Agricultural Education Research Contributes to USDA National Research Agenda

Agricultural Education and the USDA Research Agenda:
A National Imperative
(Revised at NCAC-024 meeting, 1/12)

This document identifies Agricultural Education research as a critical contributor to the research priorities of USDA and the National Institute of Food and Agriculture (NIFA). It seeks to identify how Agricultural Education researchers can interface with each of the USDA research priorities, and provides specific examples. The Agricultural Education profession includes research on community-based and industry-based education, as well as school-based programs. It includes research on agricultural communications and agricultural leadership. **Agricultural Education research provides for the human-science interface in USDA research.**

INTRODUCTION
In the past decade, there have been many changes in the food and agricultural systems both within the United States and around the world. While portions of these changes have resulted from rapid advances in science, many were influenced by societal changes and shifts in economies, priorities, and the environment. Within this backdrop, we find that it is the human dimension that is both the driver and the passenger of change of the U.S. food and agricultural systems. As such, increasing our focus on these human dimensions through research, education, and extension activities has the potential to yield incredible advances, impactful outcomes, and positive change.

Recently the Association of Public and Land-grant Universities' (APLU) Experiment Station Committee on Organization and Policy, Science and Technology Committee released its report titled *A Science Roadmap of Food and Agriculture* (2010). That report was framed around the following societal needs (p. 2):
- The need for U.S. food and agricultural producers to be competitive in a global environment.
- The need for food and agricultural systems to be economically, environmentally, and socially sustainable.
- The need for U.S. agriculture to adapt to and contribute to the mitigation of the effects of climate variability.
- The need to enhance energy security and support a sustainable bioeconomy in the United States.
- The need for safe, healthy, and affordable foods.
- The need to address global food security and hunger.
- The need to be good stewards of the environment and natural resources.
- The need for strong and resilient individual, families, and communities.
- The need to attract and develop the next generation of agricultural scientists.

The breadth and depth of these individual needs, not to mention the vastness generated through their interdependence, is more than a single researcher or single discipline can hope to tackle in a short period of time. However, a focused, collaborative research effort within a discipline and in cooperation with other disciplines has the potential to address these societal needs. This research effort must include both fundamental and translational research to achieve the desired outcome.

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Thus, the United States Department of Agriculture (USDA), through NIFA, through its Agriculture and Food Research Initiatives (AFRI), has identified these Research Priorities around which funding is directed toward meeting our challenges:

1. **Food Security and Hunger**
2. **Climate Change**
3. **Sustainable Energy**
4. **Childhood Obesity**
5. **Food Safety**

The above-listed priorities are pursued across the following research emphasis areas:

- Agricultural Systems
- Animals
- Biotechnology & Genomics
- Economics & Community Development
- Education
- Families, Youth & Communities
- Food, Nutrition & Health
- International
- Environment & Natural Resources
- Pest Management
- Plants
- Technology & Engineering

NIFA also provides funding in six Foundation RFA Areas:

1. Plant Health and Production and Plant Products
2. Animal Health and Production and Animal Products
3. Food Safety, Nutrition, and Health
4. Renewable Energy, Natural Resources, and Environment
5. Agriculture Systems and Technology
6. Agriculture Economics and Rural Communities

SIX AGED NATIONAL RESEARCH PRIORITY AREAS

To meet the challenges identified by the USDA NIFA priorities, the Agricultural Education profession has created an Agricultural Education National Research Agenda (AgEd NRA). The six AgEd National Research Priority Areas are:

1. **Public and Policy Maker Understanding of Agriculture and Natural Resources**
2. **New Technologies, Practices and Products Adoption Decisions**
3. **Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century**
4. **Meaningful, Engaged Learning in All Environments**
5. **Efficient and Effective Agricultural Education Programs**
6. **Vibrant, Resilient Communities**

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PRIORITY 1: Public and Policy Maker Understanding of Agriculture and Natural Resources

Our global population will be a projected nine billion people by 2050, and **the non-agriculture population has little to no understanding of the complexities involved with sustaining a viable agriculture system**. The potential **negative impact of an uninformed population on the United States and global agriculture** and food systems is great. An informed citizenry, including policy decisions at all levels, will ensure the long-term sustainability of agriculture, natural resources, and quality of life. Our areas of scientific focus include:

- Increasing understandings of agriculture-related messages, delivery method preferences and effectiveness, and the extent of change in audience knowledge, attitudes, perceptions and behaviors after experiencing educational programs or consuming related information and messages.
- Demonstrating the **impact of agricultural literacy** efforts on a variety of stakeholder behaviors including **consumer behavior** (e.g. knowledge level, voting behavior, food consumption behavior). Literacy research efforts must be reciprocal as the agriculture industry must also increase its understanding of various stakeholder group needs and/or behaviors.
- Determining the potential of **emerging social media technologies**, message formats, and strategies in realizing a citizenry capable of making agriculture-related informed decisions.

Interface with NIFA/AFRI Priority Areas:

1. Food Security and Hunger: Boost domestic agricultural production, improve capacity to meet the growing global food demand, and **foster innovation in fighting hunger and food insecurity in vulnerable populations.**

5. Food Safety: Provide a safer food supply and reduce the incidence of food-borne illness by addressing the causes of microbial contamination and anti-microbial resistance, **educating the consumer and food safety professionals**, and developing enhanced food processing technologies.

Agricultural Education Projects Work Group Titles:
1. "Agriculture literacy group"
2. "Public Policy / Perceptions projects "

Key Contacts/Conveners:
1. W1006: Agricultural Literacy committee, Brian Warnick
2. Agricultural Communications research group*
   *NCAC-024 recommends that this group pursue formal recognition as an Experiment Station committee.

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PRIORITY 2: New Technologies, Practices and Products Adoption Decisions

Foundational **research is needed to determine what types of knowledge, skills, environment, and support systems help decision-making processes** by individuals and groups in today's information age. Cognitive and cultural factors have a major influence on how scientific information and scientific uncertainty are communicated, accessed, understood, and responded to by various stakeholder groups and will likely require longitudinal, multidisciplinary research designs. This includes **research that validates effective educational methods that help individuals and groups make informed decisions and behavioral choices**.

Our research must incorporate advances in decision sciences that could improve uncertainty communication and the design of mitigation and adaptation oriented diffusion strategies. Our areas of scientific focus include:

- Determine the types of knowledge, skills, environment, and support systems that **facilitate decision-making and adoption processes** by individuals and groups.
- Identify potential **gaps in knowledge, socioeconomic biases, and other factors** that constrain effective communication and educational efforts to various target audiences.
- Determine which advances in decision sciences could improve **risk and uncertainty communication** and the design of mitigation and **adaptation-oriented diffusion strategies**.
- Develop and validate systems-based models that will advance our understanding of information and technology diffusion and its practice.

Interface with NIFA/AFRI Priority Areas:

1. Food Security and Hunger: NIFA supports science to **boost domestic agricultural production, improve capacity to meet the growing global food demand**, and foster innovation in fighting hunger and food insecurity in vulnerable populations.

5. Food Safety: NIFA food safety programs work to **provide a safer food supply** and reduce the incidence of food-borne illness by addressing the causes of microbial contamination and anti-microbial resistance, **educating the consumer and food safety professionals**, and developing enhanced food processing technologies.

Agricultural Education Projects Work Group Title:
   "Change and adoption of innovations"

Key Contacts/Conveners:
Craig Edwards, Jimmy Lindner, Teresea Murphrey, Julie Sexton, Amy Harder, Traci Irani

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PRIORITY 3: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century

The last one hundred years of U.S. agriculture highlight the increase in productivity, technological developments, changes brought about through consumer influences, and policy changes that have both advanced and provided course corrections to the industry. New trends in today's global economy require greater capacity of the agricultural workforce. **In order to further improve agricultural productivity efficiency and effectiveness in meeting our global food, fiber, and energy needs, a sufficient supply of well-prepared agricultural scientists and professionals is needed to drive sustainable growth, scientific discovery, and innovation in public, private, and academic settings.** Our areas of scientific focus include:

- Developing the **models, strategies, and tactics that best prepare, promote, and retain new professionals** who demonstrate content knowledge, technical competence, moral boundaries, and cultural awareness coupled with communication and interpersonal skills.
- Creation of programs that develop the **skills and competencies necessary to improve the communications** and knowledge sharing effectiveness of all in the agriculture-related workforces of societies.

Interface with NIFA/AFRI Priority Areas:
This Agricultural Education priority is relevant to all 5 NIFA Priority Areas.
1. Food Security and Hunger
2. Climate Change
3. Sustainable Energy
4. Childhood Obesity
5. Food Safety

Agricultural Education Projects Work Group Title:
"Preparing future agricultural scientists"

Key Contacts/Conveners:
1. SDC343 AgScience workgroup, Brian Meyers
2. Western AgScience workgroup, Mike Swan

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PRIORITY 4: Meaningful, Engaged Learning in All Environments

The design, development, and assessment of meaningful learning environments which produce positive learner outcomes are essential to properly educating the citizens of the 21st century. Yet, this task is complex. **Research is needed to achieve the goal of having all learners in all agricultural education learning environments actively and emotionally engaged in learning, resulting in high levels of achievement, life and career readiness, and professional success.** Our areas of scientific focus should:

- Deepen our **understanding of effective teaching and learning processes** in all agricultural education environments.
- Examine the role of motivation, self-regulation, metacognition, and/or reflection in developing meaningful, **engaged learning experiences** across all agricultural education contexts.
- Examine the **role of diversity** and multiple perspectives in meaningful learning across agricultural education contexts.
- Develop and assess various **learning interventions and delivery technologies** to **increase problem-solving, transfer of learning, and higher order thinking** across all agricultural education contexts.
- Examine various meaningful learning environments in assorted agricultural education contexts for their impact on specific cognitive, affective, and psychomotor learning outcomes.

Interface with NIFA/AFRI Priority Areas:
This Agricultural Education priority is relevant to all 5 NIFA Priority Areas.
1. Food Security and Hunger
2. Climate Change
3. Sustainable Energy
4. Childhood Obesity
5. Food Safety

Agricultural Education Projects Work Group Title:
"Teaching and learning theory and practice"

Key Contacts/Conveners:
Grady Roberts, Ann Henry, Susie Whittington, Scott Burris, John Ewing, Daniel Foster, Matt Raven

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PRIORITY 5: Efficient and Effective Agricultural Education Programs

Learning is the single most significant element molding our being. It is the driving force that combines with our experiences, our needs, and our desires to make us what we are while influencing the social structures to which we belong. Highly effective educational programs will meet the academic, career, and developmental **needs of diverse learners in all settings and at all levels**. Further, **accurate and reliable data that describes the quality and impact of educational programs and outreach efforts at all levels** must be distributed to respective decision groups. As such, our areas of scientific focus should:

- Define the characteristics of **effective agricultural education programs** and teachers and the means to correctly access the current state of these characteristics.
- Demonstrate the **effective integration of STEM** (science, technology, engineering and math) into agricultural education programs.
- Determine the means to effectively and efficiently **document the outcomes and impact of agricultural education** programs on an individual, community, industry, and societal levels.

(**note that AgEd is not just school-based.**)

Interface with NIFA/AFRI Priority Areas:
This Agricultural Education priority is relevant to all 5 NIFA Priority Areas.
1. Food Security and Hunger
2. Climate Change
3. Sustainable Energy
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Agricultural Education Projects Work Group Title:
"Program assessment and evaluation:

Key Contacts/Conveners:
Rama Radakrishna, Kathleen Kelsey, Lavon Esters, Michael Newman

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PRIORITY 6: Vibrant, Resilient Communities

Strong local communities have effective leaders and engaged citizens who ensure high quality educational and career development opportunities for youth and adults and proactively sustain an environment conducive to positive community change and growth. Communities that lack vigor and capacity have great difficulty in responding to the increasingly complex challenges present in many communities today. Additional **research is needed to ensure the environment where positive community change transforms unhealthy communities into high-capacity communities.** Our areas of scientific focus should:

- Examine the aspects of **vibrant, resilient communities** that encourage **youth and adults to become future members and leaders of the community**.
- Develop mechanisms to evaluate the capacity of a local community to lead positive change, and identify the factors that exert significant influence on **change processes and outcomes.**
- Determine the factors that influence the **educational and career aspirations of citizens in rural communities.**
- Determine the effects of technology use and interpersonal and **mass communication methods** on community dynamics and citizen engagement.
- Design and test models for increasing civic engagement in local communities and for increasing the social capital of local communities.

Interface with NIFA/AFRI Priority Areas:
This Agricultural Education priority is relevant to all 5 NIFA Priority Areas.
1. Food Security and Hunger
2. Climate Change
3. Sustainable Energy
4. Childhood Obesity
5. Food Safety

Agricultural Education Projects Work Group Title:
"Agricultural leadership, youth, and community development"

Key Contacts/Conveners:
Mark Brennan, Bob Birkenholz, Nicole Stedman