

**National Agricultural Research, Extension,
Education and Economics Advisory Board**

**Report and Recommendations from a Focus Session on FOOD SAFETY AND ITS
RELATIONSHIP TO HUMAN HEALTH Conducted at the Advisory Board Meeting,
Washington D.C., March 8-9, 2007**

Executive Summary

The National Agricultural Research, Extension, Education and Economics (NAREEE) Advisory Board was briefed on the United States Department of Agriculture (USDA) Research Education and Economics Mission Area (REE) programs that focus on FOOD SAFETY AND ITS RELATIONSHIP TO HUMAN HEALTH at its recent meeting. Below are the Board's key recommendations resulting from this meeting and follow up discussions.

- ▶ **REE must increase its strategic planning with a focus on committing its limited resources to high priority areas.**
- ▶ **The Board recommends that the formal interagency working group for food safety research be re-established.**
- ▶ To investigate critical social and economic issues in food safety, **REE should consider a more focused approach to extramural funding** and encourage greater cooperative efforts between the Economic Research Service (ERS) and the food safety efforts funded by the Cooperative State Research, Education and Economics Service (CSREES) to investigate critical social and economic issues.
- ▶ **REE should utilize the Center for Disease Control (CDC) data on incidence of food borne illness incidence to assist in prioritizing research funding.**
- ▶ The Board endorses the Agriculture Research Service (ARS) and ERS effort to support research, training, and data development in the area of risk assessment modeling for current, emerging and reemerging risks
- ▶ **Board members recommend that REE play a leading role in supporting basic and applied research programs to develop sensors and detection devices for food borne pathogens**
- ▶ **Key investments should be made in areas such as the genomics of microbial pathogens**, application of systems biology approaches to understanding communities of food borne pathogens and use of comparative pathobiology to understand how pathogens transfer from animals or plants to humans
- ▶ **The Board recommends priority funding be considered in the area of nanoscience, nanotechnology, and nanoparticles** including a focus on multidisciplinary strategies in future funding cycles
- ▶ **REE should investigate and consider adopting initiatives such as the National Needs Special Grants program to address a potential critical human capital gap** that would put the nation's food system at risk
- ▶ **The Advisory Board recommends increased efforts to fund system-oriented training of food scientists, long-term, multidisciplinary initiatives such as understanding of the nature, specificity and adaptation of microorganisms to food environments, hosts(human/animal/ plant), and host responses to both pathogenic and beneficial microbes.**

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The National Agricultural Research, Extension, Education and Economics (NAREEE) Advisory Board was briefed March 8-9 2007 on the intramural and extramural programs in the Cooperative State Research Education and Extension Service (CSREES), the Agricultural Research Service (ARS) and the Economic Research Service (ERS) that focus on food safety and its relationship to human health. Given several recent outbreaks of microbial food borne disease, the safety of the nation's food is a critically important issue for both the agricultural production and processing sectors, as well as for the consumer. In addition, the safety of our food system is an issue where the United States Department of Agriculture (USDA) and specifically Agencies of the Research, Education and Economics Mission Area (REE) play an increasingly visible and important role, not only in conducting and funding research, but in helping the public understand the issues, the risks, and safe food handling practices through a public awareness and education program. While it is well-documented that the United States has a safe food system from field to fork, the number and severity of food borne illnesses continue to make food safety a public health priority. Moreover, food safety is a moving target since pathogens continue to evolve and adapt, with changes in the way that food is produced, processed, delivered, and consumed, and as new hazards may be introduced. Given the above facts, including the severity of the issues and the multitude of federal agencies that devote some effort to the matter of food safety, **we commend USDA and REE for the depth and breadth of these programs, but we also think that there is room for change and improvement, that would place REE in the leadership forefront for many of the nation's food safety initiatives.**

There has been considerable scientific progress in understanding, identifying, and mitigating hazards in the food chain, especially during the past decade. Much of this progress is due to the rapid application of emerging science, both within regulatory agencies as well as the food industry, from pre-harvest to the consumer. In order to reduce the incidence of food borne illness even further and to ensure continued safety in the food chain, a broad food safety research and outreach agenda is needed and must be supported by increased funding and focused on the special strengths within REE to integrate research, education, and outreach.

The Board recognizes that there are many potential food safety risks. This set of recommendations is focused on microbial pathogens as these continue to pose unique challenges to regulators, the scientific community, the food industry, and the public. It is clear that the scope of research, education, and extension activity needed is beyond the current level of funding. When new funding becomes available, we recommend that the scope of REE food safety research should expand even further. To meet the challenges,

however, we recommend that REE must engage in increased strategic planning with a focus on committing its limited resources to high priority areas.

Recommendations

- **As a Board, we recommend that the formal interagency working group for food safety research be re-established.** While there appears to be limited collaboration between the Center for Disease Control (CDC), the Food and Drug Administration (FDA), and the Food Safety Inspection Service (FSIS), several opportunities for expanded cooperation appear to be overlooked. We suggest a more deliberative process of agency interaction that fosters more effective coordination and collaboration to reduce duplication while producing measurable results focused on food safety. This might include increased collaboration with the Animal and Plant Health Inspection Service (APHIS) and greater coordination of basic and applied research with National Institutes of Health (NIH). Moreover, the opportunities for coordination and collaboration would be strengthened by formal recognition of the need for such an interagency working group. Furthermore, given continued divisions in regulatory responsibilities, a working group as described above is necessary to ensure better coordinated research, education, and outreach efforts that support emerging regulatory agency priorities and needs.
- **We recommend that REE should consider a more focused approach to extramural funding and encourage greater cooperative efforts between ERS and the food safety efforts funded by CSREES to investigate critical social and economic issues.** The Board is genuinely concerned about depth versus focus for CSREES funded research. While there is considerable funding directed toward intramural and extramural efforts for food safety the focus is too broad given the limited resources. Additionally, CSREES should work to more effectively communicate the breadth of the efforts that are underway in the food safety arena at the nation's public and private research universities that receive funding from both the competitive and formula funding sources. Given the reporting mechanisms currently in place (Current Research Information Service [CRIS] and National Information Management and Support System [NIMSS]) CSREES should report on the leverage of funds from state and local sources that support efforts to address and educate the public on food safety matters.
- **REE should, to the extent possible, use the Center for Disease Control (CDC) data on food borne illness incidence to assist in prioritizing research funding.** CDC continually updates and improves estimates of food borne illness incidence and its sources. The current major effort underway in CDC to refine the understanding of the sources of food borne illness can provide useful guidance to the REE agencies in setting future research priorities. Food safety research priorities need to remain those posing the greatest public health needs and economic impacts.
- **The Board endorses the ARS and ERS effort to support research, training, and data development in the area of risk assessment modeling for current, emerging and reemerging risks.** Current ARS and ERS efforts to develop international

databases on risk assessment are to be commended. Such efforts would be further complemented by focused investments in extramural research and training to support risk assessment. Identification of emerging and reemerging needs could be facilitated by the interagency working group on risk assessment.

- **The Advisory Board recommends that REE play a leading role in supporting basic and applied research programs to develop sensors and detection devices for food borne pathogens.** The ARS applied research initiatives to develop sensors and detection devices is an area of significant promise and has already generated useful applications. This will continue to be an important area of applied research that will be useful to both industry and regulatory agencies. It is clear that efforts are needed to coordinate and develop standardized and integrated surveillance systems including diagnostic tests for microbial pathogens from production to processing; including an understanding of how such systems can support public health monitoring.
- **Key investments should be made in areas such as the genomics of microbial pathogens, application of systems biology approaches to understanding communities of food borne pathogens and use of comparative pathobiology to understand how pathogens transfer from animals or plants to humans.** Several areas of basic research were identified in the 2005 report by the American Academy of Microbiology to provide the tools for more effective identification and management of microbial pathogens in food. Such work may illuminate the mechanisms by which pathogens adapt and evolve, including the development of antibiotic resistance and greater virulence. It may also help to design risk assessment models or to develop new methods for detection. Efforts in basic research need to be linked to those who are developing new diagnostic technologies, including risk assessment models. Work in the food safety arena needs to be highly coordinated within USDA and other governmental agencies from fundamental research to applied technologies to consumer education and public awareness.
- **Integrated food safety programs, strength of REE research, should be used to understand the outcomes of systems management practices such as Good Agricultural Practices (GAPs), supply chain management, Hazard Analysis and Critical Control Points (HACCP) and other food safety controls.** A key area of applied research that falls uniquely within the REE mission is the development of best production and supply chain practices for meat and fresh produce. These two food industries remain the largest sources of food borne illness from microbial pathogens. Education and extension for all participants in the food chain—from farm workers to consumers—can best be developed from integrated activities.
- **The Board strongly recommends that new funding be considered in the area of nanoscience, nanotechnology and nanoparticles including a focus on multidisciplinary strategies in future funding cycles.** Nanoscience as a tool to better understand and identify food borne pathogens and other risks before they reach the consumer holds great promise for the future.

- **REE should investigate and consider adopting initiatives such as the National Needs Special Grants program, to correct what could be a critical human capital gap that would put the nation's food system at risk.** The Board is concerned that we may be training insufficient numbers of food scientists to meet future needs especially in the food safety sector.
- **The Board recommends increased efforts to fund system-oriented, long-term, multidisciplinary initiatives on food safety.** We understand that the CSREES Coordinated Agricultural Projects (CAPs) proposals can and have been applied to broad scale research and outreach efforts in food safety. However, as the food system becomes more complex, increased efforts need to be undertaken that develop a more sophisticated understanding of the nature, specificity and adaptation of microorganisms to food environments, hosts (human/animal/plant) and host responses to both pathogenic and beneficial microbes. This integrated approach might also be applied to investigations using a systems approach to understanding communities of microorganisms within agricultural hosts, food matrices, and production/processing environments.

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