

2010

State Accomplishments for the Formula Grants Annual Report Summary



United States Department of Agriculture
National Institute of Food and Agriculture

Katelyn Sellers

Planning, Accountability & Reporting Staff

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INTRODUCTION

This summary report from the National Institute of Food Agriculture (NIFA) highlights many of the outstanding outcomes reported by our land-grant university partners in their 2010 Annual Reports of Accomplishments and Results. The summarized outcomes in this report have been carefully selected to be representative of the excellence displayed by the nation's land-grant universities and what they accomplished in 2010 with dollars from the four major research and extension formula grant funds: Hatch, Evans-Allen, Smith-Lever 3(b)&(c), and 1890 Extension Institutions.

The formula grant process works through the long-standing partnership between USDA and the land-grant university (LGU) system. NIFA identifies national priorities for these programs, but the allocation of funding to these priorities is decided by each individual university. These formula grants also work in concert with the competitively awarded grants in the Agriculture and Food Research Initiative (AFRI) to address important problems. The competitive grants process is specifically designed to attract the best proposals related to an agency-identified topic of high importance. Funding is then awarded to those proposals of highest relevance and quality. In contrast, the formula grants process is designed to allow the state land-grant universities the flexibility to define their own high-priority and rapidly emerging issues. Funding is able to be allocated quickly by the states to subjects they deem most important. These formula funds are, therefore, often used for activities that are not well supported by the competitive process and that are specific to particular states (such as programs targeted to the regional or local level, very long-term research, seed money to initiate new lines of research, and supporting research and extension capacity).

The outcomes in this report are grouped according to the four regions – North Central, Northeast, Southern and Western – encompassing all fifty states, territories, and Washington, D.C. This grouping scheme helps demonstrate the most outstanding accomplishments realized across the nation in the most balanced manner. Additionally, each individual outcome is labeled as contributing to one of the four major USDA Goals:

Goal 1: Assist Rural Communities to Create Prosperity so they are Self-Sustaining, Repopulating, and Economically Thriving.

Goal 2: Ensure our National Forests and Private Working Lands are Conserved, Restored, and Made More Resilient to Climate Change, While Enhancing Our Water Resources.

Goal 3: Help America Promote Agricultural Production and Biotechnology Exports as America Works to Increase Food Security.

Goal 4: Ensure that all of America's Children Have Access to Safe, Nutritious, and Balanced Meals.

The outcomes highlighted in support of these goals include examples of cost-benefit ratios, dollars saved, revenue generation, increases in yield, best management practices developed and adopted, new and value-added products developed and used, as well as a myriad of increases in knowledge and changes in action and behavior.

Overall, this documentation demonstrates the link between the outcomes from the Annual Report of Accomplishments to the USDA goals while also helping tell the national story of how formula funds are supporting important agricultural research and extension activities in all four regions of the fifty states and territories. Many of the outcomes from this summary document have been used in annual NIFA reporting activities, such as portfolio reviews and the budget process. These outcomes show the continued importance of the four major formula grants to the both NIFA and USDA Goals. They also provide the agency and its land-grant partners the information needed to examine the questions of balance and direction as they move forward as a unified system.

BACKGROUND INFORMATION & DEFINITIONS

The Plan of Work reporting system is designed to accommodate the states' ability to report by various combinations of 1862 LGU and 1890 LGU institutions, including both research and extension entities. In 2010, some states have chosen to keep all of their 1862 LGU (and 1890 LGU, where applicable) research and extension reporting separate. In these cases, the outcomes reported, some of which are included in this document, are a result of *only* 1862 Research (Hatch), 1862 Extension (Smith-Lever 3b&c), 1890 Research (Evans-Allen), or 1890 Extension funding. Other states, meanwhile, have chosen to combine their research and extension reporting within their 1862 and 1890 institutions, and still others have chosen to combine all of their 1862 and 1890 reporting into one document. In these cases, outcomes reported are most often a result of multiple funding lines. Subsequently, this document contains many outcomes that can be attributed to more than one of the four funding types that make up the Plan of Work system.

LGU: Land Grant University; an institution with which NIFA has a partnership and obligation to provide research and extension funding as written by federal law.

Hatch Act (1862 Research): Hatch funds are used to support continuing agricultural research at institutions eligible to receive funds under the Act approved July 2, 1862 (12 Stat. 503, as amended) (—1862 Land-Grant Institutions), as well as State agricultural experiment stations. Funds appropriated under this section are used to conduct original and other researches, investigations, and experiments bearing directly on and contributing to the establishment and maintenance of a permanent and effective agricultural industry of the United States.

Evans-Allen Act (1890 Research): Evans-Allen funds are authorized under section 1445 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (NARETPA) and are used to support continuing agricultural research at colleges eligible to receive funds under the Act of August 30, 1890 (26 Stat. 417–419, as amended; 7 U.S.C. 321–326 and 328) (—1890 Land-Grant Institutions), including Tuskegee University and West Virginia State University. Funds appropriated under this section are used for expenses of conducting agricultural research, printing, disseminating the results of such research, administrative planning and direction, and purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting agricultural research.

Smith-Lever 3(b)&(c) (1862 Extension): Smith-Lever 3(b)&(c) funds are used by institutions eligible to receive funds under the Act of July 2, 1862 (12 Stat. 503, as amended) (—1862 Land-Grant Institutions) for the development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies in agriculture, uses of solar energy with respect to agriculture, home economics, and rural energy, and imparting information on communities through demonstrations, publications, and otherwise and for the necessary printing and distribution of information in connection with the communities.

1890 Extension Funds: These funds are authorized under section 1444 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (NARETPA) and are used to support continuing agricultural and forestry extension activities at colleges eligible to receive funds under the Act of August 30, 1890 (26 Stat. 417–419, as amended; 7 U.S.C. 321–326 and 328) (—1890 Land-Grant Institutions), including Tuskegee University and West Virginia State University. Funds appropriated under this section are used for expenses of conducting extension programs and activities.

SUMMARY OF EXPENDITURES

A total of \$562,800,703 was appropriated for the four formula grant funds subject to this Plan of Work and Annual Report in fiscal year 2010. A total of \$519,772,603 was reported expended from the formula grant funds in 2010 on various planned programs in the 2010 Annual Report of Accomplishments and Results.

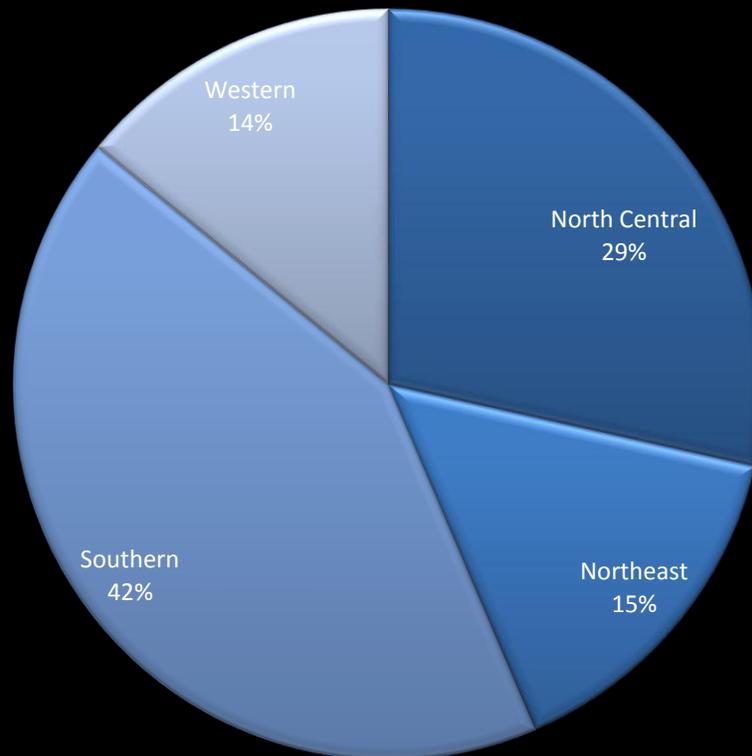
The breakdown of expenditures among fund/institution type is as follows:

Smith-Lever 3(b)&(c) (1862 Ext)	\$244,311,607
Hatch (1862 Res)	\$203,141,001
Evans-Allen (1890 Res)	\$35,795,787
1890 Extension	\$36,524,208

The breakdown of expenditures among regions is as follows:

North Central	\$148,146,384
Northeast	\$78,314,518
Southern	\$220,039,615
Western	\$73,272,086

Percentage Distribution of Expended Formula Funds across Regions



Note: The number of outcomes for each region in this document, as a percentage of the total number of outcomes included, is commensurate with the above percentages. An effort has been made to show a balance across each region and to represent most states. However, this document is only a summary and does not purport to be the only resource for the outstanding research and extension work that is done at all LGUs. For more detailed information about Plan of Work outcomes from specific states or LGUs, please email the POW staff at NIFA at pow@usda.gov.

NORTH CENTRAL REGION OUTCOMES

University of Nebraska – Hatch, Smith-Lever

Extension has delivered educational programs on irrigation, including one-on-one in-field instruction, multiple-day workshops, and educational conferences. Currently proven irrigation technologies and management practices continue to demonstrate the potential to reduce statewide irrigation water pumped by 2 inches (or 460 billion gallons per year) or more and energy use by 42 million gallons of diesel fuel equivalent per year or more. Examples include installation of approximately 60,000 acres of SDI technology, with Extension providing the only research and education efforts in the state. The Republican River Valley water use efficiency tours and demonstrations produced a water savings of about 29,000 acre-feet/year or a savings of \$1.2 million per year. Nebraska Agricultural Water Management Demonstration Network continues to demonstrate an actual water savings of 2.0 acre-inches/acre for a savings of \$2.5 million a year. Farmer participants in workshops estimated their savings at 30,000 acre-feet/acre and \$1.5 million annually.

(Supports USDA Goal #1)

Ohio State University – Hatch, Smith-Lever

OARDC and OSU Extension's South Centers (Piketon, Ohio), a regionally focused research, development and extension facility, responded to the need for business and job growth with the creation of the Endeavor Center. The five year old Endeavor Center assists new and emerging businesses, those that are ready to move out of a garage or a basement, or are poised to grow but need professional office space, help in hiring or marketing strategy, or just need access to office equipment. The Center also serves as a small business itself, creating jobs and economic activity in the region. In just five years since its opening, the Endeavor Center has incubated and guided businesses that have created more than 300 new high-skill, high-wage jobs in economically challenged Appalachian region of Ohio, resulting in \$50 million in positive economic impact.

(Supports USDA Goal #1)

Michigan State University – Smith-Lever

In Michigan, less than 10% of the beef herds use artificial insemination (AI), yet AI is one of the best management tools to consistently produce a profitable beef product for consumers. MSU Extension developed an outreach program to enhance the long term social and economic viability of the Michigan livestock industry by providing information to improve all aspects of livestock management. After evaluating a feedlot enterprise system based on the information learned in a training and developing a comprehensive nutrition plan to meet the cattle nutritional requirements in a more cost effective and efficient means, as well as utilizing growth promotant implants to increase performance efficiencies while minimizing risks of decreased quality grades in the harvested animals, one producer saved \$225.00 in the cost of taking a Holstein feeder calf to slaughter while decreasing the days each steer was in the system by 110 days. The producer saved approximately \$33,750 per year when feeding 150 Holsteins per year. It is estimated that the program statewide saved over \$2.5 million.

(Supports USDA Goal #1)

Ohio State University – Hatch

The OARDC wheat breeding program released a new wheat cultivar called OH04-264-58. This cultivar has competitive yield in Ohio, good resistance to prevailing Ohio diseases, and has strong gluten. LOH04-264-58 has a unique gene that imparts strong gluten and stable gluten strength, so it is suitable for use by Ohio millers. One Ohio based miller used nearly 1,500,000 bushel of strong gluten wheat (Soft Red Winter Wheat) in 2010, with plans to expand the program to approximately 3,000,000 bushels annually with the right cultivar. Assuming a premium of \$0.40 per bushel, then a strong gluten SRWW like OH04-264-58 is worth \$600,000 to \$1,200,000 annually to Midwest growers, primarily in Ohio. In addition, sourcing the strong gluten wheat locally will save the Ohio based miller millions of dollars annually in freight charges.

(Supports USDA Goal #1)

University of Minnesota – Smith-Lever

Workshops delivered to farmers in the region illustrated the importance of planning, and provided concrete strategies for creating a transfer plan. A total of 95.4 percent of participants stated that as a result of attending one of the workshops, they were going to begin the process of developing and implementing a transfer and estate plan. A post-meeting follow-up evaluation showed that 68.5 percent had started their transition plan, and 27 percent had completed and implemented that plan. Therefore, the value of assets protected after receiving education from Extension was \$1,689,609, including owned land, livestock equipment and machinery. Weighted average total for non-farm/ranch assets for participant families was \$187,714. Total financial impact of protected rural poverty can be assessed at \$384,300,000.

(Supports USDA Goal #1)

North Dakota State University – Hatch, Smith-Lever

In support of developing new biofuel industries, a researcher at North Dakota State University initiated an energy beet development program. Hatch and Smith-Lever funds were used to establish regional energy beet yield trials, initiate a juice storage study, test the conversion technology commercially, and conduct grower education meetings. To date, more than 20 presentations and workshops have been delivered across the state in cooperation with local Extension agents to inform producers, rural communities and industry of the opportunity. Materials have also been drafted for national distribution on www.eXtension.org. Green Vision Group is now evaluating two sites for construction of demonstration plant. Construction of a commercial plant is expected in 2012. This plant will require 30,000 acres of energy beets providing growers with a \$200 net income premium over competing crops. Each plant is expected to create 25 new jobs in rural communities. Positive encouragement and private funding support for the project has been received from MonDak sugar beet growers, Syngenta, Beta Seed, Garrison Diversion, ND Irrigation Association, Green Vision, Great River Energy, Amity, and AgCountry Farm Credit Services.

(Supports USDA Goal #1)

University of Missouri – Smith-Lever

Retention of jobs is often more economical than replacing or creating new ones. Extension staff provided technical assistance programs in fundraising, cultural competency, financial planning, and volunteer management to help nonprofit organizations in Missouri leverage resources and

increase the value of their dollar invested in employees. Projects with communities in several regions with a significant Hispanic immigrant population formed collaborations to provide services and support for those working in the area. An effort to revitalize a community betterment organization in one rural community resulted in the engagement of a new generation of business leaders committed to making the community a better place to live with new programs that increase recreational opportunities and celebrate the heritage of the community. In northeast Missouri, \$3,723,750 dollars were generated through grants and contracts with local organizations creating and/or sustaining the equivalent of at least 90 jobs in the region.
(Supports USDA Goal #1)

University of Missouri – Smith-Lever

The total economic impact of one dairy animal is about \$14,000, which includes the ripple effects from the milk being produced on the farm through the creation of a product for human consumption. University of Missouri Extension provided educational programs to increase knowledge and understanding of pasture-based dairy systems, including classroom and on-farm workshops, discussion groups and mass media. In 2010, a new pasture-based dairy was started and several other producers began work toward establishing systems as the economy improves. As a result of such recent extension programs, growth in Missouri by new grazing dairies created \$100 million in new investment, generated \$40 million in annual milk sales, added \$124 million in total output, and added 1,100 additional jobs to the state.
(Supports USDA Goal #1)

Ohio State University – Hatch

Rumen protozoa in dairy herds promote emission of ammonia and methane, reflecting inefficient use of dietary protein and energy. Because those nutrients represent 80% to 90% of feed costs, an improved ration evaluation system reduces environmental impact while improving feed efficiency and dairy farm profitability. Hatch funded research at Ohio State University offers software based equations in ration formulation. Ultimately, improving these models will increase willingness of dairy farmers to adapt dietary recommendations that improve feed efficiency to decrease ammonia and methane emissions per unit of milk produced (which will reduce risk for feed costs and increase profitability resulting from dietary changes). At current prices of corn and soybean meal, this saves nearly \$15/cow per year, and improving digestibility of forage fiber by 5% also saves nearly \$15/cow per year. If the practices of optimizing dietary conditions are adopted, the combined effects can improve income over feed costs of \$55/cow per year, which indicates profitability in Ohio herds by \$15.4 million. This is amplified 5 to 7 fold through the various industries allied with dairy farming. Thus, the total economic benefit should exceed \$50 million per year for Ohio alone, all while reducing ammonia and methane emissions from dairy farms.

(Supports USDA Goal #1)

Iowa State University – Hatch, Smith-Lever

The ISU Dairy Team initiated meetings around the state on the Dairy Financial Crisis and also presented the issue at their Dairy Days. As a follow-up to these meetings, dairy specialists highly encouraged farm visit follow-ups to further deal with the broad array of issues that can help producers survive the current financial crisis, as well as subsequent workshop sessions on managing dairy farm finances. One hundred and fifty-seven farm consultations were conducted.

A post-consultation survey was responded to by 67% of dairy producers, with 100% rating teaching and consulting highly effective, valuable, and profitable. Survey results showed increases of \$217/cow, \$45/acre, and \$90,000/farm, or net increased income of \$494,890. Milk production increases resulted in \$535,137 increased income, and milk quality improvement increased income \$85,020. Overall economic impact (increased income potential) of surveyed herds was \$1,182,191.

(Supports USDA Goal #1)

Michigan State University – Smith-Lever

Michigan forests provide 400,000 jobs and contribute more than \$13 billion to the state's economy each year. Timber industry professionals need information about environmentally sound management practices that allow them to remain profitable and harvest a high-quality crop while protecting Michigan's forests for future generations. MSU Extension conducted workshops that had more than 1,000 people representing 800 forestry businesses in sustainable forestry. Evaluation found that 87% of the timber industry professionals learned about environmentally sound management practices that helped them to remain profitable and harvest a high-quality crop while protecting Michigan's forests for future generations.

(Supports USDA Goal #2)

Kansas State University – Hatch, Smith-Lever

Three watersheds were targeted for rapid implementation of best management practices (BMPs) for atrazine herbicide, a pollutant. An education and demonstration program, surface water monitoring plan, and incentive program for atrazine BMP implementation were developed and delivered to the targeted watersheds. Twenty educational meetings were conducted to train 617 farmers and pesticide dealers. Ninety-five farmers implemented atrazine BMPs on a total of 23,000 corn and grain sorghum acres. An automated surface water monitoring system was installed in the streams at the base of the watersheds targeted for BMP implementation and also at the base of two adjoining watersheds. Water quality monitoring of treated and untreated watersheds found 51% lower atrazine concentrations, in streams in targeted watersheds in which BMPs had been implemented. Outcomes included 25 farmers committing to implementing BMPs on 138 crop fields (4,810 acres) resulting in a reduction in annual sediment delivery to streams in the watershed from 9,219 tons to 2,926 tons.

(Supports USDA Goal #2)

University of Wisconsin – Smith-Lever

Because most irrigated land in central Wisconsin is sandy, there is potential for groundwater contamination by nitrates and pesticides if fields are overwatered. Also, proper irrigation can help prevent cropland becoming saturated and causing nitrogen to be converted to nitrous oxide, a greenhouse gas. Agricultural researchers evaluated the effectiveness of using portable soil moisture sensors to manage crop irrigation in Central Wisconsin. Potato growers participating in a related summer project got hands-on experience with soil moisture sensors, and two hundred and eighty vegetable growers and crop consultants increased their knowledge of managing groundwater with this method. Eliminating, through use of soil moisture sensors, the need to apply one inch of water to irrigated land would save 27,000 gallons of water for each acre of vegetables grown, or 5.3 billion gallons in central Wisconsin. Cost savings for not needing to

pump that inch of water (\$4.00 per acre-inch) would amount to around \$785,000. If overwatering could be avoided, nutrient and pesticide leaching into the groundwater and nitrous oxide release into the atmosphere would be minimized.

(Supports USDA Goal #2)

Iowa State University – Hatch, Smith-Lever

Several food safety recall events stemming from bulk food products have demonstrated the need for more precise food safety management and for improved ability to trace products through their supply chain. Systems were developed for process mapping, geo-location of traceable units, bulk grain tracking, and cost-benefit analysis that simplified quality or food safety/quality management systems (QMS or FS/QMS). This allowed collaborating grain firms to report significant economic benefits for operational improvements/efficiencies. Additionally, enhanced public health through compliance to new food safety legislation results from organized QMS or FS/QMS. Findings were published and presented in relevant professional venues, resulting in the submission of a grant for the development of a web-based electronic quality manual/compliance program to simplify and automate supply chain firms' ability to apply FS/QMS management systems. This has large implications for the ways in which food safety, quality management, and occupational safety compliance support each other (and at significant cost savings to organizations). Savings in the billions of dollars from reduced redundant audits could result through development of a uniform audit schema around the ISO22000 Standard.

(Supports USDA Goal #4)

University of Missouri – Smith-Lever

Extension agents provided technological advantages to pork producers through educational materials, development of the National Swine Nutrition Guide least-cost diet formulator, and updating the swine feeding programs; this has resulted in a huge economic advantage for Missouri pork producers. Computerizing feeding programs has enabled swine producers to personally adapt diets as well as be knowledgeable about feed efficiency and performance values. The better use of synthetic amino acids and minimizing commodity grain in formulations have reduced feed costs and improved feed efficiency by 30 to 40 percent, resulting in an economic impact for Missouri of almost \$36 million dollars.

(Supports USDA Goal #4)

University of Illinois – Hatch

A research project investigated the metabolic products from tomato carotenoids such as lycopene, phytoene, and phytofluene, in mammalian tissues. Human CMO-I is a carotenoid cleavage enzyme that is confirmed to cleave beta-carotene at a certain location to form Vitamin A, but acyclic carotenoids, such as lycopene, are poor substrates for this enzyme. Thus, the researchers investigated the ability to cleave acyclic carotenoids to Human CMO-II, also a carotenoid cleavage enzyme. Through such research, they established novel carotenoid-accumulating *E. coli* strains that will provide invaluable tools for researchers studying tomato carotenoids. In addition, they developed a method to detect lycopene metabolic products more efficiently. Overall, this research can have a large impact on finding ways to use acyclic

carotenoids with multiple conjugated double bonds in the CMO-II expressing tissues to serve as antioxidants, which are hypothesized to reduce the risk of cancer and cardiovascular disease.
(Supports USDA Goal #4)

University of Missouri – Smith-Lever

Through Master Gardener training and volunteer activities of Master Gardeners, newsletters, media releases, Nursery Association Certification training, and Web access to extension horticultural guides, thousands of Missourians receive information on plant selection and culture every year. The 2010 program included a Native Plant Field Day and a Tomato Festival. A presentation at the FFA field day reached 175 young people with information on pests that can be spread by firewood. Of 1.4 million valid hits on all MU agricultural guides from July 1, 2009, to June 30, 2010, 55 percent were horticulture guides. This is over twice as many hits as for any other category of agricultural guides. Horticultural and pest-management guides together accounted for 0.9 million (62%) of the agricultural guide hits for the period. The most popular horticulture guides were on composting, pruning shrubs, raised bed gardening, roses and vegetable production. Thus, thousands of Missourians received information to help them improve their gardening success. If just 10 percent of those receiving home horticulture information increased their purchasing of plants, gardening supplies and landscape services by \$100 due to MU Extension activities, this would translate to a \$6 million increase in sales in the state of Missouri.

(Supports USDA Goal #4)

Purdue University – Hatch, Smith-Lever

Over 2 million ash trees provide shade and oxygen and protect the water in Indiana's cities. These trees and the other 8 billion ash trees in North America are threatened by the emerald ash borer (EAB). Purdue Extension has partnered with other states in the North Central region to develop a consistent, regional message about EAB and its management. This approach includes public education about how EAB affects communities and which actions can mitigate its damaging effects. Innovative methods such as a webinar-based series called EAB University, the EAB cost calculator, and interactive guides have been used along with publications, a web site and other media efforts. Over 800 arborists nationwide are using the Emerald Ash Borer cost calculator to make decisions on how to manage urban ash trees, including city foresters in major metropolitan areas, from Baltimore to Minneapolis, where it has been used to inform decisions on well over 2 million urban ash trees. The cost calculator is also currently being used in major Indiana cities. The calculator was featured as an essential tool for cities in a document prepared by a national task force of EAB researchers, Extension specialists, municipalities and industry representatives that was convened to conserve urban ash trees.

(Supports USDA Goal #2)

NORTHEAST REGION

University of the District of Columbia – Hatch, Smith-Lever

The DC Master Gardener Program was started as a means of extending the horticultural and pest management expertise of the DC Cooperative Extension Service to the general public. The program is designed to train volunteer horticultural educators in such topics as botany, soils, entomology, plant pathology, pesticides, vegetable, herbs, landscape design etc.) and then agreed to work in their communities to teach District of Columbia residents how to cultivate garden spaces and manage landscapes sustainably using research-based information. This environmental horticulture approach reduces fertilizer and pesticide use resulting in improved soil and water quality. In 2010, 187 Master Gardeners and Trainees provided 9,350 hours of horticultural expertise to the District of Columbia. The value of volunteer time is \$32.74 per hour according to www.independentsector.org with a total value of \$306,119 in savings to the District of Columbia. Various Master Gardener projects throughout all eight wards have been established which include schools, parks, beautification projects, landscape design, youth gardens, local and national botanical gardens, a hospice/nursing home, and partnerships with non-profit organizations.

(Supports USDA Goal #1)

University of New Hampshire – Smith-Lever

Healthy, sustainable forests are critical to New Hampshire's forest products industry and the forest-related tourism and recreation industries which contribute more than \$2 billion annually to the state's economy. Extension foresters referred 406 landowners owning 33,026 acres to licensed foresters who wrote forest stewardship plans on over 15,210 acres. Over 550 Coverts Cooperators and Natural Resource Stewards are actively involved in conservation in their communities. Volunteers contributed over 18,000 hours in 2010. Extension funding provided cost-share dollars for practices that improve and protect forestland, wildlife habitat and water quality and act as the catalyst for the forest products industry in New Hampshire. These funds provided a financial stimulus for the forest-based economy during challenging market conditions. Six communities used information from New Hampshire's Wildlife Action Plan in natural resource inventories and conservation plans. Two towns are collaborating on land conservation projects along town boundaries. Over 10,500 acres of forest and field have been permanently protected as a result of assistance provided by the UNH Cooperative Extension during this fiscal year.

(Supports USDA Goal #2)

Cornell University and New York State Agricultural Experiment Station, Hatch

The intensive production of field, vegetable, and fruit crops has contributed to reduced soil health, lower crop productivity and farm profitability, and greater environmental impacts from runoff and erosion. Until now, growers have had no way to measure and assess critical factors such as aggregate stability, available water capacity, organic matter, or root health. The Cornell Soil Health Team established an inexpensive test for integrated soil health assessment, which provides advanced understanding of soil health throughout the Northeast and is generating management changes on farms. The project has received international attention (notably Australia, India, South Africa, Singapore, and Jamaica) where there is interest in adopting these

methodologies. This research has translated into a commercial soil health test that provides critical management information for farmers.

(Supports USDA Goal #3)

Connecticut Agricultural Experiment Station – Hatch

Annual gross revenue for 440,000 harvested Christmas trees, representing 6% of the total 7.7 million trees in Connecticut, is valued at about \$9 million. Christmas trees are normally grown relatively close together on 6,000 acres in Connecticut. Under these conditions, insect pest problems can emerge and cause immediate economic losses. Experiments were conducted with the insecticide dinotefuran as a basal trunk spray of Christmas trees 6 feet taller or shorter. Field tests revealed that dinotefuran effectively suppressed armored scales without negatively impacting biological control. Properly timed treatments avoided losses ranging from \$20,000 to \$50,000 per acre, resulting in adoption of the practice by growers in Connecticut, Pennsylvania, and Rhode Island. Additionally, the increased profits from Christmas tree sales helped support the production of fruits and vegetables also grown on these farms.

(Supports USDA Goal #1)

University of Maine – Hatch

Small businesses, including those in the agriculture and biotechnology fields constitute the backbone of Maine's economy. Value-added contributions from the agriculture community leverage these positive impacts, including increased revenues and several employment opportunities for rural workers. MAFES food scientists continued use their analytical expertise and resources to help Maine's agricultural and biotech industries grow and find new markets for their products. Their work with a Maine biotech firm in the area of melamine/cyanuric acid analysis has helped the firm to refine its rapid assay kit and has led to the creation of several well-paid scientific research jobs.

(Supports USDA Goal #3)

University of Maryland, University of Maryland – Eastern Shore – Hatch, Evans Allen, Smith-Lever

The Maryland Water Quality Improvement Act requires Maryland farmers as well as green industry businesses to develop and follow nutrient management plans that are approved by the State of Maryland. UME provides training for writing a nutrient management plan and updates recently certified Nutrient Management Consultants on program and research components of a nutrient management plan. This is the only program of its kind in the State of Maryland. UME faculty developed an E-Learning Resource for Water and Nutrient Management & Conservation for the Nursery and Greenhouse Industries program. UME advisors also wrote 620 new traditional nutrient management plans and updated 4,190 plans along with 74 manure transport plans. Twenty-seven workshops were held, and 545 nutrient management consultants were trained and issued required continuing education credits. Eighty three farmers were trained to write their own plans. The E-Learning Resource Center has been accessed by thousands of individuals from 33 countries and 48 states in the US. Such high-scale outreach and educational services promise to have a significant effect on ensuring farmers follow effective nutrient management plants, resulting in safer water and food supplies.

(Supports USDA Goal #4)

University of New Hampshire – Smith-Lever

The UNH Cooperative Extension Integrated Pest Management (IPM) program helped farmers save money, reduce their dependence on chemical pesticides, reduce pest injury, and protect the environment. NH apple growers reduced their fungicide, insecticide and miticide spraying (compared to pre-IPM methods) 50% in one year and simultaneously reduced the incidence of pest injury on their fruit. Before the introduction of new IPM methods, the statewide average incidence of pest injury was 10 to 12%. In 2010 it was reduced to 3.02%. The dollar savings are estimated at \$100,000 from reduction in spraying, and \$110,000 in improved crop quality. Similar savings were also seen in vegetable IPM, estimated at about \$100,000. Economic impacts for these crops in future years are estimated to be even greater when late spring frost is not a factor.

(Supports USDA Goal #4)

University of Maine – Smith-Lever

The University of Maine Extension's Harvest for the Hungry Program seeks to mitigate hunger, improve nutrition and health, and help recipients develop lifelong positive nutritional habits. The program involves home gardeners, Master Gardeners, and other volunteers who grow and clean fresh fruits and vegetables and donate them to needy individuals and families in Maine. During the 2010 garden season, UMaine Extension collected 191,977 pounds of fresh fruit and vegetables to give to food banks, soup kitchens, service organizations, and directly to families as part of our healthy lifestyles educational programs. At an average market value of \$1.69 per pound, the contribution was valued at more than \$325,400.

(Supports USDA Goal #4)

University of Delaware, Delaware State University – Hatch, Evans-Allen

Research at UD examined pathogen transmission in the environment from the gut of a chicken, into the soil, into a plant, through processing and to the consumer. Work has included evaluating pathogenic survival on plants for pre and post harvest safety, and also the evaluation of herbal-oils that could be used to kill the bacteria before the fresh produce reaches the consumer. In addition, researchers investigated high pressure processing techniques and mild heat treatments to enhance the safety and packaging components of our food supply; these techniques completely kill pathogenic bacteria on sprouting seeds, with minimal negative impact on the seeds in a non-chemical fashion. This research has the potential to positively impact lower income communities in the form of providing safely packaged, nutritious foods that are less expensive than fresh produce but that still taste fresh and carry better flavors, since non-thermal technologies do not heat food to a degree at which taste and texture are deteriorated.

(Supports USDA Goal #4)

Connecticut Agricultural Experiment Station – Hatch

Crown gall, caused by a bacterium, was identified by homeowners and commercial growers as an important problem of grape vines. In commercial grape operations, scientists visited stakeholders' properties and conducted experiments there to determine if grafting the vines at different heights could reduce crop losses due to crown gall. Based on findings obtained over 4 years, high-grafted vines reduced vine losses. The short-term benefits include a savings of about \$2,070 plus labor per acre in replacement costs for vines and increased grape production in

Connecticut. These advances support the grape-growing industry, valued at \$10 million in Connecticut, and have potential to reduce crown gall damage in other countries. The long-term benefits include a profitable and more robust fruit juice and wine-producing industries, as well as preservation of agricultural lands at home and abroad.

(Supports USDA Goal #1)

University of Vermont – Smith-Lever

Over 95% of farms in the U.S. earn less than \$500,000 in annual sales, but they only account for 26% of the value of agricultural products sold. To ensure the long-term viability of small farms, support is needed to help farms capture more revenues for products and services while managing expenses and being environmentally responsible. Extension programming in Vermont offered conferences, workshops, consultations and other educational offerings on agri-tourism, web marketing, many commodity focused offerings, organic production, pasture management, cropping alternatives and energy options such as raising energy crops and renewable energy. Over 1000 farmers have increased revenues or reduced costs as a result of adopting one of the practices offered in Extension's educational offerings. The economic impact of one project, the Greenhouse Biomass Furnace project, whose goal is to help Vermont's greenhouse vegetable growers adopt clean burning bio-mass furnaces, is saving greenhouse growers \$2,589.00 per year per farm. The net carbon dioxide emissions avoided by this substitution of fuel is estimated to be 110 cumulative tons. By adopting science based practices, economic and environmental benefits can be achieved together.

(Supports USDA Goal #1)

Rutgers University – Hatch, Smith-Lever

Water Chestnut is a highly aggressive aquatic invasive species that has only been found in New Jersey within the past several years. There is a need for information on this species to be provided to the public and to assist in developing management measures. A Water Chestnut Task Force was developed, with Rutgers Cooperative Extension as the lead. The Task Force has developed two Fact Sheets, a scripted presentation and a speaker's bureau, collaboration with the New Jersey Invasive Species Strike Team to provide statewide GIS mapping, and an on-line reporting form to assist in tracking. Based on information from the Task Force, a canoe survey of Lake Hopatcong focused on effective preventative techniques. The 2010 canoe survey led to the discovery of a small patch of water chestnut which was rapidly and completely removed, protecting the estimated \$1.3 million recreational value from what might have been considerable short and long term harm.

(Supports USDA Goal #1)

South Dakota State University – Hatch, Smith-Lever

In 2010 nearly 38% of the corn grain produced in the United States was used for ethanol production. As a consequence, availability of its co-product, dried distillers grains with solubles (DDGS), also increased with around 37 MMT produced. Dried distillers grains are in demand as a feedstuff for livestock because of their nutrient dense composition. Nearly 78% of the DDGS produced in the U.S. goes for domestic use, and the rest is exported. Working as consultant for U.S. Grains specifically in the area of DDGS, a SD Cooperative Extension's agent helped develop the U.S. markets in Mexico by promoting the use of DDGS as a feedstuff in ruminant diets, dairy cows in particular. In 2010, DDGS exports to Mexico, Colombia and Chile

increased by 17%, 70%, and 171%, respectively. The largest dairy coop in Uruguay, PROLESA, purchased 6,700 tons of Dakota Gold dried distillers with solubles from POET Nutrition in Sioux Falls, South Dakota. The total value of this shipment to Uruguay was two million dollars. This volume of dried distillers grains came from approximately 20,000 tons of corn (714,000 bushels), which represented \$3,570,000 in sales for state corn growers. In April 2011, PROLESA/Uruguay purchased a second shipment of 12,000 tons of DDGS which represented a total of \$3.84 million in gross sales for the state of South Dakota. This DDGS tonnage equaled roughly 36,000 tons of corn which, at today's grain prices, represented an additional \$10 million perceived by grain growers.

(Supports USDA Goal #3)

SOUTHERN REGION

University of Arkansas – Hatch & Smith-Lever (3b & 3c)

The total economic impact (direct, indirect and induced effects) of agriculture (production and processing for crop, animal agriculture and forestry) on value added, employment and wage income was estimated for the latest year data are available for extensive analysis, 2008. Agriculture is responsible for the creation of 261,101 jobs, or 16.6% the state's jobs, \$9.6B or 15.6% of the state labor income and \$16.3B or 17.0% of the state's value added. While agriculture generates value added, employment and wages in all of the study sectors, roughly 48% of agriculture's contribution occurs in industries outside of agriculture such as Wholesale Trade, Real Estate and Rental, and Transportation and Warehousing. Individually, the crop, animal agriculture and forestry sectors provide the catalyst for the direct creation of \$3.3B, \$2.6B and \$2.6B, respectively, in value added and 56,051 crop sector jobs, 57,601 animal agriculture sector jobs and 34,065 forest sector jobs. The vital importance of agriculture to Arkansas' economy, particularly rural areas of the state with limited alternatives for economic activity and growth is highlighted by the significant economic activity generated in associated industrial and human service sectors as a result of the indirect and induced impacts of agriculture research and extension activities.

(Supports USDA Goal #1)

Virginia Polytechnic & State University, Virginia State University – 1890 Extension

A sustainable alternative agriculture enterprise is needed to stimulate rural economic conditions in Southside Virginia. Eight regional workshops and two field days were held to promote best management practices for shrimp farming. Extension support provided to two shrimp grant proposals. Furthermore, baseline value-added post-harvest processing techniques were developed and evaluated with a processor in Hampton, Virginia. This is a critical component to large-scale expansion of Virginia's shrimp industry, allowing for proper freezing of an otherwise perishable and seasonal product. Freshwater shrimp pond production continues to expand and has been shown to be a viable alternative agriculture operation stimulating rural economies throughout the state. In 2010 500,000 juvenile shrimps were produced and distributed primarily in the tobacco growing counties of Southside, VA. Twenty-two thousand pounds were harvested, and approximately 50% were sold at an average price of \$9.00/lb, for a total value of \$99,000; the remainder were frozen and processed before IQF and future sale during months until next harvest. Growth is expected next year as operations expand and new producers start pond construction.

(Supports USDA Goal #1)

University of Tennessee – Hatch

It is important to utilize biorefinery lignin to make high value products to improve the economics and environmental impact of energy production. UT has been producing lignin from locally grown feedstocks. This lignin is being processed in a manner to tailor it to carbon fiber production, which can have immediate and meaningful effects on making biorefining economically feasible, having the potential to contribute an additional \$4 billion annually to rural economies

(Supports USDA Goal #1)

North Carolina A&T State University – 1890 Extension

North Carolina ranks as the second largest hog producing state in the country. Intensive confinement livestock farms produce large amounts of manure that need to be treated. A novel cattail to bioethanol process was successfully developed. Findings contribute to greater ethanol production in North Carolina, increased economic opportunities in rural areas, and reduction in US dependence on imported petroleum.

(Supports USDA Goal #1)

Virginia State University – Evans Allen

Researchers at Virginia State sought to evaluate and identify grazing goats that show natural resistance and susceptibility to parasites. With proper marketing strategy, a purebred animal that exhibits disease resistance characteristics can increase the price of goat from \$250 to \$800 per head. The ability to track genetic markers that render the animal resistant to disease could further increase market value of breeding stock. Project data thus far demonstrated that molecular quantization can rapidly and simultaneously detect the presence of *Haemonchus contortus* through the β -tubulin 1 gene and determine which naturally resistant and susceptible goats are carrying the resistant strains of this parasite. Rapid molecular detection of *Haemonchus contortus* and analysis of genes that confer anthelmintic resistance (which has an annual expenditure in the US of \$3 billion) will allow pharmaceutical companies to genetically target this parasite and ultimately manufacture improved drugs to hinder development of anthelmintic drug resistance in small ruminants.

(Supports USDA Goal #1)

North Carolina A&T State University – Evans Allen

Processing of agricultural commodities grown in NC yields considerable amount of by-products such as peanut skins/shells, sweet potato peels, grape seeds and skin, products which could benefit from new value added technologies, since they are suspected to contain significant amount of bioactive compounds including phenolics (e.g., procyanidins, resveratrol), and carotenoids. The development and characterization of naturally occurring and safe functional (bioactive) compounds from these agricultural resources will not only help in the national effort to reduce the incidence of diet-related chronic diseases, but also add value to the US agricultural sector, which currently makes up \$18.25 billion of an estimated \$48 billion per year functional foods market. Furthermore, agricultural by-products offer plentiful and inexpensive sources of bioactive compounds for the growing needs of this market; many of the highest nutritional compounds are typically found in by-product residues such as cereal bran, fruit and vegetable skins/peels. Thus, their health benefits are often overlooked. New value-added uses for these by-products will benefit consumers by providing low-cost health promoting compounds and foods from natural and renewable sources

(Supports USDA Goal #1)

Oklahoma State University – Hatch, Smith-Lever

Hay ranks as the second largest crop grown and harvested in Oklahoma. Tremendous effort and expense goes into growing, cutting, baling, storing, transporting, and feeding hay in cow/calf enterprises across the state. Preliminary research at OSU showed that 12% of the hay offered as feed was actually wasted when a high quality hay feeder was used. The researchers' experiment to determine the effects of a range of hay feeder design on hay feeding waste: an incredible

range of waste was discovered due to feeder type, with the lowest cost, economy feeder (most popular feeder style in OK) wasting 21% of the hay fed and a higher cost modified cone feeder generating only 6% waste. Assuming a 5 year life of service for both feeder types, we calculate that the modified cone feeder type would generate a savings of approximately \$1,000 over the economy feeder. If only 5% of cattle producers adopt the use of a more efficient bale feeder design, the economic impact to the state is \$1.5 million dollars per year.
(Supports USDA Goal #1)

Kentucky State University, University of Kentucky – Hatch, Smith-Lever, 1890 Extension

The Kentucky Extension Beef group supported improved beef production profitability and sustainability by enhancing education, cooperation, and opportunity of Kentucky beef producers. Multiple counties utilized resources from its website to help producers design new cattle handling facilities and implement better management practices. Additionally, agents in the Green River Area hosted events focusing on all aspects of cattle production and marketing. An evaluation was completed by producers after the last session to measure changes that were made on their farms as a result of attending Master Cattlemen. Changes to feeding programs were made by 89% of participants by using information learned from the nutrition session; 94% implemented practices to improve herd health, and, as a result of making these changes, 67% reported their return on investment was over \$1,000. According to University of Kentucky Research, adoption of recommended practices in the Master Cattlemen Program returned an additional \$5,500 for a 50-cow herd.

(Supports USDA Goal #1)

Kentucky State University, University of Kentucky – Smith-Lever, 1890 Extension

Extension offered Estate and Financial Planning workshops in 13 Kentucky counties. The programs focused on estates, estate planning, attorney roles in planning, records and record keeping systems and the purpose and value of a durable power of attorney. Sixteen 2-day seminars focusing on income taxes were also held. Youth were also engaged in high school financial planning workshops. One hundred percent of adult seminar participants indicated they increased their knowledge of estate planning because they had attended the classes. Fifty three percent said the information was totally new and indicated they had increased their knowledge of the subject. One hundred percent of the participants indicated they would implement at least one area of the program because of the knowledge learned from the class. A total enrollment of 1,603 youth participants was involved in the income tax seminars. Three months after youth completed their experience with a financial literacy curriculum, it was found that: 59% of the students indicated that they had changed their spending patterns and 60% indicated that they had changed their savings patterns. Those who reported having changed their savings habits, 80% said they now save for what they really need or want and 20% indicated that they now save every time they receive money.

(Supports USDA Goal #1)

North Carolina A&T State University, North Carolina State University – Hatch, Smith-Lever, 1890 Extension

Cooperatively marketing cattle in larger groups can improve uniformity resulting in increased sale prices. Extension agents organized and coordinated feeder calf sales in northeastern North Carolina. This allows small producers to comingle their cattle to sell in more uniform packages

and gives them another source to market their cattle. Cattle typically garnered \$3 to \$5/cwt or \$25 to \$50 more than if sold at a public auction barn; 463 head were marketed through six sales, generating \$264,005.

(Supports USDA Goal #1)

University of Arkansas at Pine Bluff – 1890 Extension

Profits in baitfish farming increase with yield, as the fixed costs of production are relatively high. With the traditional spawning-rearing pond method of fathead minnow production, yields are relatively low, in the range of 250 - 450 lb/acre. A series of research studies have been conducted to develop a new method of fathead minnow production. Results from two years of studies demonstrated that yields of 2,500 to 4,500 lb/acre can be obtained in experimental ponds. Even with the added costs of egg collection and fry production, today's relatively high feed costs and increased expenses for aeration, estimated profits increase dramatically, from \$290 - \$530/acre to \$8,700 - \$14,000/acre. These studies show the potential for increased profit in baitfish farming using this new production method.

(Supports USDA Goal #1)

University of Arkansas – Hatch, Smith-Lever

The Cooperative Extension Service is the lead agency in providing continuing education credits for registered foresters and other natural resource professionals. In 2010, three different courses sponsored by the State Board of Registration for Foresters attracted 441 registered foresters. All attendees received continuing education credit hours. Over 115 land managers and foresters were trained to implement the latest Tree Farm and Forest Stewardship standards. The Wildlife Habitat Restoration on Private Lands Conference was attended by 115 natural resource professionals from Arkansas and surrounding states.

(Supports USDA Goal #2)

University of Arkansas – Smith-Lever

Winter feeding is the single largest cost of maintaining a livestock herd. By using improved forage and grazing management practices, producers can reduce the length of the hay feeding period and extend their grazing season to 300 days or more. The 300 Day Grazing Program was designed so a county agent could work with a producer to implement an improved management practice based on the producer's operation. Three farms were selected to implement as many practices as needed to achieve a 300 Day grazing season. A control demonstration was conducted on the Livestock and Forestry Branch Station where Animal Science faculty implemented the same practices on a demonstration herd with the goal of a 300 Day grazing season. The results of this comparison have direct application for Arkansas farms, showing that grazing management timing and planting of clover was coordinated to establish excellent red clover stands to use for weaned calves. The red clover forage provided quality forage that allowed the calves to be grazed an additional 60 days after weaning resulting, in an added value of \$92 per calf in 2010.

(Supports USDA Goal #2)

Virginia Polytechnic & State University, Virginia State University – Hatch, Smith-Lever, 1890 Extension

Reports from the Urban Tree Canopy (UTC) Program provide jurisdictional level canopy and land cover information and identify specific parcels and zoning classes where jurisdictions can target programs to increase tree canopy coverage. Ecosystem benefits of the urban canopy are emphasized through educational programs. The ecosystem service benefits associated with UTC can be quantified, and provide long-term benefits. Fairfax County, Virginia, estimates that urban trees provide the following ecosystem benefits: \$261/acre annually in air pollution benefits; \$231/acre each year in energy conservation; and more than \$25,000/acre in storm water management benefits.

(Supports USDA Goal #2)

University of Arkansas – Hatch, Smith-Lever

Poultry litter and dewatered municipal bio-solids were blended, compacted and wrapped in a semi-permeable plastic to test nutrient preservation and pathogen destruction capabilities of the baling system on the co-processed product (PL/DMB). The PL/DMB was seeded with a non-pathogenic E. coli routinely used as an indicator to confirm reliability of food processing procedures. Numerous leading farmers in the Arkansas Delta experienced encouraging results from use of the baled poultry litter system developed by the Division of Agriculture, now commercialized by White River Fertilizers. Overall results to date indicate a soil enrichment program incorporating PL/DMB rather than total reliance on chemical fertilizers results in increased profitability. The Northwest Arkansas Conservancy Authority is considering adopting the PL/DMB system at their regional sewage treatment plant near Centerton. Successful implementation of the system at that site could allow in excess of 200,000 tons of PL/DMB to be moved from the nutrient-excess NWA region to nutrient-deficit row crop production areas in Eastern Arkansas and surrounding states.

(Supports USDA Goal #2)

University of Arkansas – Hatch, Smith-Lever

There is growing public interest in reducing green house gas (GHA) emissions, and current bills being discussed in Congress, if passed, could result in an increase in the value of carbon from \$.10 per ton to \$30-40 per ton. A model was developed to quantify the amount of carbon each of the largest eight crops in Arkansas could sequester in each of its 75 counties. The model itself set forth a new methodology for measuring carbon emissions as well as providing policymakers the implications of carbon offset market. The model's estimates have been used by commodity groups (Cotton Incorporated) to assess how a carbon offset market would affect cotton producers. The estimates also provide policy makers a snapshot of how various carbon prices will affect cropping patterns and resulting input and output prices.

(Supports USDA Goal #3)

Virginia Polytechnic & State University and Virginia State University – Smith-Lever

Pesticide applicator education and Integrated Pest Management training are integral parts of a pesticide safety education program. In 2010, 85 Extension agents, six investigators, and one contract trainer were trained in the annual Virginia Pesticide Safety Educators Workshop. In addition the online course in pesticide recordkeeping compliance trained 507 pesticide investigators from across 46 states and territories. As a result of these trainings, pesticide safety

educators and investigators were able to conduct pesticide safety education and compliance assistance in 46 states and territories across the US, in 107 Virginia counties and city units, and in 12 school districts across Virginia. The impact of this effort helped applicators stay in compliance with federal and state pesticide control laws and regulations in the impacted states and territories and maintain their licenses, which enabled them to stay in business and avoid fines and violations. The potential of avoidance of violations of these laws is estimated in the hundreds of thousands of dollars, annually.

(Supports USDA Goal #4)

Auburn University and Alabama A&M University – Hatch & Evans Allen

Research projects were undertaken to help farmers combat money losses due to recent record high animal feed costs. New technologies and best agricultural practices have been developed and recommended for agricultural industrial uses. For example, a pond to plate project was conducted to enable the catfish industry to have a profit margin wide enough to sustain the industry. Hybrid catfish produced by crossing of channel catfish with blue catfish has generated really exciting results. The application of this technology alone can revolutionize the catfish industry. A similar farm to folk system approach was adopted in the poultry industry to enhance productivity, to reduce costs, and to enhance profitability, as well as to enhance food safety; infrared camera technology was adopted by poultry industry to ensure efficient energy use in chicken houses. This technology alone could save farmers millions of dollars.

(Supports USDA Goal #4)

Southern University and A&M College – Evans-Allen, 1890 Extension

Research scientists and extension personnel in the Nutrition and Health Program at the SU Ag Center collaborated and worked with citizens of Louisiana to increase their understanding of the impacts of food borne illnesses. The goal was to help citizens, especially the elderly, low income, educationally disadvantaged and poor families, enhance their skills in proper food selection, storage and preparation. To ensure sustainable and safe food production practices, research and educational information was also directed at producers, food businesses and food handlers. Research and extension staff provided nutritional instruction, food safety and food resource management workshops to the clientele throughout the state. In collaboration with EFNEP staff, nutrition educators reached over 2,965 families through schools, head start sites, libraries, churches and community centers. Ninety-five percent of the participants learned how to make their own healthy snacks and how to ensure that food safety guidelines are adhered to while doing so. Additionally, 90 percent of all participants can now correctly identify healthy foods, 89 percent can correctly read the nutrition facts label, 90 percent practice comparison shopping, and 70 percent plan meals.

(Supports USDA Goal #4)

Alabama A&M University and Auburn University – Smith-Lever, 1890 Extension

The Agronomic Crops Team was able to deliver timely, accurate, unbiased research-based information and programs to producers, educators, industry representatives, and private citizens in Alabama, addressing Asian Soybean Rust, row crop production (wheat, canola, cotton, soybean, and field corn), herbicide resistance, and geospatial and precision agriculture technologies. Activities included on-farm demonstrations and testing, field days, in-field training, and formal trainings (i.e., insect scouting schools and geospatial trainings), helping to

secure a stronger economic base for the continued viability of row crop agriculture. Through the different facets of the program, millions of dollars were saved through application avoidance, improved application techniques (i.e., sprayer integration with site specific terrain and guidance technologies), and utilization of varieties, cultivars, and hybrids of various crops that were suitable for specific areas of the state. While there was a fairly widespread drought across the state last year, many producers were still able to make reasonable yields as a result of management, much of which was based on extension interactions and recommendations.
Supports USDA Goal #4)

Virginia Polytechnic Institute & State University and Virginia State University – Smith-Lever

In 2010, extension programming focused on pesticide applicator education and IPM supported the training of 621 people, including extension agents, teachers, and investigators. Specifically, an online course in pesticide recordkeeping compliance trained investigators from across 46 states and territories. As a result of these trainings, pesticide safety educators and investigators were able to conduct pesticide safety education and compliance assistance in 46 states and territories across the US, in 107 Virginia counties and city units, and in 12 school districts across Virginia. The impact of this effort helped applicators stay in compliance with federal and state pesticide control laws and regulations in the impacted states and territories and maintain their licenses. This enabled them to stay in business and avoid fines and violations. The un-measurable potential of avoidance of violation of these laws would number in the hundreds of thousands of dollars annually (the average fine paid by violators in Virginia is over \$800 per violation).

(Supports USDA Goal #4)

Florida A&M University – 1890 Extension

The Farm to School Program is a public-private collaboration between FAMU and New North Florida Cooperative designed to encourage school district participation allowing schools to have access to fresh, local/regional fruits and vegetables produced by small-scale farmers while guiding school feeding programs toward promoting healthy eating habits among children. Through this program, 13 Florida school districts serving 300,000 school children improved nutritional value of school meals due to incorporating local and regional fresh produce. Schools purchased approximately 100,000 lbs. of fresh produce grown by small and medium-sized farmers. Additionally, the accomplishments and impact of Farm to School activities over the past few years was used to demonstrate effectiveness and played a major role in providing substantive evidence that subsequently led to the signing of Farm to School Funding into law.

(Supports USDA Goal #4)

University of Florida and Florida A&M University – Smith-Lever, 1890 Extension

Because of tropical weather conditions dairy sanitation and health of herds can be an issue. Specialists and county faculty have been working with the increasing numbers of smaller dairies in the state to improve sanitation and herd health. With the increase in smaller grazing dairies in the state and county, faculty have been working with smaller grazing dairies and have addressed the problems with milk quality and sanitation on these dairies, as well as ways to reduce the effects of heat stress by using shade and modifying irrigation sprinklers to cool the cows without creating muddy pastures. Muddy pastures can increase the occurrence of mastitis and affect milk quality and quantity. Educating smaller producers on these best management practices increases

herd health, sanitation and economic stability, which in turn affects the county tax revenue, the environment and human health (which can be impacted by animal sanitation issues).

(Supports USDA Goal #4)

Texas A&M University – Hatch

Researchers at TAMU identified best management practices to ensure quality, profitability, productivity and optimal utility to help clientele make changes to improve livestock, management, resources and time to increase income and improve profit opportunities. Programs conducted include Texas Beef Quality Producer, Beef and Pork 101, Beef 706, 2010, Bull Selection, Low-Stress Livestock Handling, Mare Foal Workshops and Dairy Outreach. Youth programs included the 37th Annual Summer Horsemanship Schools, Lamb/Goat Camps and Judging Camps. From measures including beef cattle, meats, dairy, sheep/goats and horses, 65% to 100% of clientele reached reported adoption of at least one best management practice, while 50% to 93% reported elimination of non-productive practices. Additionally, 68% implemented financial plans, 85% adopted EPD's and fertility testing, 80% reported use of cost/lb of nutrient strategies for alternative feedstuffs, and 90% adopted body condition scoring as a management tool.

(Supports USDA Goal #4)

Clemson University and South Carolina State University – Evans-Allen, Smith-Lever, 1890 Extension

A combined research and extension program in SC aims to improve production efficiency, environmental sensitivity, and profitability of animal production systems and reduce the environmental impact of animal waste in South Carolina. An Extension specialist designed an energy efficient ventilation system for a poultry producer in Anderson County. He provided calculations and several reports on improving energy efficiency of lighting systems in broiler buildings, provided analysis on energy savings due to adding attic insulation and an insulated tunnel door to a brooding area. He also provided analysis for improving the energy efficiency of a lighting, ventilation, and heating system. Articles were written for national journals and the Southeastern livestock newsletters. Producers learned that tunnel velocity would be increased by 36%, system efficiency by 16%, and the new lighting system will provide 32% energy savings. Additional analysis and assistance were provided to poultry producers and compiled to assist a producer with a USDA-RD Energy Efficiency Improvement Grant. Extension agents and specialists made presentations at the SC Ag Council and the World Aquaculture Society Conferences as well as the SC Sheep Industries organization.

(Supports USDA Goal #4)

WESTERN REGION

Colorado State University – Hatch & Smith-Lever

In Colorado, the contribution from beef cattle is greater than three times that from grain, oilseeds, dry beans and dry peas (\$1.0 billion), so it is vital that the industry is sustained. The CSU Beef Team efforts focused on enhancing the continued economic contribution of the Colorado Beef Industry through educational programs, problem-solving research and communication of science-based information to producers and the consuming public. This will have a long-term impact on the social, economic, civic and environmental resources in Colorado. Seventy-six percent of participants in these programs indicated they had taken action and/or used newly learned skills in relation to marketing, reproduction, nutrition, general management, animal handling, range management, health, monitoring of range lands, use of Quality Assurance (QA) protocols, assisting clientele in assuring healthy animals by proper vaccination/Beef Quality Assurance (BQA)/monitoring disease concerns as they arise, monitoring breeding success, and/or improving value of market animals.

(Supports USDA Goal #4)

Washington State University – Smith-Lever

WSU Extension professionals design and deliver programs that lead to specific and measurable changes in management practices on land and water resources of the state. WSU Extension programs reached 2,882 landowners and managers that indicated increased knowledge of forest stewardship practices, and 2,190 landowners and managers indicated they have implemented at least one new practice on their land. 486,115 acres were directly impacted by Extension programs. Program participants estimate execution of practices on 10 percent of their ownership, with a cost earnings or savings estimate of \$26,406,000. As a result of implementing forest stewardship and health practices, air and water quality has been protected by reducing wildfire risk and run-off of sediments into streams and lakes and public health threats due to smoke inhalation has been curtailed from these family forests. Additionally, quality of life improvement is suggested by the 94 percent of survey respondents who reported an increased enjoyment of their land, and 97 percent reported that they feel better equipped to successfully steward their land.

(Supports USDA Goal #1)

College of Micronesia – Hatch & Smith-Lever Aquaculture is expected to provide sources of income from new productions and add values to existing commodities in Micronesia. Extension agents in Micronesia facilitated public displays of products from aquaculture projects, hands-on training, on-site visits and broadcasted information via local radio stations. Communities have now been educated on the importance and contribution of aquaculture for the country's food security and economic development. Of special note are pearl and sea cucumber projects that have received immediate attention from domestic and overseas stakeholders and international journals on high quality products and skill training methodologies.

(Supports USDA Goal #3)

Oregon State University – Hatch

Data were analyzed to determine the causes and consequences of narrowing productivity gap among nations. This research activity focused on the role of the public sector in alleviating the likely market failures in aiding productivity growth and the opening global markets for U.S. products. Technological leadership in food manufacturing industries was assessed using an internationally comparable database on 35 developed and developing economies. Despite consistently high productivity levels in the US, several countries appear to be catching up to the U.S. productivity level at a rapid pace, suggesting erosion in US comparative advantage in food manufacturing industries. The findings identified and emphasized the fact that the US confronts difficult choices in funding agricultural and food research. In contrast, emerging and other high-income economies with flexible budgets and low external debt have been increasing investments in green technologies and agriculture. This has major implications for public policy, as global leadership in emerging green technologies and consequent producer competitiveness and consumer welfare critically depends on facilitating and investing resources in, where market failures abound, agricultural research and development.

(Supports USDA Goal #3)

Oregon State University – Smith-Lever

Educational information provided to producers included numerous classes and workshops, consultations with producers, applied research projects, and publishing and sharing of fact sheets on proper soil testing and fertilizing. Survey responses collected from 42 western Oregon producers who had worked with OSU on pasture fertilization issues demonstrated improved, economical practices for fertilizing pastures and properly testing soil. A large majority of the producers reported that they changed their practices because of OSU information, and over half said they saved money by fertilizing according to OSU recommendations. The savings reported in the survey calculates out to be an estimated \$30.25/acre of pasture. With an estimated 1.8 million acres of pasture in western Oregon, forage producers have the potential to save over 54 million dollars by following OSU pasture fertilizer guidelines. Additionally, positive impacts were observed by the fact that fertilizing judiciously protects groundwater from being contaminated by improper fertilization practices.

(Supports USDA Goal #4)

University of Nevada – Smith-Lever

The “An Ounce of Prevention” program educates and motivates participants to make lifestyle modifications to prevent or delay the onset of diabetes and related complications. The objectives of this program have been effective in teaching participants at making dietary changes, increasing physical activity and improved diabetes knowledge, consistent with the Diabetes Prevention Program study. Analysis of self-reported post and pre-tests showed a 67% increase in physical activity and a 64% decrease in TV watching. Changes in dietary choices resulted in decreased amounts of fried food (65%) and increased choosing of low-fat over high-fat foods (69%). The combination of positive changes balanced between physical activity and healthy diet meets the objectives of the program and serves to educate those at highest risk of diabetes in a more comprehensive manner than simply educating on exercise and diet separately.

(Supports USDA Goal #4)

University of Colorado – Smith-Lever

There are currently two circumstances for farmers and ranchers in Colorado that are determining the Agriculture Business Management (ABM) Team's focus. For some commodities in Colorado, market prices are below production costs -- specifically dairy, cattle feeding, and swine. Prices for input, especially petro-based inputs, are increasing. Expected high interest rates and inflation will cause further pressure on profitability in agriculture and force farm and ranch managers to be increasingly more vigilant about their finances and to consider new management and investment strategies. The Agriculture Business Management Team (ABM) runs programming efforts to increase the sustainability of farms and ranches and to improve management skills. Also, efforts cause farm and ranch families to improve communications about business and family transfer issues (succession planning). Ninety-nine percent of participants surveyed reported they had gained knowledge in topics including: Financial Statements, Costs of Production, Sources of Risk/Risk Tolerances, Business/Family Goals, Alternative Management Strategies, Insurance Products, Legacy & Succession Planning, and/or Agricultural Records. *(Supports USDA Goal #1)*

University of Nevada – Smith-Lever

The “An Ounce of Prevention” program run by extension personnel educates and motivates participants to make lifestyle modifications to prevent or delay the onset of diabetes and/or its complications. It targets people at high risk for developing diabetes. The objectives of this program have been effective in teaching participants at making dietary changes, increasing physical activity and improved diabetes knowledge, consistent with the Diabetes Prevention Program study. Statistical analysis of pre-post self reports showed significant improvements by participants in both activity and healthy eating/food preparation behavior. Statistical analysis of self-reported post-pre test showed a significant increase in physical activity from 20% to 87% who responded Always or Often and a significant decrease in TV watching from 70% to 6% who responded Always or Often. Statistical analysis of self-reported data on six food choice items demonstrated statistically significant changes of those who responded always or often. Change of intake of 5 fruits and vegetables each day increased from 15% to 91% and change of intake of fried food regularly decreased from 67% to 2%. Additionally, change of selecting low-fat rather than high fat foods increased from 25% to 94%, and change of avoiding adding fat increased from 25% to 96%. *(Supports USDA Goal #4)*

University of Idaho – Smith-Lever

Roughly 44% of the forests in the Idaho Panhandle (Boundary, Bonner, Kootenai and Benewah counties) are held and managed by 46,993 family forest owners (23,663 owning 5 acres or more). Family forests are critical to timber supply, water, wildlife, and many other shared values. For example family forests tend to be more concentrated near key locations for ecosystem functions (e.g., along lakes, streams, and in increasingly rare low elevation wildlife habitats). As part of the Idaho Forest Stewardship program, a cooperative effort with the Idaho Dept. of Lands and many other partners, UI Extension provides an annual series of workshops, field days and other educational activities titled Strengthening Forest Stewardship Skills. The activities are designed to strengthen forest owners' ability to implement practices that improve forest health and growth, and are offered in a variety of locations and times. In FY09 through FY10, 672 owners of nearly 90,000 family forest acres attended UI Extension workshops and other

educational activities in the Idaho panhandle. On average, less than a third of participants indicated previous involvement in various forestry education or assistance programs. Participants indicated knowledge increases ranging from 40% to 158%, with an un-weighted average of 84%. Based on evaluation results: 215 panhandle family forest owners will attend additional forestry education programs; 140 will contact a forester for additional assistance; 108 will monitor for insect, disease, or animal damage; 89 will thin forest trees; 81 will manage to favor larch and pines; 61 will complete a forest management plan; 52 will reduce noxious weeds or other non-native invasive species; 48 will reduce fuels in the home ignition zone; 43 will make their house easier for firefighters to identify and access; 39 will prune forest trees; 31 will reduce unwanted vegetation.

(Supports USDA Goal #2)

University of California – Hatch, Smith-Lever

In 2009, spotted wing drosophila spread to cherries, blueberries, caneberrys and strawberries in California, Oregon, Washington, British Columbia and Florida. In collaboration with a private industry researcher, a UC Cooperative Extension farm advisor undertook an aggressive research program which sought to create a program of management for this new pest. Trapping media for monitoring were tested, pesticide controls both for conventional and organic systems were screened and the removal of cull fruit from the field to limit spotted wing drosophila population growth was put into practice. The scientists established a program to share the information with growers, culminating with a standing-room-only event held at the Santa Cruz County UC Cooperative Extension office in early August 2009. The use of the Internet was critical in extending information on spotted wing drosophila. Growers and other professionals in Southern California, Oregon, Washington and British Columbia were immediately able to access updates posted on a blog about this pest. California caneberry growers, who were among the most affected by spotted wing drosophila, quickly deployed the methods as outlined by UC Cooperative Extension and private industry partners. Yeast sugar water traps were placed in fields to monitor the magnitude of infestation. Effective pesticide sprays were made and many growers removed cull fruit from the field. The result was a drop in the amount of spotted wing drosophila infested fruit of at least 20 percent, resulting in a probable savings of \$36 million to the industry.

(Supports USDA Goal #4)

University of Alaska – Smith-Lever

A sizable percentage of Alaskans live a subsistence lifestyle or supplement their diets with fish and game meat. It is particularly important that we teach residents how to safely preserve these Alaska staples. Food preservation also decreases reliance on high-cost imported foods. Extension programs in Alaska oversaw the teaching of 67 food preservation classes in 22 communities. Fifty-four were hands-on classes in which 722 participants practiced food preservation/safety skills. Agents and staff also created three additional DVDs and three online modules of a how-to series on preserving local foods. Now, as more Alaskans learn the proper methods of preserving foods, the risk of botulism decreases, and clients can be less dependent on imported foods. An estimated 95 percent of Alaska's food is imported, so food preservation training increases Alaska's food security. After surveys were given, following classes or online modules, nearly all respondents said they planned to use the information they learned about food safety and proper preserving of fish and game meats.

(Supports USDA Goal #1)

Montana State University – Hatch

MSU is examining the integration of natural enemies, pathogens, and chemicals for management of sawfly and is developing new sources of host plant resistance. Research is ongoing to find additional environmentally friendly solutions for the management of soil-borne plant pathogens. The deployment of bio-fungicides could provide an important crop management tool missing in organic wheat production. Implementation of research results reduces risk and increases sustainability of organic farming in the northern Great Plains. Educational programs are providing grower education for integrating biological controls with conventional disease management practices. Research is being directed toward identifying key mortality factors which contribute to the greatest annual losses of alfalfa leaf-cutting bee pollinators in Montana. Understanding the role of weed diversity and seedbanks in Montana cropping systems will help producers develop more effective weed control programs.

(Supports USDA Goal #4)

Montana State University – Hatch

Oilseeds (including camelina sativa, canola, soybeans, and safflower) are rapidly emerging as important Montana crops for production of oils. MSU research initiatives are providing new insights into food safety and risk assessment, including the development of new food products. MSU anticipates several new camelina products will be commercially available in the near term including bread, soil amendments, and omega-3 rich beef and pork. Additionally, new high-tocopherol lines of safflower will add value to producers in Eastern Montana and Western North Dakota.

(Supports USDA Goal #1)

University of Wyoming – Smith-Lever

There has been conflict in Wyoming and occasional litigation among interest groups that differ on how resources, even renewable resources, should be used and managed. Natural resources are important to all segments of the Wyoming population. The Sustainable Management of Rangeland Resources initiative team has produced over 175 seventy second TV spots which air twice weekly on commercial TV station in Casper. The segment, titled 'Exploring the Natural Wonders of Wyoming (ENOW), covers natural resource topics to provide education to the general public. The ENOW spots have also been placed on You-Tube to reach a national audience. In the fifth year of airing these spots, the team receives regular feedback from Wyoming citizens and now national viewers on the positive aspects of the spots. It is difficult to measure impact, though the audience response has generated enough interest and positive feedback that the energy industry now provides partial funding for the segments aired twice weekly.

(Supports USDA Goal #2)

University of Arizona – Hatch, Smith-Lever

An integrated pest management program (IPM) established in Arizona uses insect growth regulators (IGRs; effective against whiteflies), transgenic cotton (with Bt *Bacillus thuringiensis*; effective against pink bollworms), and a reduced-risk feeding inhibitor (effective against *Lygus* bugs). Statewide averages for cotton insecticide use patterns in Arizona from 1979 through 2010

show that insecticide use on cotton for all insects combined, including whiteflies, pink bollworm, Lygus bug and others reached a 32-year low over the last 5 years while also reducing costs to all-time lows. The estimated cumulative savings in control costs and yield (from reduced losses to insects) from 1996 through 2010 was more than \$223 million. Growers applied 4.15 pounds of active insecticide ingredient per acre of cotton in 1995. In 2009 and 2010, the amount of active ingredient applied per acre was reduced by 3.66 pounds, or 88.3 percent, to just 0.48 pounds per acre. This is the equivalent of applying less than a can of soda on an area the size of a football field just once over the cotton season (March to October).

(Supports USDA Goal #4)