

Food Safety and Quality

A) Food Safety Research

Improved manufacturing technologies (e.g., non-thermal processing, sensors) can improve food quality while ensuring safety.

1) **Nanotechnology and biosensor detection systems for foodborne pathogens.**

The current methods of detection are elaborate and relatively slow. Nanotechnology-driven detection systems provide a rapid and a cost-effective approach for monitoring food during production, manufacturing and processing and Penn State has considerable expertise in the area (Material Research lab, Life Sciences Consortium and Agricultural and Biological Engineering Departments).

Action Item: The College should invest resources to actively engage researchers in developing nanotechnology initiatives for real-time detection of foodborne pathogens.

2) **Emerging Food Processing and Packaging Technologies.**

Several faculty members in the College are involved in the development of new food processing/packaging technologies and the Center for Food Manufacturing exists to encourage collaboration in this area as well as to invite industry involvement. The Materials Research Institute provides a unique strength that could be better-leveraged for excellence in this area.

Action item: The College should invest resources to actively engage researchers in developing non thermal food processing technologies to address food safety and quality issues.

3) **Microbial Ecology.**

The importance of understanding the microbial ecology of a system (e.g., soil, living organisms, raw and processed foods) has received significant attention in recent years. This topic touches on questions of human health (e.g., the roles of prebiotic organisms in the gut, biofilms and sanitation) but is much broader and has the opportunity to stimulate cross-college collaboration and excellence.

Action item: Initiate a graduate program in microbial ecology

Action Item: Develop an undergraduate course on the microbial ecology of pathogens that can be a part of the AnBio, ID and FDSC majors.

B) Food Safety Education

Although the U.S. food supply is remarkably safe, there is a continued need for high quality educational programs throughout the food system. We recommend a particular focus on pre-harvest (on-farm), processors (especially small manufacturers), retail/food service and consumers. Further, the international nature of our food system requires a global perspective on food production and regulation. In addition, there is a need to build capacity and skills to cope with emergency communications, i.e., following an agroterrorism attack, an outbreak of foodborne illness, or a major recall.

1) Food Safety Training Programs. In 2008, the PA Legislature is expected to pass a new law that will require ~60,000 licensed retail, food service, or institutional food establishments to have a supervisor certified in food safety for every shift of operation. It is estimated that this change will result in the need to train up to ~100,000 individuals from food establishments across Pennsylvania and to recertify them in food safety education every 5 years.

Action item: Hire additional food safety extension educators to meet demand for food safety training for consumers, and processing-specific small food processors/entrepreneurs and to meet the demand for food safety certification training. These educators should be located in the Capital/SE Regions and work closely with identified faculty at UP.

2) Pre-harvest Food Safety.

Agricultural practices have been developed primarily focused on efficient food production. Recently concern over animal welfare issues has led to changes in food production methods and made considerable impact on the process of maintaining healthy livestock. We believe the need for safe food will drive more changes across the production sector.

Action item: Form a consortium of researchers, extension educators and industry representatives to develop the next generation of agricultural practices with food safety at the forefront of these agricultural practices. It is essential that extension programs be developed on pre-harvest food safety such that the extension educators can make it a part of their program to address pre-harvest food safety practices.

3) Support Business Development.

Pennsylvania is home to a large number of small and mid-sized food manufacturers and entrepreneurship in this sector provides an engine for economic development. However, the small food processors and new food entrepreneurs do not have sufficient guidance, support, or resources and frequently fail. The College should work to assist with identifying and managing regulatory requirements, nutrition labeling, marketing, workforce development, energy conservation strategies, food safety practices (GMPs, sanitation, pathogen reduction, microbiological testing, etc.), co-packing, purchasing of equipment, and with business development. We should do this in collaboration with others (e.g., PennTap, HRIM), by supporting and coordinating ongoing college efforts (e.g., making pilot plant and analytical facilities accessible to companies), through educational outreach (e.g., the food entrepreneurship website) and through the efforts of new extension associates in the SE/Capitol region.

Action item: same as action item described for B.1.

4) Food Biosecurity.

The issue of agricultural biosecurity-homeland security-emergency preparedness was brought to the fore by the events of September 11, 2001 and encompasses addressing intentional and unintentional threats to the food system. While extension efforts are well developed (e.g. EDEN network), there is a gap in resident education curriculum on agricultural biosecurity, food defense and emergency preparedness. Penn State is engaged in research in this area but there are specific areas that should be addressed by engaging expertise from other Colleges within the University.

Action item: Maintain support for extension programming in the area of agricultural biosecurity, food defense and emergency preparedness by providing resources for (i) regularly scheduled training programs including programs focused on small business, systems for massive animal depopulation and disaster communication where they are not available from other sources, (ii) Development of training modules for rapid response.

Action item: Incorporate curriculum on food defense, agricultural biosecurity and emergency preparedness into resident education programs. Communications courses should include risk communication and disaster communication components.

C. Food, Diet, Health and Values

The College should redouble its efforts to support a food system that improves people's quality of life. Our efforts will include support for food production and processing but will increasingly look at the upstream and downstream consequences for the environment and on consumer health and well-being.

1) Food and Values.

The majority of College activity is focused on the needs of the small fraction of the population involved in production agriculture. Consequently, our institutional view of what constitutes food quality is easily misaligned with the views of the majority of the public and it is easy for our efforts to be misunderstood or not appreciated. All members of the college should work to develop a more complete understanding of the scope of the food system and its consequences.

Action item: Challenge our own understanding of the food system by (i) inviting a nationally known and possibly controversial speaker to deliver a large public lecture on a subject related to the food system and (ii) broadening the influence of the P.S. Ag Council by actively seeking participation of non-traditional and consumer-focused groups.

Action item: Support the development of a broader understanding of the food system(s) within resident education by (i) offering a cross-college series of freshman seminars on the food system using collaboration between specialists from various academic units to tell the integrated story of a specific and practical example. (ii) Developing openly-shared teaching resources for inclusion in a variety of classes (e.g., diagrams representing material flows in the food system).

2) Food and Health.

Food choice is the last decision made in the food system and the one with the greatest effect on human health through the effects of diet on the development of heart disease, diabetes and cancers. Management of these conditions is driving the explosion in healthcare costs and making people's lives miserable. The College should work to educate people to make better choices to live better lives.

Action Item: Hire an extension nutrition/health faculty member and four extension registered dietitians to provide evidence-based community nutrition education and programs (e.g., weight management for adults and youth, diabetes education, dealing with aging health related issues).

3) Discovery and development of bioactive compounds.

Biologically active compounds that provide protection from infection, inflammation and from oxidative and carbonyl stresses abound in nature. Research in this area should be directed towards identifying the important compounds and either developing foods containing them in higher concentrations/ availabilities or extracting them for use as a drug or food additive.

Action Item: Charge a group of group of faculty members with potential interests in drug discovery (e.g., soil, plant, food, human health, animal researchers along with biochemists, molecular biologists, biotechnology and proteomics) to explore the opportunities for a program in that area.