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1680 Madison Avenue
Wooster, OH 44691-4096

March 31, 2004

Mr. Barton Hewitt
CSREES/Partnerships
US Department of Agriculture
Stop 2214
Washington, DC 20250

Dear Mr. Hewitt:

We are enclosing the FY 2003 AREERA Report of Accomplishments and Results and the Plan of Work FY 05 – FY 06 for the College of Food, Agricultural, and Environmental Sciences, including the Ohio Agricultural Research and Development Center and Ohio State University Extension.

If you have any questions, please contact for research: Steve Slack (330-263-3987), John Allred (614-292-3897) or for extension: Keith Smith (614-292-4880), Deborah Lewis (614-292-5089).

Sincerely,

Steven A. Slack
Director, OARDC

Keith L. Smith
Director, OSU Extension

Attached: FY 2003 AREERA Report of Accomplishments and Results
FY 2005 – 2006 Plan of Work

hard copies: Bob Moser
John Allred
Deborah Lewis
Tom Archer

Federal Report of Accomplishments and Results (FY 2003)

The Ohio State University
College of Food, Agricultural, and Environmental Sciences
including
The Ohio Agricultural Research and Development Center
and
Ohio State University Extension

Goal 1. An Agricultural System that is Highly Competitive in the Global Economy

Executive Summary

Agricultural production in Ohio, just as the rest of the United States, has been steadily growing since the end of World War II. American farmers lead the world in productivity and efficiency. Food costs for the American public as a percentage of disposable income have never been lower. It is clear that a portion of farm productivity can be attributed to the natural resources of fertile land and abundant water but that has always been true and does not account for the increased productivity over the past several decades. Since the increased productivity coincided with the adoption of "modern" agricultural methods as developed by State Agricultural Experiment Stations, often in partnership with industry, it has been reasonably assumed that agricultural research played a significant role in this greater productivity. After all, the use of science to expand production and increase production efficiency is the basis of the "green revolution." Yet attempts to quantify the contribution of agricultural research to increased productivity and improved efficiency have been rare. The Ohio Agricultural Research and Development Center is currently in the process of attempting to assess the economic impact of Ohio's experiment station research.

Agriculture and related industries are the mainstay of the Ohio economy, contributing over $79 billion in 2002. Support for agricultural research is strong within the state and is a significant line item in the budget of the State of Ohio. However, in these economically difficult times, it is obviously as important to the State of Ohio as it is our federal partners that money be wisely spent to continue the expansion of agricultural and related industries. To that end, in response to strong urging from the executive branch and a subsequent mandate from the Ohio Legislature, during the Autumn 2003 the Ohio Agricultural Research and Development Center (OARDC) initiated a formal review of the economic impact of OARDC investments.

The Technology Partnership Practice of Battelle Memorial Institute was engaged to do an analysis of OARDC's economic impact. They have completed Phase I of their report that focuses on quantification of the past and current economic impacts of OARDC. Results from Phase I of the study will be used extensive in this report. [Phase II, to be completed by the same group in the Spring of 2004, will focus on comparative advantages unique to OARDC and provide some recommendations for future programmatic activity. While the first two phases emphasized economics, Phase III will be conducted by an external review team composed of scientists with expertise in the administration of agricultural / University research to provide their perspective on the impact of OARDC programs.]

The Phase I report was an input / output analysis using the IMPLAN software for determining the economic impact of projects and business related activities. In addition to the economic analysis, Battelle conducted in-depth interviews with OARDC personnel to develop a detailed understanding of specific research focus areas.

One area where the contribution of OARDC research was perhaps the most obvious was in the production of soybeans so the Battelle group was able to do extensive documentation of that contribution. In terms of income to Ohio producers, corn and soybeans are the two most important agronomic crops. Corn varieties can be developed for larger geographical areas than soybean varieties so corn breeding tends to have a greater involvement by commercial seed companies. In contrast, soybean varieties are developed for more limited geographical areas and are adapted for specific soil types, climate and disease / pest pressures. These factors were considered for the 19 varieties released by OARDC since 1985.

The Battelle group determined the acreage allotted to the production of seed from OARDC varieties and from that, calculated the percentage of the Ohio soybean crop that was represented by the OARDC varieties. They calculated that this ranged from a high of 34.5% in 1994 to 6.4% in 2002. The low adoption rate of 6.4% was attributed to a markedly higher use of glyphosate - resistant ("Round-Up Ready") varieties. The "Round-Up Ready" genes are just now being incorporated into varieties adapted to Ohio growing conditions. Even so, the direct income contribution of OARDC varieties to soybean income for 2002 was $72.5 million. Using an input / output model, Battelle calculated additional indirect income of $118.5 million for a total of $191 million added to the Ohio economy from OARDC soybean varieties in 2002. Table 1 below shows the calculated value of soybeans produced from OARDC varieties for the past 17 years. It also shows the additional income of about $10 million per year to Ohio producers if they experienced an average 5% greater income because of better yield / price from the use of varieties developed and released by OARDC

The Battelle report also demonstrates that OARDC research has had a positive economic effect on production of tomatoes and on the prevention of plant diseases. While the economic developments leading to more efficient production can be documented with few assumptions, the specific and definable benefits of prevention of damage to crops by pests and diseases are more difficult to quantify. Still, management techniques and plant breeding to minimize the effects of soybean cyst nematodes have clearly benefited soybean farmers, without which Ohio may have lost the soybean industry. Indeed, celery is no longer grown in Celeryville, Ohio because of the destructive effect of nematodes that attack celery plants.

It is equally difficult to document the economic benefit of animal disease prevention because it is not possible to know the cost of something that did not happen. Battelle calculated that an outbreak of avian influenza virus like the one that occurred in Virginia in 2002 would cost Ohio over $53 million in direct losses. Even now, avian viruses are being detected in various regions of the United States and have led to a ban on the importation of American poultry by several countries because of the potential spread of "bird flu" to humans. OARDC has been actively involved for years in research in zoonotic diseases as well as viruses that infect poultry, swine and cattle.

Ohio's Commercial agriculture and horticulture industries depend upon Ohio State University Extension to provide timely and innovative, science-based, objective information that can be implemented within their management systems to remain competitive in our global economy. An innovative approach to problem solving, research and extension outreach is the use of

empowered teams. A high priority for The Ohio State University Extension is the development and coordination of commodity/issue focused teams consisting of State/District Extension specialists, County Agriculture and Natural Resource agents and research faculty from multiple disciplines to deliver high impact, research-based information and educational programming that is timely and easily accessed by Ohio's diverse commercial agriculture and horticulture industries.

Ohio State University Extension and the Ohio Agricultural Research and Development Center have currently engaged 21 interdisciplinary self-directed teams ranging from our Swine Educators' Team to our Watershed Management Network. These faculty-led teams interact closely with respective state/national commodity organizations, state/federal agencies and environmental organizations to assist in developing our Extension led statewide programming and current communications structure.

Team electronic communications are the keys to access strategic information for global competitiveness. Many of our teams continue to develop weekly/monthly electronic newsletters and research updates that will be evaluated for their economic impact. Our team members develop newsletters following weekly tele-conferences such as: *Amazin' Graze, Buckeye Yard and Garden Line (BYGL), Crop Observation and Recommendation Network (CORN), Grain Marketing Research and Innovative Strategies (GRAINS), Pesticide Update (Pep-Talk), Pork Pointers, Veg-Net and Vineyard Vantage*, etc. Many newsletters are listed on our OSU Extension *Ohioline* web site, as well as many of our team's individual web sites for easier access by our stakeholders.

Smith-Lever Fund expenditure for Goal 1: $3,029,981 EXTENSION FTE's: 62
Hatch expenditures for Goal 1: $3,995,363 OARDC FTE: 38.6

Goal 1 Key Themes

1. Key Theme: Agricultural Communications/Information Technologies

(Reference OSU Plan of Work Extension Program 1A: Summary of Extension Programs)

a. Description of Activity - Team electronic newsletters and fact sheets/bulletins through appropriate e-mail list serves and Web sites have been identified by Ohio clientele as preferred option to more traditional extension educational meetings. Many of OSU Extension's commodity-focused teams provided weekly/monthly electronic newsletters and research updates which have been evaluated for their economic impact. OSU Extension team members developed educational newsletter summaries following weekly tele-conferences titled: *Amazin' Graze, Buckeye Yard and Garden Line (BYGL), Crop Observation and Recommendation Network (CORN), Grain Marketing Research and Innovative Strategies (GRAINS), Pesticide Update (PEP TALK), Pork Pointers, Vet-Net, Vineyard Vantage* and the Watershed

Network's *Buckeye Basins*. We have listed all newsletters on our OSU Extension *Ohioline* Web site, as well as many of our team's individual Web sites for easier access by our stakeholders/producer clientele.

b. **Impact** - Newsletter surveys have indicated that agronomic crop producers saved over $11.3 million dollars in chemicals used from implementing management practices presented in the *CORN* newsletter and over $3.8 million from utilizing marketing tips found in our *GRAINS* newsletter. The OSU Extension beef team Web site, released in May 1997, had more than 8,500 hits during October, 2003. The *Buckeye Yard and Garden Line (BYGL)*, started in 1990, continues to be a key electronic educational tool developed by the OSU Extension Nursery Landscape and Turf Team for county Extension offices, the commercial green industry, and the gardening public. Estimates from the Ohio Nursery and Landscape Association place the economic benefit of the green industry state wide at over 1.4 billion dollars. In the 2002 *BYGL* Evaluation Survey, over 2,000 respondents indicated that *BYGL* saved their businesses over $3.4 million. Over 55% of the respondents indicated that the *BYGL* changed their pest management practices. Through newsletters, media and other sources, respondents indicated that *BYGL* reached over 1.1 million people in 2003. This version of *BYGL* web site is linked to thousands of plant and plant pest images and over 23,000 fact sheets from throughout the U.S. via links to the OSU Horticulture and Crop Science in *Virtual Perspective* Web site. In addition, *BYGL* is used throughout Ohio at universities as part of the curriculum for undergraduate horticultural courses.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

2. Key Theme: Adding Value to New and Old Agricultural Products

(Reference OSU Plan of Work Research Program 1B: Value Added Products)

a. **Description of Activity** - The theme of adding value to new and old agricultural products describes many of the activities of OARDC. While there are active research programs involving the development of new products / processes such as production of energy from renewable biological sources, e.g. soybean diesel fuel and anaerobic fermentation of biomass for the production of methane, none of them are sufficiently advanced to estimate their impact. A more relevant question concerns the impact of research that has gone on sufficiently long to reach some level of maturity. Soybean research is one example which qualifies and therefore was studied extensively by the Battelle economic assessment team. Soybeans were chosen as one focus because:

- more acreage is devoted to soybean production in Ohio that any other agronomic crop,
- farm revenue from soybeans is significant, usually either number one or is about equal to revenue from corn, and

- in comparison to corn and other crops, soybean production is much more dependent on varieties adapted to local conditions and therefore more dependent upon more narrow regional research.

The Battelle study reported that in 2002, sales of soybeans represented an $837 million business enterprise for Ohio. In prior years, when the price paid farmers was greater, income approached $1 billion. Because of their economic importance, soybeans have been the topic of substantial research activity for many years. OARDC scientists have used a variety of germ plasm stock to produce the most productive varieties for the soil and climate as well as disease / pest problems in Ohio. In addition, some varieties specifically designed for niche markets, e.g. high-protein soybeans, have been developed. Overall, 19 varieties designed for Ohio soil, climate and growing conditions have been released since 1985.

Phytophthora root rot is the single biggest threat to Ohio's soybean production, now infecting over a million acres each year. The number of Ohio counties in which the disease is found has been constantly expanding over the past 20 years. It is particularly a problem with clay soils which hold moisture, especially during climatic years like 2002, characterized by an unusually wet spring followed by an extended dry period. The plants look healthy until the soil becomes dry and then they wilt and die. The most effective control is genetic resistance which has now been bred into many of the varieties developed and released by OARDC specifically for Ohio growing conditions.

Another major problem for Ohio soybean producers is soybean cyst nematodes (SCN) It was first identified in Ohio in 1987 and has been spreading to more areas of the state since then. Again, the most effective means of control is genetic resistance but even then, SCN resistance is only effective if the nematode number is limited by proper management, including weed control. Both the production of SCN-resistant varieties adapted to the Ohio climate and management techniques have been the subject of OARDC research.

In addition to the intensive research designed to improve productivity and profitability for Ohio soybean farmers, a breeding program was begun in the 1980's to develop high-protein varieties of soybeans suitable for human foods. The first of these high protein food grade varieties suitable for the growing conditions of Ohio were released about ten years ago and have now become an important niche market for Ohio soybeans marketed in Asia for the production of tofu.

b. **Impact -** Data in the Phase I economic impact report by Battelle indicate that in 2002, 32% of Ohio farm land or 4,580,000 acres, was devoted to the production of soybeans, with an average yield of 41 bushels per acre. At an average market price of $4.46 per bushel, soybean farming income was $837 million. Battelle then estimated the portion of this income that could be directly attributable to OARDC research. Since 1985, OARDC has released 19 soybean varieties adapted to Ohio climate, soils and disease / pest pressures. From the acreage devoted to production of certified seed from these varieties, the percentage of the total Ohio soybean acreage planted to these varieties was calculated. Over the years, that

percentage ranged from a high to 34.5% in 1994 to a low of 6.4% in 2002. Even the low adoption rate of 6.4%, the value of Ohio soybeans produced from varieties released by OARDC was estimated at $72.5 million, representing direct income. Battelle used an input / output model to calculate indirect income consequently generated to be another $118.5 million, for a total of $191 million added to the Ohio economy from soybeans produced from OARDC varieties in 2002.

The percentage of Ohio soybean acreage planted to varieties released from OARDC calculated by Battelle from the acreage devoted to the production of certified seed from these varieties is shown in column A in Table 1 and the estimated value of soybeans produced from that acreage is shown in column B. The data in column C are a secondary calculation of the monetary benefit to Ohio soybean farmers assuming a 5% economic advantage for planting OARDC developed varieties.

The economic benefit from OARDC varieties (Column C, Table 1) needs some explanation. Each year, one of the decisions that must be made by soybean farmers is what variety to plant to maximize profit. Depending on the rainfall amount and frequency and even the climatic conditions from the previous winter, Phytophthora and / or soybean cyst nematode resistant varieties adapted to Ohio climate and soils may or may not provide a large production advantage. Column C assumes that over time, OARDC varieties will provide a 5% economic advantage.

It should be noted from the data in Table 1 that the adoption of OARDC varieties has shown a steady decline in the past few years which coincides with the increased use of glyphosate-resistant (i.e. “Round-Up Ready”) varieties. Since these glyphosate-resistant varieties were developed in states west of Ohio, they do not have genetic characteristics optimal for Ohio but glyphosate-resistance itself provides an economic advantage that Ohio soybean farmers must think outweigh that of local varieties, based on planting rates. Thus, work now being conducted to incorporated the glyphosate-resistance genes into varieties developed for Ohio should prove to be economically advantageous to Ohio farmers in the future.

It was reported by the Battelle study that Ohio soybean exports amounted to about $460 million per year over the 1991- 2001 time period. A substantial amount of that export value was attributable to high-protein varieties of soybeans developed by OARDC specifically for the Asian tofu market. These high-protein varieties resulted in another, serendipitous advantage to the Ohio economy when Cargill built an isolated soybean protein production facility in Western Ohio. This production plant was located there, according to a spokesperson from Cargill, because Western Ohio soybeans are the highest in protein found anywhere, due to the combination of genetics and the Ohio climate and soils. The protein production facility added $10 million to the local Sydney, Ohio economy in 2002.

Table 1.

Year	[A] % acres to OARDC varieties	[B] Value of soybeans in Ohio from OARDC varieties	[C] Added income to Ohio farmers from OARDC varieties

1986	7.8	$56,587,847	$2,829,000
1987	10.5	$92,685,146	$4,634,000
1988	16.4	$120,362,679	$6,018,000
1989	22.2	$164,628,487	$8,231,000
1990	27.7	$229,945,288	$11,497,000
1991	24.7	$195,996,061	$9,799,000
1992	32.7	$278,679,583	$13,934,000
1993	32.7	$336,764,856	$16,838,000
1994	34.5	$337,051,177	$16,852,000
1995	28.1	$295,530,144	$14,776,000
1996	27.6	$330,999,934	$16,550,000
1997	24.5	$313,949,255	$15,697,000
1998	19.4	$197,237,203	$9,862,000
1999	15.5	$131,700,930	$6,585,000
2000	14.6	$138,694,885	$6,935,000
2001	9.5	$88,809,168	$4,440,000
2002	6.4	$72,494,006	$3,625,000
		Average / year	**$9.947,000**

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** - State Specific

3. Key Theme: Plant Production Efficiency

(Reference OSU Plan of Work Research Program 1E: Increased Plant Production Efficiency)

a. **Description of Activity** - As noted in the previous sections, soybeans are one of Ohio's main field crops, accounting for $800 million to a billion dollars per year for Ohio farmers. Ohio is ranked sixth nationally in soybean production. To maintain this productivity, OARDC has a very active soybean breeding program backed by a strong molecular biology initiative. Continued investment in both basic and applied soybean research is essential for two reasons. First, it is clear that competition from others, especially South American countries, will continue

to make inroads into market share of soybean exports so American producers must become increasingly efficient. Second, threats to soybeans in the form of diseases and pests continue to evolve with new ones appearing on a regular basis. One of the latest diseases to become a problem in some areas of Ohio is the bean pod mottle virus, spread by bean leaf beetles. The control of this virus by management, insect control and genetic resistance is the subject of recently initiated research.

The soybean breeding and testing program is designed to research and release varieties that are best suited to Ohio conditions and keep Ohio's soybean industry thriving. To this end, varieties from around the world are tested for field performance for a variety of genetically-based characteristics including maturity date, disease resistance, yield potential and protein and oil content. When a plant with a genetic characteristic of interest is found, tools of molecular biology are used to identify the location of the gene and related markers for use in future genetic crossing. It may take years of plant breeding and field testing to produce commercial soybean varieties that can give soybean producers an edge in a competitive market.

An example of this type of research was the variety testing program conducted in 2002 in which 202 varieties were tested at six locations around the state for yield, relative maturity, disease resistance, plant height and lodging, seed size and oil and protein content. Results of the performance testing were distributed to growers. Over the past two decades, OARDC has released 19 varieties of soybeans with genetic characteristics optimized for the climate, soils and disease / pest pressures encountered in Ohio.

Tomatoes have had a long history in Ohio. Tomatoes, called "love apples," were native to Central America and were taken to Europe by Spanish explorers. Tomatoes were not considered food until the mid-1980's when Alexander Livingston from Renoldsburg, Ohio successfully cultivated and bred the native fruit to develop edible varieties. He popularized these through the Livingston Seed Company and a new industry was born in Ohio. Today, tomatoes are canned more than any other food and Ohio ranks among the top states producing processing varieties as well as fresh-market tomatoes.

The strong tradition of tomato research at OARDC continues, ranging from basic molecular biology to applied plant breeding. One such example is the use of molecular biology to identify genes which control the shape of the tomato fruit. By controlling the shape of the tomato, researchers hope to save on processing as well as shipping costs. For example, varieties with square shaped fruit could be packed and transported more efficiently. But in the short term, the development of disease resistant varieties which do well in the humid environment of Ohio has been very important to the industry. Genetic resistance to such diseases as bacterial canker, bacterial spot and color disorders has already been incorporated into varieties available to Ohio producers. Another goal is to produce products for the whole-peel and diced market that has a consistent red, saturated color. Red color is not only esthetically important to consumers but may also affect the tomatoes' health properties. That is, it is the red pigment lycopene

that is thought to reduce the risk of some types of cancers.

b. **Impact -** The soybean variety testing program identified varieties which provided an average increase in yield of 15 kilograms per hectare over several locations around the state. Based on an average normal yield of 40 bushels per acre, the yield of these varieties would average about 15% greater. From the data in Table 1, it can be calculated that an increased income of 15% would amount to an additional $30 million per year for Ohio soybean farmers, averaged over the period since 1985.

According to the Battelle study, the 2002 tomato crop was worth $101 million in direct income to Ohio producers. Ohio ranked third nationally in processing tomato production as well as in fresh market tomatoes. OARDC has released 17 varieties of tomato and tomato germ plasm since 1991. The use of these varieties adapted to Ohio growing conditions and disease pressure contributed to the 24% greater yield in Ohio compared to the national average of 299 Cwt per acre in 2002. Joe Hirzel, manager of Hirzel Canning Company and Farms in Northwest Ohio is a leader in the Ohio industry and a strong supporter of the tomato research program. He said: "OARDC research has provided us with varieties that are resistant to bacteria and perform well in dry and wet weather."

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** – State Specific

4. Key Theme: Animal Health

(Reference OSU Plan of Work Research Program 1F: Enhancement of Animal Health)

a. **Description of Activity** - The Food Animal Health program conducts research related to infectious diseases of food-producing animals. Even though Ohio is considered an urban state, the animal industry is strong. Ohio ranks 2nd in egg production, 6th in chickens sold, 9th in hog production, 11th in turkey production and 10th in cattle inventory. And because of proximity to markets, Ohio ranks third in the nation in livestock processing plants.

The two most common causes of illness in food producing animals are enteric and respiratory diseases. The OARDC food animal health program is focusing on diagnosis, vaccines, treatment and control of these. Several diagnostics have been developed within this research program.

Basic research conducted by the food animal health research group also has implications in human health. For example, last year's outbreak of severe acute respiratory infection (SARS) was quickly shown to be caused by a newly discovered coronovirus. One of the worlds few experts on this type of virus, Dr. Linda Saif, recently elected to the National Academy of Sciences, provided her expertise and antiserum for related viruses, bovine coronovirus and porcine transmissible gastroenteritis virus to the Center for Disease Control and Prevention.

The dairy industry in Ohio is important to the state's economy in the

amount of over $600 million per year but it is also important because it supports a very large cheese industry. Mastitis is a major problem for the Ohio dairy industry and is indeed the most costly of agricultural animal diseases. Mastitis is the result of a bacterial infection of the udder by any of a number of organisms but the coliform bacteria, Escherichia coli and Klebsielia pneumoniae ane the most common cause of the disease in well managed herds. These pathogens have high resistance to antibiotic treatment and chemical disinfectants. OARDC scientists are trying to take advantage of the fact that these infectious organisms must scrounge iron in the face of very low iron content of milk by developing a vaccine to the bacterial iron binding proteins.

b. **Impact** - In 2001, Ohio livestock revenues totaled $1.9 billion. Catastrophic outbreak of diseases is the greatest economic threat to this industry but even without a catastrophic, widespread occurrence, the routine annual losses from diseases within the nation are estimated to be 17% of production costs. Extrapolation of this to Ohio means an estimated revenue loss to the state of $315 million. The Food Animal Health program has successfully developed vaccines for rotaviruse in swine, and infectious bursal disease virus in poultry.

Mastitis costs Ohio dairy farmers an estimated $21 million each year in lost milk production, veterinary expenses, discarded milk and drug costs. A vaccine against mastitis would not only save these costs within the state but would decrease losses estimated to be about $97 million to coliform mastitis in the many other dairy states within the region. But the importance of the dairy industry to the State of Ohio goes far beyond the quantity of milk produced - it forms the basis of the cheese industry which produces about 140 million pounds of cheese per year, adding substantially to the state's economy. For example, the Ohio cheese industry, ranked number one nationally, produced 81 million pounds of Swiss cheese in 2000, worth about $130 million directly to the states economy.

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** – Multi-state

5. Key Theme: Plant Health

(Reference OSU Plan of Work Research Program 1G: Enhancement of Plant Health)

a. **Description of Activity** - Phytophthora root rot is the nemesis of Ohio soybean growers, especially during a wet planting season followed by dry weather. OARDC plant pathologists and soybean breeders, using a combination of conventional plant breeding and molecular biology, have identified a novel resistance gene to Phytophthora which has been introduced into elite soybean germplasm to develop cultivars resistant to this disease. Although over the past decade, OARDC researchers have bred soybeans with partial resistance to Phytophthora, this represents the first time that such a relative specific resistance gene has been discovered in nearly 20 years. Work is continuing to incorporate this gene into high-yielding varieties which also contain the Round Up Ready gene since over 80% of the soybeans grown in Ohio are "Round-Up Ready."

Another major problem for Ohio soybean producers is soybean cyst nematodes, first identified in Ohio in 1987 and in the US in 1974. These nematodes are microscopic round worms which feed on the roots of soybeans, robbing the plant of nutrients as well as creating wound sites for root rot fungi to enter. The severity of symptoms and losses depend upon several factors including the number of nematodes present in the field at planting as well as soil texture, fertility and moisture. But genetic resistant varieties are probably the most important.

OARDC scientists have been working for the past 15 years on controlling this pest, using both management and plant breeding techniques. Soybean cyst nematode resistant varieties have been developed. Using these OARDC varieties that are both resistant to soybean cyst nematodes and are adapted to Ohio growing conditions is the most effective means of control. However, the use of these varieties is most effective with low to moderate (2000 to 5000 eggs per 200 cc of soil) infestation. Still, soybean cyst nematodes represent a continuing threat to soybean production in Ohio. Over the past year, 5,000 soil samples from throughout the state have been assayed for soybean cyst nematode and 40% were found to have detectable levels of the pest. Another 10% had populations above levels that would permit even soybean cyst nematode resistant varieties to be grown.

Research over the years has shown that proper management can limit the spread and destructiveness of soybean cyst nematodes. These include careful cleaning of equipment between fields and rotating crops. Since the soybean cyst nematode is most active in warm soil, planting early will allow the establishment of roots before they are damaged. Controlling weeds is also very important especially during the non-growing season or when non-host agronomic crops are grown during crop rotation. Most legumes as well as a large variety of weeds are hosts to soybean cyst nematode.

b. **Impact** - Phytophthora, also known as root rot, is the single biggest threat to Ohio's soybean production, infecting over a million acres each year. It is particularly a problem during climatic years characterized by an unusually wet spring followed by an extended dry period. The plants look healthy until the soil becomes dry and then they wilt and die. Phytophthora related diseases result in worldwide losses estimated at $10 billion per year. In Ohio, it is estimated that phytophthora reduces yields as much as 15% to 20%, depending upon climatic conditions. If adoption of the Phytophthora resistant varieties resulted in average yields over time of only 5% greater, this would amount to almost $10 million per year of additional income to Ohio soybean farmers (see Table 1).

Soybean cyst nematodes can lead to even greater losses for Ohio soybean growers and therefore OARDC research has had an even greater economic impact. This roundworm, first detected in Ohio in 1987 had spread to 53 of Ohio's 88 counties by 1999. Over 90% of Ohio soybeans are produced in those 53 counties. Studies in 1999 and 2000 have shown that in moderately infested fields in Woods County, soybean cyst nematode resistant varieties out yielded non-resistant soybeans by 10 to 15 bushels per acre and in Clermont County with higher infestations and heavier soils, resistant varieties showed a 20 bushel per acre advantage over susceptible soybeans. Assuming an average production rate

of 40 bushels per acre (see Table 1) in non-infested soils and a price of $4.46 per bushel, use of soybean cyst nematode resistant varieties would have saved losses to the pest in these counties of $45 to $90 per acre.

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** - State Specific

Goal 2. A Safe and Secure Food and Fiber System

Executive Summary

Food safety is a national priority because failure to protect our food supply from natural outbreaks of diseases and food poisoning threatens consumer health as well as export markets. Granted there is also the possibility of terrorist's threats to our food supply but in terms of risk analysis, this external threat would seem to be small. Still, one incident could cause such public fear that it could create an economic disaster for segments of the food/agricultural industry. It is often argued that food recalls are proof that the surveillance system for the protection of our food supply is working. However, the increase in communications and the 24/7 news outlets provides greater publicity to any event than it warrants which could be a major part of the public perception that our food supply is becoming increasingly dangerous. Obviously, detection of microbial contamination that could lead to food poisoning at a sufficiently early stage to prevent the food from entering the food chain would be extremely advantageous to the consumer as well as the food industry. The use of molecular biology for real-time detection of pathogens done by OARDC and described below offers the best hope of such a detection system. This research uses DNA fingerprints to detect the presence of dangerous bacteria before they have reproduced in large enough numbers to cause food spoilage and illness whether the contamination is accidental or deliberate.

Safe food handling is a targeted issue and includes: Promote food safety across the food chain; consumer education for safe food handling; certificate training for food handlers; and food safety education for growers, producers, distributors, retailers, and food service workers. At the same time that food safety is an issue, consumers demand and will pay for greater convenience. The challenge is to produce food which is nutritious and tasty but which can be processed and distributed without contamination, either accidentally or deliberately, and is handled safely as it is prepared by and for consumers.

At the same time that food safety is an issue, consumers demand and will pay for greater convenience. The challenge is to produce food which is nutritious and tasty but which can be processed and distributed without contamination, either accidentally or deliberately. Consumers' lifestyles, hence their eating habits, are constantly changing. These changes bring about increased demand for high quality, value added, and convenient foods. This requires that production of food ingredients, which are as nutritious as non-processed counterparts and are not subject to contamination with harmful microorganisms during production and shipment.

Although research that leads to a safer food supply is actively in place, scientists acknowledge that the safest foods are still a hazard if mishandled during food preparation just before

consumption either in a food establishment or at home. Consumer and food worker behavior is an important issue to address to complete the assurance of the safe food cycle. Education efforts, either in higher education or through outreach, have focused on this critical need so that the "human factor" can be reduced or eliminated as a cause of food-borne illness.

Prevention of the growth of pathogens naturally present in our food supply has been the goal of food preservation for all times. Over 200 years ago, food preservation by heating/canning was developed and the basic methods have changed little since then. More recently, ionizing irradiation was developed as a method to reduce the population of spoilage organisms. While this non-thermal method minimized the effects on the properties of food, it has not enjoyed widespread acceptance because of consumer fears of radiation, which has provided an opportunity to develop other, non-thermal processes to preserve food. Two of these being investigated by OARDC scientists are pulsed electric field technology where microorganisms are destroyed by very high voltage applied for short time periods and high-pressure technology where microorganisms are killed by pressure. A third method under investigation is ohmic heating by electricity for a short time which affects the microbial population but not the properties of the food.

Smith-Lever Fund expenditures for Goal 2: $721,424 EXTENSION FTE's: 15
Hatch expenditures for Goal 2: $120,692 OARDC FTE: 1.3

Goal 2 Key Themes

1. Key Theme: Food Safety

(Reference OSU Plan of Work Extension Program 2Ae: Pre-Harvest Food Safety)

a. Description of Activity - Spurred by recent incidences of drug residues in junior fair animal carcasses and at the urging of meat processors in the state, the Ohio Department of Agriculture now mandates all junior fair exhibitors must attend a quality assurance training session before they sell certain species of livestock through a junior fair sale. To answer this mandate county Extension agents, with the cooperation of state Extension specialists and vocational agricultural teachers work together to provide educational quality assurance programs which meet the mandate and the needs of the consumer, and youth exhibitor.

b. Impact - More than 30,000 youth and adult junior fair food animal producers received quality assurance training to assist them in meeting compliance standards being implemented by respective processing industries. Several counties reported having no livestock quality assurance issues associated with their junior fair livestock sales in 2003. Examples of impact across the state include:

- In Ashland County (n=353), youth demonstrated on their post-test scores an average 23.42% higher than pre-test scores (87.19% vs. 63.77%).
- In Hancock County, 620 youth completed quality assurance requirements. Market swine and Market lamb carcass shows were conducted in conjunction with the Hancock County Fair in order to increase total muscling for

improved consumer demand. 20 animals of each specie were entered which was the total allowed for the local slaughter plant. The 2003 results indicated the loin eye measurements on swine increased from 4.9 square inches in 1991 (1st year) to 8.45 square inches for a 72% increase. The loin eye measurements for lambs increased from 2.44 square inches in 1994 (1st year) to 3.10 square inches for a 27% increase.

- In Delaware County, one hundred two 4-H and FFA youth learned livestock management practices relating to pork quality assurance and earned certification through the National Pork Producers Council Pork Quality Assurance Program. Following the program, 92.7 percent of respondents reported they planned to implement the 10 good production practices this year in the care of their livestock projects. Two hundred ninety-six 4-H and FFA youth learned livestock management practices relating to general livestock Quality Assurance. Following the program 96.1 percent of respondents reported that they planned to use the Ten Good Production Practices with their livestock projects this year.
- In Clark County (n=1134), 4-H & FFA members participated in county and club Livestock Quality Assurance (LQA) Programs utilizing the club kits, outside speakers and Extension Agents. Twenty-three 4-H clubs & FFA chapters used the Club LQA Kits to teach livestock quality assurance information to 300 4-H and 359 FFA members. Post assessments indicated: 98% of participants could explain why quality assurance is important to the food and animal industry; 97% could explain the differences between ethical and unethical practices; 91% could identify the 10 Good Production Practices related to LQA; and 95% could explain their role in producing a safe meat or milk product for the consumer.
- In Fayette County, a total of 1,236 pre- and post-tests were conducted by participants. Results showed an increase in participant knowledge of animal behavior and proper handling. Participants averaged 9.20 properly answered questions on the pre-test and 11.73 properly answered questions on the post-test.

c. **Source of Federal Funds** – Smith-Lever 3b&c

d. **Scope of Impact** – State Specific

2. Key Theme: Food Safety

(Reference OSU Plan of Work Research Program 2Ar: Pre-Harvest Food Safety)

a. **Description of Activity** - Food safety has been of increasing significance over the past several years. The highly publicized outbreaks of Escherichia coli 0157:H7 in products from hamburger to lettuce and apple cider has focused America'a attention on the safety of our food supply. More recently, infection of large numbers of people with hepatitis as a result of consumption of contaminated chives from Mexico has not only made the public more wary of foreign-grown produce but was a massive economic blow to Chi-Chi's restaurants. Add to that the public consternation over the recent discovery of "mad-cow disease" in the state of Washington which could threaten the multi-billion dollar cattle industry.

And then, there is public concern over the possibility of terrorist's threatening our food supply. All of this has made the food safety research program at OARDC more valuable. This research is particularly important for Ohio where food processing is such an important industry.

The food safety research program at OARDC involves several departments across three colleges: Food, Agricultural and Environmental Sciences; Human Ecology; and Veterinary Medicine. The Department of Food Science and Technology and the Department of Food, Agricultural and Biological Engineering have programs relating to the detection and control of biological contaminants.

The detection and identification of microbial contaminants of food has required one to two days because it relied upon culturing organisms. Thus, the detection of bacterial contaminants may not occur until after a product has been distributed to retail stores and often to consumers. At that point, if a health hazard to the public exists, a recall is ordered. OARDC scientists are using the methods of molecular biology to shorten the time required to detect and identify microbial contaminants. In this technique, real-time PCR is used to amplify DNA and thereby identify the nucleic acid fingerprint of specific organisms. The methodology is practical since only seven pathogens are responsible for almost all food poisonings. As the name "real-time" implies, the system requires only minutes for the identification of DNA sequences associated with specific pathogens. This technology is not only important to the food industry but is also being supported by the Department of Homeland Security.

The methods of reducing microbiological contamination by heating and preservation by canning basically have not changed since the initial development in early 19th century Europe although they have undergone major technological modernization. Non-thermal processes are currently being developed by OARDC scientists, all of which substantially reduce microbial contamination without altering the taste or properties of the food as often happens with thermal processing.

Non-thermal processes include ultra-high pressure in which food is subjected to pressures on the order of 9,000 times atmospheric pressure. The pressure inactivates microorganisms and preserves freshness. The process has been used for oysters which extends their shelf life from one to two days to one to two weeks although they still require refrigeration. Ohmic heating can also reduce bacterial numbers by running a moderate electrical current through food which causes very quick heating to sterilize it before packaging without losing freshness. Finally, pulsed electric field technology creates products which are shelf-stable or refrigerator-stable for years. In this process which is useful for juices, an electric current of 30,000 to 40, 000 volts per centimeter is applied in pulses lasting for 2 microseconds.

b. **Impact** - According the FDA, food borne pathogens cause an estimated 3.3 to 12.3 million illnesses per year and up to 3,900 deaths. The nationwide economic loss is estimated between $6.5 and $13 billion annually. Research on food safety is not only important to Ohio for the benefit of our citizens, it is also important for the food processing industry within the state. Food processing in Ohio accounts for about $19 billion annually.

The detection of pathogens within minutes instead of 18 to 24 hours could mean substantial savings to the food industry. Presently, food may be shipped to retailers and possibly sold to consumers before results of pathogen analysis are available. Most of the time, the gamble pays off for the processor because the food is not contaminated by pathogens but all too often, the food is contaminated and a costly recall must be instituted. The alternative is to not ship the food until test results are complete but this means potential spoilage and loss of freshness during the waiting period. A rapid detection system in which contaminated food is never in the food chain is clearly beneficial. Further, a rapid detection system in place to thwart deliberate acts of terrorism would be priceless in public confidence in the food supply.

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** – Multi-State

3. Key Theme: Food Processing Safety

(Reference OSU Plan of Work Extension Program 2Be: Post-Harvest Food Safety)

a. **Description of Activity** – Small food and meat processing businesses benefited from outreach educational activities provided by Ohio State University Extension and the College of Food, Agriculture and Environmental Sciences. The programs varied in content from basic thermal processing of foods, to conducting environmental surveillance for *Listeria monocytogenes*, to setting up and monitoring the safety programs of the business using a HACCP plan. Materials to document the scientific basis of HACCP were completed and distributed this year.

b. **Impact** – There were 259 participants who attended sessions in food processing safety and HACCP. Over 10,000 copies of the HACCP scientific documentation were printed and distributed by USDA, FSIS to more than 5,000 small and very small federally inspected meat processing establishments. This programming allows businesses to meet compliance requirements for local, state, or federal inspection, depending on the nature of the business.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** – State specific

4. Key Theme: Food Safety Training for Food Establishments

(Reference OSU Plan of Work Extension Program 2Be: Post-Harvest Food Safety)

a. **Description of Activities -** Ohio Food Code requires that a "person-in-charge" who is knowledgeable of food safety to be present at all times in licensed food establishments. Successful completion of the ServSafe manager training program and a passing score on the national certification examination qualifies an individual to meet this regulatory requirement for their business. Sixteen hours of instruction are required to meet certification. The course is certified by the National and Ohio Restaurant Associations and the Ohio Department of Health.

Ohio State University Extension has 25 qualified instructors who are recognized by the state Health Department as providers. Another version of the same training is aimed at employees who desire food safety knowledge, but who are not serving as "person-in-charge." This is a 6 hour training course and is provided by the same 25 qualified instructors.

b. **Impact -** This program has been in existence for Ohio State University Extension for 4 years. To date there have been 49 programs held with 544 participants in the managers course. Also, over 25 employee trainings have been held with 583 participants. In 2003 alone, there were 208 participants, which indicated the growth of this program in the last year. For the managers' training program, the national certification examination is required. The passing rate for all participants who attended extension-sponsored programs is 96.2%. This program allows food establishments to meet compliance requirements for local and state inspection. Managers who attend this course do so for the purpose of training their own employees, thus this program has a projected multiplier effect of 500% (ie. for every one participant trained, five additional employees will receive training within the business.)

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** – State specific

5. Key Theme: Food Safety – Volunteer Quantity Cooks

(Reference OSU Plan of Work Extension Program 2Be: Post-Harvest Food Safety)

a. **Description of Activities -** Churches, civic organizations, 4H-Clubs – all of these groups sponsor events where food is prepared and served to large numbers of people. The volunteers who prepare that food may only have household food safety information, but they are operating in a public situation where members of groups at high-risk for food borne illnesses may be dinning. Volunteer quantity cooks learn how to protect their clients through an extension program to train them in safe food handling procedures. The workshops held this year will benefit each of the people who eat the food prepared; thus, this program represents a train-the-trainer program that will impact many more than those who actually attend the workshops.

b. **Impact -** During the 2003 program year, over 250 people completed food safety training in Lorain County. Participants included school food service personnel, restaurant employees, nursing home managers, catering facility managers, and others who serve food in large quantities. Ninety-five percent of class participants improved their knowledge of food safety principles by increasing their scores from pre to post test evaluations. Comments from a six month follow-up evaluation included: "I think all school food workers should take this course." "I took the information back to my crew and they are now heating and cooling properly." "I found the class very useful and would recommend it to anyone in the cooking field." All participants have increased their knowledge of food safety principles by attaining at least a 75% on their posttest evaluations.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** – State specific

6. Key Theme: Food Safety for Low-income Individuals

(Reference OSU Plan of Work Extension Program 2Be: Post-Harvest Food Safety)

a. Description of Activities - Ohio State University Extension sponsors two nutrition education programs aimed at low-income individuals and families: The Expanded Food and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP). Programs are located in counties throughout the state in areas where poverty is more prevalent. Participants are people who are likely to use federal assistance programs, like the WIC program and Food Stamp program, to supplement their food purchasing power. The aims of the programs are to maximize the benefit of the federal assistance programs with wise purchasing decisions, enhanced nutritional quality, and safer food for the home. Food safety programs reach all of the participants in this program. Topics include effective handwashing, using a thermometer to ensure safe cooking, proper ways to store food for safety, and cleaning and sanitizing in the home kitchen.

b. Impact - There were 9931 FNP participants and 6160 EFNEP participants who attended food safety workshops during 2003. In the FNP program, 1949 participants attended programs that specifically targeted handwashing: 76% learned new information, 55% planned to incorporate the new information into their daily practices at home, and 41% indicated that they already practiced effective handwashing already. Additionally, 1652 FNP participants attended classes on food thermometer usage. In this portion of the program, 65% learned new information, 51% planned to use the information learned, but only 19% were currently using a food thermometer to check when food is safe to eat. In the EFNEP program, a portion of the participants also answered a behavior checklist to determine their current food safety practices. Of the 3527 who participated in this survey, 24% (887) were following one of the targeted practices (food storage or safe thawing of frozen food) and 19% (713) were practicing both food handling procedures. Collectively, this information documents that improvements have been achieved in the safe food handling practices of program participants; the need for additional education is also evident.

c. Source of Federal Funds - Smith-Lever 3b&c

d. Scope of Impact – State specific

Goal 3. A Healthy, Well-nourished Population

Executive Summary

Dietary Guidance can be defined as the use of principles found in the Dietary Guidelines for Americans to develop non-formal nutrition education series for youth and adults. Additionally, there are programs targeted to the elderly, and to individuals at risk for or having diabetes, focusing on their nutritional needs. These community-based nutrition education programs are offered at the local level by OSU Extension. The Dietary Guidelines for Americans provide a basis for healthy lifestyle choices. The Food Guide Pyramid is a pictorial and practical guide for educating consumers to use the Dietary Guidelines. OSU Extension professionals inform consumers of health risk factors (e.g., obesity, hypertension, etc.) and nutrition practices and encourage appropriate nutrition and lifestyle changes and promote reading labels on processed foods.

U.S. citizens, like other highly developed countries in the world, have an abundant, inexpensive food supply available to them. Food provides both pleasure and the nutrients necessary for health and survival. The goal is for all to be food secure, that is, access by all people at all times to enough food for an active, healthy life and at a minimum, includes: (1) the ready availability of nutritionally adequate and safe foods, and (2) the assured ability to acquire personally acceptable foods in a socially acceptable way. It is important to recognize that nutrient needs vary over the life cycle and research must be conducted to determine how age and gender influence nutrient needs. It is also important to recognize that the human body uses nutrients in chemical reactions within the body. Nutrition science plays an important role in reducing obesity, diabetes, cancer and heart diseases. The Ohio State University is one of a few institutions with a college of agriculture, a department of human nutrition science, and a medical college. Scientists from the many disciplines are researching together such agricultural products as tomatoes, soybeans, and raspberries to discover the chemical content and chemical reactions in hope of discovering chemicals that are effective as antioxidants and as anti-carcinogens. They are also researching behaviors that lead to healthy food choices.

A healthy, well-nourished population is dependent on the ability of people to obtain foods that will improve the over-all quality of their diets, and the quality of the food they eat. A healthy population also engages in other positive health practices, including physical activity, individual health monitoring, and safety practices that will reduce the risk of accidents and disease. OSU Extension professionals have been actively educating the people of Ohio regarding the importance of good health and nutrition practices. The professionals met with individuals and groups, in formal and non-formal teaching sessions, in workshops, committee meetings, health fairs, and walk-by exhibits. The result has been a change in 1) the way some individuals purchase, prepare and store food; 2) the level of interest in monitoring and improving health through screenings and exams; and 3) the ability of individuals to improve their personal practices to decrease health risk.

Stakeholder input through the Food and Nutrition Extension Advisory Committee indicates a desire of specific population groups to acquire the information and knowledge necessary to improve nutritional health. Teens active in sports want to understand how food can provide an “edge” in sports competitions. Teachers want resources for teaching the in-school pregnant teen

best nutrition choices for herself and for her baby. Older adults want to manage their blood pressure and their blood cholesterol levels. Older adults often express needs in one of two ways: those who are so busy that they want to prepare quick, nutritious meals or want to select healthy food choices at a restaurant and those who have no desire to prepare food because of declining health.

In the most basic form, adequate nutrition requires that our food provides sufficient calories and required nutrients for the proper physiological function of each cell of each organ throughout our life time. For the most part, these nutrients, such as vitamins and minerals, have specific, well-defined biochemical functions. In addition, our foods contain classes of chemicals that perform important physiological functions for which we do not have a specific biochemical requirement. For example, dietary fiber is important for the proper functioning of the gastrointestinal tract but this need can be met by a variety of specific chemicals ranging from pure cellulose to the phenolic compounds making up plant cell walls. Another example that has been the subject of a substantial number of research studies are the class of chemicals known as antioxidants.

Oxygen is essential for the survival of humans and all other aerobic organisms. At the same time, too much oxygen in the wrong form is toxic to most of our cells. Thus, the oxidative processes essential for the generation of chemical energy in the form of ATP necessary for our survival must be balanced with the control of oxidative destruction of cellular components. While we have endogenous enzyme systems such as superoxide dismutase and glutathione peroxidase to name two, it is also clear that we are dependent upon the presence of small molecules called antioxidants which limit and control destructive oxidative processes. The OARDC study of the absorption, transport and biochemistry of a class of antioxidants known as the carotenoids is described here.

Smith-Lever fund expenditures for Goal 3: $1,394,753 EXTENSION FTE's: 28
Hatch expenditures for Goal 3: $56,823 OARDC FTE: 0.5

Goal 3 Key Themes

1. Key Theme: Human Nutrition

(Reference OSU Plan of Work Extension Program 3Ae: Human Nutrition/Health)

a. Description of Activity - Extension Specialists provided leadership to using curricula targeting special audiences including low-income parents of young children and Food Stamp Program participants. Specialists provided nutrition and food safety in-service training for the Program Assistants in the Food Stamp Nutrition Education Program (we call it Ohio Family Nutrition Program) in 72 Ohio counties and for 44 Nutrition Educators in the Expanded Food and Nutrition Education Program in 11 Ohio counties. Collaborating agencies and organizations included: WIC, Departments of Health, faith-based organizations, United Way, Salvation Army, food pantries, senior meal site programs, community centers, local school districts, health clinics, Metropolitan Housing, and local and state

Departments of Job and Family Services.

b. **Impact** - The Expanded Food and Nutrition Education Program reached 6,782 parents of young children between October 1, 2002 and September 30, 2003. As a result, 89.9% of the individuals taught made positive changes in their food intake, as measured with a pre/post instrument for recalling food eaten in the previous 24 hours. Homemakers who graduated from the series of classes taught by the Expanded Food and Nutrition Education Program's Nutrition Educators showed marked change in the ability to manage food resources and practice food safety recommendations and improved their nutrition knowledge and practices. Sixty-eight percent (68%) of graduated homemakers improved one or more food resource management practices taught (meal planning, price comparisons, strategies for extending the food supply, or use of a grocery list to be a wise shopper). Forty one percent (41%) improved in two areas. Seventy five percent (75%) of the graduates improved their nutrition practices in at least one area (meal planning, healthy food choices, food preparation without salt, nutrition label reading, eating breakfast) and 53% improved in at least 2 categories. At graduation 51% of homemakers showed improvement in their food safety practices.

Six Nutrition Educators taught 19,201 young people nutrition information. Ninety percent (90%) of 1306 selected youth surveyed report that as a result of the information learned in the program, they eat a greater variety of foods, and nearly all (98% of 4,621 selected youth) reported an increased knowledge of nutrition.

Cooperating agencies, organizations and local OSU Extension offices contributed over $200,000 in support of education of low income parents of young children through EFNEP.

Program results and accomplishments of the Food Stamp Nutrition Education Program between October 1, 2002 and September 30, 2003 include:

- Ohio FNP included 66,701 direct contacts attending educational presentations and/or demonstrations. Those direct contacts reported 129,637 individuals in their households. A direct contact is an individual attending an educational program or demonstration taught by the FNP Program Assistant and/or the Family and Consumer Sciences Agent.
- Direct contacts reported their ethnicity as 82% white, 11% black, 3% Hispanic, 2% American Indian, 2% Other, and 1% Asian. This ratio is similar to Ohio's ethnic composition as reported in the 2000 Census.
- Twenty five percent of the direct contacts were male and 75% were female, of whom 6% reported being pregnant.
- Thirty four percent of direct contacts identified themselves as 65 years of age or older.
- Fifty thousand nine hundred twenty two (50,922) direct contacts responded to the question, "Which of the following statements best describes the food eaten in your household in the last 30 days?" as follows:
    - 51% reported "enough of the kinds of food we want to eat."
    - 35% reported "enough, but not always the kinds of food we want to eat."
    - 10% reported "sometimes not enough to eat."

    - 5% reported “often not enough to eat.”
- Direct contacts in Ohio FNP represent a greater percentage of households with food insecurity (49%) than that reported for Ohio (8.5%) by Nord, Jemison, and Bickel in “Prevalence of Food Insecurity and Hunger, by State, 1996-1998” (Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture, Food Assistance and Nutrition Research Report No. 2).
- Seventy seven percent of the 9,931 direct contacts participating in a food safety program or demonstration reported learning new information about food safety, 49% reported planning to use the information, and 27% reported using one or more recommended practices after having attended a program.
- Seventy four percent of the 13,106 direct contacts attending a thrifty shopping program reported learning new information about thrifty food shopping, 48% are planning to make recommended changes, and 25% reported using one or more recommended practices after having attended a program.
- Seventy six percent of the 39,461 direct contacts attending a Dietary Quality program reported learning new information about nutrition, 53% plan to make recommended changes, and 27% are using the recommended changes as a result of having attended a program.

Program results and accomplishments of basic nutrition programming through OSU Extension between October 1, 2002 and September 30, 2003 include:

- Nutrition training for Home Daycare Providers. At least 5 counties have trained Home Daycare Providers regarding feeding children.
- Programs targeting selected food items or food groups. Four counties provided lessons to county clientele about the benefits and use of soy in the diet. The need for dairy foods and calcium was a recurring topic in other lessons. Healthy snacks, using herbs and spices, breakfast, and fruits and vegetables were common subjects for other lessons. All were subjects for newsletters, news column articles, and radio programs.
- Programs targeting managing or preventing chronic disease. Sixteen Family and Consumer Science agents collaborated with local registered dietitians and certified diabetes educators to instruct individuals with diabetes about the management of their chronic disease. Two agents have become part of local coalitions to address the problem in their counties. Eating to mend the heart, prevent osteoporosis, and reduce cancer risk were other common topics for face-to-face lessons, numerous newspaper and newsletter articles, radio programs, and exhibits at health fairs.
- Weight management. Family and Consumer Science (FCS) agents in 3 counties have formed task forces to study the issue of obesity (particularly in childhood) in their county. Other agents have taught programs, written news columns and newsletters, and made radio programs about the obesity problem in children and adults. Portion

control, family meals, eating fruits and vegetables and low fat dairy products, feeling full on fewer calories, and exercise have been common topics for FCS professionals to emphasize as they teach about weight management.

- Physical Activity. In selected elementary schools in their respective counties, four Family and Consumer Science agents have collaborated with local health departments and community organizations to provide programs promoting physical activity.
- Food Preparation. Five counties taught a 'Kids Cooking School' to elementary age youth in after school programs. Most of the 88 counties also held 'skillathons' for 4Hers taking Food and Nutrition projects. Food preparation was the most common skill taught and tested. Because many people are pressed for time, quick and simple food preparation lessons were also taught to adult and youth groups in numerous counties around the state.

b. **Source of Federal Funds** - Smith-Lever 3b&c

c. **Scope of Impact** - State Specific

2. Key Theme: Nutrition Education – Collaboration with community agencies

(Reference OSU Plan of Work Extension Program 3Ae: Human Nutrition/Health)

a. **Description of Activity** - The Ohio State University Extension Family Nutrition Program used collaboration with community organizations improve outcomes in the categories of education, access to food, coordination of programs and messages, and public policy.

b. **Impact** – On a semi-annual basis participating counties worked with more than 700 organizations to provide nutrition education to Food Stamp eligible participants, contributing to key outcomes in differing proportion: education (93%), access to food (34%), coordination of programs (33%), and public policy (7%).

Organizations were related to FNP by their depth of integration of programs and impact. Cooperating organizations were categorized into four groups: Cooperator, Coalition Member, Partner, and Collaborator, with the depth increasing from Cooperator to Collaborator. Partner was distinguished by a match in dollars or in-kind goods or services provided to the FNP program. Being a Collaborator involved advising and integrating programs and evaluation to measure shared impacts. Program managers reported that 64% of organizations were Cooperators, 12% were Coalitions members, 11% were partners, and 13% were Collaborators.

Counties varied in the number of coordinating organizations, with a mean of 16 and a range of 2 to 35. Organizations were categorized in four types. Government agencies were the most common (47%), followed by Non-profit organizations (37%), Schools (11%), and Private/For-profit firms (5%). Agencies were ranked by total number of collaborations in the program statewide. The top 10 organizations listed in order of rank were senior centers, senior housing

facilities, WIC, Metro Housing, Job and Family Services, food banks/hunger programs, churches/religious organizations, Community Action agencies, Head Start programs, and high schools. County health clinics, hospitals and other health services, Salvation Army, media and vocational/technical schools followed the top ten. Distribution of organizations differed somewhat among the four key outcomes: Education: 49% government, 36% non-profit, 11% schools and 4% for-profit; Access to Food: 41% non-profit, 33% government, 21% for-profit, and 14% school; Coordination: 35% government, 34% schools, 29% non-profit, and 15% for-profit; and Policy: 12% government, 5% non-profit, and 3% each for-profit and schools all groups but the Education categories were significantly different at the .05 level or higher.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of impact** - State Specific

3. Key Theme: Nutrition Education – Food resource management

(Reference OSU Plan of Work Extension Program 3Ae: Human Nutrition/Health)

a. **Description of Activity -** Program assistants used a variety of means to share information about food resource management. People were reached through media outlets, such as radio, newspapers, newsletters, and through direct contact in programs on a weekly or monthly basis. Some programs were one-time only lessons. Objectives of the programs and media messages involved use food resource management and shopping behaviors that improve personal and family food supply; save money while shopping for food; planning spending for food; make wise choices about how food is acquired, how often food is purchased, and types of food purchased; use comparative pricing of food; and use recommended meal planning and preparation practices.

b. **Impact -** There were 11,610 low-income food stamp eligible and non-eligible families who participated in programs on food resource management/thrifty food shopping in 2002-2003. Programs were conducted with 596 agencies and organizations. The top 10 collaborating organizations for programs focusing on food resource management were, in order of rank, senior centers, Job and Family Services, food banks/hunger programs, Metro Housing, senior housing facilities, churches/religious organizations, WIC, Head Start, Community Action agencies, and the Salvation Army. Over 325 programs involved educational series consisting of 3 or more sessions. Of participants attending the programs, 74% learned new information about thrifty food shopping, 51% plan to make recommended changes in thrifty food shopping practices, and 27% are now using recommended thrifty food shopping practices.

Qualitative data included success stories reporting positive outcomes that the Ohio Family Nutrition Program had on its direct contact participants. Several direct contacts from food resource management and thrifty shopping classes have reported planning meals ahead of time and creating shopping lists. These behaviors helped reduce the cost of their grocery bills. Direct contacts have also prepared new low cost recipes and have reported success with them.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of impact** - State Specific

4. Key Theme: Human Health

(Reference OSU Plan of Work Research Program 3Ar: Human Nutrition/Health)

a. **Description of Activity** - Oxidative metabolism is essential to human life. Yet, during the process of producing chemical energy in the form of ATP, two to three percent of the oxygen that we breathe becomes a highly reactive form called "super oxide." We have enzymes, such as super oxide dismutase, which can inactivate this excessive, highly reactive form of oxygen and there are chemicals in our cells, called antioxidants, which can scavenge this super oxide. These antioxidants are mostly but not exclusively from our diet; our cells make some of them. In spite of these defense mechanisms, some of the super reactive forms of oxygen remain and cause mischief in the form of oxidative damage to critical chemicals within the cell. The most reactive of these cellular chemicals are polyunsaturated fatty acids, that is, fatty acids with two or more double bonds. [These polyunsaturated fatty acids must come from our diet because they are made only by plants and not by animals.] These fatty acids are components of every membrane. Oxidation of polyunsaturated fatty acids produce "free-radicals", i.e. very reactive forms of fatty acids which in turn can be very destructive. Again, antioxidants have the capability of scavenging these free radicals before they do damage. However, if these free radicals come into contact with DNA, for example, the purine and pyrimidine bases in the nucleic acids can be chemically altered. Chemical alteration of DNA can lead to mutations when that cell undergoes duplication and some mutations can lead to cancer. This is, in effect, the basis for the hypothesis that antioxidants are anti-carcinogenic.

In addition to cancer, antioxidants are thought to have an additional role in the amelioration of the development of atherosclerotic plaque. In this scenario, oxidative damage to the polyunsaturated fatty acids circulating in blood as components of the low-density lipoprotein (LDL) particle produce degradative products such as malonyl aldehyde. This three-carbon, highly reactive aldehyde then reacts with protein components of LDL which interferes with the removal of these LDL particles by the liver and other tissue. The concentration of these so-called oxidized LDL particles increases in blood and leads to their deposition in the intima of the arterial wall as a beginning sequella to smooth muscle cell proliferation leading to plaque formation.

In both scenarios, highly reactive oxygen is the culprit and polyunsaturated fatty acids is the target, at least initially. Since life is incompatible with the absence of oxygen and polyunsaturated fatty acids are an essential part of our diet, neither of these are subject to manipulation. We can however, manipulate the antioxidant components of our diet. It has seemed reasonable to assume that fat-soluble antioxidants would be beneficial in the control of both chronic diseases as well as other disorders related to oxidative damage of proteins such as macular degeneration in the lens of the eye.

The best known and most widely studied of the fat-soluble antioxidants

that are components of our diet are the carotenoids. These include the carotenes from carrots and green leafy vegetables, some of which, such as beta-carotene, can serve as precursors of vitamin A in humans. Other carotenoids including lycopenes which provide the deep red color of tomatoes, lutein from dark leafy vegetables such as spinach and kale and zeaxanthin from yellow corn are antioxidants but do not serve as vitamin A precursors.

The carotenoids have been the subject of intense investigation by OARDC scientists for the past several years. Unlike most of the non-nutritive chemicals in our diet, the carotenoids are generally reasonably well absorbed, especially from cooked foods. For example, it has long been known that 7 to 14 times more beta-carotene is absorbed from cooked carrots than from raw ones. Epidemiological evidence indicating that lycopene from processed tomatoes is much more effective in the prevention of prostate cancer than lycopene from raw tomatoes suggests that heating / processing also affects lycopene absorption. Work at OARDC shows that although the lycopene in raw tomatoes is in the all-trans configuration, that found in blood and tissues after absorption contain substantial amounts of the cis forms. This geometric transformation is not a function of processing but rather occurs during or after absorption. It was also shown that transport of lycopene in blood occurred in association with the lipoprotein particles. Work has also shown that lutein and zeozanthin from the diet are concentrated in the lens of the eye where they can inhibit photo oxidation of proteins by ultraviolet light and thus reduce the risk of macular degeneration.

b. **Impact** - Health care costs have risen dramatically in the past and economic planners anticipate exponential increases in another ten years when baby-boomers will begin to experience chronic diseases related to aging. It has been apparent for decades that if a proper diet can delay the onset and ameliorate the severity of chronic diseases, health care costs would decrease and the quality of life would increase for most Americans. The problem is that it is not entirely clear what a “proper diet” actually is.

The Food Guide Pyramid was developed and promoted to increase the consumption of fruits and vegetables thought to contain chemicals which would help in the prevention of cancer and heart disease. Over the past half century, there has been a decline in deaths from atherosclerotic heart disease and non-tobacco related cancers but it is not clear how much of these declines are due to earlier diagnosis and better treatments and how much is due to dietary changes. Two factors argue against the improvement-because-of-diet theory. First, the decline in both heart disease and cancer deaths began well before there was any measurable change in our diet, especially the proportion of calories from fat and carbohydrate. Second, while the Food Guide Pyramid recommends a substantially higher intake of fruits and vegetables, less than 10% of Americans follow that advice even now. It would seem that until there is hard, scientific evidence showing that food choices can prevent or at least delay the onset of chronic diseases, getting Americans to increase intake of fruits and vegetables will be a hard sell. Still, benefit to society demands that possible relationships between diet and chronic diseases must continue to be explored. The impact of the work being conducted jointly by OARDC and the Ohio State University College of Medicine and Public Health will effectively be measured by beneficial changes in the

American diet.

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** - State Specific

Goal 4. Greater Harmony between Agriculture and the Environment

Executive Summary

Ohio is different than most sister states in that it has a relatively high population density and yet agriculture [defined broadly to include plant and animal production, food and food processing and landscape/turf] leads all other industries in dollar value, amounting to about $75 billion annually. This commingling of agriculture and food processing with large urban and suburban population centers provides opportunities but also challenges. Most often the challenges are the disposal of wastes and by-products without offending the aesthetic sensibilities and quality of life of neighbors. Efforts to solve these problems have long occupied the time of OARDC scientists and OSU Extension programming and continue to do so with the development of new methods and technologies.

Ohio, with its relatively high population density and extensive agricultural industry, must deal with waste generated by humans as well as agricultural enterprises. It has been a long-range goal of OARDC research to turn worthless wastes into products with value. While OARDC scientists are currently working on the production of methane from anaerobic fermentation of animal waste and agricultural by-products, this activity has a long way to go to show an impact. On the other hand two previous research projects on composting have developed to fruition.

Technology for the composting of sewage sludge has been successfully converted to a plant in the Akron, Ohio area which converts sludge into a composted additive for gardeners. Of even greater value to the Ohio economy, tree bark has been successfully converted to potting soil which is naturally disease resistant. This saves millions of dollars in the production of nursery stock and is credited by leaders in the nursing industry with being the basis for the remarkable expansion of the nursery industry in the state.

Another area which causes some friction between urban populations and agriculture are the perceived dangers of chemicals used for pest control. Ironically, much of the use of pesticides is by home owners and companies treating lawns and golf courses within urban - suburban centers. One method to reduce pesticide use is called integrated pest management (IPM) in which management and natural enemies of pests are used to decrease the need for insecticides. The use of a species of round worms (nematodes) to control white grubs in turf grass is highlighted here as one example of IPM.

In addition to the usual methodology to minimize environmental damage, scientists at The Ohio State University have created a team, called ecosystems management, which seeks to use ecologically sound principles to not only increase profitability but also be environmental friendly. This systems management approach has been extended to the classroom in the education of undergraduate as well as graduate students.

As livestock production continues to expand in Ohio and with the odors, dust, insect pests, and water pollution associated with the increased numbers, there is a need to provide educational programs to producers on composting livestock mortality and composting animal waste. Due to the diverse distribution of the state's population, livestock producers, commodity groups and OSU Extension are taking a pro-active approach to improve neighbor relations by providing programs that ameliorate issues associated with agricultural waste.

Ohio contains nearly 7.9 million acres of forests and woodlands. OSU Extension district specialists, county agents and Soil and Water Conservation District personnel provide newsletters and best management practice workshops across the State, addressing a wide variety of topics, including but not limited to House Bill 88 - Agriculture Pollution Abatement Law and issues related to silvicultural non-point source pollution.

OSU Extension, working in partnership with the Ohio Livestock Coalition and key state and federal agencies, has developed and implemented the Ohio Livestock Environmental Assurance Program (LEAP). LEAP helps livestock producers to profitably manage environmental challenges that are critically important to the success of their business.

Smith-Lever Fund expenditures for Goal 4: $480,949 EXTENSION FTE's: 10
Hatch expenditures for Goal 4: $1,059,947 OARDC FTE: 10

Goal 4 Key Themes

1. Key Theme: Agricultural Waste Management

(Reference OSU Plan of Work Extension Program 4Ae: Agricultural Wastes And By-Products)

a. **Description of Activity** - The Manure Science Review program is a statewide manure management education program targeting animal operations. This multi-agency and organizational program focuses on environmental, economic and production issues critical to animal operations in this state with an emphasis on Best Available Technology for manure handling, treatment and storage.

b. **Impact** - The Third Annual Manure Science Review (MSR) program reached 360 individuals dealing directly with animal manure over three days at three locations across Ohio. 27% of these individuals are consultants working directly with animal producers and animal manure. The MSR provides continuing education credits toward maintaining CCA accreditation in Ohio. This program specifically targets animal producers with important information about animal manure management. The 2003 program focused on manure management and dairy operations with a special emphasis on manure entering in tile lines, manure storage structure design, maintenance, and closure, and sand laden manure technologies. Additional topics continue to highlight community and neighbor relations and the development of plans to address site-specific issues associated with animal operations.

Ohio Compost Operator Education Course combines research and

engineering knowledge to deliver an educational course on the science and art of composting, including composting principles, site design, facility operation, feedstock selection, equipment, operational management, as well as health, nuisance and environmental issues related to large-scale composting. Twenty-five individuals were through this program in 2003. Participants receive continuing education credit for wastewater certification and registered sanitarians.

As animal production, especially large scale CAFOs, increases, awareness of air quality issues pertaining to human and animal health as well as quality of life issues arise, and are becoming a major concern. Recently increased public concerns and environmental regulation have created a major challenge for the viability and growth of livestock industry. The management of aerial pollutants is a major issue that the animal sector will have to face. A systematical approach to address air emission and air quality issues associated with animal feeding operations is underway. Currently this program focuses on aligning OSU faculty expertise, and the establishment of base-line agricultural air emission and air quality parameters, scientifically.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

2. Key Theme: Agricultural Waste Management

(Reference OSU Plan of Work Research Program 4Ar: Agricultural Wastes and By-Products)

a. **Description of Activity** - As a major agricultural state with a large urban population, the problem of waste disposal has been a major issue in Ohio for years. Waste is generated by large populations of human and farm animals and is produced as well as by-products of field and forests. Composting technology has been investigated by OARDC scientists for years. One of the success stories from this research is the development of composting technologies for sewage sludge that has resulted in the formation of a compost production plant in Akron, Ohio. Research on the composting of animal wastes as well as animal carcasses has continued for several years and much of this technology has been transferred to on-farm operations throughout the state of Ohio and beyond.

Another success story with respect to waste utilization is the use of composted tree bark as potting soil for the nursery industry. Prior to the research at OARDC using tree bark to produce potting mulch, most of the potted plants were grown in a bog mulch media. The standard bog mulch has a number of drawbacks including the harboring and spreading of plant pathogens such as Phytophthora. Research has shown that as many as 75% of azaleas and rhododendrons died before they could be sold whereas the use of tree bark potting soil with its natural disease resistance reduced these losses by an order of magnitude. Creating a resource out of tree bark, which had previously been burned for disposal, started a whole new industry. Multiple processing plants have been developed both domestically and internationally based upon this OARDC technology.

Not only did the tree-bark mulch produce revenue directly, leaders of the nursery industry credit the development of disease resistant potting soil with the amazing expansion of the industry in Ohio. Previous potting soil mixes required four or five fungicide applications per year at a cost of $9 per application per cubic yard. The OARDC potting soil mix is naturally disease resistant and requires only occasional spot treatment. Moreover, current research has shown that inoculation of soil with specific microorganisms will trigger a disease immunization effect for plants growing in the soil. Tests have shown that application of this system results in one-third of the foliage diseases than untreated test plots of ornamental plants, tomatoes, and trees.

b. **Impact** - Early success of research into composting technology of sewage sludge resulting in the construction of a $35 million compost production facility in Akron led to continued work in the area. Successful composting of animal waste has been used to demonstrate the technology to Ohio food animal producers.

But the most spectacular success by far is the development of the technology for the production of disease-resistant potting soil by composting of tree bark. This formed the basis of a potting soil production industry and is credited by Ohio nursery leaders with the spectacular growth of the nursery industry in Ohio. In 1988, sales of nursery stock in Ohio totaled about $1.25 billion and by 2001, this had grown to almost $2.8 billion. Growth since 1996 has been maintained at 8.5% per year so that at present, over 96,000 people are employed in Ohio by the nursery industry with a 2001 payroll of $275 million. Without OARDC research and development of disease-resistant potting soil, this expansion would not have been possible according to industry leaders.

Finally, the use of microorganisms to trigger endogenous plant immunity has been shown to substantially reduce the use of fungicides in the production of ornamental plants and vegetables will reduce pesticide use which is good for the environment. At the same time, this technology will save production costs because the cost of the fungicides application can be as high as $15,000 to $20,000 per acre for some plants.

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** - State Specific

3. Key Theme: Amish Water Quality Education

(Reference OSU Plan of Work Extension Program 4De: Water Quality)

a. **Description of Activity** - As part of a USDA-CSREES water quality grant, under-served audiences like the Amish are being educated on water quality issues.

b. **Impact** - Accomplishments include:

- Over 1500 soil samples tested and analyzed resulting in 160 nutrient management plans and recommendations to manage manure and commercial fertilizer on Amish farms over the last four years. Extensive Amish soil testing revealed that approximately twenty percent of Amish fields were found to be extremely high in nutrients and Amish farmers were advised to not apply manure or commercial fertilizer to these fields.

About forty percent of Amish fields were low in phosphorous (about 7200 acres).

- OSU extension worked with local egg laying companies to promote poultry manure (high in phosphorous) to the Amish. In 2003, six demonstration plots using poultry manure as the main fertilizer for corn were conducted. Over the last four years, 30 demonstration plots using poultry manure as the main fertilizer for corn has shown yield increases averaging 25-30 bushels or corn per acre on Amish farms.
- Amish farmers are being taught about Management Intensive Grazing (MIG) to decrease pasture erosion, streambank erosion, and increase productivity. Ninety percent of farmers adopt MIG in one community, saving on average $7500 in feed cost per farm. These farmers voluntarily installed 10,000 feet of fencing to exclude livestock from streams.
- In the last four years, the drinking water from 204 Amish wells have been tested (281 total tests) for bacteria with 72 wells (35.3%) testing positive for total coliform bacteria (TCB) and 19 (9.3%) testing positive for E.Coli (EC). Approximately 50% of the TCB wells and 65% of the EC wells have been improved upon testing. About eighty percent of the Amish have participated and 85% have followed OSU Extension recommendations on shock chlorination and well improvements.
- An Amish newsletter, "Focus on Farming", emphasizes best management practices (BMP's) to improve water quality for Amish farmers. This educational newsletter is sent to 222 Amish families in three counties and to 73 Extension agents and education professionals with Amish communities in 13 states and Canada. Over 1600 farm visits to Amish farms have occurred in the last four years to promote BMP's. In the last four years, Extension Agents helped calibrate 10 sprayers, 12 manure spreaders, and 19 planters to more accurately apply chemicals, manure, fertilizer, seed, and insecticides. Ninety percent of sprayers were more than 10% off the desired application rate.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

4. **Key Theme: Forest Resource Management**

(Reference OSU Plan of Work Extension Program 4G: Forest Resource Management)

a. **Description of Activity** - The Forest Resource Management program once again offered landowner classes through the Ohio Woodland Stewards Program. State Specialists, Extension associates, district specialists and county agents offered 22 classes across the state in 2003. The program also published 3 editions of the program's newsletter, 'Ohio Woodlands, Watersheds and Wildlife'. The web page for the program saw over 30,000 visitors who stayed an average of 3.5 minutes. Under the Ohio Woodland Stewards (OWS) Program umbrella is also the forest wildlife course COVERTS – a one time, multi-day class that instructs interested woodland owners on managing their forests for wildlife. This program

also saw 26 new graduates.

In addition to the woodland owner side of our program there were 2 different in service type offerings for Ohio in 2003. The first in-service was a 2 day session on 'Utilizing Direct Seeding for Reforestation'. This in-service was attended by over 60 agency (NRCS, Soil and Water Conservation Districts, Division of Forestry Service Foresters, OSU Extension agents and consulting foresters). The second in-service was two pesticide applicators courses offered through Ohio State. These sessions were attended by about 240 people.

b. Impact - There were more than 500 participants in 24 classes conducted by the Ohio Woodland Stewards program in 2003. These participants, 77% of whom were first time attendees, represent nearly 13,000 acres of privately owned forestland across the state.

- Participants were asked about their woodland management objectives in order to understand how they would apply the information from OWS classes. Aesthetics, land or habitat conservation, game wildlife habitat, and non-game wildlife habitat each were indicated by about 50 or more percent of the respondents. Other management goals were indicated as follows:

ecosystem health	38%	
timber for sale	38%	
non-consumptive recreation	35%	
timber, personal use	34%	
education	25%	
water quality		24%
non-timber forest products	11%	

- Other participants indicated that the information would be put to use and shared with others in their professional lives as consulting foresters, OSU Extension staff, property managers for parks and arboreta, wildlife rehabilitation people, and schoolteachers.
- While long-term impacts of this program have not been directly measured, participants were asked about the extent to which they anticipated using course information. Sixty-six percent of them indicated that they would definitely use information from the present course in the management of their property (another 26% said they would "probably" put course information to use).

c. Source of Federal Funds - Smith-Lever 3b&c

d. Scope of Impact - State Specific

5. Key Theme: Forest Crops

(Reference OSU Plan of Work Extension Program 4H: Forest Specialty Crops)

a. Description of Activity - Forest specialty crops, including maple products, Christmas trees, herbs, and tree fruits and nuts offer income opportunities that

often exceed typical commercial timber production. In Ohio both the Christmas tree and maple syrup industries are well organized and progressive. Both have commodity organizations, the Ohio Christmas Tree Association and the Ohio Maple Producers Association. A recent study indicates that there are over 600 commercial Christmas tree growers in Ohio. The size of the commercial maple industry in Ohio is less well documented, but is probably somewhat larger. In both of these industries most of the entrepreneurs are part time, and their earnings represent an important component of their annual income. Both industries represent several million dollars in annual sales – around five million dollars for the maple industry and approaching thirty million for the Christmas tree industry. Both the Christmas tree and maple industries are interested in the application of new production technologies and marketing strategies to the industry as a whole and to their individual operations. Less well-organized are the tree fruit and nut and the forest herb producers. Nonetheless, they are a clientele who are growing in numbers and their desire to receive information and participate in OSU Extension programs.

b. **Impact** - Twelve hundred eighty participants received indepth education and training in forest alternative crop production and marketing.

- 202 commercial maple producers in Ohio, 280 commercial maple producers in New York, and 85 commercial maple producers in Indiana received in-depth training on various aspects of maple production.
- 120 potential maple producers in Ohio received training on the fundamentals of maple product production and marketing.
- 250 commercial Christmas tree growers in Ohio, 140 commercial Christmas tree growers in Illinois, and 165 commercial Christmas tree growers in Pennsylvania received training on various aspects of Christmas tree production.
- 75 potential Christmas tree growers received training on the fundamentals of growing and marketing Christmas trees.
- OSU Extension personnel continued to strengthen participation in programs that address needs of other forest specialty crops by participating in programming of other organizations including the Ohio Walnut Council and Rural Action, an entity focused on providing education and services to individuals in southeastern Ohio interested in forest specialty crops.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

6. Key Theme: Nutrient Management

a. **Description of Activity** - The Livestock Environmental Assurance Program (LEAP) continues to advance environmental stewardship educational programming in Ohio in 2003. LEAP programming continues to expand with the addition of LEAP-Pasture and the development of LEAP-Youth.

Since 1997, more than 5,000 individuals from all major animal commodity groups in Ohio, including horses, have participated in a LEAP training program.

Beef producers had the highest number of individuals participating, while poultry and dairy had the largest percentage of total producers participating, followed by swine, beef, sheep and horses.

There is a growing need for environmental education within agricultural education curriculum. Forty-eight percent of respondents in a survey of Ohio livestock producers identified manure management as the greatest environmental challenge facing their operations. Odor, soil erosion, and water quality issues were identified as additional issues critical to the future success of animal operations in Ohio. A youth Livestock Environmental Assurance Program incorporates unique outreach opportunities for cooperative interaction among government environmental organizations, livestock commodity groups, and local producers or research facilities. The involvement of these organizations will enhance the educational experience and reach beyond the boundaries of traditional adult and youth education. Youth and Youth Educators will be exposed to a diverse group of scientists who will share a rich knowledge base focused on environmental protection and enhancement from the animal producer's perspective. These individuals will be able to integrate their scientific, environmental, and ecological knowledge into the daily management, benefiting society as a whole, and linking agriculture, the food systems, and public health.

The primary objective of this program in youth livestock environmental assurance (LEAP-Youth) is to develop the next generation of highly qualified livestock producers, university, government and industry leaders, with a global perspective, and the ability to interface with numerous disciplines as they address the public's need for a safe, healthy food production system and maintaining a safe environment.

LEAP, Level 2 continues to target animal producers with more advance environmental stewardship training. LEAP, Level 2 addresses issues related to manure and wastewater handling and storage, feed management, land application practices, nutrient management, record keeping and other utilization options. Implementation plans emphasize Best Available Technologies (BAT) and Best Management Practices (BMP) to efficiently address and minimize the impact and effect from dust, noise, odors and pests on the respective farm, farm neighbors and the community. LEAP, Level 2 is designed to help producers obtain and organize data and information, as well as identify appropriate technologies necessary to implement a Comprehensive Nutrient Management Plan (CNMP) for their operation.

b. **Impact** – CNMP developed through private consultants is costing Ohio producers in excess of $4,000 per plan. LEAP, Level 2 saves producers money by helping them compile and organize the necessary data to complete a CNMP. It is expected that organized data will reduce the time required to develop and certify a completed plan. Train-the-trainer programs for LEAP, Level 2 had 160 individuals participate from across the state, and include Ohio State University Extension, Natural Resources Conservation Service, and Ohio Department of Natural Resources. Producer training will began in 2003.

Row crop producers in Ohio are generally not familiar with the benefits of utilizing animal manure nutrients within their operation. The Manure Science Review hosted an educational program to provide critical environmental,

economic and agronomic information to over 200 agricultural producers at the Ohio Farm Science Review. This program focused on the equipment available to fully utilize animal manure. Manure handling equipment manufactures demonstrated the use of their manure equipment three times during this three-day event.

c. **Source of Federal Funds** – Smith-Lever 3b&c

d. **Scope of Impact** – State Specific

Goal 5. Enhanced Economic Opportunity and Quality of Life

Executive Summary

During the decade of the 90's, most Ohioans prospered but many others were left behind. As economic difficulties continue in the 21st Century, lack of economic opportunities worsens, particularly in Southeastern Ohio which has been in decline since the coal industry moved out. Agriculture, mostly in the form of beef cow and calf operations and forage crops provide some opportunity but others are needed. One of the possibilities that have been explored is aquaculture, represented here by the newest entry in the field, fresh water shrimp. Production of these crustaceans for a niche market can provide some income to residents of this economically depressed area.

Economic development remains a top priority for agencies of the State of Ohio, including the OARDC. Phase I of the Battelle report has described a number of areas which have contributed to the economic development of the state. Another example of this activity is the resuscitation of the wine industry in Ohio. Fortuitously, the most productive areas for the Ohio grape and wine industry coincides with regions that are in economic decline, the Northeast which has lost manufacturing jobs and the South which has lost income from the loss of the coal and tobacco industries. The grape and wine industry is currently an $80 million per year industry with constant growth over the past few years. OARDC continues to develop new varieties that are compatible with the Ohio soil, climate and resistant to diseases and insect pests.

The Land Use Team has recently been active with workshops on the new state purchase of the development rights program that was funded by a $25 million state bonding initiative with a local match. In addition, the Ohio Department of Development had provided grants to nearly 60 Ohio counties to develop a farm preservation plan. Extension personnel were actively involved in recruiting and training members and assisting in the development of these plans. Additional assistance was given to the development and training of various planning commissions and in assisting in the comprehensive community planning process.

OSU Extension personnel provide the lead in about a nine counties for their community economic development programs. Extension works on a total community development paradigm. In the economic development strategies, the Business Retention and Expansion Program continues to be enhanced by the Department of Agricultural, Environmental and Development Economics. This flexible consulting program assists the local community in selecting their own survey tool and reporting mechanism. The community is provided the items

and assistance they request. Retention and Expansion Programs are conducted for nearly all sectors of the economy including industrial, agricultural, retail and service. Additional assistance is provided in educational programs on enterprise zones, joint economic development districts, and tax abatement. Assistance is also provided in attraction and community capture of local discretionary income.

Programs are also available for local leaders and government officials on wastewater treatment alternatives and water supply systems. Extension educators in several counties work closely with local groups in the creation and operation of revolving loan funds and the establishment of industrial parks. Some of the Community Development Agents conduct downtown revitalization programs and state route corridor development projects.

Community Leadership Development is a wide-ranging area that includes operation or assistance of year-long leadership training programs. More ad hoc programs include training for members of non-profit boards of directors. Leaders are instructed in such programs as: appreciative inquiry, finding and mobilizing community assets, and Vision to Action. The Public Issues Team provides instruction on Framing of Issues, National Issues Forum (as per Kettering Foundation), and dispute resolution.

Tourism Development Programs are focused in the rural areas on heritage tourism. The Ohio Chautauqua Program has brought a renewed sense of pride in several counties as they participate in enrichment activities and rekindle an interest in historical events.

The Ohio 4-H Youth Development program provides positive environments for culturally diverse youth and adults to reach their fullest potential as capable, competent, caring and contributing citizens thus enhancing their quality of life. As a result of the Ohio 4-H positive youth development experience: youth develop marketable skills for lifelong success; youth participate in and learn through citizenship opportunities to transform local communities; youth appreciate and build upon diversity to foster a harmonious global society; youth have a sustained relationship with a caring adult to enable them to be productive citizens; and volunteers build their skills and abilities in working with youth.

Smith-Lever Fund expenditures for Goal 5: $3,510,930 FTE's: 71
Hatch expenditures for Goal 5: $339,798 OARDC FTE: 3.1

Goal 5 Key Themes

1. Key Theme: Enhanced Economic Opportunity

(Reference OSU Plan of Work Research Program 5A: Economic Development)

a. Description of Activities - The resurgence of the grape and wine industry in Ohio has provided an economic boost to Northeast Ohio where so many manufacturing jobs have been lost as well as Southern Ohio which has long been a part of the depressed Appalachian region. The grape wine and juice industry has grown from virtually nothing 40 years ago into an $80 million annual sales.

Grape production and wine making has a long history in Ohio dating back to 1860 when this state was the leading producer of wine in the United States. The industry succumbed to plant diseases that killed the grape vines and to prohibition that reduced demand. According to the wine industry web site, the regeneration of the wine industry in the state started when OARDC developed and encouraged the planting of French-American varieties of grapes in Southern Ohio. Their success encouraged plantings in the Northeast, now known as the Lake Erie grape belt. This fast growing industry has propelled Ohio into eighth place in tons of grapes produced among America's wine producing states.

The re-emergence of the wine industry in Ohio can be attributed to a partnership between the State of Ohio's Grape Industry Program and OARDC. The Ohio Grape Industry Program funnels state funds from liquor taxes into marketing and research programs while OARDC serves as the primary research and development arm of the grape industry. OARDC has made significant contributions over the years by identifying appropriate juice, table and wine cultivars for the state and conducting research to improve grape quality and disease resistance. The viticulture research effort is supported by scientists in the fields of horticulture, plant pathology and entomology.

b. **Impact** As late as 1997, Ohio had only 37 wineries but by 2002, there were 81 with another five to be added in the near future. Grape production went from virtually none in the 1960's to 5,800 tons by 2002. It is estimated that the wine industry represents $70 million in new growth value plus another $10 million in grape juice.

c. **Source of Federal Funds** - Hatch

d. **Scope of Impact** - State Specific

2. Key Theme - Jobs/Employment

(Reference OSU Plan of Work Extension Program 5E: Community Economic Well-Being)

a. **Description of Activities** - Community Development Program Areas work in economic development issues is centered on working in partnerships to create and enhance economic opportunities. Seventeen full-time Community Development Agents, five Program and Research Assistants and many dual-program Extension Professionals contribute to this effort. Work reported includes tourism development activities, retention & expansion programs, attraction of businesses, downtown revitalization, economic analysis studies, small business planning and training, job preparation skills and assistance to local economic development boards.

b. **Impacts** - Agents reported assisting local communities in the creation or retention of nearly 640 jobs. Local economic development assistance helped establish 22 businesses ranging from downtown revitalization efforts for two businesses to a $1,000,000 expansion with an industry through incentives programs. The attraction of a $6,000 grant to do an environmental study for a potential industrial site in Appalachian Ohio will help that community make an informed decision.

An art consortium marketing program distributed 300,000 guides adding $200,000 in market coverage value for 60 artists in SE Ohio. Extension Professionals help manage and direct the use of small business revolving loan programs that have assisted 6 businesses loaning $1,000,000. In addition 3600 business consulting hours were provided in fifteen counties leading to thirty business start-ups of which 23 were agribusinesses.

The growing greenhouse industry was assisted by the creation of the Great Lakes Hydroponic Association while in another area of the state twenty-eight greenhouse employees from seven centers were trained on new varieties of plants leading to new plant selection. Four hundred tobacco producers received assistance in business planning, grant applications and management training to help them diversify into alternative crops. This effort led to fifty producers creating businesses plans and 6.6 million dollars in grant funds to develop new ventures. Eight new BR&E Programs and seventeen on-going programs have completed hundreds of visits to firms.

Programs in workforce assessment helped with dislocated workers in Piketon, easier continuing education training for school teachers, workforce analysis and wage benefit information in central Ohio, manufacturing employment skill training and information for economic development planning in Medina. Fifty-eight persons receiving public assistance found employment after completing computer training sessions with eleven persons retaining that employment for four months or more.

Retail Trade Analysis studies in four communities have assisted those communities develop strategies to enhance local businesses capturing dollars. Tourism development activities have brought 5500 bikers to a Honda Homecoming Event and 3000 people to Heritage Days in Logan County. Planning assistance has helped 12 communities discover the First Impression they make on visitors, three communities prepared federal applications for development funds, a research project discovered the effects of steelhead anglers on the economy plus six other communities completed general economic development plans.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

3. Key Theme: Community Development

(Reference OSU Plan of Work Extension Program 5F: Community Development)

a. **Description of Activities** - Community Leadership: Elected local government officials often take office without any formal training for the leadership responsibilities they assume once in office. Most elected officials have received on the job training as they have worked their way through community civic and political processes. However, once in office they are faced with a number of challenges relating to the way they conduct themselves in office. In a series of dialogue sessions between Ohio State University Extension Community Development representatives and directors from the County Commissioners' Association of Ohio, the Ohio Municipal League, and the Ohio Township

Association, representing a combined total of more than 7,000 local elected officials, an Ohio Local Government Leadership Academy was created to provide a structured learning experience for local elected leaders. The curriculum was negotiated among the participating parties and concluded with the development of ten courses for elected officials. The Toledo Area Local Government Leadership Academy was the first effort beginning in January 2002 with thirty-five participants. In 2003 the program expanded to add Ashtabula County, Allen County and the Ohio Township Trustees Association. This is the first local / regional Academy organized outside the major Academy for local officials who cannot find time to attend the programs and conferences of state local government associations. The focus of the Academy is better government and more efficient operations. Lorain County also provides a government officials training series that focuses on topics of interest to public officials.

b. **Impact** - Each program was very successful based on common feed back from participants. Elected officials indicated they had developed many new ideas for implementation in their local communities. The evaluations from the program showed high levels of satisfaction with the training. The four programs collectively reach nearly one thousand existing or potential elected and appointed local government officials. This success has led to additional programs development for Greene County and Marion County in 2004.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

4. Key Theme - Community Development

(Reference OSU Plan of Work Extension Programs 5F: Community Development and 5H: Land Use Issues)

a. **Description of Activities** - Land Use Issues: During the calendar year 2003, Extension agents and specialists assisted public officials, community leaders and the general public dealing with land use issues. Educational workshops were held regarding zoning and planning tools. Information was provided on land use planning and farmland preservation tools such as conservation easements. Comprehensive Land Use Plans begun in 2002 were completed in 2003 and additional programs begun.

b. **Impact** - Attendance at the various meetings held on land use issues was over 1100 people. Specific outcomes of Extension land-use programs include continuation of comprehensive land planning programs in Carroll, Van Wert and Coshocton Counties, plus the City of Kent. Coshocton County's Plan progressed to a draft stage and is being reviewed for changes and additions. Van Wert has organized and begun their planning process. The Carroll and Kent processes are focused on sustainable development concepts. Carroll County's plan is in the writing stage. The City of Kent's plan has been drafted and is being reviewed publicly. Kent's plan brought together the local university and the city in determining strategies for downtown revitalization efforts. In addition agreement was reached on development priority for a crucial site that is following wise environmental planning to protect neighboring conservation and preservation

sites. Comprehensive Land Use programs were also begun in Fayette and Morrow Counties as well as Marietta Township in Washington County. The Land Use Tools Team continued to provide training for residents and officials throughout Ohio. Of particular interest is the Hamilton County program that moved Extension's Land Use training into a major urban area. The program also provided 109 hours of continuing education credits for real estate and development professionals.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

5. Key Theme - Community Development

(Reference OSU Plan of Work Extension Program 5F: Community Development)

a. **Description of Activities** - Public Issues Education: Sessions on Biomass Issues and Food Safety were conducted across the state as well as programs to assistance in land use issues.

b. **Impacts** - Citizens deliberated public policy options concerning biotechnology and its effects on our food, health and environment in a public forum. The goals of the forum were to involve local citizens in a public discussion of agricultural and food policy, and gather the thoughts shared to make them available to decision-makers. Results were then shared in public officials in their respective communities. An emerging public issue is Ohio's land area is quickly becoming urban and suburban centered. Because of work in land use issues an emphasis on smart growth policies has been targeted. In 2003 a resource guide on land use issues was created. In addition commitment to create discussion guides and hold public forums was set as the priority area of 2004.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

6. Key Theme: Family Resource Management

(Reference OSU Plan of Work Extension Program 5G: Management of Economic Resources)

a. **Description of Activities** - Ohio families cope with daily stresses of managing resources and planning for financial security in later life. OSU Extension provides family financial resource management programs and resources including MONEY 2000+, Pathways to MONEY 2000+ (targeted to low income), Investing For Your Future, Master Money Manager Program, Family Nutrition Program, and Master Clothing Educator Program as a means to empower families to reduce debt, increase savings, prepare tax reports, manage housing and clothing resources, and plan for financial security in later life, including retirement and dispersal of wealth.

b. **Impact** – Money Management programs vary throughout the state. Some

example impacts include:

- In Medina County, seventy-nine individuals "between jobs" participated in a series of workshops about adjusting to a reduced income. Seventy-four valid evaluations were returned. Sixty-seven reported that the information presented was useful; 61 learned new information; 65 will start using at lest some of the information today; 67 reported that the information is helpful; 35 will share this information with their spouse; 30 will develop an updated spending plan; 31 will prioritize their expenses and 36 will identify ways to reduce expenses. Some new ideas they learned from the session include hints on dealing with creditors, how long to keep receipts, talking with children and spouse about changes in spending, and record keeping tips.
- In Delaware County, twenty-three money management sessions were taught during this reporting period requiring 54 hours of teaching time and 211 hours of preparation time. More than 3400 newsletters, fact sheets, letter studies, publications and handouts were distributed. These include parts of the Pathways to Money 2000 curriculum, Counting Your Money calendars, Managing Your Money letter study, and Managing Between Jobs fact sheets.

  One hundred eighty people participated in a variety of money management classes. Evaluations indicated participants implemented a variety of money management strategies. All participants wrote financial goals for themselves during class. One hundred ten participants got their family records organized and filed in a file box. Ninety-four participants set up a personal spending plan. Fifty-seven participants reported doing a better job of paying their bills on time. Thirty-one participants said they were able to find some extra money to repay debts.
- Over twelve programs have been presented to families throughout Clinton County to help them decide if they are ready to purchase their own home. Classes on budgeting, use of credit, predatory lenders, purchasing home owners insurance, home maintenance, closing costs, the need to make a habit of "Paying yourself first," as well as yard maintenance were presented throughout the year. Educational materials from OSU Extension were utilized throughout the workshops. Participants ranged in number from 5 to 27 participants. Three one-on-one counseling sessions were held with families to discuss their financial management plan. Seven families were able to purchase their first home this year. In addition, one family who had gone through the program seven years ago was helped to avoid loan foreclosure after developing a more realistic spending plan.

  In a survey conducted with the seven new homeowners, respondents indicated that all of them had an established savings account and made regular deposits. The families indicated that they had reduced their debt anywhere from 30 to 90% since having their own home. A particularly exciting result of home ownership was the impact on the children. When the parent(s) were asked about their child's grades, they all indicated that their child had improved their grades by one or more levels. The improvement was attributed to more privacy and a better study environment. Parents also indicated that their children had become more involved in school-sponsored activities since purchasing their home. Additional parent comments: "It is an important

benefit to me to be able to pay on something that will be ours someday," "we are grateful for the chance to own our own home," "my child is now talking about going on to college, "my son seems to have matured, he is much better about taking care of his things." "I am happy to have more financial security . . . I feel like I am making a real investment in the future."

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

7. Key Theme: Financial Security in Later Life

(Reference OSU Plan of Work Extension Program 5G: Management of Economic Resources)

a. **Description of Activities** - Financial security can be defined as "the ability to meet future financial needs while keeping pace with day-to-day obligations." (FSLL). Financial Security in Later Life (FSLL), a new national Cooperative Extension initiative was introduced to Ohio in 2002. Some of the goals of the FSLL program include helping participants increase their knowledge and understanding of basic financial management concepts and strategies as applied to a personal/family situation (i.e., goal setting, tracking spending, developing a spending plan, credit use and debt management). In addition, FSLL participants become aware of tools and resources available to help them with money management.

b. **Impact** – In Sandusky County, "Who Gets Grandma's Yellow Pie Plate" was conducted for Terra Community's Elder College and two community groups reaching 64 participants. 21 workbooks were sold and 43 handouts were provided. The Elder College collected data showing 81% of the participants indicated the content exceeded their expectations and the other 19% said that it met their expectations. One hundred percent reported they were motivated to discuss with their family members what they wanted to receive, 95% learned new ways to distribute their assets, and 90% said they would decide who would get their assets in the next six months.

"Take the Road to Financial Security", was presented at the Ohio Association of Family & Consumer Sciences annual meeting as a pre-conference workshop (n=39). As a result of the program, 100 % of participants agreed or strongly agreed that they could identify: a) common risk factors of later life financial insecurity, b) reasons why achieving later life security can be rewarding, and c) specific actions to protect their later life security. Ninety-six percent named their first intended action which was predominantly (63%) getting organized and communicating with spouse. Nineteen percent specifically mentioned making a will and reviewing retirement savings; 11% intended to look into long term care issues. One participant wrote: "I plan to take an active role in our finances. Up to now I've always totally relied upon my husband, as my mom did with my dad! I now see that I need to change!" All 16 participants who completed a 6-month follow-up evaluation reported taking action as a result of the program. The most common was "organized financial records" (75%) followed by "established or revised saving and investment goals" (69%), "built more than one source of

income for later life" (69%), and "identified later life financial goals" (63%).

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

8. Key Theme - Tourism

(Reference OSU Plan of Work Extension Program 5I: Business Efficiency)

a. **Description of Activities** - Tourism development is one major focus of the Ohio community economic development program. Tourism is important in Ohio with over ten billion dollars in primary economic activity. Many of our programs reported in other places such as small business development and management assist tourism. Extension tourism programs are often focused on the 29 Appalachian counties of Ohio based upon the natural resources of the area. It is also the area of the state where unemployment is highest and income levels are below the state average.

b. **Impact** - The Tourism Team newsletter "The Spectrum" is circulated statewide and provides information for the tourist industry. A statewide marketing plan for Ohio Scenic Byways was begun for the Ohio Department of Transportation in cooperation with Ohio Byways Links including seventeen byways. In addition an assessment of key sites on corridors for enhancement was developed for five byways. A First Impression assessment program for corridors was piloted to help assess the impact of strategies implemented along byways.

c. **Source of Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

9. Key Theme - Farm Safety

(Reference OSU Plan of Work Extension Program 5J: Work/Life/Health Issues)

a. **Description of Activities** - Community and Farm Safety. Safety is a priority program for Amish communities due to the relative high incidence of buggy incidents and serious farm incidents. Programs were developed to target Amish buggy drivers, Amish pedestrians, and Amish bicyclists. These programs were conducted in community events and through the Amish schools. Special Amish safety materials including fact sheets, bicycle safety curriculum, and pedestrian safety curriculum were also developed. Forums and meetings were conducted with the Amish to determine what would be acceptable or unacceptable due to religious convictions with various markings and use of lights on Amish buggies.

b. **Impacts** - More than 4,000 Amish participated in programming. Since October 2002, more than 1,500 buggies in Ohio have been outfitted with the recommended reflective materials. Over 1,500 LED lights and 3,000 SMV emblems have also been sold in this area in the same time period. From 1999 to 2002, the number of injury crashes involving horse-drawn vehicles dropped from 91 to 53. This is below the 10-year average of 66 injury crashes per year. There has not been a fatality involving a horse-drawn vehicle in the state of Ohio since 1999.

c. **Source of Federal Funds** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

10. Key Theme: Leadership Training and Development

(Reference OSU Plan of Work Extension Program 5K: Positive Youth Development)

a. **Description of Activities** - The purpose of State 4-H Leadership Camp is to help meet that challenge by enabling teen participants to become better leaders and to achieve the following objectives: develop collegial leadership knowledge, skills, and attitudes; contribute leadership in groups to identify & achieve goals and earn support; develop leadership skills such as envisioning, consensus-building, group building & recognition; realize the degree of control they have over their lives; are encouraged to take the initiative to try new things and not be afraid of failure or success; gain in physical, intellectual, emotional and social development; gain ideas & methods to improve their clubs, communities, country & world; develop new friendships; provide real leadership in committees, leadership groups, & cabin groups, and have fun.

State 4-H Leadership Camp is built on 10 research-based principles for effective youth leadership development. It: a) is built around specific leadership development purposes and goals, b) encourages high expectations and confidence in teens and demonstrates respect for teens, c) emphasizes experiential learning and involves teens in exercising genuine leadership, d) teaches teens history, values, and beliefs of U.S. society, e) promotes awareness, understanding, and tolerance of other people, cultures, and societies, f) involves teens in collaborative experiences, teamwork, and networking with peers, g) helps teens develop specific skills related to leadership, h) involves teens in significant relationships with mentors and positive role models, i) facilitates the development of individual strengths and personal characteristics, and j) involves teens in service to others, to their community, to their country, and to the world.

b. **Impact** - Camper ratings of how well the State 4-H Leadership Camp objectives were achieved ranged from 6.3 to 6.9 (Agree to Strongly Agree), as outlined on the table below (scale: 7=strongly agree/excellent to 1=strongly disagree/very poor) (n=95):

As a result of the 2003 State 4-H Leadership Camp, participants…

- Developed collegial leadership abilities – **6.3**
- Contributed leadership in helping groups shape & achieve goals and gain support – **6.4**
- Developed leadership skills such as envisioning, consensus-building, negotiation, perspective-taking, p.r., group building and recognition – **6.3**
- Realized the degree of control they have over their lives – **6.3**
- Were encouraged to take initiative to try new things and not be afraid of failure or success – **6.5**
- Gained in physical, intellectual, emotional and social development & became more competent, caring and contributing individuals – **6.3**
- Gained ideas to improve their clubs, communities, country & world – **6.5**
- Developed new friendships – **6.7**
- Provided real leadership in committees, leadership groups & cabins – **6.5**

- Had fun – **6.6**

c. **Source of Federal Funding** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

11. Key Theme: Youth Development/4-H

(Reference OSU Plan of Work Extension Program 5K: Positive Youth Development)

a. **Description of Activities -** In Ohio, 78,977 youth participated in organized community clubs, 73,023 youth participated in special interest and day camp programs, 29,308 youth participated in resident camps, and 110,291youth participated in school enrichment opportunities.

b. **Impact -** 4-H youth participants enrolled in over 358,097 individual projects as a result of their involvement. Youth participated in a variety of educational clinics and in-services to increase their subject matter and life skill development. Ohio was also a part of the national 4- H Impact Assessment project. In general, youth are very positive about 4-H and specific aspects of the program. The vast majority (90 percent or more) agree or strongly agree with the statements such as the following: "4-H teaches me to be responsible for my actions" and 4-H teaches me to help other people. Other program impact highlights include youth reporting: "All kinds of kids are welcome in 4-H," 97 percent; "I feel like I belong in 4-H," 89 percent; "4-H helps me accept differences in others," 90 percent; "I feel safe when I do 4-H activities," 93 percent; "In 4-H I feel that it is safe to try new things," 94 percent; "Boys and girls have equal chances to do everything in 4-H," 94 percent and "Both boys and girls can be leaders in 4-H" 94 percent.

c. **Source of Federal Funding** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific

12. Key Theme: Relationship Development

(Reference OSU Plan of Work Extension Program 5L: Parenting and Family Life)

a. **Description of Activities –** Marriage Matters (MM) is a quarterly newsletter available to the public on-line and for counties to print/distribute locally. MM consists of fact sheet quality articles that include research-based information, suggestions and activities that can help couples enhance the quality of their relationship.Volume 2 of the newsletter, consisting of three issues and a total of 12 fact sheet quality articles were written and distributed across Ohio in 2003.

As of 12/31/03, on average, each issue of the newsletter was accessed by 37 county offices and actually distributed by 26 (70%) of these counties. Overall, 10,845 copies of the newsletter were distributed across OH, or about 3,615 copies of each issue.

Regarding the public website, MM was accessed by 469 persons between Feb 2002-Dec 2003 (387 hits in 2003). Most visitors were from OH (77%), married (75%), white (92%), between 20-49 years of age (70%), and visiting MM

on-line for the first time (73%).

b. **Impact -** A total of 133 OH readers responded (21% response rate) from 18 different counties to a survey conducted July 2003.

- Respondents (93% female) ranged in age from 17 to 83 years ($\underline{M}$ = 41) with 90% currently in a relationship (76% married).
- 98% rated the newsletter as interesting positive, meaningful, useful, informative, and easy to read.
- 95% agreed that they learned new information, felt more confident in their relationship, and used the information learned from Marriage Matters.

c. **Source of Federal Funding** - Smith-Lever 3b&c

d. **Scope of Impact** - State Specific (except for website)

Stakeholder Input Process

The College of Food, Agricultural, and Environmental Sciences of The Ohio State University was awarded a grant from the W. K. Kellogg Foundation to conduct a process that would create: 1) a new vision for food systems education, with implications for changes in land-grant universities and higher education across the country; 2) new structures for engaging citizens in vision building, decision making, and agenda setting; and 3) new models for educational responsiveness to constituent needs. The process entitled "Project Reinvent" brought together, through 18 focus group sessions, more than 230 individuals from the College, the University, and citizens of the State of Ohio to gather their views on what the College of Food, Agricultural, and Environmental Sciences must become to most effectively serve the needs of the people of Ohio and meet the challenge of the 21st century. External stakeholder groups participating in the focus sessions included farmers and producers, consumer and food advocacy/health care, food processors and retailers, agribusiness suppliers, commodity groups, environmental and natural resources groups, sustainable agriculture groups, legislators, primary and secondary educators, entrepreneurs/new technology, rural economic development groups, and media.

Some key highlights resulting from the focus groups input includes:

- The College adopted a new vision statement that would drive future decisions and an implementation grant was secured. Four teams were formed to address system change issues in:
  - Organizational structure
  - Reward system
  - Programmatic focus
  - Communication and marketing
- A team was formed to create a strategic plan for the Ohio Agricultural Research and Development Center, encompassing the Columbus and Wooster campuses and the 10 branch stations. In May 1998 the team presented the first phase of a strategic planning process, which identified a number of strategic issues and a series of experimental efforts to address those issues.
- Integrated systems approach identified and adopted as the foundation of the efforts within the College. The College recognizes that to sustain agricultural practices in the future the efforts must address issues of 1) production efficiency, 2) economic viability, 3)

environmental compatibility, and 4) social acceptability in an integrated manner.

- A group of college and community leaders were brought together to serve as an ongoing advisory council to the Vice President and Dean of the College on issues that have widespread impact and implications for the College, its many units, and the full spectrum of audiences.
- An OARDC Internal Competitive Grants Program that matches funds from industry and other stakeholders with OARDC funds.

And the stakeholder input process continues. The Ohio Agricultural Research and Development Center and most academic departments have external advisory boards that meet at least quarterly to discuss current programs and provide input for future direction. Within the past 2 years in excess of 100 meetings have been held throughout Ohio with state legislators, community lay leaders, and representatives of Ohio State University Extension and OARDC to dialog on current educational and research programs and converse on future programs.

The Extension Community Development Program utilized a variety of methods to obtain stakeholder input. Many of these processes are intricate to the Community Development process itself. For example, appreciative inquiry, community asset assessment, and traditional needs assessments were used in twenty counties where full-time Community Development Agents are employed. Other community input programs were conducted in the Price Hill project in Hamilton County, the Comprehensive Community Planning Project in Highland County and Community Economic Development. Each of these boards conducts a year round program for community funds for the Community Economic Development Program Agents in other counties utilize Community Development Program Sub-committees that interact with the county Extension Advisory Committee.

The Ohio 4-H Youth Development program seeks stakeholder input in a variety of ways. Fundamental to the input are the local county 4-H advisory and subject matter committees located throughout the state. Furthermore, the many committees include the direct input from both adult and youth membership. Stakeholders are also involved on statewide committees to further ensure important input to the development and implementation of positive youth development programming in Ohio.

Program Review Process

Merit Review
(Note: The merit review process has not changed in FY 2003.)

OSU Extension develops long range program plans through a process involving Extension personnel from throughout the system, input of lay leaders in communities, incorporating data about Ohio's population, and through collaboration with other agencies, institutions and organizations.

Each of the four program areas conducts long range strategic planning to prioritize programming. Specialists from academic disciplines provide insight from research trends while county Extension personnel provide insight from local communities. Systematic prioritization processes, such as Delphi, are used. Program area personnel work together to identify key issues

that cut across disciplines. Special task forces or teams then collaborate to identify priority program efforts to address these issues. Funding is then allocated to support program priorities. Programmatic resources such as personnel or materials reflect the program priorities. In addition, these priorities direct from what sources grant funds are sought.

Once strategic plans are in place, there is continual review of plans to include the ability to be responsive to unanticipated issues. The system provides flexibility for agents to address these issues. In situations where grant monies are obtained, staff with specific, short-term employment contracts are hired to assist in meeting priority needs.

Agent specialization is a way for the system to provide subject matter expertise close to local communities. Agents determine a subject matter specialization that relates to needs in their geographical area of the state. They receive additional training to remain on the cutting edge of their field. They are encouraged to work with other agents in their district to address local needs in a timely manner. In addition, agents are linked to state specialists in the same discipline to enable the rapid dissemination of new information or the development of appropriate programming to address critical needs.

Scientific Peer Review
(Note: The scientific peer review process has not changed in FY 2003.)

Base funds (Hatch, McIntire Stennis, Animal Health) allocated to OARDC undergo an extensive review process within the OARDC system. The following describes the review process:

- Project proposals are initiated by research faculty and research scientists in consultation with colleagues and Department or Program chair.
- Chairs review all proposals. Chairs are responsible for selecting at least two peer reviewers for each proposal. The reviewers are expected to have expertise in the subject matter area and can be from on campus or off-campus. The reviewers evaluate, recommend, and comment on each proposal.
- Reviews are returned to the proposing scientist who them responds to suggestions, makes changes, and resubmits the proposal to the Chair.
- Chairs indicate departmental approval by signing the AD-416.
- Following review and approval by Chairs, proposals are forwarded to the Experiment Station Director's Office where they are reviewed for accuracy in coding and format and concurrence with State Experiment Station and CSREES program directions. Revisions are requested if proposals are incomplete, are not sufficiently justified, or documented.
- Upon approval by the Director or his/her designee, projects are assigned a number and are electronically forwarded to CSREES for approval and inclusion into the Current Research Information System (CRIS). The Experiment Station Fiscal Office is notified of all approved projects wherein the Fiscal Office maintains records of expenditures to be used in the AD-419 and the Annual Report which are submitted to CSREES. The Experiment Station publishes the Annual Report to document and distribute scientific accomplishments and impacts.

Evaluation of the Success of Multi and Joint Activities

Agriculture and Natural Resource Extension Programs

Over the past three years, Ohio State Extension's Agriculture and Natural Resources (Ag/NR) program area has provided strong leadership to engage our 21 Commodity and Issue Teams to network with neighboring land grant universities. Within our annual report, we have profiled just a few of the very successful high profile programs, products and activities that are better leveraging our Federal, State, and County dollars to serve our very diverse industries and clientele.

Evaluations conducted by our multi-state committees and Teams have indicated that they feel that Multi-state conferences create improved learning opportunities and also better complement the discipline strengths of each institution. Many of our conferences and educational products have developed a strong tradition of support from clientele throughout the entire region. It is our vision to continue to provide a supportive environment to our Extension Field and State Faculties that will build upon these successful multi-state ventures.

Research Activities from a Research Perspective

Multi-disciplinary research teams have been formed to address critical issues. The Agroecosystems Management Team brings together stakeholders and those involved in research, teaching and outreach from different disciplines and institutions to discuss and develop whole systems approaches to the challenges affecting agriculture and rural communities. Its activities include public seminars on system research, sustainable agriculture and agroecosystems, sponsorship of stakeholder initiated workshops on sustainable management practices, and support of local learning communities. A practical management guide that relates basic principles of ecosystems based management to specifics of crop and livestock production has been produced. Educational materials have been developed for grade K-12.

The Ohio Compost and Manure Management Team was formed to build focus on issues and system technologies leading to safe, economic utilization of livestock manure with minimum odors and nutrient losses to water supplies. A video linked seminar series addressing manure management issues followed by discussion increased communication among stakeholders and provided an opportunity for networking with researchers and policy-makers. Organized tours of livestock and composting facilities that demonstrated effective waste management were conducted. A field day highlighting construction of a composting pad and treatment wetlands was attended by approximately 100 individuals. A website that highlights OCAMM goals, activities, seminar summaries, and link to sites with relevant information was developed.

Multi-state Extension Activities

1. Key Theme: Agricultural Communication

a. Description of Activity - The *Agricultural Outlook* is a multi-state effort (Purdue-Illinois-Ohio) to provide a comprehensive and timely hard copy commodity outlook guide for the Eastern Corn Belt farmers and Agri-business professionals. Lead editors from each state choose the various commodity experts in each participating state to provide both a short and long term outlook for

commodities of major economic importance to this region. Each year, as many as twelve authors from the three participating states will produce this very timely and high demand publication.

b. **Impact** - Agriculture Economists in Indiana, Illinois and Ohio prepared a 16-page annual Outlook publication which was inserted in the issue of the Prairie Farmer which is published/circulated in each state. The potential readership of farmer and allied industry personnel is over 200,000 subscribers.

c. **Source of Federal Funds** - Smith-Lever 3b&c

2. Key Theme: Agricultural Communications

a. **Description of Activity** - Purdue/DTN Agreement (Electronic News Service) - This partnership is a joint effort to disseminate timely management/marketing information aimed at larger scale commercial farmers across the Eastern Corn Belt through the most widely subscribed farmer information network. Both Purdue and Ohio State University specialists and research faculty on a daily rotation provide articles on contemporary crop and livestock production.

b. **Impact** - Both Indiana and Ohio cooperated in disseminating production oriented ag news, research results, contemporary advice from production extension specialists and AG/NR agents, and updated calendar event information to producers via electronic news systems.

c. **Source of Federal Funds** - Smith-Lever 3b&c

3. Key Theme: Agricultural Profitability

a. **Description of Activities** - The Tri-State Dairy Nutrition and Management program effort provides an annual educational forum aimed at larger scale professional dairy producers and many professional industry consultants across the Eastern Corn Belt dairy region. Educational agendas range from the latest diet formulation software programs to recruiting and retaining new dairy farm employees and neighbor relations

b. **Impact - Dairy and Veterinary Extension Specialists from Indiana, Michigan** and Ohio developed and conducted two educational dairy conferences focusing on contemporary nutrition and efficient management systems. Conferences focused educational agendas toward highly competitive dairy managers and professional allied industry (veterinarians, nutrition and reproductive specialists and herd consultants).

c. **Source of Federal Funds** - Smith-Lever 3b&c

4. Key Theme: Water Quality

a. **Description of Activity - New Partnerships for Regional Water Quality Coordination in the Great Lakes Region.** OSU Extension is one of six partners (with University of Illinois Extension, Purdue Extension, University of Minnesota Extension Service, University of Wisconsin Extension, and Michigan State University Extension) on a USDA-CSREES Regional Water Quality Coordination Grant. The grant is spearheaded by the Great Lakes Regional Water

Quality Leadership Team (WQLT). The WQLT seeks to ensure the integration of water quality efforts in the Great Lakes Region, specifically in the areas of Animal Waste Management, Nutrient and Pesticide Management, Watershed Management, and Drinking Water and Human Health. The goals of the regional project are:

- Increase coordination and collaboration across states in the region;
- Leverage University Extension and research resources across the region to address high priority water quality issues;
- Strengthen regional relationships with federal and state partners and offer an entry point to Extension and the Land Grant University resources.

As part of the regional grant agreement, Ohio State University Extension receives an annual allocation to support efforts to coordinate Extension and research activities and foster the professional development of faculty, Extension Agents, Specialists, and Associates working in the area of water quality. In FY2003, OSU Extension personnel met with their peers from the other five Great Lakes Region states to discuss opportunities for multi-state water quality education and research projects. Several working groups are conducting ongoing discussions, including the Fish Contamination Advisory, Volunteer Monitoring, Urban Stormwater, and Animal Waste Management groups. In June, OSU Extension hosted a Watershed Conference involving representatives from all six Great Lakes Region Extension Departments.

In addition to the work groups, funding from the Great Lakes Regional Water Quality Coordination Grant was used to supplement professional development for water quality Agents and Associates.

b. **Impact –** Extension Agents, Watershed Management have conducted a number of educational programs for youth and adults using water quality testing and fish electroshocking equipment purchased with regional grant funds in year one. For example, over 500 individuals attended electrofishing demonstrations in 2003, where they learned about the connection between land use practices and local fish populations. Regional grant funds also supported the Ohio Watershed Leaders (OWLs) workshop. Over 50 agency professionals and watershed coordinators participated in this two-day workshop, which gave participants hands-on experience in Lake Erie ecology, team building, fish identification, and a variety of other water quality related topics. A survey of participants indicated that the workshop allowed them to build relationships, develop new knowledge on stream protection, and gave them a renewed sense of purpose in their work.

c. **Source of Federal Funds** - Smith-Lever 3b&c

5. Key Theme: Positive Youth Development in Out-of-School Time

a. **Description of Activities** - Ohio is the home of one military installation - Wright Patterson Air Force Base (WPAFB). Located east of Dayton, OH, the base is situated in two counties (Greene and Montgomery). WPAFB has the third largest services program in the Air Force. Due to the recent world affairs, WPAFB has realized an estimated 42% deployment rate per year. Currently WPAFB has two

school-age programs and is in the process of opening a second Youth Center. In 2003 during the school year, 100 school-age children were involved at the school-age centers at the Prairies and 50 at Kittyhawk.

A working relationship between 4-H and WPAFB was established in 2002 at the CYFAR conference. In September 2002, Air Force and 4-H staff attended 4-H 101training and developed a plan of action. The initial plan was to begin with a focus on the teens through the open recreation (drop-in) program. A skill-a-thon was held in January 2003 to introduce 4-H to the youth. This approach, although not successful in involving teens, did create awareness of 4-H. This skill-a-thon led to the staff of the school-age program realizing the benefit of involving the school-age children in the initial phase of 4-H implementation. This led to the successful participation of the school-age youth in 4-H clubs.

b. **Impact** - An important impact of this project is the successful collaboration built between 4-H and WPAFB. This positive working relationship is an important foundation that enables quality programs and outcomes for youth. This relationship is fostered through regular meetings and communication among the staff involved, and allows challenges to be identified and solutions developed. Another indicator of success is the beginning integration of military staff and youth into the 4-H culture, evidenced through staff members' attendance at the Extension Galaxy II conference and youth participation in the Montgomery County Fair. In addition, in 2003 Ohio 4-H received one of 25 4-H military grants to continue these collaborative efforts. This grant will provide funding for additional special events to bring county 4-H and military youth together.

During the summer 2003, approximately 200 children participated in 4-H as part of the WPAFB summer camp program. Fifteen Air Force staff conducted 4-H project clubs for 1½ hours per day for 10 weeks, for a total of 75 contact hours. With an average attendance of 140 youth per day, this translates into approximately 10,500 educational contact hours for the summer. Using 4-HCCS curriculum, the following clubs have been conducted with school-age youth: Art (*Palette of Fun with Arts and Crafts*), Flight (*Aerospace - Pre-Flight*), Gardening (*Budding Gardeners*), Food (*Tasty Tidbits*), and Theater (*Theater Arts Adventures - Journey into Imagination*). The pre-teen group has done Careers (*Wild Over Work*), Flight (*Aerospace - Lift Off*), Electricity (*Magic of Electricity*), Food (*Six Easy Bites*), and Sewing (*Sew and Have Fun*) clubs. Each club experience incorporates a field trip during the two-week period (e.g., the Art Club went to the Dayton Art Institute). By the account of the WPAFB staff, this program has been very successful. Furthermore, parents on the advisory board have requested that 4-H be included in the before-school program in the upcoming school year. These programs will continue in 2004.

Additionally, WPAFB staff has conducted Camp Wright Patt (patterned after a mock deployment) for youth of deployed families. The camp expanded from one week in 2002, to 2 one-week sessions in 2003. The plan for 2004 is to conduct four camp sessions.

c. **Source of Federal Funds** - Smith-Lever 3b&c

6. **Key Theme: Family Life**

a. **Description of Activities -** Extension agents' effectiveness in the field is enhanced by the desire and practice of keeping current in the research related to their work. With this in mind, Ohio State University Extension, in partnership with Alabama Cooperative Extension at Auburn University, conducted a five-day electronic seminar (e-seminar) in February 2003 in an effort to connect educators in the field with top researchers in a selected area of study in direct dialogue to promote up-to-date knowledge, dialogue about issues, and agreement on practical application. The 2003 Family Life E-Seminar, "Adolescent Sexuality: Research and Extension Programming," included multi-state participants, from Ohio, Alabama, Georgia, Illinois, Iowa, Missouri, New Hampshire, and New York. During the e-seminar participants read papers, written by a panel of experts in couple relationships, on the latest research and programming available in this field and then used a bulletin board to "converse" via computer with them (see http://hec.osu.edu/teens).

b. **Impact** - 48 extension professionals from Ohio, Alabama, Georgia, Illinois, Iowa, Missouri, New Hampshire, and New York participated in the e-seminar on adolescent sexuality. On average, participants spent about 9.2 hours involved in this five-day e-seminar. Nearly all of the participants reported that they better understood issues related to adolescent sexuality (79%), had new ideas for working with couples (76%), and were stimulated in wanting to learn more about adolescent sexuality (79%).Importantly, 90% of the participants agreed/strongly agreed that they will likely use the information learned during the e-seminar. Most (86%) participants indicated that they would like more e-seminars offered in this format and 93% said that they would participate in this type of e-seminar again.

c. **Source of Federal Funds** - Smith-Lever 3b&c

Integrated Research and Extension Activities

1. Key Theme: Workforce Preparation - Youth and Adult

a. **Description of Activity -** Workforce Preparation Across the Life Span program incorporates the multi-state project, "Rural Low-Income Families: Tracking their Well-Being and Functioning in the Context of Welfare Reform." The principal investigator in Ohio is Sharon Seiling. The other states involved are California, Colorado, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, Ohio, Oregon, Utah, Wyoming.

This is a research study of rural low-income mothers with at least one child age 12 or under. The study is assessing the impact of welfare reform on their lives and on the community. Each state interviewed 20-40 mothers in one or two counties over three years. In Ohio, the investigators interviewed participants in two counties, one Appalachian and one non-Appalachian. From the qualitative and quantitative data collected on these families, the research is providing insights to agencies and policy makers in the counties of study, the state of Ohio and the

other states regarding family economic well-being, workforce attachment, health, and food security within their rural communities.

As part of the study in Ohio, government officials and agency representatives, employers, and non-profit agency representatives we re interviewed about the employment opportunities and community support for families in the county. The data were analyzed to more fully understand the employment and economic well-being issues and to assist in better meeting the needs of low-income families in rural counties in Ohio.

b. **Impact** - Most families in the Ohio study had at least one adult working. Two-thirds of the mothers (20 of 30) and 15 of the 18 partners were working. The mothers averaged 30 hours per week, whereas the partners had an average work week of 48 hours. The mean hourly wage for mothers was $7.12, and for partners it was $9.05. Mothers were employed in five types of jobs: laborers/helpers, production, service, administrative support and sales. The partners were employed in jobs classified as laborers/helpers, production, service, transportation and mechanics. By the third year, mothers were earning $7.60 on average, while partners wages had increased to $10.66. Two-thirds of mothers had at least one work change during the three years, with 30% changing work status and 35% changing jobs. Mothers who kept the same job had higher wages ($8.09) than did those who changed jobs ($5.58) and those who had not worked the year before ($4.87). Fewer mothers had work benefits than their partners: health insurance for self 29% and 56%, respectively. Their children were typically covered my Medicaid. Most adults had no health insurance coverage. Families relied on family and friends for support. Two-thirds had family members who provided child care, 17% lived with family or friends, 60% had help with transportation, and 49% borrowed money from family or friends. Informal support provided about one-fourth of value of their overall support.

The typical family in the study involved a working mother with two children who was married or was living with a partner. The mother had completed high school or had a GED and her partner had the same level of education. Their household income was $16,272, which put them below the poverty level. They received benefits from WIC and Medicaid and had gotten the Earned Income Tax Credit in the previous year. They relied on their extended family for childcare and other types of support. The mothers were more likely to be clinically depressed and food insecure than the population as a whole. Although not significant in the small OH sample, in the larger study families' food security was significantly related to depression and money management practices, but not to amount of income, indicating the improving money management practices could go a long way to helping families become or remain food secure.

Community leaders, members of the business community, and social service professionals identified five strengths of the organizations in the county of study that enhance their ability to serve the needs of families. They were 1) the capacity to create informal networks and practices, 2) entrepreneurial thinking, 3) an inclusive view of the community, 4) inter-agency collaboration, and 5) organizational alliances.

Data from the three-year longitudinal family study and from the interviews of business, non-profit and government sectors of the community were shared

with community leaders, elected officials and social service and economic development professionals. During that meeting Extension educators and researchers led small groups of leaders and professionals in assessing community needs and making plans for community change based on study results.

c. **Source of Federal Funds** - Smith-Lever 3b&c

2. Key Theme: Food Safety

a. **Description of Activity** - During 2003, focus groups conducted with members and/or caregivers of four populations at high risk for foodborne illness due to suppressed or compromised immune function were analyzed for the study "Food Safety for the Immune-Suppressed/Compromised: A Multi-media Approach". Researchers at Colorado State University analyzed 10 focus groups conducted with pregnant women. Ohio State University researchers analyzed 6 focus groups and **16 in-depth interviews with cancer, organ transplant and bone marrow transplant patients** and Washington State University researchers analyzed 9 focus groups with HIV/AIDS patients and one with caregivers. Although most women in the focus groups with pregnant women indicated moderate concern regarding the safety of food and had made some food handling or consumption changes since becoming pregnant, most were not following 7 of 12 specific recommendations important during pregnancy. Further, there was resistance to change habits, especially for newer recommendations. The women assumed the safety of food, and wanted strong evidence regarding why they should change current practices. Common barriers included no prior illness from implicated foods, and the convenience, health benefits of, and personal preference for, many risky foods discussed. Participants wanted quick, easy to read, but sufficiently thorough information specifically targeting pregnant women. Focus groups with other high risk audiences indicated similar interests. The information gained in the focus groups were used in developing food safety educational materials for each of the four high-risk groups. Colorado State University took the lead in developing food safety educational materials for pregnant women, Ohio State University materials targeting cancer patients and organ transplant patients and Washington State University materials targeting HIV/AIDS patients. In-depth interviews conducted with health care providers of each of the high-risk audiences were also analyzed. In Colorado, 23 interviews conducted with doctors, nurses, nutritionists and social workers that work with pregnant women were transcribed and analyzed for common themes among and between professional groups. Important themes were reported based on strength and frequency of information mentioned. Another researcher analyzed a sample of the transcriptions and a comparison between the two analyses ensured the reliability of the analysis. Results showed that health care providers perceived long-standing food safety recommendations as more acceptable to discuss with clients than more recent recommendations aimed at emerging pathogens like Listeria monocytogenes. Most health professionals felt food safety information for pregnant women should be provided by doctors and nurses. A prominent barrier to discussing food safety issues was limited contact time with clients. Interviews conducted with health

care providers of other high-risk groups reported similar thoughts. These results were used in developing Food Safety for High-Risk Groups, a graduate-level academic course taught simultaneously to 33 students via video and web-based distance education technology on three university campuses (Ohio, Colorado and Washington).

b. **Impact** - The information gained through the focus groups and interviews was useful in developing educational materials on food safety specifically targeting each of four groups at high risk for foodborne illness (pregnant women, HIV/AIDS patients, organ transplant patients and persons on chemotherapy). The 33 students participating in the graduate education course on food safety for high risk audiences gained valuable insights on the interrelationships between immune function and risk for specific foodborne pathogens as well as important lessons on how to target educational materials to specific audiences. The materials developed for the course will be edited and condensed into a 6 module web-based continuing education course on food safety for high risk audiences designed for health care providers.

Publications Generated:

- Hillers, V.N., Medeiros, L.C.**,** Kendall, P., Chen, G., DiMascola, S. 2003. Consumer food handling behaviors associated with prevention of thirteen foodborne illnesses. Journal of Food Protection. 66:1893-1899.
- Kendall, P., Medeiros, L.C., Hillers, V., Chen, G., DiMascola, S. 2003. Food handling behaviors of special importance for the pregnant, young, elderly and immune compromised. Journal of the American Dietetic Association. 103:1646-1649.
- Chen, G., Bergmann, V., Schroeder, M. 2003. Research: a collaborative approach. Times Food Processing Journal. Vol???, February-March, pg. 16-21. (BETTER REF??)
- Medeiros, L., Chen, G., Kendall, P., Schroeder, M., Hillers, V., Bergmann, V. 2003. Cancer patient beliefs, barriers and motivators to adopting food safety recommendations: a qualitative needs assessment study. Oral presentation at American Dietetics Association, San Antonio, TX. J. Amer. Dietetic Association. 103(9):Supplement 1, A-11.
- Hillers, V., Bergmann, V., Hoffman, E., Kendall, P., Schroeder, M., Medeiros, L., Chen, G. 2003. Attitudes of HIV infected individuals and their health care providers regarding barriers and motivators to adopting food safety recommendations. J. Amer. Dietetic Association. 103(9):Supplement 1, A-36.
- Chen, G., Medeiros, L., Kendall, P., Schroeder, M., Hillers, V., Bergmann, V. 2003. Health care providers' attitudes toward food safety recommendations for cancer and transplant patients. J. Amer. Dietetic Association. 103(9):Supplement 1, A-36.
- Athearn, P.N., Dean, J., Kendall, P., Morales, S., Schroeder, M., Medeiros, L., Chen, G., Hillers, V., Bergmann, V. 2003. Risk assessment: Pregnant women discuss perceptions of food safety recommendations. Abstract: 36th Annual Society for Nutrition Education Conference Proceedings. Vol 36, abstract O10, pg 4.
- Morales, S., Athearn, P., Kendall, P., Schroeder, M., Medeiros, L., Hillers, V. 2003. Health care providers attitudes toward current food safety

recommendations for pregnant women. Abstract: 36th Annual Society for Nutrition Education Conference Proceedings. Vol 36, abstract O11, pg 4.

- Morales, Shelly M. Health Care Providers Attitudes toward Current Food Safety Recommendations for Pregnant Women. M.S. Thesis. 2003. Department of Food Science and Human Nutrition. Colorado State University, Fort Collins, CO.
- Athearn, Prudence N. 2003 Risk Awareness: Pregnant Women Discuss Perceptions of Food Safety Recommendations. M.S. Thesis. 2003. Department of Food Science and Human Nutrition. Colorado State University, Fort Collins, CO.

c. Source of Federal Funds - Smith-Lever 3b&c

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities

Institution_The Ohio State University
State_Ohio

Check one: __X_ Multistate Extension Activities
____ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1				**$119,641**	
Goal 2				**$3,693**	
Goal 3				**$5,459**	
Goal 4				**$173,162**	
Goal 5				**$182,881**	
Total				**$484,836**	

Director **March 29, 2004**
Date

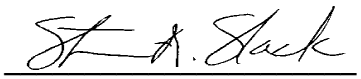
Form CSREES-REPT (2/00)

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities

Institution_The Ohio State University
State_Ohio

Check one: ___ Multistate Extension Activities
_X_ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1				**$888,336**	
Goal 2				**$5,820**	
Goal 3				**$876**	
Goal 4				**$336,216**	
Goal 5				**$18,637**	
Total				**$1,249,884**	



Director

March 29, 2004
Date

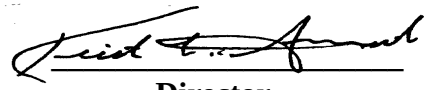
Form CSREES-REPT (2/00)

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities

Institution_The Ohio State University
State_Ohio

Check one: ____ Multistate Extension Activities
____ Integrated Activities (Hatch Act Funds)
_X__Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1				**$341,828**	
Goal 2				**$3,350**	
Goal 3				**$26,682**	
Goal 4				**$180,585**	
Goal 5				**$122,957**	
Total				**$675,402**	



Director **March 29, 2004**
Date

Form CSREES-REPT (2/00)