National Agricultural Research, Extension, Education and Economics Advisory Board

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NATIONAL AGRICULTURAL RESEARCH, EXTENSION, EDUCATION AND ECONOMICS (NAREEE) ADVISORY BOARD RELEVANCY AND ADEQUACY OF FUNDING REPORT

Annual Review and Recommendations on Relevancy and Adequacy of Funding for Agricultural Research, Extension, Education and Economic Activities Conducted by the United States Department of Agriculture

September 19, 2011

EXECUTIVE SUMMARY

Throughout the first several months of 2011, the NAREEE Advisory Board was involved in a review of a series of documents describing the direction of research funded by the United States Department of Agriculture (USDA) Research, Education and Economics (REE) mission area. Based on reviews, a committee of the Advisory Board has developed this annual review and recommendations on the relevancy and adequacy of funding for Agricultural Research, Extension, Education and Economics activities. The documents reviewed in preparation for this report include input from agency administrators and other interested parties, and considered the diverse views of the NAREEE Board membership. The most obvious conclusion of this review is that current funding for agricultural research, extension, education, and economics is inadequate to meet the expectations stated in the REE mission.

The NAREEE Board has reviewed and submitted comments on several documents describing the changes introduced by the National Institute of Food and Agriculture (NIFA). The Relevancy and Adequacy Committee has attempted to assimilate the outcomes from these documents and reviews, and address the relevancy and adequacy of funding for REE programs. The REE mission area utilizes partnerships with land-grant and other universities so that appropriate region-specific programs are implemented. These programs are necessary to address some of the most pressing challenges related to food security, climate change, sustainable energy, food safety, childhood obesity and nutrition, as well as the education and training of future professionals and leaders. These programs support the food system and are relevant to every citizen. Finally, the outcomes from the research have global impact on food security and political stability.

The following recommendations are made as a result of this review:

1. The shortage of funds (formula or capacity) at both the state and federal level for maintaining and/or increasing efforts devoted to agricultural research, extension, education, and economics continues to be serious. The partnership between NIFA and the land-grant system has the advantage of leveraging state investments and doing highly site-specific regional projects that return approximately $10 for every dollar invested. Creating a competitive funding model for NIFA similar to The National Science Foundation (NSF) and National Institutes of Health (NIH) model proposed for NIFA is a positive step for improvement of funding available for competitive research grants. Unfortunately, the short-term shift in competitive grant funding to larger multi-disciplinary projects has created a serious challenge for small to moderate size academic institutions, as well as the younger researchers who depend on single-investigator grants to become established as independent researchers.

2. The need for increased funding for educational programs on the importance and role of the food system in human health, obesity, national security and the economy must continue to be high priority. The building and maintaining of educational capacity across all universities is essential to ensuring a highly trained and diverse professional workforce which reflects the changing demographics of the United States.

3. The efficient use of funding available to REE depends on leveraging and collaborations with other federal agencies, such as NIH, NSF, Department of Energy, Environmental Protection Agency, Centers for Disease Control and Department of Defense. It also requires leveraging and collaborating with agricultural stakeholders.

4. The demographics of retirements within the Agricultural Research Service, Economic Research Service, National Agricultural Statistics Service, Forest Service, other agencies of USDA, and within Land Grant Universities continues to be a serious issue. Increased emphasis on workforce development should be a priority within all REE programs.

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Research conducted by the United States Department of Agriculture (USDA) continues to be one of the best investments within the federal budget. The outcomes from the research efforts of the agencies associated with USDA have a broad range of applications from increased productivity at the farm gate to improved understanding of human nutrition and environmental conservation. Efforts to increase agricultural productivity are critical to meeting the food demands of increasing world populations, and contribute to the recovery of the U. S. economy. Research will continue to be the source of the new knowledge needed for increased agricultural production, efficient delivery of safe food to consumers, improvements in the health of all populations, and the continued development of an array of non-food products from agriculture. The prospect of climate change and its impact on food production must be considered in future allocations of funding for agricultural research.

Overall, the competitiveness of the U.S. agricultural system depends on continued investment in research funding. Notably there is a significant need for increased agricultural productivity research as was recommended in the May 2011 report of the Board entitled *A Report on Agricultural Productivity and Agricultural Research*. Along with research, increased funding of education and outreach programs should be a priority. Unfortunately, the USDA Research, Education, and Economics (REE) agencies have not received sufficient intramural or extramural funding for many years, and the current economy will prevent significant improvements.

One of the more significant recent shifts in funding of research within USDA has occurred through creation of the National Institute of Food Agriculture (NIFA). This new agency has responsibility for funding of competitive grants to support the mission of USDA, as well as the federal funding for state experiment stations, cooperative extension and outreach, as well as an

array of important educational programs. The format for funding during the first two cycles of competitive grants through NIFA has included an increased proportion of funding for large multi-disciplinary challenge grants, while decreasing the portion dedicated to the traditional smaller single investigator projects. This shift is based on a strategy to leverage an overall increase in appropriations of research funds for competitive grants. An evaluation of the success of this strategy will require several years, and the success is likely to be impacted by the rate of recovery of the U. S. economy.

A complete analysis requires consideration of intramural research programs in the Agricultural Research Service (ARS) and Economic Research Service (ERS), as well as the extramural research at universities across the country. Regardless of location of research, there is considerable evidence that funding levels are inadequate to meet the challenges of the future.

The current focus of USDA research is on five broad areas, which include:

- Global Food Security and Hunger
- Climate Change
- Sustainable Energy
- Childhood Obesity
- Food Safety

While shifting significant resources to these five broad social challenges, the Department could have improved its assessment of the relevance of this research had it first consulted with agricultural industry and related associations. By confirming the relevancy of the research directly with the impacted stakeholders, the Department could be sure it continues to address the most pressing issues facing food and agricultural systems. In addition, it should be noted that appropriate funding levels for outreach and education programs related to the priority areas must be established.

Relevancy of Research

The relevancy of research in the five priority areas can be evaluated based on the direction indicated in recent reports developed by USDA staff. There is a general consensus in the responses from NAREEE Board members to the research directions described in these reports.

Global Food Security and Hunger

The direction of research on global food security and hunger seems to reflect the important role of United States agricultural production in meeting the challenges of supplying adequate food for an increasing world population. A continued research emphasis on increasing productivity, enhanced food safety and nutrition, the exploration of markets in developing countries and on maintaining the economic viability of the U. S. agricultural system is essential.

More specifically, research on productivity, quality and nutritional value of food products must continue to emphasize food safety and nutrition, as well as use of post-harvest technologies to reduce losses throughout the food delivery system. Research on the sensing, packaging and the processing systems as required to reduce losses and wastes is needed, along with increased agricultural production.

Research on minimizing human health risks should include development and applications of current or new technologies for control of food-borne health hazards. A focus on agricultural markets and factors impacting food systems in developing countries is appropriate, but similar analyses of domestic food systems would be beneficial in reducing the incentives for food wastes.

Climate Change

The current direction of climate change research has a focus on adaptation and mitigation. The impacts of climate change need to be identified and aligned with research priorities. Nutrient management is one of the critical challenges, due to the association with greenhouse gas emissions. More specific attention must be given to establishment of intensity targets per unit of land area, nutrient use efficiency as needed to mitigate climate change, and on reducing energy to process, transport or apply nutrients.

Research conducted by the USDA needs to demonstrate science-based leadership on defining the most efficient production, processing and distribution systems for reducing the impact of all sectors of agriculture on climate change. The results of these types of research will assist in establishing priorities for future research on systems having positive impact on climate change.

Specific research to be considered includes expansion of adaptation strategies to ensure that components of the agricultural system remain economically viable as the impacts of climate change are experienced. In addition, research on mitigation strategies is needed to assist in identifying significant contributors to climate change within the agricultural system. USDA should assume leadership in the development of methods for quantifying parameters associated with carbon off-set policies, with specific attention to carbon sequestration and analyzing the costs-benefits of these policies. Finally, quantitative models to predict the reductions in greenhouse gas emissions resulting from change in agricultural production, handling and distribution practices must be developed.

Sustainable Energy

A primary challenge facing the United States and the world over the next several decades is to increase agricultural production sufficiently to meet the food demands of a 50% larger world population, while using less land and water, and responding to the expectations of sustainability. The research needed to meet this challenge must consider all sectors and types of food production and distribution. The funding for research cannot advocate a particular system or approach or suggest that any system is superior to another. The focus must remain on increasing productivity in a sustainable manner. Research on sustainability should integrate all sectors of the agricultural production and product delivery system.

The research strategies should provide a framework for sustainability and for development of the input information for sustainability models. The models and information must be applied to the entire system for delivery of products to consumers, not individual sectors of agriculture or the product delivery system. While local and regional food systems may contribute to the goals of sustainability in some manner, the relative impact of these systems, as compared to traditional

systems, has not been demonstrated. In addition, these models must incorporate the availability of water and the emissions of greenhouse gases.

As the focus on energy independence continues to increase as a national priority, research on bioenergy must be part of an integrated approach. Success in bioenergy R&D will depend on consistent funding and efficient use of the funding. It will also depend on integration of research efforts with other agencies involved in research on sources of energy and efficient use of the energy from all sources. Research funding within USDA must ensure that emphasis on the core fundamentals of food and agriculture is maintained. Recognizing the importance of food productivity, animal agriculture, foreign trade and the challenges and opportunities of biotechnology will ensure that U.S. agriculture is sustainable and efficient.

Childhood Obesity

Research on childhood obesity needs to focus on the link between the food system and human health. The conversion of raw food materials into safe and attractive foods to be delivered to the consumer at costs that will encourage health-enhancing diets should be given a high priority. The research should be integrated, and involve all sectors of the food system from production to consumer. Nutrition monitoring should include the food marketing sector, as needed to ensure that appropriate foods are available at costs for all income sectors of the population.

Research on establishing a scientific basis for dietary guidelines should include new knowledge about bioavailability, as well as an emphasis on the processes and systems needed for delivery of these attributes in consumer food products. While research on obesity prevention should improve the understanding of the biology of obesity, along with the behavioral, environmental and educational factors, research is needed to ensure that appropriate foods are delivered to consumers at attractive costs.

In addition, the research must address behavioral economics and behavioral nutrition. Educational institutions should become partners in providing the cultural sensitivity and local credibility needed to affect changes in behavior. The research should include an emphasis on the adults who influence the food choices of children. The research conducted by USDA agencies needs to include a focus on the food retailing environment and the restaurant environment. The consumer's lack of understanding of the term "healthy food" should be given high priority, with emphasis on communication of a clear explanation of the information in a user-friendly manner.

Food Safety

The direction of food safety research must be comprehensive with equal attention to all sectors of the food system. While an emphasis on control of pathogens at the source during production and assembly of food is important, the control of pathogens and contaminants throughout the food system is essential to ensure safety of the food supply. The research should emphasize the risk dimension of food safety and the communication of risks. The importance of animal health and the importance of food supply animals must be included in food safety research.

Research on understanding microbial populations in foods, including more attention to environments after processes and packaging, is important. The impacts of environments during

transportation, distribution and retail display are important components of successful food safety systems. The research should include a focus on quantitative kinetic models for description of residual microbial populations, as compared to statistical models, to ensure that a sound structure for future research and development on food safety is established. The need for development of sensors for microbial pathogens to be used throughout the food system is evident, including applications in the packaging used for delivery of the product to the consumer. Finally, research on intervention strategies for process technologies used to eliminate the hazards created in foods by microbial pathogens must be considered. The rapid improvement in food safety practices and changes in regulations present a challenge for continuous workforce education. Adequate funding of outreach activities is needed to ensure that the outcomes of all research are available to all food companies of all sizes.

Workforce development

Recent reports indicate that a significant portion of the workforce involved in agricultural research will retire within the next 10-15 years. Similar projections are true for university research faculty. Any decline in capable workforce would have a negative impact on the quality and quantity of research conducted by the REE system. The need for funding to ensure an appropriate supply of professionals in the agricultural sciences must be given a high priority. Adequate funding should be provided to all types of universities, with emphasis on all agricultural universities, will ensure a pipeline of diverse future professionals spanning the undergraduate experience to graduate levels to agriculture-food system professionals.

Adequacy of Funding

In general, the funding for USDA research, education and outreach is not adequate to meet all goals associated with the five research areas identifies within REE. Given the limited funding available, it will be critical to prioritize all programs to be funded within each of the five areas. Using the available funding to leverage research should provide a viable approach to meeting the overall goals of the research. Several approaches to leveraging are possible, including the strategy being pursued within NIFA. Hopefully, the impacts of outputs from the larger competitive research projects will establish a basis for an overall increase in funding available for competitive grants in the future, and funding of individual investigator grants can be restored to pre-NIFA levels. Whenever possible, current funds should be leveraged to encourage joint and/or cooperative programs with other agencies outside USDA. These types of leveraging should be pursued within each of the five priority research areas being pursued.

Summary

The USDA REE agencies have not received sufficient intramural or extramural funding for many years, and the current economy will prevent significant improvements. The shortage of funds at both the state and federal level for maintaining and/or increasing efforts devoted to agricultural research, extension, education, and economics continues to be serious. The shift in funding of competitive grants has created a serious challenge for younger researchers at academic institutions. The impact on faculty at small and medium size institutions is even greater. The need for increased funding for educational programs on the importance and role of the food system in human health, obesity, national security and the economy continues to be high

priority. To ensure efficient and effective use of available funds, REE must leverage collaborations with other federal agencies. Due to the demographics of retirements within USDA research agencies and within Land Grant Universities, emphasis on funding workforce development programs should be a priority for the agricultural sciences.

Report Developed by the NAREEE Advisory Board – Relevancy and Adequacy Committee

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