

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, of 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 Act¹.

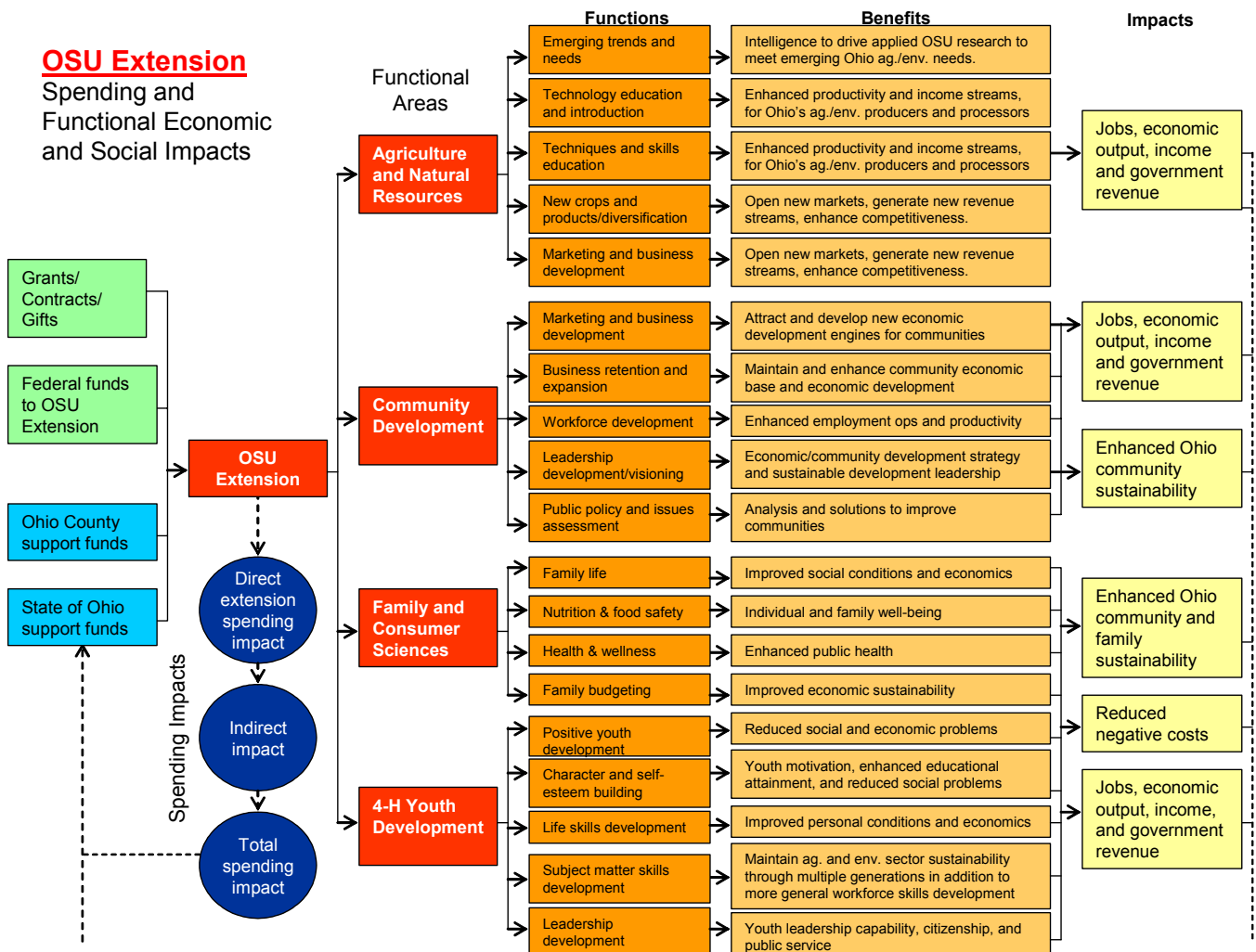
¹ Smith-Lever Act. Section 2. 1914.

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

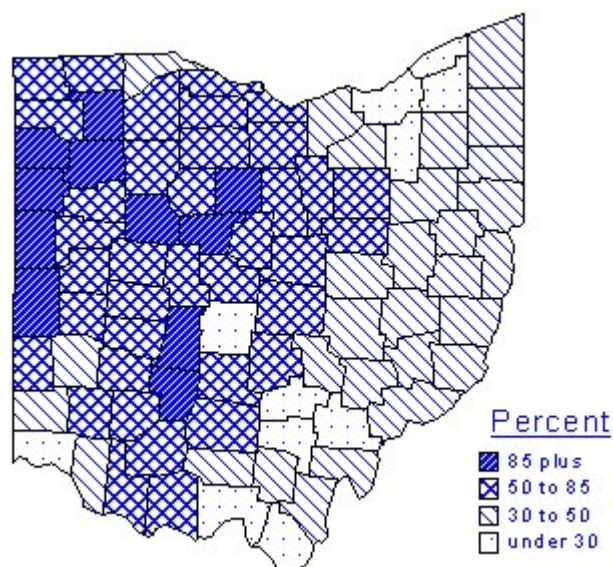


The forward linkage impacts of OSU Extension are delivered through four primary functional areas of service: (1) **agriculture and natural resources**, (2) **community development**, (3) **family and consumer sciences**, and (4) **4-H youth development**. Each of these four primary areas of activity 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.

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.

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.**

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 | ▪ Highland |
| ▪ Brown | ▪ Huron |
| ▪ Carroll | ▪ Lorain |
| ▪ Columbiana | ▪ Marion |
| ▪ Crawford | ▪ Morrow |
| ▪ Coshocton | ▪ Noble |
| ▪ Fayette | ▪ Portage |
| ▪ Fulton | ▪ 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.