

AFRI STAKEHOLDER FEEDBACK

Results of an AFRI Gap Analysis conducted by the ESCOP Social Science Subcommittee on February 21-22, 2012.

Introduction

In response to NIFA's call for stakeholder feedback to the Agriculture and Food Research Initiative (AFRI), the ESCOP Social Science Subcommittee (SSSc) conducted a gap analysis of recent AFRI RFA's to identify ways these could solicit more robust contributions from social scientists. Suggestions are provided to help AFRI envision the signature and foundational programs in ways that better address the human and social dimensions of the grand challenges and foundational research that shape AFRI priorities.

The purpose of the ESCOP SSSc is to "Recommend specific actions to help the Land-Grant system address high priority research and education issues leading to outcomes that deal with social issues in a significant, measurable way and that will generate sustained financial support." The SSSc hopes that this gap analysis will produce results not only for AFRI, but for the many other science initiatives at NIFA and within the Land-Grant system that can benefit from the body of work, perspectives and approaches, and skill sets that social scientists bring to solving some of our most vexing food, agricultural, and rural problems.

The SSSc reviewed the science priorities of available 2012 RFAs, including Food Safety, Agricultural and Natural Resources Science for Climate Variability and Change, Food Security, and Sustainable Bioenergy, as well as the 2011 RFA for foundational programs, including Plant Health and Production and Plant Products; Animal Health and Production and Animal Products; Food Safety, Nutrition, and Health; Renewable Energy, Natural Resources, and Environment; Agricultural Systems and Technology; and, Agriculture and Rural Communities.

The SSSc conducted their review by organizing into five small multidisciplinary working groups, each tasked with a different RFA. This was done to divide the labor and focus the attention and expertise of participants on a specific set of challenges. The SSSc defined the scope of their work by focusing exclusively on those 30 pages extracted from the five RFAs which articulated the science priorities in each of the challenge and foundational areas. No other facets of the solicitation or competitive process were reviewed.

Instructions for the gap analysis were open-ended and non-prescriptive, so each group was able to tailor their responses and recommendations as best suited the needs of their work. As a result, working groups reported back in a variety of ways; this will be evident in the various ways that feedback is presented below.

There are, however, general themes, cross-cutting issues, and overarching concerns that are presented first. Then, attention is focused on the specific science priorities of each RFA. The ultimate purpose of this gap analysis and stakeholder feedback is so NIFA may reap greater benefits from their social science investments to solve the grand and foundational challenges identified within AFRI.

Cross-cutting Areas from the Five Working Groups

The SSSc has high regard for the work done by NIFA and the RFA developers in reshaping the Agriculture and Food Research Initiative. As a result of your efforts, important work is being done by the land grant partners and other AFRI awardees. No recommendation made in this SSSc review is meant as a criticism of this hard work. Rather, our comments and suggestions are offered as a means to continually improve the science enterprise and to assist NIFA to remain nimble in response to dramatic changes in food, agriculture, natural resources, and the environment, and the coupled natural and human systems we are all trying to better understand.

Hundreds of pages of RFA text were sifted through to distill the 30 pages of science priorities that were their focus. This burdensome task hints at a challenge that all social scientists may face when trying to respond to NIFA solicitations. The human and social dimensions are diffused throughout NIFA programming (as we believe they should be), but this means that social scientists must work much harder to identify competitive opportunities in NIFA RFAs. We would recommend that NIFA create some mechanism to provide a summary of the human and social dimensions solicited by the aggregate of NIFA RFAs. We believe this would facilitate more robust contributions from social scientists in the competitive process and, ultimately, to the outcomes of AFRI investments.

The problems to be addressed in each RFA are almost always framed from a technological perspective, rather than from human needs perspective. Most RFAs are quite prescriptive, requesting an assumed solution to a problem rather than eliciting projects that propose a new way to solve the problem or that represent an array of potential solutions. Moreover, the assumed solutions solicited by the RFAs are almost always of a technological nature, which do not derive from an understanding of social systems and human behavior. If the human needs are assumed, they are implicit, not explicit, as though all RFA developers agree on the problem. The outcome of science application may be a product OR a process. Examples of some vexing paradoxes that require research on the human and social dimensions rather than technological fixes include: food processers and preparers frequently neglect even basic food safety practices; farmers do not automatically switch production to a carbon sequestering cultivar; consumers often do not select the healthiest foods on the grocery shelf; and, increasing the food supply does not ensure food security or feed the hungry.

RFA developers need to integrate the social sciences in the framing of the issue, rather than bringing them in at the end to evaluate behavioral change. Ask “How does this RFA address the human condition?” And make the answer explicit in the solicitation and in the proposed projects. USG solicitations for international development work require that all proposals include a social impact assessment (SIA). Inclusion of an SIA requirement for AFRI-funded projects would go a long way to strengthening the human and social dimensions of AFRI investments and solving human problems.

The RFAs frequently rely on social science buzzwords without defining them. For example, what is meant by cost-benefit analysis or social, economic, and environmental sustainability? What are the components? What are the benchmarks? Costs to whom? Benefits for whom? How will we know when we've achieved sustainability? Without defining and providing benchmarks, how can we evaluate whether a proposed project is designed to achieve it? This repetition of buzzwords gives the impression that RFA developers don't understand the incredible potential of social science research or the nuanced approaches that each science can contribute. The social sciences can do so much more than cost/benefit analysis!

If behavior change is an end goal, it is essential to understand the drivers of human decision-making, adoption and diffusion, and action to change conditions. Where do the RFAs (and the proposed projects they solicit) consider producer or consumer adoption? What cultural elements contribute to variability in acceptance, response, choice, etc.? What are the barriers that thwart and enhancers that facilitate changes in human behaviors, policies and institutions, and social systems?

There seems to be a disconnect in the RFAs between the science being solicited and those who hold a stake in its success, especially farmers and consumers. For example, is it implicit or explicit that a market exists for the technology developed or practices recommended as a result of AFRI investment? Assessing producer and consumer needs prior to developing new agricultural technologies and practices will be essential.

RFA developers need to consider a number of questions, including: Who are the intended users of AFRI-developed technologies? Who will adopt this technology? Is this a farmer decision, consumer decision, voter decision, manufacturer decision? Whose behavior needs/is going to change? Who will implement this change? And what are the implications of these changes for individuals, communities, institutions, governments, and social systems? What will be the impact on agriculture? What will be the impact on communities? Does the technology contribute to people prosperity or place prosperity? What conditions will change as the result of diffusion of these technologies, and how will they impact quality of life?

We were pleased to see that a number of RFAs solicit systems analyses. Their presentation in the text, however, appeared quite linear, rather than iterative. We could not detect whether a feedback loop was considered. If so, we would recommend that this be made more explicit in RFAs that solicit systems analyses. If not, we would recommend its inclusion.

In many solicitations, the evaluation component is missing or invisible. A three-year award constrains the ability to measure outcomes, and science can't verify impacts by the end of five years. Is AFRI considering extending the timeframe of awards to allow more robust evaluation of results?

The RFAs should solicit education research, not just education doing. Education and extension is not just an activity or a product, it is a researchable science. Education and Extension scholarship should be expected and invested in.

We didn't see much in the way of addressing the needs of limited-resource producers, communities, and populations, including the 1890 institution stakeholders. This could be addressed by insistence on involvement of minority-serving institutions, 1890, 1994, and HSIs. Proposed project should be able to demonstrate how all partners were involved in the development and integration of the project and will contribute to its outcomes.

Finally, is there a way for NIFA (or Congress) to define Hispanic-serving institutions that would allow focused partnerships with the Land Grant system? Defining them by enrollment figures creates a "moving target," which thwarts meaningful long-term collaborations. This is compounded because HSIs are NOT structurally similar to Land Grants, as they have no colleges of agriculture or Extension services. If NIFA could designate a number of HSIs it seeks to support and identify them, this would help the Land Grant system establish working relationships that are easier to sustain.

FY 2012 Food Safety (AFRI)

General Observations and Reflections

The RFA does not question how consumers and producers will respond to changes in food safety. That is assumed. But if erroneously assumed, the investment may be wasted. Food safety needs to include research on what drives consumers' preferences and behaviors. Such research would examine motivation, affective and cognitive development, and emotional intelligence, among other things. This would attract other social sciences (psychology, e.g.) to make contributions to solving food safety problems.

Social structures, social and economic systems, the market and organizational structures (ownership, contracts, organizational literature on how business, industry, & gov't interaction, incentives) and how they interact among one another are key dynamics that should be among the subjects solicited for food safety science.

The supply chain is NOT a buzzword. We recommend the RFA encourage examination of the entire value chain in terms of food safety, especially critical control points, broadly defined. This would require looking at potential breakdowns in technology and behavior and what the costs and benefits of success or failure are. Food safety behaviors of farmers and producers and processors and manufacturers are all significant areas of inquiry. The food processing and production links in the chain are essential to include, as are interactions among social system factors and external influences.

We did not see food safety priorities related to potential contaminants in the food supply. Is there a way to incorporate issues related to antibiotics, pesticide residue, food irradiation, and/or biotechnology in the solicitation?

The RFA did not seem to provide a way to evaluate how people assess their food safety risk. An informed choice is not correlated to a change in behavior. How are consumers responding to food safety information? What are their perceptions of food safety risk? These are important areas of inquiry for food safety.

In the RFA, education appears to simply be an add-on. There is no attention given to education scholarship or education science. Simply "educating" the public is not the solution; labels don't elicit consumer response. A perfect food safety system is cost prohibitive. What is needed is better understanding of which food safety practices are more economically important to focus on. Which gives the greatest margin for safety? Of all the potential problems and solutions, which gives us the greatest bang for the buck?

Specific Suggestions are embedded below **in bold** in the text of the Food Safety RFA. Extracts of Program Priorities from the Food Safety RFA follow.

Background

While the U.S. food supply is generally considered to be one of the safest in the world, food-borne illness continues to be a source of concern for the American consumer, federal government, and industry. The Food Safety Challenge Area promotes and enhances the scientific discipline of food safety, with an overall aim of protecting consumers from microbial, chemical, and physical hazards that may occur during all stages of the food chain, from production to consumption. This requires an understanding of the interdependencies of human, animal, and ecosystem health as it pertains to food-borne pathogens.

To meet these identified needs, the long-term outcome for this program is to reduce food-borne illnesses and deaths by improving the safety of the food supply, which will result in reduced impacts on public health and on our economy. Projects are expected to address one of the stated Program Area Priorities which collectively contribute to the achievement of the following goals:

1. Improve the safety of the food supply through developing and implementing effective strategies that prevent or mitigate food-borne contamination, including food processing technologies, resulting in a reduction in the incidence of food-borne illness, while preventing future food-borne outbreaks. **In addition, identifying and promoting the development of incentives, organizational structures, and contracts that lead to behavior on the part of producers and consumers that promote food safety.**
2. Promote the development, adoption **and diffusion** of detection technologies for food-borne pathogens and other contaminants in foods, which are sensitive, specific, rapid, economical, easily-implemented, and usable under a variety of conditions, including use in the field. **This will involve the need to understand what factors influence producer and consumer behavior and how they respond to incentives. Topics that are important are cultural values, social structures and organization, brain mapping, etc.**
3. **Evaluating the value chain to identify the critical control points (with costs and benefits broadly defined to incorporate the values of the participants). Contracting will also be important. Another area is a reporting system where consumers are able to report problems with food illnesses – thus there will be a need for a data repository (data – information – knowledge). Reduce** negative public health and economic impacts through the development and demonstration of effective traceability systems that track the source, movement, critical tracking events (CTEs), storage, and control of contaminated food and food ingredients from production to consumption.
4. Increase the number of food safety scientists, as well as scientists who are cross trained in environmental science, animal science, microbiology, genetics, epidemiology, economics, social science, food science, engineering, and public health, to provide a holistic approach to ensuring the safety of the food supply, from pre-harvest through consumption.

5. The role of contaminants in our food supply is another question of importance here.

In order to achieve these program goals, the Food Safety Challenge Area will address several focused objectives over the next three years. These specific objectives are intended to allow for a stepwise progression toward effective strategies for prevention and mitigation of contamination, evaluation and demonstration of effective food processing technologies, rapid detection of food contaminants, and development of effective traceability systems for food and food ingredients. In FY 2010, the AFRI Food Safety program focused on the following priority areas: shiga-toxin producing *Escherichia coli* (STEC) in beef, food processing technologies, food-borne viruses, food safety education and emerging food safety issues. In FY 2011, the AFRI Food Safety Program will solicit new grant applications that address *Salmonella* and *Campylobacter* in poultry products. In addition and like the FY 2010 priority areas, the AFRI Food Safety Challenge Area will request applications for critical and emergent food safety research needs to prevent and control threats to the safety of the U.S. food supply. Contingent upon the availability of new funds, in FY 2012, the priority areas will include: microbial ecology of food-borne pathogens and control of other food-borne pathogens of concern, e.g., *Listeria monocytogenes*.

Comment: This suggests that the entire problem relates to food contamination, and if we just educate people all will be solved. However people respond in sometimes seemingly irrational ways – so further understanding of human behavior on the part of all players in the value chain will be essential.

1. Prevention and Control of Salmonella and Campylobacter in Poultry Flocks and Poultry Products, including Eggs

Comment: Why is the focus on such a specific example when there are food-borne illnesses from many food sources (e.g.; other animal products; fruits and vegetables?)

Program Area Priority – Applicants must address the following:

Projects in this priority area should generate information and/or strategies critical to the reduction of *Campylobacter* and/or *Salmonella* in poultry and poultry products. Projects are encouraged to identify risk factors and develop intervention and risk management strategies for reducing *Campylobacter* and/or *Salmonella* contamination in the pre-harvest and/or post-harvest environments and evaluate the effectiveness of the strategies using a risk-informed approach. Highly focused projects that include two of three functions (research, education, extension) will be considered for funding.

Applications are encouraged to include one or more of the following topic areas:

Comment: This sort of evaluation will be incomplete without an understanding of the systems, and the incentives that result from those systems, and how those incentives lead to particular behavior (with respect to taking on risk) that decision makers will use.

- Develop new and improved methodologies for monitoring poultry flocks for the presence of *Campylobacter* and/or *Salmonella*. Monitoring and surveillance should target both chicks known to be pathogen-negative, and suspected targets of vertical transmission from grandparent, to parent, to offspring (or to egg).
- Develop improvements in slaughter hygiene and technology that are effective for reducing contamination of poultry products. Improvements should address a combination of control factors that provide a series of “hurdles” to minimize the risk of poultry meat contamination.
- Develop and implement guidelines for taking appropriate action when finding positive flocks.
- Develop novel technologies to reduce human pathogens in live birds and/or poultry products, including eggs.
- Develop guidelines and recommendations for best practices to reduce human pathogen loads in poultry flocks.
- Investigate improvements in control technologies that promote protective mechanisms in individual live birds, such as vaccinations, and optimization of the intestinal flora of poultry.
- Develop effective and efficient processing and packaging methods for prevention, control, and elimination of contamination of poultry products.
- Design effective training, education (graduate and undergraduate), and outreach programs for industry, veterinarians, producers, processors, and others who are critical influencers of effective infection control and prevention of contamination, both for live animals, poultry meat, and eggs.
- **There may be a need to study the impact of scale of operation on the propensity for problems with food safety in production operations. On the one hand a large scale poultry operation may be safer because that organization can afford to have a veterinarian on-site to watch for problems and have them treated before they become severe. On the other had, if there is an outbreak that quickly spreads through the flock there are many more animals affected and that can affect consumer safety.**
- **Sometimes consumer response to a food safety crisis is to “buy local” or “buy organic” or “grow your own” and the relative safety of these approaches is unknown. This is another area in need of study.**
- Design new, innovative, and effective consumer education programs that focus on the best ways to avoid infection, including safe handling and preparation and proper cooking instructions (for example, proper temperature and time controls) for poultry and poultry products. **Identify and develop knowledge diffusion systems for the 21st century. How do we inform consumers and producers in a manner that is effective and wide-spread?**

- **Use school based (formal) education for safety education and take a lesson from the positive experiences with recycling and farm safety.**
- **Cultural sensitivity, norms and traditions play a very large role here. More study is needed to identify how these factors are influencing consumer behavior and how educational programs might be structured.**
- Determine the most effective and practical methodologies for measuring and evaluating the impact of potential interventions on preventing and controlling infections associated with poultry products.
- Conduct economic analyses that compare the costs and benefits of implementing various prevention and control measures from farm to fork. These measures should be developed for small, medium, and large producers and/or processors. There is a need to broaden this to incorporate the impact of different organizational (different market structures, different ownership organization) and contract structure on incentives and behaviors.

Other Program Area Requirements:

- *Detail Removed*
- To increase the potential impact of projects on control of *Campylobacter* and *Salmonella*, inclusion of animal scientists, food microbiologists, poultry plant operators, veterinarians, engineers, economists, epidemiologists, social scientists, educators, extension educators and specialists, and statisticians to the project team is highly recommended, where applicable.

Comment: In order to understand the cultural and social factors it will be important to expand this list to include other social scientists (anthropology, sociology, psychology) among others, including other life sciences for investigations that include bio-chemistry, brain mapping, etc.

2. Addressing Critical and Emerging Food Safety Issues

Program Area Priority – Applicants must address the following:

- Research generated in this priority will reduce the burden of food-borne illness by supporting a wide range of critical and emerging food safety research needs. Emerging pathogens and contaminants are defined in this program as being potential food safety hazards where little to no science-based information is available demonstrating that the hazard is a cause of food-borne disease. This program will support both fundamental and applied research focused on identifying and characterizing emerging food-borne human pathogens and other contaminants (*e.g.*, chemicals, nanoparticles, and toxins) in foods; development of concentration and purification methods for isolating pathogens and contaminants from foods; identification and evaluation of under-researched food vehicles that harbor or support pathogen growth and transmission; and/or

novel and practical processing, mitigation, and control strategies that reduce the transmission, growth, and survival of pathogens in food environments.

Applications are encouraged to include one or more of the following topic areas:

- **Evaluate the value chain to identify the critical control points – using broad based measures of cost and benefits and return on investment (ROI).**
- Identify and characterize emerging human food-borne pathogens and contaminants of significance to the food supply.
- Develop novel intervention strategies in live animals for emerging human food-borne pathogens and/or contaminants, with special emphasis on the critical period leading up to, and ending with presentation for slaughter and hide removal (meat) or collection (milk).
- Conduct pre-harvest basic and applied studies to develop sensitive, accurate and validated pen-, chute-, or animal-side emerging food-borne human pathogen detection tests that are cost-effective and amenable to high-throughput scaling.
- Develop and statistically validate an improved method for the detection of *Brucella* in cheeses or *Mycobacterium avium* or *bovis* in dairy products including cheese. The method should be rapid, specific, practical, and sensitive. Determine the incidence of these pathogens in these products.
- Develop and statistically validate and improved method for the detection of, and if possible to distinguish between, the meat-associated and feline-associated *Toxoplasma gondii*. The method should be rapid, specific, practical, and sensitive.
- Determine the incidence of *Toxoplasma gondii* in live food animals and identify interventions to reduce contamination of meat and/or produce.
- Develop novel concentration and purification procedures for isolating human pathogens or contaminants from foods.

Other Program Area Requirements:

- *Detail Removed*
- To improve the potential impact of projects on enhancing food safety, inclusion of engineers, food microbiologists, economists, epidemiologists, social scientists, animal scientists, and statisticians to the project team is highly recommended where applicable.

Comment: Include other disciplines as well, such as psychology.

3. Research Projects

Single-function Research Projects will be support fundamental or applied research conducted by individual investigators, co-investigators within the same discipline, or multidisciplinary teams.

Fundamental research means research that (i) increases knowledge or understanding of the fundamental aspects of phenomena and has the potential for

broad application and (ii) has an effect on agriculture, food, nutrition, or the environment.

Applied research means research that includes expansion of the findings of fundamental research to uncover practical ways in which new knowledge can be advanced to benefit individuals and society.

Multidisciplinary projects are those in which investigators from two or more disciplines collaborate closely to address a common problem. These collaborations, where appropriate, may integrate the biological, physical, chemical, or social sciences.

4. Integrated Research, Education, and/or Extension Projects

An Integrated Project includes at least two of the three functions of the agricultural knowledge system (*i.e.*, research, education, and extension) within a project, focused around a problem or issue. The functions addressed in the project should be interwoven throughout the life of the project and act to complement and reinforce one another. The functions should be interdependent and necessary for the success of the project and no more than two-thirds of the project's budget may be focused on a single component.

- 1) The proposed research component of an integrated project should address knowledge gaps that are critical to the development of practices and programs to address the stated problem.
- 2) The proposed education (teaching and teaching-related) component of an Integrated Project should develop human capital relevant to overall program goals for U.S. agriculture. An education or teaching activity is formal classroom instruction, laboratory instruction, and practicum experience in the food and agricultural sciences and other related matters such as faculty development, student recruitment and services, curriculum development, instructional materials and equipment, and innovative teaching methodologies.

Educational activities may include any of the following: conducting classroom and laboratory instruction and practicum experience; faculty research internships for curricula development; cutting-edge agricultural science and technology curriculum development; innovative teaching methodologies; instructional materials development; education delivery systems; student experiential learning (student led-research; internships; externships; clinics); student learning styles and student-centered instruction; student recruitment and retention efforts; career planning materials and counseling; pedagogy; faculty development programs; development of modules for on-the-job training; providing knowledge and skills for professionals creating policy or transferring to the agriculture workforce; faculty and student exchanges; and student study abroad and international research opportunities relevant to overall program goals for U.S. agriculture. Educational activities must show direct alignment with increasing technical competency in AFRI priority area(s) to ensure that U.S. agriculture remains globally competitive in the knowledge age.

Educational components must address one or two of the following key strategic actions:

- Train students for Associate, Baccalaureate, Master's or Doctoral degrees; and/or
- Prepare K-12 teachers and higher education faculty to understand and present food and agricultural sciences.

These projects should synthesize and incorporate a wide range of the latest relevant research results. Note that routine use of graduate students and postdoctoral personnel to conduct research is not considered education for the purposes of this program.

- 3) The proposed extension component of an Integrated Project should conduct programs and activities that deliver science-based knowledge and informal educational programs to people, enabling them to make practical decisions. Program delivery may range from community-based to national audiences and use communication methods from face-to-face to electronic or combinations thereof. Extension Projects may also include related matters such as certification programs, in-service training, client recruitment and services, curriculum development, instructional materials and equipment, and innovative instructional methodologies appropriate to informal educational programs.

Extension activities address one or more of the following key strategic actions:

- Support informal education to increase food and agricultural literacy of youth and adults;
- Promote science-based agricultural literacy by increasing understanding and use of food and agricultural science data, information, and programs;
- Build science-based capability in people to engage audiences and enable informed decision making;
- Develop new applications of instructional tools and curriculum structures that increase technical competency and ensure global competitiveness;
- Offer non-formal learning programs that increase accessibility to new audiences at the rate at which new ideas and technologies are tested and/or developed at the community-scale; and
- Develop programs that increase public knowledge and citizen engagement leading to actions that protect or enhance the nations' food supply, agricultural productivity, environmental quality, community vitality, and/or public health and well-being.

These projects should synthesize and incorporate a wide range of the latest relevant research results. Please note that research-related activities such as publication of papers or speaking at scientific meetings are not considered extension for the purposes of this program.

Integrated Projects aim to resolve today's problems through the application of science-based knowledge and address needs identified by stakeholders. Integrated Projects clearly identify anticipated outcomes and have a plan for evaluating and documenting the success of the project. These projects should lead to measurable, documented changes in learning, actions, or conditions in an identified audience or stakeholder group.

**Agricultural and Natural Resources Science for
Climate Variability and Change (AFRI)**

General Observations and Reflections

Everything is dynamic (social, economics, environmental) so there is no firm target for a sustainable climate. Costs are going to rise. People's choices will be influenced. Food access/security is the key question with climate change. What are the responses? The market will respond to climate change because people will react and adjust. But where is the market? And how does it respond? Answers to such questions are not solicited by this RFA.

Does the RFA consider a feedback loop in all systems analysis? It's not explicit, but it should be.

The evaluation component is invisible, due to the contracted timeframe for measuring outcomes within 3 years. Researchers can't verify impact by end of 5 years. The intermediate or long-term outcomes can't be measured within timeframe.

Specific Suggestions are presented below **in bold**:

- 1. General Frame Question: The basic formulation of the RFA is on the production/technology side of the problem:**
 - a. For example, maybe the optimal response to rising seawater is to move rice production inland and use the freed land for something else.**
 - b. A larger/regional response to climate change.**
- 2. General Frame Question: The RFA focuses on place prosperity rather than people prosperity.**
- 3. General Frame Question: These decisions may imply that people have to make different consumption decisions than they did before – some commodities may become more expensive – does this impact food security?**
- 4. With regard to 5.1 – Assess the existing and potential market for ecosystem services focusing on carbon sequestration.**
- 5. With regard to 5.4 and 5.5 – This may not be attainable given the lifespan of the projects. An instrument may show a difference, but we cannot show impact [Pic 1,2, or 3 and then 4 or 5].**
- 6. What is the difference between 5 and 6? Is the focus in 6 on increased variability or regional shifts?**
 - a. They use the term ecosystem services in the individual objectives.**
 - b. Regional changes in production/mitigation.**
- 7. How would supply chains have regional context?**
 - a. Clarification of the economic dimension of the second bullet point on 6.**

- 8. Why do producers decide to participate in decision-making, management practices, and supply chains on second bullet point on 6?**
- 9. What is the educational research content? It seems to be more a delivery of service instead of research.**
- 10. More detail on collaboration between education and research would be helpful.**

FY 2012 Food Security (AFRI)

General Observations and Reflections

The focus of the RFA is on increasing food production, but food security is about more than producing more food. The paradox is that hunger goes up as production goes up. Consequently, the science of food security needs to be reframed. What are the human issues causing food insecurity and how do we address these? Create new category in the RFA—on the food system. Refocus the new program priority on the food system and human behavior; neither animal nor crop, but instead looking at human factors—the behavior of people. People will have to behave differently. Not everything is amendable to a technological fix. Food access and affordability, and public and private food distribution systems are essential areas of inquiry, as are economics, logistics, infrastructure, etc.—to improve food security. It is not essential to have social scientist on every project, but researchers do need to recognize the human dimensions of these problems. The RFA needs to facilitate this, so it is not simply tacked on to the end of any project.

Human behavior is affected by information and policy. How will we use the information generated by the program to implement change? This suggests that policy analysis should be built into the RFA as essential area of inquiry for food security, too. Likewise, how will the knowledge generated be disseminated? Considering how information will be disseminated should be part of RFA, to initiate discussion and development of food system that ensures food security.

Specific suggestions are presented below **in bold**:

The Food Security Group was struck by several things in critiquing the Program Priorities of the 2012 AFRI RFA. The first would be that the RFA focused on increasing food production as a primary way of increasing food security. The primary assumption for this “production focused” proposition seems that food insecurity occurs largely because of lack of food, ignoring myriads of other social and human consumption issues. We recognize that the food security issues being addressed are global as well as national and support research that enhances production. But we note, for example, the RFA indicates that between 2007 and 2008, food insecurity increased 30 percent in this country. Food production during the same period increased and the food system became more efficient: food production increased by 2 percent, and total agricultural inputs decreased by 2 percent. We argue that increased food production and food production efficiency alone does not lead to reductions in food insecurity. Therefore, we suggest that the introductory section of the RFA broadens the assumption underlying as well as causes of food insecurity.

We further noted that the RFA summary was structured into two sections that address the production side: the first dealing with “increasing animal health and production” and the second with “increasing sustainable crop production. The

first section had three programs that focused on animals and the second section had four programs, three of which focused on crops and the last of which dealt with “sustainable food systems to improve food security”. We believe that the section “sustainable food systems” should be treated as a separate category, dealing with the human factor. Therefore, we suggest restructuring the seven programs into three major categories: food systems (dealing with the human factor), animal systems, and crops systems.

Based on the above observations, we identified several ways in which the RFA categories can be improved and the social sciences and human dimensions can be incorporated into the AFRI process:

1. The human dimensions need not be explored in every priority: economic impacts have some relevance to many programs, but analysis of human behavior and social systems has marginal relevance to 5 of the 7 programs priority reviewed.
2. Consider taking advantage of the human and social science expertise in the system by refocusing existing programs or focusing new programs on human behavior and the food system, broadly conceived.
3. Specifically, we’d recommend a new category on “improving food systems through understanding human behavior and economic/social systems” (in addition to the sections on “increasing animal health and production” and “increasing sustainable crop production”) that draws on the strengths of the human and social sciences as well as the agricultural production sciences. And bring this category to the front of the description of Food Security research.
4. The program under Food Security that fits in this new category and that most heavily draws on this expertise was Number 7 on “sustainable food systems to improve food security”. This program supported analysis of food access and affordability issues, the public and private and nonprofit food distribution system and the production and value chains embedded in this system.
5. Human behavior is changed by new information as well as policies. (Think about how new information and policies about smoking and health affected tobacco use over the last 50 years.) This program can contribute to information about human behavior related to food choices, food system functioning, and policies that affect the food system and human health in a way that can lead to improvements in global and national food security. Requests for proposals should encourage analysis of policies that affect food systems and plans for getting the information to potential users.

FY 2012 Sustainable Bioenergy (AFRI)

General Observations and Reflections

This RFA needs to be more prescriptive in inclusion of social & human dimensions of bioenergy and the participation of social scientists. Researchers responding to the RFA should demonstrate a foundational understanding of what a human system is and what it encompasses.

The RFA needs to articulate the sustainable dimensions of each of the three legs of the stool: environmental, economic, and social. What are the social pieces that have to be in place before a sustainability goal can be achieved? Sustainability analysis should reach down to the social components.

Specific suggestions are presented below and embedded below **in bold**.

Comment: In framing and shaping the science for sustainable bioenergy, as well as for developing the program description, it would be advantageous to also view the challenges through the lens of farmers and communities.

Extracts of Program Priorities from the Sustainable Bioenergy RFA follow:

Sustainable Bioenergy Challenge Area:

- *Detail Removed*

Background

The AFRI Sustainable Bioenergy Program will fund grants that target vital topical areas related to the development of regional systems for the sustainable production of bioenergy, biopower and biobased products. These programs will, where appropriate, align with existing Regional Bioenergy Coordinated Agricultural Projects (CAP) to promote NIFA's goal and mission of economic, environmental, and rural community sustainability **through research, education, and outreach**.

Comment: Extension scholarship should be a requirement, especially with regard to goals 7 and 8 below.

Demand for biomass continues to increase as additional targets for heat, transportation fuels, power, and biobased products are realized. Current policies are designed to provide agricultural support, rural enhancement, reduced dependence on foreign sources of energy, climate change mitigation/adaptation, and environmental sustainability. Policy developments often are identified as drivers of production decisions in the biofuels and bioenergy industries. New policies will need to take into full account associated risks/uncertainties and unintended consequences of feedstock production systems on natural resource and ecosystem service sustainability. Research

is not well developed around the implications of current and alternative regulatory policies, fuel and portfolio standards, market distorting and other production subsidies, tax credits, and agricultural assistance programs on both bioenergy and agricultural markets and production decisions, which are subject to further evaluations of environmental and other indirect effects.

To meet these identified needs, the long-term outcome for this program is to implement regional systems that materially deliver liquid transportation biofuels to help meet the Energy Independence and Security Act (EISA) of 2007 goal of 36 billion gallons/year of biofuels by 2022 and reduce the National dependence on foreign oil and, as appropriate, produce biopower and biobased products. Projects are expected to employ a systems approach to address the stated Program Area Priorities which collectively contribute to the achievement of the following goals:

1. Deployment of superior genotypes of regionally-appropriate dedicated energy crops.
2. Refinement and implementation of sustainable regional feedstock production practice.
3. Seamless feedstock logistics.
4. Scalable, sustainable conversion technologies that can accept a diverse range of feedstocks.
5. Regional marketing and distribution systems.
6. Regional sustainability analyses, **procedures of policy analysis and community engagement**, data collection and management, and tools to support decision-making, **system-development, and transitional science; initial data collection should include limited-resource bio-energy producer and consumer concerns.**
7. **A workforce well-educated and prepared through formal and informal education from secondary through post-secondary to adult level** with the capacity to fill the cross-disciplinary needs of the biofuels industry.
8. **Build capacity in minority-serving institutions for research, education, and outreach in sustainable bio-energy.**

In FY 2010, NIFA solicited for the establishment of three Regional Bioenergy CAPs that focus on dedicated energy crops including energy cane, perennial grasses, sorghum, woody biomass, and oil crops (oilseeds and algae). These sustainable crops serve as feedstocks for the production of advanced non-ethanol, infrastructure-compatible fuels and biobased products through a systems-oriented approach that links feedstock development, production, logistics, conversion and markets. NIFA supports programs that are trans-disciplinary and integrate genetic crop development; sustainable agronomic and silvicultural practices; pest and beneficial species management; coordinated energy-efficient logistics; flexible and scalable sustainable conversion and refining technologies; effective marketing and distribution systems; provide sustainable ecosystem services and rural community prosperity. In FY 2012, NIFA will support one additional Regional Bioenergy CAP that focuses on the production and delivery of Regionally Sustainable Biomass Feedstocks. While the focus will be on feedstocks,

competitive proposals will present their feedstock development and production concepts in the context of a complete regional supply chain.

The FY 2010 Request for Applications received useful stakeholder input which helped to identify the specific areas of research for FY 2012. These topics increase NIFA's pursuit of sustainability by focusing on the interplay between policy, **planning and implementation**, the environment, and bioenergy and protecting and providing habitats for wildlife and beneficial insects. Each topic has strong ties to the environment, economic efficiency, and rural community life. The topics are important to achieving National goals and can span borders creating the potential of international collaboration and learning.

Comment: We added planning and implementation as important areas of inquiry. These currently go unaddressed in the solicitation, but we would recommend their inclusion and see a number of opportunities for research in these areas.

Comment: Here is a great place to introduce the capacity-building suggestions made previously.

5. *Development and Sustainable Production of Regionally-appropriate Biomass Feedstocks*

Program Area Priority – Applicants must address the following:

- Present a coordinated plan for developing a regional approach for feedstock development, production, and delivery to ensure the sustainable production of biomass to be used for conversion to advanced liquid transportation fuels, and if appropriate, biopower and biobased products. These systems should have net positive social, environmental, and rural economic impacts and be specifically targeted to an industrial, **cooperative, or government** partner or platform. It is expected that the Regional Feedstock CAP will network with and leverage existing efforts within USDA; university research, education, and extension **faculty and resources**; other federal agencies; and the private sector by taking multidisciplinary and transdisciplinary approaches.

Comment: The word “network” isn’t very descriptive. We would suggest substituting “partner” or “collaborate”.

Other Program Area Requirements:

- *Detail Removed*

Comment: Has the program defined what they mean by “sustainable”? How will the program be able to evaluate sustainable production and delivery systems? How will the program insure sustainability?

- This program is focusing on the development of sustainable production and delivery systems around five groups of dedicated energy feedstocks: Energycane, perennial grasses, sorghum, woody biomass, and oilseed crops. For this solicitation, projects targeting algae are not eligible given that recently awarded grants from the Department of Energy has strongly supported algae. Certain specific woody biomass feedstocks are also not eligible given that recent awards from NIFA have strongly supported work in this area, including; western species of Abies, Alnus, Larix, Picea, Populus, Pseudotsuga, and Tsuga. The regional CAP should focus on one or more feedstocks as regionally appropriate. These systems should focus on producing the feedstock in areas with high net primary production; where inputs, such as water and fertilizer, are at their minimum; and where land is available that will not displace existing productive agricultural sectors or harm existing rural economics or environmental conditions. Applicants can determine what area comprises a region.
- Applicants **must** to consider developing approaches, practices, and technologies that allow small and medium-size landowners **and limited-resource farmers** to participate and contribute to the regional feedstock system.
- Transdisciplinary studies that **include** social, behavioral, and biological/chemical/physical sciences into comprehensive study designs at an accelerated rate are highly desired.
- Education activities should:
 - develop human capital relevant to program goals
 - **educate** students for Associate, Baccalaureate, Master’s or Doctoral degrees; and/or prepare K-12 teachers and higher education faculty
 - synthesize and incorporate a wide range of the latest relevant research results for outreach materials
 - lead to measurable, documented changes in learning, actions, or conditions in an identified audience or stakeholder group
- Extension activities should:
 - conduct programs and activities that deliver science-based knowledge and informal educational programs to people, enabling them to make informed decisions

Comment: Informed decisions about what?

- include program delivery that may range from community-based to national and from face-to-face to electronic or combinations thereof
- synthesize and incorporate a wide range of the latest relevant research results
- lead to measurable, documented changes in learning, actions, or conditions in an identified audience or stakeholder group

- **engage limited-resource populations.**
- The Regional CAP supported under this RFA must direct integrated research, education, and/or extension activities to the biomass supply chain segments where USDA has a lead national role. Feedstock conversion research is being supported by the Department of Energy and not requested in this NIFA AFRI priority area. However, applicants must document partnerships with an end-user who anticipates a sustainable supply of feedstock to ensure that feedstock development and production are well-aligned with appropriate conversion technologies. The following descriptions highlight aspects of the biomass supply chain segments that applicants must address:
 - 1) *Feedstock Development*: Optimize yields and allow for reduced inputs.
 - Maximize the range of feedstock phenotypes, through advanced genomics, breeding, and systems integration.
 - Increase the geographic range where dedicated feedstocks may be grown with high yields and low inputs.
 - Maximize year-around photosynthetic efficiency and net carbon fixation.
 - Minimize water usage and nutrient, pesticide, and herbicide inputs through genetic improvement.
 - 2) *Sustainable Feedstock Production Systems*: Optimize yields with minimal environmental impact.
 - Identify management practices that minimize water usage, and nutrient, pesticide, and herbicide inputs.
 - Evaluate (from field-to-watershed scales) impacts of bioenergy feedstock production on food, feed, or fiber production, and identify strategies to minimize adverse impacts.
 - Optimize agronomics, cropping systems, and silviculture.
 - 3) *Feedstock Logistics*: Develop equipment with the scale and efficiency required for sustainable biomass production.
 - Harvest and collection – Operations to acquire biomass from the point of origin and move it to a storage or queuing location. Examples include cutting, harvesting, collecting, hauling, and often some form of densification, such as baling or bundling.
 - Storage – Operations essential for holding biomass material in a stable form until preprocessing or transport to the processing facility. Storage could be at locations near the harvesting areas, at the industrial facility, or both.
 - Preprocessing – Processes that physically, chemically, or biologically transform biomass into a state more suitable for transport or for product conversion. Examples include densifying, thermochemical processing, grinding, drying, chemically treating, ensiling, fractionating, and blending.
 - Transportation – Movement of biomass through the logistics system from harvest and collection to the processing facility. Biomass transport options are generally constrained to existing transportation

infrastructure, such as truck, rail, barge, or pipeline. Develop new transportation technology, **transport models and modes**, including improved containers and lighter vehicles to reduce truck traffic and transportation costs, reduce impact on roads and bridges, and reduce undesirable social impacts, such as, for example, bankruptcy and small business foreclosure, loss of productive or legacy land, etc..

- Health and Safety issues as they pertain to new systems integration and equipment.
- 4) *System Performance Metrics, Data Collection, Modeling, Analysis, and Decision Tools*: Generate social, environmental, and economic metrics and data to evaluate the sustainability as well as production performance of a regional system.
- Develop region and feedstock specific data management plans for Sustainability Performance Metrics and Data Acquisition methods.
 - Validate region and feedstock specific sustainability performance metrics.
 - Use existing and initial data to determine if performance metrics are valid and support sustainability performance objectives.
 - Data Collection and Management
 - Environmental Impact Evaluation
 - Soil Quality
 - Greenhouse gas emissions and carbon sequestration
 - Pollinators, Wildlife, and Habitat
 - Land-use Change
 - Water quality and availability
 - Economic Impact Studies
 - Socioeconomic Impacts
 - Develop decision-making tools

Sustainable Bioenergy Research

These Program Areas support research with high relevance to the development of sustainable regional systems for the production of bioenergy and biobased products. In order to attain the greatest benefit from biomass-based energy, the nation must consider the many environmental, social and economic benefits and trade-offs associated with decisions and policies regarding the where, when, how and who of national and regional biofuels development. USDA is dedicated to developing our Nation's biomass based energy resources in a socially, economically, and environmentally sustainable manner. Applicants must address one of the priority areas listed below. These Program Areas are dynamic and interdisciplinary, spanning ecological, biogeochemical, and social science inquiries. Consequently, applications focused on one Program Area may logically incorporate concepts or elements from other Program Areas listed. For example, applications for Program Area A6122 that address land use impacts of agricultural, biofuels, or other policies may also include aspects of Program Areas A6125, which focuses on the environmental impacts of land

use changes resulting from feedstock production. Applicants must indicate in their Letters of Intent the one Program Area that is the primary focus of their proposal.

6. *Policy Options for and Impacts on Regional Biofuels Production Systems*

- This priority seeks research findings that evaluate and develop policy options for achieving sustainable regional biofuels/bioenergy production and commercialization. Proposals should address a diverse range of agricultural, biofuels, or environmental policy options and opportunities (*e.g.*, standards, mandates, subsidies, tax credits, trade, and agricultural assistance programs) that may impact economic, environmental, social, and other prospects. Proposals may include the compatibility and challenges between Federal and state policies. Proposals may also address the indirect consequences of changes in agricultural markets and production decisions that policies may have.

Other Program Area Requirements:

- *Detail Removed*

7. *Impacts of Regional Bioenergy Feedstock Production Systems on Wildlife and Pollinators*

Program Area Priorities – Applicants must address the following:

- This priority seeks proposals that focus on issues such as fragmentation of habitat, edge-effects, migratory and breeding patterns, predator-prey interactions, and other wildlife issues impacted by biomass development. The potential for land-use change with respect to the production of feedstocks for biofuels and bioenergy will have an unknown effect on sustainable wildlife habitat and pollinator species. Research should focus on the development of best-management practices to minimize adverse effects on wildlife and pollinators.

Other Program Area Requirements:

- *Detail Removed*

8. *Socioeconomic Impacts of Biofuels on Rural Communities*

Program Area Priorities – Applicants must address the following:

- This priority seeks research findings that enhance scientific knowledge of socioeconomic behaviors, potential direct and indirect impacts, and implications of sustainable regional production of biofuels and biobased products. Proposals should address the nexus of social, economic, legal, or institutional factors; production or markets constraints and vulnerabilities at different scales; or

temporal dynamics leading to long-term sustainable biofuels production and commercialization. Examples include assessing technology adoption; social acceptability; income and welfare effects; implications for small-scale and minority producers; rural economic diversification and development; public health, employment and human capital issues; the role of agricultural cooperatives; risks and uncertainties management; the linkage among food, feed, fiber, and biofuels production; or the U.S. role in global food and feed markets.

Other Program Area Requirements:

- *Detail Removed*

9. *Environmental Implications of Direct and Indirect Land Use Change*

Program Area Priorities – Applicants must address the following:

- This priority seeks research to enhance understanding of the environmental implications of direct or indirect land use change as a result of biofuels feedstock production. The overall goal is to maximize the benefits of biofuel and feedstock production while minimizing potential negative environmental consequences of biofuels-induced land use change. This includes potential risks to ecosystem services; issues of water availability; issues of soil, water and air quality; and indirect land use change with potential cascading environmental effects.

Other Program Area Requirements:

- *Detail Removed*

FY 2011 Foundational Programs (AFRI)

General Observations and Reflections

What does “foundational” mean? Each of these research areas has essential practical application, which suggests that integration of education and extension scholarship is warranted. But these foundational programs appear to focus on research exclusively. Why?

Applicants should be required to discuss the human dimensions of their proposed projects. What is the social, economic, and environmental relevance of their research and intended results? What, for example, are the implications of their research and intended results for human health, consumers, community development, capacity-building, and the three facets of sustainability—social, economic, and environmental?

Specific suggestions are presented below **in bold**:

Plants Health and Production and Plant Products

Consider a research priority to examine the adoption and diffusion process for technologies and innovative practices. What are the human, social, cultural, and economic factors that impede or facilitate and enhance adoption and diffusion of the technologies and/or innovative practices proposed by the research?

Animal Health and Production and Animal Products

Consider research priorities that focus on the implications of animal health, production and products on domestic and foreign markets and trade. These would include such things as:

- **Producing to consumer specifications; eg., the impact of size and/or composition of animal produced and processed in response to consumer needs or preferences for optimal market appeal.**
- **The implications of specified products on export markets and/or marketability.**
- **The effects of research results on commodity markets and feeding operations.**

Food Safety, Nutrition, and Health

Consider research priorities that examine:

- **Cultural factors influencing food choices**
- **Consumer choices to maximize health outcomes from good nutrition**
- **Complexities of the hunger/obesity paradox**
- **Body image effect on eating behaviors**
- **Impact of mass media on nutritional/eating behavior**

- **Models to achieve an abundant supply of safe, nutritious, appealing food**
- **Enhancing economic value**

Renewable Energy, Natural Resources, and Environment

Consider research priorities that examine the effects of renewable energy from agriculture or agricultural lands on agricultural production systems, farming and ranching operations, and rural communities.

Agricultural Systems and Technology

Consider research priorities that examine:

- **Adoption and diffusion issues.**
- **Workforce implications of the research and intended results.**
- **Risk assessment from a consumer perspective.**
- **Behavioral assessments of the consequences of change in agricultural systems and technology.**

Agricultural and Rural Communities

This solicitation is much too broad. It reads like a catch-all for the human and social dimensions neglected in other RFA program solicitations. It appears that everything “social” has just been an add-on, but this does not seem “foundational” and we would encourage more critical thinking in this area. Furthermore, the solicitation appears to be discipline-oriented, rather than issue-driven as it should be.

We believe that Community Development should be separated out, as should Markets and Trade. These are quite disparate areas of science and need to be stand-alone programs.

With the creation of these as separate stand-alone programs, we would also recommend that NIFA consider infusing priorities related to agricultural markets and trade and rural communities throughout the foundational programs as suggested above. For example, consideration of globalization and markets and trade should be included with plant and animal production, processing, and product categories above. Research on adoption and diffusion should be a part of any program that proposed technology development. This done, the Agricultural and Rural Communities programs can focus on critical areas of concern, including:

- **Sustainable agriculture and its implications for communities.**
- **The impact of federal and state policies on agriculture and rural communities.**
- **Economic development policies and practices.**
- **Finance and taxation issues as they related to food and agriculture.**

- **The implications of demographic shifts and diversity for agriculture, rural communities, and food security.**
- **Immigration and the agricultural workforce.**
- **Rural communities and capacity-building for business development, job creation, health care, schools and education, youth development, etc.**
- **Community and regional innovation, workforce development, human capital challenges, poverty, income and inequality, broadband expansion, agri-tourism, STEM/STEAM, and rural livelihoods.**
- **Transportation decisions and their implications for agricultural and rural communities.**

Members of the ESCOP Social Science Subcommittee sincerely appreciate this opportunity to provide feedback on AFRI solicitations. We stand ready to assist NIFA as the agency strives to promote better understanding of coupled natural and human systems and to advance science along the human and social dimensions of food, agriculture, natural resources and the environment, and agricultural and rural communities. We hope you will call on us if you have any questions as you proceed.

END