

Purdue Research and Extension Plan of Work

Brief Overview:

The planned programs for Indiana are

- natural resources and environment
- plants and their systems
- animals and their systems
- agricultural, natural resources, and biological engineering
- food/non-food products: development, processing, quality, and delivery
- economics, markets and policy
- human nutrition, food safety, human health and well being
- family well being
- youth development
- economic, community development

These planned programs were determined after reviewing input from stakeholder interviews and community sessions conducted throughout Indiana in 2003 and 2005. In 2005, nearly 4600 people participated in the interviews and community sessions. Under-served and under-represented populations were included in the interviews and community sessions. Approximately 10% of the 1700 interview participants were from underserved or under-represented populations. Interviews with stakeholders representing state level organizations and agencies were also conducted to assess the needs of the state. Stakeholders recognized Purdue as a trusted source of information for families, farms, businesses, and communities. They said that Purdue research and extension should continue to focus efforts to strengthen families, farms, businesses, and communities.

In addition, many of the planned programs respond to issues identified in the State of Indiana's and Purdue University's strategic plans. According to the Indiana Department of Agriculture, Indiana is in a unique position to be a global leader in several food and agriculture areas. This conclusion is based on the state's productive land base, central location to the U.S. population, innovative research, and manufacturing expertise. Agriculture continues to have a significant role in Indiana's economy and represents an area for economic growth and development. In Indiana the food and agricultural sector generates directly or indirectly about twenty percent of the jobs and income in the state. With Indiana's diverse agricultural structure, Purdue research and extension can play a role in helping people become more productive and prosperous. Environmental safety and increases in bio-fuel production are also high priority policy issues in Indiana. Several areas targeted for growth by the State Department of Agriculture are included among the planned programs identified in this plan of work. The natural resources and environment, plants and their systems, animals and their systems, agricultural, natural resources, and biological engineering, and economics, markets, and policy planned programs describe research and extension efforts that address these issues.

Indiana's 2006 strategic plan for economic development stresses the need for a skilled constantly improving workforce, a culture of entrepreneurship, a pro-investment business climate, and strategic leadership development. Purdue's engagement strategic plan focuses on advancing Indiana's economic prosperity, enhancing educational and learning opportunities, and improving the quality of life of Hoosiers. Planned programs for Purdue research and extension include strategies for each of these factors. Five areas within the economic community development planned program focus on entrepreneurship, workforce development, public issues, education, community planning and visioning, and leadership and civic engagement. In addition, several other planned programs include efforts that relate to economic prosperity and improving the quality of life.

Stakeholders noted that families face many challenges including financial concerns, health issues, and the need to build positive relationships inside and outside the family. These types of challenges can impede healthy family functioning and decision making. Research and extension programs addressing topics such as effective parenting, caring for older adults, building self-esteem, managing stress, basic money management, and planning for the future will assist families in dealing with these challenges. Stakeholders encouraged Purdue to continue to work with family members across generations and in collaboration with others in the community, including schools and local and state agencies, to strengthen Hoosier families.

Developing Hoosier youth was a key theme stressed by stakeholders. The 4-H Youth Development program provides opportunities, relationships, and support for youth to help them acquire the life skills necessary to meet the challenges of adolescence and adulthood. Youth development programs are aligned with specific mission areas including science, engineering and technology, healthy lifestyles, and citizenship education. With 20,000 volunteers involved in the Indiana 4-H youth development program, volunteer development opportunities are another essential part of this planned program. These volunteers are a vital component to positive youth development because of the on-going relationships that are established.

Improving the health of Hoosiers is another of the state's priorities. Indiana is near the top of the rankings of negative health issues, including obesity, smoking rate and the afflictions that accompany these: diabetes, high blood pressure, cancer, heart disease, and stroke. Purdue research and extension programs focus on the impact of dietary intake and exercise on human health, use and beneficial effects of phytochemicals, cereal processing and nutrition, calcium and bone metabolism, and impact of dietary intake and bone health. Educational programs are provided for the food and health care industries and consumers.

Consumers expect a wholesome and safe food supply yet outbreaks of foodborne illness indicate a need for ongoing research and education in this area. Purdue food safety programs focus efforts toward rapid detection of foodborne pathogens, food processing treatments to reduce pathogens, control of molds and mycotoxins, pest control, and the impact of human intestinal microflora and human disease. Effective educational

programs translate the best practices for farmers, retailers, and consumers to help them adopt food-handling procedures that more effectively minimize food-safety risks.

One of the goals of the planned programs is to integrate research, outreach, and educational efforts to effectively address the issues identified. For some issues further integration of research and extension efforts and building more interdisciplinary teams is needed while for other issues those teams are already established. Another key strategy will be to continue to partner with industry, regulatory groups, and other stakeholders to increase the potential impact of the research and extension efforts.

Since one of the objectives of this plan is to provide relevant research and extension programs, continual review of progress toward ultimate goals and outcomes will be an essential part of the process. Teams working on planned programs will provide continual review of progress toward goals and outcomes, including assessing whether additional topics should be added to a specific planned program because of changing needs. County Extension Boards will continue to review planned programs on an annual basis to ensure that programs are continuing to address critical needs. PCARET, the Purdue Council on Agricultural Research, Extension and Teaching, meets semi-annually with county, district, and state administrators to discuss needs and how extension and research are or can address them. An annual conference also provides an opportunity for the state PCARET to review progress on planned programs and provide input on expectations of future needs and programs. In addition, specific research projects are peer reviewed before they are undertaken.

The ultimate goals of these planned programs are very similar to the goals of Purdue's engagement strategic plan: advancing Indiana's economic prosperity, enhancing educational and learning opportunities, and improving the quality of life of Hoosiers. In its own way, each planned program contributes to Indiana's economic prosperity, enhances educational opportunities, or improves the quality of life of Hoosiers.

Natural Resources and Environment

The integrated research and extension programs in Natural Resources and Environment include faculty and staff from 8 departments within the College of Agriculture. One of the primary segments of the program involves increasing knowledge of the relationship between soils, nutrients, and plants. Another goal is increasing and improving the productivity of forest resources, particularly hardwoods. Programs will teach landowners and land managers to evaluate the condition of lands and undertake management and restoration activities. A number of activities are aimed at preventing or mitigating pollution of natural resources, whether from natural causes or as a result of human activity. The mission of the Animal Manure Management Common Interest Group is to provide current scientifically sound information and technologies that are economically sound, feasible for implementation and promote environmental stewardship to livestock and poultry producers, technical service providers and consultants, government officials and the general public. The Water Quality Common Interest Group will address non-point sources of water pollution and loss of riparian habitat by working with land owners

and managers to participate in collaborative watershed planning and adoption of sustainable land use practices. Programs will also be offered to enhance the natural components of urban environments through promotion of urban forestry.

Plants and Their Systems

Research and Extension programs will be conducted to discover and disseminate knowledge that will help row crop producers (primarily corn and soybean, along with wheat and forages) and horticultural crop growers (fruit, vegetables, and ornamental plants) produce their crops more efficiently, with less adverse effects on the environment, and in a way that strengthens rural economies. One of the fastest growing areas is the turfgrass industry, with a proliferation of golf courses, athletic fields, and landscapes requiring maintenance. Research and Extension programming will support these professionals. The Small Farms and Sustainable Agriculture Team will assist entrepreneurs in establishing small or alternative agricultural enterprises, through professional development opportunities for educators and through direct programming for potential producers. The Consumer Horticulture Team will provide professional development opportunities for county Extension educators to assist them in answering the ever-increasing number of requests for information on home horticulture.

Animals and Their Systems

Research projects will be targeted at understanding the biology of poultry and livestock at the molecular, cellular, and systemic level, and improving the profitability of poultry and livestock production while minimizing environmental impacts on production and enhancing the health and well-being of animals. Specific efforts will span fundamental areas of growth and development, animal behavior and well-being, and sustainable and efficient production systems, using a multi-disciplinary approach. Research projects will also investigate the efficient use of by-products and co-products from ethanol and biofuels production facilities as feed for poultry and/or livestock. Extension activities will seek to improve producers' management skills to improve economic viability, enhance environmental stewardship, improve awareness among youth of the opportunities in poultry and livestock production, and to promote a positive image of poultry and livestock production in Indiana. These activities will be accomplished through publications, workshops, road-shows, and on-farm assistance. In addition, Extension programs will be presented for small livestock and poultry producers, in which often the producer has limited technical knowledge or experience or is attempting to use alternative production techniques.

Agricultural, Natural Resources, and Biological Engineering

Agricultural and biological engineering embraces a broad array of research challenges. Development of economical and technically efficient processes to transform agronomic crops and biomass into liquid fuels is critical for our nation's future. Interdisciplinary teams of scientists are investigating the role of enzymes, chemical interactions, and processing techniques to enhance the conversion of biological materials into fuels for on

and off-road vehicles, aircrafts, and as heating oil. To reduce air pollution, monitoring studies of livestock operations are being conducted to assist the U.S. Environmental Protection Agency with the development of science-based regulatory guidelines. Engineering and life science faculty are collaboratively designing bio-sensors to more efficiently detect food pathogens and contaminants. Optimal nutrient management from large-scale livestock operations is critical from an environmental safety and a more efficient and profitable cropping systems perspective. Finally, with the advent of GPS and other electronic and nanotechnology discoveries new machine sensors and data collection and management systems are being developed. Purdue University faculty are collaborating not only on the research associated with these new engineering and life science-based systems, but are also closely involved in engagement activities with Federal and State regulatory agencies, farm and agribusiness managers, and community leaders as they share their research results. Enhanced environmental safety and increases in bio-fuels production are high priority policy issues in Indiana. A statewide energy summit, nutrient management workshops, and community-level extension education programs are being developed to share research results and dialogue with key stakeholders on the various aspects of this knowledge area.

Food and Non-Food Products: Development, Processing, Quality, and Delivery

This program focuses on conversion of inorganic and organic materials into edible food products and non-food products. In the conversion of food materials, focused commodities will include pork (processing and quality), grains (processing and nutrition), dairy products (processing and quality), and aquaculture (processing, yield, and quality). Research and extension programs will be developed for better separation of bio-products, improved biomass conversion, and computational modeling approaches to understand and improve processes. Thermal and non-thermal processing systems will also be optimized to improve the overall product food quality and safety. Key research and extension integrated groups will include the Post-Harvest Processing Grain team and the Computer Integrated Food Manufacturing Center. For non-food products, much of the emphasis will be dedicated to bio-mass energy and bio-based fuels. Considerable expertise exists on the Purdue campus to develop alternative fuels from corn, soybeans, and starch. Systems will be designed that integrate agricultural and engineering approaches to optimize efficiency and yield and an economic analysis will be performed to identify appropriate applications. Because of the interest in Indiana, a major commodity that will receive attention is wood and wood products, especially for the conversion into furniture. Two important integrated research and extension groups that will be active in studying processing of non-food products include the Laboratory of Renewable Resources Engineering and the Wood Research Laboratory. In the development of both food and non-food products, effective and constant communication with stakeholders, from the farm to processing, will be critical for success.

Economics, Markets, and Policy

The global and U.S. agricultural economy is experiencing unprecedented technological and economic change. The World Trade Organization, along with several bilateral country negotiations, is attempting to further liberalize trade and increase market access. This is especially important within the Doha Development Agenda to reduce poverty in low-income countries. U.S. domestic agricultural policy, under severe budget constraints, is attempting to reduce direct farmer subsidies and direct federal resources towards programs that improve environmental quality and help sustain rural communities. Biotechnology, growing demand for bio-fuels, and increased concentration of livestock production are increasing the opportunities and challenges for farm and business leaders as they seek to maximize profits in an environmentally and consumer sensitive fashion. Consumers increasingly are demanding low-cost, safe food with added convenience and value. This is creating tremendous marketing challenges within the food supply-chain. Purdue University economists, along with colleagues in other disciplines, and in other research institutions around the globe, are collecting the appropriate data and estimating complex global trade and policy models to ascertain the socioeconomic impacts of proposed international and domestic policy changes, potential threats to our food supply from dangerous pathogens or bioterrorism, implications of the adoption of new biotechnology-based crops, and the economic and environmental impacts of concentrated animal production systems. The Center for Trade Policy Analysis will conduct periodic conferences with trade and policy stakeholders. Faculty in the Center for Agricultural Business through degree and non-degree-based programs will provide the intellectual knowledge and training for agribusiness executives and managers. Finally, faculty and administrators in the College of Agriculture and other colleges and centers across the Purdue University campus are involved in various engagement and extension activities to create jobs and entrepreneurial skills among our citizens and to facilitate technology transfer and economic development throughout the State of Indiana. In addition, several farm management programs such as the annual Farm Management Tour, the Economic Outlook Campaign, and the Top Farmer Workshop will share business and marketing management concepts along with the transfer of new farming technologies. In cooperation with field extension staff, a series of programs are planned with various stakeholders on the economic impacts of proposed provisions in the next Farm Bill.

Human Nutrition, Food Safety, and Human Health and Well-Being

Our integrated program for food safety, human health and nutrition includes a wide variety of disciplines in the college of agriculture, the veterinary school, and the college of consumer and family sciences. Purdue food safety programs focus efforts toward rapid detection of foodborne pathogens, grain processing and control of molds and mycotoxins, non-thermal and thermal food processing treatments to reduce/eliminate pathogens and spoilage organisms, pest control and integrated pest management programs, the impact of human intestinal microflora and human disease, and food safety educational programs for farmers, retailers, and consumers. Examples of food safety integrated multi-disciplinary centers and efforts include the Center for Food Safety

Engineering, the Center for Urban and Industrial Pest Management, and the Extension Disaster Education Network. Purdue human nutrition and human health programs focus on the impact of dietary intake and exercise on human health, use and beneficial effects of phytochemicals, cereal processing and nutrition, calcium and bone metabolism, impact of dietary intake and bone health, and nutritional educational programs for the food industry, healthcare, industry professionals, and consumers. Examples of human health and nutrition related research and extension integrated efforts include the Agriculture and Rural Safety and Health Program, Dietary Calcium and Human Health program, and Healthy Well Nourished Hoosiers.

Family Well-Being

Family well being is a high priority for Indiana. A variety of programs and delivery methods will be offered to strengthen families and help them learn and use positive, personal development and relationship skills as well as teach parents to know and use positive parenting practices. Programs will help individuals increase their knowledge of effective financial management and improve their financial stability.

Youth Development

The Indiana 4-H Youth Development Program will provide young people with sustained opportunities to gain a sense of belonging, independence, mastery, and generosity. When these essential elements of a positive youth development experience are in place, youth can: master skills to make positive life choices; effectively contribute to decision-making and act responsibly; and positively influence their communities and the general society.

4-H Youth Development Programs provide just such opportunities, relationships, and support for young people to help them acquire the life skills necessary to meet the challenges of adolescence and adulthood. On-going relationships with adults are essential to positive youth development. These relationships are established with adult volunteers who serve as positive role models for the young people who are affiliated with 4-H programs and activities.

Economic/Community Development

This planned program area includes five focus areas: Entrepreneurship, Community Planning and Visioning, Workforce Development, Leadership and Civic Engagement, and Public Issues Education. The Following is a brief summary of these focus areas. Collectively they represent a summary of this planned program area.

1. Entrepreneurship. Economic development strategies have shifted from industrial recruitment to (a) the retention and expansion of existing firms and (b) the creation of new businesses. Specific areas of emphasis are small businesses, especially in rural areas; new opportunities in entrepreneurial agriculture and natural resource enterprises (e.g., agritourism); and the strong and growing interest in entrepreneurship among youth and young adults, women, ethnic minorities, and new immigrants.

2. Community Planning and Visioning. Communities, neighborhoods and regions need to create their own road map for the future in today's fast paced world of change. Two areas of high priority in many communities and regions are economic development planning/strategies and land use issues. While Extension's visioning and planning efforts will not be limited to these areas, they will receive special emphasis.

3. Workforce Development.

Extension, in partnership with Purdue's Division of Continuing Education, has been heavily involved in creating several community based learning centers. These centers provide a variety of credit and non-credit offerings based entirely on local demand, using both face to face and distance-education technologies. Extension will continue to nurture existing learning centers and be as helpful as possible to other communities and neighborhoods that wish to consider the establishment of such a center. Workforce development opportunities and programs will receive special emphasis.

4. Leadership and Civic Engagement. A rapidly growing body of research indicates a strong civic infrastructure is a precursor to economic development and in the creation of strong and vibrant communities, neighborhoods and regions. Extension can help build strong communities, neighborhoods and community-based organizations through a variety of leadership programs including Leadership 20/20, i-LEaD, the Master Gardener Leadership Program, and a new Natural Resources Leadership Development Institute.

5. Public Issues Education. Purdue Extension is playing a key role in Purdue's university-wide engagement effort. When community and regional needs arise at the local level which cannot be addressed by an existing Extension program, Extension personnel can help identify and access specialized resources at Purdue that may be helpful in addressing the need or issue. Training and resources are also available to help communities manage controversial public issues. Finally, policy analysis and applied research by faculty on Purdue's campus is critical to informed decision making. Areas of potential emphasis include energy policy, agricultural and environmental policy and a variety of issues related to state and local government taxation and finance.