships in Food Safety Education project funded by a USDA grant. The project included five, two-day statewide workshops that taught 103 teachers techniques they can use in their classrooms to teach students about preventing bacterial growth. Participants received educational materials ready for classroom use and have access to a Web site for more resources. Participants gave the workshop high marks for usefulness. Nearly all evaluation respondents said they plan to use at least half of the workshop materials in their classrooms within the next two years. The workshops continue in 2005.

Society-Ready Graduates

Topic: Professional Golf Management Major

Issue:

As Americans seek ways to relax and enjoy the outdoors, golf has become increasingly popular. There's growing demand for well-educated professionals in a variety of golf-related careers.

What has been done:

To educate University of Nebraska-Lincoln students to meet this demand, the College of Agricultural Sciences and Natural Resources launched a new professional golf management major in 2003, which was accredited by the Professional Golfers' Association in 2004. The college's strong science-based agriculture and horticulture coursework provided a natural foundation for the new program. The rigorous major requires a solid background in biology, physical sciences and turf science, business management from the College of Business Administration, hospitality, food and nutrition from the College of Education and Human Sciences and 16 months of internships. At the end of the 4.5-year program, graduates enter careers such as golf facility management, events coordination, golf instruction or merchandising. As of fall 2004, 31 students were enrolled in this major with significant growth anticipated in the future.

Impact:

This new program is expanding opportunities for College of Agricultural Sciences and Natural Resources students to prepare for careers in a growing ag-related industry. UNL is one of only 15 universities nationwide to offer a PGA-accredited program. The program's rapid growth reflects student interest in this major, which is attracting students who would not traditionally enter an ag-related field, including out-of-state students.

Funding:

UNL College of Agricultural Sciences and Natural Resources

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Summary:

UNL students are preparing for careers in the expanding golf industry, thanks to a new College of Agricultural Sciences and Natural Resources major. Launched in 2003, the new professional golf management major combines the strengths of CASNR's science-based courses with business offerings from the College of Business Administration, and hospitality and nutrition courses in the College of Education and Human Sciences. UNL's program is one of only 15 nationwide accredited by the Professional Golfers' Association. The popular new major is attracting students who would not traditionally enter an ag-related field, many of whom are out-of-state students, to the college. In fall 2004, 31 students were professional golf management majors. Enrollment is expected to grow significantly in the future. This new program prepares students for careers in this expanding industry, including careers in golf facility management, events coordination, golf instruction or merchandising.

Society-Ready Graduates

Topic: Students Aid CWD Testing

Issue:

There's growing concern about chronic wasting disease in deer and elk. There is no scientific evidence of any human connection to CWD, but hunters want to avoid eating meat from infected animals and wildlife officials need to track their location to monitor and manage the disease.

What has been done:

Each year the University of Nebraska-Lincoln's Veterinary Diagnostic Center tests thousands of deer tissue samples for CWD. Nearly all samples come in following the state's nine-day rifle deer hunting season and must be processed immediately. About 20 undergraduate students, most from the College of Agricultural Sciences and Natural Resources, work side-by-side with the center's staff to speed testing for this degenerative neurological disease in deer and elk in North America. In Nebraska, about 0.3 percent of deer test positive each year. In 2004, the center tested more than 7,000 deer lymph node samples collected from deer shot by hunters in Nebraska and Arizona.

Impact:

Students get practical laboratory experience and a better understanding of how to apply the science they've learned in their courses to real-world problems. Their assistance allows the center to provide results quickly for hunters and state wildlife officials. Quick turn-around time on tests helps state monitoring efforts as well as providing timely information for hunters. One student worker said working in the lab is a valuable experience that he'll use on his resume when he seeks a job after graduation.

Funding:

University of Nebraska Agricultural Research Division
Nebraska Game and Parks Commission
University of Nebraska-Lincoln Veterinary Diagnostic Center

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Summary:

Each year, UNL's Veterinary Diagnostic Lab tests thousands of deer tissue samples for chronic wasting disease. Thanks to the help of about 20 undergraduate students, the lab quickly processes the flood of samples following rifle deer season for hunters and for state wildlife officials who monitor the spread of the disease in Nebraska. The students, mostly from the College of Agricultural Sciences and Natural Resources, get practical laboratory experience and learn how the science they study in their classes helps address real-world problems. The center gets much-needed help, and officials and hunters get timely results. There is no scientific evidence of a human connection to CWD, which affects deer and elk, but hunters want to avoid eating meat from infected animals and wildlife officials need to track their location to monitor and manage the disease. The center processed more than 7,000 deer samples in 2004.

Society-Ready Graduates

Topic: Undergraduate Research

Issue:

There's much to learn in college and an undergraduate's studies typically are packed with exams, papers and course work. Undergraduates who get the chance to apply that book learning to hands-on research are likely to be better prepared for careers or graduate school.

What has been done:

Some University of Nebraska-Lincoln College of Agricultural Sciences and Natural Resources undergraduates get firsthand scientific experience and work closely with agricultural scientists in the lab or the field. Students write research proposals and the most promising projects receive funding through the Agricultural Research Division's Honors Student Research Program. Students learn how to design and conduct experiments and interpret results, which often are published in scientific journals.

Impact:

Students say the opportunity to see how science and research are applied to solve real-world problems rounds out their education and better prepares them for their careers. Participating scientists say the students' findings contribute to Nebraska's economy, environment and public health. For example, a veterinary science student's research will help more accurately diagnose West Nile virus infection in horses. An agribusiness student's findings about Nebraska feedlot labor costs were published in a Cooperative Extension publication, which the state's cattle feeders now widely use.

Funding:

University of Nebraska Agricultural Research Division

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Summary:

University of Nebraska-Lincoln undergraduate students are working closely with IANR scientists on research that benefits Nebraskans. Students learn to write research proposals, design experiments and interpret and report their findings through the Agricultural Research Division's Honors Student Research Program. Students say the opportunity to see firsthand how science and research are applied to solve real-world problems rounds out their education, improves their problem-solving skills and prepares them for their careers. Participating scientists say the young researchers' findings contribute to Nebraska's economy, environment and public health. For example, a veterinary science student's research will help more accurately diagnose West Nile virus infection in horses. An agribusiness student's findings about Nebraska feedlot labor costs were published in a Cooperative Extension publication, which the state's cattle feeders now widely use.

Society-Ready Graduates

Topic: CASNR CARES Program

Issue:

Happy and involved students are more likely to stay in school and graduate. But homesickness, injury, illness, work – even class schedules – can tug on students' emotions and become burdensome to the point they leave school.

What has been done:

CASNR CARES (Caring Attitudes and Respect for Every Student), a program in the College of Agricultural Sciences and Natural Resources at the University of Nebraska-Lincoln, was launched in summer 2002 to help students with a variety of issues and needs. It provides a single contact parents, students, faculty and staff can confidentially turn to for help. The program coordinator answers questions, provides a sympathetic ear and connects students with resources to ensure their well-being. Making sure each student gets acclimated to campus, engaged in his or her education and has every opportunity to succeed is the goal of this student retention effort. During the first year of CASNR CARES, 128 students contacted the coordinator. And in fall semester 2004 alone, 111 students received help on everything from how to seek counseling for severe depression to tips for selling textbooks.

Impact:

Helping students adjust to college or cope with worries improves the odds they'll stay in school and graduate. Parents say they are thrilled to know that a "mom away from home" is available to respectfully look in on their children's well-being. Parents note the program has relieved their children's anxiety about being away from home. One mother wrote: "I truly believe you and the rest of the faculty on East Campus ... are there for our students, and you really care about each and every one of them. It has made the transition so much easier."

Funding:

UNL College of Agricultural Sciences and Natural Resources

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Summary:

Happy, involved students are more likely to stay in school and graduate. Yet worries can tug on students' emotions, make them unhappy and may become so burdensome they leave school. At the University of Nebraska-Lincoln, the CASNR CARES (Caring Attitudes and Respect for Every Student) program works to ensure every student becomes acclimated to campus and has every opportunity to succeed. The College of Agricultural Sciences and Natural Resources student retention program provides a "mom away from home" that parents, students, faculty and staff can use to confidentially seek help. One mother wrote: "It has made the transition so much easier." During fall semester 2004 alone, 111 students received help on everything from how to seek counseling for severe depression to tips for selling textbooks.

Society-Ready Graduates

Topic: CASNR Students Involved in Community Service

Issue:

When young adults learn the importance of giving their time while in college, they develop a deeper sense of commitment to the community and are on their way to becoming more responsible citizens. They increase their level of civic engagement and become better problem-solvers.

What has been done:

Students in the College of Agricultural Sciences and Natural Resources at the University of Nebraska-Lincoln learn the importance of giving their time through service learning as part of several classes, programs, residence halls and fraternities. CASNR students have collected mittens, hats and homework supplies for elementary students, organized trick-or-treating at a local residence hall, and helped children with their homework at school. Others pick up trash, scoop snow off sidewalks, collect donations for the food bank and shelters, and help coordinate a prom for senior citizens who had been unable to attend their own proms. Some students even took waltz and foxtrot lessons to dance with the senior citizens.

Impact:

Organizers say students who apply their classroom learning to the real world become more excited and enthused, which helps them as well as the beneficiaries of their volunteer efforts. Plus, students who volunteer in college are much more likely to volunteer after graduation.

Funding:

UNL College of Agricultural Sciences and Natural Resources

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Summary:

When young adults learn the importance of giving their time while in college, they are more likely to become responsible citizens and volunteer after graduation. Students in the College of Agricultural Sciences and Natural Resources at UNL learn the importance of giving their time, often with faculty serving as role models. CASNR students have collected mittens, hats and homework supplies for elementary students, organized trick-or-treating and helped children with their homework at school. Students also pick up trash, scoop snow, collect donations for the needy, and even help coordinate a prom for senior citizens who had been unable to attend their own proms.

Society-Ready Graduates

Topic: Preventing the Credit Card Blues at 22

Issue:

College students on average have four credit cards and a debt of \$3,000 to \$7,000 in addition to their college loans, according to Nellie Mae Corp., a leading college loan provider. Learning to use credit cards wisely helps students build and maintain good credit ratings, protect their credit identity and avoid costly credit card debt.

What has been done:

To help students get off to a solid start with credit, University of Nebraska Cooperative Extension educators developed Preventing Credit Card Blues at 22, a classroom-based educational program for high school seniors. The program uses real-life scenarios to help students understand key concepts of managing credit responsibly. Students learn to shop for a credit card, manage debt and protect their identity. In 2004 alone, 2,500 Nebraska students completed the course and it has been introduced to extension education nationwide.

Impact:

By targeting high school seniors, this program helps students avoid credit card debt in college and sets the stage for them to use credit responsibly as adults. After completing the program, students were better able to define credit and identify factors to consider when choosing a credit card, sound practices for managing credit card debt and ways to protect personal identity. One high school principal told his students that the course could save them each \$50,000 or more over their lifetime.

After the program, one student said: "I feel the presentation was very valuable. I do not think (my classmates) have a realistic understanding of using credit and that many of them are already 'charge-aholics.' I hope they learned they can't charge unlimited amounts, and understand all of the costs of using credit cards." A teacher said the course helps counter the advertising students see for credit cards and makes them more aware of the link between college costs and credit use. "Now they'll hesitate before signing up for that free T-shirt."

Funding:

University of Nebraska Cooperative Extension
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Summary:

College students on average have four credit cards and a debt of \$3,000 to \$7,000 besides college loans. University of Nebraska Cooperative Extension educators developed Preventing Credit Card Blues at 22, a classroom-based educational program for high school seniors to teach students to use credit wisely and protect their credit identity. The program uses real-life scenarios to teach key concepts of responsible credit management. In 2004, 2,500 Nebraska students completed the course. After the training, students were better able to define credit, identify factors to consider when choosing a credit card, identify sound practices for managing credit card debt and knew how to protect personal identity. One high school principal told his students that the course could save them each \$50,000 or more over their lifetime.

Society-Ready Graduates

Topic: Student Development Initiative Promotes Leadership

Issue:

Freshmen often don't get many opportunities to participate in leadership- and character-building activities, yet such involvement enhances the chances a student will stay in college and do well.

What has been done:

Since 2002, the University of Nebraska-Lincoln's College of Agricultural Sciences and Natural Resources has offered the Dean's Scholars for Experiential Leadership program to involve freshman students in leadership and character-building activities. DSEL participants hear speakers, participate in forums about campus events and are encouraged to get involved in clubs and scholastic activities. One of the program's aims is to make students more comfortable with and confident to lead change. Approximately 40 freshmen volunteered for the program in 2002-03, and all but one continued at the university into 2003-04, mentoring 33 new freshman students.

Impact:

Program coordinators report students who participate in the program are seeking and assuming leadership roles earlier in their college experience; have more confidence in leadership positions and situations; seek leadership roles beyond their traditional academic clubs, including roles outside of the university; and feel more comfortable approaching faculty and administrators with questions and concerns.

One participant said of the program: "(I'm) not so afraid of my future and greatly more independent and responsible for my own actions." Another said: "I think I have a better perspective on how to balance school, work, clubs and activities and social time."

DSEL students also partnered with second-graders from a nearby school in a pen pal program that provided winter clothing for about 40 children.

Funding:

UNL College of Agricultural Sciences and Natural Resources

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Summary:

Freshmen are gaining confidence and honing their decision-making and leadership skills through a UNL College of Agricultural Sciences and Natural Resources' program. Students say that after participating in the Dean's Scholars in Experiential Leadership program, they feel more confident, are better able to manage their time, and feel better able to take on challenges and opportunities that will benefit their careers and their lives. About 40 freshmen participated in 2002-03, the program's first year. All but one of these students remained at the University of Nebraska and helped mentor the 33 students in the 2003-04 program.

