

# 2009

## State Accomplishments for the Formula Grants Annual Report Summary



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National Institute of Food and Agriculture

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11/22/2010

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## OVERVIEW AND BACKGROUND INFORMATION

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 2009 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 2009 with dollars from the four major research and extension formula grant funds: Hatch, Evans-Allen, Smith-Lever 3b&c, and 1890 Extension Programs.

The formula grant process works through the long-standing partnership between USDA and the land-grant university 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 therefore 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 five NIFA Priorities: Childhood Obesity, Climate Change, Food Safety, Global Food Security and Hunger, and Sustainable Energy. There are also certain themes related to each of these Priority areas, which are listed at the beginning of each section. Outcomes that fall under these "themes" refer to expenditures and results for programs that, although not specifically classified as a NIFA Priority, were closely related to that subject and have outcome effects related to the Priority area. While it is important to know the major outcomes according to the five NIFA priorities, it also important to recognize that there are other major outcomes that have occurred as a result of NIFA funding that do not fall within the specific confines of the five Priorities. Therefore, the final section in this report contains groupings of outcomes according to NIFA Portfolios. These outcomes were chosen as examples of outstanding results garnered through NIFA funding that support two of the more robust portfolios of the agency.

The outcomes in this document include examples such as cost-benefit ratios, dollars saved, revenue generation, increases in yield, best management practices developed and used, new and value-added products developed and used, as well as a myriad of increases in knowledge and change in action and behavior outcomes. These outcomes show the continued importance of the four major formula grants to the NIFA Priority Areas, as well as portfolios. They also provide the agency and its land-grant partners the information needed to examine the questions of balance and direction as a unified system.

NIFA believes that the current Plan of Work reporting procedures, including the Annual Report of Accomplishments, are not only reducing burden on the States from the old Plan of Work structure and Annual Report requirements, but they are also providing much needed supporting documentation for NIFA Portfolio reviews, the PART process for OMB, the budget submission, and other external requirements. As part of this documentation, we have been able to more efficiently and accurately link the outcomes from the Annual Report of Accomplishments via the NIFA Priorities, Portfolios, and Knowledge Areas to the NIFA and USDA strategic plans, and thus, to our goals, objectives, and our portfolios. Many of the outcomes from this summary document have already been used in annual NIFA reporting activities, such as Portfolio reviews and the budget process.

More detailed summary information for the 2009 Annual Report of state accomplishments and outcomes focuses on statistical summaries and is available on the NIFA Plan of Work website.

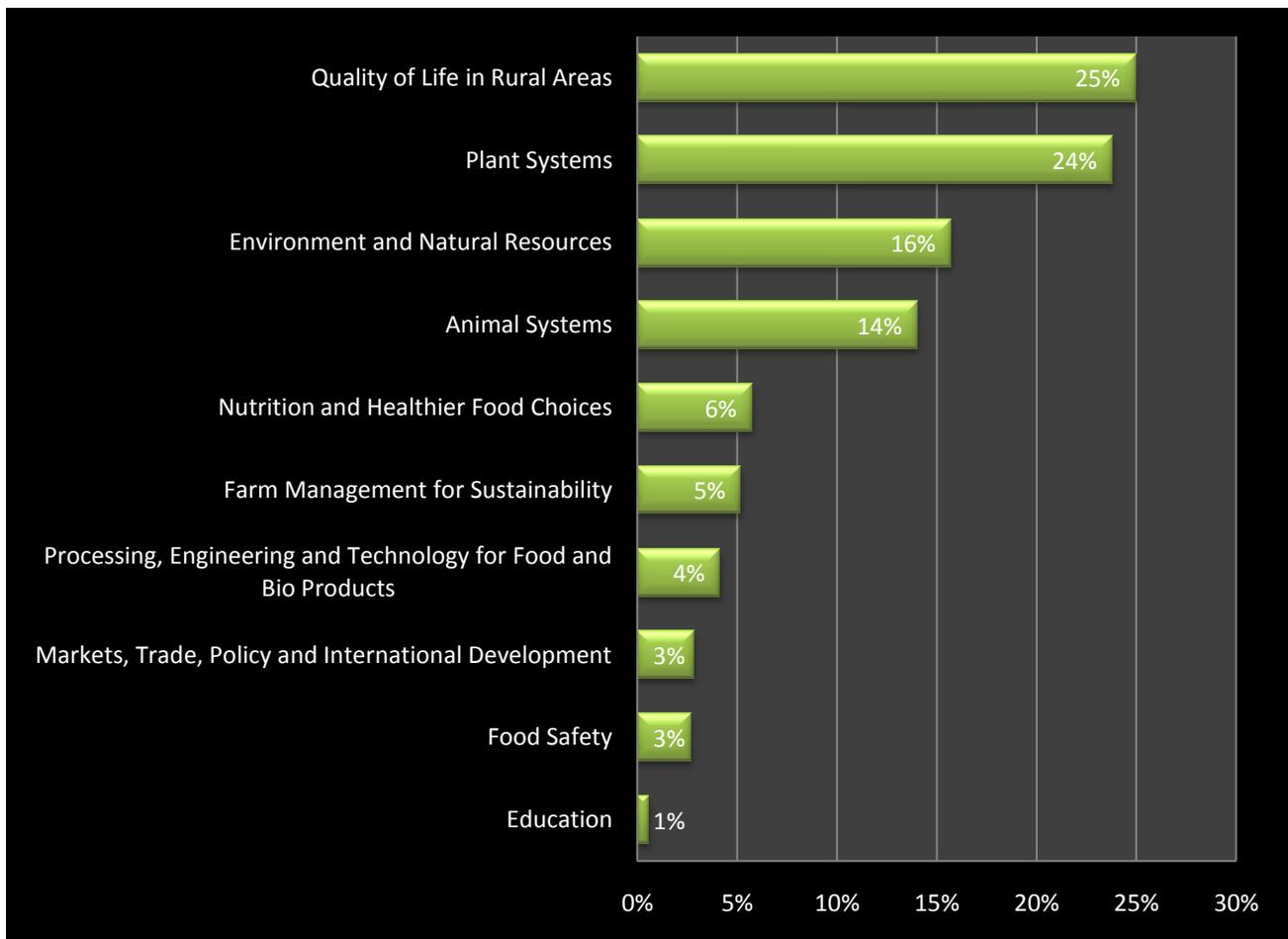
## GRAPHICAL SUMMARIES OF EXPENDITURES

A total of \$542,714,259 was appropriated for the four formula grant funds subject to this Plan of Work and Annual Report in fiscal year 2009. A total of \$495,757,695 was reported expended from the formula grant funds in 2009 on various planned programs in the 2009 Annual Report of Accomplishments and Results.

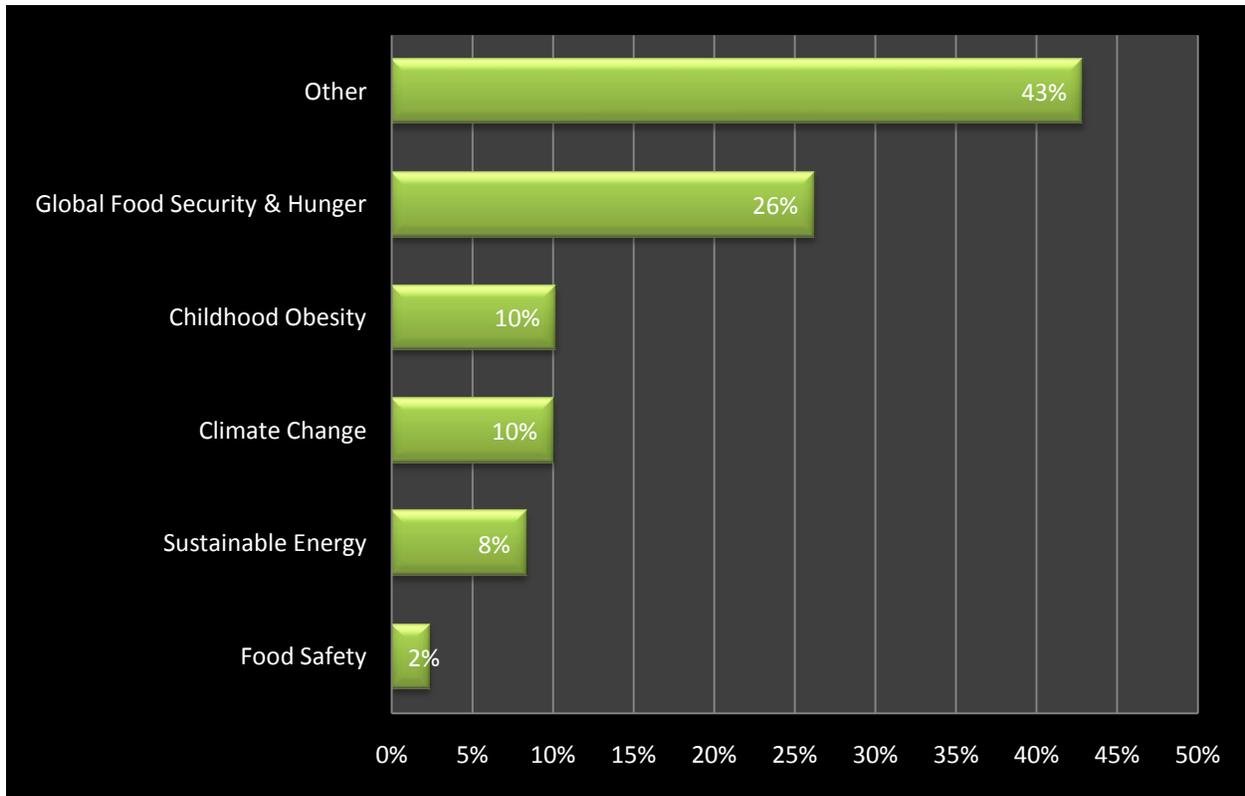
**The breakdown of expenditures among fund/institution type is as follows:**

Smith-Lever	\$250,260,424
Hatch	\$174,523,420
Evans-Allen	\$38,387,888
1890 Extension	\$32,366,890

### PERCENTAGE DISTRIBUTION OF FORMULA GRANT FUNDS BY PORTFOLIO



**PERCENTAGE DISTRIBUTION OF FORMULA GRANT FUNDS  
BY PRIORITY & RELATED THEMES**



**Planned programs having to do with the following themes related to each of the priority areas were included in the above percentage distributions:**

Childhood Obesity: Nutrition; 4H Health & Nutrition; Family Health & Nutrition

Climate Change: Environment; Natural Resources; Forest & Forestry Management

Food Safety: Food Processing & Quality (as they relate to safety); Food Production & Protection

Global Food Security & Hunger: Animal Systems, Plant Systems

Sustainable Energy: Bio-Economics (sustainable bio-energy development); Bio-Based Products, Engineering & Resources

## MAJOR OUTCOMES BY NIFA PRIORITY

### NIFA PRIORITY: CHILDHOOD OBESITY

*Related Themes: Nutrition, 4H (specific to Health & Nutrition), Youth & Family (specific to Health & Nutrition)*

“MS in Motion”, a 12-week healthy lifestyle program, gives individuals the skills, knowledge, and the support to make positive lifestyle behavior changes in the state of **Mississippi**. Pre and Post-survey returns from Bower Schools (n=230) participants lost a total of 725.9 pounds. There was a significant decrease in weight, BMI, and blood glucose and cholesterol, and a significant increase in fruit and vegetable intake, water intake, and physical activity. There was also a significant increase from pre to post survey in self-esteem, appearance, and mobility. In 2009, Neshoba County had 43 people weigh out, with an average weight loss of 8.1 pounds. In general, the average weight lost during the program is 5 pounds over the 12 weeks.

*Formula Grant: Smith-Lever and Hatch*

A variety of classes on Steps to a New You, Healthy Eating, Weight Management and basic nutrition were conducted by nutrition educators from the **University of Wyoming**. Thirty-six percent of participants reported being physically active for at least 30 minutes per day, on four or more days per week, more often. Forty percent of participants reported getting a 'super-sized' portion less often. (A 'super-sized' portion of food or beverage is one that is much bigger but costs only a little more money). Ninety-two percent of participants showed improvement in one or more nutrition practices. Many individuals reported weight loss as a result of changes in eating, meal planning, and increasing physical activity.

*Formula Grant: Smith-Lever*

Several programs conducted by **North Carolina Cooperative Extension** promote eating and physical activity patterns that have been shown to decrease blood pressure. Over 700 participants decreased blood pressure as a result of participating in programs conducted by NC Cooperative Extension. Many other participants adopted physical activity or healthy eating behaviors that can positively affect blood pressure.

*Formula Grant: Smith-Lever and 1890 Extension*

NIFA funded **North Carolina Cooperative Extension**, in partnership with North Carolina Division of Public Health, offers the Eat Smart, Move More, Weigh Less program. Eat Smart, Move More, Weigh Less is a 15-week weight management program that offers dietary, physical activity, and lifestyle strategies that are consistent with a healthy weight. Participants plan, track and live mindfully in addition to eating healthy and being physically active. In its first full year of implementation and has reached over 2,500 participants across the state. Most participants set a healthy weight loss goal at the beginning of the program (some participants enroll to learn

about healthy eating and physical activity and do not need to lose weight). Average weight loss is 7 pounds during the 15-week program.

*Formula Grant: Smith-Lever and 1890 Extension*

The “My New Weigh of Life” course developed by **Penn State Extension** is a NIFA funded program aimed at reducing the prevalence of obese adults by 15%. The course objective is to motivate permanent lifestyle changes of healthier eating and increased physical activity so that adult participants can achieve and maintain a healthier weight. The course consists of 12 classes. The program was conducted in ten counties as a pilot the first year. The course resulted in an average weight loss was 8 pounds, average decrease of BMI was 1.65 and average decrease in waist circumference was 2.3 inches. These changes can impact not only the quality of life of the individual, but also incidence of chronic diseases and associated healthcare costs. Of the 48 participants completing the pilot program, 94% made healthier food choices, 88% consumed more low calorie foods and beverages, and 77% increased their physical level of activity.

*Formula Grant: Smith-Lever and Hatch*

The **New Jersey** School Walking program was implemented in 10 schools across the state to 4th and 6th grade elementary school classes reaching 1,077 youth who walked 53,037 miles. 4-H youth were trained as 4-H Food Fitness Ambassadors to work with 4-H professionals to present Get Moving-Get Healthy at county fairs, community health fairs and educational programs. Family Fun Nights were implemented to engage the entire family in nutrition lessons and physical activities. Adult and youth have engaged in the Walking Point to Point program. Collectively survey results document that participants have increased their consumption of fruits and vegetables, whole grains and low-fat dairy products; decreased consumption of sugared beverages and high fat and sugar foods; correctly identified appropriate portion sizes; increased physical activity; and increased the number of family meals eaten together.

*Formula Grant: Smith-Lever and Hatch*

**University of Florida Extension** 4-H Life Skills programs enrolled 133,280 youth in science, engineering and technology programs with 74,000 youth focused on biological, environmental and plant sciences; 135,213 youth were educated through participation in citizenship and civic engagement experiences and another 37,532 were engaged in healthy lifestyle educational programs during 2009-10 program year. As a result of these 4-H programs 87.9% reporting change in knowledge; and 76.7% reporting changes in behavior/practices. 4-H educational programs often provide added benefits and life-changing impact to the more than 13,000 adult volunteers or classroom teachers.

*Formula Grant: Smith-Lever and 1890 Extension*

A NIFA funded study in **Virginia** found that the fatty acid composition of the grape, apple, and tomato pomace was similar to previous studies of respective oil and flour extracts. Grape pomace extract had the highest antioxidant activities in all tests followed by the apple pomace and tomato pomace. Anti-proliferation effects against certain types of human colon cancer cells and human liver cancer cells were significant and correlated to antioxidant activities. Grape pomace extract had the strongest anti-proliferation effects followed by apple pomace and tomato pomace. The

results from this study suggest possible food applications for grape pomace in health promotion and disease prevention through improving human nutrition.

*Formula Grant: Evans-Allen*

NIFA funded researchers at the **University of Missouri** have developed a soy product that looks, feels, pulls apart and, most importantly, chews like real chicken. Using an extrusion cooking process, color, flavor and fiber are added to the soy protein isolate (SPI) to produce a food product with the taste and texture of white chicken meat. This new food product will provide people with a healthy alternative to meat and can be useful in the fight against obesity. Soy analogs provide important bio-active components, such as isoflavones, which help maintain healthy bones, and prevent prostate, breast and colorectal cancers. Soy foods are also a good source of essential fatty acids and contain no cholesterol.

*Formula Grant: Hatch*

Scientists at **Ohio State University** investigated three factors that may influence childhood obesity - eating dinner as a family, getting adequate sleep, and limiting their weekday television viewing time. This is the first study to assess the combination of all three routines with obesity prevalence in a national sample of preschoolers. In a large sample of the U.S. population, the study showed that 4-year-olds living in homes with all three routines had an almost 40 percent lower prevalence of obesity than did children living in homes that practiced none of these routines. The researchers suggested that adopting these three household routines could be an attractive obesity-prevention strategy for all families with young children, especially because these routines may benefit children's overall development.

*Formula Grant: Hatch*

In **Missouri**, 62% of adults and 32% of youth are overweight or obese. Poor eating habits and physical inactivity also contribute to chronic health problems. Programs must provide adults and youth with the knowledge and skills needed to promote healthful eating and develop a lifelong interest in physical activity. Over 10,000 nutrition, health and physical activity programs were conducted through EFNEP, SNAP Ed and general **Extension** programming throughout the state of Missouri. Ninety-one percent of program participants reported that they were more aware of the benefits of healthy eating behaviors and increased physical activity.

*Formula Grant: Smith-Lever*

The “Show Me the Ropes” program in **Missouri** has cultivated a positive atmosphere where young people are taught the basics of healthy eating choices and nutrition. EFNEP offers individual and family nutrition education, recreational and fitness programs. LUES students are taught healthy lifestyles and leadership skills while being active. Participants have learned basic and advanced skills in a health activity which promotes longer life by increasing cardio vascular efficiency, muscle tone, endurance, and agility.

*Formula Grant: 1890 Extension*

Communities are expressing more and more that they want their youth to learn more and have opportunities for healthy food and other lifestyle choices. By providing education, programs and experiences that promote healthy behaviors, 4-H programs through the **University of Missouri Extension** can help youth, adults and families integrate healthy behaviors, which include physical, mental and emotional well being, into their everyday lives. Forty-five youth are well

positioned to make healthy food and fitness choices by attending Camp Food and Fitness. A survey completed immediately following the event. Eighty-nine percent of the youth indicated they learned healthy food choices, 84% indicated increased knowledge of food safety procedures, and 100% of the youth completed a Healthy Lifestyle Plan.

*Formula Grant: Smith-Lever*

In **North Carolina** eighty seven counties emphasized the Healthy Eating, Physical Activity and Chronic Disease Risk Reduction Initiative. As snapshot of impacts include: 27,841 youth increased their knowledge of the importance of fruits and vegetable consumption; 16,252 youth increased their skills in selecting and preparing healthy meals and snacks at home; and 12,254 youth reported an increase in their knowledge of the importance of reducing risk factors for chronic disease

*Formula Grant: Smith-Lever and 1890 Extension*

## **NIFA PRIORITY: CLIMATE CHANGE**

*Related Themes: Environment, Forest & Forestry Management, Natural Resources*

Because of concern about ground water contamination from the use of pesticides, **Idaho Extension** worked with NRCS to allow for cost share dollars to be spent on two IPM practices; scouting and the use of biofumigants or green manure crops. 10,850 acres in Idaho had these two IPM practices implemented for the purpose of protecting the resources, mainly water quality. Of these acres, 75% grew green manure crops as a replacement for synthetic soil fumigant pesticides, resulting in a reduced use of pesticides, and a positive impact for cleaner ground water.

*Formula Grant: Smith-Lever*

One hundred and six Master Gardeners, funded by the **University of Maryland** and **University of Maryland – Eastern Shore**, learned the importance of water quality and how it can be maintained and improved during Bay-Wise Advanced Trainings. In end of class evaluations, 91% of Bay-Wise Master Gardeners said they would attract more beneficial insects to their landscapes, 99% would recycle yard waste, 91% would conserve water, and 100% would mow higher to reduce weeds as a result of taking the class. Thirty-two of these Bay-Wise Master Gardeners had their home landscapes certified as ecologically sound demonstration sites in their own neighborhoods and pledged to encourage others to do the same.

*Formula Grant: Smith-Lever, Hatch, and Evans-Allen*

As a result of a **Missouri Extension** educational effort, about 250 landowners (affecting more than 30,000 acres) participated in Master Wildlife Programs and educational workshops. Over 90 percent of the participants indicated an interest in improving habitats for game species (including white-tailed deer, wild turkey, bobwhite quail, waterfowl) and developing lease-hunting opportunities on their property, resulting in approximately \$250,000 in economic benefit.

*Formula Grant: Smith-Lever*

Because Mississippi has no licensed facility in which to dispose of hazardous agricultural pesticide waste, **University of Mississippi** faculty coordinated and conducted five agricultural waste pesticide disposal programs for farmers through the Mississippi Waste Pesticide Disposal Program. A total of 103 farmers in 36 Mississippi counties participated in the five events. As a result, a total of 232,122 pounds of waste pesticides were collected and properly disposed of out of state by a licensed hazardous waste contractor. In addition to the water quality and environmental benefits, the programs collectively saved participating farmers \$185,600 in direct waste pesticide disposal costs that would have resulted in the absence of the program.

*Formula Grant: Smith-Lever and Hatch*

Currently proven technologies and management practices have 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 in Nebraska. In addition, for every acre-inch of water not pumped, we benefit from 55 pounds of reduced CO<sub>2</sub> emissions creating a current potential for a 490,000 tons of reduction in CO<sub>2</sub> emissions. Participants in a NIFA funded **University of Nebraska** program estimated that the skills gained during the educational experiences would allow them to reduce water use between 1.4 and 2.6 inches of water per acre.

*Formula Grant: Smith-Lever and Hatch*

A three-year study out of **Oregon State University** on plant growth hormones to control leader growth was completed. A 24C label for leader control in Christmas trees via a hormonal growth compound, Sucker Stopper, was granted by the Oregon Department of Agriculture for official use. Over 150 Christmas tree growers attended technology transfer meetings and field tours to help them understand use of this new growth control method. Potential annual savings to the Oregon Christmas tree industry for this new innovation are up to \$1.5 million per year.

*Formula Grant: Smith-Lever*

The **University of the Virgin Islands Extension** is working with the Magens Bay Authority (MBA) to recommend the adoption of various best management practices (BMPs) to promote improved environmental management planning in Virgin Islands Territorial Parks. Based on CES recommendations, MBA agreed to fence off additional sensitive vegetated areas at Smith Bay Park and Magens Bay. Improperly cleared areas of berm are recovering. MBA now routinely consults CES before clearing, disturbing, or planting coastal vegetation.

*Formula Grant: Smith-Lever*

**Washington State University Extension** programs impacted almost 500,000 acres of forested lands improving stewardship and reducing fire hazard to rural communities. An additional 67,500 acres of range land was put under higher levels of management saving owners up to \$6 million. Coastal counties saw some significant changes in invasive species reductions that are having major economic impacts to the shellfish industry.

*Formula Grant: Smith-Lever*

The invasive species Dalmatian toadflax once threatened over 1 million acres of rangeland and was spreading exponentially. **Washington State Extension** faculty worked with local tribal officials to release a bioagent. The biocontrol has been very effective and has largely arrested or

reversed the spread of the invasive species. The alternative process would have resulted in expenditure of \$5,879,480 to achieve similar control with chemical herbicides.

*Formula Grant: Smith-Lever*

**Minnesota Extension** partnered with Minnesota's Departments of Agriculture and Natural Resources, as well as the U.S. Department of Agriculture, and the National Plant Diagnostic Network, to develop the Emerald Ash Borer (EAB) First Detectors Program to identify the first incidence of EAB in Minnesota. The first confirmed infestation of EAB in Minnesota was discovered on May 13, 2009 by a tree service company that participated in Extension trainings. The detectors took all established steps to report the finding, and as a result the USDA confirmed the EAB detection within just 24 hours. Both federal and state quarantines were established immediately. This was one of the earliest EAB detections in the country. Most happen 5 - 6 years after introduction; Minnesota's was at year 3. Other states have contacted Minnesota with interest in replicating its trainings and procedures.

*Formula Grant: Smith-Lever*

**Western Sustainable Agriculture Research and Education (SARE)** is NIFA funded to educate and help the agriculture industry become more profitable, protect natural resources/the environment, and improve the quality of life for producers and consumers. The number of separate SARE-impacted farms and ranches which increased profits and/or reduced costs was documented as at least 1,452, with adjacent farms and ranches totaled over 3000, impacting 4,178,000 acres. Of these farms and ranches, 82% reported sustained usage of the research-based idea or practices tested. Finally, across the 5-year life-span of this Cooperative Agreement, and across the entire Western Region, there was a positive economic impact of over \$500 million.

*Formula Grant: Smith-Lever and Hatch*

**Lincoln University of Missouri** supports educating stakeholders and target audiences about the relationship between soils and soil properties to reduce greenhouse gas emissions. Numerous workshops and presentations were given to help educate the target audience. Tests were conducted to evaluate in situ phosphate treatment of contaminated soils. Samples were taken from abandoned mines and one stream for further analysis to help determine level of contamination and impacts to ground water. The results produced a better understanding of the relationship between soil properties and greenhouse gas emissions. The target audience has been informed about these environmental issues and the complex interaction between natural ecosystems and human practices, as well as advised on better management practices and conservation practices.

*Formula Grant: 1890 Extension & Evans-Allen*

One of the challenges of global climate change is it has highlighted how much we still don't know about global plant ecology. Developing that basic information is critical to finding ways to respond to environmental change in ways that sustains the environment. **University of Minnesota** forest research has discovered universal rules of leaf design and the scaling of plant physiology from seedling to tree, from cell to ecosystem, and from the stand to the globe. The research radically improves the understanding of and ability to predict land ecosystem responses

to global environmental changes. This includes responses of forests and grasslands to biodiversity loss, carbon dioxide emissions and climate change.

*Formula Grant: Hatch*

As concern about the rising carbon dioxide levels in the atmosphere increase, there has been a search for natural solutions. One of those is the carbon sequestration potential of forest land. **University of Minnesota** forest biology and ecology research analyzed North American forest plots and found a highly limited capacity for carbon sequestration. The analyses of the limits to carbon sequestration potential is helping to alert government agencies to the danger of attempting to build state greenhouse emissions reduction strategies on the back of forest sequestration. Instead, the research indicates that more economically beneficial and realistic means of conserving fossil fuels and of developing alternative energy sources should be targeted.

*Formula Grant: Hatch*

Increasing atmospheric CO<sub>2</sub> may lead to global warming and other climate changes. The **University of Nevada, Reno's** investigation team has determined the effect of elevated CO<sub>2</sub> on key physiological processes that affect primary production in an intact Mojave Desert ecosystem. Arid ecosystems are some of the most important biomes globally on a land surface area basis, are increasing in area at an alarming pace, and have a strong coupling with regional climate. These water-limited ecosystems also are predicted to be the most sensitive to elevated CO<sub>2</sub>, in part because they are stressful environments where plant responses to elevated CO<sub>2</sub> may be amplified. Results from the University's work at the Nevada Desert FACE Facility have provided significant insight into the complex responses of an intact desert ecosystem to elevated CO<sub>2</sub>. This project is helping land managers and ecologists understand the structure and function of desert ecosystems and how elevated atmospheric CO<sub>2</sub> will affect the structure and function of desert ecosystems. It is also providing guidance to land managers and users on actions that will adversely affect deserts in the short and long-term.

*Formula Grant: Hatch*

In New York, demand for information and invitations for presentations from policy makers, news media and general public has grown substantially. Through the **NY Agricultural Experiment Station**, more than 40 presentations on climate change were made reaching 2870 stakeholders. Outreach has included interviews and collaboration with national and local journalists for newspaper, magazine, radio and television news media outlets and substantial interaction with state, national, and international agency staff and policy makers. A major result of this outreach was the production of multiple high-profile Congressional briefings and a poster presentation at the 2009 UN COP15 climate change conference in Copenhagen, thus entering the state into national and international dialogue and policy development regarding climate change impacts on agriculture and forestry, and cap-and-trade policy. Ongoing briefings to Congress, the NYS Farm Bureau, the NYS Agriculture and Markets, and the Department of Environmental Conservation are influencing policy development at the national and state levels.

*Formula Grant: Smith-Lever*

A key value to Vermonters is protecting the landscape that is 'Vermont' and its natural resources, especially water. Intensive land development, urbanization and agricultural production can result in erosion and storm water runoff that degrades many Vermont streams and watersheds.

The farming community has the complex job of keeping economically viable while protecting the environment. The Nutrient Management Program at the **University of Vermont** has focused on erosion control through improved cover cropping strategies and guiding farmers in developing their own water quality assessments, and nutrient management plans (NMP). Through collaborative efforts there were on-farm research/demonstration sites, more than 24 farm tours and field days, 8 workshop series, 12 single session workshops, and over 1100 consultations. As a result of cover cropping research and demonstration, over 3000 acres of cover crops have been integrated.

*Formula Grant: Smith-Lever*

### **NIFA PRIORITY: FOOD SAFETY**

#### *Related Themes: Food Processing & Quality, Food Production & Protection*

Analyses conducted by NIFA funded scientists in **Connecticut** revealed illegal residues of the insecticide pirimiphos methyl in imported cereals. Results were reported to the Connecticut Department of Consumer Protection and the US Food and Drug Administration. There were 4,553 cases of cereal products recalled nationally. These results had impact because stakeholders learned that a food security monitoring system was detecting contaminated products. The prompt recall of contaminated products prevented human illness.

*Formula Grant: Hatch*

NIFA funded **Cooperative Extension Services** around the nation has been a key provider of food safety education. For example, in Iowa, 963 people have taken ServSafe® courses through **Iowa State University Extension**. As a result, a food safety certification was awarded to 818 participants reflecting an 85% pass rate on the certification exam. Another example is in **Ohio** where 10,666 people participated in all types of food education programs in 2009. Evaluations showed they had learned new information about one or more safe food handling skills or good agricultural practices that promote safe food practices.

*Formula Grant: Smith-Lever*

During 2009, 672 food service employees became certified in ServSafe® through NIFA funded **Virginia Cooperative Extension** across Virginia. Three hundred and seventy-one restaurants, schools, daycare centers, and prisons sent employees to the program. Of those who completed feedback forms, 72% of ServSafe® respondents increased their knowledge of food safety practices. As a result of the ServSafe® program across the state, \$88,421.76 to \$727,177.92 were potentially saved from pain and suffering, reduced productivity and medical expenses (on the basis of one case of foodborne illness was prevented per food handler completing the course).

*Formula Grant: Smith-Lever*

Over 319 food handlers representing 230 food establishments completed educational workshops offered by the **Clemson University** Extension Service, and gained knowledge and skills in safe food handling techniques to reduce the incidence of food-borne illness, which reduces the likelihood of medical costs that are incurred due to food-borne illness. The food handlers had the

potential of reaching 234,232 people. Working with Child Nutrition Services, specialists have developed operational HACCP school foodservice plans, providing the Department with support and training to implement these plans. Over 90% of the participants received a course completion certificate indicating knowledge proficiency.

*Formula Grant: Smith-Lever and 1890 Extension*

NIFA funded researchers in **Oklahoma** showed that house flies regurgitate live E. coli O157:H7 onto spinach plants, suggesting that this might be an important route of contamination in field situations that interface with filth fly breeding areas. As a result of this work, at least one distributor of leafy greens is implementing wider border zones separating cow-calf operations and greens production areas in California.

*Formula Grant: Smith-Lever and Hatch*

NIFA funded researchers in **Oregon** conducted laboratory experiments on lingcod fillets by dipping them into an edible, protective coating enriched with fish oil. The liquid coating contained chitosan, which comes from crustacean shells and can be made into film for food wrapping to keep out bacteria and fungi and prolong storage life. This study found that the coating tripled the omega-3 fatty acids in the refrigerated and frozen fish when compared against the uncoated fish. Omega-3 fatty acids are essential nutrients, and research suggests that increasing them may have a number of health benefits.

*Formula Grant: Hatch*

With support from **American Samoa Community College** Combined Research and Extension, F4HN staff conducted 772 food safety workshops and demonstrations about safe food handling, storage and preparation to youth, childcare providers, WIC participants, Food Stamp clients, homemakers, and other clients. Demonstrations on the correct way to wash hands to prevent food borne illness continued to be conducted to school age children and adults. Also, 5157 program participants adopted safer food handling, storage, and preparation practices. Teachers and parents reported that more students are washing their hands before preparing family meals and consumption of food.

*Formula Grant: Smith-Lever and Hatch*

At **North Carolina A&T State University** and **North Carolina State University** Research and Extension, education and technical services were provided during workshops and one-on-one consultations with firms and individuals seeking new methods for storing, processing, and preserving food products. A number of informational brochures and marketing Web sites were developed to assist firms seeking to expand into new market areas. The primary area of interest has been in extending the shelf life of refrigerated products in order to expand the marketing area and time for distribution of food products. Fifteen firms have adopted new technologies for delivery of extended shelf life refrigerated food products. The number of value-added products developed varies by the size of firm, ranging from three to four to over 50 new products per company. The outcome has been expansion of the market for value-added food products due to use of new processing techniques.

*Formula Grant: Smith-Lever and Hatch*

Experiments at **Oklahoma State University** have shown that it is possible for E. coli 0157:H7 to internalize into spinach plants during growth. Related experiments have shown that generic E. coli can remain viable in soil used for growing spinach for several weeks. Fresh produce has potential of being sources of food borne pathogens being introduced into the food supply. A clearer understanding of how the pathogens interact with the plants could provide information to enable the food production and processing industries to better supply a safe supply of fresh produce.

*Formula Grant: Smith-Lever & Hatch*

With NIFA funding, the **University of Wyoming** conducted 56 classes ranging from ServSafe certification courses, Going for the Gold food safety classes for food service handlers, consumer food safety classes and school workshops on proper hand washing methods. One hundred percent of participants reported increased awareness and knowledge of food safety practices, 97% made at least one change in regard to cleanliness, 80% made at least one change in regard to cooling food, and 78% made at least one change related to food preparation. Additionally, 70% made at least one change related to cooking food, such as monitoring critical control points more closely.

*Formula Grant: Smith-Lever*

**Virginia Polytechnic Institute** and **Virginia State University** are recognized as a Process Authority for acidified foods, food processors who receive guidance through this program are able to file required processing documents with the Food and Drug Administration (FDA). Two hundred twenty-seven products were analyzed, submitted by 67 clients. In cooperation with NCSU and UGA, the program director helped develop new criteria, submitted and accepted by the FDA, for the evaluation of acidified foods. There was a total direct cost savings to Virginia food companies of \$92,395. This calculation does not include over 1500 phone calls and emails fielded by this office to individual Virginia residents, VCE agents, VDACS agents and VDH agents. If each client prevents just one food borne illness (using Salmonella as a low-cost basis), then the savings is \$120,186, annually. Therefore, a conservative estimate of the value of this program to Virginia is approximately \$313,211 annually.

*Formula Grant: Smith-Lever*

## **NIFA PRIORITY: GLOBAL FOOD SECURITY & HUNGER**

*Related Themes: Animal Systems, Plant Systems*

The **Colorado State University (CSU) Extension** Wheat Improvement Work Team provides 18% of the total investment in developing and promoting CSU wheat varieties. Plantings of improved wheat varieties increased Colorado farmers' farm gate income by \$12,840,000. Extension's share (18%) of this impact for the Colorado wheat industry is \$2,311,000, or about \$13.70 returned for each \$1.00 invested.

*Formula Grant: Smith-Lever and Hatch*

With NIFA funding scientists in **North Dakota** developed three barley cultivars which are recommended for malting and brewing by the American Malting Barley Association. The two-rowed malting barley cultivar Conlon was grown on 18% of the North Dakota barley acreage or 265,000 acres. Since Conlon is a malting barley, it commanded on average a \$1.25 premium over feed barley. In 2009, this resulted in Conlon generating an additional \$23 million in revenue for North Dakota growers that grew this cultivar.

*Formula Grant: Hatch*

In 2004, no-till acreage in **Oklahoma** was estimated to be 8%, approximately 20% behind the national average. The second annual No-till Oklahoma Conference (state-wide meeting) was held and attended by 275 people from the southern plains region. Two hundred thousand acres were represented at the conference and a post-meeting survey indicated an average benefit of \$15 per acre, resulting in an impact of \$3,000,000 to the no-till producers in attendance. Results from a survey sent out to Oklahoma producers indicated that 33% of the 1200 respondents practiced no-till. This is a substantial increase compared to the estimated 8% in 2004.

*Formula Grant: Smith-Lever and Hatch*

Animal scientists at the **University of Missouri**, in cooperation with scientists from **Nebraska** and **Maryland** have developed a device called the SNP chip to identify DNA markers for economically important traits in livestock, including disease susceptibility, milk production, reproduction and growth. This genomic tool significantly reduces genetic selection time for cattle from years to just a few months. Overall, it allows scientists to be more efficient and economical in their examinations of an animal's entire genome to detect variations that cause trait variation.

*Formula Grant: Hatch*

At the **Connecticut Agricultural Experiment Station**, diagnostic test results provided immediate new knowledge to stakeholders on what was causing the decline or premature death of plants. Pesticide treatments and fertilizer applications were remedies. During the past year, late blight affected tomatoes and potatoes in Connecticut. Heavy rainfall contributed to widespread crop infections. Use of fungicides in commercial fields saved crops valued at \$4,000,000.

*Formula Grant: Hatch*

With the West Virginia beef cow population at approximately 212,000, the work conducted by the **West Virginia Extension** Grassland team is providing a \$4.24 million dollar per year impact in the region and directly in West Virginia. In 2008 there were major increases in supplemental mineral costs. By taking the data provided in these studies they were able to work with feed companies and fine tune the concentration of expensive minerals in feeds resulting in a \$10 per 50 pound bag saving in pasture minerals and still meeting the nutritional needs of cattle on pasture. At least two companies used this updated approach to formulate minerals and reduce mineral cost for farmers in West Virginia.

*Formula Grant: Smith-Lever*

A NIFA funded project at **Colorado State University** has the primary goal of continuing development and enhancement of a flexible, user-friendly online decision support system for

commercial and seedstock producers of beef cattle to improve profitability through improved selection of breeding animals and better design of mating systems. A prototype post-weaning model has been developed and will be added as new genetic evaluations for time-to-finish in the feedlot are released to the beef cattle breeding industry. The two models (cow-calf and feedlot production) will be combined to give users additional options of simulation outputs. The tool will allow the producer to evaluate the effect of selection and mating decisions on profitability of the enterprise and various marketing endpoints including weaning, post-weaning, and harvest.  
*Formula Grant: Hatch*

Farmers, crop consultants, state and federal agricultural agencies, environmental agencies and groups are concerned about efficient water use and crop production. Through funding provided by NIFA, the **University of Delaware** developed and expanded an irrigation system evaluation for improving the uniformity and efficiency of agricultural irrigation systems. In addition, they designed, fabricated and tested a system for removing waste plant material from crops grown on plastic mulch, followed by a machine for the collection, cleaning and condensing (baling) of waste plastic mulch and drip tape for recycling. A patent has been obtained for the high lift plastic mower and one is expected for the plastic baler.  
*Formula Grant: Smith-Lever, Hatch, Evans-Allen, 1890 Extension*

A **University of Tennessee (UT) Extension** variety testing program facilitated farmers increase in crop yields by identifying the varieties that perform best in local conditions. Approximately 80% of the state's row crop producers utilize UT Extension variety testing data to select seed used to plant their crops. The higher crop yields resulted in approximately \$68.2 million additional income to Tennessee farmers in 2009.  
*Formula Grant: Smith-Lever*

United Nations medical personnel in Africa have recommended the development of a low cost, stable food item to be used in developing counties that is suitable for disaster feeding. NIFA funded **Ohio State University** has developed a disaster feeding product manufactured primarily from mechanically deboned turkey, whey, soy flour, and orange juice, with oil added. The product has so far tested successfully. If adopted, the feeding diet could be used in place of cornmeal which is the current diet for hospital patients in Africa. Some of the ingredients are byproducts and underpriced from a nutritional standpoint. The cost of the raw material is relatively inexpensive. The adoption of this product could have a tremendous humanitarian effect for disaster feeding, including hospital feeding, and in areas where other alternatives are not readily available.  
*Formula Grant: Hatch*

NIFA funded scientists at **Oklahoma State University** have developed genetic testing models to determine the economic value of genetic information as it relates to the genome-wide effects of improving beef tenderness via genetic marker-based selection of bulls and replacement heifers. Analyses have determined that an industry-wide strategy to select bulls in the upper 50% of genetic merit of meat tenderness would result in increased profitability (not counting genetic testing costs) of \$4.34/head for feeder cattle and \$1.54/head for fed cattle in 20 years. The present value of this 20 year selection strategy is projected to produce economic benefits of \$3.5

billion. So far, the models developed to determine the value of genetic information to optimally sort cattle have been used by a number of the largest feedlots in the U.S.

*Formula Grant: Hatch*

Arkansas is the largest rice-producing state in the USA, representing almost half of the nation's total production. In order to maintain competitiveness and sustainability, rice production efficiency (relative to inputs, costs of production, and returns) must be improved continually. The most effective way to increase production efficiency is the release of new rice cultivars that enhance yield potential. The overall rice yield potential has increased by an average of 83 lbs/acre each year. The contribution of genetic gain to this yield increase is 47 bushels/acre. Considering more than 50% of the rice acreage in Arkansas is planted to cultivars developed by the **University of Arkansas** Breeding Program, this contribution has resulted in an additional \$429 million additional farm income over this 20-year period. Four new cultivars have been released in 2009 by the University of Arkansas, which is anticipated to continue the major impact on the rice industry in the Southern U.S. Two of these cultivars appear to provide an additional 4% in yield potential (compared to similar cultivars) and it has also been determined that one of the cultivars could produced on as much as 25% of the acreage in 2011.

*Formula Grant: Smith-Lever & Hatch*

Management-intensive grazing involves moving the herd from paddock to paddock, thereby intensifying the grazing pressure on a small area for a few days before allowing it to rest for several weeks. This practice results in more even distribution of manure, more legume persistence, and less commercial fertilizer application. Management-intensive grazing therefore improves the economic and environmental status of a livestock operation. The **University of Missouri** teamed up with the Natural Resources Conservation Service to hold 27 multiday workshops for 708 producers about Management-intensive grazing. The investments in pasture improvements as a result of Management-intensive Grazing Program in the past year are likely to exceed \$5 million.

*Formula Grant: Smith-Lever*

**Texas AgriLife Extension** conducted a Master Marketer program in 2007. A survey was done 2.5 years after the initial program to allow time for adoption of new practices and to identify economic impacts. Survey results indicated participants increased understanding of risk management tools, increase their willingness to use new tools and analysis, and felt that they had increase their income by an average of \$18,929 or 3.3% of gross farm income relative to how they would have performed before going through the program.

*Formula Grant: Smith-Lever and Hatch*

A **University of Missouri Extension** NIFA funded business development program assisted businesses in securing over 88 million in increased sales and government contracts. This impact is documented through client signatures and then validated through a yearly independent research study. This increase in sales and government contracts had a direct positive impact on Missouri's businesses, economy, society, and educational system.

*Formula Grant: Smith-Lever*

A website called “Farmdoc” contains online crop insurance tools, including a premium calculator for crop insurance products and a decision tool that computes payoffs and risk statistics for representative farms in each of the counties in **Illinois, Indiana, and Iowa**. This project is substantially improving risk management decisions for crop farms in Illinois, the U.S. corn belt, and the U.S. Great Plains. The incorporation of this information into enhanced models provides farmers with an important tool to use in evaluating specific farm risk management strategies, particularly as it relates to crop insurance decisions, which have quickly become one of the most important risk management decisions made by farmers.

*Formula Grant: Smith-Lever and Hatch*

At **Purdue Extension**, the Purdue Risk Management Team developed and conducted a five-week workshop series to provide producers with the tools to determine their breakeven prices, marketing goals, marketing plans, crop insurance decisions, and leasing options with the end goal of being able to lock-in profitable margins. End of session evaluations showed the program had direct impacts on attitudes and modified risk management behavior. Over 95 percent of respondents said the workshops increased their comfort level in using risk management tools covered in the program.

*Formula Grant: Smith-Lever and Hatch*

The **University of Missouri** Business Development Program (BDP) seeks to encourage entrepreneurship strengthen/expand existing businesses and generate jobs and careers essential to the vitality to the community. This program provides a linkage between Extension's BDP and Small Business Development Center's for business training and counseling services, thereby helping communities identify existing and potential entrepreneurs. The Business Development Program reported 612 new jobs in the Extension Community Economic and Entrepreneurial Development program (ExCEED) communities along with \$13,159,991 in new investment. In addition, ExCEED community programs reported 60 new jobs, 9 business expansions, 60 new businesses and \$12,190,000 in new investments.

*Formula Grant: Smith-Lever*

At **Alcorn State University** in Mississippi, a primary area of research is on disadvantaged small farmers who often lack adequate knowledge and information about the economic impact of growing timber for profit. A series of eight educational workshops was held, focusing on Forestry Management as a means of giving the over 100 landowners an opportunity to meet their goals and objective in they relate to profiting from their small family farms. As a result of the training, it was determined that 60 percent of the farmers gained knowledge on effective business practices and Forest Management. Ultimately, this benefits them in the area of growing timber for a profit.

*Formula Grant: 1890 Extension*

**Texas A&M University's** FARM Assistance model (financial simulation strategic planning tool) was used to complete 179 analyses for producers, for demonstrations or agent planning purposes. Survey respondents show that as a result of participating in FARM Assistance, 86% claim a better understanding of the financial aspects of their operation and 86% claim an improved ability to assess the financial risks and potential impacts of strategic business decisions

they make. Participants were able to analyze their own economic situation over a 10-year planning arise in using the FARM Assistance model. Comparing the difference between the basic situation and one alternative scenario implies that producers using the program, on average, could expect a \$30,000 per year difference in net worth.

*Formula Grant: Smith-Lever & Hatch*

Producers attending in-depth workshops with **Texas A&M University** are learning the information needed to improve their risk management skills and increase their economic returns. Surveys were done 2.5 years after the initial program to allow time for adoption of new practices and to identify economic impacts. Survey results indicated participants increased understanding of risk management tools, increase their willingness to use new tools and analysis, and felt that they had increase their income by an average of \$18,929 or 3.3% of gross farm income relative to how they would have performed before going through the program.

*Formula Grant: Smith-Lever & Hatch*

A Management-intensive Grazing Program at the **University of Missouri** strategically attacks the problem of beef production costs from several angles. In addition, researchers have developed software called the "Beef Forage Systems Planning Software." This software helps producers choose forages and forage management practices that best suit their production objectives. More than 23,000 producers have adopted the techniques developed from this program, such as increasing their use of stockpiled tall fescue, which saved the state's beef producers \$27.2 million in 2009.

*Formula Grant: Smith-Lever*

Fish farmers and the Virginia AquaFarmers Network (VAN) are in need of adopting Best Management Practices. Five workshops were given through the **Virginia Polytechnic Inst. & State University** and **Virginia State University** that covered BMPs in pond production of fish (Catfish). These workshops covered feed management, water quality and fish health. Technical Assistance was provided for live fish transport for sales. VAN and other fish farmers have developed new markets in the live fish sales, especially for stocking pond and lakes for urban fishery programs. This represents around 50% of sales for fish farmers. Farmers have increase stocking by 25% to meet previous year demand. Three workshops are planned for 2010 to increase farmer's awareness of BMPs, especially water quality, for fish farming

*Formula Grant: 1890 Extension*

Organically raised products often garner a premium from consumers, enhancing producer's profitability. A team of Extension Specialists at **Virginia State University** joined forces with the Virginia Association for Biological Farming to implement the 2009 Virginia Biological Farming Conference. Over 420 farmers, USDA agriculture professionals, representatives from non-government organizations and youth attended the conference. One of the greatest benefits of this conference is the networking that occurs among these small farm families. Evaluation results indicated that the participants increased their knowledge of organic farming by participating in this program. Virginia producers reported organic sales of \$19.2 million, or about 1 percent of all U.S. organic sales.

*Formula Grant: Smith-Lever, 1890 Extension, and Hatch*

Extension specialists at **Alabama A&M University** and **Auburn University** developed and distributed to goat producers a training manual and an accompanying CD containing all of ACES numbered publications on goats and PowerPoint presentations of expert speakers. Approximately 80% of the participants felt that, as a result of the program, their knowledge base regarding herd health and parasite management, forages and pasture management, and marketing had been somewhat increased.

*Formula Grant: 1890 Extension*

NIFA funded **Southern University Agricultural Research and Extension Center** worked with profit and non-profit organizations to strengthen links between businesses and community-based organizations. This effort provided assistance to 85 small businesses with planning, market strategies/assessment, and management and assisted 22 local farmers to develop alternative enterprise initiatives. In collaboration with community organizations, 245 computers with internet access were placed in 20 locations and used by 2,406 individuals saved those users about \$88,200 in annual bills payment. Survey results indicate that 93 percent respondents gained knowledge and skills which would be useful to their organizations in areas such as grant writing, evaluation, leadership, and strategic planning.

*Formula Grant: 1890 Extension and Evans-Allen*

Four sessions were convened to review possible uses for the dead wood in Colorado. A **Colorado State University** business class was engaged to study options and present recommended business plans for dealing with blue-stained wood. Tree removal funds were secured from the State Forest Service. One logger received \$1 million for tree removal, and saved an estimated 20 jobs in the community during this winter and the coming year.

*Formula Grant: Smith-Lever and Hatch*

Extension staff at **American Samoa Community College** has identified improved vegetable cultivars that perform well in the tropics and are disease resistant. Similar to 2008, the success of the improved cultivars in the farming community is evident by the increase in the number of seed purchases, demand to order more seeds to cover the shortage of the seed supply, increase in production and human consumption, and vegetable sales. One hundred and twenty-seven farmers cultivated improved vegetable cultivars.

*Formula Grant: Smith-Lever and Hatch*

NIFA funded researchers at **Iowa State University** identified and disseminated information on how to adopt management systems to improve cost control and market access for producing cattle. More than 500 persons attended meetings about PVP and over 3000 head of cattle have been enrolled into a PVP program following the meeting. The average net income to producers for adopting such practices is \$23.16/head or a total of \$272,672.

*Formula Grant: Smith-Lever*

Growing Farms is a workshop series through **Oregon State University** Extension for small acreage farmers who are in their first five years of farming, who are intending to start a farm, or who are considering major changes to their farms. The program focuses on business planning and niche marketing. Only 20% of participants starting the workshop series had some level of a written business plan. At the end of the series, 80% created mission statements and/or written

goals, 54% created production plans, 49% created new or improved business plans, and 46% created marketing plans. Important skills and knowledge participants self reported they gained from the Growing Farms series included financial planning, risk management strategies, marketing techniques, and assessing physical resources.

*Formula Grant: Smith-Lever*

At the **University of Maine** Extension, the Apple Integrated Pest Management Program assisted growers in correctly identifying Fire Blight and taking proper sanitation measures to limit further spread. By helping apple growers identify the timing, relative severity, and control measures for Apple Scab infection periods, we helped growers achieve excellent suppression, avoiding widespread crop losses. Tree losses to Fire Blight were minimal and inoculums levels for next year's crop were suppressed. Tree fruit growers throughout Maine now understand how to prevent and manage Fire Blight infections should weather conditions once again favor this disease. While Apple Scab was able to persist on leaves, the epidemic was adequately suppressed due to early detection, leading to an excellent quality fall crop. Overall, the value of our work in identifying, preventing, and managing threats to Maine's apple crop is estimated to be a minimum of \$800,000 or five percent of a \$16 million crop.

*Formula Grant: Smith-Lever*

### **NIFA PRIORITY: SUSTAINABLE ENERGY**

*Related Themes: Bio-economics (Sustainable Bio-energy Development),  
Bio-based Products Engineering & Resources*

NIFA funded researchers at **Purdue University** have examined the basis for enhancing pretreatment of cellulosic biomass, including corn stover, wood, and wet cake for the purpose of reducing the amount of enzyme required to transform the cellulosic fractions of these materials into fermentable sugars and ethanol. This is an important development because the single major cost of cellulose conversion is the cost of the enzyme. The impact of this effort in cellulosic biofuels is to develop processes capable of cost-effectively utilizing cellulosic, agricultural residues for the purpose of production of ethanol. The work in process is enabling designs and testing of designs for large scale pretreatment and bioprocessing of cellulosic materials to ethanol. This will make a significant contribution to the energy security of the U.S. as well as providing products for other agricultural commodities in the state, Midwest, and the U. S.

*Formula Grant: Smith-Lever and Hatch*

Educational programs at the **University of Delaware** and **Delaware State University** on agricultural and forestry sources of biomass energy were conducted for legislators. The Governor's Energy Advisory Council concluded a 12-month effort to develop the next 5-yr. Delaware Energy Plan. UD represented agriculture & forestry interests as a member of one working group resulting in 'biomass energy' being included in the Plan as a 'high priority' recommendation for legislative change or adoption, while establishing potential economic opportunities for DE agriculture and forest landowners

*Formula Grant: Smith-Lever and 1890 Extension*

At **Ohio State University**, institutionalizing new long term initiatives requires a substantial investment in time, money, personnel, and organizational commitments. OARDC and the larger business and government community committed to research innovation in bio-based products in 2005. In 2005 the Ohio Bioproducts Innovation Center (OBIC), founded at OARDC, was created to bring together various parties to address creation of bioproducts, including bioenergy, as a replacement for petroleum based products. OBIC has brought together two of the largest industries in Ohio, respectively, agriculture and polymers, with substantial state support. OBIC's mission is to position Ohio as a leader in economic development based on the utilization of bio-derived materials and products.

With NIFA funded support from **Ohio State University**, the five year impact of the Ohio Bioproducts Innovation Center (OBIC) is the creation of an institution that is highly interdisciplinary and highly integrated, linking business, industry, government, and academia throughout Ohio to advance bioproducts research and development. Within the first five years, OBIC has received \$11 million dollars in funding, with an additional 2X match from alliance members, with over \$71 million dollars leveraged.

*Formula Grant: Hatch*

A bioenergy bus tour to Iowa and training was planned and implemented by the Field Crop AoE Team at **Michigan State University**. Materials and a Web site were developed for bioenergy. The Web site has an RSS feed that allows communication with educators and partners about current happenings in the bioenergy area. In-service trainings were also presented at North Region Ag Agents Retreat, the Bioeconomy Meeting with the MSU Product Center, and with the Biosystems Engineering Department. A follow-up survey after the bus tour found participants planned to use knowledge gains to start new ventures that included: wind, utilizing agricultural wastes, anaerobic digestion, sustainable biomass production, cellulosic ethanol, corn ethanol, and greenhouse gas reductions using bioenergy, biocomposites, solar, and biodiesel.

*Formula Grant: Smith-Lever*

NIFA funded researchers at multiple universities in **Alabama** recognize that bioenergy is a new area of research, and much knowledge still needs to be not only learned but disseminated to the scientific community to help promulgate more research. In 2009, over 50 publications were generated to help close this knowledge gap. The publications show that there is a promising trend in bioenergy research and development but that the actual application of bioenergy awaits economic testing.

*Formula Grant: Hatch and Evans-Allen*

Through NIFA funding and the **University of Georgia and Fort State Valley University**, Dalton Utilities is developing technology for biofuel production coupled with phosphorus removal. Considering the future potential of algae biofuel technology, we are currently developing novel reactor configurations and advanced technologies for nutrients and CO<sub>2</sub> delivery, harvesting and cost effective production of biodiesel, biomethane, and bioethanol from algal biomass which will reduce the cost of production leading to more rapid commercialization."

*Formula Grant: Smith-Lever and Hatch*

At **Auburn University**, **Alabama A&M**, and **Tuskegee University**, research was conducted to identify the varieties of switch grasses and other bioenergy crops. Several switch grasses have been identified as productive crops for bioenergy, along with pine trees naturally covering a large acreage of Alabama. Lotus is also being identified as a possibility that does not compete with land uses of food and feed crops. Utilization of agricultural and urban wastes as a source of bioenergy also shows promise.

*Formula Grant: Hatch and Evans-Allen*

Extension staff at the **University of Alaska** supported the development of biomass projects. Staff helped sawmill operators form a cooperative with the goal of manufacturing compressed wood bricks. Extension and USFS developed a consumer survey to rate the bricks. Other Extension-assisted biomass projects include proposed projects at Kenny Lake School and a Coast Guard plan to switch to biomass heat. A wood-heating website was updated with resources for residents, wood-heating workshops and information at two energy fairs. The website provided 24,000 views of accurate information on wood heating focused on Alaska. A biomass project in the community of Craig, which was supported by Extension, is lowering heating costs for the city.

*Formula Grant: Smith-Lever and Hatch*

**Colorado State University** has used NIFA funding to help close the knowledge gap for people interested in renewable energy and energy efficiency. This gap slows the implementation of energy efficient measures and installation of renewable energy projects. The University sponsored training, workshops, webinars, presentations, and consultations. Seventy-five percent of participants reported they gained knowledge about wind, solar, biomass/biofuel, geothermal/hydropower, and homes/community energy.

*Formula Grant: Hatch and Smith-Lever*

## MAJOR OUTCOMES BY SELECT NIFA PORTFOLIOS

### QUALITY OF LIFE IN RURAL AREAS

Too many young Americans do not have the science, engineering and technology (SET) career skills necessary to succeed and meet our country's needs in the future. With 4-H and the **University of Vermont** Cooperative Extension System's direct connection to the research and resources of the nation's 106 land-grant universities and colleges, 56 4-H club programs reported doing SET related activities. There were 4 SET related school enrichment activities and 10 Special interest programs including programs. Data collected through observation by leaders/teachers, showed that 2,192 students demonstrated improved behavior in science learning. Observers noted such things as gains in decision making, scientific process, wise use of resources, leadership, observing, predicting, collecting data and inventing solutions. In one middle school, who has used the 4-H science curriculum and tools such as the "What Makes a Great Science Experience Checklist" for going on 3 years, has seen its NECAP math scores go from below state average at 61% to 11%.

*Formula Grant: Smith-Lever*

Through **Clemson University** and **South Carolina State University** over 123 youth participated in 4-H service learning or community development projects. Youth participated in a Habitat for Humanity building project, conducted service projects for local a children's shelter and a children's home, conducted a food drive and prepared food baskets for Department of Social Services. The value of in-kind donations to youth-focused service learning or community development projects was \$16,580. Skills learned as a result of 4-H involvement are valued and can help youth to grow into positive, contributing members of society.

*Formula Grant: Smith-Lever*

**Colorado State University** The benefits of 4-H programs in Colorado have historically been communicated through anecdotes and success stories. These typically reflected the quality of the programs through the feelings of those familiar with the program, but did not demonstrate the public value of the youth development program in quantifiable measures. Little sound, research-based information was available to inform the public about the effect 4-H membership (particularly related to life-skill development, an important aspect of 4-H) has on the lives of youth. Colorado 4-H collects information from 4-Hers on a regular basis to determine the impact that the 4-H program has on its members. Evaluation instruments have been designed to capture and compile the impacts in a consistent manner. This past year, 3715 out of 4744 4-Hers surveyed (78%) reported positive changes in behavior in life skills.

*Formula Grant: Smith-Lever*

**Iowa State University** Extension, with the Southwest Iowa Coalition, the Grow Iowa Foundation, and the Wallace Foundation for Rural Research and Development developed and secured funding for the Southwest Iowa Rural Development Resource Center (RDRC). RDRC is a communication hub that brings together resources and service providers for businesses in SW Iowa. RDRC worked with southwest Iowa businesses and entrepreneurs to develop the,

Buy Iowa Online is an online marketplace for Iowa that was developed by **Iowa State University** in connection with the Iowa Rural Development Resource Center. An additional 19 small businesses/individual ventures trained to use the Buy Iowa Online Web site and loaded product for 2009 shopping season. In one month \$1,000 in sales from product sales were generated. Twenty-seven small business and individuals with product ventures were trained on Web site user technology and posted products for sale for the 2008 holiday season. Fifty-one individual enterprises and small businesses have been assisted with technology training, product pricing/packaging and image/branding procedures in order to post products for sale on Buy Iowa Online which can contribute toward heightened success for Iowa businesses and increase wealth within local communities.

*Formula Grant: Smith-Lever*

**NY State Agricultural Experiment Station** and **Cornell University** run Strengthening Families, an evidence-based parent, youth and family skills-building curriculum, developed by Iowa State University Extension (ISUE) and designed to prevent teen substance abuse and other behavior problems, strengthen parenting skills, and build family strengths. Statewide, 143 parents and other caregivers and 147 youth participated this year. Test results indicated that the program was highly successful in helping them to calm down before addressing problems with their youth, work collaboratively to solve problems together, follow through with consequences for broken rules, and view situations from their teen's perspective. Caregivers also felt that they better understood normal teenage development, spent more special one-on-one time together, and talked more often with their teens about their future goals, were more likely to show their child love and respect and spend time doing something fun together as a family. Youth reported that they were more goal-oriented, better able to resist peer-pressure, and more aware of their own stress levels. They felt they could sit down with their caregivers to calmly discuss problems.

*Formula Grant: Hatch & Smith-Lever*

Through active 4-H participation, youth learn to manage relationships, make decisions, become resilient enough to overcome risks they face, become better communicators, and serve their communities. 4-H Programs through **North Carolina A&T State University** and **North Carolina State University** reported that 64 counties emphasized the volunteerism program initiative. The volunteer programs reported that 15,706 participants indicated an increase in knowledge of volunteerism; and that over 1,598 participants served in new roles on community boards or councils. Over 4,728 participants reported aspirations to serve as new volunteers in their community. This volunteerism initiative had an estimated value to society of over \$22.8 million dollars.

*Formula Grant: Smith-Lever and 1890 Extension*

Entrepreneurship can create new businesses, strengthen/expand existing businesses and generate jobs and careers essential to the vitality of a community. Extension staff at the **University of Missouri** has facilitated training and awareness building opportunities that encourage youth and adults to consider self-employment/entrepreneurship. They have also linked with the Extension's Business Development Program (BDP) and SBDCs for business training and counseling services and have helped communities identify existing and potential entrepreneurs. Results in ExCEED communities reported 83 new businesses, 23 of which were youth-owned. The Business

Development program reported an additional 49 new businesses in the ExCEED project counties.

*Formula Grant: Smith-Lever*

Thirteen million American homes have indoor radon concentrations above the level recommended by the World Health Organization. In the North Central Region of the U.S., the Midwest Universities Radon Consortium (MURC) of the **University of Minnesota** Extension's Housing Technology Program trains and certifies the radon measurement and mitigation professionals who identify and remediate elevated radon in homes and reduce the risk of lung cancer. MURC-trained radon professionals reduced indoor radon concentrations in 35,000 homes. Using a U.S. Environmental Protection Agency (EPA) metric, it is possible to estimate that 1 life is saved annually for every 1,542 homes with elevated radon that is mitigated.

*Formula Grant: Smith-Lever*

Participants who attended 4-H military camps sponsored by **Montana State University** through NIFA funding completed evaluations that revealed: 80% learned how to communicate better with others; 74% were better able to make decisions for themselves, 64% are better able to solve problems, 78% learned how to show emotions in a good way, 60% are more confident about themselves, 54% learned how to handle stressful situations. Studies show youth who participate in 4-H are less likely to participate in destructive behavior (use of illegal drugs, smoking, drinking, etc) than non-participants. They are also more likely to succeed in school, serve in leadership roles in their schools and help others in their communities.

*Formula Grant: Smith-Lever*

## EDUCATION

Maine Agriculture in the Classroom (MAITC) program promotes an improved understanding of agriculture and natural resources among students, educators, and the general public. A **Maine Extension** staff member designed a specialty license plate that promotes Maine agriculture, a portion of the sale of which benefits MAITC. The infusion of revenue from license plate sales has enabled MAITC to hire a permanent director, develop a grants program for agricultural education projects in Maine, and begin an endowment fund for safeguarding MAITC's future. The result is a strengthened array of core programs, such as the popular Summer Teacher's Institute. Programs and agricultural curricula trainings conducted in partnership with **University of Maine** Extension faculty and staff have enabled more than 150 Maine K-12 educators and 15,000 Maine students, annually, to increase their understanding and awareness of Maine agriculture and the source of their food and fiber.

*Formula Grant: Smith-Lever*

At **Delaware State University** and **University of Delaware** educators provided training to childcare providers through conferences, presentations, and monthly workshops offered in each of Delaware's counties. It is estimated that over 12,000 children were impacted by the programs that offered. After each session, child care providers are surveyed. For almost every program

offered 90% or more of respondents indicate that they will take away at least one best practice that they will implement in their setting.

*Formula Grant: Smith-Lever and 1890 Extension*

As the meat goat industry grows and evolves, a quality assurance (QA) program is essential. Such a QA program ensures the production of a wholesome product that satisfies consumers and increases profit for the meat goat industry. One-thousand-sixty-two goat producers have enrolled in an on-line certification program developed by **Langston University** Extension specialists and 153 goat producers has been certified via the site to date. They represent nearly every state in the United States, several provinces in Canada, and three foreign countries. Knowledge gained by producers for more efficient and effective goat production can potentially result in increased profits for many of these 153 producers.

*Formula Grant: 1890 Extension and Evans-Allen*

Farm operators' understanding that sustainable management practices are environmentally, friendly, socially acceptable and economically feasible is the cornerstone of keeping farm operations viable. Extension agents and specialists at **Prairie View A&M University** Extension work one-on-one in an intensive manner during workshops and educational sessions with small farmers and landowners to ensure that their operations remain sustainable. Small farmers and landowners improved their skills and business operations. They now report being more economically viable, socially accepted, and environmentally friendly.

*Formula Grant: 1890 Extension*

In cooperation with regional and state-wide industry associations, the **Ohio State University Extension** greenhouse team personally visited over 150 greenhouse operations in Ohio and reached nearly 485 individuals through workshops, tours and other programs specifically geared for producers. Educational programs and materials focused on how to properly rotate fungicides and insecticides, use of disinfectants, alternative fertilizer methods, improving energy efficiency of greenhouses, and how to detect and avoid ethylene contamination in the greenhouse.

*Formula Grant: Smith-Lever*

## DEFINITIONS

***Knowledge Areas (KAs)*** – A subject content classification scheme for use in characterizing federally-funded, NIFA-administered research, education, and extension activities for the purpose of enabling budget and accountability reporting and integration.

***State Planning Unit*** – One or more institutional entities that make up a single State Plan of Work. This could be any combination of 1862 and 1890 State Land Grant University Research and/or Extension entity in a single State.

***Portfolio*** –A portfolio is a set of continuing, NIFA-funded activities broadly focused on a current and/or emerging issue of societal importance and serves as the foundation for agency planning and evaluation. A portfolio is operationally defined by a unique set of primary knowledge areas (KAs) supplemented by secondary KAs that may be shared with other portfolios.