FINAL REPORT

THE OHIO STATE UNIVERSITY EXTENSION:

A GENERATOR OF POSITIVE ECONOMIC IMPACTS FOR OHIO

PREPARED FOR:
The Ohio State University Extension

PREPARED BY:
Technology Partnership Practice
Battelle

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Battelle
The Business of Innovation

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Executive Summary

All Ohio universities engage in research and teaching; but, The Ohio State University (OSU), as one of the nation's more than 100 land-grant colleges and universities, has a third critical mission—extension. "Extension" means "reaching out," and OSU—along with teaching and research— "extends" its resources, solving public needs with university-based intellectual capital through a myriad of activities.

Congress created the extension system nearly a century ago to address exclusively rural, agricultural issues. At that time, more than 50 percent of the U.S. population lived in rural areas, and 30 percent of the workforce was engaged in farming. Extension's engagement with rural America helped make possible the American agricultural revolution, which dramatically increased farm productivity.

Despite the sharp decline in the size and economic prominence of rural America, on which the nation's original extension activities primarily focused, OSU Extension remains an important component of Ohio's economic development and social well-being activities. By adapting to changing times and landscapes, OSU Extension continues to remain relevant by addressing a wide range of human, plant, and animal needs in both urban and rural areas.

Today, OSU Extension focuses on a wide array of critical issues affecting people's daily lives and the state's future. The advanced research and educational technologies they support empower people and communities to solve problems and improve their lives. Specifically, Extension works to improve the quality of life for all Ohio citizens by helping to

- Improve agricultural profitability and productivity
- Create new products
- Protect animal and plant health
- Promote sound human nutrition and health
- Strengthen children, youth, and families
- Revitalize Ohio's communities.

Through these activities, OSU Extension has a substantial track record in contributing to Ohio's overall quality of life and positively impacting the economy of the state. As "knowledge" and intellectual capacity become the foremost drivers of modern economies, it is likely that university extension activities will grow in their central importance to economic progress. Strengthening the lives and communities of Ohio through research-based educational programming (activities at the core of OSU Extension's mission) are keys to the long-term competitive sustainability of Ohio's high standard of living. The degree to which OSU Extension's work has, and is, contributing to the economic progress in the State of Ohio is the subject of this report.

OSU Extension – A Generator of Positive Economic Impacts for Ohio

As an operating entity, irrespective of the benefits of its transfer of scientific knowledge and functional expertise, OSU Extension generates a significant economic impact for the State of Ohio. Extension receives funds from the federal government, extramural funding sources, industry contracts, and allocations from the State of Ohio—and it invests these funds in human capital, resources, and infrastructure to benefit the state. In turn, the expenditures of Extension and its faculty and staff within Ohio, in and of themselves, become a significant generator of economic impact. Analysis by Battelle of Extension's direct and indirect expenditure impacts, using input/output analysis, shows that on an annual basis OSU Extension generates the following impacts:

- **$159 million in total Ohio economic output (sales),** comprised approximately evenly between direct and indirect economic output.
- The operations of Extension also support **1,918 jobs in Ohio,** comprising 1,150 direct jobs and a further 768 jobs generated in the Ohio economy via the employment multiplier effect.
- Extension direct and indirect employment generates **personal income for Ohio residents amounting to $64 million annually.** This is divided between direct Extension income of $41.3 million and indirect income of $22.7 million.
- While state government is an important funder of OSU Extension operations, it also receives revenue cycled back to the state through Extension generated taxes. OSU Extension directly and indirectly generates **$4.8 million in annual tax revenues.**

These are simply the impacts realized by the annual expenditures of OSU Extension and its associated faculty and staff, and the follow-on multiplier effect of these original direct expenditures. The full impact generated by Extension's programs and activities is, or course, far larger, but also much more difficult to quantify.

The Impact of OSU Extension's Programs and Activities

Extension was founded and is sustained to meet the goals laid out in the original Smith-Lever Act of 1914, as follows:

> *Cooperative agricultural extension work shall consist of the development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies in agriculture, home economics, and rural energy, and subjects relating thereto to persons not attending or resident in said colleges in the several communities, and imparting information on said subjects through demonstrations, publications, and otherwise and for the necessary printing and distribution of information in connection with the foregoing; and this work shall be carried on in such manner as may be mutually agreed upon by the Secretary of Agriculture and the State agricultural college or colleges or Territory or possession receiving the benefits of this Act*[1].

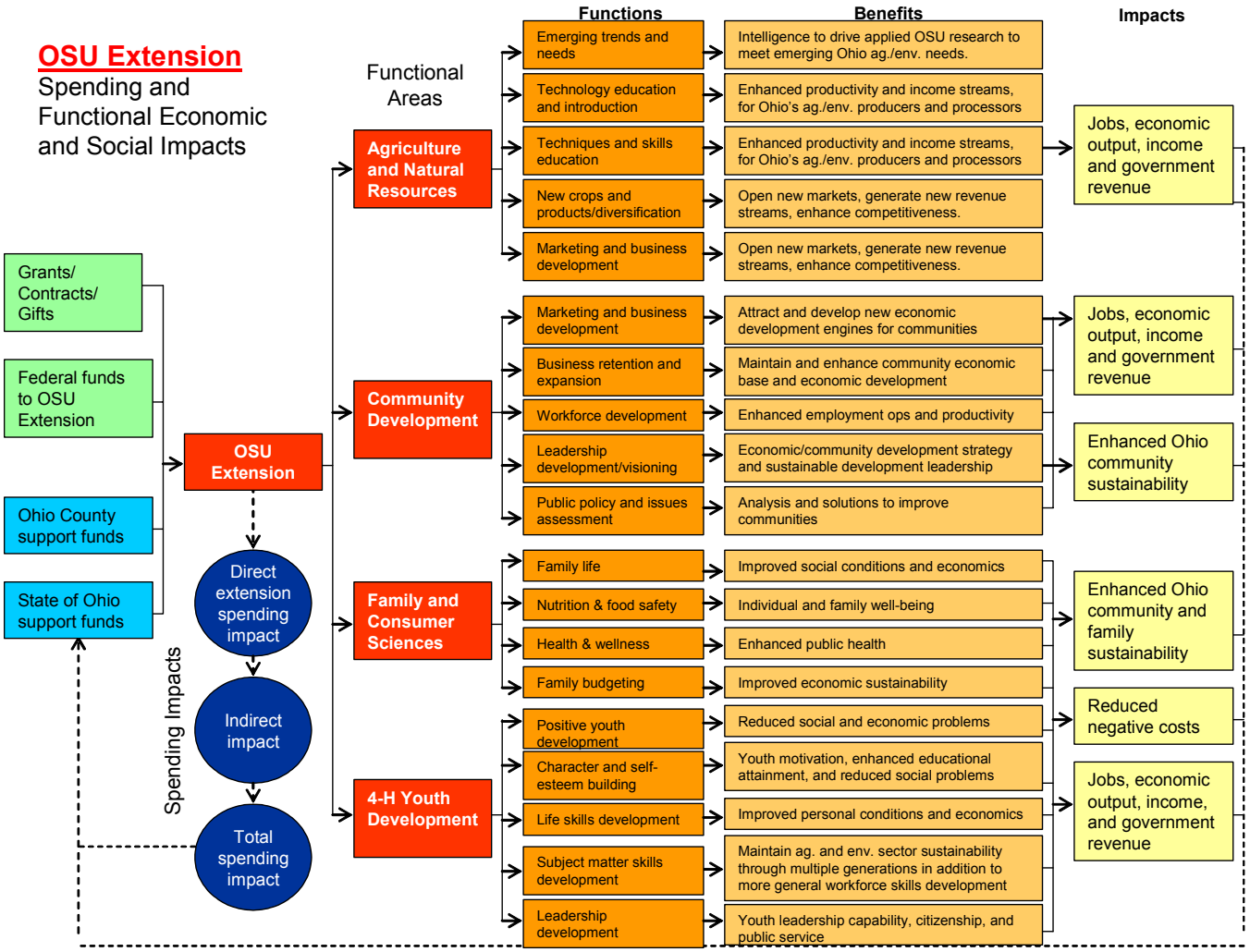
[1] Smith-Lever Act. Section 2. 1914.

As the Act makes clear, Extension is a pragmatic organization dedicated to diffusion of research knowledge and practical training and skills development for Ohioans. Thus, Extension is **purposely designed to produce positive economic and social impacts** for the State of Ohio—impacts that include the following:

- Enhanced productivity and profitability for Ohio agriculture and business enterprise
- Expanded product lines and new business generation to increase Ohio's economic output
- Enhanced state and local government revenues through expansion of the Ohio economy
- Increased employment opportunities and enhanced workforce skills
- Improved social conditions and quality of life for residents of urban and rural Ohio
- Protection of Ohio's environment and the promotion of sustainability in the state
- Protection and promotion of the health of Ohioans.

These impacts are categorized as "forward linkage impacts" which, rather than being related to institutional spending, are related to institutional mission and function. These impacts constitute a broad and multifaceted array of positive economic and social impacts for Ohio. The principal Extension functions and associated impact benefits are illustrated in Figure ES-1.

Figure ES-1: The Scope of OSU Extension Impacts

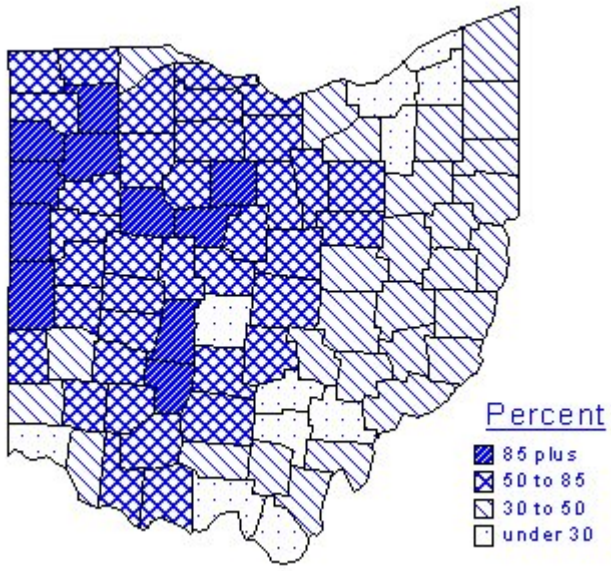


The forward linkage impacts of OSU Extension are delivered through four primary functional areas of service: (1) **agriculture and natural resources,** (2) **community development,** (3) **family and consumer sciences**, and (4) **4-H youth development**. Each of these four primary areas of activity contains multiple programs and initiatives that build and sustain Ohio's economic and social well-being. The following narrative illustrates the size and scope of impacts that the program and activities of OSU Extension engenders in the state.

Agriculture and Natural Resources Impacts

Agriculture is big business for the Ohio economy, comprising a vertically integrated system of *products and services for farms;* leading to *farming and associated agricultural production;* leading to *agricultural processing* and *food, fiber, and other processing industries;* culminating in *wholesale and retail distribution*. In terms of agricultural production in 2002, Ohio contained 78,000 farms covering a total of 14.7 million acres (56 percent of Ohio's total land area). The sector is present in every Ohio county (Figure ES-2).

Figure ES-2: Geographic Distribution of Farm Land in Ohio



Source: Ohio Department of Agriculture.

Within the rapidly changing and highly competitive global marketplace, Ohio's agriculture and related industries must operate at peak competitive efficiency—and must do so in a uniquely unpredictable production environment impacted by such significant and wide-ranging variables as

- Climatic conditions, including rainfall, amount of sunlight, high and low temperatures, etc.;
- The waxing and waning of bacterial, fungal, and viral diseases and pathogens;
- The control of insects and other pests;
- The maintenance of optimal soil fertility, drainage, and retention; and

- The impact of these variables on farmers in other regions, countries, and continents whose production will affect commodity prices and the Ohio farmer's return on investment.

Those working in these highly competitive sectors do, however, have a professional resource in Ohio to which they turn for advice, analysis, and access to the very latest in applied research—OSU Extension. Extension serves every county in Ohio, providing local, on-the-ground, applied OSU services and a full-service gateway to the intensive intellectual and R&D resources of the University, the OARDC, and its branch research stations. Through Extension, those in agriculture and related industries have access to state-of-the-art research, education, and training—access that introduces new crops, value-added products, and production technologies; improves production and processing efficiency; reduces losses to environmental and disease threats; and enhances marketing strategies and management skills.

Battelle Calculates the Impact of a 1 Percent Increase in Ohio's Agricultural Output

Extension clearly provides a diverse range of product development, technology transfer, training, education, and advisory services for Ohio's agricultural sector—but, what overall effect might this have? One way to generalize the potential for positive impacts on Ohio is to calculate the impact on the state of a 1 percent increase in agricultural output. Then, the output impacts for various estimations of OSU Extension impacts can be produced.

Using IMPLAN input-output data, Battelle calculated that **a 1 percent increase in agricultural output in Ohio has the following impacts:**

- **$149 million in direct and indirect output**
- **$29 million in personal income generated for Ohioans**
- **2,712 jobs created.**

It should also be noted that expansion of the agricultural sector has benefits that can be felt in every county in the state. Agriculture and associated processing industries are highly diffused across every Ohio county and, therefore, the direct and indirect effects of expansion in the sector are felt much more widely that would be the case with more narrow, geographically focused sectors

Agriculture and Natural Resources provides research and educational assistance to help individual farmers, gardeners, landowners, and businesses learn new ways to produce income through alternative enterprises, improved marketing strategies, and management skills and improve productivity through resource management, controlling crop pests, soil testing, livestock production practices, and marketing. In addition, with an emphasis on natural resources, this functional programmatic area teaches landowners and homeowners how to use natural resources wisely and protect the environment by providing programming in water quality; by protecting streams and watersheds; and by encouraging woodland management, composting, lawn waste management, and recycling.

Specific emphasis is placed on developing programming that focuses on

- Strengthening businesses;
- Adopting new technology; and
- Improving efficiency while protecting the environment.

OSU Extension, through its Agriculture and Natural Resources activities, continually strives to identify the most efficient means to deliver timely, research-based information and educational

programs to its diverse clientele and stakeholders. Agriculture and Natural Resources' focus has been to network closely with respective Ohio and national commodity groups and farm, horticultural, and environmental organizations to be able to assist stakeholders in maximizing profitability while minimizing the impact on the environment.

To this end, Agriculture and Natural Resources has focused on the formation and development of interdisciplinary commodity/issue-focused teams composed of county, center, and state extension and research faculty to address the current needs faced by Ohio producers and agbioscience industry. Currently, 24 Agriculture and Natural Resources Teams have been formed and include a myriad of concerns including the following:

- Ohio Agronomic Crops
- Nursery, Landscape, and Turf
- Sustainable Agriculture
- Precision Agriculture
- A variety of livestock, including beef cattle, dairy, poultry, sheep, and swine
- Waste Resource Management
- Watershed Networks.

Knowledge Diffusion Impacts

Extension specialists provide a wide variety of knowledge diffusion and education services. These educational and training initiatives have the potential for substantial impacts. Livestock, for example, represented a $1.9 billion industry for Ohio in 2001; but, it is threatened by severe losses through disease outbreaks. **OSU Extension is at the frontline of training farmers in disease prevention, awareness, and treatment, helping to suppress disease-related losses that currently average 17 percent of production costs in livestock nationwide.**

OSU Extension's Ohio Agronomic Crops Network similarly works to positively impact the knowledge and expertise of crop producers in the state. **The CORN Web site receives an average of 58,000 hits per month** and is instrumental in apprising Ohio producers of current disease and pest risks, diagnoses, and associated actions. One study in 2001 found that **weed control recommendations provided by Extension resulted in increased corn yields of more than 2.5 million bushels and a 1-million-bushel increase in soybean yield.**

In addition, the OARDC and OSU Extension provide an integrated service to research, develop, test, and introduce new and enhanced crops and products for the agricultural sector in Ohio. Services range from development of enhanced strains of existing crops (having enhanced disease resistance, increased yield and quality characteristics, for example) to the introduction of completely new crops, livestock, and value-added products. Currently, Ohio farmers are seeing income increased through enhanced strains of soybean, wheat, corn, tomato, and vegetable crops. In addition, diversification is being achieved through the development of aquaculture, grape and wine production, and horticulture products. In the future, research at the OARDC and OSU is anticipated to produce new opportunities in bioresource-based energy; fiber products; biopharming; and the development of chemicals, proteins, and other materials through plant and animal pathways.

The introduction of new crops and products for Ohio agriculture is no simple task. It has to be facilitated through OSU Extension's network of practitioners, scientists, and field staff who can advise producers on the best path to take, help them analyze the suitability of their land to new production requirements, evaluate the marketability and revenue potential from new or enhanced products, and plan their introduction.

Example: Dissemination of New and Enhanced Crops for Ohio's Farmers

Research by Battelle has documented the combined impact that OARDC research and OSU Extension field introductions and training have in the area of soybeans in Ohio. Soybeans are a staple crop of Ohio farming, accounting for more acreage of farmland than any other crop in the state. Soybeans are also very sensitive to regional variation in growing environment, and OARDC and OSU Extension play a critical role in developing Ohio-specific varieties and training Ohio's farmers in their application.

Since 1985, Extension has worked with OARDC in the dissemination of 19 varieties of soybeans specially adapted to thrive in Ohio growing conditions. In 1994, OSU varieties accounted for 34.5 percent of all soybeans grown in the state. In 2002, 6.4 percent of Ohio soybeans were OARDC releases, with this lower percentage resulting from the quick adoption of Monsanto's "Round-Up Ready" soybeans—currently OARDC is working on introducing the Round-Up gene into more custom-tailored soybeans better suited to Ohio's conditions. At the lowest OSU variety usage rate of 6.4 percent, the impact is still significant. **Battelle calculated that $72.5 million in direct farm output resulted from this percentage adoption, while an additional $118.5 million was generated for the Ohio economy via indirect impacts (a total of $191 million)**. Battelle also calculated the estimated impact of the enhanced productivity resulting from OSU soybean releases and found that, even at a conservative 5 percent enhanced productivity, this resulted in an average of almost $10 million per year in enhanced income for Ohio farmers during the period 1986 through 2002. In actuality, OSU varieties have achieved a 15 percent productivity increase per acre since 1985, meaning that the **positive additional revenue benefit to farmers would average $30 million annually across the state.**

OSU research has had a similar impact on a variety of other crops for Ohio's farmers. Since 1991, OSU has released 17 varieties of tomatoes and tomato germplasm—providing specialized varieties that are resistant to bacteria and well-suited to Ohio growing conditions. **In 2002, Ohio achieved 24 percent greater yield of tomatoes per acre than the national average.**

Clearly, the effects of OSU Extension on agriculture, agribusiness, and associated sectors in Ohio are many and widespread. It is neither possible nor feasible to assess the impact of each and every initiative and program provided by Extension and its individual county educators. Instead, the types of forward linkage impacts generated are considered by Battelle through examination of some specific case studies.

Example: Diversifying the Farm Product Base—OSU South Centers (Piketon)

OSU South Centers have been leading multiple initiatives aimed at diversifying the product and income base of Ohio agriculture. Particular recent attention is being paid to diversified crops, livestock, and products that will help sustain the thousands of small farms spread across Ohio. Aquaculture is one of the focus areas at the South Centers, with work on yellow perch and freshwater prawn production. In 2002 and 2003, eight private farms worked with the Centers in prawn research trials, where it was found that, over a 120-day production cycle, fresh market prawns could be produced with a market value of $10 per pound. Yellow perch is proving to be a similarly profitable crop for the multiple Ohio farms now moving into production. OSU South Centers has assumed a leadership position in aquaculture, teaching current and potential Ohio fish farmers new technology in aquaculture production, marketing, and business development.

A steadily rising demand for goat meat has resulted in Extension work to promote the rearing of meat goat herds in southern Ohio. Goats can thrive on low-quality forage, bringing marginal farmland into profitable use. In 2004, approximately 250 southern Ohio farms began to raise meat goats for supplemental farm income.

Example: Ohio Berry Production

A number of trends have favored a movement to berry production on Ohio farms, with steady growth in the industry experienced since 1997. OSU Extension has been instrumental in leveraging OARDC research to assure that berry farmers in Ohio have the knowledge they need to plant the best varieties of berries for Ohio soil and climate conditions. In the case of crops such as blueberries, being among the first to market is important for achieving a premium price. Ohio's berry farmers now have the varieties they need to harvest earlier than other leading producers in Michigan and on the East Coast.

Recent data on the health and anticarcinogenic properties of berries are leading to an increase in demand, and berry crops are proving to be suitable for replacing tobacco and other products experiencing declining demand. Since 1997, Ohio has seen a steady increase in the acreage of farmland moving into berry production (including strawberries, raspberries, blackberries, and blueberries). In 1997, strawberries were grown on 801 acres in Ohio, and by 2003, this had increased to 1,300 acres. Similar growth was experienced in raspberries (245 acres in 1997 increasing to 427 acres in 2002), blackberries (56 acres in 1997 rising to 163 acres by 2002), and blueberries (200 acres in 1997 rising to 295 acres by 2002). OARDC and OSU Extension have helped Ohio's berry producers focus on quality as a means to achieving a price premium over competing berries. A 2001 survey found that Ohio raspberry producers, for example, were receiving between $2.55 and $3.25 per pound for their raspberries, versus the traditional Washington and Oregon growers who received between $0.45 and $1.39 per pound.

Community Development Impacts

While 56 percent of Ohio's surface area is agricultural land, 44 percent is dedicated to other state, community, and commercial uses. OSU and OSU Extension are also active researchers, service providers, and development advisers for this nonagricultural land area. OSU Extension's community development work helps local governments and communities investigate and create viable options for economic and community development. From small rural communities to Ohio's largest cities, OSU is active in the applied delivery of service and assistance.

While the American economy is firmly rooted in free enterprise, this competitive system, by its very nature, produces extremes of success and failure. Just as the 19th and 20th centuries saw a powerhouse industrial nation emerge from an agrarian societal base, so too is the 21st century bringing dramatic change as the economy shifts to an information- or knowledge-based, technologically driven platform. As economic adjustments take place, some communities immediately prosper; but, many others face great challenges in altering their economic base and structure to fit into the New Economy.

OSU Extension plays an important role in helping communities adjust to changing economic conditions. Through multiple initiatives (in new business development, business retention and expansion, production of development strategy, marketing and community promotion, workforce development, public policy assessment, and leadership development), OSU Extension provides development assistance to communities in every Ohio county.

Community Development helps local business communities, current and emerging community leaders, and elected and appointed government officials investigate and create viable options for economic and community development by

- Increasing the knowledge base for individual and community decisions;
- Developing clientele skills necessary to help achieve their individual and community goals; and
- Helping create an inclusive decision-making environment.

For the State of Ohio, this leads to improved job creation and retention, small and medium-sized business development, workforce education, and improved land-use planning. Specific programmatic elements that have been developed by the Community Development educators include the following:

- Land-use and comprehensive planning programming that focuses on providing education and training to county land-use planning committees as they prepare a Comprehensive Land-Use Plan.
- First Impressions programming that helps community leaders assess the impact of their development efforts and take necessary actions to improve their image to first-time visitors.
- Local Government Leadership Academy designed as a 10-session program targeted toward local elected and appointed government officials. Each session

Land Use Development and Comprehensive Planning

Counties where OSU Extension has been active, during the past 3 years, in the delivery of education and training for land use development and comprehensive planning include the following:

- Adams
- Brown
- Carroll
- Columbiana
- Crawford
- Coshocton
- Fayette
- Fulton
- Highland
- Huron
- Lorain
- Marion
- Morrow
- Noble
- Portage
- Van Wert
- Wyandot.

incorporates a curriculum designed to enhance leadership and decision-making skills in the public sector.

- Ohio Business Retention and Expansion Initiative that provides resources, training, and tools to assist communities in monitoring and assessing their local economy in order to pursue economic development actions and planning. Since its establishment in 1986, the OSU Extension–sponsored BR&E initiative has provided assistance to more than 120 Ohio communities.
- The Food and Agricultural Technology Commercialization and Economic Development Program (ATECH) that fosters and accelerates economic development as a result of university research at OARDC and Extension programs with a primary focus on food, agricultural, environmental, and life science technologies.

Successful BR&E Initiatives in Ohio

Carroll County

The Wingfoot Film Corporation decided to reinvest $7 million and add a new product line at its existing Carroll County site rather than at an out-of-state site. The expansion added 25 jobs to the existing 115 to 120 employees.

Jefferson County

When it lost its largest customer, a Jefferson County business needed to diversify its lines and find new markets. The business was awarded a grant from the Ohio Department of Development's Ohio Industrial Training Program to cover some of the retraining costs. Probable layoffs among the existing 35 employees were avoided, and nine new jobs were created.

Putnam County

Philips Display Components, the county's largest manufacturing employer, with 2,041 employees, was offered an enterprise zone and incentive package on its $24 million expansion project. As a result, the business made a 10-year commitment to stay in the community at its 40-year-old site. The BR&E survey identified expansion of 13 manufacturing businesses and the creation of about 300 new jobs. Following the BR&E program, the county attracted a Canadian freezer manufacturer (creating 130 new jobs) and a Japanese-U.S. joint-venture steel-galvanizing plant.

Some specific examples of OSU Extension's work impacting community development are discussed below:

Example: Incubators

OSU Extension is helping to facilitate enhanced entrepreneurship and new business development in Ohio through the development and operation of business incubator facilities. At the **OSU South Centers, the Endeavor Center** is under construction. The Endeavor Center will offer space for the operation of up to 26 entrepreneurial ventures. The Center will also provide assistance to and education and training of entrepreneurs, small business owners, existing job employees, and young graduates.

On the **Wooster Campus of OARDC**, plans are being developed to create an incubator/commercialization center, in concert with ATECH activities, to foster the creation of new businesses stemming from innovative discoveries within the agbioscience field.

Example: SBDC/MSBDC

The Small Business Development Center (SBDC) program's goal is to help existing businesses develop and retain a competitive economic advantage in the ever-changing global economy, and to help entrepreneurs successfully launch new business enterprises. SBDCs and their manufacturing-dedicated equivalent, MSBDCs, operate nationwide to enhance economic development. In Ohio, the OSU South Centers, for example, is the operator of a multicounty SBDC/MSBDC program.

Family and Consumer Sciences Impacts

One of the core elements of extension service envisioned in the original Smith-Lever Act was the *"development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies in … home economics … and subjects relating thereto."* Extension was conceived not only as a technological and educational institution for agricultural practitioners, but also a provider of resources that would strengthen American family life and communities. Today, that original vision of extension as a supporter of families is very much alive.

At OSU Extension, the Family and Consumer Sciences division operates a wide range of programs aimed at supporting and improving life across the full-range of Ohio's rural and urban communities. Urban programs aim at providing a stabilizing influence and helping achieve positive economic gains for families in low- and moderate-income neighborhoods, while Extension's work in rural communities is targeted at helping families and communities adjust to competitive pressures and social change.

Family and Consumer Sciences programs at OSU Extension are used to help Ohioans address a range of issues, including building stronger families, improving nutrition and food safety, enhancing health and wellness, and managing family budgets and financial resources.

Today, a significant area of focus for Family and Consumer Sciences is human nutrition. Increasing time pressures, dual-worker families, and societal changes have led to a shift in American dining habits. Fast-food and ready-prepared meals have gained considerable popularity with most consumers; with this shift in diet have come a range of nutrition problems and an epidemic of obesity. Fried food and fat consumption have increased, while consumption of fresh fruits and vegetables has declined. As families rely increasingly on foods prepared outside the home, traditional skills in food preparation and food safety have diminished. Food-borne illnesses are estimated to cost Ohio between $260 million and $532 million per year, while obesity-related health problems also carry substantial annual costs. Costs of these problems are borne by society in the form of increased health and insurance costs and an increased tax burden to support government-sponsored care of lower-income groups and seniors. OSU Extension works to tackle these threats and provide solutions at the individual and family level—working to improve personal nutrition and lifestyle choices with a range of consumers from prenatal children and mothers to Ohio's senior citizens. Extension is actively providing nutrition education, food safety, food preservation and preparation, and weight-management programs.

Through administering two federal programs, the Family Nutrition Program (FNP) and the Expanded Food and Nutrition Education Program (EFNEP), in addition to unique programs developed by county educators, such as Dining with Diabetes, educators are assisting Ohio citizens in acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets and in contributing to their personal development and the improvement of the total family diet and nutritional well-being. As a result of this educational intervention, participants adopt new behaviors that improve the nutritional quality of their diets, reduce the incidence of chronic disease, increase safe food-handling practices, and stretch their food dollars.

OSU Extension is also active in providing food-handling and food safety training and services for Ohio's food industry. The food processing industry in Ohio benefits from specific OSU Extension work in safety training, as do food establishments.

Examples: Food Safety Training and Outreach by OSU Extension in 2003

- **A total of 259 participants from small food and meat processing businesses** were trained in subjects including thermal processing of foods, environmental surveillance for pathogens, and the setting up and operation of formal safety programs.
- Food safety courses certified by the National and Ohio Restaurant Association and the Ohio Department of Health for food establishments were provided to **544 participants across 49 programs for the manager's courses and 583 participants across 25 programs for the employee courses.** Managers trained through the Extension courses are in a "training the trainer" program—designed to leverage their education for the training of their employees.
- **Over 250 "public service" cooks** (such as school food service personnel, catering facility managers, church cooks, etc.) completed food safety training in Lorain County, Ohio.
- **A total of 9,931 FNP recipients and 6,160 EFNEP recipients participated in food safety workshops** in Ohio.

Example: Potential Impact of Enhanced Food Safety for Ohio

Food-borne illnesses account for considerable economic costs. According to research conducted by the U.S. Food and Drug Administration, just seven of the more common food-borne pathogens cause an estimated 3.3 to 12.3 million illnesses in the U.S. in any given year and up to 3,900 deaths. If food-borne pathogens are estimated to cause illness at a proportion equal to Ohio's percent of the total U.S. population (4 percent or 11.4 Ohioans out of 288.4 million U.S. residents), there are likely to be between 132,000 and 492,000 food-borne illnesses in Ohio each year and about 156 deaths. In a 1995 study, USDA researchers estimated the negative monetary losses of these seven pathogens to be between $6.5 billion and $13.3 billion nationwide, or between $260 million and $532 million in Ohio annually.[2] The magnitude of potential costs in Ohio are confirmed in analysis by Lydia Medeiros of the OSU Department of Human Nutrition, who calculates the estimated costs from the five main food-borne pathogens in Ohio to be over $211 million annually.

OSU Extension works to lower the incidence and cost of food-borne illnesses in Ohio through the education services outlined above. Poor food handling and preparation by consumers are the primary reasons food-borne illnesses occur, and the best means to combat the threat is by providing consumers with the knowledge and skills required to positively alter their food-handling and preparation behavior. **Given the cost figures profiled above, it is evident that every 1 percent reduction in food-borne illness in Ohio would result in an estimated $2.6 million to $5.3 million in cost savings.**

[2] Buzby, J., and T. Roberts. "ERS Updates U.S. Foodborne Disease Costs for Seven Pathogens." *Food Review,* 20. Authors are economists with the Food and Consumer Economics Division, Economics Research Service, USDA.

As the 21st century moves America forward toward a knowledge- and skills-based New Economy, the preeminent importance of human capital is being recognized. Social challenges, threats to the family, and urban and rural poverty continue to reduce the capacity of many Americans to reach their full potential. For Ohio to thrive in the New Economy, it is crucial that its population have the well-grounded social net, work ethic, and support services that form a stable life platform upon which personal progress may be built. Single mothers struggling to make ends meet, educational dropouts, youth at risk, and those drawn into crime and self-destructive behavior represent valuable opportunities and human assets lost. Indeed, in many instances, these groups become costs to society. When set against this background, the work of Extension in Family and Consumer Sciences is perhaps more relevant and needed than it has ever been.

4-H Youth Development Impacts

4-H seeks to instill integrity, service, leadership, a sense of duty, and personal growth in the youth it serves. It is in these efforts that 4-H can be seen to build a basis for positive personal and societal economic impacts. Specific life skills development activities are built into 4-H projects, activities, and events with the goal of helping youth become contributing, productive, self-directed members of society. 4-H projects are designed to be in-depth learning experiences for 4-H members.

Three types of learning experiences are emphasized in 4-H youth development programs and activities:

- Hands-on (making, producing, practicing, observing, etc.)
- Organized activities (demonstrations, workshops, field trips, camps, etc.)
- Leadership/citizenship (conducting, planning, assisting, informing, organizing, etc.).

While often thought of as a rural program, 4-H serves a much broader audience. Within Ohio, 230,576 children and youth were enrolled in 4-H programs in 2003.[3] Overall, 11.7 percent of total youth in the State of Ohio between the ages of 5 and 19 participated in 4-H programs in 2003. Ohio's 4-Hers come from both rural and urban settings, with 43 percent of the youth residing in towns and cities with populations larger than 10,000. In Ohio, 28,488 4-H enrollees are from minority populations, accounting for 12.5 percent of total Ohio 4-H membership. Ohio 4-H is obviously gender inclusive, with 52 percent of 4-Hers being female and 48 percent male. One out of every six people in Ohio has been or is currently involved with 4-H youth development programs either as a member, parent, volunteer, or donor. There are currently 45 million 4-H alumni nationwide.

How effective is 4-H at reaching youth and having a positive influence in their life? This question was examined in a national survey research project of 4-H participants conducted in 2000 by a research team at Kansas State University, with oversight by a National Impact Project

[3] Fox, T. *Ohio 4-H Youth Development State Statistical Report 2003.* 4-H Youth Development, The Ohio State University Extension.

Steering Group.[4] The research team found the following eight "critical elements" of 4-H impact on youth:

- The opportunity to value and practice service for others
- An opportunity for self-determination
- A positive relationship with a caring adult
- A physically and emotionally safe environment
- An inclusive environment
- Engagement in learning
- Opportunity for mastery
- An opportunity to see oneself as an active participant in the future.

The findings of the survey speak to the positive impact that 4-H programs have on American youth and the high levels of satisfaction with those programs among participating youth. Table ES-1 highlights some of the core responses of survey participants to key questions on the national survey.

Table ES-1: Percent of Affirmative Responses to Positive Statements About 4-H on National Survey

Statement Regarding 4-H	Percent of Respondents Who "Agree" or "Strongly Agree"
"All kinds of kids are welcome in 4-H"	97%
"4-H helps me accept the differences of others"	90%
"I feel good during 4-H activities"	94%
"In 4-H I feel that it is safe to try new things"	94%
"Adults in 4-H help me to work with others as a team"	91%
"Adults in 4-H make me feel good about myself"	90%

Source: *Prepared and Engaged Youth Serving American Communities: National 4-H Impact Assessment Project,* http://www.national4-hheadquarters.gov/about/impact/impact1.pdf.

These national results are similar to those obtained in a 2000 study in Nebraska, which indicated that more than 90 percent of 4-H respondents cited the benefits of 4-H as being "responsibility," "self-confidence," "a greater respect for others and leadership," and "relationship building skills." It is fair to conclude that the education and values instilled by 4-H in the majority of participating youth are those that are important to individual development and to providing valued and productive members of Ohio society and Ohio's economy.

Furthermore, as has already been clearly indicated, an engaged and knowledgeable workforce will be critical in building a vibrant Ohio economy in the 21st Century. Clearly, creating this workforce will require fully engaging Ohio youth. In the 21st Century economy, unskilled, unmotivated elements of the population are no resource for society, rather these individuals will place an increasing burden upon society as such individuals struggle to find a place within the new economic reality. Therefore, the role that 4-H plays in both encouraging educational

[4] *Prepared and Engaged Youth Serving American Communities: National 4-H Impact Assessment Project,* http://www.national4-hheadquarters.gov/about/impact/impact1.pdf.

achievement and discouraging risk behaviors through its programming and activities, will positively impact the economy of Ohio over the long-term.

For instance, if only 5 percent of the 230,576 Ohio 4-Hers were encouraged by their 4-H educational experience to achieve a bachelor's degree, rather than ending their formal education after receiving their high school diploma, this would equate to 11,529 bachelor's degrees. At a median earnings differential of an additional $19,100 per year for the degree over and above a diploma, this equates to increased annual earnings for this group of $220.2 million. If 5 percent gained an associate's degree beyond a high school diploma, this would generate additional personal income of $78.4 million annually.

The 4-H experience also may keep students from dropping out of high school. Again, if 5 percent of Ohio 4-Hers stayed and received their high school diploma, rather than dropping out of high school, their annual personal earnings gain would be $106.1 million. The potential personal-income impacts of Ohio 4-H positive effects on education decisions are summarized in Table ES-2, using varying percentages of 4-Hers potentially influenced to pursue a higher level of education because of their positive 4-H experience.

Table ES-2: Annual Personal-Income Impacts of 4-H Influence on Education by Various Percentages of Ohio 4-Hers

Higher Level of Education Attained	1% of Ohio 4-Hers	5% of Ohio 4-Hers	10% of Ohio 4-Hers	25% of Ohio 4-Hers
High School Diploma vs. Less than High School Diploma	$21,212,992	$106,064,960	$212,129,920	$530,324,800
Some College (no degree) vs. High School Diploma	$11,298,224	$56,491,120	$112,982,240	$282,455,600
Associate's Degree vs. High School Diploma	$15,679,168	$78,395,840	$156,791,680	$391,979,200
Bachelor's Degree vs. High School Diploma	$44,040,016	$220,200,080	$440,400,160	$1,101,000,400
Master's Degree vs. High School Diploma	$66,175,312	$330,876,560	$661,753,120	$1,654,382,800

Source: Baum, Sandy, and Kathleen Payea. "Education Pays 2004: The Benefits of Higher Education for Individuals and Society." *College Board, Trends in Higher Education Series.* www.collegeboard.com, with Battelle calculations.

The following are some specific examples of OSU Extension's work that is impacting the development of Ohio's youth.

Example: Adventure Central, Dayton

Adventure Central, located in Dayton, is a vibrant example of 4-H in action, working to enhance the social skills, reading abilities, and activities of youth. Adventure Central operates as an education center for youth between the ages of 5 and 18, serving as a hub for out-of-school programming through after-school programs, youth boards, clubs, and camps. Adventure Central was developed as a partnership between Five Rivers Metro Parks and 4-H.

The program leverages the resources of adult volunteers to provide youth with caring adult mentors. The youth receive help and encouragement with their homework; receive tutoring in areas of academic importance such as reading; and learn discipline, self-control, and respect for others.

In 2003, more than 100 urban youth participated in Adventure Central's after-school programming, with a total of 15,486 hours of service provided. In addition, 117 youth participated in a 7-week day camp program, with more than 14,000 hours of contact made. Volunteers are key to the success of the program, with 58 volunteers contributing 7,115 hours of service.

Example: CARTEENS

The accident rate of teen drivers is more than double their percentage of the driving population. In response to the personal safety and cost concerns of teen driver accidents, 4-H youth professionals worked with junior leaders to design a peer-intervention program for traffic offenders. Based on research findings, the junior leaders created a safety intervention program called Caring And Responsible TEENS or CARTEENS. The CARTEENS program is a 2-hour safety program run by the junior leaders or other teen facilitators, with technical assistance from Ohio Highway Patrol personnel. The 4-H youth professionals involved with the program provide guidance in public speaking, group dynamics, conflict resolution, and interactive teaching techniques for the facilitators. Ten years after its inception, the original Brown County CARTEENS program has expanded to become the Ohio 4-H CARTEENS Program with 34 counties participating. Results from a survey of participants indicate a positive response to the program by the teens. In addition, early results in participating counties are showing lower rates of repeat offenders among teens than prior to the program.

Example: Youth Outdoors, Cleveland

Youth Outdoors operates as a partnership between OSU Extension, the City of Cleveland, and Cleveland Metro Parks. The program provides lower-income, urban youth with an opportunity to experience and participate in outdoor recreation and environmental education programs. The initiative provides youth between the ages of 8 and 18 with an opportunity to experience many activities that they otherwise may be unable to access. Participants actively take part in multiple outdoor sports (such as hiking, rock climbing, biking, kayaking, horseback riding, etc.) as well as special skill-building exercises in leadership, team building, compass navigation, and community service.

The program has experienced considerable demand, with more than 2,600 individual youth served in 2003. A total of 438 youth programs were provided, leveraging staff and volunteers (who provided more than 2,400 hours of service) to provide a broad range of educational and recreational experiences for the participants. The program has been specifically successful in planting a long-term presence in Cleveland's urban neighborhoods through the establishment of Adventure Clubs. These clubs offer monthly programming and outings and provide youth with the opportunity to stay involved and increase their skills in areas of interest. In 2003 the program provided leadership for 21 Adventure Clubs.

The Impact of OSU Extension-Related Volunteerism in Ohio

The voluntary contributions of Americans to sustaining social good in the nation are often overlooked in terms of benefit to society and the economy. Tasks and services provided by volunteers meet needs that would otherwise go unmet (with likely negative social costs) or would have to be met by government or other providers at a direct monetary cost. OSU

Extension plays an important role in recruiting and engaging youth and adult volunteers for a range of activities important to Ohio. Data compiled for the 2004 Extension Annual Report show that OSU Extension leverages the volunteerism of more than 37,000 Ohioans annually, under the following programs and initiatives shown in Table ES-3.

Table ES-3: OSU Extension's Youth and Adult Volunteers

Group	Youth Volunteers (under age 18)	Adult Volunteers (18 or older)
4-H	10,019	23,183
Master Clothing		109
Community Development		1,268
Master Gardeners		3,000
Totals	**10,019**	**27,560**

Source: OSU Extension provided data.

In total, OSU Extension's data for adult volunteer activities indicates that 5,015,920 hours were donated in 2003. Independent Sector's analysis, together with labor data from the Bureau of Labor Statistics (BLS), can be used to develop estimates of the annual value of this OSU Extension–related volunteerism for Ohio.[5] Based on 2002 BLS data (the most recent available), the estimated hourly wage and benefits value per volunteer for Ohio is $15.43. **Thus, it may be seen that the more than 5 million hours of OSU Extension–related volunteer time equates to a monetary benefit of $77,395,646 (an amount that actually exceeds the total annual budget of OSU Extension).**

Future Initiatives—Emerging Opportunities for Expanding the Impacts and Benefits of OSU Extension in Ohio

The opening of the 21st century has brought challenging economic times, times in which some of the underlying fundamentals of economic and community development practice must be critically examined. The New Economy, globalization, competitive market pressures, technological advances, the preeminent importance of innovation and talent, and other forces are restructuring the economic playing field. Against this background, it is imperative that Ohio have the institutions in place to respond to the new economic challenges and opportunities.

Against such a background of rapid and dramatic change, can a system such as Extension, established in the early 1900s, be relevant? The answer may be surprising, and is a testimony to the foresight of those who originally developed the structure and mission of extension under the Smith-Lever Act. It is exciting to note that OSU Extension may well be *more* necessary and relevant than ever before. Much of what is required for 21st century success (innovation, technology transfer, human capital enhancement, productivity improvement, networking, quality of environment and place) is directly addressed through the mission and operations of OSU Extension.

[5] http://www.independentsector.org/programs/research/volunteer_time.html.

OSU Extension is dedicated to performing multiple functions of critical importance to economic and social progress in Ohio—and these functions are of direct relevance to the needs and challenges of the New Economy:

- Extension is an education-driven organization seeking to significantly enhance human capital and promote lifelong learning in the state.
- Extension is a pragmatic disseminator of the latest in research and technologies to enhance productivity and expand the economic base of Ohio.
- Extension forms a statewide network—with a presence in every county—serving to link communities, businesses, and the general population to the intensive R&D resources of OSU.
- Extension addresses both urban and rural social and economic issues.
- Extension works to enhance and sustain the environment and quality of place in Ohio, assuring the attractiveness of the state for human capital and new ventures.
- Extension places a heavy emphasis on youth development and leadership, helping to provide the next generation of New Economy workers and leaders.
- Extension, with its history of engagement with agricultural production, has a track record in applying technology and enhancing marketing and productivity to assure Ohio's performance in the highly competitive globalized marketplace.

Therefore, it is quite possible that OSU Extension is even more relevant today in helping Ohioans meet the ever increasing needs of this complex world in which we live. That said, there are opportunity areas on which Extension needs to focus in order to ensure its relevance and effectiveness into the future:

Alignment with OARDC core competencies. The research strengths found in OARDC's identified core competencies are a good match to current and emerging industry strengths in Ohio's agbioscience sector. What must be established and maintained to realize the benefits of these platforms are strong relationships between OARDC and key industry sectors and representatives. Furthermore, the translation and transfer of OARDC research discoveries into Ohio's business and agbioscience industry base must be facilitated to assure development potentials are realized. OSU Extension is a critical element in facilitating the application of OARDC discoveries and innovations. OSU Extension serves as the gateway for industry, especially agbioscience industry, access to OSU resources and thus forms a crucial link in realizing the potential of OSU-initiated agbioscience economic development and economic growth. Realizing value from OARDC innovation requires moving that innovation into an Ohio-based value-added chain of production. OSU Extension is the critical link in moving R&D from the bench into formal application within industry.

Innovation-driven economic development. Technology and the forces of the New Economy are changing the rules upon which industries, and thus regional and local economies, have been built. Developing a strong foothold in the New Economy requires a strong innovation-led strategy, most notably rooted in science- and technology-led R&D activity. OSU Extension has an extremely important role to play in helping Ohio's communities understand and adjust to the positive and negative ramifications of these forces for their economic and community development.

Paramount to success is Extension's continued support of the Agricultural Technology Commercialization and Economic Development Program (ATECH) in conjunction with OARDC. Through ATECH, Extension is focusing on building a food and agricultural science infrastructure that will:

- Facilitate the development of new food and agricultural businesses and create jobs.
- Attract existing companies to Ohio.
- Facilitate commercialization and transfer of technologies and knowledge to the private sector from the university.
- Provide technical assistance and market analyses to existing and new Ohio companies to allow these firms to capture more of their market, enter new markets, or expand product lines into new applications and capture additional value.

Diffusion of best practice programs and initiatives. One of OSU Extension's key strengths is its "bottom-up" structure, whereby individual counties and communities work with their Extension representative to identify needs and set the agenda for locally provided Extension services. In doing this, the powerful resources of OSU can be efficiently focused on highly specific local needs throughout the state. Adherence to the local delivery model, as it is currently structured, does, however, have a weakness. Successful programs and initiatives developed for one county may have potential for migration and diffusion to other communities and counties in Ohio—however, the current operations of Extension do not appear to place a priority on the "re-use" of such best practices. There is an opportunity to leverage the existing programs and initiatives of Extension through development of an OSU Extension best practices system.

Industry/community engagement via Extension Teams. Just as it is critically important that county educators leverage each other as resources for best practices, it is equally important the county educators are able to leverage and link to state and center specialists in order to stay on the cutting edge of their respective fields and deliver the highest quality service and programming activities to the various constituencies within the State of Ohio. Extension activities centered on the Agriculture and Natural Resources services have been quite effective leveraging their knowledge resources through the formation and development of interdisciplinary commodity/issue-focused teams composed of county, center, and state extension and research faculty to address the current needs faced by Ohio producers and agbioscience industry. Similar efforts need to be fostered within other areas of Extension to link county educators with state and center specialists, in addition to various stakeholder and constituency groups, to ensure that programming initiatives and service activities stay focused on the most pressing needs.

Continuing education and lifelong learning access. Much has been written about the rise of "knowledge" as the driver of the U.S. economy. This rise is an accepted fact; but, there is much misunderstanding about who possesses this "knowledge." Some have interpreted this to mean that a four-year college-degreed elite is the route to economic success; but, the fact is that skills and knowledge are increasingly required across the total workforce. The implication for Ohio is critically important for all involved in government, education, and economic development to grasp. It is that, in a 21st century economy driven by high productivity and increasingly skilled processes, an unskilled workforce is no resource at all. It is only a "potential" resource, and that potential can only be realized through workforce education and continuous skills development.

It is readily apparent that Extension, with resources in every county and access to the wide-ranging technical and educational resources of the University, is very well positioned to deliver continuing education and workforce skills development services. Extension already plays an important role with programs as diverse as training in precision agriculture technology to basic computer literacy for inner-city residents. What does not exist yet at Extension is a formal strategy for deploying Extension resources for optimum impact in key strategic sectors of the Ohio economy. As such, a future imperative for Extension should be the drafting of such a strategy—working to assure seamless and efficient access to OSU education and training resources for those in key strategic industries.

Holistic resource deployment (versus silos). As Ohio enters the 21st century, the problems of its citizens, communities, and industry become increasingly more complex. As a result, the solutions provided must become more multidisciplinary in nature to respond to ever more multidimensional issues. This is particularly true in the case of urban issues, an area in which Extension has not historically focused and in which its traditional services sometimes appear to community leaders as somewhat less relevant.

It is therefore critical that OSU Extension deploys its services within a holistic framework in order to meet these complex needs. This evolution is already occurring across numerous programmatic areas, such as food safety programming and Master Gardener activities. However, an increased effort to integrate the four functional areas of Extension must become a priority of senior leadership. Cross-functional teams should be created to address specific issues that the State of Ohio faces today, such as food security and agbioterrorism. These internal linkages will be critical in development of future significant impacts.

CONCLUSION

Battelle finds OSU Extension to be a significant economic engine for the State of Ohio. Simply in terms of expenditure impacts, OSU Extension generates $159 million of Ohio economic output and more than 1,918 jobs for Ohioans. These expenditure impacts are, however, eclipsed in their importance by the benefits accruing to the state through the extensive services provided through Extension's network of county educators, center specialists, and state specialists.

OSU Extension is first and foremost a training organization with a uniquely practical mission—strengthening the lives and communities of Ohio through research-based educational programming. This mission is the key to the long-term competitive sustainability of Ohio's high standard of living. Therefore, OSU Extension is a pragmatic organization dedicated to the diffusion of research knowledge and practical training and skills development for Ohioans.

Extension's purpose is to produce positive economic and social impacts for the State of Ohio. These impacts are categorized by economists as "forward linkage impacts," which, rather than being related to institutional spending, are related to institutional mission and function. These are the impacts that Congress envisioned as benefits to be provided through the formation of the state extension programs. Furthermore, the wide array of services and activities that OSU Extension provides the citizens, industry, and communities of the State of Ohio clearly continue to be relevant in meeting today's needs, just as Extension has met the needs of Ohioans for the past 100 years.

However, the opening of the 21st century has brought challenging economic times, times in which some of the underlying fundamentals of economic and community development are shifting at a seemingly rapid pace. Therefore, OSU Extension must continue to evolve and advance in order to meet these new demands. Areas of opportunity that deserve attention in planning for the future include the following:

- Alignment with OARDC core competencies
- Innovation-driven economic development
- Diffusion of best practice programs and initiatives
- Industry/community engagement via Extension Teams
- Continuing education and lifelong learning access
- Holistic resource deployment (versus functional silos).

By addressing these areas of opportunity, OSU Extension will continue to be a significant economic engine for the State of Ohio into the next century.

Introduction

All Ohio universities engage in research and teaching; but, The Ohio State University (OSU), as one of the nation's more than 100 land-grant colleges and universities, has a third critical mission—extension. "Extension" means "reaching out," and OSU—along with teaching and research— "extends" its resources, solving public needs with university-based intellectual capital through a myriad of activities.

These activities and programs are accomplished through a network of county, regional, and center facilities. These offices have educators and other staff who respond to public inquiries; conduct informal, noncredit workshops and other educational events; and provide answers to commonly encountered problems through educational materials (print, video, and CD), Web-based information, the telephone, and other means.

OSU Extension is supported by county, state, and federal funding, in addition to private contributions and contract work. The U.S. Department of Agriculture's (USDA's) Cooperative State Research, Education, and Extension Service (CSREES), the federal partner in the Cooperative Extension Service (CES), plays a key role in the land-grant extension mission by distributing annual Congressionally appropriated formula funding to supplement state and county funds. The unique mission of CSREES for extension activities across the nation is to advance knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the Land-Grant University System and other partner organizations.

Congress created the extension system nearly a century ago to address exclusively rural, agricultural issues. At that time, more than 50 percent of the U.S. population lived in rural areas, and 30 percent of the workforce was engaged in farming. Extension's engagement with rural America helped make possible the American agricultural revolution, which dramatically increased farm productivity:

- In 1945, it took up to 14 labor-hours to produce 100 bushels of corn on 2 acres of land.
- By 1987, it took just under 3 labor-hours to produce that same 100 bushels of corn on just over 1 acre.
- In 2002, that same 100 bushels of corn were produced on less than 1 acre.

Today, OSU Extension focuses on a wide array of critical issues affecting people's daily lives and the state's future. The advanced research and educational technologies they support empower people and communities to solve problems and improve their lives. Specifically, Extension works to improve the quality of life for all Ohio citizens by helping to

- Improve agricultural profitability and productivity
- Create new products
- Protect animal and plant health
- Promote sound human nutrition and health

- Strengthen children, youth, and families
- Revitalize Ohio's communities.

Through these activities, OSU Extension has a substantial track record in contributing to Ohio's overall quality of life and positively impacting the economy of the state. As "knowledge" and intellectual capacity become the foremost drivers of modern economies, it is likely that university extension activities will grow in their central importance to economic progress. Strengthening the lives and communities of Ohio through research-based educational programming (activities at the core of OSU Extension's mission) are keys to the long-term competitive sustainability of Ohio's high standard of living. The degree to which OSU Extension's work has, and is, contributing to the economic progress in the State of Ohio is the subject of this report.

STUDY GOALS

The Technology Partnership Practice (TPP) of Battelle Memorial Institute was retained by OSU Extension to perform an in-depth analysis of the wide array of impacts of extension programs and activities on the State of Ohio. Specifically, the project seeks to provide the following:

- Measures of the quantitative impact of OSU Extension operations and activities on key economic metrics such as Ohio business volume, personal incomes, and employment.
- An understanding of the broad range of social and community benefits afforded by OSU Extension's activities in the state.
- Specific illustrations of the range of positive impacts generated in the state as a result of OSU Extension's activities as they relate to agriculture and natural resources, community development, family and consumer sciences, and youth development.
- An assessment of future initiatives that could be undertaken to further enhance OSU Extension's impact on the state based on the ever-changing makeup of Ohio's socio-economics and demographics, in addition to advancements in the means by which information is organized and disseminated.
- A "tool" for OSU Extension to use in the future for estimating annual economic impacts.

METHODOLOGY

Battelle uses both quantitative and qualitative approaches in evaluating OSU Extension's broad range of impacts. On a quantitative basis, Battelle reports the results of economic impact calculations using input-output analysis techniques. Qualitative research techniques are used to provide illustrative examples of the types of impacts provided by OSU Extension through activities such as research, development, application, commercialization, and societal integration and education.

Input-Output Analysis

The economic impact analysis section of this report relies on federal government data consolidated within the IMPLAN[6] regional economic analysis system. The IMPLAN data files include information for 528 different industries (generally at the three- or four-digit Standard Industrial Classification [SIC] code level) and 21 different economic variables. Along with the data files are national input-output structural matrices. IMPLAN sources its employment data from ES202 employment security data supplemented by county business patterns and REIS[7] data. Employment data utilized in the analysis include full-time and part-time positions.

The IMPLAN software performs input-output analysis for determining the economic impact of projects, economic sectors, new companies moving into an area, etc. For the OSU Extension project, Battelle researchers acquired the IMPLAN data file for the State of Ohio as a whole.

It should be noted that the most recent IMPLAN data files for Ohio are for 2001. While the data are not current, it is highly unlikely that the fundamental structure of Ohio's economic fabric has changed to an extent that would invalidate the analysis.[8] IMPLAN data and accounts closely follow the accounting conventions used in the "Input-Output Study of the U.S. Economy" by the U.S. Bureau of Economic Analysis and the rectangular-format impact analysis recommended by the United Nations.

Interviews

In addition to conducting input-output analysis, Battelle researchers and analysts also conducted a series of in-depth interviews with OSU Extension administrators, directors, and educators. Through one-on-one interviews, a detailed understanding of specific focus areas at OSU Extension were developed, allowing Battelle to further investigate potential impacts of these programmatic initiatives.

SUMMARY

The recent report, *OARDC: A Generator of Positive Economic Impacts for Ohio,* profiled the past, current, and likely future economic benefits accruing to the State of Ohio from the ongoing operations of the Ohio Agricultural Research and Development Center (OARDC), OSU's agbioscience research and development (R&D) arm. This study seeks to build on that work by analyzing the second component of the valuable network of activities, OSU Extension, to ascertain the impact of its activities on the citizenry of the State of Ohio. The following narrative provides detail concerning the following:

- The activities of OSU Extension.
- Its overall quantitative economic impact.
- Specific illustrations of the range of positive impacts generated in the state as a result of OSU Extension's activities as they relate to agriculture and natural resources, community development, family and consumer sciences, and youth development.

[6] Minnesota IMPLAN Group, 1725 Tower Drive West, Suite 140, Stillwater, MN 55082.
[7] Regional Economic Information System—Bureau of Economic Analysis, U.S. Department of Commerce.
[8] The data set used in this study is the most current available for the methodology employed.

- Recommendations for future areas of focus to ensure that OSU Extension remains a valuable resource for the State of Ohio.

Roles and Responsibilities of OSU Extension (The Scope of Benefits Provided by Extension to Ohio)

History and Historic Impact of OSU Extension

The roots of U.S. agricultural extension go back to the early years of the nation. Numerous agricultural societies and clubs were formed after the American Revolution, and in 1810, the first *Farm Journal* was published. It survived for only 2 years, but in 1819, John Stuart Skinner of Baltimore began publishing the *American Farmer*. Farmers were encouraged to learn from other farmers by reporting on their achievements and their methods of solving problems in this publication.

Agricultural education became much more formalized after the enactment of the Morrill Act of 1862, which established land-grant universities in each state to educate citizens in agriculture, home economics, mechanical arts, and other practical professions. As a result, OSU was designated as Ohio's land-grant university.

Congress soon realized that, to be effective, the educational function of land-grant universities needed to be supplemented with research capabilities. The Hatch Act was passed in 1887 to establish research farms where universities could conduct research in agricultural, mechanical, and related problems faced by rural citizens. The Hatch Act allowed for the creation of what is now known as the OARDC, the agbioscience research arm of OSU.

With education and research in place, it was quickly recognized that a third leg of the stool needed attention—extension. Ohio leaders recognized that, to be truly effective, research must be delivered from the bench to the field. Between 1906 and 1913, Ohio agricultural extension trains traveled around the state carrying agricultural exhibits and offering presentations on farm practices. In 1911, 16 trains made 418 stops and reached more than 45,000 people.

During these same formative years, Ohio also was playing an instrumental role in the development of today's nationwide 4-H Program. Albert B. Graham, a Clark County school teacher, attracted national recognition by establishing boys' and girls' clubs—the forerunners of 4-H—and was later named superintendent of agricultural extension at OSU, the first position of its kind in the United States.

Just as Ohio was realizing the important role of extension services in disseminating valuable information, the federal government was beginning to understand the importance of this activity. Congress recognized that education and research alone could not provide the services that were needed within the nation's communities. Instead, specific resources and activities related to disseminating this information would be required. The CES was further expanded in 1914, with the Smith-Lever Act. It established the partnership between the agricultural colleges and the USDA to provide for cooperative agricultural extension work. At the heart of agricultural extension work, according to the Act, was to

- Develop practical applications of research knowledge, and
- Give instruction and practical demonstrations of existing or improved practices or technologies in agriculture.

Smith-Lever mandated that the federal government (through USDA) provide each state with funds based on a population-related formula. OSU, as the land-grant institute, was chosen to be the recipient of these federal funds in the State of Ohio.

The relevance of extension activities grew during World War I, when extension services assisted the country in meeting wartime needs by

- Increasing wheat acreage significantly, from an average of 47 million acres annually in 1913 to 74 million in 1919;
- Helping the USDA implement its new authority to encourage farm production, marketing, and conserving of perishable products by canning, drying, and preserving; and
- Helping to address war-related farm labor shortages at harvest time by organizing the Women's Land Army and the Boys' Working Reserve.

More generally, extension's role in WWI helped it expand its reputation as an educational entity to one that also emphasized service for individuals, organizations, and the federal government.

During the Great Depression, activities emphasized farm management for individual farmers. Extension agents taught farmers about marketing and helped farm groups organize both buying and selling cooperatives. At the same time, extension home economists taught farm women—who traditionally maintained the household—good nutrition, canning surplus foods, house gardening, home poultry production, home nursing, furniture refinishing, and sewing—skills that helped many farm families survive the years of economic depression and drought. In addition, OSU Extension helped carry out New Deal programs, such as price supports, production control, and rural electrification to help Ohio through the Depression.

During World War II, the extension service again worked with farmers and their families, along with 4-H club members, to secure the production increases essential to the war effort. Each year for 5 years, total food production increased. In 1944, food production was 38 percent above the 1935 to 1939 average. Specifically, OSU Extension worked with farmers and 4-H members to increase production by conducting farm-labor recruitment programs, leading scrap metal drives, allocating scarce supplies of fertilizer and machinery, and helping homemakers substitute for unobtainable foods during the war emergency.

The Victory Garden Program was one of the most popular programs in the war period; and extension agents developed programs to provide seed, fertilizer, and simple gardening tools for victory gardeners. An estimated 15 million families across the nation planted victory gardens in 1942, and in 1943, some 20 million victory gardens produced more than 40 percent of the vegetables grown for that year's fresh consumption.

The evolution of extension activities continued to be significant during the second half of the 20th century as a result of the nation's changing socioeconomics and demographics. The number of farms in the United States declined dramatically during this period—from 5.4 million in 1950 to 1.9 million in 1997. Because the amount of farmland did not decrease as much as the number of farms, the remaining farms have a larger average acreage. During the same period, farm production increased from one farmer supporting the food needs of 15.5 persons in 1950 to one farmer supporting 100 persons in 1990. By 1997, one farmer supported the food needs of almost 140 U.S. citizens.

This increased productivity, despite the decline in farm numbers, resulted from increased mechanization, commercial fertilizers, new hybrid seeds, and other technologies. Extension played an important role in extending these new technologies to U.S. farmers and ranchers. For instance, since 1962, OSU Extension has sponsored the Farm Science Review to exhibit the latest advancements in farm power machinery and agricultural science and technology.

THE SCOPE OF EXTENSION TODAY

Despite the sharp decline in the size and economic prominence of rural America, on which the nation's original extension activities primarily focused, OSU Extension, as part of the national CES, remains an important component of Ohio's economic development and social well-being activities. By adapting to changing times and landscapes, OSU Extension continues to remain relevant by addressing a wide range of human, plant, and animal needs in both urban and rural areas.

OSU Extension's stated mission is to "engage people to strengthen their lives and communities through research-based educational programming." It seeks to accomplish this mission by

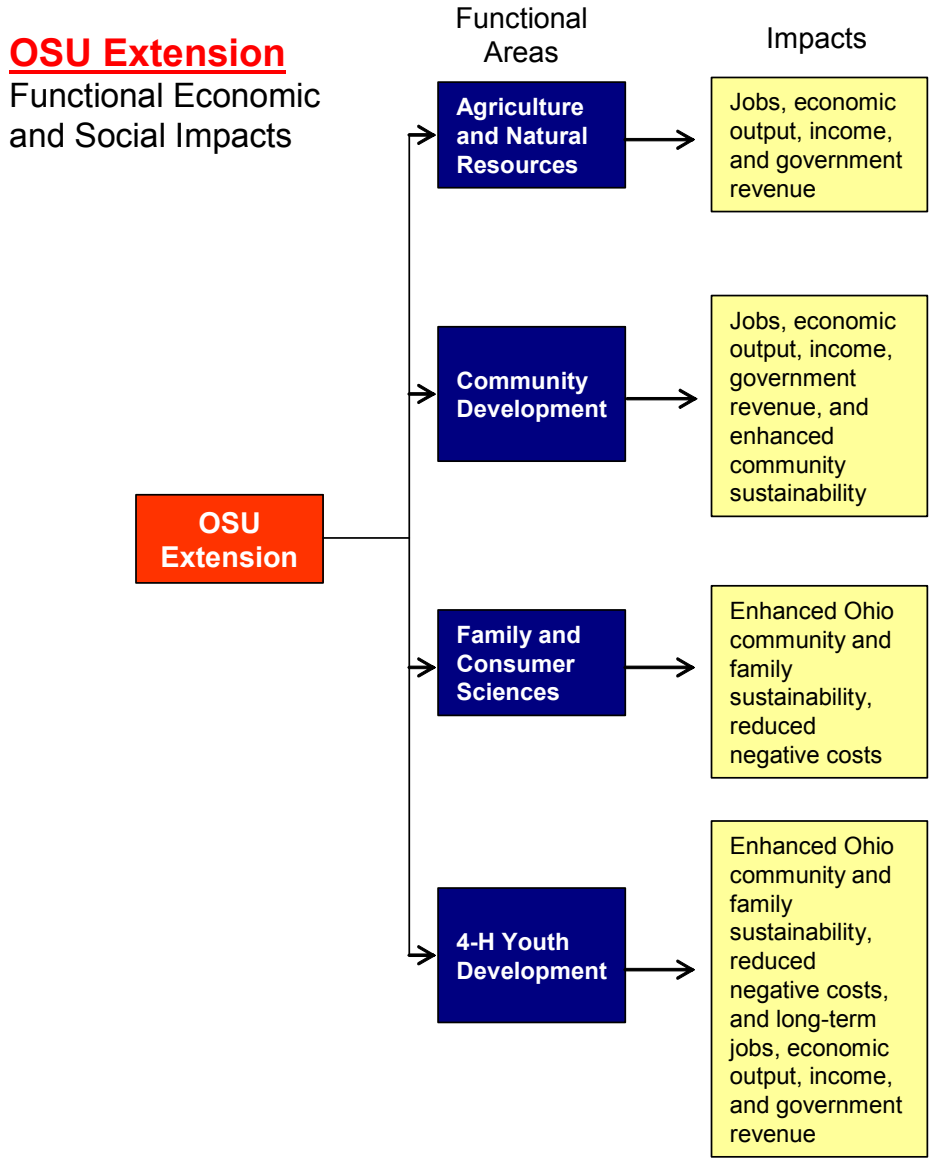
- Focusing on critical economic, environmental, leadership, and youth and family issues;
- Engaging people in lifelong learning;
- Applying knowledge and practical research to the diverse needs and interests of Ohioans in rural, suburban, and urban communities;
- Extending resources of OSU;
- Recruiting and developing volunteers to multiply Extension's efforts while developing their leadership potential;
- Enhancing teamwork through networking and connectedness;
- Linking youth, family, and community needs to scholars in Ohio and nationwide; and
- Teaching with cutting-edge strategies using new technologies and approaches.

Extension focuses these activities within four major functional areas:

- **Agriculture and Natural Resources**
- **Community Development**
- **Family and Consumer Sciences**
- **4-H Youth Development.**

OSU Extension activities thus have multiple avenues in which to positively impact the State of Ohio. Figure 1 illustrates the primary impacts generated via OSU Extension activities and clearly indicates that this wide array of programming generates a broad range of functions and benefits. Each of the four primary functional impact areas is discussed below.

Figure 1: Principal Impacts Generated by OSU Extension Activities



Agriculture and Natural Resources

Agriculture and Natural Resources provides research and educational assistance to help individual farmers, gardeners, landowners, and businesses learn new ways to produce income through alternative enterprises, improved marketing strategies, and management skills and improve productivity through resource management, controlling crop pests, soil testing, livestock production practices, and marketing. In addition, with an emphasis on natural resources, this functional programmatic area teaches landowners and homeowners how to use natural resources wisely and protect the environment by providing programming in water quality; by protecting streams and watersheds; and by encouraging woodland management, composting, lawn waste management, and recycling.

Specific emphasis is placed on developing programming that focuses on

- Strengthening businesses;
- Adopting new technology; and
- Improving efficiency while protecting the environment.

OSU Extension, through its Agriculture and Natural Resources activities, continually strives to identify the most efficient means to deliver timely, research-based information and educational programs to its diverse clientele and stakeholders. Agriculture and Natural Resources' focus has been to network closely with respective Ohio and national commodity groups and farm, horticultural, and environmental organizations to be able to assist stakeholders in maximizing profitability while minimizing the impact on the environment.

To this end, Agriculture and Natural Resources has focused on the formation and development of interdisciplinary commodity/issue-focused teams composed of county, center, and state extension and research faculty to address the current needs faced by Ohio producers and agbioscience industry. Currently, 24 Agriculture and Natural Resources Teams have been formed and include a myriad of concerns including the following:

- Ohio Agronomic Crops
- Nursery, Landscape, and Turf
- Sustainable Agriculture
- Precision Agriculture
- A variety of livestock, including beef cattle, dairy, poultry, sheep, and swine
- Waste Resource Management
- Watershed Networks.

These teams meet as needed, sometimes as often as once a week, to be able to help address the urgent and real needs of their constituencies in a timely manner. These self-directed teams also interact with their respective statewide commodity groups and state and federal agencies in an effort to forge strategic relationships that assist in the development of the structure for their educational products and programs.

Agriculture and Natural Resources' educational products range from developing informative electronic newsletters promoting best management practices; assisting in the design and analysis of site-specific, on-farm research; and developing new programs in rising fields of interest that relate to areas such as the green industry. Overall, Agriculture and Natural Resources' goal is to provide timely, research-based information to all interested Ohio citizens.

Community Development

Community Development helps local business communities, current and emerging community leaders, and elected and appointed government officials investigate and create viable options for economic and community development by

- Increasing the knowledge base for individual and community decisions;
- Developing clientele skills necessary to help achieve their individual and community goals; and
- Helping create an inclusive decision-making environment.

For the State of Ohio, this leads to improved job creation and retention, small and medium-sized business development, workforce education, and improved land-use planning. Specific programmatic elements that have been developed by the Community Development educators include the following:

- Land-use and comprehensive planning programming that focuses on providing education and training to county land-use planning committees as they prepare a Comprehensive Land-Use Plan.
- First Impressions programming that helps community leaders assess the impact of their development efforts and take necessary actions to improve their image to first-time visitors.
- Local Government Leadership Academy designed as a 10-session program targeted toward local elected and appointed government officials. Each session incorporates a curriculum designed to enhance leadership and decision-making skills in the public sector.
- Ohio Business Retention and Expansion Initiative that provides resources, training, and tools to assist communities in monitoring and assessing their local economy in order to pursue economic development actions and planning.
- The Food and Agricultural Technology Commercialization and Economic Development Program (ATECH) that fosters and accelerates economic development as a result of university research at OARDC and Extension programs with a primary focus on food, agricultural, environmental, and life science technologies.

Family and Consumer Sciences

Family and Consumer Sciences provides assistance that helps individuals and families become resilient and healthy by teaching the following:

- Nutrition
- Food safety
- Food preparation
- Positive child care
- Parenting
- Family communication
- Adult development and aging

- Balancing life, jobs, families, and health
- Financial management
- Health care strategies.

Today, a significant area of focus for Family and Consumer Sciences is human nutrition. Through administering two federal programs, the Family Nutrition Program (FNP) and the Expanded Food and Nutrition Education Program (EFNEP), in addition to unique programs developed by county educators, such as Dining with Diabetes, educators are assisting Ohio citizens in acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets and in contributing to their personal development and the improvement of the total family diet and nutritional well-being. As a result of this educational intervention, participants adopt new behaviors that improve the nutritional quality of their diets, reduce the incidence of chronic disease, increase safe food-handling practices, and stretch their food dollars.

Both the EFNEP and FNP teach basic nutrition, food safety, meal management, thrifty shopping, and food resource management information to a variety of Ohio citizens across the state. The programs are successful because of close partnerships with local agencies/organizations whose outreach includes food stamp program participants and other low-income audiences.

National studies[9] have found that these activities successfully deliver an educational program that leads to sustainable behavior change. EFNEP impact data from 1997 showed that 89 percent of adults improved nutrition practices, 84 percent improved food resource management practices, and 67 percent improved food safety practices. The benefits are far reaching, not only improving the nutrient intake of a vulnerable population, but also building the basic life skills for those moving into the workforce. In addition, the improvements in early childhood nutrition will allow children to achieve their full cognitive development potential. Preliminary results of a cost-benefit analysis showed that, for every $1 spent on EFNEP, a potential health care savings of $2 to $17 may result from the prevention or delayed onset of nutrition-related chronic diseases and conditions among participants. Thus, this proven program clearly works for the benefit of families and the state.

4-H Youth Development

4-H Youth Development cultivates important life skills in youth that build character and assist them in making appropriate life and career choices. Participants in Ohio include the following:

- More than 230,000[10] young people, ages 5 to 19
- Members of clubs, camps, and after-school programs
- 32,000 volunteers donating time, energy, and talents to work with young people annually.

[9] Multiple EFNEP cost-benefit analysis examples are provided at the EFNEP section of the CSREES Web site at http://www.csrees.usda.gov/nea/food/efnep/impacts.html.
[10] Program participants number more than 300,000, which includes duplication that results from children participating in multiple program offerings.

Three types of learning experiences are emphasized in 4-H youth development programs and activities:

- Hands-on (making, producing, practicing, observing, etc.)
- Organized activities (demonstrations, workshops, field trips, camps, etc.)
- Leadership/citizenship (conducting, planning, assisting, informing, organizing, etc.).

4-H offers learning experiences in more than 200 subject matter areas. Some of these areas include health, family life, photography, aerospace science, bicycles, natural resources, safety, horticulture, and nutrition.

As the population demographics of Ohio have evolved over the last several decades, so too has the programming of 4-H. Today, 4-H programs have branched out into urban areas. Last year, more than 28 percent of all Ohio 4-Hers were living in towns and cities with populations between 10,000 and 50,000. More than 16 percent were living in cities and suburbs with populations greater than 50,000.

One out of every six people in Ohio has been or is currently involved with 4-H youth development programs either as a member, parent, volunteer, or donor. There are currently 45 million 4-H alumni nationwide.

FUNDING FOR EXTENSION ACTIVITIES

Following a long-standing tradition, Extension's operations are supported by federal, state, and local (primarily county) resources. For the budget year of July 2002 through June 2003, the total OSU Extension budget was $65.2 million. Table 1 lists the sources of Extension funds.

Table 1: Sources of OSU Extension Funding

Funding Source	Dollar Amount	% of Total Budget
State	$25.4 million	39.0%
Federal	$11.9 million	18.2%
County	$18.5 million	28.4%
Other	$9.4 million	14.4%
Total	**$65.2 million**	**100%**

As with many organizations in the United States, Extension is being asked to accomplish more with less each year. Currently, Extension is operating with a budget that is below year 2000 levels. Cutbacks in funding have occurred in the last 3 years at both the state and federal levels, while county funding has remained relatively stable. The largest funding reductions came at the state level, where 2002 saw state funding reduced by 6 percent, which was then carried forward into 2003 with a further 2.5 percent budget reduction. In 2004, continued decreases in state funding resulted in operating budgets reduced by 4 percent. It is important to note, however, that the declining state resources have occurred across the State of Ohio due to difficult economic times and reduced overall state budgets, not as the result of specific dissatisfaction with Extension's activities.

SUMMARY

As indicated, Extension has had a long and successful history, both across the nation and within the State of Ohio, for almost 100 years. As the socioeconomic composition of the State of Ohio has evolved over this time period, so too have the services of OSU Extension. The following sections will examine in detail the impact of Extension today both in terms of its expenditures, but more importantly, in terms of the unique role that it plays through the activities and services it provides throughout the State of Ohio.

The Economic Impact of OSU Extension's Expenditures on the State of Ohio

INTRODUCTION

Activities undertaken by Extension produce measurable economic impacts in two general areas:

- **Backward Effects.** Extension activities bring in dollars, including federal dollars, that are used to support extension teams and associated ancillary staff activities that have salary, wage, and other related impacts on the state economy.
- **Forward Effects.** The transfer of R&D discoveries and know-how from OSU into the communities served by Extension produces technologies, expertise, and services that may increase the efficiency and productive capacity of clients and client industries, which in turn impact the economy of the state.

This section of the report describes the data and methods used to estimate **backward** effects, together with a description of the results and findings of the analysis. Forward effects are covered in the next section of the report entitled *The Impact of OSU Extension's Services and Activities*. The backward effects associated with Extension R&D activities used

- Expenditure data provided by Extension to estimate direct impacts of wage, salary, and other spending; and
- An IMPLAN input-output framework to estimate indirect impacts of Extension research activities.

DATA, METHODOLOGY, AND IMPACT MEASURES USED TO ESTIMATE OSU EXTENSION IMPACTS

Current year expenditure data used to estimate impacts were provided by OSU Extension and included a detailed accounting of wage and salary expenditures, benefits, capital projects, and materials and supplies. Extension provides funding for outreach activities in two ways:

- Direct funding for Extension staff
- Funding support for faculty at OSU and other educational institutions. Extension provides support to faculty and staff at the University from funding it receives in support of research activities that directly benefit Ohio agriculture.

Wage and salary expenditure data included full and part-time extension staff, full and part-time faculty, and independent contractors hired by Extension to undertake various activities. The latter includes partnerships and all 1099 recipients.[11] Wage and salary data in each category were adjusted to exclude savings and wages and salaries used to pay taxes to give the amount of disposable income spent by Extension-funded staff and faculty. It was assumed that all

[11] The Internal Revenue Service Requires 1099s for any worker who is not an employee who receives in excess of $600 in payments from the 1099 issuer (the "payer" institution) during a 1-year period.

employee benefits paid from Extension funds were spent outside the state; and, therefore, these are excluded from the impact analysis.[12]

With the exception of a small percentage of expenditures on independent contractor personnel (2.2 percent), all wage and salary expenditures were assumed to take place in Ohio. For materials and supplies, it was assumed that 95 percent of Extension expenditures occurred within Ohio. For capital projects, 82 percent of capitalized equipment purchases took place in Ohio, while 100 percent of all other expenditures occurred in Ohio.

Direct Impacts of Extension Activities

Extension funding currently stands at about $79 million (Table 2). Total funding for Extension has risen slightly over fiscal years (FY) 2001 to 2003.[13]

Table 2: Total Extension Funding, 2001-2003 (millions of dollars)

	2001	2002	2003
OSU Extension Total	75.9	78.8	79.3

Source: Extension 2004.

A total of 1,150 full-time equivalents (FTEs) were employed by Extension in FY 2003 (Table 3). Of this number, 623 were full-time staff employed directly by Extension funding or through full-time faculty support. An additional 527 part-time employees were either directly employed by Extension or were receiving support through the University.

Table 3: 2003 Extension Employment (FTEs)

	Total
Full-time	623
Part-time	527
Total	**1,150**

Source: Extension 2004.

Almost two-thirds of Extension expenditures in FY 2003 ($50 million) supported the wages and salaries of staff and university faculty contributing to Extension activities (Table 4 and Figure 2). The mission of Extension also means that capital projects, which include both renovation of existing facilities and construction of new research facilities ($1 million), and the laboratory materials and supplies used to operate these facilities (almost $13 million), constitute 17 percent of overall annual Extension expenditures.

[12] Expenditures for employee benefits such as health care and retirement program providers were assumed to flow out of the state. While there may be some in-state providers (i.e. ones with in-state headquarters), producing an in-state impact, the majority are likely located out of state. There may be local offices through which payments are made (either directly by employees or on their behalf by OSU Extension); however, their headquarters (and therefore the locations of the majority of the subsequent expenditures by these firms) are likely out of state.

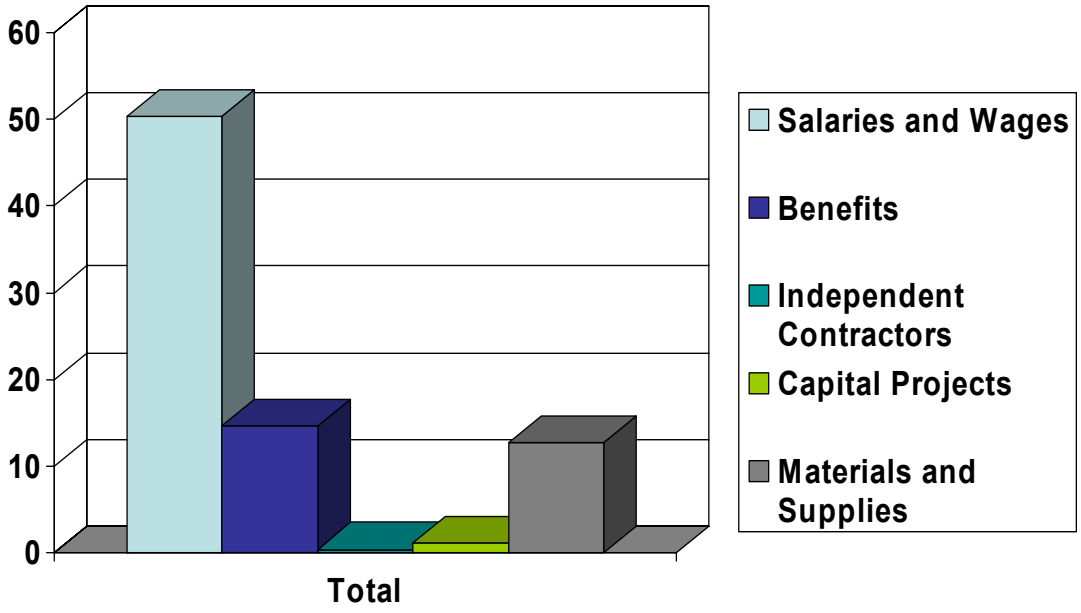
[13] The Extension funding total is higher here than the total Extension budget in the previous chapter because this also takes into account persons at OSU active on Extension projects who are not direct employees of Extension.

Table 4: Direct Extension Expenditures, 2003 (millions of dollars)

	Total
Salaries and Wages	50.4
Benefits	14.7
Independent Contractors	0.4
Capital Projects	1.1
Materials and Supplies	12.7
Total	**79.3**

Source: Extension 2004.

Figure 2: OSU Extension Spending by Category (millions of dollars)



Methods Used to Estimate Indirect Impacts

Indirect impacts were estimated based on direct labor expenditure data for specific income categories and procurement data for capital projects and materials and supplies. Expenditure information was associated with the relevant Bureau of Economic Analysis (BEA) sectors in an IMPLAN input-output model (Minnesota IMPLAN Group, Inc. 2003) specified for the state of Ohio.

The IMPLAN input-output model is a PC-based program that allows construction of input-output models for counties or combinations of counties for any location in the United States. Input-output data are the economic accounts of any given region and show the flow of commodities to industries from producers and institutional consumers. The accounts also show consumption

activities by workers, owners of capital, and imports from outside the region. The IMPLAN model contains 528 sectors, representing industries in agriculture, mining, construction, manufacturing, wholesale and retail trade, utilities, finance, insurance and real estate, and consumer and business services. The model also includes information for each sector on employee compensation; proprietary and property income; personal consumption expenditure; federal, state, and local expenditure; inventory and capital formation; and imports and exports.

The model was used to estimate multipliers for each sector where labor and procurement expenditures occur. Multiplying expenditures in these sectors by the sector multipliers and summing across all sectors impacted by Extension expenditures produce estimates of impacts of the Extension on the state.

Impact Measures

The impact of Extension activities in Ohio was measured using four economic and two fiscal variables. The economic variables are

- **Output**. The total value of production (sales) in all industries as a result of expenditures by Extension.
- **Value added**. An overall measure of individual and institutional income produced by Extension activities. Value added includes labor income (employee compensation), income to self-employed persons (proprietor income), rents, royalties and dividends, and indirect business taxes (primarily property taxes).
- **Income**. Employee compensation. In addition to being included in value added, the impact of Extension on labor income was also specified separately in the analysis.
- **Employment**. The total number of jobs in all industries created by Extension. To include both full- and part-time workers, jobs are measured in terms of full-time equivalents.

In addition, the analysis also estimated the tax impacts of Extension activities, including

- **Sales taxes**. The analysis estimated direct sales tax revenues by multiplying the value of Extension capital project expenditures and materials and supplies expenditures by the FY 03 sales tax rate in Ohio of 5 percent.[14] Indirect sales taxes were calculated using the value of the additional indirect output (sales) generated by Extension wage and salary spending, procurement of materials and supplies, and capital projects and the Ohio sales tax rate.
- **State personal income taxes**. State income tax revenues were estimated by multiplying the value of direct and indirect personal income generated by Extension activities by the state tax rates for six separate taxpayer income categories.

[14] Five percent was used as the basis of the FY 03 analysis. It is important to note that Ohio's sales tax increased from 5 percent to 6 percent on July 1, 2003. Therefore, annual projections for FY 04 would increase. At the time of the release of this report, it was uncertain whether the Ohio General Assembly would reduce the tax rate to 5 percent as of July 1, 2005.

THE IMPACT OF OSU EXTENSION ON THE OHIO ECONOMY

Extension activities in FY 2003 generated 1,150 direct jobs and more than $41 million in direct income. Direct expenditures on wages and salaries, capital projects, and materials and supplies by Extension produced an additional 768 indirect jobs and almost $23 million in indirect income in the state. Almost 1,920 total (direct plus indirect) jobs and $64 million in total income were generated (Table 5 and Figures 3 and 4). Extension funding produced more than $106 million of direct and indirect value added and $159 million in total output in the state. Extension funding also produced $3 million in personal income taxes and $1.8 million in sales taxes.

Table 5: Total Impact of Extension on the Economy of Ohio, 2003 (in millions of dollars, except where noted)

	Output (Sales)	Value Added	Income	Employ-ment (number)	State Income Tax Revenues	Sales Tax Revenues
Direct Impacts	79.3	67.9	41.3	1,150	1.9	0.7
Indirect Impacts	79.8	38.1	22.7	768	1.1	1.1
Aggregate Extension Impact	**159.0**	**106.1**	**64.0**	**1,918**	**3.0**	**1.8**

Note: Data in tables may not sum to column totals due to independent rounding.
Source: Extension, 2004. Minnesota IMPLAN Group, Inc. 2004. Ohio state data files.

Figure 3: Backward Linkage Impacts of OSU Extension

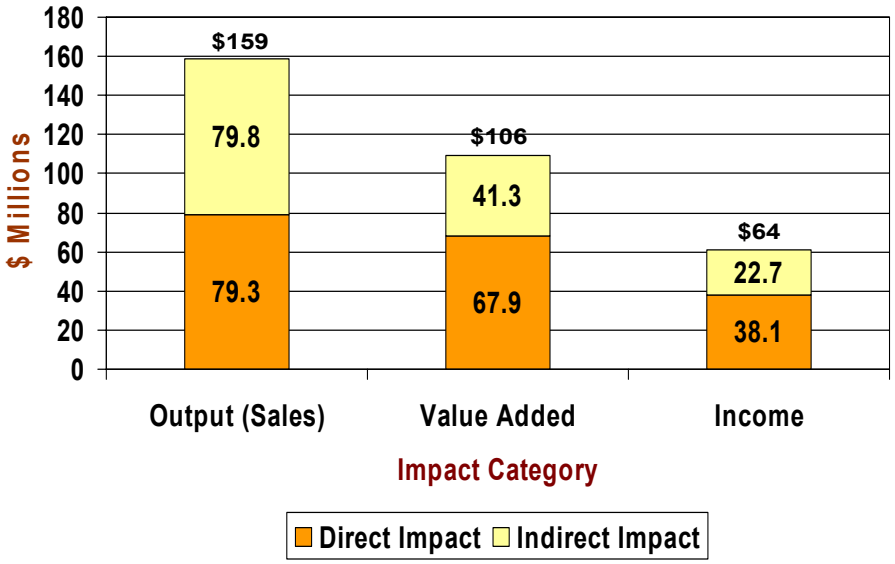


Figure 4: Backward Linkage Employment Impacts of OSU Extension

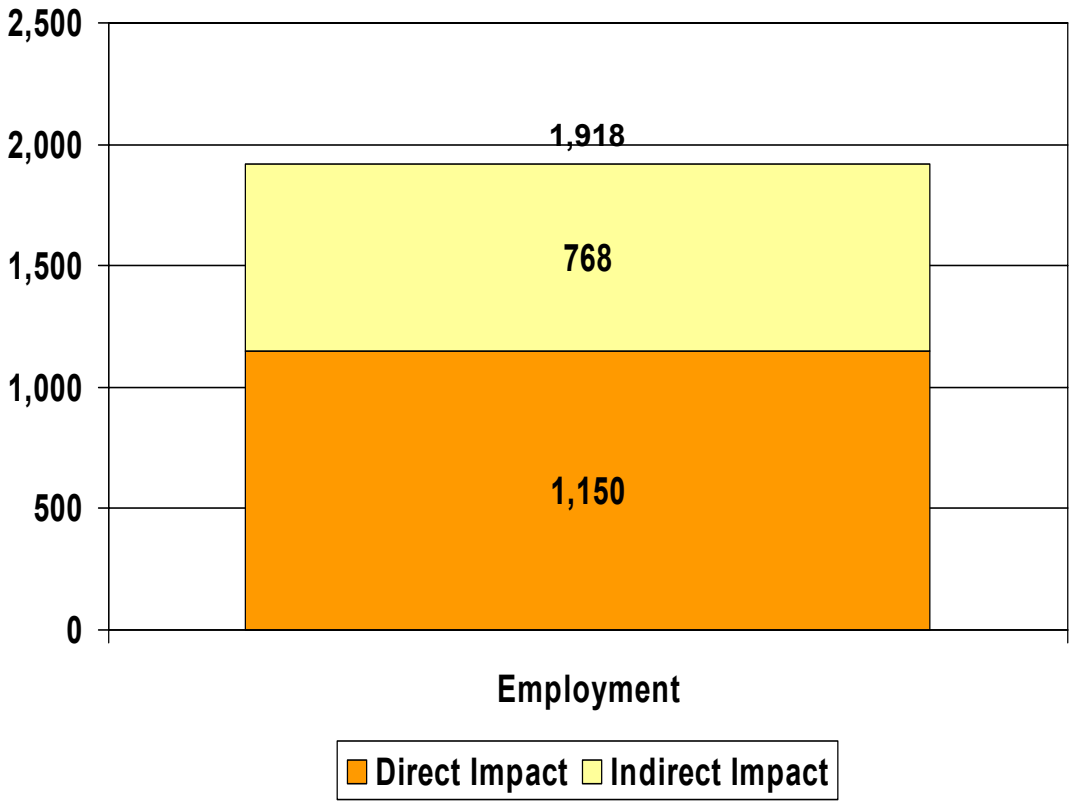


Table 5 shows that the direct employment, value added, and income impacts of Extension activities are greater than the corresponding indirect effects, while direct and indirect output impacts are almost identical. This is because of the relative importance of Extension labor expenditures compared to a lower importance of labor expenditures in the various sectors affected indirectly by Extension spending.

Extension expenditures on wages and salaries, including fringe benefits, constitute approximately 80 percent of the overall Extension annual budget, with support provided to a relatively large number of higher-income staff and faculty positions. Expenditures on materials and supplies and funding for capital projects play a relatively small role in the annual Extension budget. While the direct effects of Extension reflect the important role of funding for higher income staff and faculty positions, the indirect effects of wage and salary spending by Extension employees, and expenditures on materials and supplies and on capital projects, produce a smaller number of lower paid indirect jobs in the state. The indirect output (sales) impact of Extension is similar to the direct output impact, not only indicating the lower relative importance of labor expenditures in the various sectors affected indirectly by Extension spending, but also the importance of not limiting the measurement of the economic benefits of Extension expenditures simply to employment and income. The importance of the indirect output impact of Extension is also reflected in the larger indirect sales tax revenue impact.

SUMMARY

As clearly indicated by the economic impact analysis, the spending by OSU Extension's county educators, state specialists, centers, and staff impacts the state of Ohio. In fact, in and of itself, this impact is significant, accounting for $159 million of Ohio's economic output and more than 1,918 jobs for Ohioans. These types of impacts, involving expenditures of Extension and its employed populations, are backward linkage impacts.

Because OSU Extension is dedicated to the diffusion of knowledge, training, and skills to Ohioans, its services and activities also impact the state of Ohio. These impacts are categorized as forward linkage impacts that, rather than being related to institutional spending, are related to institutional mission and function. The next section of the report examines this broad and multifaceted array of positive economic and social impacts for Ohio

The Impact of OSU Extension's Services and Activities

The previous chapter highlights the economic impacts generated for Ohio by the operating expenditures of OSU Extension and the spending of its county educators, state specialists, centers, and staff. In and of itself, this expenditure impact is significant, accounting for $159 million of Ohio economic output and more than 1,918 jobs for Ohioans. These types of impacts, involving expenditures of Extension and its employed populations, are termed "backward linkage impacts" or "spending impacts"—and the structure of these impacts is represented in the blue circles in Figure 5.

Backward linkages, however, quantify only one dimension in a much larger, multidimensional impact generated by OSU Extension. Extension was founded and is sustained to meet the goals laid out in the original Smith-Lever Act of 1914, as follows:

> *Cooperative agricultural extension work shall consist of the development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies in agriculture, home economics, and rural energy, and subjects relating thereto to persons not attending or resident in said colleges in the several communities, and imparting information on said subjects through demonstrations, publications, and otherwise and for the necessary printing and distribution of information in connection with the foregoing; and this work shall be carried on in such manner as may be mutually agreed upon by the Secretary of Agriculture and the State agricultural college or colleges or Territory or possession receiving the benefits of this Act*[15].

As the Act makes clear, Extension is a pragmatic organization dedicated to diffusion of research knowledge and practical training and skills development for Ohioans. Thus, Extension is **purposely designed to produce positive economic and social impacts** for the State of Ohio—impacts that include the following:

- Enhanced productivity and profitability for Ohio agriculture and business enterprise
- Expanded product lines and new business generation to increase Ohio's economic output
- Enhanced state and local government revenues through expansion of the Ohio economy
- Increased employment opportunities and enhanced workforce skills
- Improved social conditions and quality of life for residents of urban and rural Ohio
- Protection of Ohio's environment and the promotion of sustainability in the state
- Protection and promotion of the health of Ohioans.

These impacts are categorized as "forward linkage impacts" which, rather than being related to institutional spending, are related to institutional mission and function. These are the impacts that Congress envisioned as benefits to be provided through the formation of the state extension

[15] Smith-Lever Act. Section 2. 1914.

programs. As will be discussed in this chapter, they constitute a broad and multifaceted array of positive economic and social impacts for Ohio.

As a service supported by the public sector, extension must fulfill economic and social needs that would not otherwise be adequately met by private sector activity. It was public need that led to the initiation of the extension program in 1914; and today, the same holds true. Table 6 shows some of the primary benefits of extension, in economic terms, as revealed by research[16]:

Table 6: Needs Fulfilled by Public Sector Provision of Extension Services

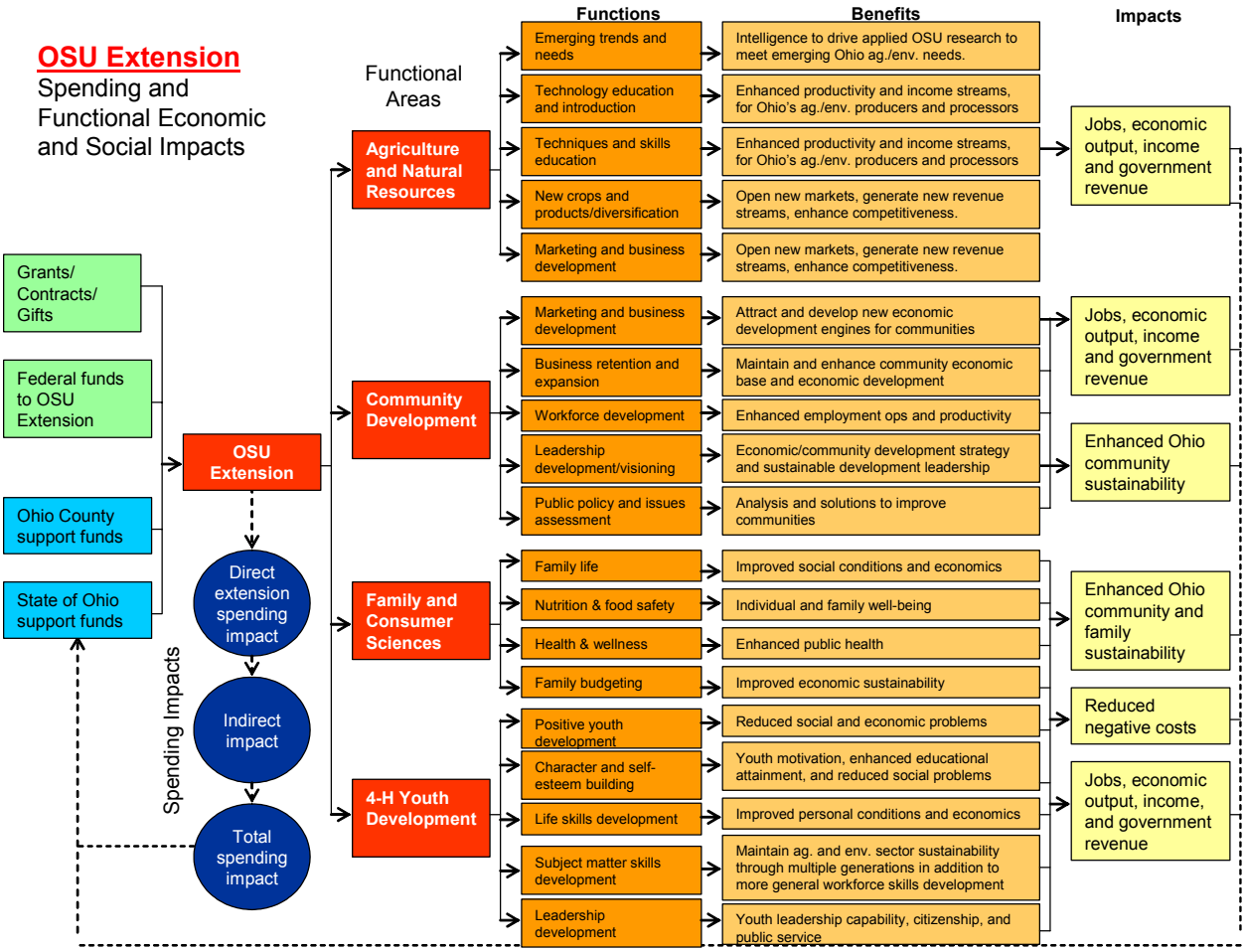
Economic Terms	Explanation	Free Market Outcome	Selected Extension Examples
Imperfect Information	When information available to consumers is poor or inadequate, the government provides information (a service) so that consumers can make better choices.	Consumers cannot make the best choices for themselves because they are inadequately informed about the products they purchase.	• Nutrition education • Soil management education for agricultural producers • Master Gardener training • Pesticide applicator training
Distribution of Resources	The government provides goods or services that address crucial concerns about fairness or justice.	Society as a whole could be better off if certain private goods were available to everyone at some minimal level, regardless of their ability to pay.	• Youth development programs in underserved communities • Nutrition education for low-income families
External Benefits (costs) from Consumption	The use of a good or service confers benefits (costs) on someone other than those directly involved in the transaction.	The consumer fails to fully consider the external benefit (cost), and consumes less (more) of the good than society desires.	• Shoreline management • Erosion control • Wastewater treatment • Youth development • Municipal waste management
External Benefits (costs) from Production	The production of a good or service confers benefits (costs) on someone other than those directly involved in the transaction.	The producer fails to fully consider the external benefit (cost) and produces less (more) of the good than society desires.	• Development of non-fossil fuels • Agricultural product development
Public Good	When it is costly (or impossible) to exclude non-payers from benefiting from a good or service and one person's enjoyment of the good or service does not detract from anyone else's.	Too few citizens pay, not enough funds are collected, not enough of the good or service is produced.	• Disease prevention and control (through home food safety for high-risk individuals and food safety training for food service industry) • Main Street revitalization • After-school programs for children • Financial literacy programs
Natural Monopoly	The more of a good or service is produced, the lower is the cost per unit to produce it.	A single company may build the infrastructure and act as a monopoly supplier.	• Knowledge generation at a research university

[16] Kalambokidis, Laura. "Identifying the Public Value in Extension Programs." *Journal of Extension*: Volume 42, Number 2.

As Table 6 indicates, extension services fulfill important public needs that would not be fulfilled, or would be inadequately fulfilled, if left completely to market forces. The fulfillment of these public needs is provided through the forward linkage functions of extension.

The forward linkage impacts of OSU Extension are delivered through four primary functional areas of service: (1) **agriculture and natural resources,** (2) **community development,** (3) **family and consumer sciences**, and (4) **4-H youth development**. Each of these four primary areas of activity contains multiple programs and initiatives that build and sustain Ohio's economic and social well-being. These principal functions and associated impact benefits are illustrated in Figure 5 and discussed in further narrative detail in the following sections of the report.

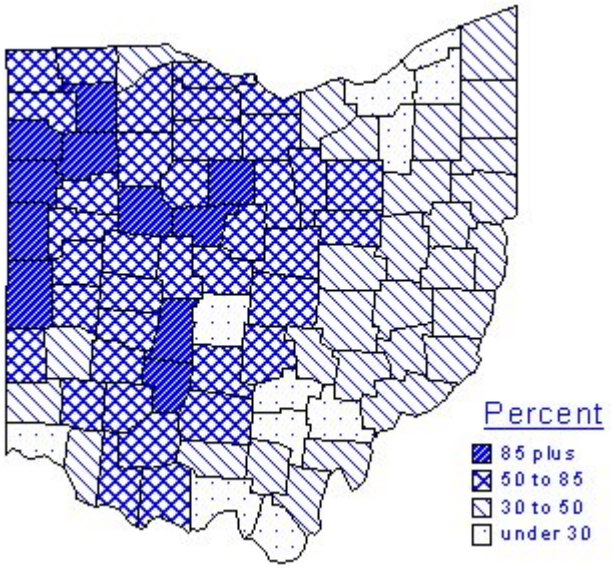
Figure 5: The Scope of OSU Extension Impacts



AGRICULTURE AND NATURAL RESOURCES IMPACTS

Agriculture is big business for the Ohio economy, comprising a vertically integrated system of *products and services for farms;* leading to *farming and associated agricultural production;* leading to *agricultural processing* and *food, fiber, and other processing industries;* culminating in *wholesale and retail distribution*. In terms of agricultural production in 2002, Ohio contained 78,000 farms covering a total of 14.7 million acres (56 percent of Ohio's total land area). The sector is present in every Ohio county (Figure 6).

Figure 6: Geographic Distribution of Farm Land in Ohio



Source: Ohio Department of Agriculture.

Thomas Sporleder of OSU recently analyzed the vertically integrated chain of the agriculture and food industry sector in Ohio. His analysis finds an overall economic output of $76.6 billion (fully 12 percent of the Ohio economy) and provision of employment for more than 1 million Ohioans.[17]

Within the rapidly changing and highly competitive global marketplace, Ohio's agriculture and related industries must operate at peak competitive efficiency—and must do so in a uniquely unpredictable production environment impacted by such significant and wide-ranging variables as

- Climatic conditions, including rainfall, amount of sunlight, high and low temperatures, etc.;
- The waxing and waning of bacterial, fungal, and viral diseases and pathogens;
- The control of insects and other pests;

[17] Sporleder, Thomas L. *OHFOOD: An Ohio Food Industries Input-Output Model – Version 6.0*. The Ohio State University Department of Agricultural, Environmental and Development Economics. June 2003.

- The maintenance of optimal soil fertility, drainage, and retention; and
- The impact of these variables on farmers in other regions, countries, and continents whose production will affect commodity prices and the Ohio farmer's return on investment.

In the 21st century, with globalization of markets and production introducing a new competitive landscape that imposes a high degree of complexity on agriculture and agribusiness, extension has become perhaps more important than ever. Local problem solving is impacted by a variety of national and global conditions that require considerable sophistication to navigate. In this context, the Ohio farmer faces an almost overwhelming series of decisions each year that may make or break his or her bottom line. What new crop cultivars have researchers developed that I should use this year? What variety will grow best and yield the highest returns? Which commodities will be in oversupply or scarce supply this year, and what effect will this have on prices? What predictive computer models should I use to guide my planting? What diseases will my crops and animals face, and what is my best approach to offset the threat of these? Should I invest in precision agriculture technology this year, and what would my return on investment be? What fertilizers and soil improvement strategies should I adopt based on my soil characteristics, crop rotation history, and recent environmental factors? What planting, harvesting, and processing technologies should I invest in to enhance my bottom line? What new crops, products, and varieties should I be considering based on changing consumer and market demands? **No other category of business faces such a variable and risky series of decisions that must be made and remade year after year—**agriculture, agribusiness, and those sectors that depend on them are unique in this regard.

Those working in these highly competitive sectors do, however, have a professional resource in Ohio to which they turn for advice, analysis, and access to the very latest in applied research—OSU Extension. Extension serves every county in Ohio, providing local, on-the-ground, applied OSU services and a full-service gateway to the intensive intellectual and R&D resources of the University, the OARDC, and its branch research stations. Through Extension, those in agriculture and related industries have access to state-of-the-art research, education, and training—access that introduces new crops, value-added products, and production technologies; improves production and processing efficiency; reduces losses to environmental and disease threats; and enhances marketing strategies and management skills.

In meeting the needs of Ohio agriculture, agribusiness, and associated sectors, OSU Extension provides the following diverse set of services.

Emerging Trends and Needs

Agricultural practitioners have so many tasks that it is impractical to expect them to stay abreast of all relevant developments in crops, livestock, value-added products, the worldwide operating environment, and emerging market opportunities. Having the capacity of Extension, backed up by the substantial knowledge-based resources of OSU, serves as an important provider of competitive advantage for Ohio producers and processors.

OSU Extension has specific ongoing initiatives targeted at keeping the Ohio agricultural and agribusiness communities updated on recent developments, technologies, and trends. The OSU Extension Web site (http://extension.osu.edu), for example, is regularly updated and maintains links to current news and issues on its homepage. In addition, Ohioline (the OSU College of Food, Agricultural, and Environmental Sciences at http://ohioline.osu.edu) maintains current

links to a broad range of information. In early December 2004, *The Scout Report,* a weekly publication offering a selection of new and newly discovered Internet resources of interest to researchers and educators, recognized Ohioline as going "above and beyond the call of duty in creating this online information resource.… Ohioline gives Web users access to hundreds of fact sheets, bulletins, and other important educational materials that run the gamut from agriculture to community development."[18]

The depth of focus that OSU is able to bring to bear on specific issues is shown in the range of specific newsletters, fact sheets, and specialized Web sites produced and maintained by OSU. Examples include the following:

Newsletters	Fact Sheets	Information on Web Sites
• *Amazing Graze News* • *(C.O.R.N.) Crop Observation and Recommendation Network News* • *Ohio Ag Manager News* • *Sustainable Agriculture Newsletter* • *VegNet News* • *BeefCattle News* • *Buckeye Dairy News* In addition to newsletters, OSU Extension regularly releases specialized and in-depth bulletins relating to specific issues or opportunities relevant to Ohio farmers and producers.	• *Agronomic Crop Disease Series* • *Agricultural Economics Series* • *Agricultural Engineering Series* • *Agricultural Law Fact Sheet Index* • *Agronomy Fact Sheets* • *ANR Series* • *Animal Sciences Series* • *Community Development Series* • *Farm Labor Relations* • *Farm Rental Series* • *Forestry Fact Sheet Series* • *Horticulture Series, HYG-1000* • *Landscape, Crop, and Household Pest Series, HYG-2000* • *Natural Resources Facts* • *Plant Disease Fact Sheets, HYG-3000* • *Pest Management Circulars* • *Sustainable Agriculture* • *Turf Series, HYG-4000* • *Veterinary Medicine Series*	• Agriculture and Natural Resources • Ohio Ag Manager • Direct Ag Marketing • Farm to Markets • Agronomic Crops Network • Crop Observation and Recommendation Network • Sustainable Agriculture • Integrated Pest Management • Ohio Forages Network • Ohio Midwest Small Fruit and Grape Net • OSU PlantFacts • VegNet • Precision Agriculture • Beef Team • Ohio Beef Quality Assurance • Ohio Bull Test • Five State Beef Initiative • Ohio Dairy Industry • Ohio Equine Program • Ohio Pork Industry Center • 4-H Animal Sciences • Department of Animal Sciences • Ohio State Veterinary Medicine • Waste Resource Management

[18] *The Scout Report,* a publication of the Internet Scout Project, Computer Science Department, University of Wisconsin. Volume 10, Number 49. December 10, 2004.

The communications opportunities provided by the above publications and Web sites are further enhanced through the direct work of the extension educators in each Ohio county. These county educators understand the specific needs and issues facing the farm and agribusiness sector in their serviced county and work to draw attention to and disseminate OSU information of particular relevance and importance to their local client base.

Information Dissemination Impacts

OSU Extension communications have been found to have positive impacts. Information in the *Crop Observation and Recommendation Network (CORN) Newsletter* **has resulted in a documented $11.3 million cost savings** through reduced use of agricultural chemicals via enhanced management practices. Newsletter reader surveys show similar effectiveness for the *GRAINS Newsletter,* where **marketing and other advice resulted in $3.8 million in gains for users of the advice**.

Within the nursery and landscaping sector, more than 2,000 survey respondents attributed **$3.4 million in savings through the implementation of advice and recommendations contained in the *Buckeye Yard & Garden OnLine (BYGL)***. This publication achieves a broad reach, with the 2003 *BYGL* reaching more than 1.1 million Ohioans.

Technology Education and Introduction

For American agriculture and agribusiness to survive against intense global competition, they must sustain increasing productivity returns from scarce land and production resources. Only by sustaining high levels of productivity can American industry compete against low-cost international producers and earn the revenues required to sustain high incomes and the high standard of living to which Americans are accustomed. Increasingly, the U.S. economy's productivity position is being driven by "knowledge" and technology. Major R&D-based discoveries in plant and animal sciences, information technology, engineering, chemistry, etc., are being applied to agbioscience and agriculture to achieve increasing returns from resources. Agriculture and agribusiness in the United States have become "high-science" industries, dependent on access to the latest research and technologies to maintain their competitive edge.

OSU Extension plays a critical role in this 21st century operating environment—providing access to R&D-based technological innovations, experienced research faculty and applied scientists, and a variety of training and education programs designed to keep Ohio's producers at the leading edge of high-productivity technologies and innovations.

Extension has also paid special attention to the development and dissemination of software tools aimed at helping farmers evaluate potential decisions. Models including AgRisk, Managing Risks and Profits via DTN, and FarmDayta are newly developed examples of OSU's work in this area. Rapid response to changing market and growing conditions is also important, and OSU Extension emphasizes electronic information delivery to its clientele to speed knowledge delivery and increase the utility of the provided information.

Techniques and Skills Education

Technology provides one set of competitive advantages, but OSU's R&D, and the R&D of other land-grant and research institutions throughout the United States, also provides important breakthroughs in the technique and science of agricultural production and processing. Concepts such as crop rotation strategy, soil quality management, the timing of planting, the application of fertilizers, and the use of biologics in animal husbandry are knowledge-diffusion and education issues, not pure technology issues. OSU Extension thus serves an important role as an educator and advisor to the agricultural and processing sectors in Ohio, working to keep Ohio's producers ahead of the curve in terms of practical skills and modern production techniques.

Knowledge Diffusion Impacts

Extension specialists provide a wide variety of knowledge diffusion and education services. These educational and training initiatives have the potential for substantial impacts. Livestock, for example, represented a $1.9 billion industry for Ohio in 2001; but, it is threatened by severe losses through disease outbreaks. **OSU Extension is at the frontline of training farmers in disease prevention, awareness, and treatment, helping to suppress disease-related losses that currently average 17 percent of production costs in livestock nationwide.**

OSU Extension's Ohio Agronomic Crops Network similarly works to positively impact the knowledge and expertise of crop producers in the state. **The CORN Web site receives an average of 58,000 hits per month** and is instrumental in apprising Ohio producers of current disease and pest risks, diagnoses, and associated actions. One study in 2001 found that **weed control recommendations provided by Extension resulted in increased corn yields of more than 2.5 million bushels and a 1-million-bushel increase in soybean yield.**

New Crops and Products/Diversification

The OARDC and OSU Extension provide an integrated service to research, develop, test, and introduce new and enhanced crops and products for the agricultural sector in Ohio. Services range from development of enhanced strains of existing crops (having enhanced disease resistance, increased yield and quality characteristics, for example) to the introduction of completely new crops, livestock, and value-added products. Currently, Ohio farmers are seeing income increased through enhanced strains of soybean, wheat, corn, tomato, and vegetable crops. In addition, diversification is being achieved through the development of aquaculture, grape and wine production, and horticulture products. In the future, research at the OARDC and OSU is anticipated to produce new opportunities in bioresource-based energy; fiber products; biopharming; and the development of chemicals, proteins, and other materials through plant and animal pathways.

The introduction of new crops and products for Ohio agriculture is no simple task. It has to be facilitated through OSU Extension's network of practitioners, scientists, and field staff who can advise producers on the best path to take, help them analyze the suitability of their land to new production requirements, evaluate the marketability and revenue potential from new or enhanced products, and plan their introduction.

Example: Dissemination of New and Enhanced Crops for Ohio's Farmers

Research by Battelle has documented the combined impact that OARDC research and OSU Extension field introductions and training have in the area of soybeans in Ohio. Soybeans are a staple crop of Ohio farming, accounting for more acreage of farmland than any other crop in the state. Soybeans are also very sensitive to regional variation in growing environment, and OARDC and OSU Extension play a critical role in developing Ohio-specific varieties and training Ohio's farmers in their application.

Since 1985, Extension has worked with OARDC in the dissemination of 19 varieties of soybeans specially adapted to thrive in Ohio growing conditions. In 1994, OSU varieties accounted for 34.5 percent of all soybeans grown in the state. In 2002, 6.4 percent of Ohio soybeans were OARDC releases, with this lower percentage resulting from the quick adoption of Monsanto's "Round-Up Ready" soybeans—currently OARDC is working on introducing the Round-Up gene into more custom-tailored soybeans better suited to Ohio's conditions. At the lowest OSU variety usage rate of 6.4 percent, the impact is still significant. **Battelle calculated that $72.5 million in direct farm output resulted from this percentage adoption, while an additional $118.5 million was generated for the Ohio economy via indirect impacts (a total of $191 million)**. Battelle also calculated the estimated impact of the enhanced productivity resulting from OSU soybean releases and found that, even at a conservative 5 percent enhanced productivity, this resulted in an average of almost $10 million per year in enhanced income for Ohio farmers during the period 1986 through 2002. In actuality, OSU varieties have achieved a 15 percent productivity increase per acre since 1985, meaning that the **positive additional revenue benefit to farmers would average $30 million annually across the state.**

OSU research has had a similar impact on a variety of other crops for Ohio's farmers. Since 1991, OSU has released 17 varieties of tomatoes and tomato germplasm—providing specialized varieties that are resistant to bacteria and well-suited to Ohio growing conditions. **In 2002, Ohio achieved 24 percent greater yield of tomatoes per acre than the national average.**

Marketing and Business Development

The agricultural sector in Ohio comprises many thousands of, mostly small, businesses. These businesses have to operate in a multitask environment—performing functions in soil science, environmental resource management, equipment maintenance and repair, planting, animal care and nutrition, chemical management, pest and disease management, harvesting, storage, and distribution. In some cases, producers also will be involved in product processing and other activities designed to realize added value from their initial output. On top of its scientific and engineering aspects, a farm also operates as a business. With this comes the issues and responsibilities of financial management, personnel management, and sales and marketing.

Extension provides an important education, training, and support role for those in agriculture, agribusiness, and associated sectors—working with producers and processors to help them grow, sustain, and enhance the profitability of their businesses.

Other Examples

Clearly, the effects of OSU Extension on agriculture, agribusiness, and associated sectors in Ohio are many and widespread. It is neither possible nor feasible to assess the impact of each and every initiative and program provided by Extension and its individual county educators. Instead, the types of forward linkage impacts generated are considered by Battelle through examination of some specific case studies.

Example: Diversifying the Farm Product Base—OSU South Centers (Piketon)

OSU South Centers have been leading multiple initiatives aimed at diversifying the product and income base of Ohio agriculture. Particular recent attention is being paid to diversified crops, livestock, and products that will help sustain the thousands of small farms spread across Ohio. Aquaculture is one of the focus areas at the South Centers, with work on yellow perch and freshwater prawn production. In 2002 and 2003, eight private farms worked with the Centers in prawn research trials, where it was found that, over a 120-day production cycle, fresh market prawns could be produced with a market value of $10 per pound. Yellow perch is proving to be a similarly profitable crop for the multiple Ohio farms now moving into production. OSU South Centers has assumed a leadership position in aquaculture, teaching current and potential Ohio fish farmers new technology in aquaculture production, marketing, and business development.

A steadily rising demand for goat meat has resulted in Extension work to promote the rearing of meat goat herds in southern Ohio. Goats can thrive on low-quality forage, bringing marginal farmland into profitable use. In 2004, approximately 250 southern Ohio farms began to raise meat goats for supplemental farm income.

Example: Ohio Berry Production

A number of trends have favored a movement to berry production on Ohio farms, with steady growth in the industry experienced since 1997. OSU Extension has been instrumental in leveraging OARDC research to assure that berry farmers in Ohio have the knowledge they need to plant the best varieties of berries for Ohio soil and climate conditions. In the case of crops such as blueberries, being among the first to market is important for achieving a premium price. Ohio's berry farmers now have the varieties they need to harvest earlier than other leading producers in Michigan and on the East Coast.

Recent data on the health and anticarcinogenic properties of berries are leading to an increase in demand, and berry crops are proving to be suitable for replacing tobacco and other products experiencing declining demand. Since 1997, Ohio has seen a steady increase in the acreage of farmland moving into berry production (including straw-berries, raspberries, blackberries, and blueberries). In 1997, strawberries were grown on 801 acres in Ohio, and by 2003, this had increased to 1,300 acres. Similar growth was experienced in raspberries (245 acres in 1997 increasing to 427 acres in 2002), blackberries (56 acres in 1997 rising to 163 acres by 2002), and blueberries (200 acres in 1997 rising to 295 acres by 2002). OARDC and OSU Extension have helped Ohio's berry producers focus on quality as a means to achieving a price premium over competing berries. A 2001 survey found that Ohio raspberry producers, for example, were receiving between $2.55 and $3.25 per pound for their raspberries, versus the traditional Washington and Oregon growers who received between $0.45 and $1.39 per pound.

Battelle Calculates the Impact of a 1 Percent Increase in Ohio's Agricultural Output

Extension clearly provides a diverse range of product development, technology transfer, training, education, and advisory services for Ohio's agricultural sector—but, what overall effect might this have? One way to generalize the potential for positive impacts on Ohio is to calculate the impact on the state of a 1 percent increase in agricultural output. Then, the output impacts for various estimations of OSU Extension impacts can be produced.

Using IMPLAN input-output data, Battelle calculated that **a 1 percent increase in agricultural output in Ohio has the following impacts:**

- **$149 million in direct and indirect output**
- **$29 million in personal income generated for Ohioans**
- **2,712 jobs created.**

It also should be noted that expansion of the agricultural sector has benefits that can be felt in every county in the state. Agriculture and associated processing industries are highly diffused across every Ohio county; therefore, the direct and indirect effects of expansion in the sector are felt much more widely than would be the case with more narrow, geographically focused sectors.

COMMUNITY DEVELOPMENT IMPACTS

While 56 percent of Ohio's surface area is agricultural land, 44 percent is dedicated to other state, community, and commercial uses. OSU and OSU Extension are also active researchers, service providers, and development advisers for this nonagricultural land area. OSU Extension's community development work helps local governments and communities investigate and create viable options for economic and community development. From small rural communities to Ohio's largest cities, OSU is active in the applied delivery of service and assistance.

While the American economy is firmly rooted in free enterprise, this competitive system, by its very nature, produces extremes of success and failure. Just as the 19th and 20th centuries saw a powerhouse industrial nation emerge from an agrarian societal base, so too is the 21st century bringing dramatic change as the economy shifts to an information- or knowledge-based, technologically driven platform. As economic adjustments take place, some communities immediately prosper; but, many others face great challenges in altering their economic base and structure to fit into the New Economy. The rhetoric of the recent Presidential elections served to highlight Ohio as a microcosm of both the challenges of the New Economy (with significant declines in manufacturing jobs) and the opportunities that the New Economy presents (represented by Ohio's strong R&D base and emerging technology sectors).

OSU Extension plays an important role in helping communities adjust to changing economic conditions. Through multiple initiatives (in new business development, business retention and expansion, production of development strategy, marketing and community promotion, workforce development, public policy assessment, and leadership development), OSU Extension provides development assistance to communities in every Ohio county.

Extension's community development work is delivered in much the same way as its agricultural services. Extension field staff, on the ground in Ohio counties, works to identify community development issues and needs that may be addressed by OSU's multilayered resources. Extension provides a range of communications materials and information sources dedicated to community development in Ohio, including bulletins, fact sheets, and multiple Web sites such as the following:

Community Development Publications	Community Development Information on Web Sites
• *Briefings in Community Economics* • *Small Business Series* • *Industrial Attraction Series* • *Land Use Series* • *Environment Series* • *Environment Info for Developers Series*	• OSU Extension Community Development • OSU Extension Data Center • OSU Extension Leadership Center • Ohio Business Retention and Expansion Initiative • Economic and Fiscal Impact Analysis

The community development work of OSU Extension can be categorized in multiple ways. However, five categories of activity appear to capture the majority of work being performed by OSU Extension in community development: (1) marketing and business development, (2) business retention and expansion, (3) job training, (4) leadership development and strategic visioning, and (5) public policy and issues assessment.

Marketing and Business Development

Business development is a key component of successful economic development. Through expansion of the employment base, and the development of high-productivity, high-wage positions, communities in Ohio can build long-term economic prosperity and sustainability. OSU Extension is an active participant in the provision of training and tools for local Ohio business development initiatives and has taken a leadership position in increasing the professionalism of business development approaches in the state.

OSU Extension's work in business development and marketing comprises three main sets of activities: (1) community visioning and planning for development, (2) business development and recruitment programs, and (3) the development of a marketable community image and associated marketing materials.

Work in community visioning and planning provides the platform for mission- and data-driven professional economic development. Through instruction and training programs in comprehensive plan development, land use planning, sustainable development practice, development strategy, and organizational structure for development delivery, OSU Extension builds the basis for strategic actions at the regional, county, and local municipality level.

Almost every community in America pitches itself as a "great location for business," and entire publications such as *Area Development* and *Plants Sites & Parks* are filled with advertisements from localities and communities claiming to be prime locations for consideration. Against this highly competitive background, it is imperative that a community focus its work in business recruitment and development to build upon a solid understanding of its strengths and "marketable offerings." OSU Extension provides training,

Land Use Development and Comprehensive Planning

Counties where OSU Extension has been active, during the past 3 years, in the delivery of education and training for land use development and comprehend-sive planning include the following:

- Adams
- Brown
- Carroll
- Columbiana
- Crawford
- Coshocton
- Fayette
- Fulton
- Highland
- Huron
- Lorain
- Marion
- Morrow
- Noble
- Portage
- Van Wert
- Wyandot.

planning, and development services that help Ohio communities improve their development performance. The OSU Extension Industrial Site Development and Marketing Program helps communities to thoroughly understand how an industrial firm reviews sites, what qualities firms seek within industrial sites, and how they fit within the overall State of Ohio attraction system. By helping community leaders gain a better understanding of the requirements for competitiveness and develop recruitment strategies, a community's chances for development success are improved.

The OSU Extension First Impressions Program also is helping Ohio communities understand and prioritize improvements required to enhance their image and attractiveness to new businesses, tourists, and other income generators. The program facilitates the matching of communities with one another for objective third-party review and recommendation sessions. Communities completing or engaged in the First Impressions Program are spread across Ohio and include Ashville, Baltimore, Caldwell, Carrollton, Gallipolis, Holmes County, Logan, Marion, Morgan County, Mt. Gilead, New Matamoras, New Philadelphia, New Richmond, Norwalk, Ottawa, Pomeroy/Middleport, Rio Grande, and Van Wert.

Several additional OSU Extension programs are contributing to overall community business development in Ohio. For example, Extension is providing training in economic and fiscal impact analysis techniques so that communities can quantify the positive effects of new investment and the potential negative impacts of business downsizing or closures. Extension is also providing a valuable coordinating and quality control service in helping communities develop professional marketing materials, promotional brochures, and communications materials.

Business Retention and Expansion

While business recruitment and new business formation often receive the most attention in economic development, it is extremely important for communities to realize the primary importance of retaining and expanding existing enterprise. Research study findings vary in the percent of new employment generated in communities by existing firms; but, in almost every study, the percent has exceeded 50 percent and often run as high as 70 to 90 percent. Despite the importance of business retention and expansion, economic development groups and communities have often approached it haphazardly. OSU Extension has been instrumental in providing training, planning, and strategic services designed to increase the professionalism of recruitment and expansion initiatives in the state.

The flagship OSU Extension program is the Ohio Business Retention and Expansion (BR&E) Initiative. The BR&E initiative has been designed by OSU Extension to provide "the resources, training, and tools that streamline and automate the BR&E process so local leaders and economic developers can focus on planning, action, and results."[19] The initiative, sponsored by OSU Extension and managed within the OSU Department of Agricultural, Environmental, and Development Economics, serves as a resource for education, training, and research assistance to help communities identify and address opportunities and issues that directly or indirectly impact their regional and local economies. Via BR&E programs, Ohio's economic development professionals are shown how to use business and worker surveys to define the strengths and weaknesses of the local economy. Resulting survey data are then used by community leaders in

[19] http://brne.m2ns.com/

prioritizing, developing, and implementing actions and policy that best address the needs of local firms.

To assist communities with the establishment and ongoing operation of professional retention and expansion programs, OSU Extension provides a range of resources and tools, including the following:

- BR&E training courses
- A comprehensive handbook
- Pre-tested survey questions
- Data entry and analysis software
- Online access to report templates, surveys, and forms
- Program support.

By adopting a formal approach to business retention and expansion, communities reap multiple benefits. First, the analytical phase builds an in-depth understanding of community economic and general business conditions—understanding that forms a platform for work to sustain the good and generate improvements in areas of need. Likewise, the research phase also builds relationships between the economic development community and business and workforce leaders, strengthening local bonds and providing a trusted basis for dialogue. Work to improve local business conditions not only serves existing enterprises, but also improves the marketability of the community to external firms and entrepreneurs. Professional BR&E programming is thus a critically important component in a comprehensive and integrated economic development delivery system.

Since its establishment in 1986, the OSU Extension–sponsored BR&E initiative has provided assistance to more than 120 Ohio communities.

Successful BR&E Initiatives in Ohio

Carroll County

The Wingfoot Film Corporation decided to reinvest $7 million and add a new product line at its existing Carroll County site rather than at an out-of-state site. The expansion added 25 jobs to the existing 115 to 120 employees.

Jefferson County

When it lost its largest customer, a Jefferson County business needed to diversify its lines and find new markets. The business was awarded a grant from the Ohio Department of Development's Ohio Industrial Training Program to cover some of the retraining costs. Probable layoffs among the existing 35 employees were avoided, and nine new jobs were created.

Putnam County

Philips Display Components, the county's largest manufacturing employer, with 2,041 employees, was offered an enterprise zone and incentive package on its $24 million expansion project. As a result, the business made a 10-year commitment to stay in the community at its 40-year-old site. The BR&E survey identified expansion of 13 manufacturing businesses and the creation of about 300 new jobs. Following the BR&E program, the county attracted a Canadian freezer manufacturer (creating 130 new jobs) and a Japanese-U.S. joint-venture steel-galvanizing plant.

Washington County

A chemical workers' training program was created through the cooperation of the local technical college, the Job Training Partnership Act, the Ohio Bureau of Employment Services, and the Ohio Department of Human Services. The program enabled a business to hire local residents to fill 40 new positions. The program was later expanded to a 2-year degree program at the technical college.

Eastern Ohio Development Alliance (EODA)

EODA, a 14-county cooperative economic development effort, is the direct result of the BR&E program. Most of the counties in EODA have conducted BR&E programs, and their findings and leadership networks were used to develop linkages among area businesses.

Workforce Development

In the competitive 21st century economy, having a good job, with a family-sustaining wage, requires skills. Unskilled jobs are hard to find, pay low wages, and often offer no benefits.

Those with solid educational attainment and the ability to participate in lifelong skills development and learning activities will be best equipped to thrive in the New Economy.

In this new, highly competitive economic environment, the work of those who provide education, training, and "reskilling" services is more important than ever. Extension was originally founded with a mandate to train people in new technologies, techniques, and agricultural practices; that mission continues today with a broad range of job training and skills development services provided through OSU Extension.

The 1914 Smith-Lever Act stated that "*cooperative agricultural extension work shall consist of the development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies."* Based on this set of goals for extension, OSU Extension dedicates significant resources to training and instruction. OSU Extension's training runs from detailed agricultural practitioner courses to skills improvement in urban settings. Some examples of the range of courses and instruction projects undertaken by OSU Extension include the following:

Practitioner Courses	General Courses
• Global Positioning Satellite Systems • Pesticide Application • Equipment and Work Practice Safety • No Till Agriculture • Livestock Management • Composting and Manure Management • Pruning • Precision Agriculture • Crop Rotation and Management • New Fields, such as Aquaculture, Viticulture, etc.	• Keyboard Skills • Computer and Internet Skills • Communications • Management • English for Non-Native Speakers • Food Preparation and Safety • Child Care • Job Preparation Skills and Interviewing Techniques

Given Extension's 4-H heritage, and its work in inner city communities, it is not surprising to find job training programs focused on youth. At OSU Extension in Cuyahoga County, for example, OSU Extension reached 1,043 youth with a program of "life skills and development, including leadership and communications skills" and provided a workforce preparation skills program to 287 youth. Similar initiatives are provided to the adult low-income population, with 140 Cuyahoga County low-income residents trained in pre-employment skills.

At the other end of the training spectrum, OSU Extension provides in-depth training programs in highly specific skills for agribusiness and business practitioners. Within agriculture, for example, Extension is providing courses in fields as diverse as plant pest diagnostics, pesticide application techniques, and precision agriculture. Extension also is providing management and other business skills to those in, or entering, management positions in business.

OSU Extension also offers training through the OSU Learning Centers, which are designed to extend the University and its resources beyond the traditional campus and out into communities. Education is provided via credit and noncredit courses and facilitated using distance learning, videoconferencing, and high-speed Internet connectivity. The OSU Learning Centers, under the leadership of Extension, have incorporated the creation of three regional Learning Centers

(Piketon, Caldwell, and Franklin County). Through these Learning Centers, a wide range of educational opportunities are being offered, facilitated by OSU's communications technology, in partnership with various OSU colleges and departments.

Example: OSU Extension Training

The Alber Enterprise Center, which receives funding from OSU Extension and Jobs Challenge funding from the Ohio Board of Regents, provides noncredit training and workforce development services for business and industry in Ohio. The Center, based on the Marion campus, is the corporate education center of OSU, providing workforce training, organization development, and performance improvement techniques. It focuses on working with business and industry by creating customized training, which allows it to incorporate individual companies' objectives and preferences into design, implementation, and evaluation processes.

Computer, workforce development, and other life skills classes are offered through a partnership between OSU Extension, the College of Education's Center on Education and Training for Employment (CETE), and the Godman Guild Association in Columbus.

The Technology Access for Better Learning and Employment (TABLE) project, which was funded by a grant from the national Department of Education, began in October 2002. The grant specifically funds a community technology center, which provides disadvantaged residents with access to information technology and related training. The goal of the TABLE project is to provide education and employment training for at least 400 residents who live in empowerment zones, which are federally designated areas that have residents with lower education and higher unemployment rates than other areas in Columbus. The center helps residents earn their general equivalency diplomas or, with job training, pursue postsecondary education or become more computer literate.

Leadership Development and Strategic Visioning

Along with specific job skills training, OSU Extension operates multiple programs and initiatives aimed at increasing leadership capacity in the state. Many Extension leadership programs focus on building capacity in nonprofit and local government service, with specific programs including the following:

- **Project EXCEL: Excellence in Community Elected and Appointed Leadership**—This is a personal and team development program for existing and emerging leaders in Ohio's local communities. The coursework covers topics including Personal Leadership Assessment, Situational Leadership, Conflict Management and Dispute Resolution, Problem-Solving in Teams, Communications, Short- and Long-Term Planning, and Foundations for Organizational Development. The EXCEL project's designers note that its primary objectives are to (1) provide opportunities for people to assess their individual public leadership and personal development needs, (2) develop a logical continuing education program for local leaders based on assessed needs, and (3) assist them in locating educational resources including OSU Extension. Services include individual assessment, individual and group curriculum development, consulting, teaching, and networking.
- **Public Boardmanship**—This program seeks to enhance the leadership capability of those with public board responsibility. It provides members of public boards with training to help them manage their responsibilities and uses the following teaching modules: Recruitment, Retention and Training, Successful Board Meetings, Professional Presentations, Financial Issues, Funding Sources, Strategic Planning, and Relationships Management.
- **County Commissioners Assessment Center**—This program works to enhance the capabilities of Ohio's county commissioners. OSU Extension specialists worked with a group

of existing commissioners to identify duties, tasks, and competencies necessary for the position of Ohio county commissioner. Using this job analysis, an expert panel of county commissioners and OSU staff identified 15 behavioral dimensions as a basis for the assessment center. The center uses real-world scenarios to help train commissioners in leadership and decision making. The program has been very well received, and now Extension staff are working to expand the assessment center concept to reach more of Ohio's emerging and existing public leaders. Mayors, trustees, school board members, Chamber of Commerce directors, and other influential local leaders are among those being targeted for the development of specific assessment center experiences.

Leadership skills development is also an integral component of 4-H programs, discussed in further detail later in this chapter.

Public Policy and Issues Assessment

As the local gateway to the resources of the University, OSU Extension is able to provide and direct multiple services that help communities deal with policy issues and other issues of public sector interest. Some of the primary areas in which OSU Extension provides assistance to the public sector include the following:

- Data services
- Community services
- Public safety and health
- Environmental preservation and waste water management
- Community natural resource education.

In the data services arena, Extension maintains the Data Center that serves the data and information needs of OSU, OSU Extension, the OARDC, and Ohio's citizens. The Data Center is a member of the Ohio Data Resource Network, a cooperative venture of the U.S. Census Bureau, the Ohio Department of Development's Office of Strategic Research, and multiple other agencies and organizations throughout Ohio. Table 7 lists some of the data-related services that OSU Extension offers.

Table 7: OSU Extension's Activities and Goals Related to Data Services

Program or Initiative	OSU Extension Goals
Using GIS as an Economic Development Tool	Using OSU resources, Extension is able to provide instruction in the use of GIS for economic development and local government applications.
Retail Trade Area Analysis	OSU has developed specific tools for retail market analysis and, through Extension, provides access to these resources for existing retailers and for use as a tool in retail attraction.
Community Development Data and Graphics	OSU's database of spreadsheets and maps is made available through Extension to give decision makers across Ohio access to secondary data that might be helpful for informed decision making.
Barn Again–Barn Rehabilitation and Re-utilization Workshops	OSU works to raise interest in preserving, rehabilitating, and converting existing farm buildings to meet modern economic needs.
Growth Management Policies	This Extension program enables local community leaders to become aware of land-use planning and growth management policies that can inform community land-use decision-making strategies.

Table 7: OSU Extension's Activities and Goals Related to Data Services, continued

Program or Initiative	OSU Extension Goals
Marketing the Community	Under this program, OSU Extension assists local leaders in how to evaluate and develop a community marketing program. The program encourages communities to consider the needs of business as the base for their marketing plan and to develop an appropriate community image.
The Exurban Change Project	This project provides analysis of economic, social, agricultural, and land-use changes in Ohio with a focus on exurban areas of the state. The overall goal is to perform applied research and to disseminate data and research results to local officials, professionals, and interested citizens to support their planning and decision making.

In the area of public safety and health, a major focus of OSU Extension programs has been placed on safety initiatives. From a base of knowledge in food safety and public health, OSU Extension has branched out in its safety initiatives to include programs specific to safety and health on the farm and in agricultural work and to highway safety for the buggies of Ohio's significant Amish population.

Similar efforts are being made in providing information to create a more sustainable environment in Ohio, especially in terms of vital water resources. Table 8 lists several OSU Extension initiatives that focus on water management and resource preservation.

Table 8: OSU Extension's Activities and Goals Related to Environmental Preservation and Wastewater Management

Program or Initiative	OSU Extension Goals
Water and Watersheds Information Sheet	This includes general information regarding OSU and the latest research relating to water and watershed management and descriptions of specific programs and initiatives.
Nonpoint Source Pollution—A Terminology and Programming in Ohio	This program provides a primer on Nonpoint Source Pollution in Ohio, with particular emphasis on terminology, processes, and organizing local activities to address local problems. Terminology is provided, together with an introduction to best management practices and how to identify and address water quality issues locally.
Ohio's Drainage Laws	This program provides an overview of Ohio's drainage laws, background to the present laws, insight on cases that have prominent stature in Ohio courts, and summary of the legal rights of landowners who want to resolve drainage disputes.
Ohio Management Systems Evaluation Area	Ohio contains one of five federally supported Management Systems Evaluation Areas (MSEA) for addressing water quality issues. The MSEA emphasizes research, evaluation, and technology transfer related to agricultural impacts on ground-water quality. OSU Extension provides introductions to the research and extension activities associated with the Ohio project and the other four U.S. MSEAs.

Table 8: OSU Extension's Activities and Goals Related to Environmental Preservation and Wastewater Management, continued

Program or Initiative	OSU Extension Goals
Water Systems for Small Communities	Under this program, Extension helps officials of the many small communities throughout Ohio that have no or substandard water systems. Extension provides specific education pertaining to water supply alternatives, water treatment and distribution principles, assessment of community needs, operation and management requirements, and available resources.
Wastewater Treatment Alternatives for Small Rural Communities	This Extension program is similar to the above, but focused on wastewater treatment and management alternatives.

Extension's work with water is reinforced by five dedicated Extension Watershed Agents. These agents, as part of the Ohio Watersheds Initiative, work with agencies, local communities, government, and the public to assure appropriate actions in Ohio's eight major watersheds.

OSU Extension also works to provide information for public decision making and public policy on broader environmental issues. Initiatives relating to the environment range from individual consumer education (such as backyard composting and other waste options) to community-wide and public initiatives. While much of OSU Extension's environmental policy and issues management work is directed at public decision makers and officials, Extension also provides a series of environmental education courses and programs that help the general public be better stewards of environmental and natural resources. This, in turn, provides an enhanced quality of life for all in Ohio and promotes the public good. Table 9 lists current programs offered through Extension in these areas.

Table 9: OSU Extension's Activities and Goals Related to Community Natural Resource Education

Program or Initiative	OSU Extension Goals
Backyard Composting	This program works to help reduce residential waste streams through composting technology. The program helps consumers understand the position of organic wastes in solid waste, comprehend the basic science of biological degradation, and learn the simple holding-bin approach to composting.
Community Composting	This program helps communities and municipalities prepare approaches to composting. The Extension program introduces the social/political dimension of large-scale composting, provides a basic understanding of the science and technology of large-scale composting, and discusses various implementation options.
Don't Bag It	This consumer-oriented Extension program provides information and education regarding the composting/mulching of grass clippings—again with the goal of reducing community waste streams.
Household Hazardous Waste for Teachers	This Extension initiative trains teachers to use exercises in reducing household hazardous waste as core elements of the science curriculum.

Table 9: OSU Extension's Activities and Goals Related to Community Natural Resource Education, continued

Program or Initiative	OSU Extension Goals
Low-Level Radioactive Waste Education Program	Extension takes an active role in providing fact-based education and information regarding low-level radioactive waste. This allows communities to make informed decisions regarding the handling, transporting, and processing of low-level radioactive materials.
Packaging Education Program	This OSU Extension initiative provides consumers with information regarding packaging and the large burden it places on waste management.
Solid Waste Management Education	The educational program in solid waste provides an array of resource packages and programs for county agents to use in local settings. Objectives vary from program to program, but include empowering citizens to make personal decisions regarding solid waste and identifying the individual's role in contributing to the problems and solutions for solid waste.
Solid Waste Policy Education Program	This is an initiative aimed at giving local officials and government leaders a solid base of understanding relating to solid waste management issues and policy options.
Used News for Animal Bedding	This OSU initiative promotes recycling newsprint for use as animal bedding rather than discarding it into the waste stream.
Trees for Holidays; Trees for the City	Yard waste is banned from Ohio landfills, so the disposal of Christmas trees after the holidays has begun to pose a problem. This OSU project seeks to promote the use and subsequent planting of live trees.
The Invisible Environment	OSU Extension works to inform the public and decision makers of the science and facts behind environment-related health issues.

Other Examples

Some specific examples of OSU Extension's work impacting community development are discussed below:

Example: Incubators

OSU Extension is helping to facilitate enhanced entrepreneurship and new business development in Ohio through the development and operation of business incubator facilities. At the **OSU South Centers, the Endeavor Center** is under construction with $4.5 million provided by grants from the U. S. Department of Commerce Economic Development Administration, the Ohio Governor's Office of Appalachia, and the U. S. Department of Agriculture. Local matching funds for the grants are being provided by OSU Extension, Ohio Agricultural Research and Development Center, Southern Ohio Diversification Initiative, and Scioto County's Office of Economic Development.

The Endeavor Center will offer space for the operation of up to 26 entrepreneurial ventures. In addition to space, the Center will provide assistance to and education and training of entrepreneurs, small business owners, the existing workforce, and young graduates. The Center will serve new and expanding businesses within Ross, Pike, Jackson, Scioto, and adjacent counties.

In Columbus, OSU and Extension have been instrumental in the development of the **Science and Technology Campus Corporation** (Scitech). Scitech includes new and renovated properties on the West Campus of OSU and

was developed to facilitate the commercialization of new technologies (especially those emanating from OSU) and to promote applied R&D with commercial uses. Scitech operates as both a research park and new-business incubation center, serving to link "academic technical expertise with cutting-edge commercial technology-based innovation. In this way, the campus is able to provide an environment for cooperative alliances between commercial research and development and corresponding concentrations of research effort at OSU that would not otherwise be possible." Scitech has been especially concentrating on the commercialization of innovations stemming from life sciences, information technology, and physical science R&D.

Finally, on the **Wooster Campus of OARDC**, plans are being developed to create an incubator/commercialization center, in concert with ATECH activities, to foster the creation of new businesses stemming from innovative discoveries within the agbioscience field.

Example: SBDC/MSBDC

The Small Business Development Center (SBDC) program's goal is to help existing businesses develop and retain a competitive economic advantage in the ever-changing global economy, and to help entrepreneurs successfully launch new business enterprises. SBDCs and their manufacturing-dedicated equivalent, MSBDCs, operate nationwide to enhance economic development. In Ohio, the OSU South Centers, for example, is the operator of a multicounty SBDC/MSBDC program.

Example Projects:

AgriEnergy Limited of Pemberville, with assistance from the OSU Extension Agricultural Business Enhancement Center, is leading an initiative to explore utilizing biomass as an energy source for heating greenhouses and warehouses. AgriEnergy has been awarded approximately $43,000 from the USDA Rural Development Grant Program to support the initiative.

A manufacturer of custom-sized replacement windows worked with the Ohio Manufacturing SBDC at the OSU South Centers, the TechSolve Ohio Edison Center, and Shawnee State University. Thanks to an Ohio Enterprise grant program from the Ohio Board of Regents, the company hosted an on-site Lean Simulation. As a result, the company was able to address production inefficiencies and realize significant improvements in process time, inventory flow, and work flow. The company presently employs 70+ personnel.

FAMILY AND CONSUMER SCIENCES IMPACTS

One of the core elements of extension service envisioned in the original Smith-Lever Act was the *"development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices or technologies in … home economics … and subjects relating thereto."* Extension was conceived not only as a technological and educational institution for agricultural practitioners, but also a provider of resources that would strengthen American family life and communities. Today, that original vision of extension as a supporter of families is very much alive.

At OSU Extension, the Family and Consumer Sciences division operates a wide range of programs aimed at supporting and improving life across the full-range of Ohio's rural and urban communities. Urban programs aim at providing a stabilizing influence and helping achieve positive economic gains for families in low- and moderate-income neighborhoods, while

Extension's work in rural communities is targeted at helping families and communities adjust to competitive pressures and social change.

Family and Consumer Sciences programs at OSU Extension are used to help Ohioans address a range of issues, including building stronger families, improving nutrition and food safety, enhancing health and wellness, and managing family budgets and financial resources.

As the 21st century moves America forward toward a knowledge- and skills-based New Economy, the preeminent importance of human capital is being recognized. Social challenges, threats to the family, and urban and rural poverty continue to reduce the capacity of many Americans to reach their full potential. For Ohio to thrive in the New Economy, it is crucial that its population have the well-grounded social net, work ethic, and support services that form a stable life platform upon which personal progress may be built. Single mothers struggling to make ends meet, educational dropouts, youth at risk, and those drawn into crime and self-destructive behavior represent valuable opportunities and human assets lost. Indeed, in many instances, these groups become costs to society. When set against this background, the work of Extension in Family and Consumer Sciences is perhaps more relevant and needed than it has ever been.

Family Life

One of Extension's core missions is to help "build strong families through better parenting skills, conflict management skills, and shared values."[20] It is well recognized that the family dynamic within this country has significantly changed over the last several decades, and furthermore, it is anticipated to continue to change over the decades to come. For instance, more blended families than families of first marriages will exist in the future. Already today, more than 59 percent of children will live in a step-relationship before they are 18 years old. Yet, our society provides no guidelines for the transition into a blended family.

To this end, OSU Extension provides programming related to parenting, family management, seniors, and child care provider training in an effort to address these rising needs. Specific programmatic activities include *Blending Families Newsletter,* My Families and Me Program, and Stepping Stones Workshop that addresses the implementation of stepfamily integration.

Nutrition and Food Safety

Increasing time pressures, dual-worker families, and societal changes have led to a shift in American dining habits. Fast-food and ready-prepared meals have gained considerable popularity with most consumers; with this shift in diet have come a range of nutrition problems and an epidemic of obesity. Fried food and fat consumption have increased, while consumption of fresh fruits and vegetables has declined. As families rely increasingly on foods prepared outside the home, traditional skills in food preparation and food safety have diminished. Food-borne illnesses are estimated to cost Ohio between $260 million and $532 million per year, while obesity-related health problems also carry substantial annual costs. Costs of these problems are borne by society in the form of increased health and insurance costs and an increased tax burden to support government-sponsored care of lower-income groups and seniors. OSU Extension works to tackle these threats and provide solutions at the individual and family level—working

[20] "Extension is Here for You." The Ohio State University Extension.

to improve personal nutrition and lifestyle choices with a range of consumers from prenatal children and mothers to Ohio's senior citizens. Extension is actively providing nutrition education, food safety, food preservation and preparation, and weight-management programs.

The Family Nutrition Program is an integral part of the OSU Extension program. FNP involves a partnership with local agencies/organizations whose outreach includes food stamp program participants and other low-income audiences. FNP assistants teach basic nutrition, food safety, meal management, thrifty shopping, and food resource management information to food stamp recipients and to eligible nonparticipants. OSU Extension has the responsibility to provide additional educational experiences for the FNP audience.

Extension also provides the Expanded Food and Nutrition Education Program. Adult program participants learn how to make good choices to improve the nutritional quality of the meals they serve their families. They participate in hands-on learning activities that provide practical skills necessary to make positive behavior changes. The program helps to increase the ability of participants to select food that meets the nutritional needs of their families and to gain new skills in food preparation, storage, safety, and sanitation. The EFNEP also has a youth component, providing nutrition education to help children develop healthy eating patterns and skills in preparing nutritious meals and snacks.

Examples: Impact of Nutrition Programming

- The EFNEP, between October 2002 and September 2003, provided **nutrition and food service training to more than 6,700 parents of young children in Ohio**. Post-training study shows that almost 90 percent of these individuals made positive changes in their food serving/intake.
- Programs also directly served youth, with more than **19,000 young persons receiving nutrition information in 2003 from OSU Extension**. The nutrition education programs have high impact, with post-event surveying of 1,306 participants indicating that 90 percent have increased the variety of foods consumed and 98 percent have increased knowledge of nutrition.
- OSU Extension's FNP has targeted food stamp recipients to increase nutrition awareness. Over a 12-month period, the **FNP provided education programs or demonstrations to more than 66,700 participants**.
- **A total of 11,610 low-income families participated in food resource management and thrifty food shopping programs.**

OSU Extension is also active in providing food-handling and food safety training and services for Ohio's food industry. The food processing industry in Ohio benefits from specific OSU Extension work in safety training, as do food establishments.

Examples: Food Safety Training and Outreach by OSU Extension in 2003

- **A total of 259 participants from small food and meat processing businesses** were trained in subjects including thermal processing of foods, environmental surveillance for pathogens, and the setting up and operation of formal safety programs.
- Food safety courses certified by the National and Ohio Restaurant Association and the Ohio Department of Health for food establishments were provided to **544 participants across 49 programs for the manager's courses and 583 participants across 25 programs for the employee courses.** Managers trained through the Extension courses are in a "training the trainer" program—designed to leverage their education for the training of their employees.
- **Over 250 "public service" cooks** (such as school food service personnel, catering facility managers, church cooks, etc.) completed food safety training in Lorain County, Ohio.
- **A total of 9,931 FNP recipients and 6,160 EFNEP recipients participated in food safety workshops** in Ohio.

Example: Potential Impact of Enhanced Food Safety for Ohio

Food-borne illnesses account for considerable economic costs. According to research conducted by the U.S. Food and Drug Administration, just seven of the more common food-borne pathogens cause an estimated 3.3 to 12.3 million illnesses in the U.S. in any given year and up to 3,900 deaths. If food-borne pathogens are estimated to cause illness at a proportion equal to Ohio's percent of the total U.S. population (4 percent or 11.4 Ohioans out of 288.4 million U.S. residents), there are likely to be between 132,000 and 492,000 food-borne illnesses in Ohio each year and about 156 deaths. In a 1995 study, USDA researchers estimated the negative monetary losses of these seven pathogens to be between $6.5 billion and $13.3 billion nationwide, or between $260 million and $532 million in Ohio annually.[21] The magnitude of potential costs in Ohio are confirmed in analysis by Lydia Medeiros of the OSU Department of Human Nutrition, who calculates the estimated costs from the five main food-borne pathogens in Ohio to be over $211 million annually.

OSU Extension works to lower the incidence and cost of food-borne illnesses in Ohio through the education services outlined above. Poor food handling and preparation by consumers are the primary reasons food-borne illnesses occur, and the best means to combat the threat is by providing consumers with the knowledge and skills required to positively alter their food-handling and preparation behavior. **Given the cost figures profiled above, it is evident that every 1 percent reduction in food-borne illness in Ohio would result in an estimated $2.6 million to $5.3 million in cost savings.**

Health and Wellness

Going hand-in-hand with nutrition and food safety are the broader issues of general health, wellness, and a healthy living environment. Extension's historic links to the land, to food production and the environment, combined with OSU's deep academic and research expertise, provide considerable resources to draw upon in improving health and wellness in Ohio. Programs under this category are broad, encompassing projects as diverse as cancer prevention,

[21] Buzby, J., and T. Roberts. "ERS Updates U.S. Foodborne Disease Costs for Seven Pathogens." *Food Review,* 20. Authors are economists with the Food and Consumer Economics Division, Economics Research Service, USDA.

diabetes management, and flood damage control and remediation. Ultimately, Extension's health and wellness programs combine to increase the quality of life in Ohio—maintaining a sustainable and healthy environment and creating opportunities for Ohioans to increase their personal wellness and reach their full potential.

Family Budgeting

The wide availability of credit, more rapidly changing job environment, and complexity of the financial marketplace provide both benefits and threats to American families. Managing personal and household finances is no simple task, and major mistakes can lead to serious hardships and family stresses. Extension provides services and programs that help Ohio families navigate monetary issues, challenges, and opportunities. Programs range from basic money management to investment decision making. In addition, specialized programs are offered to advise first-time home buyers, help form and grow home-based business enterprises, and gain time management skills.

Other Examples

Clearly, the effects of OSU Extension on families and individuals in Ohio are many and widespread. In addition, Family and Consumer Sciences activities also focus on community wellness. Below is an example of such an activity.

Example: Neighbor to Neighbor

An example of an urban program that combined the programmatic resources of Family and Consumer Sciences with Community Development is Neighbor to Neighbor, which sought to help reduce social unrest in Cincinnati born of racial tensions that boiled over in 2002. Initiated by the OSU Extension Agent for Hamilton County and her colleagues at OSU's Civic Life Institute, Neighbor to Neighbor leveraged and customized proven solution models developed originally by the Kettering Foundation. More than 100 volunteers participated in training as facilitators for the project; in total, the Neighbor to Neighbor Program held 131 facilitated community "conversations" about race issues, covering 108 Cincinnati area communities. A total of more than 1,800 persons attended the events, which were strongly supported by the *Cincinnati Enquirer;* and more than 50 percent of the neighborhood groups committed to meeting again to further the cause of easing racial tensions.

4-H Youth Development Impacts

Ohio is considered the birthplace of 4-H, founded in Springfield in 1902 by A.B. Graham. 4-H is the youth education branch of the CES, and programming is delivered in each state and county through the County Extension Office. As of 2003, nearly 7 million youth belonged to 4-H nationally. The four H's stand for **H**ead, **H**eart, **H**ands, and **H**ealth, described in the 4-H pledge as follows:

> *I pledge*
> *My Head to clearer thinking*
> *My Heart to greater loyalty*
> *My Hands to larger service, and*

My Health to better living
For my club, my community, my country and my world.

4-H seeks to instill integrity, service, leadership, a sense of duty, and personal growth in the youth it serves. It is in these efforts that 4-H can be seen to build a basis for positive personal and societal economic impacts. Specific life skills development activities are built into 4-H projects, activities, and events with the goal of helping youth become contributing, productive, self-directed members of society. 4-H projects are designed to be in-depth learning experiences for 4-H members. Training pets, making clothing, repairing computers, growing plants, and building rockets are just a few examples of 4-H projects.

While often thought of as a rural program, 4-H serves a much broader audience nationally. Certainly, rural youth is an important constituency, with 45 percent of 4-H enrollees coming from rural areas and towns; but, fully 55 percent are from larger cities, their suburbs, and large inner-city communities. 4-H is also inclusive, with more than 30 percent of its members coming from racial and ethnic minorities on a national basis, and a fairly even split between female and male membership. To illustrate the importance of 4-H, Table 10 shows enrollment statistics for major categories of national 4-H educational content.

Table 10: National 4-H Education Enrollment, 2001

Type of Education	National 4-H Enrollment
Plants and Animals	2,094,838
Personal Development and Leadership	1,371,172
Environmental Education and Earth Sciences	986,186
Science and Technology	855,253
Communications and Expressive Arts	604,286
Citizenship and Civic Education	511,165
Consumer and Family Sciences	341,579

Source: *4-H Youth Development Facts in Brief—2002.* National 4-H Headquarters—Cooperative State Research, Education and Extension Service, U.S. Department of Agriculture.

Within Ohio, 230,576[22] children and youth were enrolled in 4-H programs in 2003, accounting for almost 3.5 percent of the national enrollment.[23] Overall, 11.7 percent of total youth in the State of Ohio between the ages of 5 and 19 participated in 4-H programs in 2003. As with the nation, Ohio's 4-Hers come from both rural and urban settings, with the specific statistics noted in Table 11.

[22] Program participants number 301,525, which includes duplication that results from children participating in multiple program offerings.
[23] Fox, T. *Ohio 4-H Youth Development State Statistical Report 2003.* 4-H Youth Development, The Ohio State University Extension.

Table 11: Ohio's 4-H Enrollment, 2003

Place of Residence	Ohio Enrollment
Farms	34,740
Towns with Populations Under 10,000 and Rural Nonfarms	97,010
Towns and Cities with Populations of 10,000 to 50,000	56,029
Suburbs and Cities with Populations over 50,000	11,909
Central Cities with Populations over 50,000	30,888
Total	**230,576**

Source: Fox, T. *Ohio 4-H Youth Development State Statistical Report 2003.* 4-H Youth Development, The Ohio State University Extension.

In Ohio, 28,488 4-H enrollees are from minority populations, accounting for 12.5 percent of total Ohio 4-H membership. Ohio 4-H is obviously gender inclusive, with 52 percent of 4-Hers being female and 48 percent male. During 2003, Ohio 4-H enrollees completed a total of 361,650 projects, with percentages by type of education as shown in Table 12.

Table 12: Percentage of Ohio 4-H Education Projects, 2003

Type of Education	Ohio 4-H Projects Percentage
Plants and Animals	37%
Personal Development and Leadership	17%
Science and Technology	14%
Environmental Education and Earth Sciences	10%
Healthy Lifestyle Education	10%
Consumer and Family Sciences	5%
Citizenship and Civic Education	4%
Communications and Expressive Arts	3%

Source: Fox, T. *Ohio 4-H Youth Development State Statistical Report 2003.* 4-H Youth Development, The Ohio State University Extension.

How effective is 4-H at reaching youth and having a positive influence in their life? This question was examined in a national survey research project of 4-H participants conducted in 2000 by a research team at Kansas State University, with oversight by a National Impact Project Steering Group.[24] The research team found the following eight "critical elements" of 4-H impact on youth:

- The opportunity to value and practice service for others
- An opportunity for self-determination
- A positive relationship with a caring adult

[24] *Prepared and Engaged Youth Serving American Communities: National 4-H Impact Assessment Project,* http://www.national4-hheadquarters.gov/about/impact/impact1.pdf.

- A physically and emotionally safe environment
- An inclusive environment
- Engagement in learning
- Opportunity for mastery
- An opportunity to see oneself as an active participant in the future.

The findings of the survey speak to the positive impact that 4-H programs have on American youth and the high levels of satisfaction with those programs among participating youth. Table 13 highlights some of the core responses of survey participants to key questions on the national survey.

Table 13: Percent of Affirmative Responses to Positive Statements About 4-H on National Survey

Statement Regarding 4-H	Percent of Respondents Who "Agree" or "Strongly Agree"
"All kinds of kids are welcome in 4-H"	97%
"4-H helps me accept the differences of others"	90%
"I feel good during 4-H activities"	94%
"In 4-H I feel that it is safe to try new things"	94%
"Adults in 4-H help me to work with others as a team"	91%
"Adults in 4-H make me feel good about myself"	90%

Source: *Prepared and Engaged Youth Serving American Communities: National 4-H Impact Assessment Project,* http://www.national4-hheadquarters.gov/about/impact/impact1.pdf.

The 4-H youth survey respondents report that, to them, the top benefits of participation in 4-H are best described as follows:

1. Knowledge and skill
2. Self/well-being
3. Friends
4. Self responsibility
5. Activity
6. Relationships
7. Engagement
8. Community service
9. Leadership.

4-H has taught me responsibility and dedication. The people I have met in 4-H have and continue to inspire me to do my best and to continue growing. I've learned that I want to devote my life to learning, meeting new people, and helping others. 4-H has made me more aware of who I am, and I am able to say I am proud of the person I am, a great deal due to 4-H.

Learned about goals/goals setting, leadership, citizenship, life skills. It has made me an all around better person that is responsible, optimistic, and artistic. 4-H allows people from all different backgrounds to shine.

Two written statements by respondents to The National 4-H Impact Survey

These national results are similar to those obtained in a 2000 study in Nebraska, which indicated that more than 90 percent of 4-H respondents cited the benefits of 4-H as being "responsibility," "self-confidence," "a greater respect for others and leadership," and "relationship building skills." It is fair to conclude that the education and values instilled by 4-H in the majority of participating youth are those that are important to individual development and to providing valued and productive members of Ohio society and Ohio's economy.

Positive Youth Development and Ohio 4-H

Americans for the Arts defines "youth at risk" as youth who are exposed to factors that may increase their tendency to engage in problem or delinquent behaviors. This definition covers self-destructive behavior, as well as costs to society related to crime and antisocial behavior. The research outlined above on the impact of 4-H shows convincing evidence that participation in 4-H programs engenders positive self-esteem, personal responsibility, and an engagement with and responsibility toward community. Participants from at-risk backgrounds who achieve such positive outcomes through 4-H are, of course, less likely to succumb to external peer pressures and the low self-esteem issues that so often lead to antisocial and self-destructive behavior.

What are the economic returns of preventing youth crime and misdemeanors? Statistics are not readily available that show the impact of youth-related crime in the nation or individual states. However, the costs of various crimes (both juvenile and adult) have been estimated in a major national study by Kathryn McCollister at the University of Miami.[25] Taking both tangible and intangible costs into account, the total per-offense costs in 2004 dollars were found to be significant, as indicated in Table 14.

Table 14: Tangible and Intangible Costs of Crime per Offense in 2004 Dollars

Type of Crime	Tangible per-Offense Costs	Intangible per-Offense Costs	Total per-Offense Cost*
Murder**	$1,139,922	$7,352,983	$8,492,905
Rape/Sexual Assault	$25,954	$174,228	$200,037
Aggravated Assault	$18,599	$101,336	$111,801
Robbery	$20,890	$27,755	$46,484
Arson	$6,267	$2,341	$8,405
Motor Vehicle Theft	$8,166	$178	$8,328
Household Burglary	$3,663	$342	$3,974
Larceny/Theft	$1,333	$12	$1,344
Stolen Property Offenses	$493	$0	$493
Vandalism	$449	$0	$449
Forgery and Counterfeiting	$435	$0	$435
Embezzlement	$434	$0	$434
Fraud	$420	$0	$420

Source: McCollister, K. *The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation.* University of Miami, 2004. http://www.tresearch.org/resources/AHSRPresentations/McCollister.ppt#12.

* Total per-offense costs calculated as the sum of tangible costs (excluding uncorrected risk-of-homicide costs) and intangible costs.

** Costs taken into account as tangible include Victim Costs (medical expenses, cash losses, property/theft damage, lost wages), Mental Health Costs (cost estimates of post-victimization counseling), Criminal Justice System Costs (police protection, legal and judicial, corrections) and Crime Career Costs (productivity losses incurred by perpetrator). Intangible costs take into account jury awards data for pain and suffering and adjusted value-of-life in the case of homicide.

[25] McCollister, K. *The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation.* University of Miami, 2004. http://www.tresearch.org/resources/AHSRPresentations/McCollister.ppt#12.

Deriving a formal estimate of the costs saved by 4-H programs in reducing youth antisocial behavior is problematic. However, considering some basic Ohio crime statistics suggests the type of benefits that may be realized. Table 15 shows selected reported crime statistics for Ohio.[26]

Table 15: Types and Numbers of Crimes in Ohio, 1999

Type of Crime	Number of Crimes in Ohio
Homicide	397
Aggravated Assault	16,685
Robbery	14,405
Motor Vehicle Theft	39,192
Burglary	87,023

Source: Federal Bureau of Investigation. "Uniform Crime Reports: Crime in the United States 1999—Table 5, Index of Crime by State." http://www.fbi.gov/ucr/99cius.htm.

For this discussion, youth of an age to commit such crimes might be defined as between 15 and 19 years old. In Ohio (2000 census), there are 816,868 such persons, comprising 9.1 percent of the total Ohio population aged 15 or older (8,954,053 persons). If crimes are allocated proportionately, youth crime metrics as noted in Table 16 would result.

Table 16: Estimated Costs of Crimes in Ohio Committed by Youth 15 to 19 Years Old

Type of Crime	Number of Crimes in Ohio (1999)	Estimated Number of 15 to 19 Youth-Committed Crimes (at 9.1%)	Total Cost Per Crime	Total Cost to Ohio for Listed Crimes of 15- to 19-Year-Olds (Estimated)
Homicide	397	36	$8,492,905	$305,744,580
Aggravated Assault	16,685	1,518	$111,801	$169,713,918
Robbery	14,405	1,311	$46,484	$60,940,524
Motor Vehicle Theft	39,192	3,566	$8,328	$29,697,648
Burglary	87,023	7,919	$3,974	$31,470,106

Source: Federal Bureau of Investigation, "Uniform Crime Reports: Crime in the United States 1999—Table 5, Index of Crime by State." http://www.fbi.gov/ucr/99cius.htm. With Battelle calculations.

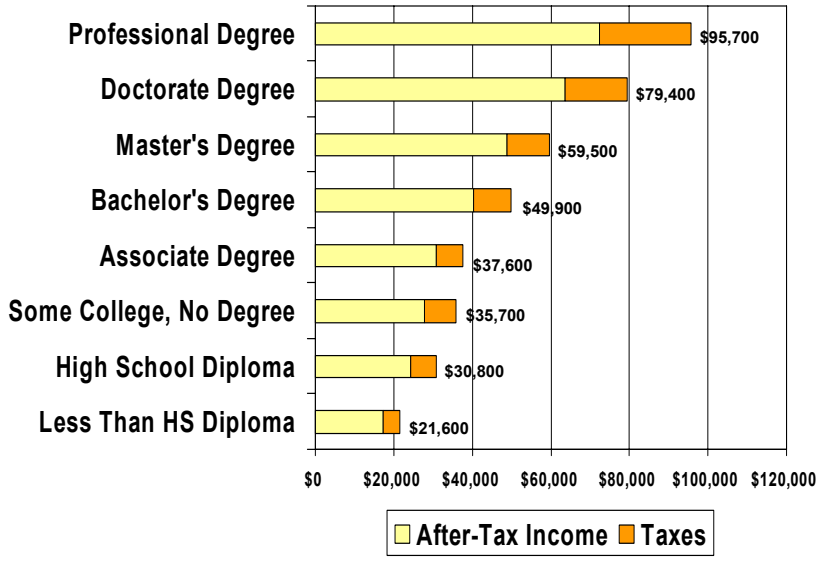
[26] Federal Bureau of Investigation. "Uniform Crime Reports: Crime in the United States 1999—Table 5, Index of Crime by State." http://www.fbi.gov/ucr/99cius.htm.

Approximately 11.7 percent of youth in Ohio are in 4-H programs, so the potential for OSU Extension's 4-H efforts to positively impact crime statistics and associated costs is likely to be considerable. For example, taking 11.7 percent of youth as 4-H members and saying that only a conservative 2 percent of these 4-H members would have committed crimes such as those noted above (had they not been positively influenced by their 4-H experience), the estimated Ohio crime cost saving is $1.4 million. Thus, for every 1 percent of 4-H youth who are dissuaded by their positive 4-H experience to avoid the above criminal behavior, Ohio could save $700,000 in costs. The total savings would be larger, given that the above data cover only a few of the possible crime categories (although they do include the largest cost item—homicide).

Education

A more positive metric to consider than crime offsets is the added contribution to the economy and society of a better adjusted and educated youth citizenry. By working to keep youth feeling positive about themselves and their abilities and instilling a desire to learn and improve, 4-H can lead to greater personal and societal economic success. U.S. Census Bureau data illustrate the increasing personal returns from educational attainment, with greater levels of education being rewarded with higher median earnings (and benefiting society through higher taxation receipts). Data for 2003 are shown in Figures 7 and 8.

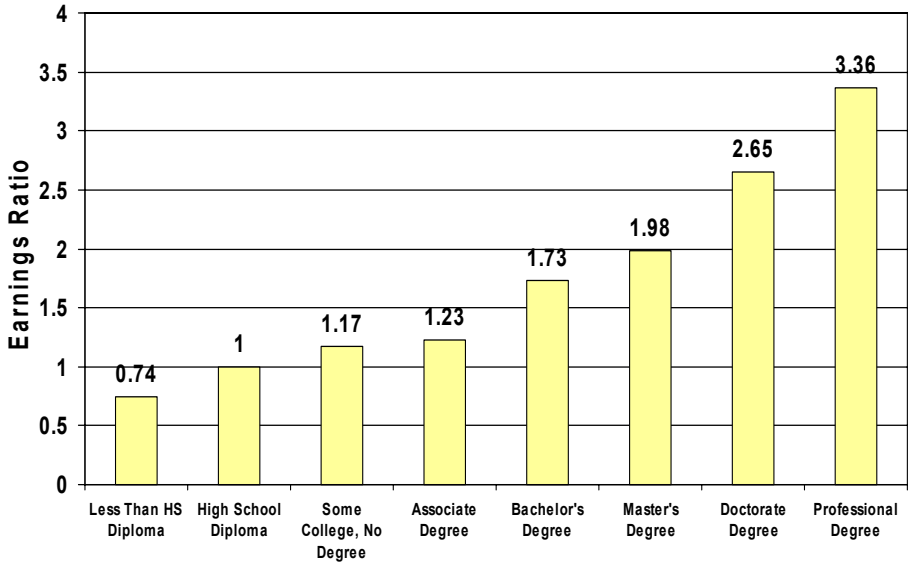
Figure 7: Impact of Increasing Levels of Education on Income



Source: Baum, Sandy, and Kathleen Payea. "Education Pays 2004: The Benefits of Higher Education for Individuals and Society." *College Board, Trends in Higher Education Series.* www.collegeboard.com.

Figure 7 clearly shows the increasing returns to individuals and government arising from increasing levels of education. As the American and Ohio economies increasingly depend on knowledge and innovation as drivers, those initiatives that enhance interest in education and promote increased educational attainment will be of heightened importance. Figure 8 further emphasizes the high earnings return of education, displaying the ratio of lifetime earnings to be expected by education level attained beyond the baseline of a high school diploma.

Figure 8: Advanced Education Earnings Ratio



Source: Baum, Sandy, and Kathleen Payea. "Education Pays 2004: The Benefits of Higher Education for Individuals and Society." *College Board, Trends in Higher Education Series.* www.collegeboard.com.

Research has not yet confirmed that 4-H has a positive impact on decisions to pursue higher education. The findings of the 4-H national survey in regards to 4-H building more self-confident youth, however, match other research findings that point to faith in personal abilities as a good indicator of college success. Tufts University is currently enrolling participants in a longitudinal study to measure the effects of positive youth development via 4-H.

If only 5 percent of the 230,576 Ohio 4-Hers were encouraged by their 4-H educational experience to achieve a bachelor's degree, rather than ending their formal education after receiving their high school diploma, this would equate to 11,529 bachelor's degrees. At a median earnings differential of an additional $19,100 per year for the degree over and above a diploma, this equates to increased annual earnings for this group of $220.2 million. If 5 percent gained an associate's degree beyond a high school diploma, this would generate additional personal income of $78.4 million annually.

The 4-H experience also may keep students from dropping out of high school. Again, if 5 percent of Ohio 4-Hers stayed and received their high school diploma, rather than dropping out of high school, their annual personal earnings gain would be $106.1 million. The potential personal-income impacts of Ohio 4-H positive effects on education decisions are summarized in Table 17, using varying percentages of 4-Hers potentially influenced to pursue a higher level of education because of their positive 4-H experience.

Table 17: Annual Personal-Income Impacts of 4-H Influence on Education by Various Percentages of Ohio 4-Hers

Higher Level of Education Attained	1% of Ohio 4-Hers	5% of Ohio 4-Hers	10% of Ohio 4-Hers	25% of Ohio 4-Hers
High School Diploma vs. Less than High School Diploma	$21,212,992	$106,064,960	$212,129,920	$530,324,800
Some College (no degree) vs. High School Diploma	$11,298,224	$56,491,120	$112,982,240	$282,455,600
Associate's Degree vs. High School Diploma	$15,679,168	$78,395,840	$156,791,680	$391,979,200
Bachelor's Degree vs. High School Diploma	$44,040,016	$220,200,080	$440,400,160	$1,101,000,400
Master's Degree vs. High School Diploma	$66,175,312	$330,876,560	$661,753,120	$1,654,382,800

Source: Baum, Sandy, and Kathleen Payea. "Education Pays 2004: The Benefits of Higher Education for Individuals and Society." *College Board, Trends in Higher Education Series.* www.collegeboard.com, with Battelle calculations.

As noted above, 4-H programs are specifically designed to help build character and self-esteem in youth. The national 4-H survey findings point strongly toward 4-H achieving this goal among the national sample of 4-Her respondents. Why does character and self-esteem matter? Research points to multiple positive outcomes attributable to self-esteem, including (1) higher levels of school achievement and reduced dropout rates, (2) reduced levels of crime and violence, (3) reduced teen pregnancy rates, (4) reduced drug and alcohol use, and (5) reduced levels of suicide and self-harm.

In terms of school achievement, considerable evidence exists indicating that self-esteem and a positive image of self are correlated with academic achievement. Covington[27] found that, as self-esteem increases, so do test scores, while Walz and Bleuer[28] found that self-esteem promotion programs in school reduce absenteeism and dropout rates. Wylie[29] found that self-esteem and a positive self-concept are predictors of achievement from primary grades to undergraduate education. Evidence linking low self-esteem to crime and delinquent behavior is even stronger. Steffenhagen and Burns[30] concluded from their studies that low self-esteem is the psychodynamic mechanism underlying all deviant behavior; while Kelley[31] found that, as programs were implemented to raise the level of self-esteem, the incidence of delinquent behavior in schools declined. Toch[32] and Davis[33] concluded separately that the most common factor promoting violence was "self-image compensating" that involved aggression in defense of self-image. They found that many who commit violence do so to compensate for their feelings of

[27] Covington, M. "Self-Esteem and Failure in School." *The Social Importance of Self-Esteem*. Berkeley, CA: U.C. Press, 1989.
[28] Walz, G., and J. Bleuer. *Student Self-Esteem: A Vital Element of School Success*. ERIC Counseling and Personnel Services, Inc., Greensboro, NC, 1992.
[29] Wylie, R.C. *The Self-Concept*. Lincoln, NE: University of Nebraska Press, 1974.
[30] Steffenhagen, R.A., and J. Burns. *The Social Dynamics of Self-Esteem.* New York, NY: Praeger, 1987.
[31] Kelley, T.M. "Changes in Self-Esteem Among Pre-Delinquent Youths in Voluntary Counseling Relationships." *Juvenile and Family Court Journal* Vol. 29, May 1978.
[32] Toch, H. *Violent Men*. Chicago: Aldine, 1969
[33] Davis, Eddie. "Youth Violence: An Action Research Project." *Journal of Multicultural Social Work* Vol. 1 No. 3, 1991.

insecurity and low self-esteem. Other socially harmful and self-destructive behaviors such as teen pregnancy[34], drug and alcohol abuse[35], and suicide[36] have likewise been correlated with low self-esteem.

By encouraging self-esteem through custom-designed projects and positive experiences, 4-H helps to increase the volume of productive citizenry in Ohio and reduce the negative factors associated with low self-value. One national study indicated that every $1 invested in developing youth into economically and socially viable adults returned $10.51 to the economy, which is considered a significant return on investment.[37]

Skills Development

Three types of learning experiences are emphasized in Ohio's 4-H youth development programs and activities: hands-on (e.g., making, producing, and practicing); organized activities (e.g., demonstrations, workshops, field trips, and camps); and leadership/citizenship (e.g., conducting, planning, assisting, informing, and organizing). Each of these areas imparts specific skills to the youth who participate in them. 4-H in Ohio operates a range of project-oriented programs designed to build youth skills. Many of these program offerings are provided through each county's individual Community Club programming. Some of these include the following:

- Aerospace Science
- Animal Science and Livestock
- Children/Babysitting
- Clothing and Appearance
- Communications
- Creative Arts
- Cultural Awareness
- Electronics and Technology
- Environment and Natural Resources
- Field Crops
- Financial Management
- Food Science and Human Nutrition
- Health
- Veterinary Science
- Woodworking
- Writing and Reporting.

Linked to 4-H programs in skills development are programs specifically directed at helping youth develop the skills to be future practitioners in specific careers. 4-H historic roots in agriculture and agribusiness are reflected in multiple initiatives aimed at producing a well-skilled, productive pipeline of leaders for farming, horticulture, aquaculture, agricultural processing, environmental preservation, and other important areas of focus.

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[34] Beane, J., and R. Lipka. *Self-Concept, Self-Esteem, and the Curriculum*. New York: Teachers College Press, 1984.
[35] Skager, Rodney. *Prevention of Drug and Alcohol Abuse.* California Attorney General's Office, Sacramento, CA, 1987.
[36] Bhatti, B., D. Derezotes, S. Kim, and H. Specht. "The association between child maltreatment and self-esteem." *The social importance of self-esteem,* A. M. Mecca, N. J. Smelser, and J. Vasconcellos (Eds.). Berkeley, CA: University of California Press, 1989, pp. 24-71.
[37] Newman, Robert P., S. Smith, and R. Murphy. *A Matter of Money: The Cost and Financing of Youth Development.* Center for Youth Development and Policy Research, Academy for Educational Development.

Leadership Development

One of Ohio 4-H's goals is that "every 4-H member, in every project, should experience some leadership development related to that project." 4-H also has developed a specific Youth Leadership Development Curriculum, which includes the projects shown in Table 18.

Table 18: Ohio 4-H Participants in Youth Leadership Development Projects, 2003

Project	Description	2003 Ohio Participants (Projects Completed)
One-On-One	This mentoring project is designed for teens with at least 2 years of 4-H experience. Teens mentor at least one beginner 4-H member and complete a series of learning experiences with their protégé.	328
Club Teen Leadership	This project is designed for teens who want to provide leadership and assistance to advisors and members within a local 4-H club or group. Teens who participate in this project work with a local 4-H advisor to develop an individual plan for gaining abilities needed to provide leadership within the club. A variety of activities and leadership learning experiences are provided through the project.	218
Multi-Level Teen Leadership	In this project, teens complete responsibilities in local, county, and state 4-H programs; participate in study guide experiences; mentor younger members; and take part in other 4-H teen leadership opportunities. The project includes opportunities at beginner, intermediate, and advanced levels.	134
Teen Leadership On The Job	This project is designed for teens who are employed, who want to develop leadership for "making the best better" on the job, and who want to succeed in attaining their personal goals and those of their employers. Information and experiences related to the real world of work, attaining goals and objectives, developing a work ethic, stress management, money management, time management, and performance assessment are included.	71
Speak Out	This project is designed for teens who are interested in serving on 4-H awareness teams, as 4-H Ambassadors, and on 4-H Speakers Bureaus and other public relations groups, as well as for teens who are interested in developing abilities in public relations for working with non-4-H groups and organizations.	88
Teen Board Leadership	This project is designed for teens who serve on Fashion and Food Boards, Junior Fair Boards, Student Councils, and similar representative bodies.	112

Source: Fox, T. *Ohio 4-H Youth Development State Statistical Report, 2003 State Breakdown of Projects by Type.* 4-H Youth Development, The Ohio State University Extension.

4-H also operates a multilevel, four-step leadership series entitled "Leadership Skills You Never Outgrow." In total, 3,347 4-Hers participated in this series in 2003. Overall, in 2003, a total of 4,298 leadership and leadership skills projects were completed by Ohio 4-Hers.

Other Examples

The following are some specific examples of OSU Extension's work that is impacting the development of Ohio's youth.

Example: Adventure Central, Dayton

Adventure Central, located in Dayton, is a vibrant example of 4-H in action, working to enhance the social skills, reading abilities, and activities of youth. Adventure Central operates as an education center for youth between the ages of 5 and 18, serving as a hub for out-of-school programming through after-school programs, youth boards, clubs, and camps. Adventure Central was developed as a partnership between Five Rivers Metro Parks and 4-H.

The program leverages the resources of adult volunteers to provide youth with caring adult mentors. The youth receive help and encouragement with their homework; receive tutoring in areas of academic importance such as reading; and learn discipline, self-control, and respect for others.

In 2003, more than 100 urban youth participated in Adventure Central's after-school programming, with a total of 15,486 hours of service provided. In addition, 117 youth participated in a 7-week day camp program, with more than 14,000 hours of contact made. Volunteers are key to the success of the program, with 58 volunteers contributing 7,115 hours of service.

Example: CARTEENS

The accident rate of teen drivers is more than double their percentage of the driving population. In response to the personal safety and cost concerns of teen driver accidents, 4-H youth professionals worked with junior leaders to design a peer-intervention program for traffic offenders. Based on research findings, the junior leaders created a safety intervention program called Caring And Responsible TEENS or CARTEENS. The CARTEENS program is a 2-hour safety program run by the junior leaders or other teen facilitators, with technical assistance from Ohio Highway Patrol personnel. The 4-H youth professionals involved with the program provide guidance in public speaking, group dynamics, conflict resolution, and interactive teaching techniques for the facilitators. Ten years after its inception, the original Brown County CARTEENS program has expanded to become the Ohio 4-H CARTEENS Program with 34 counties participating. Results from a survey of participants indicate a positive response to the program by the teens. In addition, early results in participating counties are showing lower rates of repeat offenders among teens than prior to the program.

Example: Youth Outdoors, Cleveland

Youth Outdoors operates as a partnership between OSU Extension, the City of Cleveland, and Cleveland Metro Parks. The program provides lower-income, urban youth with an opportunity to experience and participate in outdoor recreation and environmental education programs. The initiative provides youth between the ages of 8 and 18 with an opportunity to experience many activities that they otherwise may be unable to access. Participants actively take part in multiple outdoor sports (such as hiking, rock climbing, biking, kayaking, horseback riding, etc.) as well as special skill-building exercises in leadership, team building, compass navigation, and community service.

The program has experienced considerable demand, with more than 2,600 individual youth served in 2003. A total of 438 youth programs were provided, leveraging staff and volunteers (who provided more than 2,400 hours of service) to provide a broad range of educational and recreational experiences for the participants. The program has been specifically successful in planting a long-term presence in Cleveland's urban neighborhoods through the establishment of Adventure Clubs. These clubs offer monthly programming and outings and provide youth with the opportunity to stay involved and increase their skills in areas of interest. In 2003 the program provided leadership for 21 Adventure Clubs.

THE IMPACT OF OSU EXTENSION-RELATED VOLUNTEERISM IN OHIO

The voluntary contributions of Americans to sustaining social good in the nation are often overlooked in terms of benefit to society and the economy. Tasks and services provided by volunteers meet needs that would otherwise go unmet (with likely negative social costs) or would have to be met by government or other providers at a direct monetary cost. The value of volunteerism to the American economy and quality of life should not be discounted because the impact is substantial. Independent Sector, a national nonprofit coalition dedicated to enhancing nonprofit activity, philanthropy, and citizen action, performed a national survey-based analysis to derive estimates of the value of volunteerism on an annual basis.[38] Its findings include the following:

- 89 percent of American households "give" (provide charitable and voluntary funding).
- The average annual contribution of contributors is $1,620.
- 44 percent of American adults perform volunteer activities each year.
- The value of volunteer hours contributed annually equates to more than 9 million FTE employees with an estimated labor value of $239 billion.

OSU Extension plays an important role in recruiting and engaging youth and adult volunteers for a range of activities important to Ohio. Data compiled for the 2004 Extension Annual Report show that OSU Extension leverages the volunteerism of more than 37,000 Ohioans annually, under the following programs and initiatives shown in Table 19,

Table 19: OSU Extension's Youth and Adult Volunteers

Group	Youth Volunteers (under age 18)	Adult Volunteers (18 or older)
4-H	10,019	23,183
Master Clothing		109
Community Development		1,268
Master Gardeners		3,000
Totals	**10,019**	**27,560**

Source: OSU Extension provided data.

In total, OSU Extension's data for adult volunteer activities indicates that 5,015,920 hours were donated in 2003. Independent Sector's analysis, together with labor data from the Bureau of Labor Statistics (BLS), can be used to develop estimates of the annual value of this OSU Extension–related volunteerism for Ohio.[39] Based on 2002 BLS data (the most recent available), the estimated hourly wage and benefits value per volunteer for Ohio is $15.43. **Thus, it may be seen that the more than 5 million hours of OSU Extension–related volunteer time equates to a monetary benefit of $77,395,645 (an amount that actually exceeds the total annual budget of OSU Extension).**

[38] Independent Sector. *Giving and Volunteering in the United States 2001.* Signature Series. http://www.independentsector.org/programs/research/gv01main.html.
[39] http://www.independentsector.org/programs/research/volunteer_time.html.

SUMMARY

The wide array of services and activities that OSU Extension provides the citizens, industry, and communities of the State of Ohio clearly continue to be relevant in meeting today's needs, just as Extension has met the needs of Ohioans for the last 100 years. However, the opening of the 21st century has brought challenging economic times, times in which some of the underlying fundamentals of economic and community development are shifting at a seemingly rapid pace. The final section of this report will examine the evolving needs of the State of Ohio and provide suggestions on how OSU Extension can continue to advance in order to meet these new demands.

Future Initiatives—Emerging Opportunities for Expanding the Impacts and Benefits of OSU Extension in Ohio

The opening of the 21st century has brought challenging economic times, times in which some of the underlying fundamentals of economic and community development practice must be critically examined. The New Economy, globalization, competitive market pressures, technological advances, the preeminent importance of innovation and talent, and other forces are restructuring the economic playing field. Against this background, it is imperative that Ohio have the institutions in place to respond to the new economic challenges and opportunities.

Modern economic development challenges are dictating a new look at state development. The old models of industrial recruitment, large incentive packages, and marketing based on being a "low-cost" environment are being supplanted by fresh approaches. The economic and community development profession has begun to recognize that factors such as human capital (talent), innovation engines, technology, and the availability of risk and expansion capital have moved to the fore as location factors. Universities and R&D institutions are now primary engines for economic growth, and human talent is the leading location factor in determining places that will win or lose.

Underlying innovation and successful technology implementation, and therefore employment growth, in high-performance regions is a strong R&D base—a base rooted in skilled human capital and infrastructure providing technology-intensive companies with access to top-quality research talent, resources, and research facilities. Berglund and Clarke[40], writing for the National Governor's Association, note that a successful technology-based economy (or New Economy) requires the following:

- A strong intellectual infrastructure, such as universities and public or private research laboratories that generate new knowledge and discoveries
- Efficient mechanisms through which knowledge is transferred from one person to another or from one company to another
- Excellent physical infrastructure, including high-quality telecommunications systems and affordable, high-speed Internet connections
- A highly skilled technical workforce
- Good sources of capital.

Robert Atkinson[41] of the Progressive Policy Institute points out the fundamental differences in forces and drivers of the old versus new economies. As the following lists illustrate, the old and new ways of operating are considerably different from one another:

[40] Berglund, Dan, and Marianne Clarke. *Using Research and Development to Grow State Economies*. National Governors' Association, NGA Center for Best Practices. 2000.
[41] Atkinson, Robert. "Urban Economic Prospects in the New Knowledge Economy." Paper presented to the CEOs for Cities Conference, Chicago, IL, October 20, 2000.

Old Economy Building Blocks	New Economy Building Blocks
• Stable • National Based • Hierarchical • Mass Production and Standardization • Capital and Labor • Mechanization • Lower Costs • Go-It-Alone Business Culture • A Skill or Degree • Adversarial Relations	• Dynamic • Global • Networked • Flexible Production and Customization • Innovation and Knowledge • Digitization • Innovation, Quality, and Speed (Productivity) • Alliances and Partnerships • Lifelong Learning • Collaboration

Clearly, the fundamentals for economic progress in the 21st century have changed significantly. The realities of this new economic order are already being strongly felt, as some states, regions, and communities win and others lose. It is equally clear that state governments and their institutions must not be passive players as their economies change. State policy, development departments, land-grant universities, and a broad range of state-related institutions have a major role to play in determining the economic success or failure of a state.

THE RELEVANCE OF EXTENSION IN THE 21ST CENTURY ECONOMY

Against such a background of rapid and dramatic change, can a system such as Extension, established in the early 1900s, be relevant? The answer may be surprising, and is a testimony to the foresight of those who originally developed the structure and mission of extension under the Smith-Lever Act. It is exciting to note that OSU Extension may well be *more* necessary and relevant than ever before. **Much of what is required for 21st century success (innovation, technology transfer, human capital enhancement, productivity improvement, networking, quality of environment and place) is directly addressed through the mission and operations of OSU Extension.** The current vision statement of OSU Extension speaks very strongly to this.

Vision

OSU Extension is a dynamic educational entity that partners with individuals, families, communities, business and industry, and organizations to strengthen the lives of Ohioans. As Extension educations, we:

- *Focus on critical economic, environmental, leadership, and youth and family issues.*
- *Engage people in lifelong learning.*
- *Apply knowledge and practical research to the diverse needs and interests of Ohioans in rural, suburban, and urban communities.*
- *Extend resources of The Ohio State University*
- *Recruit and develop volunteers to multiply Extension's efforts while developing their leadership potential.*
- *Enhance teamwork through networking and connectedness.*
- *Link youth, family, and community needs to scholars in Ohio and nationwide.*
- *Teach with cutting-edge strategies using new technologies and approaches.*

As shown in the previous chapter, which examined forward linkage impacts, OSU Extension is dedicated to performing multiple functions of critical importance to economic and social progress in Ohio—and these functions are of direct relevance to the needs and challenges of the New Economy:

- Extension is an education-driven organization seeking to significantly enhance human capital and promote lifelong learning in the state.
- Extension is a pragmatic disseminator of the latest in research and technologies to enhance productivity and expand the economic base of Ohio.
- Extension forms a statewide network—with a presence in every county—serving to link communities, businesses, and the general population to the intensive R&D resources of OSU.
- Extension addresses both urban and rural social and economic issues.
- Extension works to enhance and sustain the environment and quality of place in Ohio, assuring the attractiveness of the state for human capital and new ventures.
- Extension places a heavy emphasis on youth development and leadership, helping to provide the next generation of New Economy workers and leaders.
- Extension, with its history of engagement with agricultural production, has a track record in applying technology and enhancing marketing and productivity to assure Ohio's performance in the highly competitive globalized marketplace.

The activities of Extension compare very favorably with the types of economic building blocks that Atkinson points out as necessary for New Economy success. As Table 20 indicates, Extension has roots and operations relevant to each of the New Economy success factors.

Table 20: New Economy Building Blocks and OSU Extension's Related Activities

New Economy Building Blocks	OSU Extension Activity
▪ Dynamic	Extension is a "change-oriented" organization, responding to dynamic agricultural, business, and community challenges on an annual basis. Response to highly dynamic business like agriculture (responding constantly to dynamic forces such as weather, pest emergence, global commodities markets, etc.) is testimony to the appropriate structure of OSU Extension.
▪ Global	Because of the global nature of agricultural and commodities markets, OSU Extension has considerable experience working with producers and processors on global issues. This includes OSU Extension's involvement with the National Initiative to Internationalize Extension. This involvement has led to OSU Extension partnering with Purdue University, Iowa State University, and Florida A&M University to develop an international extension curriculum for extension personnel.
▪ Networked	With operations in every Ohio county, OSU Extension serves as the gateway to OSU, providing links to the University's deep pool of talent and expertise. Extension's programs are delivered in a networked partnership with multiple agencies and nonprofits throughout Ohio's counties. OSU Extension is also an integral part of the national network of extension agencies and land-grant institutions.
▪ Flexible Production and Customization	OSU Extension's direct work with producers, processors, and manufacturers provides access to this field of expertise.

Table 20: New Economy Building Blocks and OSU Extension's Related Activities, continued

New Economy Building Blocks	OSU Extension Activity
▪ Innovation and Knowledge	This is a primary mission of OSU and OSU Extension. The University and OARDC are innovation engines working to produce new knowledge and to diffuse new technologies and working practices into Ohio's economy.
▪ Digitization	OSU Extension has been an early adopter of advanced technologies, using Internet-based distance education and being networked state-wide from office to office. Extension is also highly active in leveraging new digital technologies to improve traditional focus areas, such as work in computer-driven precision agriculture and sophisticated software systems for informing producer decision making.
▪ Innovation, Quality, and Speed (Productivity)	Again, this lies at the core of OSU Extension's mission. Extension works to diffuse the latest innovations, technology, and know-how into the Ohio economy with the defined intent to increase the volume and quality of economic output. Examples ranging from the development of high-quality, high-productivity soybean varieties to advanced high-throughput packaging technology point to OSU and OSU Extension's track record in this area.
▪ Alliances and Partnerships	Much of Extension's work in Ohio, especially in the social and community development areas, is delivered through partnerships with other organizations. Benefits include avoiding service duplication and extending OSU's skills and talents to strengthen and improve the activities of other organizations. Extension alliances extend across state lines, helping to leverage the expertise of other state extension services for the benefit of Ohio.
▪ Lifelong Learning	As a distributed system, with operations in every county, OSU Extension is well positioned to provide lifelong learning opportunities across the state. Beginning with youth programs, Extension is working to instill the practice of lifelong learning and skills improve-ment in Ohio's population. Extension is also home to a broad variety of specialized continuing education and skills development programs targeted to specific audiences in industry and community.
▪ Collaboration	As noted above, OSU Extension is networked both within the state and across the country.

Despite the direct relevance of existing Extension operations to the needs of the 21st century economy and society, the system, on both a national and state basis, has been considering ways to improve and extend positive Extension impacts. An outgrowth of this consideration was the Extension Vision for the 21st Century Committee, comprising 23 extension directors and national thought leaders tasked with formulating "a vision that considers the impact of changing demographics, advances in technology and profound social changes that confront our society."[42] Dr. Bob Moser, Vice President and Dean of the College of Food, Agriculture and Environmental Sciences at OSU, served as one of the 23 committee members.

[42] Extension Committee on Organization and Policy (ECOP). *The Extension System: A Vision for the 21st Century.* National Association of Universities and Land-Grant Colleges, February 2002.

The Extension Vision for the 21st Century Committee has made specific recommendations for extension systems at the state level to consider. These include the following:

- **Evaluation of Mission and Changing Program Direction**—The committee recommends the use of a broad stakeholder base in charting mission and course, thereby working to assure engagement with the diversity of needs present across the state. Furthermore, the committee suggests an evaluation of decisions against 21st century mission, a review of leadership staff for commitment to progress and change, and the building of an organizational structure that encourages internal and external collaborations.
- **Leadership**—The committee strongly recommends the inclusion of extension leadership in the highest levels of university-wide decision making, thereby working to assure a strong voice is present to encourage university-to-community engagement. Furthermore, significant programs in extension leadership development are encouraged, together with hiring practices that seek appointment of those well-equipped to lead within a diverse society.
- **Partnerships—**Clearly, extension cannot operate alone; it has to be proactive in forming university and community partnerships that share resources and respond to diverse needs and expectations. Cross-state collaborations are encouraged, as are connections to continuing education systems.
- **Funding—**The committee recommends that extension maintain flexibility in its funding by allocating no more than 70 percent of regular recurring funds to long-term personnel costs. This recommendation is made to assure that extension has the flexibility and agility needed to respond to rapidly changing conditions and challenges. Furthermore, the committee suggests expanding extensions links to foundations, corporations, and other nongovernmental funding sources.
- **Information Technology and Learning Methodologies—**The committee recognizes the promise of information technology for providing greater economic inclusion and learning access across rural and urban areas and various socioeconomic and demographic groups. Because of its on-the-ground presence in each county, extension is envisioned as becoming a key local hub for lifelong learning and knowledge transfer.
- **Scholarship—**Recognizing the need of extension-related faculty to be engaged in scholarship, the committee recommends development of a new definition for "engagement scholarship," thereby allowing employees to gain scholarship recognition for their applied work and community engagement.

It is readily apparent that the committee's recommendations point to a perceived need for restructuring extension and broadening its horizons and connectivity. In essence, the recommendations testify to the direct relevance of extension programs as they have existed, but call for expansion and greater connectivity of these programs and initiatives with broader elements of society and the economy.

OSU Extension has taken the recommendations of the committee and is integrating them into its plans for 21st century operations. Key elements of OSU Extension's future focus include the following:

- **Forecasting**—OSU Extension is working to identify, in advance, emerging issues and needs for the State of Ohio.

- **Relevance to Timely Issues**—OSU Extension is assuring that it has the capabilities and flexibility to work on prescient issues such as workforce development and skills enhancement, health care, and value-added agriculture.
- **Enhanced Local Functionality**—OSU Extension has the goal of making county/ district offices into local learning centers and true "front doors" to the full resources of OSU. This also includes a commitment to county-based programming meeting specific localized needs.
- **Information Technology**—OSU Extension is using on-line and just-in-time learning technologies to assure expedited information and skills delivery and provide statewide access for all communities, both rural and urban.
- **Organizational Leadership**—Following the national committee's recommendation, OSU Extension has been active in ensuring its representation on the most important University committees.
- **Partnerships**—In addition to increasing work with partner agencies and organizations throughout Ohio, OSU Extension has established close collaborations with the extension services in Indiana and Michigan. The goals are to provide Ohio with expanded access to research and resources and also to allow for more specialization and reduced duplication. Kentucky, West Virginia, and Pennsylvania also are expected to engage in this collaboration with Ohio.
- **Funding**—Following the national committee's lead, OSU Extension is seeking to expand its funding sources beyond the traditional federal, state, and local government sources. Extension is targeting expansion of foundation grants, commercial contracts, and user fees as potential sources of funds for enhancing operations. Extension is also seeking to secure more federal grants, beyond the formulary funding received annually.
- **Accountability—**OSU Extension is grounding its accountability in quantitative market research. The intent is to establish a baseline by understanding the needs of customer and potential customer groups, and then to perform post-service evaluations to assess results obtained. OSU is also expanding the marketing of Extension services to provide the public and industry with a better understanding of the scope of services offered and how they may be accessed.
- **Scholarship—**Extension is adopting a pragmatic approach, seeking to be very much engaged in "applied" research in the field and working to assist OSU and the OARDC in moving more research from the bench into practice. Multiple Extension staff are co-located with OARDC branch operations to facilitate this applied field research.

FUTURE EXTENSION INITIATIVES

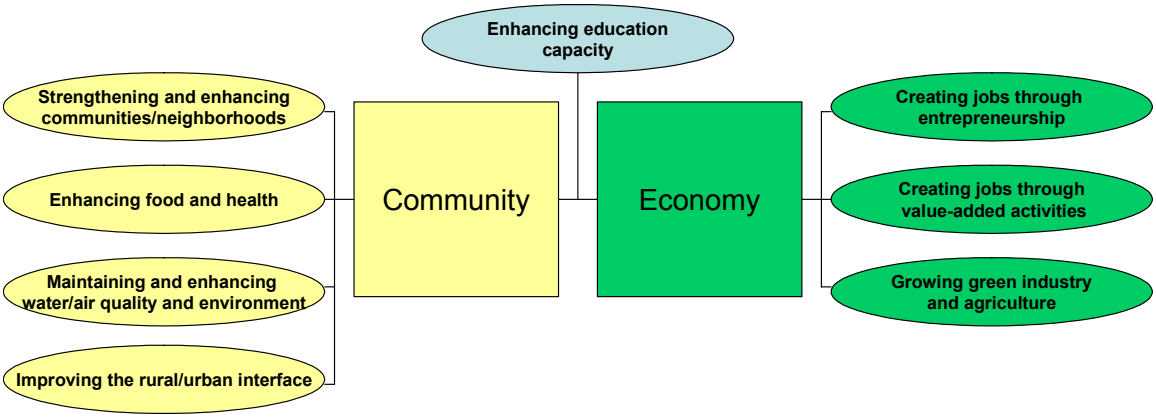
Together with the above organizational enhancements, Extension has targeted the following thematic focus areas for future development:

- **Strengthening and enhancing communities and neighborhoods**
- **Enhancing Ohio's educational capacity**
- **Growing Ohio's green industry and agriculture**

- **Maintaining and enhancing Ohio's water quality and air quality natural environment**
- **Creating jobs for Ohioans through entrepreneurship and value-added activities**
- **Enhancing food and health**
- **Improving the rural/urban interface.**

As Figure 9 illustrates, the thematic focus areas that OSU Extension is targeting for the future fall broadly into two macro themes—community and economy. The focus area of enhancing educational capacity spans both of these macro themes because it would impact both.

Figure 9: Generalized Structure of Future OSU Extension Themes



OSU Extension has been active in rethinking its mission, role, and programming areas for the 21st century. That said, the Battelle impact review process identified the following opportunity areas that deserve attention by Extension as it plans for the future:

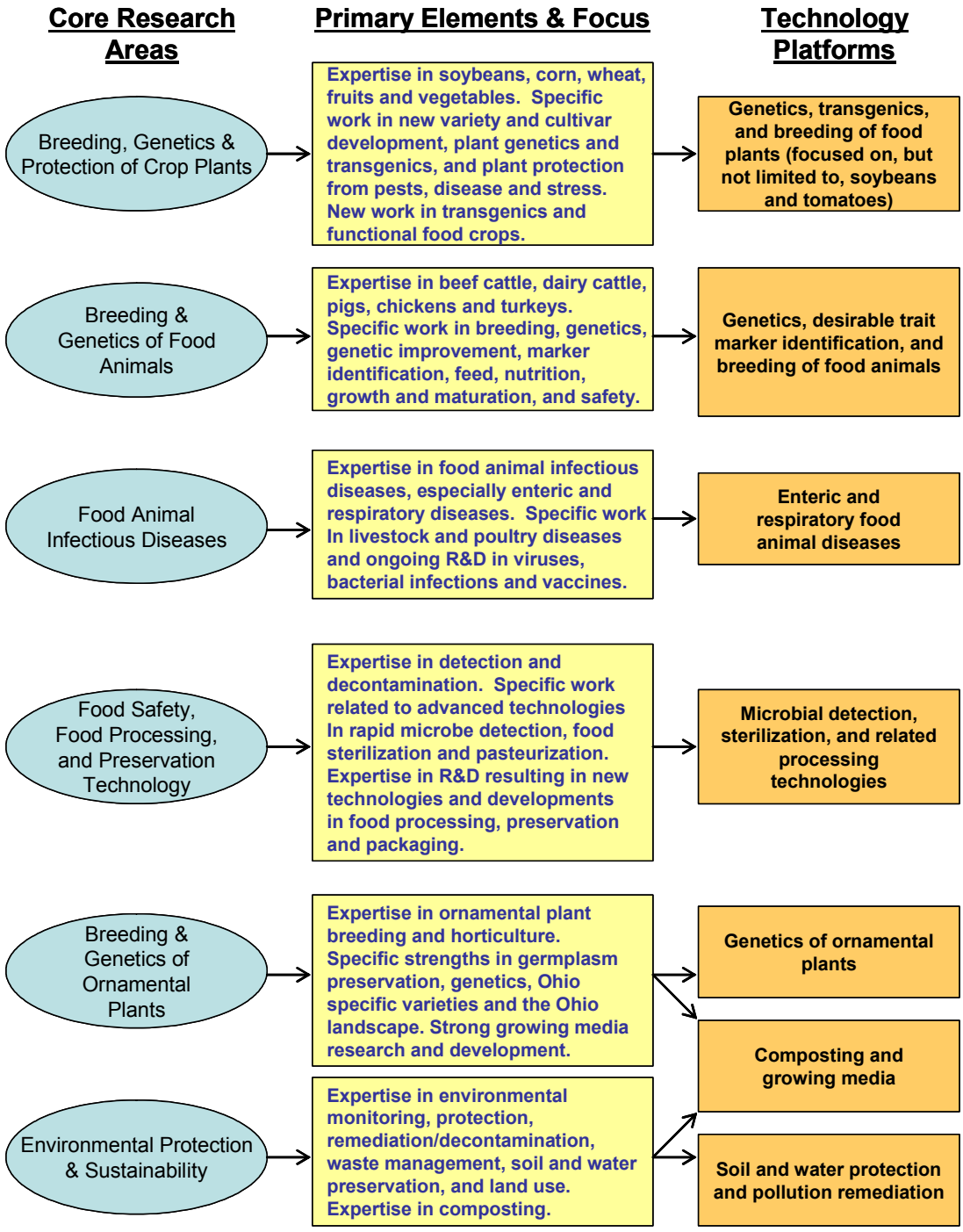
- **Alignment with OARDC core competencies**
- **Innovation-driven economic development**
- **Diffusion of best practice programs and initiatives**
- **Industry/community engagement via Extension Teams**
- **Continuing education and lifelong learning access**
- **Holistic resource deployment (versus silos).**

Alignment with OARDC Core Competencies

In April 2004, the OARDC released *A Development Path for the Future*[43], a competitive positioning strategy based on in-depth research and analysis by Battelle's Technology Partnership Practice. The positioning strategy identifies the core technology platforms upon which OARDC-originated agbioscience business development for Ohio could be based. The research concluded that seven technology platforms have significant merit as areas of focus and investment for future economic progress in Ohio. These platforms are illustrated in Figure 10.

[43] Battelle Technology Partnership Practice. *OARDC's Competitive Positioning Strategy: A Development Path for the Future.* Ohio Agricultural Research and Development Center, April 2004.

Figure 10: OARDC Core Competencies as Platforms for the Future



Based on these core competency platforms, specific recommendations were made for OARDC R&D activities aimed at producing economic development benefits for the Ohio economy. These recommendations are shown in Table 21.

Table 21: Key Recommendations for OARDC Technology Platforms

Technology Platform	Recommendation/ Conclusion	Market Analysis
Genetics, transgenics, and breeding of food plants (focused on, but not limited to, soybeans and tomoatoes)	OARDC research should focus on the following: • Enhancing the functional food, phytochemical, and nutraceutical components of soybeans. • Establishing the health benefits of soybean phytochemicals and then increasing the expression of these beneficial chemicals in Ohio varieties. Represents opportunity to significantly increase the value of the Ohio crop and engender the development of the functional food and nutraceutical sectors in the state. • Extracting relevant nutrients and phytochemicals (or maintaining their active expression after food processing). • Continuing OARDC's ongoing work in disease and stress resistance and yield enhancement. • Pursuing tomato-based research along the same lines as that of soybeans. Could reap economic rewards for the state, but at a lower overall volume than realized by soybeans.	Large monetary opportunity given rapid growth of worldwide functional food and nutraceutical sectors. Critically important to increasing value and productivity of the key crop on Ohio farms—soybeans.
Genetics, trait marker identification, and associated breeding of food animals	In the near term, applied food animal sciences at OARDC/OSU should focus on two principal areas: • Marker and gene identification and the production and marketing of diagnostic tests • Production of value-added animal breeds, via transgenics or traditional pathways, for the Ohio livestock and poultry system. Animal transgenics for biomedical purposes has a long-term development horizon; but, discussions related to interest in the field should be opened up between the OSU College of Medicine and Public Health, the College of Pharmacy (for animal biopharming), and OARDC animal sciences.	Large monetary opportunity for advanced marker technologies and diagnostic tests for food animals. Opportunities to leverage OARDC genetics and transgenics skills for early entry into value-added animal production and transgenic animals. Opportunity to link transgenic animal expertise to OSU human medical research.
Enteric and respiratory food animal diseases, including zoonotic diseases	A clear near-term focus of OARDC should be R&D leading to the following: • Commercializable diagnostic tools, tests, vaccines, drugs, and biologics related to established and emerging food animal diseases. • Major categories of disease, including enteric, respiratory, and immunosuppressive diseases and disorders. OARDC has been wise in focusing its research on these areas and this approach should be continued. Approaches to zoonotic diseases may benefit from liaison and multidisciplinary research projects between OARDC and human medicine researchers on the Columbus campus.	Direct opportunity to continue OARDC IP generation and commercialization related to diagnostic tools, tests, vaccines, drugs, and biologics. Near-term opportunities to link clear OARDC skills in this area to large volume of funds being provided at the federal level for biosecurity and agrosecurity.

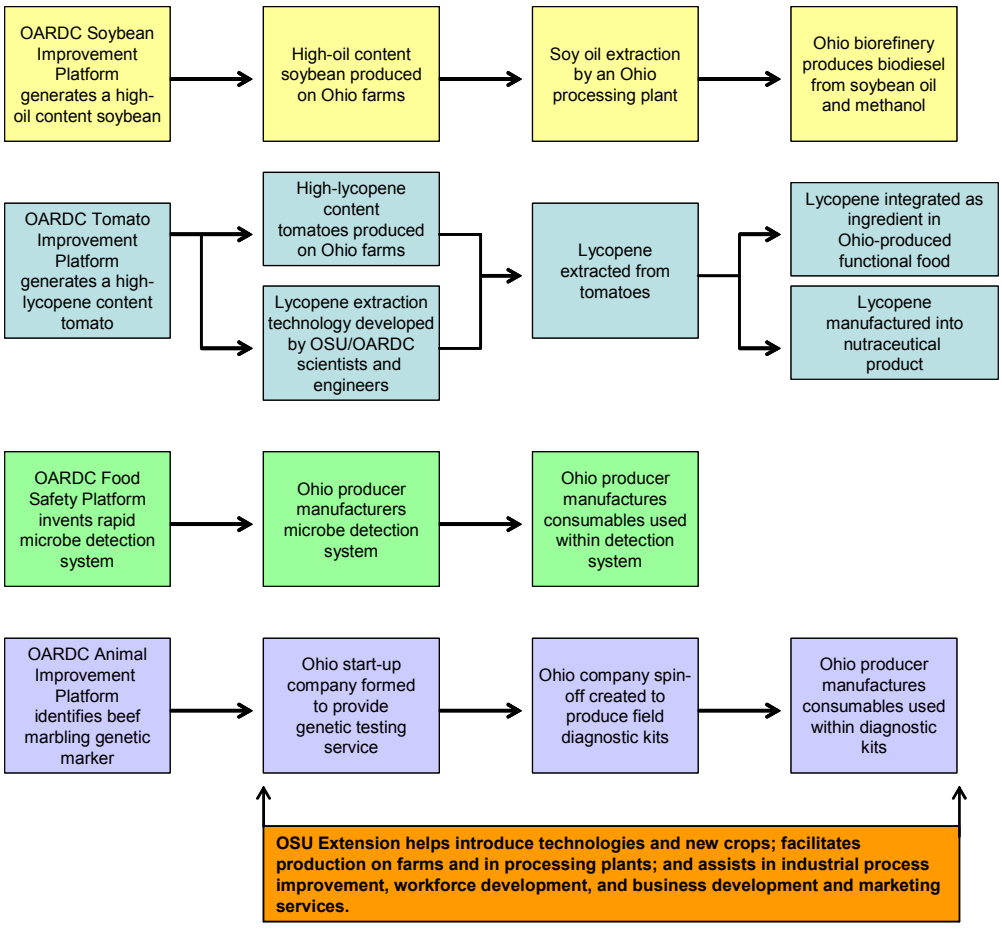
Table 21: Key Recommendations for OARDC Technology Platforms, continued

Technology Platform	Recommendation/ Conclusion	Market Analysis
Food decontamination, sterilization, and associated processing technologies	• The current focus of the CAPPS program is on point and pragmatically led in partnership with industry—this is the type of model initiative that should be duplicated elsewhere within the OSU system. • A focus on advanced sterilization and decontamination technologies and associated devices based on the work at the Columbus labs should remain a high priority for the University. • In addition, the rapid microbe detection technologies being developed by OARDC faculty have potential not only in food safety, but in biosecurity applications where monitoring for bio-contaminants will be a key growth sector.	Significant opportunity for R&D discoveries leading to an expanded decontam-ination and sterilization equipment advanced manufacturing sector in Ohio. Opportunity to open bio-technology opportunities in microbe and contaminant detection (again with significant biosecurity funding possibilities).
Ornamental plant genetics and germplasm "mining" for functional genes useful in the agbiosciences	• Applied R&D and extension services to the rapidly growing nursery and horticulture sector in Ohio should be an OARDC economic development priority. • Gaining *technology-based* economic development from this strength area will require a formal program to structure ornamental genomics research that links to biotechnology, pharmacology, and other plant and medical bioscience initiatives that may result in novel and valuable compounds and resources from plant germplasm.	Enhancing Ohio's position in the lucrative ornamental plants/nursery business sector. Potential for very large economic returns on novel gene/compound discoveries useful to medicine within unique ornamental plant germplasm resources of OSU.
Environmental protection and decontamination technologies focused on soil and water	• Development of rapid diagnostic tests to check for pollutants/contaminants in water resources and Ohio's agricultural soils is recommended. • The development of microbes and microorganisms for pollution control and decontamination applications also is a logical economic pursuit.	Large worldwide market for environmental protection and remediation technologies. Near-term federal financing opportunities due to relationship to biosecurity and homeland security.
Composting and advanced potting soil/growing media development	• Work should continue on increasing the quality of growing media while reducing its production costs. This may include R&D related to developing new technologies for producing and managing advanced growing media products, and potentially using various municipal waste, agricultural waste, and other waste streams in the industry. • Continued OARDC work on probiotic and biocontrol inoculants shows considerable promise for potential "agbiotechnology" chemicals and products.	Potentially significant ag-chemicals market if biocontrol inoculants research at OARDC is successful. Long-term opportunities to reduce disposal and environmental costs of waste streams and gain value from them through advanced composting technologies.

OSU research strengths in these areas are a good match to current and emerging industry strengths in Ohio's agbioscience sector. What must be established and maintained to realize the benefits of these platforms are strong relationships between OARDC and key industry sectors and representatives. Furthermore, the translation and transfer of OARDC research discoveries into Ohio's business and agbioscience industry base must be facilitated to assure development potentials are realized. OSU Extension is a critical element in facilitating the application of OARDC discoveries and innovations. OSU Extension serves as the gateway for industry, especially agbioscience industry, access to OSU resources and thus forms a crucial link in realizing the potential of OSU-initiated agbioscience economic development and economic growth.

Realizing value from OARDC innovation requires moving that innovation into an Ohio-based value-added chain of production. OSU Extension is the critical link in moving R&D from the bench into formal application within industry. Figure 11 provides a few examples of the type of value chains that may result and the important role that OSU Extension plays in making and facilitating the links.

Figure 11: Potential Integrated Value Chains for Ohio Based on OARDC Technology Platforms

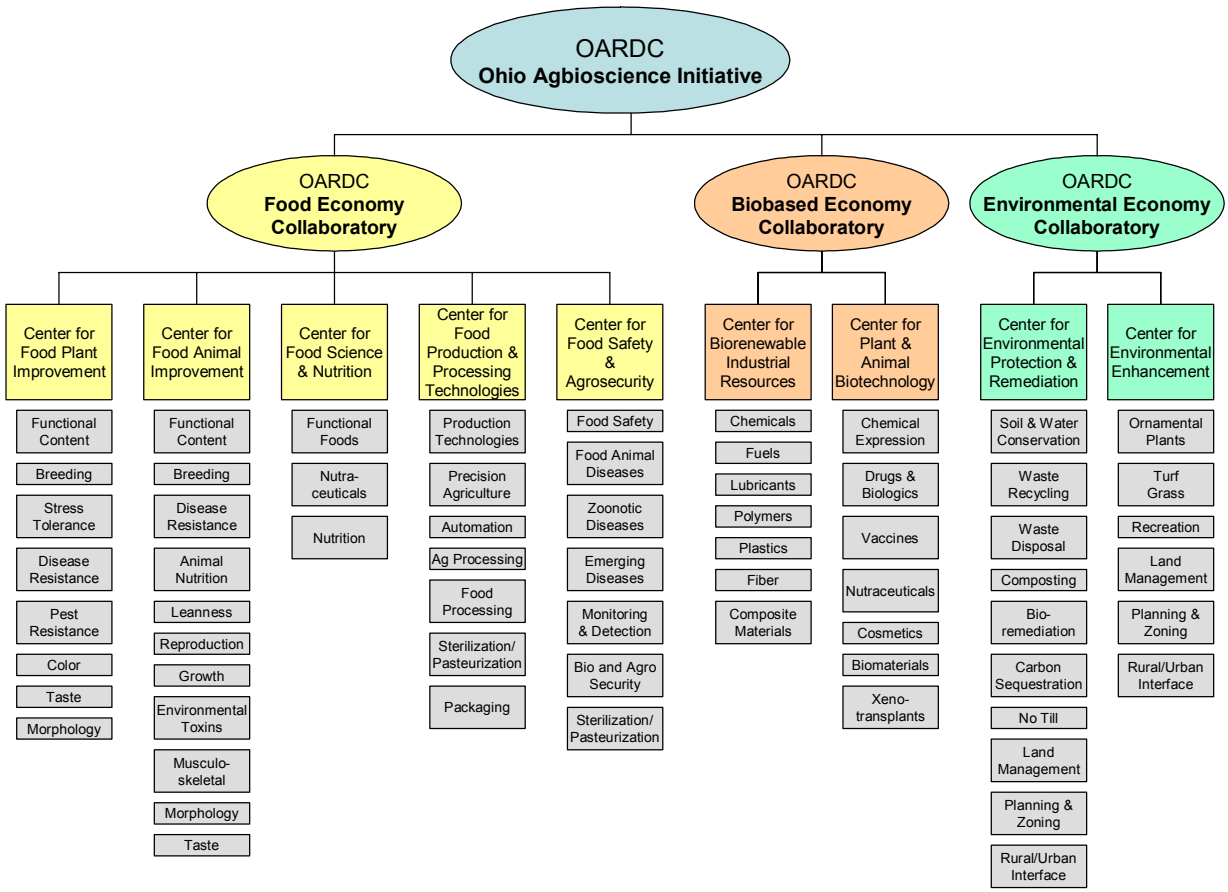


For advancing Ohio's current and future potential in agbioscience and related development fields, Battelle's report outlined a formal structure designed to facilitate interdisciplinary work, collaboration with industry and producers, innovation, and commercialization of agbioscience discoveries. Under an umbrella "Ohio Agbioscience Initiative," the following three "collaboratories" were proposed:

- **Food Economy Development**—Leveraging OARDC expertise in food science and technology, in combination with advanced R&D skills in plant and animal breeding, nutrition, processing technologies, and food safety.
- **Biomass Economy Development**—Creating progress in biotechnology and biorenewable industrial commodities to generate an enhanced agbioscience economy and new, fast-growth business fields for Ohio.
- **Environmental Economy Development**—Using OARDC strengths in environmental sciences, resource management, and environmental remediation to generate new environmental business technologies and promote an enhanced environmental sustainability and quality of life for Ohio.

The overall proposed collaboratory structure, comprising the three collaboratories and nine constituent program focus areas, is illustrated in Figure 12.

Figure 12: Ohio Agbioscience Initiative



It is clear that Extension, with its community development and agbioscience-sector development missions, has an extremely important role to play in assuring the success of this collaboratory model. Extension's experience and expertise in fields such as agribusiness and management, agricultural marketing, and agricultural development economics and finance, to name a few, can serve as vital resources and significant components as the Collaboratories are formed and implemented. In addition, Extension has the statewide network required to assure widespread participation in the collaboratory initiatives and the delivery system required to assure connectivity to producers, processors, manufacturers, and distributors.

OSU Extension has already formed specialist teams to respond to current specific commodity and sector needs. This model should be extended to form three specialist Extension teams with the remit of furthering the development of the Ohio "Food Economy," "Biomass Economy," and "Environmental Economy" platforms.

Innovation-Driven Economic Development

As noted earlier, the New Economy, globalization, competitive market pressures, technological advances, the preeminent importance of innovation and talent, and other forces are restructuring the economic development playing field. Against this background, it is imperative that Ohio and the state's local governments and institutions be structured to respond to the new economic challenges and opportunities.

Technology and the forces of the New Economy are changing the rules upon which industries, and thus regional and local economies, have been built. Such change means that the practice of economic development must also change to reflect the new order. The question, of course, is how the practice of economic development should change to engender positive economic performance in the New Economy.

Developing a strong foothold in the New Economy requires a strong innovation-led strategy, most notably rooted in science- and technology-led R&D activity. The following approaches have been identified as important to the development of such strategy in national and international case studies[44]:

- **Supporting high-tech companies and facilitating R&D activities.** In this approach, policies and programs work on the fundamental premise that R&D and corporate innovation around high technology serve as engines for economic growth and competitiveness. Thus, programs and policies are designed to induce and encourage R&D and the commercialization of R&D discoveries.
- **Facilitating university-industry partnerships and commercialization.** Successful regions are facilitating strong interactions between industry and academic R&D institutions and forging alliances that speed the commercialization and transfer of new technologies and innovations.

[44] Kenan Institute of Private Enterprise, University of North Carolina at Chapel Hill. *Best Practices in Science and Technology-Based Economic Development Policy: US and Global.* North Carolina Board of Science and Technology, September 1999.

- **Investing in human capital.** Innovation and the accompanying rapid structural change require a dynamic, well-educated, and skillful populace. The Kenan Institute[45] notes that "the leading technology regions are investing heavily in programs to enable the workforce to learn and re-learn the competencies and skills required in that dynamic economic world."
- **Harnessing information technology.** A region must have a "well-developed, well-utilized information network to be competitive in a knowledge economy."[46] It has been found that leading technology regions are cementing their leadership position by investing substantially to develop information networks linking schools, governments, private companies, and other organizations—allowing citizens to access expanding information to provide a competitive advantage.
- **Capital.** For companies to start, grow, and thrive, they must have access to necessary capital for each stage in their development. To be successful, an economy built upon innovation will need to provide good access to capital for each stage in company development including pre-seed, seed, and venture capital rounds and additional financing sources. Major gaps in the continuum of capital required for successive stages of development will limit, if not stifle, economic development potential.
- **Networks.** The Knowledge Economy is driven by the free flow, or spillover, of knowledge. Just as the movement of money is required to expand an economy, the movement of ideas is required to spur knowledge-driven growth. It is imperative that modern economic development works to build collaborations, networks, and communications mechanisms that promote the free flow of ideas and knowledge spillover effects.
- **Physical infrastructure.** A quality physical and communications infrastructure is required to facilitate human interactions and provide for the efficient movement of human capital and the output of their economic functions. It is also required to maintain the quality of place required for attracting and retaining talent and employers.
- **Global linkages.** Competing in the New Economy means competing in an increasingly global business environment. Strong programs to encourage international partnerships, access to overseas markets, and a greater visibility for the region on the world economic stage are increasingly important.
- **Developing an entrepreneurial culture.** It is hard to define an entrepreneurial culture, but it is a distinct necessity to have such an environment for building an innovation and technology-led economy. Berglund and Clarke note that "in an entrepreneurial culture, people view starting a company as routine rather than an unusual occurrence, entrepreneurs are celebrated, individuals know many others who have started their own company, and people view company failure as a possible outcome of doing business rather than a cause for social disgrace."[47] This impact report adds to that statement, noting that a true entrepreneurial culture is one in which a considerable number of serial entrepreneurs have

[45] Kenan Institute of Private Enterprise, University of North Carolina at Chapel Hill. *Best Practices in Science and Technology-Based Economic Development Policy: US and Global.* North Carolina Board of Science and Technology, September 1999.
[46] Ibid.
[47] Berglund, Dan, and Marianne Clarke. *Using Research and Development to Grow State Economies.* National Governors' Association, NGA Center for Best Practices, 2000.

successfully created multiple start-ups, are visible in the community, and are actively mentoring the next generation.

- **Quality of life/quality of place.** Betsy Donald[48] points out that "quality of life is an individualized concept, whereas quality of place suggests a consensus in a place regarding how quality of life strategies should be prioritized in terms of an overall development plan." A city's quality of place is the sum of those cultural, social, recreational, and other assets that serve the needs of the whole population. While a somewhat intangible concept, there can be little doubt that the qualities of a place translate into an image and reputation that are of great importance in talent attraction and associated economic growth.

If these are the factors around which modern economic development will occur, then OSU Extension has an extremely important role to play in helping Ohio's communities understand and adjust to the positive and negative ramifications of these forces for their economic and community development. OSU Extension must develop a new curriculum for economic and community development in the innovation-led economy and work to

- **Provide training for community leaders and economic development practitioners in innovation-led economic development fundamentals;**
- **Assist communities in developing formal strategies for economic and community development in the New Economy; and**
- **Provide access to OSU scientific, technical, and other expertise required for evaluating innovation-development prospects, needs, and activities in each community.**

In addition, Extension must continue its support of the Agricultural Technology Commercialization and Economic Development Program in conjunction with OARDC. The mission of ATECH is to foster and accelerate economic development as a result of university research and Extension programs with a primary focus on food, agricultural, environmental, and life science technologies. The funding dedicated to supporting ATECH is building a food and agricultural science infrastructure that will

- Facilitate the development of new food and agricultural businesses and create jobs;
- Attract existing companies to Ohio;
- Facilitate commercialization and transfer of technologies and knowledge to the private sector from the University; and
- Provide technical assistance and market analyses to existing and new Ohio companies to allow these firms to capture more of their markets, enter new markets, or expand product lines into new applications and capture additional value.

The success of ATECH will be a determining factor in whether or not Extension can positively impact innovation-driven economic development. Therefore, Extension's support and dedication to the initiative will be critical in the near term.

[48] Donald, Betsy. "Competitiveness and Quality of Life in City Regions: Compatible Concepts?" Paper presented at the Canadian Association of Geographers Annual Meeting, Montreal, Quebec, June 2001.

Diffusion of Best Practice Programs and Initiatives

One of OSU Extension's key strengths is its "bottom-up" structure, whereby individual counties and communities work with their Extension representative to identify needs and set the agenda for locally provided Extension services. In doing this, the powerful resources of OSU can be efficiently focused on highly specific local needs throughout the state. This local focus of Extension is at the very heart of the organization's mission and must remain so.

Adherence to the local delivery model, as it is currently structured, does, however, have a weakness. Successful programs and initiatives developed for one county may have potential for migration and diffusion to other communities and counties in Ohio—however, the current operations of Extension do not appear to place a priority on the "re-use" of such best practices. There is inherent inefficiency in such a structure that likely results in efforts on similar problems being duplicated across the state and in good programs that might be applicable elsewhere going "under the radar" in all but their originating county.

There is an opportunity to leverage the existing programs and initiatives of Extension through development of an OSU Extension best practices system. First, it is recommended that each county extension representative be asked to complete a standard form regarding what they consider to be the three most effective Extension programs deployed in their county. To the extent possible, the information collected should cover the nature of the service, the populations served, the approximate cost and time involved in developing and deploying the service, and measures of outcomes achieved. Then, OSU Extension should produce a best-practices section of the Extension Web site, providing a searchable solutions database. Over time, the approach should be extended to include extension services of surrounding states as well.

Industry/Community Engagement via Extension Teams

Just as it is critically important that county educators leverage each other as resources for best practices, it is equally important the county educators are able to leverage and link to state and center specialists in order to stay on the cutting edge of their respective fields and deliver the highest quality service and programming activities to the various constituencies within the State of Ohio. The inability to stay connected will result in inferior services. However, with an ever-increasing, fast-paced world of new discoveries and innovative thoughts, even with the advancement of telecommunications as a means for information dissemination, it is still difficult to stay abreast of recent developments. In fact, with the advancements in information technology, professionals may be faced with information saturation in terms of the amount of data that passes before them. Therefore, it is critical that systems be put in place to ensure that the most critical information is not lost in the noise.

Extension activities centered on the Agriculture and Natural Resources services have been quite effective in overcoming these issues. As previously discussed, Agriculture and Natural Resources has focused on the formation and development of interdisciplinary commodity/issue-focused teams composed of county, center, and state extension and research faculty to address the current needs faced by Ohio producers and agbioscience industry. Currently, 24 Agriculture and Natural Resources Teams have been formed. These teams meet as needed, sometimes as often as once a week, to help address the urgent and real needs of their constituencies in a timely manner. These self-directed teams also interact with their respective statewide commodity

groups and state and federal agencies to forge strategic relationships that assist in the development of the structure for their educational products and programs.

Similar efforts need to be fostered within other areas of Extension to link county educators with state and center specialists, in addition to various stakeholder and constituency groups, to ensure that programming initiatives and service activities stay focused on the most pressing needs.

Continuing Education and Lifelong Learning Access

As noted previously, much has been written about the rise of "knowledge" as the driver of the U.S. economy. This rise is an accepted fact; but, there is much misunderstanding about who possesses this "knowledge." Some have interpreted this to mean that a four-year college-degreed elite is the route to economic success; but, the fact is that skills and knowledge are increasingly required across the total workforce. The creative elite may be a critically important driver of invention and new products and services, but it encompasses only a small proportion of the U.S. labor force. The rest of the workforce must produce the output of creativity in volume and do so at a higher level of productivity than can be achieved elsewhere. Gray and Herr[49] note as follows:

> *If the route to success is inventing new products, the education of the smartest 25 percent of the labor force is critical. If the route to success is being the cheapest and best producer of products, new or old, the education of the bottom 50 percent of the population moves to center stage. This part of the population must staff those new processes. If the bottom 50 percent cannot learn what must be learned, new high-tech processes cannot be employed. If the education of the bottom half moves to center stage, so too must workforce education, which we have defined as education and training below the baccalaureate level.*

Thurow[50] echoes these sentiments in one of his recent works, when he notes the following:

> *A knowledge economy requires two interlocking but very different skills sets. Knowledge creation requires highly educated creative skills at the very top of the skill distribution. Knowledge deployment requires high-quality skills and education in the middle and bottom of the skills distribution.*

The implication for Ohio is critically important for all involved in government, education, and economic development to grasp. It is that, in a 21st century economy driven by high productivity and increasingly skilled processes, an unskilled workforce is no resource at all. It is only a "potential" resource, and that potential can only be realized through workforce education and continuous skills development.

It also must be noted that technology and productive processes are being improved or supplanted at a rapid pace. In such a fast-paced, change-oriented working environment, a workforce has to be equipped with the personal learning skills and adaptability traits required to keep pace. Life-long learning is not just a catch phrase; it is becoming a necessity. Most workers cannot expect that their job will continue to be done as they currently do it, or even that it will exist, a decade from now.

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[49] Gray, Kenneth C., and Edwin L. Herr. *Workforce Education.* Massachusetts: Allyn and Bacon, 1998.
[50] Thurow, Lester C. *Building Wealth: The New Rules for Individuals, Companies, and Nations in a Knowledge-Based Economy.* NY: HarperCollins Publishers, 1999.

It is readily apparent that Extension, with resources in every county and access to the wide-ranging technical and educational resources of the University, is very well positioned to deliver continuing education and workforce skills development services. Staying ahead in the productivity race requires the adoption of the latest in technologies and personnel equipped with the education and skills to use it. Extension already plays an important role with programs as diverse as training in precision agriculture technology to basic computer literacy for inner-city residents. **What does not exist yet at Extension is a formal strategy for deploying Extension resources for optimum impact in key strategic sectors of the Ohio economy. As the text box indicates, other states such as Iowa are strategically positioning themselves. A future imperative for Extension should be the drafting of such a strategy—working to assure seamless and efficient access to OSU education and training resources for those in key strategic industries.**

Iowa's Investment in Training for the Agbioscience Economy

Education and training are keys to growing an agbioscience economy. Iowa is an excellent working example of multiple partners coming together to develop facilities and curriculum to advance bioprocessing industry growth in the state. The Iowa Bioprocess Training Center (IBTC) is a state-of-the-art educational facility operated by Indian Hills Community College designed specifically to serve the bioprocessing industries of Iowa. Special features of the center include a large, dividable, multipurpose classroom and meeting room; separate training laboratories for bioprocess technology and process control; and a fermentation pilot plant. In addition, the facility has a personal computer lab for software training, a virtual reality computer lab, an Iowa Communications Network (ICN) classroom, and a safety meeting room.

The IBTC is the result of close cooperation between a number of academic, public, and private partners. Under a National Science Foundation grant, the IBTC, in conjunction with Iowa State University and Extension, has developed a mobile virtual reality computer system, simulating the fermentation process. This allows the IBTC education process to be extended throughout Iowa; and students can visually experience the inner workings of a fermenter, thus gaining a better understanding of the fermentation process. Other industries can use the virtual reality system to model their own processes.

Through IBTC courses, students prepare for careers as laboratory technicians, process control technicians, or quality control technicians. They also have the option of transferring to a 4-year institution to complete a bachelor's degree upon completion of a 21-month (7-term) program.

Holistic Resource Deployment (Versus Functional Silos)

As Ohio enters the 21st century, the problems of its citizens, communities, and industry become increasingly more complex. As a result, the solutions provided must become more multidisciplinary in nature to respond to ever more multidimensional issues. This is particularly true in the case of urban issues, an area in which Extension has not historically focused and in which its traditional services sometimes appear to community leaders as somewhat less relevant.

It is therefore critical that OSU Extension deploys its services within a holistic framework in order to meet these complex needs. This evolution is already occurring across numerous programmatic areas, such as food safety programming and Master Gardener activities. A specific successful outcome is the Neighbor to Neighbor initiative in Cincinnati. However, an increased effort to integrate the four functional areas of Extension must become a priority of senior leadership. Cross-functional teams should be created to address specific issues that the State of Ohio faces today, such as food security and agbioterrorism. These internal linkages will be critical in development of future significant impacts.

ISSUES TO CONSIDER FOR THE FUTURE

While it is recognized that considerable attention and thought are being focused on broadening the role of Extension within the larger university context, it is important to note that risks may be involved in pushing to accelerate technology transfer and realize the full potential of University expertise for the growth of the knowledge economy. States are viewing their research universities (especially their land-grant universities) as primary engines for innovation and economic progress in a technological, knowledge-driven society. While states are right to acknowledge the economic potential within their academic research institutions, they run the risk that unreasonable expectations and additional unfunded mandates will be placed upon these institutions. Extension, as a primary OSU gateway for interaction between the University and outside parties, is obviously being seen as critically important to the entire spectrum of University departments (rather than just the traditional agriculture, environment, and community development audiences).

The skills and expertise of Extension in reaching out and connecting the University to multiple constituencies are certainly resources to be built upon. It is only natural for OSU to seek to further leverage the skills of Extension to provide a gateway to many additional areas of University expertise—such as arts and culture, engineering, business administration, medical research, and other fields. While the movement from agricultural extension to University Extension is a move in the right direction for leveraging the knowledge and innovation of OSU for the state, such an expansion of the Extension mission should be pursued strategically. As this impact report has highlighted, OSU Extension's mission is already quite broad and financial resources have not grown in recent years. An expansion of Extension's mission to serve a much larger University-wide constituency is unlikely to succeed if said expansion does not come with a concomitant expansion in financial and associated staffing resources. As one senior party noted to Battelle during the impact interview process, the current situation is akin to widening the input end of a funnel to put more content in, but keeping the narrow output end of the funnel the same size—doing this results in no more actual output but instead may result in diluting expertise.

The expansion of Extension's mission must be accomplished through strategic planning, whereby the inputs and desired outputs are appropriately balanced. In other words, through partnering selectively in domains that will enhance the agbioscience sector of the state, Extension will be able to further its mission without diluting its current offerings. Potential partnerships might include the following:

- The College of Medicine in the areas of functional foods and nutraceutical characteristics in crops such as berries and tomatoes
- The College of Engineering in the areas of bio-based polymers and other materials
- The College of Law in the areas of land-use and farm-land management.

By focusing on specific partnerships, financial and staffing resources will be able to be identified to meet the needs of the additional areas of focus and the subsequent demand load.

Conclusion

Battelle finds OSU Extension to be a significant economic engine for the State of Ohio. Simply in terms of expenditure impacts, OSU Extension generates $159 million of Ohio economic output and more than 1,918 jobs for Ohioans. These expenditure impacts are, however, eclipsed in their importance by the benefits accruing to the state through the extensive services provided through Extension's network of county educators, center specialists, and state specialists.

OSU Extension is first and foremost a training organization with a uniquely practical mission—strengthening the lives and communities of Ohio through research-based educational programming. This mission is the key to the long-term competitive sustainability of Ohio's high standard of living. Therefore, OSU Extension is a pragmatic organization dedicated to the diffusion of research knowledge and practical training and skills development for Ohioans.

Extension's purpose is to produce positive economic and social impacts for the State of Ohio—impacts that include the following:

- Enhanced productivity and profitability for Ohio agriculture and business enterprise
- Expanded product lines and new business generation to increase Ohio's economic output
- Enhanced state and local government revenues through expansion of the Ohio economy
- Increased employment opportunities and enhanced workforce skills
- Improved social conditions and quality of life for residents of urban and rural Ohio
- Protection of Ohio's environment and the promotion of sustainability in the state
- Protection and promotion of the health of Ohioans.

These impacts are categorized by economists as "forward linkage impacts," which, rather than being related to institutional spending, are related to institutional mission and function. These are the impacts that Congress envisioned as benefits to be provided through the formation of the state extension programs. Furthermore, the wide array of services and activities that OSU Extension provides the citizens, industry, and communities of the State of Ohio clearly continue to be relevant in meeting today's needs, just as Extension has met the needs of Ohioans for the past 100 years.

However, the opening of the 21st century has brought challenging economic times, times in which some of the underlying fundamentals of economic and community development are shifting at a seemingly rapid pace. Therefore, OSU Extension must continue to evolve and advance in order to meet these new demands. Areas of opportunity that deserve attention in planning for the future include the following:

- Alignment with OARDC core competencies
- Innovation-driven economic development
- Diffusion of best practice programs and initiatives
- Industry/community engagement via Extension Teams

- Continuing education and lifelong learning access
- Holistic resource deployment (versus functional silos).

By addressing these areas of opportunity, OSU Extension will continue to be a significant economic engine for the State of Ohio into the next century.

Appendix A: Input-Output Analysis—Impact of OSU Extension Expenditures on Sectors of the Ohio Economy

Sector	Ohio Employment Impact
Food services and drinking places	90
Hospitals	36
Offices of physicians- dentists- and other health	36
Real estate	31
General merchandise stores	26
Nursing and residential care facilities	25
Food and beverage stores	25
Employment services	21
Motor vehicle and parts dealers	20
Non-store retailers	19
State & Local Education	14
Civic- social- professional and similar organizations	13
Private households	13
Social assistance- except child day care services	13
Miscellaneous store retailers	13
Automotive repair and maintenance- except car wash	12
Clothing and clothing accessories stores	12
Legal services	11
Securities- commodity contracts- investments	11
Building material and garden supply stores	10
Monetary authorities and depository credit intermediaries	10
Services to buildings and dwellings	9
Other amusement- gambling- and recreation industries	9
Other educational services	9
Gasoline stations	9
Child day care services	9
Health and personal care stores	8
Home health care services	8
Insurance carriers	8
Personal care services	7
Sporting goods- hobby- book and music stores	7
Truck transportation	7
Other ambulatory health care services	7
Telecommunications	7
Other State and local government enterprises	6
Colleges- universities- and junior colleges	6

Sector	Ohio Employment Impact
Management of companies and enterprises	6
Accounting and bookkeeping services	6
Furniture and home furnishings stores	6
Elementary and secondary schools	5
Non-depository credit intermediation and related a	5
Business support services	4
Grant making and giving and social advocacy organization	4
Electronics and appliance stores	4
Management consulting services	4
Hotels and motels- including casino hotels	4
Postal service	4
Maintenance and repair of nonresidential buildings	4
Fitness and recreational sports centers	4
Investigation and security services	4
Dry-cleaning and laundry services	4
Couriers and messengers	3
Performing arts companies	3
Advertising and related services	3
Wholesale trade	3
Architectural and engineering services	3
Insurance agencies- brokerages- and related	3
Commercial printing	3
Power generation and supply	3
Other personal services	3
Religious organizations	3
Transit and ground passenger transportation	3
Warehousing and storage	3
Spectator sports	3
Automotive equipment rental and leasing	3
Bread and bakery product- except frozen- manufacturing	2
Cattle ranching and farming	2
Newspaper publishers	2
Veterinary services	2
Motor vehicle parts manufacturing	2
General and consumer goods rental except video tap	2
Video tape and disc rental	2
Promoters of performing arts and sports and agents	2
Death care services	2
Car washes	2
Plastics plumbing fixtures and all other plastics	2

Sector	Ohio Employment Impact
Scenic and sightseeing transportation and support	2
Motion picture and video industries	2
Funds- trusts- and other financial vehicles	2
Computer systems design services	2
Radio and television broadcasting	1
Waste management and remediation services	1
Office administrative services	1
Other support services	1
Oil and gas extraction	1
Meat processed from carcasses	1
Other maintenance and repair construction	1
Commercial machinery repair and maintenance	1
Electronic equipment repair and maintenance	1
Animal production- except cattle and poultry and e	1
State and local government passenger transit	1
Scientific research and development services	1
Travel arrangement and reservation services	1
Air transportation	1
Household goods repair and maintenance	1
Maintenance and repair of farm and nonfarm residences	1
Other computer related services- including facilities	1
Photographic services	1
Specialized design services	1
Non-upholstered wood household furniture manufacturing	1
All other miscellaneous professional and technical	1
Pharmaceutical and medicine manufacturing	1
Museums- historical sites- zoos- and parks	1
Automobile and light truck manufacturing	1
Cut and sew apparel manufacturing	1
Periodical publishers	1
Other Federal Government enterprises	1
Machine shops	1
Other accommodations	1
Rail transportation	1
All other crop farming	1
Natural gas distribution	1
Greenhouse and nursery production	1
Machinery and equipment rental and leasing	1
Vegetable and melon farming	1
Independent artists- writers- and performers	1

Sector	Ohio Employment Impact
Data processing services	0
Total, All Sectors	**768**

Appendix B: Examples of OSU Extension Impacts from the USDA Cooperative State Research, Education and Extension Service (CSREES) Science and Education Impacts Project

Enhancing Economic Opportunities for Agricultural Producers

Training in Sustainable Forestry

2004 S&E Impact Report 2004-069-01-005

Issue (Who cares and why?)

Ohio has 330,000 private woodland owners and about 5,000 loggers. Much of Ohio's logging is conducted on private lands. And, about 90 percent of the state's logging is done without the involvement of a professionally trained forester who can help plan a timber harvest with the least environmental impact. A program that reaches landowners and loggers with information about sustainable forestry practices would allow the continued production of timber from Ohio's forests without sacrificing environmental quality.

What has been done?

The Sustainable Forestry Initiative (SFI) is a national program developed in 1994 by the American Forest and Paper Association (AF&PA) that promotes using responsible logging practices that conserve soil, air and water quality, wildlife and fish habitat, and aesthetics while harvesting trees and maintaining forest productivity. **Ohio State University Extension is part of the committee formed to promote SFI in the state and serves as an educator and impartial reviewer of SFI efforts.**

Impact

Extension helps train Ohio's loggers to harvest wood using Best Management Practices, or BMPs, such as planning a harvest before it starts, leaving vegetated buffer strips along streams to maintain water quality, reseeding logging roads and landings to prevent soil erosion, and using water diversions on skid trails and logging roads to prevent severe gully erosion. **Extension helps teach** landowners the principles of SFI through a unique program called Partnerships For Sustainable Forests. The program gathers loggers, landowners and foresters together to share opinions and concerns about sustainable forestry and how to practice it. Ohio State also helped develop and distribute an Ohio SFI Committee brochure to educate landowners. The brochure tells what landowners should know about selling and harvesting their timber and managing their forest land for the future.

Primary impact area(s)

Education & Extension

Funding sources

- Financial support for SFI in Ohio is provided by a grant from the American Forest and Paper Association. All other support is offered in-kind.

Enhancing Economic Opportunities for Agricultural Producers

Producing and marketing alternative crops

2004 S&E Impact Report 2004-069-01-012

Issue (Who cares and why?)

Shrinking profit margins on traditional crops, coupled with the potential health benefits and consumer demand of specialty crops, is paving the way for the production and marketing of alternative cash crops in Ohio. Research being conducted at the OSU South Centers focuses on the feasibility of growing and marketing non-traditional crops in Ohio.

What has been done?

Berries, including strawberries, raspberries, blackberries and blueberries, exhibit potential health benefits as they contain compounds, like ellagic acid, that may prevent cancer. Current research on rats has produced such promising results that human trials are being sought. The OSU South Centers is currently conducting research on berries that focuses on the production of berries and the feasibility of growing them in Ohio. The Center also conducts greenhouse studies on such crops as tomatoes, cucumbers and strawberries. Studies in order of importance include:

1. Determining the yield potential, fruit quality and marketability of various blueberry, blackberry, strawberry and raspberry cultivars.
2. Determining a nontoxic foliar spray of selenium that will optimize selenium uptake in Heritage Fall red raspberries. Selenium is a trace element that is essential for human life.
3. Alternate-year production of black raspberries as a viable option for growers.

Dick Funt, of Horticulture and Crop Science, and Winston Bash and Steve Schwartz, of the Department of Food Science and Technology, have studied the levels of ellagic acid in various berry cultivars and determined which cultivars grow best in Ohio with respect to their ellagic acid content.

Some farmers are already growing berries in Ohio. Berry farms take up more than 1,300 acres on approximately 570 farms.

In addition to berry research, the OSU South Centers have grown and marketed the sweet potato, Asian eggplant and bitter melon. Research results indicate that the crops grow favorably in Ohio with little impact from weather, insects or diseases. The crops, which were marketed throughout the state, were targeted to the growing Asian, Indian and Mediterranean populations. The crops are also a potential health benefit.

Impact

Research on alternative cash crops has shown that they can successfully be grown under Ohio conditions. With this in mind, the crops can be an economically viable alternative to traditional crops in Ohio. Producers need substantial acreage with traditional crops to maintain an adequate income. In situations where the farmer cannot or does not want to increase his acreage, specialty crops can provide an opportunity to enhance income. Outlined in a report released by OSU Extension, specialty crops provide a higher per acre profit than traditional crops, such as corn or soybeans. **For example, a "Pick Your Own" strawberry operation generates $495 of returns per acre compared to $16 of returns for non-till soybeans**. Although specialty crops require more labor and take several years of growth before turning a profit, producing cash crops may be an option, especially when the potential health benefits are high and demand increases in the market.

Primary impact area(s)

Research & Extension

Funding sources

- Hatch Act
- State (New Enterprise Grant)

Enhancing Economic Opportunities for Agricultural Producers

Introduction of Phytophthora resistant soybeans

2004 S&E Impact Report 2004-069-01-016

Issue (Who cares and why?)

Ohio's no. 1 soybean disease is best described as a "killer." The disease is called Phytophthora damping off and stem rot. In 2000, farmers replanted almost one-third of their soybean acreages due to serious Phytophthora infections. Some individual fields had plant losses have high as 40 percent. The disease is common in poorly drained, or "heavy," clay soils of northwestern Ohio, but also affects parts of western and southern Ohio. The disease can kill soybeans when they are seedlings, or else cause root rot that kills adult plants. To control Phytophthora, farmers usually select seeds resistant to the biological "races" of Phytophthora found in their fields. However, these races continually change and adapt to resistant soybeans. A soybean variety that offers effective resistance one year might be susceptible to infection in later years.

What has been done?

An intensive, interdisciplinary research effort by Ohio State University agricultural scientists found a promising source of Phytophthora-resistant genes that may be bred into existing soybean varieties. Scientists found genes in soybeans originating from Korea, which were held at the federal Soybean Germplasm Collection, Urbana, Ill. OSU scientists found the promising materials in examining more than 1,000 soybean lines. These materials are being studied to determine the number of genes involved in the resistance, their location on the soybean genes, and to develop molecular markers to assist in the breeding process. OSU scientists are trying to understand the mechanism of another type of resistance that is effective against Phytophthora at the biochemical level
and also by identifying the number of genes involved. They are taking a novel approach by looking for genes resistant to Phytophthora in Arabidopsis plants and tobacco. These plants are not attacked by the same Phytophthora that affects soybeans, but discovering the resistance genes may lead to new ways to managing the disease in soybeans. On another front, Ohio State scientists collected more than 500 soil samples from farmers' fields as part of an ongoing "race survey." This research helps identify shifts in Ohio's Phytophthora races that can threaten once-resistant plant varieties. Another Ohio State research project is attempting to understand the dynamics of race shifts as it relates to the
plant's molecular level. So far, race shifting is not understood very well.

Impact

Ohio State plant breeders will use the Korean genetic material to develop soybean varieties with hopefully high levels of resistance to Phytophthora. Using conventional breeding (without genetic engineering but with molecular tools to expedite the process), the new soybean lines may be available to Ohio farmers within about five or six years. Until then, Ohio State's race survey will provide farmers with the most up-to-date information on which varieties to select to offer the best protection against Phytophthora. Ohio State's Phytophthora research has received financial support from the Ohio Soybean Council based on farmers' check off funding, as well as from seed grant programs of Ohio State University and OSU's Ohio Agricultural Research and Development Center.

Primary impact area(s)

Research & Extension

Funding sources

- Hatch Act

Enhancing Economic Opportunities for Agricultural Producers

Shrimp Production

2004 S&E Impact Report 2004-069-01-031

Issue (Who cares and why?)

In Appalachian Ohio and surrounding southern counties, farmers raise tobacco crops that have declining economic viability and have rough terrain with inadequate growing conditions. The agricultural productivity in those areas is slowly dwindling and farmers are looking for new ideas to increase the livelihood of their farms.

What has been done?

Ohio State University Extension researchers raised freshwater Malaysian prawns in several one-acre and 1/4-acre ponds in 2002. The purpose of the project, funded through the Ohio Agricultural Research and Development Center (OARDC) and Ohio State Sea Grant, is to determine the feasibility of raising shrimp in Ohio. The Ohio Department of Natural Resources approved the production of freshwater shrimp in Ohio in January of 2001. Before the project could begin, researchers had to prove to ODNR that freshwater shrimp are not a threat to natural wildlife or the environment, said Laura Tiu, an Ohio State University Extension aquaculture specialist with the university's South Centers. Malaysian prawns, which are what are being grown in Ohio, die when the water temperature goes below 55 degrees. The prawns also cannot reproduce without saltwater and therefore will not be able to do so in Ohio, Tiu said.

In addition to working out production kinks, Ohio State researchers also are studying marketing options for shrimp producers through the collaboration of Extension agents and economic community organizations, such as ACEnet in Athens, Ohio.

Impact

Depending on the pond size, stock density, and marketing plan, economic analyses conducted at Kentucky State University estimates profits of $2,000 to $5,000 per acre of shrimp.

Favorable regional temperatures, small production space requirements, a short growing season and a promising profit generator are just some of the driving forces behind the interest in shrimp, Tiu said. Farms are becoming more diversified in their crops and shrimp is a high-value choice that does not require the farmer’s attention the entire year.

Primary impact area(s)

Research & Extension

Funding sources

- Hatch Act
- Smith-Lever 3(b) & (c)
- State (Ohio Sea Grant)

Enhancing Economic Opportunities for Agricultural Producers

Enhancing business prospects for smaller beef producers

2004 S&E Impact Report 2004-069-01-010

Issue (Who cares and why?)

Economic changes in the beef industry over the past 20 years have favored large operations. Larger operations can buy feed and other inputs at cheaper bulk rates and receive market premiums for selling large loads of calves with similar traits. This has not been good for Ohio's small beef herds. The state's 17,000 beef operations average less than 17 cattle per herd, compared to the United States average of almost 40 cattle per herd. As a result, since1986, one out of every three cattle operations in the region has folded, according to the National Agricultural Statistics Service.

What has been done?

Ohio State University Extension organized a meeting in February 2000 to hear from a group of Virginia producers who had agreed to work together to buy inputs and sell calves. Since then, with the help of Extension and USDA Rural Development, the Ohio Pro Beef Alliance, Inc, was formed in south-central Ohio. The alliance has 18 members from five counties who own 1,200 broad cows and feed nearly 1,000 head of finishing cattle. A similar alliance, Ohio Premium Beef Producers, was organized in eastern Ohio with Extension's assistance. It has 11 members from three counties. Extension is facilitating the writing of formal business plans and operational plans for the alliances. The alliances allow members to work together to gain some of the benefits of larger operations, without having to expand individual herds.

Impact

Both alliances have saved money on inputs through their initial bulk ordering. The Ohio Pro Beef Alliance has saved more than $1,000 on mineral feed supplements, and about $2,000 on semen for artificial insemination. The Ohio Premium Beef Producers alliance also saved about $600 on semen – a nearly 40 percent savings. The greatest benefits from these alliances will be in the coming year, when members are able to sell their calves in combined lots of 60 to 85 animals. Markets typically provide a premium for larger lots of uniform calves with similar size, age, vaccinations and conditioning. Members hope to gain an extra 5 cents to 10 cents per pound at market for calves raised and sold through the alliances. For a 600-pound calf, that translates into an income increase of $30 to $60 per calf. A third alliance is forming in northwest Ohio, and Extension hopes to expand the existing groups and add others in the future.

Primary impact area(s)

Education & Extension

Funding sources

- Smith-Lever 3(b) & (c)
- Other (membership fees)

Enhancing Economic Opportunities for Agricultural Producers

Improving soil quality and productivity

2004 S&E Impact Report 2004-069-01-017

Issue (Who cares and why?)

The poorly drained silty clay loam soils of northwestern Ohio are unforgiving to farmers trying to grow corn and soybeans. Drainage is very slow on these soils; the window of opportunity to plant crops is short during a rainy spring. And farmers don't have time to wait for soils to adequately dry out. Modern farming requires large acreages to remain profitable. As farm sizes increase, so does the pressure to get all fields planted in time for the best yields. Consequently some farmers enter fields when they aren't dried out. These -- and other soils around the state -- are highly prone to a yield-robbing phenomenon known as soil compaction. It occurs when heavy farm equipment bears down on the ground to make the soil denser. Compacted soils hurt yields because they restrict root movement and also alter the field's natural drainage patterns.

What has been done?

Realizing that soil compaction threatens farm profitability, Ohio State University agricultural engineers embarked on studies at two locations in the state more than 10 years ago. Engineers intentionally compacted every inch of ground for three consecutive years on OSU plots. The project is still ongoing in the center of Ohio's compaction belt at the northwestern branch of OSU's Ohio Agricultural Research & Development Center (OARDC) in Wood County. They confirmed that compacted soils rob yields. They also found that treating compacted soils with a piece of equipment known as a subsoiler can improve yields by about 5 percent on average, and as much as 25 percent in some years. Oddly, subsoiling improved the crop yields on plots that had not been intentionally compacted by same amount. Subsoilers come in various shapes and sizes, but their basic design consists of steel shanks that till the ground 12 to 15 inches deep to loosen up the compacted soils. Data for the 2000 crop year showed subsoiling hiked soybean yields by 7 bushels per acre and corn by 2 bushels per acre. Through the years, the 5 percent increase in crop yields would easily justify the cost of subsoiling every one to three years, the study found.

Impact

Farmers are convinced of the value of subsoiling where soils show a benefit from deep tillage. Two years into another project comparing five subsoiler designs on a private farm in Madison County, the owner was "sold" on subsoiling after seeing the results on his poorly drained Brookston soil. The farmer subsoiled the entire farm the third year. The official results from two years of data gave corn and soybean yield increases of 2 to 5 percent for each of the subsoilers. An equipment dealer reports that farmers in a northwestern Ohio county regularly increased corn yields by 15-20 bushels per acre, and soybean yields by 5 bushels per acre. Yield increases of this magnitude allow farmers to quickly pay off the cost of a new subsoiler, sometimes in one year, the dealer reported. The dealer said that OSU research, on-farm results, and word-of-mouth seem to be the best advertising for subsoilers. Farmers are interested because drainage is poor in the region's clay soils, even when fields are tiled. OSU engineers preach the gospel of subsoiling at field days, farm meetings and at conferences such as the annual Conservation Tillage & Technology Conference at Ada, which draws a regular attendance of 400 farmers every winter. Funding for OSU's compaction and subsoiling research comes mainly from OARDC.

Primary impact area(s)

Research & Extension

Funding sources

- Hatch Act

Enhancing Economic Opportunities for Agricultural Producers

Ginseng as an alternative crop option

2004 S&E Impact Report 2004-069-01-033

Issue (Who cares and why?)

To some, there is more to a tree farm than growing and harvesting the land for timber. In the 30 years it takes to harvest timber, alternative crops could be beneficial in offering additional cash flow.

What has been done?

With assistance from Ohio State University researchers at Ohio State's South Centers, a Pike County resident is hoping to take advantage of his 224 acres of poplar, red oak and maple trees to grow ginseng – a high-value agroforestry crop that is slowly finding a niche market in Ohio.

The Pike county resident received a $6,000 U.S. Department of Agriculture grant for its Sustainable Agriculture Research and Education (SARE) program. The purpose of the program is to give agricultural professionals the opportunity to develop sustainable agriculture and market and manage those systems.

To help develop this program, researchers have been studying the feasibility of growing and marketing ginseng to boost the economic sustainability for farmers looking to raise alternative crops.

Impact

Southern Ohio forests are perfect for growing wild-simulated American ginseng because they provide shade and the acidic soils that make for ideal growing conditions. The crop is gaining popularity in the state as an alternative specialty crop because of its medicinal benefits and the high prices the roots fetch.

Ginseng has the potential to gross $300 to $400 per pound of wild ginseng root, said Rafiq Islam, an Ohio State soil and water specialist. This is considerably higher than the typical $10 or $15 for roots cultivated in a greenhouse.

Primary impact area(s)

Extension

Funding sources

- Smith-Lever 3(b) & (c)
- Other (SARE Grant)

Enhancing Economic Opportunities for Agricultural Producers

Self-automated GPS guidance systems – assessment and training

2004 S&E Impact Report 2004-069-01-028

Issue (Who cares and why?)

Many farmers in Ohio are embracing new technologies to help maintain their business. Some technologies are being introduced so quickly, it's difficult for producers to assess what would work best on their farms.
Such technologies include the industry's latest precision agriculture innovation – an auto-steer real-time kinematic GPS guidance system that provides more accurate field navigation, plantings and chemical applications with little operating intervention from the farmer.

What has been done?

Ohio State University agricultural engineers are aiding farmers in assessing the practicality of investing in a $50,000 piece of equipment. Though more than eight times more expensive than conventional light bar guidance systems, Ohio State researchers believe there are advantages to owning such a piece of equipment.

Impact

Accuracy is one advantage of the new technology. The automated system measures within the inch, eliminating overlap or skips and leading to improved field efficiency, fewer inputs, less fatigue for the operator, and the potential for overall increased profits. "If a farmer can increase the size of his operation by 10 percent using auto-steer, he's spreading the fixed costs over more acres," said Reza Ehsani, an Ohio State precision agriculture Extension specialist. "Doing more in the same amount of time should substantially increase a farmer's income."

Primary impact area(s)

Research & Extension

Funding sources

- Hatch Act
- Smith-Lever 3(b) & (c)

Enhancing Economic Opportunities for Agricultural Producers

C.O.R.N. Newsletter Saving Producers Over $11 Million

2004 S&E Impact Report 2004-069-01-030

Issue (Who cares and why?)

Farmers constantly target pesticide use in order to better protect the environment and to cut costs of production. But in order to do so without suffering yield loss, farmers need to make informed decisions based on immediate information about current pest pressures.

What has been done?

C.O.R.N. (Crop Observation and Recommendation Network) is a weekly electronic newsletter produced by the Ohio State University Extension Agronomy Team that provides timely, useful tips on insect and disease management, crop production, pesticide/herbicide recommendations, research results and program/workshop information.
C.O.R.N. provides research-based information to producers regarding pending pest pressures and current topics. The newsletter is a compilation of timely topics tapped from a spectrum of expertise in OSU Extension and the Ohio Agricultural Research and Development Center.

Impact

Ohio farmers and agri-businesses reported they saved over $11.2 million in reduced pesticide and herbicide costs and increased crop production with the help of C.O.R.N. Currently, there are over 800 individuals subscribed to the newsletter's list serve.
Team members conducted a survey in 2001 to determine the overall economic impact C.O.R.N. has on its readers. **Survey results indicated that users saved over $1 million in reduced chemical costs of corn and soybeans and increased their yields of the crops by 3.5 million bushels. The estimated value from the increased production totaled over $10.1 million using the 1996 Farm Bill government loan rates.** The survey represented 2.57 million acres of corn, soybeans, wheat and alfalfa – 30 percent of Ohio's crop acreage.

Primary impact area(s)

Research & Extension

Funding sources

- Hatch Act
- Smith-Lever 3(b) & (c)

Enhance Economic Opportunities for Agricultural Producers

New retailing opportunities for agricultural producers

2004 S&E Impact Report 2004-069-01-007

Issue (Who cares and why?)

Farmers tucked in the hills of southern Ohio were seeking alternative sources of income, but had little access to markets for their new ventures into fresh produce production.

What has been done?

What was done: Ohio State University Extension helped farmers organize and launch a new produce auction in southern Ohio. The Bainbridge Wholesale Produce Auction brings buyers and sellers together for price discovery. Started by a largely Mennonite population, sellers used to have to call buyers one by one, and then deliver the product themselves. Buyers can see what they are buying, and then take it with them after the auction.

Impact

The auction, which attracted more than 400 growers and buyers in its first year, saves farmers time by bringing buyers together. It's also netted prices at or above USDA's daily terminal price.

Primary impact area(s)

Extension

Funding sources

- Hatch Act

Enhance Economic Opportunities for Agricultural Producers

Specialty corn production and marketing

2004 S&E Impact Report 2004-069-01-006

Issue (Who cares and why?)

Grain industry analysts predict that specialty corns will account for as much as 20 percent of corn production within 10 years. Specialty corns may offer corn growers a more profitable alternative to yellow dent corn production.

What has been done?

To help Ohio farmers take part in specialty corn production, Ohio State University Extension developed the High Oil Corn Production and Marketing Guide on the web site http://www.ag.ohio-state.edu/~hocorn/. Extension specialists also developed nine fact sheets on specialty corns including high oil corn, white corn, food grade, and waxy corn. Performance trials evaluate the economic potential of these specialty corn hybrids when compared to yellow dent commodity grade corn. Research is in progress to identify management practices that optimize yield and grain quality of these specialty corns.

Impact

More than 800 farmers attended meetings in 1999 to learn about specialty crops. Applying this information to their own operations will increase their ability to compete and improve profits.

Primary impact area(s)

Extension

Funding sources

- Smith-Lever 3(b) & (c)

Enhancing Economic Opportunities for Agricultural Producers

Helping farmers navigate herbicide resistance

2004 S&E Impact Report 2004-069-01-015

Issue (Who cares and why?)

Many popular herbicides applied by Ohio farmers just aren't killing weeds the way they used to. A class of herbicides known as acetolactate synthase inhibitors (ALS-inhibitors) were a godsend when introduced to the market 14 years ago. ALS-inhibitors were a great improvement by providing easier and improved control of many of the state's most worrisome weeds, as well as being better for the environment. These days, ALS-inhibitor herbicides give farmers cost savings as high as 50 percent from other and earlier products. But the honeymoon is over. Farmers overused ALS-inhibitor herbicides. Those once easy-to-control weeds are returning to interfere with high-yielding crop production. ALS-inhibitors kill weeds by interfering with an enzyme, which results in cutting off some of a weed's amino acid production, causing plant death. However, a few weeds have become resistant to ALS-inhibitor herbicides, have survived, and continue to flourish.

What has been done?

Ohio State weed scientists were the first in the nation to confirm some important weeds resistant to ALS-inhibitor herbicides. In all, they have found seven weed species resistant to ALS-inhibitor herbicides. This breakthrough research has alerted the state and the nation to the threat of weed resistance from herbicide overuse. In four years of research, herbicide resistance was found in weed populations in 30 (38 percent) Ohio counties. These counties are in the northwestern, southwestern, and to a lesser extent, the southern, part of the state. The weeds are common ragweed, giant ragweed, horseweed (marestail), common cocklebur, Powell amaranth and shattercane. Weed scientists became aware of resistant populations by soliciting samples from farmers, agricultural dealers and chemical company representatives. More than 30 individuals have responded with potential problems in fields. Seeds were harvested from suspected weeds and grown in a greenhouse. Eventually they were sprayed with appropriate herbicides to determine levels of resistance.

Impact

One way to combat weed resistance is to use herbicides that come from a different class than ALS inhibitors. These alternative herbicides act differently on the weed's biological processes to kill it. In addition, farmers who regularly switch their cropping patterns may also control resistance, because different crops use different kinds of herbicides that may not contain ALS inhibitors. Tillage is also helpful in controlling weed resistance. Some farmers are already solving herbicide resistance without realizing it. The popularity of crops genetically modified to tolerate herbicide use may be a short-term answer. In the long-term, overusing these products will result in weed problems shifting to different species that are not controlled by these herbicides. OSU weed scientists continue to educate farmers about the complexity of weed resistance at agricultural field days, Extension meetings and workshops. Several farmers working with weed scientists have diversified their herbicide program after resistant weeds threatened to overtake all of their fields. Using careful management, they will have to only use non-ALS-inhibitor herbicides for at least 10 years, until non-resistant weed populations might re-appear. OSU's herbicide resistance weed project has been supported by grants from Dow AgroSciences and departmental funding within the College of Food, Agricultural, and Environmental Sciences.

Primary impact area(s)

Extension & Research

Funding sources

- Hatch Act
- Smith-Lever 3(b) & (c)

Protect and Enhance Ohio's Natural Resource Base and Environment

Developing Productive and Healthy Farm Ponds

2004 S&E Impact Report 2004-069-05-028

Issue (Who cares and why?)

Bass, bluegill, birds and bullfrogs find homes in Ohio farm ponds.
Unfortunately, so do loose-boweled Canada geese, aquatic weeds and mats of stinking algae. Through research, Ohio State Extension is working to encourage the former and discourage the latter.

What has been done?

The School of Natural Resources has been conducting research on how Ohio farm ponds work, and how they work best. Extension programs, such as fact sheets and clinics, then use research information to educate people on aquatic management. The goal: to help pond owners head off problems and, in the end, save money.
Research shows that ponds that have controlled watershed, or controlled input of nutrients, tend to have fewer problems.
Building a pond right in the first place, especially having a 3:1 slope
on the bottom near shore, is key. It limits the growth of nuisance plants.
Restricting nutrients is also important. It's done by not fertilizing adjacent lawns, limiting waterfowl to only a few, keeping out manure and fertilizer runoff, and locating ponds away from septic- and leach-field runoff.

Impact

Prevention pays. Re-contouring a too-shallow pond may cost thousands of dollars. And using herbicides to control plants and algae may cost up to $600 per acre per year. Proper construction and limiting nutrients cost far less.
In addition to sheltering wildlife, well-managed farm ponds provide recreation -- swimming, fishing, birdwatching and ice skating -- and water for crops and livestock.

Primary impact area(s)

Extension

Funding sources

- Smith-Lever 3(b) & (c)

Protect and Enhance Ohio's Natural Resource Base and Environment

Bioswales for watershed environmental remediation

2004 S&E Impact Report 2004-069-05-038

Issue (Who cares and why?)

The Olentangy River watershed near Columbus, Ohio, is not meeting environmental standards. The water is dirty, smelly and unattractive. It contains large amounts of phosphorus, nitrogens, hydrocarbons and heavy metals. In order to counteract these negative issues and to restore the watershed to a more natural and healthy state, the CampUShed project was created.

What has been done?

Students and faculty in the fields of horticulture and natural resources have teamed up with the Ohio State University Roads, Grounds, Traffic and Parking divisions to create bioswales in areas that have high ground water runoff. A bioswale is an engineered stretch of grass, plants, trees and bushes that creates a filter system for stormwater runoff.

Impact

These new bioswales that the students and faculty are producing will provide examples to over 250 communities in Ohio that must start complying to the EPA's Phase II Storm Water Program.

The bioswales will also clean up the Olentangy River and the environment around this watershed. "The bioswales make sense because they filter the stormwater and slow down the flow of sediments into the watershed," said Tim Lawrence, OSU Extension. "We hope that by showing communities our example they will see that it has real-world application and that they will start to implement the use of bioswales as well."

Primary impact area(s)

Research, Education & Extension

Funding sources

- State (Ohio State University Extension, Ohio NEMO Program, Ohio Watershed Network)

Protect and Enhance Ohio's Natural Resource Base and Environment

Education to reduce and prevent livestock waste pollution

2004 S&E Impact Report 2004-069-05-012

Issue (Who cares and why?)

The increasing size of livestock operations in Ohio plus the well-publicized problems of a few poorly managed farms have caused concerns throughout the state over the impact these large operations, and livestock operations in general, may have on the environment. Common concerns include manure storage and handling, odors and insect control. Operations of 1,000 animal units or more have been required to develop manure management plans and are regulated by the Ohio Department of Agriculture. Smaller operations with less than 1,000 animal units and no direct discharge into the waters of the state are encouraged to voluntarily develop and follow manure plans.

What has been done?

The Livestock Environmental Assurance Program is a voluntary, confidential and free educational program that helps livestock producers identify and economically address management issues affecting environmental quality. The goal is to provide medium- and small-sized producers with a voluntary educational program that addresses the environmental issues relevant to Ohio. The program is designed for beef and dairy cattle, sheep, hogs, horses and poultry. LEAP is coordinated by the Ohio Livestock Coalition in cooperation with Ohio State University Extension and a number of other agencies and organizations. Extension personnel organize many of the meetings and provide much of educational resources. To be eligible for cost-share assistance for agricultural pollution abatement grants from local Soil and Water Conservation Districts, participation in LEAP training is required. Plus, applicants for EQIP money through the Natural Resources Conservation Service earn qualification points by attending a LEAP training session.

Impact

More than 50 LEAP training sessions have been held and nearly 2,600 Ohio livestock producers have participated. About 60 percent of the participants operate farms with fewer than 500 animal units, and nearly 45 percent indicated they plan on changing management practices as a result of LEAP. "I would like to see more producers get involved in LEAP and get a better understanding of what needs to be done to make a livestock operation an environmentally safe operation," said Kenny Elsas, a LEAP participant who manages a 2,000-head finishing hop operation near Russia, Ohio. Two additional levels of LEAP participation are being developed. LEAP Level Two will help producers develop manure management plans, conservation plans and emergency action plans for their individual operations. Level Three will look at the operational changes LEAP participants have made as a result of the program.

Primary impact area(s)

Extension

Funding sources

- Smith-Lever 3(b) & (c)
- Other CSREES (USDA/NRCS EQIP funds)
- Local (Soil and Water Conservation Districts (SWCDs), USDA/NRCS)
- Other (Grant from US EPA through the Nonpoint Source Management Program pursuant to Section 319h of the Federal Clean Water Act as amended in 1987;; Supported in part by a grant from the Ohio Department of Natural Resources (ODNR) Division of Soil & Water Conservation)

Protect and Enhance Ohio's Natural Resource Base and Environment

Managing manure

2004 S&E Impact Report 2004-069-05-026

Issue (Who cares and why?)

Unsound operational and environmental practices of some livestock farms have put all farms under increased public scrutiny.
Negative images dominate the information received by the public. Through an Ohio State research program, good stewards doing the right kinds of things are highlighted. These farmers are found all over Ohio, redeveloping their communities in positive ways by using proper plans and management practices.

What has been done?

An Ohio State University research and Extension program strives to educate Ohioans that through teamwork and efficient management practices, farmers can be good environmental stewards. Bringing exemplary production facilities into public light is just one goal of the Ohio Composting and Manure Management (OCAMM) program, a three-year-old program created by Ohio State faculty and staff that brings together producers, commodity groups and agricultural and environmental agencies to find solutions to management problems. It focuses on such topics as manure management, composting, nutrient balance and soil ecology through tours, workshops and seminars. "Another goal is to build a common focus on issues that will create technologies that are safe and economical. For example, livestock producers would not see how a feeding program has any influence on how a tree grows. OCAMM is designed to achieve that kind of vision."

Impact

This program is an invaluable economic resource for Ohioans. The results of Ohio's efforts are becoming real, as seen in some recently created enterprises and joint ventures. The program helps others to look at an end product as a resource and not a waste.

Primary impact area(s)

Extension & Research

Funding sources

- Hatch Act
- Smith-Lever 3(b) & (c)

Protect and Enhance the Nations Natural Resource Base and Environment

Sprayless sprayer technology - design and introduction

2004 S&E Impact Report 2004-069-05-014

Issue (Who cares and why?)

Farmers need ways to increase their profitability: the line between success and failure, especially for small and mid-size family farms, is often razor thin. A big part of most farms' budget is pesticides -- the average Ohio farm spends $5,000 a year on them. **Cutting this expense will increase profits and keep more family farms in business**. At the same time, pesticide application is an inefficient process -- less than 1 percent of herbicides and pesticides actually reach their targets -- so people and the environment stand to gain from a better way to apply pesticides.

What has been done?

Ohio State University scientists designed and patented a new pesticide sprayer, called the Spray-less sprayer. While conventional sprayers spray a mix of pesticide and water out of a single nozzle, the new device uses two nozzles: one sprays a fine mist of pesticide, the other a coarse spray of water. The two sprays intersect, and the big drops of water carry the tiny drops of pesticide deep into the plants to their targets. (Earlier research by the scientists showed that small pesticide drops work better than large ones. The challenge was to find a way to deliver these drops, since the small drops that come from conventional sprayers mostly just drift away.)

The device was designed to be retrofitted to existing hydraulic sprayers, the type used by most Ohio farmers, at a cost of about $2,500. The scientists formed a company, Spray Redux LLC, in partnership with the Cleveland Advanced Manufacturing Program to build and market the sprayer. The design is being licensed to Spray Redux by the university.

Impact

The sprayer uses up to 70 percent less pesticide than conventional sprayers while controlling pests the same or better. Even a 50-percent reduction will save the average Ohio farm $2,500 a year as well as put half as much pesticide into the environment and on our food, and the device pays for itself in only one growing season. Large farms or farms that grow pesticide-intensive crops, such as potatoes, will see even greater benefits, and the sprayer pays for itself in less than half a season. Shelby and Mercer counties, in cooperation with the Ohio Environmental Protection Agency, are sponsoring pay-down programs for the sprayer; farmers in the Loramie, Upper Great Miami and Grand Lake St. Marys watersheds get a 20-percent refund if they buy one.

Primary impact area(s)

Extension & Research

Funding sources

- Hatch Act
- Other (U.S. EPA)

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

Helping pregnant teens graduate from high school

2004 S&E Impact Report 2004-069-02-005

Issue (Who cares and why?)

Pregnant teens are unlikely to graduate from high school, making it difficult to find jobs to allow them to support themselves and their children

What has been done?

Ohio Agricultural Research and Development Center and OSU Extension scientists helped implement the GRADS program for pregnant and parenting teens in Ohio. The program has succeeded in helping these students stay in school until they graduate.

Impact

It has achieved an 85 percent retention rate in Ohio and a 78 percent rate in other states, compared with a national average for non-participants of 40 percent. Ohio has about 21,000 teen births a year. If all these mothers were to participate in GRADS, nearly 10,000 more would graduate than without the program. Every teen mother who drops out of school and then repeats a grade costs taxpayers an estimated $4,605. This means that by keeping students in school, GRADS could be saving the state of Ohio about $12 million a year.

Primary impact area(s)

extension

Funding sources

- Hatch Act

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

Expanding charter operations on Lake Erie

2004 S&E Impact Report 2004-069-02-019

Issue (Who cares and why?)

In 1975, only about 35 Ohio charter operators were licensed on Lake Erie. Since then, a boom in the popularity of boating and fishing has swelled the number of charter boats, each representing an independent small business, to nearly 1,000. Ohio's Lake Erie charter fishing generates nearly $15 million in total economic activity each year. Operating a charter boat demands a wide range of skills. Captains need detailed knowledge of lake conditions, fish populations and fish behavior. They must keep abreast of state and federal regulations and possess a bit of electronics wizardry to maintain and use sonar, global positioning, radio and radar systems. They also need people skills to entertain and satisfy clients, and must market their services aggressively. Finding a good, reliable source for this wide variety of information can be difficult.

What has been done?

Since 1981, to ensure that charter fishing stays profitable along Ohio's Lake Erie coast and provide a source for the varied information charter captains need, Ohio Sea Grant Extension has organized the annual Ohio Charter Captains Conference. Entering its 20th year, the conference is held each spring prior to the beginning of the active fishing season. Experts from private industry, state and federal agencies, universities, and Sea Grant provide updates on environmental issues, regulations, boat and electronics technology, marketing and services, and advanced fishing techniques. Suppliers of fishing gear, boating equipment and captains' services also are featured to keep captains updated on market trends.

Impact

Attendance at the Ohio Charter Captains Conference has grown in step with expansion of the industry. The first conference drew 40 captains, while attendance at more recent programs averages more than 200. Former Charter Industry Trade News publisher Paul McElroy described the ongoing conference as "The largest one-day gathering of charter captains in the country." Survey results from the 2000 Charter Captains Conference show that captains attending the conference believe the information they get is accurate and useful. Of responding captains, 97 percent said they have used conference information to improve their charter operations; 82 percent said they have modified their boating, fishing and business practices using conference information; and 60 percent said the conference has increased their overall profitability.

Primary impact area(s)

Education & Extension

Funding sources

- Smith-Lever 3(b) & (c)
- Local (Registration fees)

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

Improving reading proficiency among Ohio's children

2004 S&E Impact Report 2004-069-02-028

Issue (Who cares and why?)

In 1998, 48 percent of all fourth graders in Ohio failed the reading proficiency test. Instead of getting better, test results have declined: In 1999, 56 percent of Ohio fourth graders failed.

What has been done?

Ohio State University Extension launched a Read and Succeed program in four Ohio counties. In Hancock County volunteers receive 10 hours of training, and then work one-on-one with children in the city schools for at least two hours each week.

Impact

Funded by Ohio State University and the OhioReads initiative, Read and Succeed reached more than 1,500 children its first year alone. One parent reported that participation in the program sparked an enormous interest in reading in her child. He struggled with reading English in school in part because Spanish was the primary language spoken at home. The collaborative effort includes partners in Ohio State University Extension's 4-H and Family and Consumer Sciences departments, the College of Education and the Office of Academic Affairs.

Primary impact area(s)

extension

Funding sources

- Smith-Lever 3(b) & (c)
- State (OhioReads grant)

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

Enhancing employment prospects for Appalachian youth

2004 S&E Impact Report 2004-069-02-003

Issue (Who cares and why?)

Youth in the Southeastern part of Ohio, the Appalachian region of our state, have limited employment options. This financially distressed part of Ohio has a poverty rate of 25.3 percent. The per capita income is 61 percent of Ohioan's average income. Employers needed a better trained work force. Community members need more employment options, particularly with Welfare to Work issues.

What has been done?

Ohio State University Extension in Vinton County addressed these issues with a new program called PRIDE (Preparing Resourceful, Informed, Dedicated Employees). Its goal was to prepare high school students to work in the "hospitality" area, a segment of the economy identified by the Vinton County Chamber of Commerce as one with great potential.

Impact

This pilot program attracted 13 high schoolers for its inaugural run. The 10-hour, four-session after-school program taught students about tourism and career potential, food service information, dealing with the public and selling
yourself and the community. Participants learned about food service and customer service, tourism and hospitality, worth ethic, getting and keeping a job, and about the community as a whole.
In post tests, 90 percent said they learned something about the service and restaurant industry, 80 percent increased their knowledge about the county, 90 percent felt more prepared for interviewing and all participants said they'd recommend the PRIDE program and that it should be offered again. Three of the participants went to work for local restaurant, and another planned to study food service in college.

Primary impact area(s)

extension

Funding sources

- Other (OSU Extension Innovative Grant)

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

Reducing employee turnover and associated company costs

2004 S&E Impact Report 2004-069-02-042

Issue (Who cares and why?)

Executives at the General Mills plant in Southern Ohio understand the value of retaining good employees. Replacing an employee can cost anywhere from $5,000 to $20,000 due to issues such as lost productivity. The reasons for leaving, however, usually remain unknown because employees are reluctant to share the reasons with their former bosses.

What has been done?

The General Mills company began working with Ohio State University Extension to find answers. Dave Boulay, management specialist with Ohio State University's South Centers, began conducting third-party exit interviews to get at the root causes for employee turnover. He found people do not want to burn bridges. Ex-employees were more willing to talk about issues within the company with a third party.

Boulay, being the third party, then reported the reasons for employee turnover so the company managers could make adjustments in their business practices.

Impact

Through the third-party exit interviews, Boulay found the company was doing many things right, such as offering training and providing good pay and benefits. He also found the plant needed to address how new employees were introduced and welcomed into the 1,100-employee plant. As a result, the plant is establishing a mentor program that they hope will help new employees feel welcome and decrease turnover.

Next, Boulay plans to conduct focus groups with current employees to see how their perceptions match with those who have left. He also will apply his efforts across the region so that other businesses can reduce employee turnover and increase competitiveness.

By keeping just 10 employees, a company could save anywhere from $50,000 to $200,000, which would put them back in the competitive market.

Primary impact area(s)

Extension

Funding sources

- Hatch Act
- Smith-Lever 3(b) & (c)

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

New business opportunities for southeastern Ohio

2004 S&E Impact Report 2004-069-02-020

Issue (Who cares and why?)

Economically depressed communities in southeastern Ohio are seeking new business and job opportunities for local residents.

What has been done?

Through the Food Ventures program, sponsored by the Appalachian Center for Economic Networks (ACEnet), a nonprofit community development organization, food scientists provide technical assistance and training to foster growth of small, specialty food businesses in economically depressed rural areas of southeastern Ohio. Faculty and staff from Food Science and Technology and the Food Industries Center supplied technical assistance and training on product development, packaging, processing, sterilization processes, microbiology and HACCP.

Impact

The Food Ventures program serves 140 specialty food firms in the Ohio-Kentucky-West Virginia corridor; participants have placed products, such as relishes, tomato juice, and salsa in Wild Oats, Kroger and Big Bear food stores.

Primary impact area(s)

Extension

Funding sources

- Smith-Lever 3(b) & (c)

Society-Ready Graduates

Financial planning courses for Latinos

2004 S&E Impact Report 2004-069-06-005

Issue (Who cares and why?)

Ohio's Hispanic/Latino population continues to grow both in numbers and needs. Between 1990 and 2000, the state's Hispanic population grew 32 percent, reaching 240,000. Still, Extension faculty and staff who work with this group believe either the official count was low, or there has been a big increase in the Latino population since the census was carried out. As the population grows, communication barriers become more evident.

For instance, Hispanic community members are subject to scams and theft because they do not have access to financial entity services. Most Latino immigrants have trouble opening banking accounts most financial institutions do not have bilingual personnel or information in Spanish. Also, as more Hispanics joined the green industry workforce, there was a need for safety and business information in Spanish.

What has been done?

Ohio State University Extension teamed up with four local credit unions and the Ohio Credit Union League to offer Spanish-language financial planning classes throughout 2002.

The four-week class, held monthly at one of the sponsoring credit unions —Big Bear/Members First Credit Union, OhioHealth Credit Union, Telhio Credit Union, and Western Credit Union— included sessions on setting financial goals, developing a spending and savings plan, building up credit and managing a checking account.

Extension also has worked to reach the Latino population with other programs. Extension produced an English/Spanish newsletter for the Hispanic green industry workforce. This project also included two Spanish bus tours to different Ohio nurseries.

Another project was, "Spanish for Greenhouse Supervisors," a bilingual collection of common words and expressions used in the floriculture industry. The booklet-and-audio-CD package was prepared by an OSU floriculturist.

Impact

Around 225 people representing 15 countries attended the financial Spanish-language course. Out of the 225 attendees, 130, or about 58 percent, completed the required four sessions to receive their certificate.

One participant in the program said, "I am very grateful for all the time, effort and interest in helping the Latino community organize their personal finances."

Primary impact area(s)

Extension

Funding sources

- Smith-Lever 3(b) & (c)
- Local (Latino Financial Literacy Program)