

**Assessment Review Report of the Accomplishment Report for  
USDA Agricultural Research Service  
National Program 216: Agricultural System Competitiveness and Sustainability  
Executive Summary  
December 22, 2011**

## **Overview of NP216 2008 – 2011 Accomplishments**

In this section, we provide a number of general impressions and suggestions related to the NP216 Accomplishment Report in its entirety. These general observations address the report itself and how it was organized as well as our suggestions regarding the broad research vision of NP216 and how the Accomplishment Report provides evidence that the program's goals have been generally achieved.

### *Report Organization*

The review team is impressed with the breadth and depth of the projects amalgamated into NP 216. It is probable that some of them would be more appropriately included in other National program areas or perhaps needed a different focus to better fit into the goals outlined in the Action Plan. Aspects of the Accomplishment Report appeared to be out of synch with the four guiding Problem Statements and their respective objectives. There were difficulties in a number of sections with respect to how exactly reported work supported specific objectives. Additionally, there was not enough detail to answer the criteria of "how well" any objective was met nor was it possible to tell whether "customers' needs" were met. We suggest that ARS research in NP216 could be better served by a more intensive effort to show just who has used the research. ARS needs to more systematically document their research impact.

### *Report Preparation*

The intent of a program review is a laudable goal. However, overall, it is apparent that preparation of this report was not taken very seriously. The quality of this report starkly contrasts with the Action Plan, which is polished. Being familiar with the work of many of the scientists whose work is reported here, we find it particularly disappointing that these results are so poorly showcased. There appears to have been no overall edit of the Accomplishment Report and little effort to relate the accomplishments to the goals of the four sections. Many, if not most, individual sections are poorly written, with typographical errors and poor organization. Some entire sections are repeated. Continuity within and between sections is lacking. We strongly recommend organizing individual sections according to the problem statements and objectives to which they apply (which is done here to some extent but haphazardly).

If ARS values the inputs and objectives from the listening session-derived plan, then the research focus and subsequent work and reporting should reflect that. Projects should be focused on the objectives developed under each problem statement and where

possible a lead scientist identified with each goal to insure responsibility for carrying out and meeting the objectives. The program manager has the overall responsibility for projects meeting the goals of the program plan, or indicating in what way progress (or lack of progress) has occurred. We suggest that objectives have at least one project assigned to each. When objectives fall outside the expertise of ARS scientists, such as social science questions, for instance, collaborations with appropriate experts must be developed.

### *ARS Role in Identifying Production System Tradeoffs*

To achieve the overall vision of NP216, ARS can play a critical role in helping to identify tradeoffs associated with production and other ecosystem services, such as environmental impacts of agricultural systems alternatives, and act as a catalyst for bringing about stakeholder consensus as to what the long-term goals of a given sustainable system really are. Economic valuation of these green benefits could be an important overall goal of ARS research collaboration efforts. There is a need to better link policy and research. There are several instances where the foundational efforts of researchers were valuable, but they

- did not go far enough in suggesting broader-based lessons or solutions that could be implemented across broader regions of the US, and
- lacked tangible information for assisting policymakers and stakeholders in formulating public policy. This was particularly evident in objective 4 modelling research and some of the work done on water quality as well as studies related to bio-energy.

### *Use of Appropriate Metrics in Evaluating Production Systems*

There is a need to develop and use appropriate metrics when evaluating production systems, as identified under component 4. These metrics should better integrate broad, long-term system goals and should also provide more principles and decision tools that apply to diverse regions and production environments. For example, in the area of conservation tillage, there should be less emphasis on labels such as 'no-till' and 'minimum till,' etc. and more focus on measurable metrics such as soil quality (organic matter, porosity, aggregation), soil biology (mycorrhizae, nematodes, earthworms, etc.), above ground biodiversity, nutrient management, and carbon management (net emissions/sequestration).

The information currently being generated is in many cases site-specific but could be used to generate principles that apply to different environments if each project had some activities that focused on synthesis and scale and include meaningful collaboration with other ARS locations. Notably, the use of models, geospatial and remote sensing tools is not integrated with other research projects. Instead these appear to be separate, individual projects in the main. We strongly support the integration of conceptual and simulation modeling, as well as statistical approaches to synthesize and apply findings on a regional basis and to a range of agricultural zones.

The decentralized organization of ARS locations provides a unique opportunity to compare results across ecoregions. Unfortunately, there was no evidence of cross-location collaboration in the report. The projects that do exemplify integrated approaches are noted below in our discussion of each of the four components of the report and should be used as models for other projects.

#### *ARS Meta-Data Transparency, Storage and Accessibility*

A major deficiency of the NP216 Accomplishment Report, and one that threatens the credibility of the knowledge being generated in the 216 Program, is the lack of attention to meta-data transparency, storage and accessibility. Data associated with soil and agronomic research has to be made available to the scientific world in a transparent and easily retrievable manner. This is the standard for data associated with genetics and it is becoming the new standard for agricultural research in general, as it allows meta-analyses to be conducted and research findings to be transparent, reproducible and verifiable. Publication and availability of data sets is now standard for the top international journals such as PNAS and is becoming the norm for many other journals. Publishing and making available the data sets associated with long-term experiments is clearly the first step in this process and indeed was an explicit goal of this 216 program (Objective 4). This goal was set five years ago, yet no information was provided in the accomplishments report regarding progress on this goal. This review highlights the importance of this goal and encourages an all-out effort to standardize collection, storage and accessibility of soil and plant data along the lines of ARS genetics data retrieval systems.

#### *Evidence of NP216 Outreach*

There was a broad, recurring need for insuring that knowledge and products generated by ARS are useful to farmers, other researchers, agricultural educators and policy makers in the Action Plan. We suggest that relevance and adoptability of research could be enhanced through greater integration between ARS researchers and farmers, as well as researchers and extension educators, and colleagues in NRCS and land-grant universities. Extension educators and NRCS staff have networks and methodology to extend the research to the appropriate audiences. Collaboration with many of these professionals, who work with producers on a regular basis, would improve and enhance ARS scientists' ability to do outreach.

#### *The Long View*

Lastly, but perhaps most importantly, we encourage ARS to take a much longer view to the NP216 research program. If a given practice under consideration is used for 100 years, for instance, what would the US social and environmental landscape look like? How about 600 years? Those working on projects designed to be "sustainable" must attempt to peer over the horizon. This requires that the emphasis be on seeking a specific set of goals. There is sufficient knowledge about ecosystem processes and what characteristics define one that is functioning properly to allow diverse teams of

scientists to attempt to build “model” systems for different locations in the United States. This is the agronomic/ecological equivalent of the “moon race” of the 1960’s. They did not achieve a successful landing by testing small incremental improvements in rocket design; they did it by having a specific goal and teams focused on developing the techniques required to achieve that goal. The need to develop productive and truly sustainable farming systems is more important to the future of humans than landing a person on the moon. The review team is confident that the scientists and support staff involved in this national program are capable of achieving this goal before the “end of the decade.”