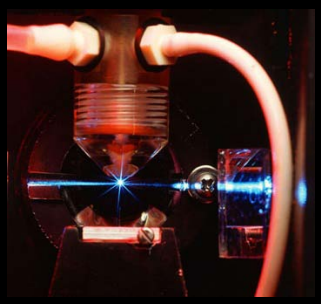
United States
Department of
Agriculture

**Agricultural
Research
Service**

# AGRICULTURAL RESEARCH SERVICE STRATEGIC PLAN FY 2012-2017



# Abstract

U.S. Department of Agriculture, Agricultural Research Service. 2012. ARS Strategic Plan for FY 2012 - 2017. The Service, Washington, D.C.

This publication is the Agricultural Research Service's strategic plan for 2012 through 2017; the Plan describes the ARS national programs and lays out the agency's strategies and activities under four strategic goal areas that encompass specific objectives and also several management initiatives.

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# Message from the Administrator

I am pleased to present the Agricultural Research Service (ARS) Strategic Plan for 2012-2017. In this Plan, we have outlined our vision for accomplishing USDA's research-related mission: supporting the national food and agricultural systems while protecting human health and the environment. Though organized within the framework of our existing National Program structure, this Plan emphasizes the 5 key priorities currently identified by USDA's Research, Education, and Economics mission area: global food security, food safety, human nutrition, climate change, bioenergy and civil rights/equal employment opportunities.

In articulating this plan to support the broad USDA goals for agriculture, ARS has sought to maintain continuity with the strengths of prior planning processes, while making several changes to help achieve key cultural transformation and relevance goals aimed to dramatically increase the impact of our work.

Like the ARS Strategic Plan for 2006-2011, the new Plan specifies performance measures that will indicate progress toward identified goals and objectives, while outlining the specific research activities needed to address each performance measure. The Plan also accommodates current accountability mechanisms designed to evaluate the effectiveness of Federal programs.

In a shift from prior planning processes, however, we have taken a new approach to developing this iteration, building on our existing, rigorous national program planning processes. Recognizing that ARS scientists and national program leaders have worked hard to identify strategic and responsive, relevant goals for each research area through intense customer and stakeholder interaction and internal discussion, we have collected the strategies already devised through the national program management process, described on page ix. The plan then documents, at broad and specific levels—the research needed to achieve national priorities. This approach succeeds in achieving a direct link from each research project plan in ARS to the ARS, REE and USDA Strategic Plans, through the National Program Action Plan.

The resulting Plan, we believe, is attentive to a broader range of national needs and more relevant to addressing the most significant agricultural problems than any plan we have developed before. Moreover, this Plan, as developed, will be dynamic to respond to new and emerging problems. As research goals are achieved and new problems and priorities emerge, the Strategic Plan will be updated accordingly and regularly to reflect necessary changes in emphasis. It is our hope that this Plan will not only help USDA meet the food and agriculture needs of the American people effectively, but will also provide an available model for other agencies looking to streamline and improve upon their planning processes.

I would like to thank those individuals who helped prepare this plan: Sharon Drumm, Tracy Botelho-Havermann, and Michele Esch, who worked in consultation with scientists and leaders throughout the agency to develop, revise, and finalize the vision and specific goals and performance measures outlined. The 2012-2017 ARS Strategic Plan is available on the ARS Web site: http://www.ars.usda.gov; (click on "National Programs").

Edward B. Knipling
Administrator

# Introduction

## Mission Statement

ARS conducts research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to:

- ensure high-quality, safe food, and other agricultural products
- assess the nutritional needs of Americans
- sustain a competitive agricultural economy
- enhance the natural resource base and the environment, and
- provide economic opportunities for rural citizens, communities, and society as a whole.
- provide the infrastructure necessary to create and maintain a diversified workplace

## Vision Statement

The ARS vision is to lead America towards a better future though agricultural research and information.

## Core Values

Our success depends on:

- **Inclusion** — Providing opportunities for ARS constituents to shape and improve those services provided by the Agency.
- **Collaboration** — Working cooperatively at all governmental levels domestically and internationally on policy matters affecting a broad audience.
- **Accountability** — Ensuring that the performance of all employees is measured against the achievement of the Agency's strategic goals.
- **Customer Focus** — Serving ARS' constituents by delivering programs that address their diverse needs.
- **Professionalism** — Building and maintaining a highly skilled, diverse, and compassionate workforce.
- **Results Orientation** — Measuring performance and making management decisions to direct resources to where they are used most effectively.

# Strategic Plan Framework

Formed in 1953 as USDA's chief scientific research agency, ARS is one of the four component agencies of the Research, Education, and Economics (REE) mission area. The Agency's mission centers around conducting the basic and applied research needed to solve problems of national importance for American agricultural producers, Government action agencies, and the general public and, increasingly, for producers and consumers worldwide. This work covers a wide range of needs, ranging from animal and crop protection and production to human nutrition, food safety, and natural resources conservation. Today, with a staff of over 8,500 employees, ARS carries out research at over 100 laboratories throughout the Nation and in several foreign countries.

Outlining the major needs and corresponding goals for the next five years, this new Strategic Plan will help guide the Agency's scientific activities and the accompanying transfer of ARS research products to producers, consumers, action and regulatory agencies, the private sector, and other customers and stakeholders.

## Goal Areas

Echoing ARS' National Program structure, the Plan is organized into five main Goal Areas: Nutrition, Food Safety, and Quality, Natural Resources and Sustainable Agricultural Systems, Crop Production and Protection, Animal Production and Protection, and Equal Employment Opportunity. These Goal Areas—and the goals, performance measures, and actionable strategies identified within them—align with the components of the REE Action Plan and the USDA Strategic Plan Goals as follows:

| ARS Goal Area | ARS Strategic Goal | REE Action Plan Goal | USDA Strategic Goal Objective (s) |
|---|---|---|---|
| 1: Nutrition, Food Safety & Quality | 1.1 Human Nutrition | 4 | 4.2 |
| | 1.2 Food Safety | 5 | 4.3 |
| | 1.3 Quality & Utilization of Ag Products | 2B, 7 | 1.3 |
| 2: Natural Resources & Sustainable Ag Systems | 2.1 Water Availability & Watershed Mgmt | 3A | 2.2 & 2.3 |
| | 2.2 Climate Change, Soils & Emissions Research | 2A | 2.1, 2.2 & 2.3 |
| | 2.3 Bioenergy | 2B | 1.1 |
| | 2.4 Agricultural & Industrial Byproducts | 3B | 1.3, 2.1 & 4.3 |
| | 2.5 Rangeland, Pasture & Forages | 3B | 2.1 |
| | 2.6 Agricultural Competitiveness & Sustainability | 2A, 2B, 3B | 1.3, 2.1, 2.2 & 2.3 |
| 3: Crop Production & Protection | 3.1 Plant Genetic Resources, Genomics, Genetic Improvement, and Crop Production | 1A, 1C | 1.3, 3.1 & 4.4 |
| | 3.2 Plant Diseases, Crop Protection & Quarantine, and Methyl Bromide Alternatives | 1B, 1C | 4.4 |
| 4: Animal Production & Protection | 4.1 Animal Production | 1A, 1B, 1C | 1.3 & 3.1 |

| | | | |
|---|---|---|---|
| | 4.2 Prevention and Control of Pests and Animal Disease that Threaten Agriculture | 1B, 1C | 1.3, 3.1, 4.3 & 4.4 |
| 5: Equal Employment Opportunity | 5.1 Develop a Model Equal Employment Opportunity (EEO) Program | | MI 2 |

## Goals

Each Goal Area (with the exception of EEO/CR, an overarching Agency Goal Area) includes specific goals that are aligned groupings of ARS' 18 National Programs, derived from the Agency's specific mission, as outlined in each 5-year National Program Action Plan. In developing their individual Project Plans, each ARS scientist will, in turn, align his or her research objectives with the overarching goals identified in this portion of the ARS Strategic Plan, thereby ensuring continuity with the USDA, REE, and ARS vision for agricultural research.

## Performance Measures – Explaining the Numbering System

The 14 performance measures describe specific measurable achievements, which indicate progress toward reaching the broader objectives and goals. The first digit of the performance measure ties it to the primary USDA Strategic Goal that is being addressed, the next digit represents the ARS goal area, while the 3rd digit together with the ARS goal area, represents the specific ARS goal.

## Performance Targets

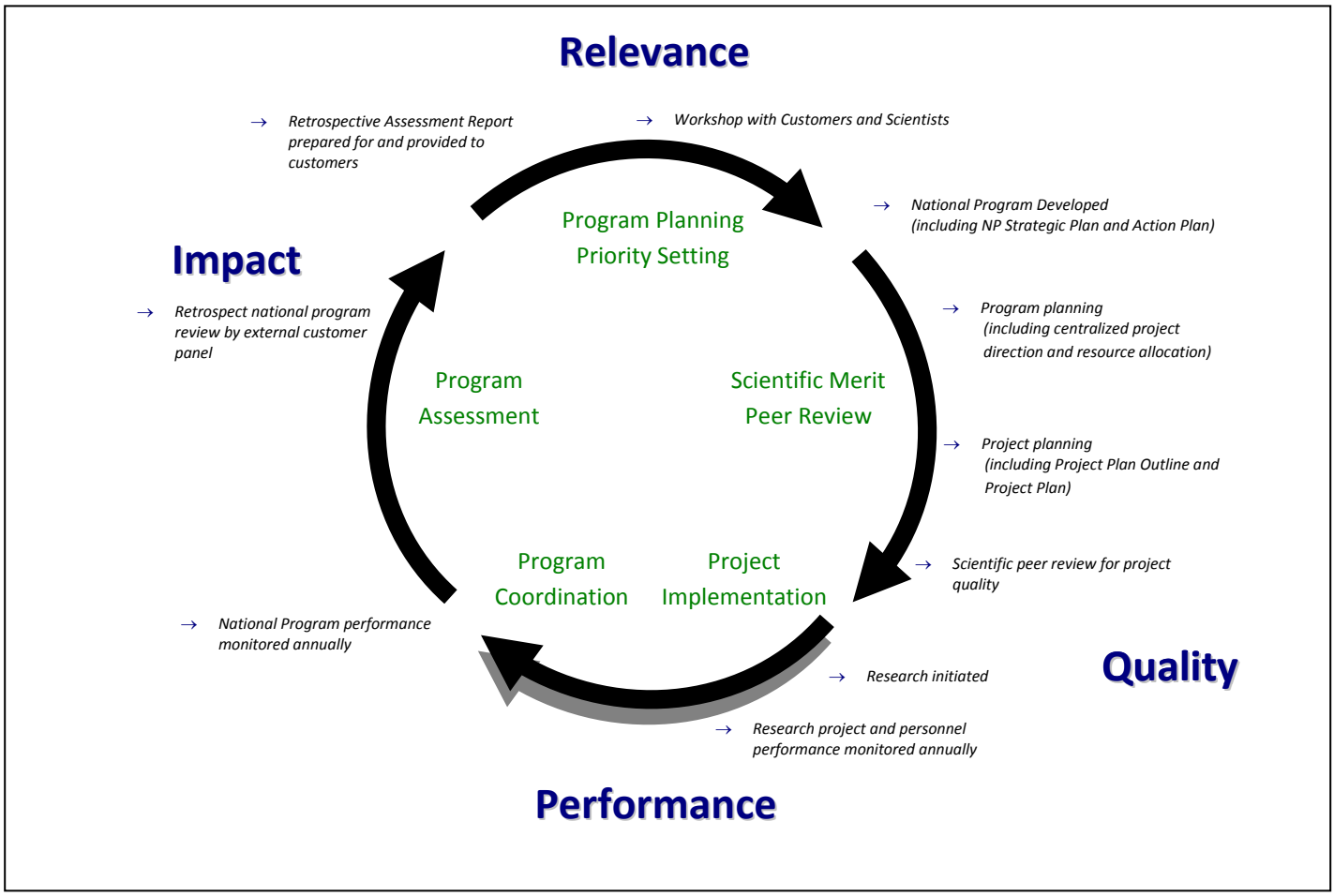
There are a number of performance targets that will be used to achieve each performance measure. These are research components broken down to more clearly align research products and accomplishments with the appropriate performance measure, with a baseline and target to be reached by 2017.

## Strategies and Means

These include some of the specific research activities that ARS anticipates conducting during the next 5 years to address each Performance Measure.

# National Research Program Management in ARS

Approximately 800 research projects from around the Country are aligned into 18 National Programs that encompass all the research of the Agency. The National Programs are grouped into four program areas: Animal Production and Protection, Crop Production and Protection, Natural Resources and Sustainable Agricultural Systems, and Nutrition, Food Safety, and Quality. Each of the four program areas is managed by a Deputy Administrator, and each program is led by a team of National Program Leaders (NPLs). Some 30 NPLs are responsible for planning and developing research strategies to address critical issues affecting American agriculture. Nearly 200 Research Leaders work with 8 geographically-based Area Directors to implement the coordinated research objectives issued by the National Program Leaders.




### Implementation of the Five-Year National Program Cycle

The overarching objectives of the National Programs are ***relevance, quality,*** and ***impact*** of ARS research, all important elements of improved accountability. Research must be ***relevant*** to the highest priority problems, the goals and outcomes of the research should significantly ***impact*** the problems, and the science must meet the highest standards of ***quality.*** To ensure that these objectives could be achieved, ARS implemented the National Program Cycle, a cycle of phases embodying a series of recurring activities.

The 5-year program management cycle illustrates the activities by which ARS conducts its research: program planning and priority setting, peer review, project implementation, program coordination, and assessment. The cycle ties these activities together in a recurring 5-year sequence to ensure effective and efficient program and project management within ARS.

Ongoing monitoring of project quality and performance takes place throughout the program cycle, and adjustments are made when necessary to improve performance or meet emerging challenges. At the end of the program's 5-year cycle, a rigorous National Program Retrospective Review is convened. The purpose is two-fold: to ensure, based on feedback from an outside group of experts (made up of academics, stakeholders, and government) that the research is being conducted as indicated in the Action Plan; and to gain advice and insight from these same experts as to the future direction of the research.

Relevance, Quality (Prospective and Retrospective), and Performance—these objectives are what a research organization must promote to be successful. Program Planning and Priority Setting, Scientific Merit Peer Review, Project Implementation and Coordination, and Program Assessment —prescribe the actions that the Agency undertakes carefully, thoroughly, and with outside review to demonstrate that our research is of the highest quality.

## Increasing Communication within and outside ARS

By definition, the planning and implementation of National Program research is designed to be a participatory process requiring significant input from the broad sources of expertise and experience within and outside the Agency. Through coordinated efforts that emphasize communication with valued partners and scientists, ARS can ensure that public resources are expended in a targeted and synchronized fashion on scientifically and programmatically relevant problems.

Further, by gathering input from outside users of ARS research, the Agency meets the ever-increasing demand for public accountability. ARS solicits input from the Administration, regulatory and action agencies, producers and producer groups, university communities, and non-governmental organizations, often through face-to-face exchanges. By accounting for the needs and priority issues of these customers, stakeholders, and partners, ARS develops responsive research that emphasizes meeting short-term emergencies or requirements as well as long-term sustained research to address problems of regional, national, and international scope and importance.

Emphasis on communication and coordination ultimately ensures that the physical, financial, and human resources of ARS are deployed appropriately to address high-priority agricultural, food, and environmental research needs of the Nation.

Because agricultural research is not the exclusive domain of any public or private entity, the very specific and the wide variety of needs that farmers, producers, ranchers, and industry stakeholders have must be met in a broad collaborative and cooperative effort. ARS has developed and continues to utilize an extensive network of research relationships among researchers with universities, industry, and other Federal government agencies to meet the research needs of U.S. agriculture. First among those Federal relationships is the USDA National Institute for Food and Agriculture (NIFA), USDA's extramural research agency. ARS and NIFA national program leaders work closely together to ensure that research funded by each agency is complimentary, and not duplicative. For example, ARS and NIFA national program leaders have collaborated on utilizing intramural and extramural research to develop joint action strategies for research on plant diseases and pests (i.e., citrus greening), animal diseases, and water and soil conservation.

## National Programs

ARS organizes its research activities under 18 National Programs under four broad categories: Nutrition, Food Safety and Quality; Natural Resources and Sustainable Agricultural Systems; Crop Production and Protection; and Animal Production and Protection. To best address issues of agricultural importance, ARS makes regular adjustments to this program structure. The structure appears below.

***Nutrition, Food Safety, and Quality***

- Food Safety (Animal and Plant Products)
- Human Nutrition
- Quality and Utilization of Agricultural Products

***Natural Resources and Sustainable Agricultural Systems***

- Water Availabiity and Watershed Management
- Climate Change, Soils and Emissions Research
- Bioenergy
- Agricultural and Industrial Byproducts
- Pasture, Forage and Rangeland Systems
- Agricultural System Competitiveness and Sustainability

***Crop Production and Protection***

- Plant Genetic Resources, Genomics and Genetic Improvement
- Plant Biological and Molecular Processes
- Plant Diseases
- Crop Protection and Quarantine
- Crop Production
- Methyl Bromide Alternatives

***Animal Production and Protection***

- Food Animal Production
- Animal Health
- Veterinary, Medical , and Urban Entomology
- Aquaculture

# Strategic Goal Area 1:
# Nutrition, Food Safety and Quality

The Nutrition, Food Safety and Quality research and information area exists to lead and coordinate ARS research and information dissemination to define the role of food and its components in optimizing health for all Americans; develop tests and processes that keep the food supply safe; reduce and control pathogens and toxins in agricultural products; and improve the economic viability and competitiveness of American agriculture by enhancing the quality and utilization of agricultural products for the benefit of producers and consumers.

## GOAL 1.1 – ENABLE AMERICANS TO MAKE HEALTH-PROMOTING, SCIENCE-BASED DIETARY CHOICES: HUMAN NUTRITION (107)

To improve the nutrition and health of the American people, ARS conducts research on the quality of the American diet and on related health behaviors. Distinctive aspects of this research include an emphasis on a food-based approach to improving health; the core capability to sustain long-term research in areas deemed of high priority for the Nation's health; the availability of state-of-the-science equipment and facilities for human research across the lifecycle; and the conduct of multidisciplinary research to improve the nutritional value of the American diet and food supply. The mission of the Human Nutrition Program is to define the role of food and its components in optimizing health throughout the life cycle for all Americans by conducting high national priority research. This research emphasizes study of essential nutrients and nonessential, health-promoting components in foods; evaluating the nutritional value of diets eaten by people in America; determining how consumption of specific foods or food components can enhance health; and developing strategies to improve food choices and lifestyle factors. Increasingly, research focuses on addressing over-consumption and caloric imbalance with incorporation of cutting-edge genomic and metabolomic technologies to carry out research. Research addresses four overarching components: nutrition monitoring, the scientific basis for dietary recommendations, obesity prevention, and life stage nutrition and metabolism. Information dissemination programs operated by the National Agricultural Library address general and specific human nutrition issues and audiences and include general Web portals such as www.nutrition.gov as well as the targeted Web sites of the Food and Nutrition Information Center.

**Performance Measure**

**4.1.1 Monitor nutrient composition of food supply and consumption by Americans while conducting research on life stage nutrition and metabolism. Strengthen the scientific basis for dietary guidance for health promotion and disease prevention and develop strategies for prevention of obesity and related diseases.**

**Performance Targets**

### 1.1.A Link Agricultural Practices and Beneficial Health Outcomes

### 1.1.B Monitor Nutrient Composition of the Food Supply and Consumption by Americans

| Baseline 2012 | Target 2017 |
|---|---|
| Three datasets on food composition and dietary intake were released by ARS and used by customers to establish Federal dietary policy guidelines, food assistance and feeding programs, and food labeling to safeguard the health of the American people. | Cumulatively, 15 databases developed and released to ARS customers. |

### 1.1.C Strengthen the Scientific Basis for Dietary Guidance for Health Promotion and Disease Prevention

| Baseline 2012 | Target 2017 |
|---|---|
| Four research studies on health effects of foods or nutrients published in peer-reviewed scientific journals that contribute evidence used in Dietary Reference Intake reports or the Dietary Guidelines for Americans. | Cumulatively, 20 studies published and released to ARS customers. |

### 1.1.D Develop Strategies for Prevention of Obesity and Related Diseases

| Baseline 2012 | Target 2017 |
|---|---|
| Five papers in peer-reviewed scientific journals that test innovative approaches to preventing obesity or related conditions. | Cumulatively, 25 papers documenting these discoveries added to the scientific literature on this topic. |

### 1.1.E Conduct Research on Life Stage Nutrition and Metabolism

| Baseline 2012 | Target 2017 |
|---|---|
| Five studies published in peer-reviewed journals that increase knowledge of nutrient requirements in the youngest and oldest Americans, how nutritional status relates to health, and how genes and epigenetic mechanisms contribute to this interplay. | Cumulatively, 25 scientific discoveries will be documented in scientific publications. |

**Strategies and Means**

- Discover how agricultural production, post-harvest practices and environmental conditions affect the nutrient content of the U.S food supply
- Determine food consumption and dietary patterns of Americans
- Update, enhance and expand U.S. food composition data
- Identify roles of food, nutrients, food components, and physical activity in promoting health and preventing disease
- Improve the science base for updating national dietary standards and guidelines
- Identify causes and consequences of obesity and related disorders
- Develop and evaluate strategies to prevent obesity and related diseases
- Evaluate the role of the Dietary Guidelines for Americans in preventing obesity and improving health
- Understand mechanisms by which nutrition promotes healthy development and function from conception to old age
- Define the basis for, and consequences of, nutritional programming

## GOAL 1.2 – PROTECT FOOD FROM PATHOGENS, TOXINS, AND CHEMICAL CONTAMINATION DURING PRODUCTION, PROCESSING, AND PREPARATION: FOOD SAFETY (108)

The safety of the food supply continues to be a highly visible public health issue and a national priority for the Federal government. The continued priority is partly due to the diverse and complex system of production, processing, and distribution of food in the U.S. and the increasing global distribution. Outbreaks of foodborne illness are seen as a major cause of morbidity and mortality, and economic costs, both nationally and internationally. The full extent of the disease burden is still unknown, even with recent CDC estimates. Foodborne illnesses can be caused by microbial pathogens, parasites, viruses and an array of foodborne contaminants such as chemicals or toxins. The cause of every outbreak is still unknown, but persistent outbreaks of major commodity-specific foods that may directly affect public health, regulations, industry, and trade, require our immediate attention.

ARS has developed an integrated approach to food safety, that is, food production is seen as a continuous process from production, through harvesting and processing, to retail and the consumer. Pre- and post-harvest are not separated but considered an integrated production system of safe and quality food. Interventions and controls that are applied to one phase will ultimately affect the other segments of food production and processing. Food safety research has also changed during the past decade, having moved past simple, surveillance/prevalence studies to asking more complex questions. Consequently, researchers are required to think creatively to solve problems, which means considering alternate perspectives, exploiting new opportunities and technologies, and crossing conventional boundaries. Multidisciplinary collaborations, especially between Centers/Institutes, nationally and internationally are an absolute necessity.

ARS provides the intramural infrastructure and expertise to address short and long-term needs in food safety. Because of the infrastructure, ARS is uniquely poised to respond quickly to emerging and critical food safety issues. ARS also collaborates closely with Federal regulatory agencies as well as industry, professional, and international stakeholders to assist in addressing their specific food safety needs.

**Performance Measure**

**4.1.2 Develop new technologies that assist ARS customers in detecting, identifying and controlling foodborne diseases associated with the consumption of animal products that affect human health.**

**Performance Targets**

**1.2.A Develop detection methodologies for food-borne pathogens and technologies for the rapid and sensitive detection of toxins, chemicals, and biologics that can be implemented for improved food safety and food defense.**

| Baseline 2012 | Target 2017 |
|---|---|
| Develop and transfer one new technology to ARS customers to detect, identify, and control foodborne pathogens and contaminants along the food production continuum. | Cumulatively, five new technologies will be developed and transferred. |

**1.2.B Conduct and evaluate research that will lead to effective control and intervention strategies for the reduction of microbial, chemical, and other contaminants of the food supply, as well as elucidation of the molecular and physiological mechanisms that allow for persistence, survival, and transmission of foodborne pathogens in the populations and environment.**

| Baseline 2012 | Target 2017 |
|---|---|
| Identify and evaluate potential control and intervention strategies for the reduction and control of foodborne pathogens and contaminants along the food production continuum. | Identify and evaluate potential control and intervention strategies for the reduction and control of foodborne pathogens and contaminants along the food production continuum. |

**Strategies and Means**

- Identify and characterize the movement, structure, and dynamics of populations throughout food production and processing.
- Apply concepts of systems biology, taking advantage of genomics, proteomics, transcriptomics, metabolomics, bioinformatics, to the study of pathogenicity and virulence.
- Develop and evaluate technologies for the detection and characterization of microbial contaminants.
- Develop new intervention and control strategies for the reduction and control of foodborne pathogens and foodborne contaminants along the entire food production.
- Develop and evaluate predictive microbiology and data acquisition studies to understand microorganisms and their immediate environment and that can be used in risk assessments.
- Develop and evaluate detection methods and toxicology (including toxins) for the regulation, reduction, and control of veterinary drugs, chemical residues, heavy metals, persistent organic pollutants, and biological toxins derived from bacteria, fungi and plants.
- Expand and improve the services of the national agricultural library food safety research information office.

## GOAL 1.3 – ENHANCE THE ECONOMIC VIABILITY AND COMPETITIVENESS OF U.S. AGRICULTURE BY MAINTAINING THE QUALITY OF HARVESTED AGRICULTURAL COMMODITIES OR OTHERWISE ENHANCING THEIR MARKETABILITY, MEETING CONSUMER NEEDS, DEVELOPING ENVIRONMENTALLY FRIENDLY AND EFFICIENT PROCESSING CONCEPTS, AND EXPANDING DOMESTIC AND GLOBAL MARKET OPPORTUNITIES THROUGH THE DEVELOPMENT OF VALUE-ADDED FOOD AND NONFOOD TECHNOLOGIES AND PRODUCTS, EXCEPT ENERGY AND FUELS. (QUALITY AND UTILIZATION OF AGRICULTURAL PRODUCTS – 306)

This research will increase our knowledge and develop technologies to better measure or enhance the quality of crop and animal products after harvest. Similarly, the marketability and value of commodities can be increased by ensuring that value-added food products (such as fresh-cut or minimally processed produce) retain sensory quality, nutritional value, and are free from food safety hazards. The research in this National Program will also generate new information on health promoting components of foods and assess their effects on important human diseases and obesity, in cooperation with the Human Nutrition National Program (NP 107) and other partners. In addition to food quality and safety, consumers have expressed concern over rising food prices which can be attributed to multiple factors. A significant factor in the cost of food production can be attributed to food waste or rot. Estimates indicate that approximately 27% of food produced in the U.S. is lost as waste among retailers, food service businesses, and consumers. Additional losses occur during food harvesting, storage, and distribution. The magnitude of the loss is even greater when resources spent on growing food such as fuel, water, fertilizer, chemicals, land-use and human resources are considered. NP 306 research will develop technologies that improve quality, extend product shelf life, reduce waste, and decrease costs.

Research is being conducted on the development of nonfood, nonfuel biobased products from agricultural commodities and byproducts. Interest in biobased products has increased as consumers and governments have sought more environmentally friendly products that provide alternatives to petroleum and which do not contribute to greenhouse gases. Thus, biobased products can reduce our dependency on petroleum and provide a more sustainable technology for the future. Biobased products that were once too expensive to commercialize may now be affordable. There is some public concern that biobased products could contribute to the rising cost of food in the U.S. This program seeks opportunities to develop biobased products from agricultural feedstocks that do not compete with food, in cooperation with other ARS national programs and partners. ARS also supports quality and processing research on crop fiber, such as cotton, and animal hides, leather and wool. Stakeholders who produce fibers and hides constitute an important segment of our rural economy. These industries are severely impacted by energy and production costs and have lost market share to foreign competition. Technologies that improve fiber quality, reduce the energy consumption of processing equipment, and develop new products are needed to help the fiber industry to compete in a global market.

**Performance Measure**

**1.1.3 <u>Develop methods and technologies to better define, measure, preserve or enhance quality and improve utilization of food crops, animals and agricultural fibers, as well as non-food, non-fuel biobased products and sustainable technologies/processes.</u>**

**Performance Targets**

**1.3.A Develop Methods and Technologies to Better Define, Measure, Preserve, or Enhance Quality and Improve Utilization of Food Crops and Animals**

**1.3.B Develop Methods and Technologies to Better Define, Measure, Preserve, or Enhance Quality and Improve Utilization of Agricultural Fibers**

### 1.3.C Develop Non-Food, Non-Fuel Biobased Products and Sustainable Technologies/Processes

The following baselines and targets apply to all three performance targets listed above.

Non-food, non-fuel biobased products derived from renewable agricultural resources represent a small fraction of the market for petroleum-based industrial products and some are not yet economically competitive. Also, many agricultural products are marketed as low-value commodities, with postharvest spoilage decreasing return to producers. Healthy foods are often not convenient or readily accepted by significant numbers of consumers. Quality of agricultural fibers needs to be assured in an increasingly competitive global market.

| Baseline 2012 | Target 2017 |
|---|---|
| Four new biobased or fiber products and food items with improved quality, nutritional or functional characteristics were developed by ARS and used by customers, both domestic and foreign. | Cumulatively, 20 new technologies developed by ARS and adopted for uses that provide food crops and products with higher quality and extended shelf life; convenient and acceptable healthy foods; non-food, non-fuel biobased products with cost and performance features comparable or superior to petroleum-based products; high quality agricultural fibers; and valuable co-products from agricultural residues and processing wastes. |

**Strategies and Means**

- Define, measure, preserve, or enhance quality of foods and agricultural fibers
- Identify and characterize new bioactive ingredients and develop functional foods
- Develop new or improved technologies, processes, or products for foods and agricultural fibers
- Identify and characterize agricultural feedstocks and byproducts for biobased products
- Develop sustainable technologies/ processes which facilitate development of biobased products

# Strategic Goal Area 2:

# Natural Resources and Sustainable Agricultural Systems

We conduct research that *explains* the nature and function of agricultural systems and their physical, chemical, and biological components. With that explanatory power, we develop abilities to *predict* how agricultural systems may respond to different environments or management scenarios. Once we can make predictions with confidence, we turn that knowledge into *decision support* tools and methods for:

- Improving the efficiency and effectiveness of management practices for agricultural systems and working lands to enhance ecosystem goods and services, including the sustainable production of agricultural commodities;
- Managing soil, water, air, and biological resources for society's benefits, including reductions in environmental impact, under different climatic regimes and environmental conditions;
- Providing agricultural products and co-products as renewable, bio-based alternatives to petroleum as inputs to manufacturing and generating energy;
- Developing new, valuable, environmentally sound uses for agricultural and industrial byproducts.

Major priorities for ARS research on interactions among land, water, atmosphere, and diverse biological communities include remediation and use of degraded water for production of a wide range of crops; protection and enhancement of ecosystem goods and services arising from our natural resources; adaptation of agricultural production systems to climate change, and mitigation of agricultural greenhouse gas emissions; development of diverse energy crops and agronomic practices for efficient and sustainable production, optimized for different geographic regions and climatic conditions throughout the U.S.; identification of safe uses of agricultural wastes and byproducts in generating energy/fuel and value-added biochemical products and fertilizers; creation and evaluation of conservation practices and land management decision-support tools arising from ARS' long-term agricultural research conducted in the agency's unique, critical infrastructure of instrumented watersheds and rangelands; development of widely accessible databases to support analyses of agriculture, land management, and the environment; and creation of a broad-based data and information access portal at the National Agricultural Library to enable life-cycle analyses and development/validation of sustainability indices for agricultural production and delivery systems .

### GOAL 2.1 – INTEGRATED, EFFECTIVE, AND SAFE WATER RESOURCE MANAGEMENT (WATER AVAILABILITY AND WATERSHED MANAGEMENT - 211)

There is no substitute for fresh water nor are there replacements for its essential role in maintaining human health, agriculture, industry, and ecosystem integrity. As the nation was established and expanded, it flourished in part because of its abundant and readily available water and natural resources. In the 21st century, the nation faces depleted ground water reserves, degraded water quality, and adverse climate conditions that are reducing the amount of available freshwater. At the same time, allocations of our freshwater resources are shifting among different users and different needs (e.g., from agricultural to urban uses; from storing water supplies in reservoirs to maintaining in-stream flows to support healthy aquatic ecosystems; from industrial and energy production to recreation). Our shared freshwater supply has been significantly reduced and is becoming more variable, unreliable, and inadequate to meet the needs and demands of an expanding population.

Today, agriculture is the largest user of fresh water yet offers opportunities for conserving water supplies and improving water quality for drinking, swimming, and fishing.
Agriculture faces new challenges—the increasing demand for water by our cities, farms, and aquatic ecosystems; the increasing reliance on irrigated agriculture for crop and animal production and farm income; and changing water supplies due to groundwater depletion in some areas, climate variability, and global change. Science can provide the tools needed by water planners and managers to accurately predict the outcomes of proposed water management decisions, and new technologies can widen the range of options for future water management. The factual basis for decision-making includes an understanding of effectiveness, potential unintended consequences, and a plan for getting water users and agencies to adopt the most effective technologies. The Nation has the opportunity to use science and technology to build a strong economy and to improve human and ecological health.

**Performance Measure**

**2.2.1 <u>Develop technology and practices to promote improvement of integrated, effective and safe water resource management.</u>**

**Performance Targets**

**2.1.A Develop Tools and Technologies to Improve the Effectiveness of Agricultural Water Management.**

| Baseline 2010 | Target 2017 |
|---|---|
| ARS released new FAO water quality guidelines for irrigation with marginal waters and treated wastewaters, replacing earlier guidelines that: did not consider pH; and underestimated the effects of sodium absorption on water infiltration. The new guidelines were used by customers to improve the ability to evaluate the infiltration of hazards associated with the application of marginal waters or treated wastewaters, ensuring safer use of saline waters for irrigation and increasing the water available to support irrigated agriculture. | Cumulatively, 17 models, tools, databases, sets of guidelines, or design criteria developed and released to ARS customers. |

**2.1.B Improve the Scientific Understanding of Erosion, Sedimentation, and Contaminant Transport Processes from Agricultural Fields and Landscapes to Facilitate the Development of Tools and Technologies to Better Protect the Agricultural Water Quality.**

| Baseline 2010 | Target 2017 |
|---|---|
| ARS released version 2010.1 of the Water Erosion Prediction Project (WEPP) model, to users in the US and throughout the world. Customers include land managers and conservationists charged with predicting runoff, soil loss, and sediment yield from hill slopes and small watersheds. The new version gives improved performance especially in areas experiencing substantial erosion from snowmelt on thawing soils. | Cumulatively, 16 technologies, databases, tools, models, or sensor-based monitoring systems developed and released to ARS customers. |

**2.1.C Develop Strategies to Improve the Effectiveness of Agricultural Conservation Efforts by Developing New or Improved Conservation Practices, Improving Practice Placement to Maximize Effectiveness and Minimize Cost, and Developing a Better Understanding of the Effects of Agricultural Conservation at the Landscape Scale.**

| Baseline 2010 | Target 2017 |
|---|---|
| Three tools to enhance conservation effectiveness released by ARS and used by customers to improve conservation management. | Cumulatively, 10 tools, technologies, models, databases, or improved conservation practices developed and released to ARS customers |

### 2.1.D Conduct Research to Improve Watershed Management and Ecosystem Services in Agricultural Landscapes.

| Baseline 2010 | Target 2017 |
|---|---|
| Two tools to enhance watershed management and ecosystem services in agricultural landscapes released by ARS and used by customers to improve flash flood forecasting and set design standards for flood and transport infrastructure, erosion estimates, storm characteristics, and other watershed processes. | Cumulatively, 10 tools, models, databases, or technologies developed and released to ARS customers |

**Strategies and Means**

- Develop irrigation scheduling technologies for water use efficiency
- Achieve water productivity at multiple scales
- Develop irrigation application methods
- Improve dryland/rainfed water management
- Improve drainage water management and control
- Expand use of degraded waters
- Manage field scale processes controlling contaminant fate and transport
- Quantify and predict in-stream processes
- Explain ecological response to improved water quality
- Develop and test cost-effective control measures for agriculture, urban, and turf systems
- Improve our understanding of the aggregate effects of conservation practices at the watershed scale
- Improve our ability to select and place conservation practices on the landscape for maximum effectiveness
- Improve conservation practices to better protect water resources
- Maintain the effectiveness of conservation practices under changing climate and land use
- Characterize how conservation practices affect ecosystem services
- Develop a better understanding of the economic impacts and social drivers of conservation practice adoption in agricultural watersheds
- Develop tools to improve hydrologic assessment and watershed management
- Improve watershed management and ecosystem services through long-term observation and characterize of agricultural watersheds and landscapes
- Maintain water availability in a changing global environment
- Develop tools to improve the quantification of hydrologic processes and water budget parameters in varying landscapes and under varying conditions.
- Clarify the water implications of biofuel production
- Downscale climate change impacts to improve water availability and watershed management

## GOAL 2.2 – IMPROVE QUALITY OF ATMOSPHERE AND SOIL RESOURCES, UNDERSTAND EFFECTS OF CLIMATE CHANGE (CLIMATE CHANGE, SOILS AND EMISSIONS RESEARCH – 212)

Agricultural systems function within the soil-atmosphere continuum. Mass and energy exchange processes occur within this continuum and agriculture can significantly affect the processes. Emissions from agriculture to the atmosphere affect air quality and increase atmospheric greenhouse gas (GHG) concentrations. While GHG emissions are a result of the natural cycling of carbon (C) and nitrogen (N), these emissions also contribute to climate change.

A changing climate impacts agriculture, range and pasture systems, and soils through alterations of precipitation and temperature patterns. Increased atmospheric carbon dioxide (CO2) concentration has an enhanced fertilization effect on plants, particularly weeds. Combining these impacts of changing climate can alter habitats, thus changing the distribution of pathogens, weeds, and invasive species, resulting in increased threats to agricultural production and increasing the cost of production. The impacts of climate change clearly create challenges to agriculture and soil, water and air resources, and yet may also offer new opportunities for agricultural production and enhancement of soil quality.

Soils are a crucial boundary resource between agriculture and the atmosphere. Soils in agricultural systems must be managed to meet rising global demands for food, feed, fiber, fuel and ecosystem services while maintaining soil productivity and limiting undesirable interactions between soils and the atmosphere. Enhancement of soil productivity is a focus of ARS research and together with crop improvement research, offers promise for meeting future global agricultural demands.

The variability of the atmosphere, soils, and plants, and the complexity of interactions among these systems require collaborations by ARS scientists conducting NP212 research. Formal and informal Cross Location Research (CLR) projects including the Greenhouse gas Reduction through Agricultural Carbon Enhancement network (GRACEnet), the Renewable Energy Assessment Project (REAP), and field campaigns focused on air quality are successful examples. Synthesis and integration of information, including sources outside NP212 research projects, increases the utility and impact of ARS research for producers, land managers and policy-makers. Efficient assimilation of data from NP212 projects into existing and future collaborative data bases enhances synthesis and integration analyses and expands research opportunities.

**Performance Measure**

**2.2.2 Improve quality of atmosphere and soil resources; understand effects of climate change through development of knowledge and technologies.**

**Performance Targets**

**2.2.A Enable Improvements of Air Quality via Management and Mitigation of Emissions from Agricultural Operations.**

| Baseline 2010 | Target 2017 |
|---|---|
| Integrated Farm Systems Model (IFSM) and Dairy Greenhouse Gas Emissions Model (DairyGEM) developed with focus on NE US agricultural systems, as a prototype for on-farm decision support technology. | Protocols implemented for standardized air quality research data collection and storage with transport parameters and emission rates for emission and transport model improve-ment, evaluation, and validation. IFSM and DairyGEM calibrated and tested for other regions of US. |

**2.2.B Develop Knowledge and Technologies for Reducing Atmospheric Greenhouse Gas Concentrations Through Management of Agricultural Emissions and Carbon Sequestration.**

| Baseline 2010 | Target 2017 |
|---|---|
| Cumulative GRACEnet project production of 208 scientific publications on GHG emissions and carbon sequestration in US croplands and rangelands. | Agriculture product/production system/-specific decision support tools and management strategies for balancing production goals, environmental stewardship objectives, GHG emission reductions, and C sequestration. |

**2.2.C Enable Agriculture to Adapt to Climate Change.**

| Baseline 2010 | Target 2017 |
|---|---|
| Data revealing anticipated impacts of climate change on crop production, weeds, pathogens, food and forage quality. | Prototype decision support tools that enable sustainable agriculture under conditions of changing climate |

### 2.2.D Develop Technologies for Maintaining and Enhancing Soil Resources.

| Baseline 2010 | Target 2017 |
|---|---|
| Data on effects of biochar amendments and crop rotations on soil biomass, carbon cycling and enzymes. | Develop guidelines and practices to lower production costs, improve soil quality and health, and reduce use of energy and petroleum-based products. |

**Strategies and Means**

- Understand, predict, and manage emissions from cropping systems
- Understand, predict, and manage emissions from animal operations
- Understand, predict, and manage emissions from post harvest processing systems
- Understand and measure emissions of greenhouse gases from agricultural sources
- Develop process understanding of GHG emissions
- Develop improved technologies and agricultural systems to manage greenhouse gas emissions
- Understand the responses of crops, rangelands and pasture systems to anticipated climate change
- Understand the impact of anticipated climate change on endemic pests, weeds and diseases
- Evaluate germplasm and identify genetic variation that will respond positively to climate change
- Evaluate and adapt agronomic management to climate change
- Identify and develop scalable methodologies for assessing potential impacts and adaptation of agriculture to climate change
- Develop strategies for controlling soil erosion
- Improve soil management and water use efficiency
- Improve nutrient cycling and Use

## GOAL 2.3 – ENABLE NEW BIOREFINING TECHNOLOGIES TO SUPPORT AN ECONOMICALLY ROBUST BIOREFINING INDUSTRY (BIOREFINING - 213)

The ARS Bioenergy program develops technologies to enable sustainable commercial production of biofuels by the agricultural sector in ways that enhance our natural resources without disrupting existing food, feed, and fiber markets. Research will optimize both the production of plant feedstocks and the biorefining of agricultural materials to bioenergy and value-added coproducts. This research will strengthen rural economies, provide increased supplies of renewable transportation fuel, enhance energy security, and improve the U.S. balance of trade.

The growth and long-term viability of bioenergy production in the Nation is impeded by a number of technical and commercial barriers. ARS leverages its unique strengths and capabilities to pursue technical barriers that can be overcome by ARS resources.

In addition to tackling specific technical barriers and leveraging ARS core competencies, ARS bioenergy research is consistent with relevant non-technical considerations associated with public policy, general resource constraints, and overall practices/trends within the bioenergy industry.

**Performance Measure**

**1.2.3 <u>Enable new commercially-viable technologies to (1) convert agricultural materials and byproducts into fuels and other marketable products, and (2) reduce risks and increase profitability in existing industrial biorefineries.</u>**

**Performance Targets**

**2.3.A Enable New Technologies that Benefit Biorefiners which Utilize Biochemical Processes to Convert Carbohydrate-Based Feedstocks.**

| Baseline 2012 | Target 2017 |
|---|---|
| ARS will characterize 2 important feedstock traits, make progress on one enhanced germplasm pool, and establish one significant public-private partnership for advancing feedstock variety improvement. | By 2017, ARS will characterize 10 important feedstock traits, create three enhanced germplasm pools, and establish five significant public-private partnerships for advancing feedstock variety improvement. |

### 2.3.B Enable New Technologies that Benefit Biorefiners with Convert Lipid-Based Feedstocks.

| Baseline 2012 | Target 2017 |
|---|---|
| ARS will incorporate at least one new technology that enables production of biomass and will contribute to the introduction of a new region-based system. | By 2017, ARS will incorporate six new technologies and introduce three new region-based systems that enable the production of biomass feedstocks to help achieve U.S. goals for meeting legislated mandates for blending biofuels. We will provide 10 science-based practices suitable for developing NRCS conservation plans. |

### 2.3.C Enable New Technologies that Benefit Biorefiners which Utilize Pyrolysis to Convert Feedstocks.

| Baseline 2012 | Target 2017 |
|---|---|
| ARS will commercialize one biorefining and /or co-products technology which was enabled by ARS research. | By 2017, industry will commercialize five biorefining and/or co-products technologies which were enabled by ARS research. |

**Strategies and Means**

- Enable biocatalytic, chemical or hybrid (biocatalytic and chemical) technologies that are used by industry for the production of advanced biofuels, biobased products, and/or co-products.
- Enable new technologies that are used by existing biorefiners to reduce their business risks and increase profitability.
- Enable new technologies that are used by industrial buyers of co-products from existing biorefiners.
- Enable new technologies that are deployed by industry to significantly improve cold-flow performance of biodiesel fuels.
- Enable commercially-viable technologies for manufacturing new products or co-products at biodiesel facilities.
- Enable pyrolysis-based technologies that are used by industrial biorefineries for producing marketable advanced biofuels and/or fuel intermediates.
- Identify desirable feedstock traits and feedstock handling/preprocessing/blending practices that are adopted by biorefiners, feedstock producers or plant breeders to enhance pyrolysis processing performance.

- Create capital and operating cost models for biorefining technologies to assess the commercial viability of new technologies and to identify ARS research that will result in the greatest impact.
- Technologies that are employed by industrial users of products or co-products from biodiesel facilities

## GOAL 2.4 – EFFECTIVELY AND SAFELY MANAGE AND USE MANURE AND OTHER AGRICULTURAL AND INDUSTRIAL BYPRODUCTS IN WAYS THAT MAXIMIZE THEIR POTENTIAL BENEFITS WHILE PROTECTING THE ENVIRONMENT AND HUMAN AND ANIMAL HEALTH. (AGRICULTURAL AND INDUSTRIAL BYPRODUCTS - 214)

Improvements are needed in animal feeding and management regimens in order to increase the proportion of dietary nutrients retained in the animal or animal products while decreasing the quantity of dietary nutrients excreted and lost to the environment. Basic research is needed to evaluate the fate and transport of manure nutrients in the major soil-crop systems common to animal agriculture. This is the foundation for developing Best Management Practices (BMP). Application methods are needed that can improve nutrient use efficiency and incorporate manure to conserve N while maintaining adequate crop residue to protect the soil from erosion and runoff. These practices, and their associated nutrient management plans, must be based on sound understanding of the fate and transport of specific nutrients for major soils, hydrologic conditions, and cropping systems. Information is needed on pathogen inactivation and die-off as well as their potential for regrowth as functions of environmental conditions (e.g., temperature, moisture, etc.) during all stages of waste management. Technologically sound methods are needed for utilizing byproducts that will be characterized as beneficial and can result in products that are commercially sustainable. This includes blending, composting, and amending byproducts as well as developing land application and management techniques that will improve soil, water, and air quality in addition to improved plant growth. In addition, improved formulations of agriculture byproducts feed stock for use in industrial as well as agricultural applications are needed.

**Performance Measure**

**2.2.4 <u>Effectively and safely manage and use manure and other agricultural and industrial byproducts in ways that maximize their potential benefits while protecting the environment and human and animal health.</u>**

**Performance Targets**

**2.4.A Increase Utilization of Manure Nutrients and Resources.**

| Baseline 2012 | Target 2017 |
|---|---|
| Data of the effectiveness of current practices. | Manure treatment/handling systems and management strategies for maximizing effective nutrient utilization and environmental stewardship objectives. |

### 2.4.B Reduce Manure Pathogens and Pharmaceutically Active Compounds (PACs).

| Baseline 2012 | Target 2017 |
|---|---|
| Data on environmental fate and transport of pathogens and PACs. | Animal production strategies for reducing excretion of pathogens and PACS. Manure treatment/utilization systems minimizing introduction of pathogens and PACs into the environment. |

### 2.4.C Reduce Atmospheric Emissions from Animal Production Facilities.

| Baseline 2012 | Target 2017 |
|---|---|
| Initial datasets of emissions from animal production operations and facilities. | Manure treatment/handling systems and animal production/management strategies for minimizing emissions. |

### 2.4.D Develop Beneficial Uses of Agricultural, Industrial, and Municipal Byproducts.

| Baseline 2012 | Target 2017 |
|---|---|
| Reuse of some materials and disposal of the majority | Ten new economical and environmentally beneficial products created from materials previously considered to be wastes. Examples include new fuels, structural materials, and soil amendments. |

**Strategies and Means**

- Improve the Usability of Manure Nutrients through More Effective Animal Nutrition and Management.
- Maximize the Value of Manure through Improved Collection, Storage, and Treatment Options.
- Utilize Manure in Integrated Farming Systems to Improve Profitability and Protect Soil, Water, and Air Quality
- Use Manure and Other Agricultural Byproducts as a Renewable Energy Resource.
- Identify Factors that Control the Fate and Transport of Pathogens from Animal Agriculture.
- Minimize the Release of Veterinary Pharmaceuticals and Hormones.
- Reduce Antibiotic Resistant Bacteria in Agricultural Manures and Wastes.
- Minimize Risk with Best Management Practices and Treatment Technologies.
- Quantify the Extent of Agricultural Emissions of Air Pollutants.

- Characterize the Physical, Chemical, and Biological Processes Essential for the Development and Evaluation of Emissions Models.
- Develop and Test Technologies and Improved Management Practices to Reduce Emissions.
- Enhance the Value of Agricultural, Industrial, and Municipal Byproducts by Developing Beneficial Uses.
- Quantify the Risks and Benefits of Using Byproducts in Agriculture and Horticulture.

## GOAL 2.5 - DEVELOP AND TRANSFER ECONOMICALLY VIABLE AND ENVIRONMENTALLY SUSTAINABLE PRODUCTION AND CONSERVATION PRACTICES, TECHNOLOGIES, PLANT MATERIALS AND INTEGRATED MANAGEMENT STRATEGIES, BASED ON FUNDAMENTAL KNOWLEDGE OF ECOLOGICAL PROCESSES, THAT CONSERVE AND ENHANCE THE NATION'S DIVERSE NATURAL RESOURCES FOUND ON ITS RANGE, PASTURE, HAY AND TURF LANDS. (RANGELAND, PASTURE & FORAGES – 215)

This program develops and integrates improved management practices, germplasm, and land-use strategies to optimize productivity, economic viability and environmental enhancement in managing vegetation, livestock and natural resources on private and public grass and forage lands. Research activities include: enhancing conservation and restoration of ecosystems and agro ecosystems through improvements based on the application of ecological principles; improving management of fire, invasive weeds, grazing, climate change and other agents of change; developing grazing-based livestock systems that reduce risk and increase profitability in existing and emerging markets; developing improved grass and forage legume germplasm for livestock, conservation, turf and bioenergy and bioproduct systems; improving the sustainability of turf management; and improving decision-support systems including improving inventory, monitoring, and assessment tools.

**Performance Measure**

**2.2.5 Develop and transfer economically viable and environmentally sustainable production and conservation practices, technologies, plant materials and integrated management strategies, based on fundamental knowledge of ecological processes, that conserve and enhance the Nation's diverse natural resources found on its range, pasture, hay and turf lands.**

**Performance Targets**

**2.5.A Develop Practices and Technologies to Improve Rangeland Productivity and Ecological Services.**

| Baseline 2012 | Target 2017 |
|---|---|
| 3 practices and technologies that improve livestock production and the effectiveness of conservation and restoration including reducing the risk of wildfires, invasive weeds and climatic uncertainty to improve profitability and enhance ecological services | Cumulatively, 15rangeland practices and technologies developed and released to ARS customers |

### 2.5.B Develop Practices and Technologies to Improve Pasture Productivity and Ecological Services.

| Baseline 2012 | Target 2017 |
|---|---|
| 2 practices and technologies that improve livestock production and the effectiveness of conservation on pasture lands including reducing the risk of climatic uncertainty and enhancing water resources and other ecosystems services | Cumulatively, 10 pasture practices and technologies developed and released to ARS customers |

### 2.5.C Developed Sustainable Harvested Forage Systems for Livestock, Bioenergy and Bioproducts.

| Baseline 2012 | Target 2017 |
|---|---|
| 2 practices and technologies that improve harvested forage production for livestock and bioenergy while reducing the risk of climatic uncertainty and enhancing water resources and other ecosystems services | Cumulatively, 10 pasture practices and technologies developed and released to ARS customers |

### 2.5.D Develop Improved Germplasm and Management Practices for Sustainable Turf Systems.

| Baseline 2012 | Target 2017 |
|---|---|
| 1 improved germplasm that enhances turf management including improving the environment and reducing the risk of climatic uncertainty | Cumulatively, 5 improved germplasm releases or improved management practices developed and released to ARS customers |

**Strategies and Means**

- Develop rangeland livestock grazing systems that can meet producer, land manager, and global food security objectives while being adaptable to changing environmental and climatic conditions.
- Develop management strategies and practices that enhance and conserve rangeland ecosystems to provide multiple ecosystem services under changing environmental and climatic conditions.

- Develop science-based understanding of how soils, plants, animals, climate and human activities interact to affect rangeland ecosystem structure and function at multiple scales over time to improve the effectiveness of land management under changing conditions.
- Develop pasture-based livestock production systems that can meet producer, environmental, and global food security objectives while being adaptable to changing environmental and climatic conditions.
- Develop management strategies and practices that enhance and conserve pasture agroecosystems to provide multiple ecosystem services under changing environmental and climatic conditions.
- Develop science-based understanding of how soils, plants, animals, climate and human activities interact to affect pasture agroecosystem structure and function at multiple scales over time to improve the effectiveness of land management under changing conditions.
- Develop improved plant materials for harvested forage and biomass production systems that will increase the efficiency of livestock and bioenergy production systems while enhancing the environment.
- Develop improved harvested forage and biomass production systems that increase economic and energy efficiency while enhancing the environment to meet national energy and food security goals.
- Develop improved turf germplasm and management practices that meet the objectives of turf producers and users under changing climatic and environmental conditions**.**

## GOAL 2.6 – DEVELOP INTEGRATED SOLUTIONS TO SOLVE CHALLENGES RELATED TO AGRICULTURAL SYSTEM PRODUCTIVITY, PROFITABILITY, ENERGY EFFICIENCY, AND NATURAL RESOURCE STEWARDSHIP. (AGRICULTURAL COMPETITIVENESS & SUSTAINABILITY – NP 216)

Profitable farms are the basis of vibrant rural economies. Consumers benefit from agricultural production that provides abundant choices of products at relatively low costs. Even though commodity prices are now high, many farms still have difficulty responding to changing market conditions, and the high costs of fuel and other purchased inputs. In addition, there is increasing competition from overseas markets where production costs are comparatively low. At the same time, continued advancement of conservation goals is needed to enhance the natural resource base upon which the nation not only depends for food, feed, fiber, and renewable energy, but also for supplies of fresh water, clean air, and healthy ecosystems. The challenges producers face regarding productivity, profitability, and natural resource stewardship are complex, so the solutions to these challenges will not be simple.

Producers and natural resource managers need holistic solutions to the complex problems they face. Not only do they need to decide what the best production methods, improved varieties, and advanced technologies to use, they want to know how these innovations can be best incorporated into their operations and whether their investment will increase their ability to compete in the market. Though many of the problems producers face are the same across the country, it is accepted that each region and every farm is different, so there are no "one-size-fits-all" solutions.

These challenges are not unique to the United States. The United Nations Food and Agriculture Organization (GAO) addressed similar issues in their Strategic Framework 2010-2019 (ftp://ftp.fao.org/docrep/fao/meeting/017/k5864e01.pdf). Strategic Objective A – Sustainable Intensification of Crop Production – seeks to increase production per unit land area to meet world food needs and "requires the integration and harmonization of all appropriate crop production policies and practices aimed at increasing crop productivity in a sustainable manner, thereby meeting key millennium development goals aimed at reducing hunger and preserving the natural resources and environment for future use."

Interdisciplinary systems research provides an approach to understand how different kinds of farm enterprises function, and how changing or introducing new technology will affect their productivity, profitability, energy efficiency, and natural resource stewardship. Finding the best combinations of practices will help producers achieve their production goals, while enhancing the environmental goods and services derived from agricultural lands. Diverse and dynamic agricultural systems are needed that can adjust to changing environmental and market conditions to increase the long-term financial viability and competitiveness of farms, enhance natural resource quality, contribute to the vibrancy of rural communities, and increase the food, fiber, and energy security for the Nation and the world. This research will contribute to making sustainable intensification of agriculture a reality.

**Performance Measure**

**1.2.6 Develop integrated solutions to solve challenges related to agricultural system productivity, profitability, energy efficiency, and natural resource stewardship.**

**Performance Targets**

**2.6.A Develop new strategies and technologies to reduce production costs and risks of economic losses for agronomic and bioenergy crop production systems.**

| Baseline 2012 | Target 2017 |
|---|---|
| Description of baseline systems for regional agronomic crop production systems. | Identify five new region-specific agronomic crop production system configurations that utilize on-farm resources and natural ecosystem processes to reduce the need for purchased inputs and reduce whole-system costs and risks. |

**2.6.B Develop new specialty crop management strategies to reduce production costs but have neutral or positive impacts on yield, product quality, and risk of economic loss.**

| Baseline 2012 | Target 2017 |
|---|---|
| Description of baseline condition for region-specific specialty crop production systems. | Identify four new region-specific production system configurations for new crops that utilize on-farm resources and natural ecosystem processes to reduce the need for purchased inputs and reduce whole-system costs and risks. |

**2.6.C Develop new strategies that integrate crop and livestock production elements to reduce risks of economic loss, diversify income, and enhance environmental benefits.**

| Baseline 2012 | Target 2017 |
|---|---|
| Description of baseline conditions for integrated crop-livestock production systems. | Identify two enhanced region-specific system configurations that take advantage of the complimentary benefits of combining crop and livestock production enterprises to reduce the need for purchased inputs and reduce whole-system costs and risks. |

### 2.6.D Develop and integrate technology and decision support tools to increase production system efficiency.

| Baseline 2012 | Target 2017 |
|---|---|
| Single natural resource and plant growth assessment models calibrated for local conditions. | Natural resource assessment and plant growth models applied to regional crop production systems and integration of economic factors. |

**Strategies and Means**

- Develop economic risk averting management strategies that improve soil productivity, enhance soil and water conservation and nutrient cycling, and reduce fuel and pesticide use while enhancing the natural resource base.
- Identify optimal regional strategies to incorporate bio-based energy production without disrupting agricultural diversity and compromising natural resource quality.
- Develop on-farm production systems to replace purchased fuel and energy.
- Develop ecological-based pest management strategies that enhance yields and market quality, while reducing the need for pesticides.
- Develop production systems that meet new market opportunities and improve producer profitability and competitiveness.
- Identify the most appropriate methods for delivering new information and technologies to promote adoption by customers and stakeholders.
- Develop a set of management principles that are common to agricultural systems across production regions that reduce risks, improve competitiveness, and promote environmental stewardship.
- Improve production efficiencies through precision management, automation, and decision support technologies that reduce agricultural chemical and irrigation water use.
- Develop an approach to assess the economic and environmental impacts of agriculture across broad landscapes.

# Strategic Goal Area 3:
# Crop Production and Protection

Research conducted by ARS's Crop Production and Protection Program (CPP) National Programs will deliver science-based information and technologies to meet

- Producers' needs for increased crop productivity and quality, protection from diseases and pests, and economically and environmentally sustainable methods of crop production;
- Consumers' demands for a ready supply of high quality, safe, affordable and nutritious food;
- Worker's needs for a safe working environment;
- The public's desire to protect the environment; and
- The global community's needs for food security.

To meet these needs, ARS will conduct research that addresses the national priorities of genetic resource conservation, genomics, and genetic improvement; prevention and treatment of plant diseases; identification and management of arthropod and weed pests, including quarantine pests; improved crop management strategies; and the development of methyl bromide alternatives. The research of the Crop Production and Protection National Programs is well integrated with other ARS research in Animal Protection and Production; Natural Resources and Sustainable Agricultural Systems; and Nutrition, Food Safety and Quality. Through the National Invasive Species Information Center and Alternative Farming Systems Center of the National Agricultural Library, key information will be disseminated to agricultural producers, the research and education community, and the general public.

## GOAL 3.1 – PROTECT, EXPAND, AND ENHANCE THE UNITED STATES' CROP GENETIC RESOURCE BASE, INCREASE SCIENTIFIC KNOWLEDGE OF CROP GENES, GENOMES, BIOLOGICAL PROCESSES AND SYSTEMS, AND DELIVER ECONOMICALLY AND ENVIRONMENTALLY SOUND TECHNOLOGIES THAT IMPROVE THE PRODUCTION EFFICIENCY, QUALITY, HEALTH AND VALUE OF THE NATION'S CROPS. (PLANT GENETIC RESOURCES, GENOMICS, AND GENETIC IMPROVEMENT – NP 301 & 305).

**Crop Improvement**

U.S. crop production depends on new and improved varieties of crops—developed faster and for less cost—that are competitive in the market, increasingly tailored to meet the complex demands for food, feed, fiber, ornamentals, and energy; and adapted to an increasingly challenging global climate. To do so, ARS research will harness the inherent genetic potential of plants. This research will develop, and effectively apply, new knowledge of crop genes, genomes, and the control and expression of genes, to accelerate productivity and improve the quality of crops; realized via traditional and novel plant breeding methods.

Genetic resources are the foundation of our agricultural future. ARS crop gene banks contain the sources of resistance to biotic and abiotic stresses and new genes to improve the quantity and quality of food, feed, energy, fiber, and ornamental crops. To ensure that these genes are available for research and breeding, ARS will continue to acquire and conserve crop genetic resources, develop more effective screening methods for identifying superior traits, characterize the genetic profiles of gene bank holdings, ensure that genetic resources are distributed where and when they are needed, and safeguard these collections and their associated information for future generations.

New ARS genetic technologies will address the specific needs for higher crop yields; more durable and effective tolerance to abiotic stresses including drought, heat, cold, freezing, and flooding; more efficient crop use of key inputs such as water and nutrients; more durable and effective pest and disease resistance; control of flowering time; enhanced product composition and nutritional quality; value-added traits; and conversion efficiency to biofuels. ARS research will elucidate how crop traits are controlled by underlying genetic systems, how these traits are affected by environmental factors during crop production, and how to enhance traits by incorporating novel sources of genetic variation from underexploited genetic resources or by genetically-engineering such traits. ARS will devise new crop genetic improvement methods that incorporate advances in genome sequencing and analysis, molecular genetics, computational biology, and metabolic engineering. New crop breeding theories and strategies will be developed to more effectively capture the intrinsic genetic potential of germplasm—especially to improve key agronomic and horticultural traits—resulting in crops tailored for consumer and producer needs.

ARS will continue to lead the development of crop genetic and genomic information management and database systems that broadly support and enhance crop research, from germplasm improvement and breeding to genetic and genomic analyses. New tools will be generated to efficiently incorporate valuable new data into databases, extract key information from the massive quantity of data safeguarded in those databases, identify the important properties of genes, apply that knowledge to crop improvement, and build on genetic advances in one crop so as to accelerate genetic gains in others.

**Crop Production**

The Nation's economic vitality depends on the ability of U.S. crop producers to grow and market food, fiber, ornamentals, industrial products, feed, and fuels profitably; while enhancing the natural resource base on which crop production depends. Future economic success for U.S. producers depends on increased productivity, access to new markets for specialized products, new technologies that generate new opportunities for U.S. farmers, and new tools and information to mitigate risks and enable rapid adjustments to changing market conditions. The agricultural sector is challenged by a wide variety of resource, climatic, economic, and social factors that require an equally diverse array of strategies and solutions for successfully meeting those challenges.

Contemporary U.S. crop enterprises for annual, perennial, and greenhouse crop production are complex and depend on access to and successful integration of highly diverse components, such as a steady stream of superior crop varieties, new strategies for mitigation of crop losses from biotic and abiotic stresses, and mechanization and automation of undesirable or labor intensive activities. The development of successful new production systems to sustain or increase crop yield and quality requires focusing on 1) productive and profitable crop management strategies for new and traditional crops that conserve natural resources; 2) efficient and effective integrated management strategies for multiple pests; 3) mechanization of management activities to address labor constraints; and 4) improved crop management models and decision aids.

Pollination is a critical element in agriculture as well, because honey bees pollinate more than 130 crops in the United States and add $15 billion in crop value annually. Declining honeybee populations and honey production due to Colony Collapse Disorder (CCD) require special attention. CCD has now increased honey bee mortality to more than 30 percent. Also, as new crops are introduced and stresses on honeybees increase, pollinators will be continuously required for specific crops or protected environments.

Improved production systems must address the needs of small, intermediate, and large field-, greenhouse-, orchard-, and vineyard-based farming enterprises for more efficient conventional, organic, and controlled-environment production methods and strategies. New crop production technologies must increase production efficiency, conserve energy and natural resources, and provide resilience in the face of abiotic and biotic stresses; while maintaining or enhancing productivity and product quality.

Key Outcome: New technologies (such as superior crop varieties; enhanced breeding stock; more effective crop and pest management strategies; improved sensors, robotics, and spray application equipment; improved decision support systems; more efficient production systems) and information that sustain U. S. crop production and enable producers to compete more effectively in the global market place. The U. S.'s national capacity to exploit the genetic potential of crops efficiently and effectively is maintained, and U.S. crop productivity and efficiency are enhanced.

**Performance Measure**

**1.3.1 Develop knowledge, strategies, systems and technologies that maximize the production efficiency of our annual, perennial, greenhouse and nursery cropping systems. Develop new technologies and tools contributing to improving these systems to meet current and future food crop production needs of diverse consumers, while ensuring economic and environmental sustainability and production efficiency, health, and value of our nation's crops.**

**Performance Targets**

**3.1.A Develop and Maintain Superior Crop Genetic Resources and Associated Information, Genetic, Genomic, Bioinformatic, and Breeding Tools, Techniques, and Analytical Approaches, Crop Production Systems, and Technologies to Harness Crops' Genetic Potential and Optimize Productivity and Profitability of U.S. Crop Production. The Preceding Will Underpin a Safe, Affordable and Sustainable Supply of Nutritious Foods and Superior Crop Products for the U.S. and Other Nations, Protect the Environment, and Contribute Strongly to Global Market Competitiveness of U.S. Agriculture.**

| Baseline 2012 | Target 2017 |
|---|---|
| Ten new technologies are developed by ARS and used by ARS customers, leading to increased production efficiency and enhanced economic value and quality of U.S. crop production, while reducing any negative environmental impact. | Fifty new technologies are developed by ARS and used by ARS customers, leading to increased production efficiency and enhanced economic value and quality of U.S. crop production, while reducing any negative environmental impact. |

**Strategies and Means**

- Higher yielding plants
- Plants with resistance or tolerance to diseases and pests
- Plants tolerant to environmental changes or extremes
- Plants with superior product quality
- Plants with enhanced water and input-use efficiencies
- Plants optimized for production efficiency
- Plants for bioenergy and bio-based products

- New uses for current crops
- Genetically and phenotypically characterized germplasm designed for elucidating gene function and/or developing superior cultivars
- High-throughput genotyping methods and mapped genetic markers for priority traits in diverse crops
- High-resolution genetic maps and sequences for priority crops
- New phenotyping approaches for quantitative trait analysis
- Dissection of the genetic structure of complex traits and functional characterization of their constituent genes
- Methods of genomic selection and prediction
- Genomic-assisted breeding approaches for dealing with complex traits, and identifying and introgressing exotic alleles into adapted backgrounds
- Improved plant breeding techniques that apply knowledge from model plants
- Actively curated, long-term, interconnected information resources that support crop breeding, genetic, genomic, and biological research.
- Bioinformatic tools for data analysis or data mining that can extend from a single crop to related species.
- New tools to manage high-throughput phenotypic and genotypic data.
- Expanded outreach to instruct users on database access and the diversity of available data.
- Database improvements resulting from user surveys and database working group recommendations.
- Expanded domestic and international research community utilization of bioinformatic tools and data
- Priority genetic resources and associated knowledge safeguarded in state-of-the art genebanks and databases.
- Genetic gaps in collections identified and priority genetic resources acquired.
- Genetic resources characterized systematically.
- Genetic resources evaluated for priority agricultural traits.
- More efficient and effective genetic resource management methods developed.
- High quality genetic resources and associated information delivered to requestors.
- International partnerships for genetic resources research and exchange expanded.
- Genetic resource management plans and Crop Germplasm Committees strengthened.
- Enhanced knowledge of how plants interact with the environment at the molecular, whole genome and systems level which is needed for developing resilient, well-adapted crops
- Determining how plant growth and development are controlled at the genetic and epigenetic levels, so that more productive crops can be bred
- Understanding the control of plant metabolism and biochemical pathways to enable higher yielding crops and new crop products to be developed
- Improved biotechnology risk assessment methods for the analysis of potential unintended consequences in crop plants, on crop production, and on the environment
- Improved public domain tools for producing transgenic crops
- Genetic engineering technologies that can serve as adjuvants to improve the efficiency of conventional crop breeding
- Improve understanding of the effects of management practices on crop productivity and quality.
- Develop integrated strategies for managing pests, soil, water, nutrient, and environmental factors for optimal yield, quality, and economic returns.
- Develop sensors, mechanization, and automation technologies that increase production efficiency.

- Develop technologies and information that enable agricultural input applicators to appropriately apply and deliver pesticides to target pests and pathogens and comply with safety and regulatory requirements.
- Integrate crop cultivars, management strategies for abiotic and biotic stresses, and mechanization technologies into improved, productive, profitable, and environmentally acceptable crop production systems.
- Develop decision support systems to optimize the efficiency of crop production systems.
- Improve bee health, which will in turn increase honey production and effectiveness of crop pollination.
- Protect pollinator biodiversity needed for conserving and restoring U.S. landscapes.

## GOAL 3.2 – PROTECT OUR NATION'S CROPS (PLANT DISEASES, CROP PROTECTION & QUARANTINE – NP 303 & 304)

**Introduction and Background to Crop Protection:** Economic losses of agricultural crops and natural ecosystems due to arthropods, plant pathogens, nematodes and weeds are considerable, with estimates in the tens of billions of dollars each year to agriculture, landscapes, and forests in the United States. Losses are due to reduced yields, lower product quality or shelf-life, decreased aesthetic or nutritional value, and food and feed contaminated with toxic compounds. Pest management strategies include cultural, biological, physical, and chemical methods. Non-chemical methods based on biological knowledge continue to expand, but the United States continues to depend heavily on chemical control to produce agricultural commodities. For instance, in 2007 over 850 million pounds of pesticides (including herbicides, insecticides, fungicides, and nematicides) were applied to agricultural crops in the United States to protect these commodities from pests and pathogens (Pesticides and Industry Sales and Usage; 2007 and 2007 Market Estimates, EPA).

Maintenance of our arsenal of valuable management strategies is a constant challenge, as inherent disease and pest resistance in crops declines while pests become resistant to chemical controls, new pest problems emerge, new regulatory requirements are enacted, and production costs increase with rising energy costs. Further, the problem of losses due to pests and plant diseases does not end in the field or with the harvest. Insects and diseases reduce the quality of stored grain and other stored products, and it is estimated that post-harvest losses to corn and wheat alone amount to as much as $2.5 billion annually. Pests and diseases can also impede foreign trade. Imported commodities as well as those destined for export must be protected from endemic and exotic pests. Exotic insect, disease, and weed pests that threaten our food, fiber, and natural ecosystems are another mounting concern, as world trade and travel continues to expand. Invasive species such as the brown marmorated stinkbug and the Asian soybean rust directly threaten our agricultural crops, while other invasive insects transmit devastating viral and bacterial diseases, like citrus greening, that threaten entire agricultural industries. Still other invasive insects such as the Asian longhorned beetle and the sudden oak death pathogen decimate our forests and urban landscapes, while invasive weeds reduce biodiversity, displace native species, and cost billions of dollars to control annually. Management of arthropod pests, plant diseases, and weeds is essential for providing an adequate supply of food, feed, fiber, and ornamental crops, but effective control depends on understanding the biology and ecology of these deleterious organisms as well as beneficial ones.

**The Action Plan Guides Strategic Plan Development**:

- **Plant Pathogens and Nematodes**: Numerous, diverse approaches are needed to protect our crops from arthropods, plant pathogens, nematodes and weeds. To manage plant pathogens and nematodes, ARS will: 1) develop and improve rapid and reliable methods for detection and identification of plant pathogens and nematodes.; 2) enhance knowledge of the etiology of plant diseases and systematics of their pathogens; 3) provide in-depth knowledge of the biology, ecology, and epidemiology of plant pathogens and their interactions with hosts and vectors to identify targets for new disease management strategies; 4) develop and deploy host resistance against plant diseases and nematodes, and 5) develop biologically-based and integrated disease management strategies.

- **Weeds:** To reduce the impact of weeds on the nation's agricultural and natural systems, ARS will 1) develop novel weed management solutions to control the reproduction and spread of invasive and weedy plants—based on new knowledge derived from plant genomics, biochemistry, and physiology; 2) expand integrated weed management programs by incorporating newly identified natural products or natural enemies, such as fungi, bacteria, viruses, nematodes, and insects; 3) determine the mechanisms of herbicide resistance in weeds and enhance knowledge of the biology, physiology, and ecology of weeds, so as to develop cropping system methods that mitigate herbicide resistance development and spread; 4) develop spatial models to monitor and control invasive plants in complex landscapes; 5) develop recommendations for restoring

natural systems in ways that prevent weed invasions following effective biological control; and 6) identify effective weed management solutions for reduced tillage, low herbicide input, and organic production systems.

- **Arthropods:** To ensure the cost effective management and control of native and invasive arthropod plant pests, ARS will 1) develop new bioinformatic tools that enhance insect species identification; 2) identify genetic, biological, and ecological determinants of plant insect pests that can be manipulated to improve their control; 3) determine critical factors involved in disease transmission by insects; 4) improve insect monitoring and capturing methodologies by identifying, synthesizing, and field-testing semiochemicals, 5) develop new biological, chemical, and cultural methodologies to control plant insect pests, 6) improve or develop sterile insect technique technologies to eradicate insect pests; and 7) develop systems for rearing natural enemies that have been demonstrated to be effective and safe biological control agents.

**Key Outcomes:** The key outcomes of this research will be the knowledge and improved capacity needed to protect plants in agricultural and natural systems –including the safe production and trade of food, feed, fiber, ornamentals, industrial products, and biofuels. This research and the transfer of resulting technologies will provide globally competitive and sustainable agricultural systems, safe and nutritious food, and healthy landscapes.

**Performance Measure**

**4.3.2 Provide scientific information to increase our knowledge of plant genes, genomes and biological and molecular processes to protect crops and cropping systems from the negative effects of pests and infectious diseases. Develop sustainable control strategies for crop pests and pathogens based on fundamental and applied research that are effective and affordable, while maintaining food safety and environmental quality.**

**Performance Target**

**3.2.A Develop sustainable control strategies for crop pests and pathogens based on fundamental and applied research that are effective and affordable, while maintaining food safety and environmental quality.**

| Baseline 2012 | Target 2017 |
|---|---|
| Technologies produced by ARS were transferred to growers and producers, action agencies, the research community, and exporters and importers of agronomic products to exclude, eradicate and/or better manage disease and pest outbreaks as they occur in the United States or prior to their arrival on our shores. | At least 30 new or improved technologies produced by ARS will be transferred to growers and producers, action agencies, the research community, and exporters and importers of agronomic products to exclude, eradicate and/or better manage disease and pest outbreaks as they occur in the United States or prior to their arrival on our shores. |

**Strategies and Means**

- Develop and improve diagnostics and systematics for plant pathogens and nematodes, and systematics of arthropods, and weeds
- Expand our knowledge of fundamental biology and ecology of arthropods, plant pathogens, nematodes and weeds; and pathogenesis of plant diseases
- Develop and deploy plant resistance to effectively manage pests and diseases
- Develop and implement biologically-based and integrated management strategies of pests and diseases.
- Develop pest management systems to optimize efficacy of pesticides and reduce harmful emissions
- Identify and mitigate emerging pest problems
- Increase understanding of disease and pest etiologies to effectively interrupt critical points in life cycle.
- Develop and deploy trapping methods for new and endemic pests and pathogens.
- Identify and develop new molecular targets related to host preference, virulent and pest mitigation.
- Develop natural products and strategies to reduce pesticide use for sustainable cropping, horticultural and organic systems.
- Improve monitoring and restoration management approaches in natural ecosystems.
- Develop methods that allow economical replacement of methyl bromide fumigation for the purpose of controlling quarantine pests, pests on fresh and preserved commodities, and pests of stored products.
- Perform research to understand the risk from invasive species that affect agriculture, to develop methods to prevent entry of invasive pests, and to develop biological control to mitigate the damage from invasive species.

# Strategic Goal Area 4:
# Animal Production and Protection

The mission of the ARS Animal Production and Protection (APP) national programs is to provide the scientific information and tools to help support the U.S. food animal industries to continue to compete successfully in worldwide trade, provide the supply of nutritional animal products required by the Nation, and contribute toward global food security. APP will accomplish this mission by maximizing production efficiency and animal health through scientific innovation and the discovery and development of new technologies focused on national priorities. Strategic public-private partnerships will be established to achieve our mission, including support of government action and regulatory agencies responsible for trade, biodefense, and global food security. Emphasis will be given to genetic improvements of traits related to production and production efficiencies and germplasm conservation; understanding the mechanisms of disease resistance, and the development of tools to prevent, control, or eradicate diseases that threaten our food supply and public health; and identifying and developing sustainable systems for production of high quality meat, fish, milk, and eggs that also ensure animal health and well-being. The portion of the program that produces new solutions to the many veterinary problems created by arthropod pests and vectors will be leveraged to solve related problems affecting human health and the well-being of American citizens.

### GOAL 4.1 – PROVIDE SCIENTIFIC INFORMATION AND BIOTECHNOLOGIES TO ENHANCE MANAGEMENT PRACTICES THAT WILL ENSURE AN ABUNDANT SUPPLY OF COMPETITIVELY PRICED ANIMAL AND AQUACULTURE PRODUCTS: (ANIMAL PRODUCTION AND AQUACULTURE - NP 101 & 106)

U.S. production systems for food animals and aquaculture face formidable challenges. One of the most exacting challenges is successful adaptation to the accelerating demands of society that impact animal productivity and product quality, including increased production, improved production efficiencies, economic and environmental sustainability, ensuring animal well-being and improved product quality and healthfulness for consumers.

The demands placed on the national system of food animal production by a rapidly changing world can only be met by technologies that optimally harness the inherent genetic potential of animal germplasm in concert with industry stakeholders. Production systems that successfully harness that genetic potential will maximize profits, secure supply, increase market competitiveness, sustain small and mid-sized producers, maintain genetic diversity and increase consumer confidence. These optimized production systems will also ensure the economic and environmental sustainability of animal agriculture while enabling production of animal products adequate to meet the dramatically increased demand for animal products worldwide.

Consequently, the overall mission of ARS animal production and aquaculture systems is to 1) safeguard and utilize animal and microbial genetic resources, associated genetic and genomic databases, and develop robust bioinformatics tools; 2) develop a basic understanding of the physiology of livestock, poultry, and aquaculture; 3) develop improved understanding of nutritional requirements for animals, particularly in aquaculture and improve the efficiency of nutrient utilization for animals; and 4) develop information, tools, and technologies that can be used to improve animal production systems, all to ensure an abundant, safe, and inexpensive supply of animal products produced in a healthy, competitive, and sustainable animal agriculture sector of the U.S. economy.

**Performance Measure**

**1.4.1 Provide scientific information to maximize the production efficiency of our food animal production systems. Develop new technologies and tools contributing to improve those systems to meet current and future food animal production needs of diversified consumers, while ensuring economic and environmental sustainability and animal well-being.**

**Performance Targets**

**4.1.A Provide scientific information to maximize the production efficiency of our food animal production systems.**

| Baseline 2012 | Target 2017 |
|---|---|
| Seven research studies on production efficiency published in peer-reviewed scientific journals that contribute evidence to improve food animal production systems. | Cumulatively, 35 new scientific papers will be published in this area of research. |

**4.1.B Develop new technologies and tools contributing to improved precision animal production systems to meet current and future food animal production needs of diversified consumers, while ensuring economic and environmental sustainability and animal well-being.**

| Baseline 2012 | Target 2017 |
|---|---|
| One new technologies developed and used by ARS customers to increase production efficiency and enhance the economic value and well-being of U.S. food animal production while decreasing the environmental footprint of production systems. | Cumulatively, five new technologies developed and used by ARS customers |

**Strategies and Means**

- Develop genome analysis tools and reagents to enable better utilization of agricultural animal and microbial genomes and enhance genetic improvement programs
- Develop understanding of metagenomes and how to exploit metagenomes for improved animal production and protection
- Identify economically important genetic traits, their interactions and correlations for application in genetic evaluation programs
- Translate animal genomics into animal improvement programs and accelerate genetic gain

- Determine biological processes that improve animal productivity and quality
- Compare and analyze animal genes and genomes
- Preserve and curate agricultural animal genetic resources
- Identify criteria needed to ensure animal well-being and reduce stress in agricultural animal production systems
- Improve efficiency of nutrient utilization and conversion of feeds and forages to animal products
- Understand the relationship between nutrition and animal health/immunity
- Enhance reproductive performance and reduce reproductive losses in agricultural animals
- Improve the quality and healthfulness of food animal products
- Develop systems for measuring and reducing variation in product quality and yield
- Characterize safety and quality of products from non-conventional production systems
- Improve aquaculture production systems, recirculation technologies, flow-through and pond production systems
- Develop shellfish systems to maximize productivity and environmental benefits of filter feeders
- Determine nutrient requirements for various aquaculture species
- Evaluate the nutritional value, and develop alternative ingredients as sources of protein and lipid for aquatic animal diets

## GOAL 4.2 - PREVENT AND CONTROL PESTS AND ANIMAL DISEASES THAT POSE A THREAT TO AGRICULTURE, PUBLIC HEALTH, AND THE WELL-BEING OF AMERICAN CITIZENS (ANIMAL HEALTH, VETERINARY, MEDICAL & URBAN ENTOMOLOGY, AND AQUACULTURE NP – 103, 104 & 106)

Investments in animal protection research are critical to the growth and resilience of the supply of food for tomorrow and feed the future initiatives. Enhancing the health of animals in agricultural production systems will directly impact food quality and ensure a sufficient supply of macro and micro-nutrients to meet people's basic needs worldwide. When combined with other investments in agricultural development, research-based innovations will address some of the fundamental constraints that give rise to food insecurity by reducing production risks associated with pests and diseases.

Achieving results in animal protection research in the 21st century will demand a systems biology approach in which knowledge obtained from animal genomes, functional genomics, clinical trials, and epidemiology are integrated in the discovery and development of countermeasures for preventing and controlling disease outbreaks.

Entomological research will concentrate on priority problems affecting animal production, human health, and the well-being of American animals and citizens. The research aims to dedicate 30% of resources to basic research that provides relevant information about target pests and 70% to applied research and product development. The program seeks to attain a balance of skills among its scientists so that it can take full advantage of the latest developments in biology at the same time as applying its efforts to solution of practical problems.

Accordingly, the goal of the ARS animal protection research programs is to protect and ensure the safety of the Nation's agriculture and food supply through improved disease detection, prevention, control, and treatment. Basic and applied research approaches will be applied to solve animal health problems of high national priority. Emphasis will be given to methods and procedures to control animal diseases through the discovery and development of:

- Diagnostics and tools for identification of pests/vectors
- Vaccines
- Biotherapeutics
- Pesticides, repellents, attractants, traps, and other innovative products for pest/vector control
- Animal, pest, and vector genomics applications
- Disease management systems and integrated pest/vector management systems
- Animal disease models
- Farm biosecurity measures
- Applications of global information systems
- Chemical ecology of pests and vectors

Animal protection national programs have eight strategic objectives:

1. Develop an integrated animal, arthropod, and microbial genomics research program
2. Launch research programs to provide alternatives to antibiotics in food animal production
3. Build a technology-driven vaccine and diagnostic discovery research program
4. Develop core competencies in field epidemiology and predictive biology
5. Develop expert collaborative research laboratories recognized by the World Organization for Animal Health (OIE) and the United Nation's Food and Agriculture Organization (FAO)

6. Develop a model technology transfer program to achieve the full impact of our research discoveries
7. Perform the full spectrum of research for improvement of veterinary, public, and military entomology
8. Develop safe and effective methods for prevention of damage caused by arthropods to homes and households

**Performance Measure**

**4.4.2 Provide scientific information to protect animals, humans, and property from the negative effects of pests and infectious diseases. Develop and transfer tools to the agricultural community, commercial partners, and government agencies to control or eradicate domestic and exotic diseases and pests that affect animal and human health.**

**Performance Targets**

**4.2.A Provide scientific information to protect animals, humans, and property from the negative effects of pests and infectious diseases.**

| Baseline 2012 | Target 2017 |
|---|---|
| Seven research studies that had significant impact on the scientific community and/or will lead to new technologies for protection of humans, property, and livestock from harm due to pests or diseases. | Cumulatively, 35 new scientific papers will be published in this area of research. |

**4.2.B Develop and transfer tools to the agricultural community, commercial partners, and government agencies to control or eradicate domestic and exotic diseases and pests that affect animal and human health.**

| Baseline 2012 | Target 2017 |
|---|---|
| One technology used by the commercial and/or government sectors relevant to the protection of humans, property, and domestic animals. | Cumulatively, transfer five technologies to the commercial and/or government sectors. |

**Strategies and Means**

- Increase our capability to understand and predict emerging disease threats
- Discover the genetic and epigenetic drivers of disease susceptibility.
- Improve our understanding of microbial pathogenesis, transmission, host-range specificity, and immune responses to enable the development of countermeasures to prevent, control, and eradicate animal diseases
- Understand the role of poly-microbial infections in our domestic animal production systems
- Improve our understanding of prions and other misfolding protein diseases
- Apply a systems biology approach to the discovery of highly effective vaccines to prevent diseases of livestock, poultry, and aquaculture species

- Create new tools to control highly infectious diseases of livestock, poultry, and aquatic species
- Develop diagnostics and vaccines specifically designed for disease control programs
- Discover, develop, and evaluate alternative strategies to mitigate the threat of antimicrobial resistance in animal agriculture
- Identify effective disinfectants and validate their use to decontaminate containment areas and equipment
- Improve the ability to perform assessment of risk from mosquitoes, flies, invasive ticks, stable flies, house flies, horn flies, biting midges, fire ants, and other invasive ants.
- Develop better surveillance methods for mosquitoes, sand flies, ticks, bed bugs, invasive ticks, screwworm fly, fire ants, and other invasive ants.
- Create better control techniques against mosquitoes, flies, sand flies, ticks, bed bugs, invasive ticks, stable flies, house flies, horn flies, screwworm fly, biting midges, fire ants, and other invasive ants.
- Achieve better sustainability of integrated pest management against mosquitoes, invasive ticks, house flies, screwworm flies, and fire ants.

# Strategic Goal Area 5:
# Equal Employment Opportunity

**GOAL 5.1 - DEVELOP A MODEL EQUAL EMPLOYMENT OPPORTUNITY (EEO) PROGRAM THAT WILL PROVIDE INFRASTRUCTURE NECESSARY TO CREATE AND MAINTAIN A DIVERSIFIED WORKPLACE FREE FROM DISCRIMINATION, HARASSMENT, OR RETALIATION, AND CHARACTERIZED BY AN ATMOSPHERE OF INCLUSION AND CAREER DEVELOPMENT OPPORTUNITIES.**

**Performance Measure**

**2.5.1 Implement a Civil Rights Program that is fully compliant with all Civil Rights laws, rules, and regulations including DR 4300-010, Civil Rights Accountability Policy and Procedures and EEOC's MD-715 and other USDA and ARS regulations, policies and guidelines.**

| Baseline 2012 | Target 2017 |
|---|---|
| The FY 2011 Area Management Directive 715 (MD 715), Annual EEO Program Report was used as a management tool to identify potential barriers to creating and maintaining a diversified and qualified workplace, and to develop action plans to reduce/eliminate barriers. | Reduce/eliminate barriers identified in the MD-715, Annual EEO Program Report. |

**Strategies and Means**

- Review and issue annual policy statements regarding EEO/civil rights, anti-harassment, and sexual harassment to promote an environment free from discrimination, sexual or non-sexual harassment, and retaliation to 100 percent of ARS employees.
- Develop and submit annual EEO Program Status reports to EEOC and the Department aimed at eliminating barriers to hire women, underrepresented groups based on the Civilian Labor Force (CLF), and persons with disabilities.
- Expand outreach activities in K-12 schools, universities/colleges, minority serving institutions and organizations that cater to persons with disabilities providing education about scientific research to increase percentage of underrepresented groups based on the CLF. ARS' goal is to increase the annual percentage of new hires by 75 percent of the following groups compared to the new hire FY 2011 data (goal is noted in parentheses): White females (49); Hispanic male (3); Hispanic female (2); African American male (11); African American female (18); and persons with targeted disabilities (1).
- Use Schedule A hiring authority for persons with disabilities and Veteran Hiring Authorities as part of strategy to recruit and retain a diverse workforce. ARS' goal is to increase the annual percentage of veteran new hires by 75 percent or 62 veterans.
- Provide EEO/civil rights information and counseling and advice to 100 percent of the employees requesting the information through a variety of sources to reduce EEO complaints.
- Ensure that all employees complete mandatory and recommended EEO training.
- Conduct civil rights impact analyses as required.
- Offer the ADR process to all employees in all stages of the EEO complaint process. ARS' goal is to increase the annual usage of ADR by 50 percent or 18.

# ARS Management Goals

ARS is continually assessing the relevance, quality, and performance of its research, providing agricultural information to the public through the National Agricultural Library and print and electronic media, ensuring adequate facilities to support Agency research, and ensuring a workplace conducive to personal and professional development.

## MANAGEMENT GOAL 1: ENSURING THE QUALITY, RELEVANCE, AND PERFORMANCE OF ARS RESEARCH (COVERS ALL RESEARCH OBJECTIVES)

The Office of Management and Budget (OMB) has established Government-wide R&D Investment Criteria that are designed to assess the relevance, quality, and performance of Federally funded research, and ARS adopted the R&D Investment Criteria as a tool to measure its research. To establish the relevancy of the Agency's research programs, ARS relies on organized interactions with customers, stakeholders, and partners. Peer reviews conducted by the Office of Scientific Quality Review (OSQR) and the Research Position Evaluation System (RPES) ensure the quality of the Agency's research and scientific workforce. All research projects are assessed annually to determine the number of currently approved milestones that were met/not met during the preceding fiscal year. Near the end of the 5- year program cycle, National Programs are subject to retrospective reviews, which verify the scientific impact and programmatic relevance of the work conducted under each National Program Action Plan.

**Performance Measures**

### MG 1.1 RELEVANCE: ARS' BASIC, APPLIED, AND DEVELOPMENTAL RESEARCH PROGRAMS ARE WELL- CONCEIVED, HAVE SPECIFIC PROGRAMMATIC GOALS, ADDRESS HIGH PRIORITY NATIONAL NEEDS, AND HAVE DIRECT RELEVANCY IN ACHIEVING ARS' LONG-TERM GOALS.

| Baseline 2012 | Target 2017 |
|---|---|
| As assessed against the Program Action Plans, the Agency's long-term goals, and the priority needs of U.S. agriculture, 97.1% of ARS' projects were conducting highly relevant research. | 100% of ARS' projects will be conducting highly relevant research. |

## MG 1.2 QUALITY: ARS' RESEARCH PROJECTS ARE REVIEWED FOR QUALITY BY NATIONAL PROGRAM USING INDEPENDENT EXTERNAL PEER REVIEW PANELS AT THE BEGINNING OF THE 5-YEAR NATIONAL PROGRAM CYCLE.

On average, one fifth of the Agency's Research Projects are reviewed annually by external peer panels. Most projects receive initial scores of needing "No Revision", "Minor Revision", or "Moderate Revision" and are certified after any needed revisions, based on review panel comments, are made. The remaining projects, rated as needing "Major Revision" or as "Not Feasible", receive detailed comments from the review panel and are revised. When these revised projects are examined again by the panel, the majority receives scores of "No", "Minor", or "Moderate" revision needed. Those few projects (approximately 3% of all projects) still rated as needing "Major Revision" or "Not Feasible" after a second review is terminated and resources redirected to High Priority projects. A strength of this Peer Review process is the opportunity to incorporate recommendations of peer panels and enhance ARS research. The Research Position Evaluation System (RPES) conducts Peer Reviews of all ARS scientists on a three-to-five-year cycle. RPES is designed to ensure that ARS will continue to classify and evaluate scientists through a peer process to ensure the highest quality scientific workforce.

| Baseline 2012 | Target 2017 |
|---|---|
| Using an average based on cumulative scores for the past 5 years, 80% of projects received scores of No, Minor, Moderate revision need upon initial review and, overall, 98% received such scores by the completion of the review. | Using a cumulative five-year average, 85% of the projects reviewed will receive initial scores of No, Minor, or Moderate revision needed and 99% will receive such scores by completion of the review. |

| Baseline 2012 | Target 2017 |
|---|---|
| As assessed against the Program Action Plans, the Agency's long-term goals, and the priority needs of U.S. agriculture, 97.1% of ARS' projects were conducting highly relevant research. | 100% of ARS' projects will be conducting highly relevant research. |

**OSQR and the Peer Review Process**

The Office of Scientific Quality Review (OSQR) manages the ARS peer review system for research projects, which gives researchers the opportunity to obtain constructive feedback from their external peers. These reviews are conducted by panels made up almost entirely of non-ARS scientific professionals, including an external chairperson with expert knowledge pertinent to the research being reviewed. In their evaluations, panels assess each Project Plan's research methodology, probability of success, and scientific merit. The peer review panel provides comments and scores each project as needing "No Revision", "Minor Revision", "Moderate Revision", and "Major Revision" or as "Not Feasible".

## MG 1.3 PERFORMANCE: ARS WILL MONITOR THE PERCENTAGE OF ANNUAL RESEARCH PROJECT MILESTONES MET.

All research projects are assessed annually to determine the number of currently approved milestones that were met/not met during the preceding fiscal year. Information as to why a milestone was not met (including mitigating circumstances) is collected and will be used for making program management decisions. ARS projects a 10 percent baseline level of milestones not met due to personnel attrition. Thus, the maximum achievable milestone target is reduced in real terms to 90 percent. Each National Program is reviewed by external review panels at the end of its 5-year National Program cycle. The panel provides a written report on the quality of accomplishments, impact of the research, and thorough constructive critique recommendations for the next National Program cycle. Twenty percent of National Programs are reviewed annually.

| Baseline 2012 | Target 2017 |
|---|---|
| 89% of project milestones were fully or substantially met. | 94% of project milestones will be fully or substantially met. |

| Baseline 2012 | Target 2017 |
|---|---|
| Office of National Programs (ONP) completed National Program Retrospective Reviews for all Programs in the first 5-year cycle and began reviews for the programs currently in the second 5-year cycle. | ONP will complete National Program Retrospective Reviews for remaining programs in the second 5-year cycle and begin reviews for programs in the third 5-year cycle. |

**National Program Assessment Process**

The Office of Scientific Quality Review (OSQR) manages the ARS peer review system for research projects, which gives researchers the opportunity to obtain constructive feedback from their external peers. These reviews are conducted by panels made up almost entirely of non-ARS scientific professionals, including an external chairperson with expert knowledge pertinent to the research being reviewed. In their evaluations, panels assess each Project Plan's research methodology, probability of success, and scientific merit. The peer review panel provides comments and scores each project as needing "No Revision", "Minor Revision", "Moderate Revision", and "Major Revision" or as "Not Feasible".

**Strategies and Means**

- Conduct an annual assessment of projects to determine if they have maintained direct relevance in achieving ARS' long term goals and the priority needs of U.S. agriculture. Those projects considered of lower relevance will be redirected into higher priority research areas/objectives. *(Relevance)*
- Receive summary information from OSQR, using a statistical rolling average, of the results achieved during the initial panel review. *(Quality)*
- Receive a summary each year of peer reviews that RPES conducts on ARS scientists. *(Quality)*
- Assess each project's progress against each approved milestone, indicating whether it was fully met, substantially met, or not met with an explanation for the latter two ratings. Line management will review and concur in these assessments. Each year, ONP will review these assessments to validate their conclusions. *(Performance)*
- Assess National Programs to gauge the level of past performance and establish the research

priorities and direction of the program for the next five-year cycle. This process, covering approximately 20 percent of the Agency's research program each year, provides valuable input to the writing teams that are drafting Action Plans for the next five-year program cycle. *(Performance)*

## MANAGEMENT GOAL 2: INTERNATIONAL ENGAGEMENT AND PARTNERSHIPS: EXTEND THE CAPACITY OF THE NATIONAL PROGRAMS TO ADDRESS PROBLEMS CONFRONTING U.S. AGRICULTURE

In recognition that agriculture, and agricultural research, is now a global enterprise, ARS' international office enhances the productivity, effectiveness, and impact of ARS National Programs through mutually beneficial international research activities. The United States directly benefits from international collaboration in agricultural research through access to new ideas and technologies, global germplasm collections, crucial international foreign research sites, enhancement to domestic research, and increased trade. The increasingly transboundary nature of many agricultural problems, such as emerging and re-emerging plant and animal diseases, control of invasive species through discovery and importation of biological control agents, scientific collections including genetic resources preservation, and the need to increase productivity to ensure adequate supplies of agricultural products, provides a strong incentive for greater international cooperation. International agricultural research cooperation addresses global food security by providing solutions to current and future agricultural productivity and sustainability challenges. By sharing knowledge and technology through close collaboration with national and international research institutions in other countries and in the United States to increase institutional research capacity and speed technology development, ARS collaborations enhances international relationships and provides a benign face to U.S. trade and diplomacy.

**Crop Production and Protection (CPP):** Because USDA does not have the capacity to maintain collections for the entire world's vital crop germplasm, international cooperation plays a critical role in germplasm conservation. In addition, USDA must continue to cooperate with several foreign and international research institutions to fully realize the promise of genomics and genetics research. To also address the concern of food security, additional, long term cooperation is needed in research to continue increasing productivity, availability and utilization of food. International cooperation is also critical for the U.S. to address the control of invasive species (diseases, weeds and insect pests) detrimental to crops, forests, and other natural areas.

**Animal Production and Protection (APP):** International cooperation enhances the goals of this area by increasing access to different livestock species which enables research to understand the mechanisms of disease resistance. International cooperation helps to develop and test tools to prevent, control, or eradicate diseases that threaten our food supply or public heath, and identifying and developing sustainable systems for production of high quality meat, milk, and eggs. International cooperation is particularly important in the area of animal diseases and their vectors since the approaches to controlling exotic diseases are not as well tested outside of areas where they occur endemically. It plays a key role in animal and aquaculture genomics and should continue to focus on development of tools and resources to meet productivity, efficiency and sustainability needs. International cooperation also provides access to management systems and animal species that have been developed or evolved in tropical and semi-tropical climates and manifest much greater stress and disease tolerance.

**Natural Resources and Sustainable Agricultural Systems (NRSAS):** Scientists from around the world are drawn to work with ARS in this arena given our current capacities and successes in developing and applying natural resources management strategies and models. ARS gains from these collaborations with additional data which helps scientists improve these techniques and models over time and prove their application in different environments. In addition, sharing these applications helps extend the impact of these technologies in a world facing critical challenges to manage natural resources, particularly water. This also extends to addressing Climate Change and how to manage its impact on U.S. agricultural production as well as how it is impacted by agricultural practices. Finally, to try and meet U.S. bioenergy targets through research on biomass production, we continue to engage our international partners to address biomass use, productivity, management and sustainability.

**Nutrition, Food Safety and Quality (NFSQ):** Because this area addresses many issues of concern to consumers and because of the global nature of agriculture, international cooperation can help provide a scientific foundation, both for research and to address regulatory, trade, and consumer issues. Because of the diversity of the American population and food consumption patterns, international collaborations can leverage and greatly enhance U.S. nutrition research.

**Performance Measures**

### MG 2.1 DYNAMIC INTERNATIONAL ENGAGEMENT THROUGH PROGRAMS, PROJECTS, CO-PUBLICATIONS AND OTHER ACTIVITIES THAT SUPPORT ACHIEVING THE ARS NATIONAL PROGRAM GOALS.

### MG 2.2 EFFECTIVE ENGAGEMENT IN MULTILATERAL AND BILATERAL FORUMS IN WAYS THAT CAN HELP CATALYZE, OR PREVENT OR REDUCE IMPEDIMENTS TO, SCIENTIFIC OR ECONOMIC COOPERATION AND TRADE.

**Strategies and Means**

- Catalyze and implement international programs and projects that help the Agency to address critical threats to U.S. agriculture, including foreign animal and plant diseases and pests and invasive species.

## MANAGEMENT GOAL 3: ENSURE PROVISION AND PERMANENT ACCESS OF QUALITY AGRICULTURAL INFORMATION FOR USDA, THE NATION, AND THE GLOBAL AGRICULTURAL COMMUNITY VIA THE NATIONAL AGRICULTURAL LIBRARY.

The National Agricultural Library (NAL) has statutory mandates to identify, collect, preserve in perpetuity, and provide access to quality information relevant to agriculture; serve as one of four national libraries; serve as USDA's library; provide leadership in developing and operating a comprehensive agricultural library and information network; and provide specialized information services through such NAL information centers and programs as AGRICOLA, the LCA Digital Commons, the Animal Welfare Information Center (AWIC), Alternative Farming Systems Information Center (AFSIC), Food and Nutrition Information Center (FNIC), Food Safety Research Information Office, National Invasive Species Information Center, Rural Information Center (RIC), and Water Quality Information Center (WIC). The world's largest agricultural library and a member of the Association of Research Libraries, NAL serves a large and broad customer base, including such audiences as policymakers, researchers, agricultural specialists, farmers, members of the library, educational and agribusiness sectors, food stamp recipients, and the general public. NAL and NAL customers benefit from participation in a number of partnerships and alliances, including the Agriculture Network Information Center (AgNIC), Nutrition.gov, and CENDI.

**NAL Service Delivery**

The National Agricultural Library manages the world's largest agricultural information collections, designated as a USDA heritage asset, which include more than 50 million physical items as well as extensive digital information products including databases, digital full-text journals and digital full-text books and maps. AGRICOLA (AGRICultural OnLine Access), NAL's online catalog and index to the agricultural literature, serves as the finding tool for these collections and is made available free of charge by NAL at http://agricola.nal.usda.gov and by a number of commercial companies. In addition to extensive reference, research, information center, and document delivery services delivered to a global clientele, NAL provides 24/7 access for USDA staff worldwide to a large and growing array of digital information products via DigiTop (NAL's Digital DeskTop Library for USDA). NAL has initiated development of a digital collection system to preserve for perpetuity USDA publications and other essential agricultural information assets.

### Performance Measures

### MG 3.1 THE SERVICES AND COLLECTIONS OF THE NATIONAL AGRICULTURAL LIBRARY CONTINUE TO MEET THE NEEDS OF ALL CUSTOMERS.

| Baseline 2012 | Target 2017 |
|---|---|
| The National Agricultural Library total annual volume of customer service transactions exceeded 95 million. | The National Agricultural Library total annual volume of customer service transactions will exceed 130 million. |

**Strategies and Means**

- Understand the information needs of NAL beneficiaries, customers, stakeholders, and partners by conducting large-scale as well as targeted surveys, focus groups, and other assessment instruments in order to meet and anticipate needs.
- Deliver unified, easy to use, convenient 24/7 digital services designed to meet customer needs and preferences.
- Deliver rapid information and services concerning “hot topics” and emerging issues of critical national importance.
- Improve information delivery to underserved customer audiences.
- Develop NAL brands to raise visibility.
- Market NAL services to specific audiences.
- Increase advocacy and outreach initiatives.
- Deliver training to optimize use of NAL programs and services.
- Optimize NAL structure, information technologies, and workflows to reflect increased movement to digital programs and services.
- Recruit and retain a service-oriented, technologically-adept workforce.
- Foster a culture of innovation and creativity within NAL.
- Partner with important technology concerns to expose NAL content and to develop shared technical standards in conformance with national policies.
- Extend partnerships with USDA and other Federal agencies to develop targeted information services.
- Continue to participate in and lead national and international alliances and partnerships
- Conserve the rare and at-risk items in the NAL physical collection to secure the Nation’s agricultural heritage.
- Broaden and deepen the NAL physical and digital information collections.
- Extend and enrich AGRICOLA, including through links to online full-text publications and the continued enhancement of the NAL Thesaurus.
- Expand the audience and content for the NAL Digital Collections
- Advance NAL preservation and digitization programs.

## MANAGEMENT GOAL 4: DEVELOP OUTREACH ACTIVITIES THAT WILL ENABLE ARS TO BETTER SUPPORT THE USDA INITIATIVE TO INCREASE SERVICES TO LIMITED RESOURCE, SOCIALLY DISADVANTAGED, AND/OR HISTORICALLY UNDERSERVED FARMERS AND RANCHERS.

USDA has identified a number of issues related to how it serves or fails to serve that segment of the U.S. agricultural community that has been historically underserved by many Government programs. These studies did not identify specific issues or problems in the USDA research programs, but in 2000, ARS decided to take a more active approach to see how the knowledge and technologies developed through its intramural research activities could be made available to Outreach target populations (historically underserved, limited resource, and/or socially disadvantaged).

**Performance Measures**

### MG 4.1 BRING THE BENEFITS OF ARS RESEARCH TO UNDERSERVED POPULATIONS AND ORGANIZATIONS SERVING THESE TARGET POPULATIONS BY PROVIDING THEM WITH ACCESS TO ARS-GENERATED KNOWLEDGE AND TECHNOLOGY THAT ENABLES THEM TO INCREASE THEIR PRODUCTIVITY AND PROFITABILITY.

| Baseline 2012 | Target 2017 |
|---|---|
| ARS has an Agency Outreach Coordinator and an Outreach Coordinator in every Area. The Agency Outreach Coordinator will answer directly to the Associate Administrator of ONP. The Outreach Coordinators are responsible for actively seeking ways to reduce/eliminate internal barriers that prevent target populations from accessing ARS research products. | Area Outreach coordinators will identify organizations and individuals that serve the underserved populations who are potential users of ARS research and work to reduce/eliminate barriers to their participation. |

### MG 4.2 IDENTIFY SIGNIFICANT OUTREACH ACTIVITIES AND REPORT THEM ANNUALLY TO THE USDA OFFICE OF OUTREACH.

| Baseline 2012 | Target 2017 |
|---|---|
| ARS identified 20 significant Outreach activities and reported them to the Departmental Office of Outreach as requested. | ARS will cumulatively report 100 significant Outreach Activities to the USDA Office of Outreach and through the GPRA Annual Performance Report. |

**Strategies and Means**

- Provide leadership to forge interagency efforts to better serve underserved populations (partnerships within USDA, and with other Federal agencies, State agencies, universities, and private organizations)
- Increase extramural agreements with organizations that serve underserved populations.
- Increase the number of invitations extended to representatives of underserved populations to participate in program workshops, symposia, project/program reviews, and site/location reviews.
- Increase the number of research collaborations and technology transfer activities focused on meeting the special needs of this target population.
- Identify good examples of recent research that can or will be useful to target populations and ways to help them access this information.
- Ensure that appropriate employees are aware of the outreach initiative and their responsibilities in it.
- Promote knowledge of the outreach initiative to new employees, as appropriate.

# ARS Administrative and Financial Management (AFM) Initiatives

## OVERVIEW OF AFM INITIATIVES

ARS' Administrative and Financial Management (AFM) initiatives link with USDA's management initiatives to support more efficient program operations and deliver scientific excellence and public service.

AFM expects to:

- Ensure an efficient, high performing, high quality, diverse workforce to fully accomplish the ARS mission and work cooperatively with partners and the private sector.
- Ensure ARS sustains a clean annual audit opinion and provides access to quality financial information through financial systems that meet the needs of their users.
- Enhance ARS effectiveness through effective and automated services for acquisition, personal property, and administrative management.
- Link budget decisions and program priorities more closely with program performance and consider the full cost of programs.
- Reduce improper payments by establishing targets and corrective actions.
- Efficiently and effectively manage real property through good stewardship (*i.e.*, acquisition, maintenance, and disposal) of ARS' real property assets.
- Award extramural agreements in an efficient and timely manner, and ensure they are legally and fiscally sound and in full compliance with established policies and procedures.
- Ensure systems fully meet needs for AFM information and guidance in support of the President's Management Agenda and E-Gov initiatives.

Below is a brief summary of AFM's priorities.

## IMPROVE HUMAN CAPITAL MANAGEMENT

The AFM strategic plan contains objectives related to improved management of ARS human capital. The plan focuses on strategic workforce planning, leadership development, optimizing organizational structures to address current and future challenges, and improving performance management to maximize employee performance. The AFM strategic plan identifies human capital challenges and implements an accountability system to monitor and address these challenges. Such challenges include meeting the demand for cutting edge research talent, creating a workforce with a combination of skills not previously required, and fully supporting the Department's mission.

In managing its human capital and delivering its services to customers, ARS will continue to focus on ensuring civil rights and equal employment opportunity for everyone, regardless of race, color, national origin, gender, religion, age, sexual orientation, disability, political belief, marital or familial status, or any other factor. ARS is committed to continuous civil rights progress in the workplace, program

delivery, and the efficient processing of complaints.

AFM plans to:

- Identify current and future skill gaps through an effective workforce planning process.
- Deliver human resource services through the implementation of e-HR tools.
- Improve individual and organizational performance through the development of position descriptions, standard performance plans, and training and knowledge management strategies.
- Ensure that ARS fosters a workplace atmosphere conducive to achieving the Agency's mission.

## IMPROVE FINANCIAL MANAGEMENT

Effectively managing the use of taxpayer dollars is a fundamental Federal responsibility. ARS intends to ensure that all funds spent are accounted for properly to taxpayers, Congress, and the Government Accountability Office (GAO). The AFM Financial Management Division (FMD) works to improve financial management in partnership with the USDA Office of the Chief Financial Officer (OCFO).

AFM-FMD plans to:

- Ensure that ARS meets all appropriation level accounting and reporting requirements, and ensure that all reports continue to indicate an accurate financial picture and that reporting difficulties are rapidly resolved.
- Continue to improve financial system business processes and financial reporting capabilities.
- Provide support to ARS travelers with professional customer-oriented travel and transportation staff and a Web-based travel system.
- Ensure financial management bulletins and undocumented business practices are incorporated into policies and procedures for the agency.

## PROCESS IMPROVEMENT FOR EXTRAMURAL AGREEMENTS PROGRAM

USDA promotes the improvement and development of systems of accountability that encourage all employees to achieve high standards of performance and customer service. ARS recognizes the need for improved business process to achieve this high level of customer service and employee performance. The AFM Extramural Agreements Division further supports this initiative through the review and improvement of the extramural agreements process to provide a streamlined and consistent agreements process throughout the Agency.

## ELIMINATE IMPROPER PAYMENTS

Based on recent audit estimates, Federal agencies make more than $45.1 billion in improper payments annually. This USDA initiative requires agencies to measure their improper payments annually, develop improvement targets and corrective action plans, and track the results annually to ensure that corrective actions are effective.

AFM will work with the Department plan to:

- Work with Department and Agency officials to reduce the number of improper payments made.
- Recover, where possible, overpayments made to individuals and organizations.

## IMPROVE ASSET MANAGEMENT

It is the policy of USDA to promote the efficient and economical use of the Department's real property assets and to assure management accountability for implementing Federal real property management reforms. Based on this policy, ARS recognizes the importance of real property resources through increased management attention, the establishment of clear goals and objectives, improved policies and levels of accountability, and other appropriate actions. AFM supports the Department's real property asset management program and the following strategic objectives used for real property management improvement:

- Develop a capital investment strategy that incorporates both facility needs as well as program needs.
- Maximize facility utilization and co-locate Agency operations when possible.
- Use performance measures as part of the asset management decision process.
- Provide management information to determine the appropriate levels of investment.
- Dispose of unneeded assets.
- Use appropriate public and commercial benchmarks and best practices to improve asset management.
- Provide for safe, secure, and healthy workplaces.

## SUPPORT FAITH-BASED AND COMMUNITY INITIATIVE

This initiative strives to support the essential work of faith-based and community organizations. AFM supports this initiative by ensuring the acquisition process allows these organizations to compete on equal footing for ARS contracts.

# ARS Office of the Chief Information Officer (OCIO)
# Management Initiatives

## OVERVIEW OF MANAGEMENT INITIATIVES

ARS works through its Office of the Chief Information Officer (OCIO) to enable more effective and efficient research mission delivery through a strengthened information and technology management program. The premise of this program is based on the following vision statement:

***"ARS information systems are mission driven and responsive to customer needs; they are reliable, secure, user friendly, relevant, innovative, well planned, and managed effectively."***

Effective information systems flow from mission requirements. This relationship dictates a structured, comprehensive, and ongoing review of information systems and the technology needed to support ARS mission and internal and external customer needs. Because ARS is the government entity uniquely responsible for creating new knowledge and the data, information, and technology necessary for a sustainable and globally competitive American agriculture, the Agency's information technology program must provide a safe and reliable environment to support the creation, storage, and dissemination of this
knowledge.

The ARS OCIO works in consultation with the ARS Executive Information Technology (IT) Steering Committee to define the strategic direction of the Agency's information technology program in the ARS IT Strategic Plan, which defines ARS' IT strategic goals, objectives, and strategies. The plan identifies key information management issues and provides the framework for developing integrated information systems and technology through further definition and specification of architecture components and information elements. OCIO then works in coordination with the Agency's IT specialists to implement these IT strategies with broad Agency wide impact.

## EXPAND ELECTRONIC GOVERNMENT

OCIO facilitates the Agency's implementation of broad Federally and USDA-mandated IT programs focused on expanding electronic government. OCIO will continue to work with the USDA Office of the Chief Information Officer (USDAOCIO) to achieve this goal. Specifically, OCIO will work with the USDA-OCIO on key areas for effective IT management, such as Enterprise Architecture, Federal Information Security Management Act (FISMA), and Capital Planning and Investment Control, as well as on network efficiency, reliability, and capacity to ensure support of E-Government projects.

**Strategies and Means**

- Ensure that the ARS mission drives its information systems and the deployment of information technology.
- Ensure that ARS information systems are reliable, secure, relevant, innovative, well planned, and managed effectively.
- Invest in appropriate human resources and infrastructure to ensure effective management of high quality information and state-of-the-art technology.
- Ensure information systems support research and technology transfer through development and dissemination of ARS advanced knowledge-based systems, decision tools, and databases.
- Ensure that researchers, educators, and the public have an awareness of and access to research accomplishments and agriculturally related information.

# Appendix A:
# Strategic Consultations & Inter-Agency Working Groups

ARS regularly consults with external groups – from customers to policy experts, to industry and consumer groups – about the effectiveness of its programs and the need for improvement. While many of these consultations are not conducted expressly for the purpose of the strategic plan, they influence strategic goals, objectives, strategies, and targets. ARS Associate Administrators, Deputy Administrators, and National Program Leaders serve on many committees, taskforces and inter-agency working groups where they lend their expertise to solving agricultural problems on both a domestic and global scale.

| ARS Inter-Agency Working Group Participation | | |
|---|---|---|
| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Academy of Finland | USDA/Finland | Collaborate on food safety research; share food safety information |
| ADODR on Confidentiality Agreements | Food Companies | To discuss mutual interests related to functional foods |
| Agricultural Air Quality Task Force | Chief of NRCS, Office of the Secretary | FACA dealing with air quality, climate change and sometimes bioenergy research & policy |
| Agricultural Trilateral Working Group Pakistan, Afghanistan (NEW) | FSA | To promote food security for Pakistan and Afghanistan in partnership with USDA |
| Air Quality Research Subcommittee | CENR | Federal agency information sharing |
| Alternative Feeds for Aquaculture Initiative | USDA/NOAA | Spur progress in development of aquaculture feedstuffs not reliant on marine pelagic fisheries |
| American Bakers Association | ABA | To exchange information and assess industry research needs and priorities. |
| American College of Veterinary Preventative Medicine | AVMA | board certification association for veterinary preventive medicine- I'm a diplomat |
| American Leather Chemists Association | ALCA | To share information and assess priority needs of the hides and leather industries |
| American Meat Science Association | Meat and Livestock Industry and Universities | Coordinate public research in meat quality, and safety |
| American Society of Microbiology | ASM | share microbiologic information |
| American Veterinary Medical Association | AVMA | sharing of information on veterinary medicine |
| AMI Scientific Steering Committee | American Meat Institute (AMI) | Set research priorities and review grants |
| AMI, NCBA, AMI, Pork Board, UFFV, | Commodity | Exchange information on priorities |
| APHIS Plant Protection and Quarantine Board of Advisors | USDA, APHIS, PPQ | Coordination and Customer Needs for APHIS PPQ |
| APHIS Research Priorities Steering Committee | APHIS, ARS, NIFA | Interagency Coordination |
| APHIS Technical Advisory Group for Biological Control Agents for Weeds | APHIS | Provide Technical guidance to APHIS on risks associated with biological control agent releases |
| Aquatic Nuisance Species Task Force | Federal Interagency | Provide Technical Guidance to Federal Invasive Species Response (Aquatic Nuisance Species) |
| Armed Forces Pest Management Board | DoD | Consultant |

| ARS Inter-Agency Working Group Participation | | |
|---|---|---|
| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| ARS Liaison to FSIS Biosecurity Division | USDA | Coordinates biosecurity related research conducted for DHS or FSIS by ARS. Assist in conducting Carver-Shock analysis on biosecurity agents |
| ARS MOU with DMI, Inc. | DMI, Inc. | To cooperate in developing innovative new products to expand markets for U.S. dairy producers and processors |
| ARS MOU with the United Soybean Board | United Soybean Board | To improve coordination between the two organizations to better leverage resources applied to the research necessary to develop value-added non-food, non-feed, products using soybeans as a feedstock |
| ARS partnership with DMI, Inc., the National Dairy Council, and the Department of Defense, Combat Feeding | DMI, Inc. | Designed to leverage government, industry and university resources to greater overall effectiveness and efficiencies, increase collaboration, and help to achieve a more profitable dairy industry |
| Asian Tiger Mosquito Areawide IPM Project | ARS | Coordination and consultant |
| ASM Steering Committee for Research Colloquium | American Society of Microbiology (ASM) | To occur in 2011 on Meeting Global Water Needs (includes food safety) |
| Association of Public Health Veterinarians | AVMA | Communicate public health information among veterinarians working in state, local and federal govt |
| BEP Animal Health Initiatives | ARS, DoS | Scientific Diplomacy |
| Biobased Products and Bioenergy Coordination Council | REE Undersecretary | The Biobased Products and Bioenergy Coordination Council (BBCC) was established by the Secretary of Agriculture to provide a forum through which USDA agencies will coordinate, facilitate and promote research, development, transfer of technology, commercialization, and marketing of biobased products and Bioenergy using renewable domestic agricultural and forestry materials. This includes promoting information sharing, strategic planning and providing policy advice to the Secretary. (see www.ars.usda.gov/bbcc) |
| Biochem 20/20 | Contractor | Biosecurity |
| Biodefense Backstopping | subPCC - DoD | Coordinate International collaborative efforts in developing countries |
| Bioenergy Crop Assistance Program (BCAP) Project Area Selection Criteria Working Group | Farm Service Agency | BioEnergy Science Team assisting FSA in developing science-based criteria for evaluation BCAP proposals |
| Biofuels Sustainability Criteria and Indicators Sub-committee | Biomass Research & Development Board | Develop criteria and indicators for sustainable biomass production |
| Biological Threat Reduction Program | DOD | Coordinate international collaborative efforts to enhance the development of a veterinary infrastructure and animal health research in developing countries |
| Biomass Conversion Interagency Working Group | Biomass R&D Initiative Board | coordinate Federal-wide efforts in support of converting ligno-cellulosics to fuels |
| Biomass R&D Board - Environmental Health & Safety | Congress/EPA/USDA | Identify EH&S hazards and benefits related to practices and technologies of components of the biofuels supply chain |
| Biosurety working group | NSABB | Advise federal government on developing personnel reliability standards |
| Biotechnology Coordinating Committee | Across USDA | Consistent communication regarding Biotech w/in USDA |
| Borlaug Global Rust Initiative | USDA, CG Centers, Gates Foundation, multiple wheat growing countries | Address Ug99 and other virulent wheat stem rusts |

| ARS Inter-Agency Working Group Participation | | |
|---|---|---|
| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Cattle Fever Tick Eradication Program | APHIS | Coordination of research and operations |
| CBRN Countermeasures | Federal | Biosecurity Research |
| CEAP Steering Committee | NRCS | Coordinate CEAP activities |
| CEAP Working Group | NRCS | coordinate grazingland CEAP activities |
| Citrus Greening Coordinating Group | ARS, APHIS, Florida Citrus Mutual | To coordinate research to combat citrus greening disease in cooperation with APHIS, University collaborators, and IFAS. |
| Citrus Greening Research Planning Taskforce | ARS | Plan national research programs to develop and implement management strategies for citrus greening and canker. |
| Classified Life Sciences Research Interagency Working Group | ARS, HHS, DHS, NIH, CDC, USAF, OSTP, FPA, FSIS | To coordinate interagency activities related to classification of research. |
| Climate Change Carbon Cycle Interagency Working Group | US Climate Change Science Program | Info sharing, research coordination |
| Climate Change Ecosystems Interagency Working Group | US Climate Change Science Program | Info sharing, research coordination |
| Climate Change Land Use/Land Cover Interagency Working Group | US Climate Change Science Program | Info sharing, research coordination |
| Climate Change North American Carbon Project Steering Committee | US Climate Change Science Program | Research coordination |
| Climate Change Water Cycle Interagency Working Group | US Climate Change Science Program | Info sharing, research coordination |
| Codex Alimentarius | Codex- FDA coordinating US group | Intergovernmental Task Force on Antimicrobial Resistance |
| Colony Collapse Disorder Steering Committee | ARS | Coordination of research for Colony Collapse Disorder. |
| Combase | USDA/FSA-UK | Collaborate on food safety research: share food safety information |
| COMEXA (Comision Mexicano-Estados Unidos Para La Eradicacion del Gusano Barrenador de Ganados) | APHIS | Coordination |
| Committee on Environment & Natural Resources (CENR) Subcommittee on Water Availability & Quality (SWAQ) | OSTP (USGS has lead) | Coordinate water activities across all Federal agencies with water missions. |
| COPEG (Comision Panameno-Estados Unidos Para La Eradicacion del Gusano Barrenador de Ganados) | APHIS | Coordination |
| Core Group | Office of Pest Management Policy (USDA ARS) (participants include all USDA agencies involved in pesticide research or policy development) | Provide coordination of pesticide related issues across USDA |
| CRWG committee on Practices for Enhancing Personnel Reliability and the Culture of Responsibility in High Containment Labs | Interagency | Evaluate standards for personnel for high containment laboratories |

| ARS Inter-Agency Working Group Participation | | |
|---|---|---|
| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Department of Defense Biological Threat Reduction Program (BTRP) Review | DoS, DoD, HHS, and USDA | Interagency Coordination |
| Deployed Warfighter Protection Program | DoD | Coordination of research and development |
| DHS AG/Food Sub IPT | Interagency | Coordination of research and development |
| DHS Chemical-Biological Capestone IPT | Interagency | Coordination of research and development |
| DHS S&T Chemical Countermeasures | USDA | The mission of the committee is to enhance and coordinate the nation's capability to anticipate, prevent, and protect, respond to and recover from chemical threat attacks through innovative research, development, and transition capabilities. Specific focus NSTC Task Force on Non-Traditional Chemical Agents: Research and Development Plan |
| DHS/NTA | USDA | The committee identifies and evaluates food and water capability, and countermeasure gaps for non-traditional agents (NTAs) |
| DHS-OMB-MAX | USDA | 3 groups: Coordinating Homeland Security Science and Technology; Agriculture; and Rapid Detection Working Group |
| Diabetes Mellitus Interagency Coordinating Committee | NIH | Provide input on plans for research/treatment/education of diabetes |
| Dietary Guidance Working Group | USDA | Review federal nutrition publications for compliance with Dietary Guidelines for Americans |
| Drought Coordinating Council | USDA | Coordinate drought monitoring and decision making in USDA, advise Sec'y and agencies. |
| Dual Use Research working group | NSABB | Advise federal government on developing Dual use research guidelines |
| EFSA Scientific Colloquium on Assessing HealthBenefits of Controlling Campylobacter in the Food Chain ASM Research Colloquium on Global Food Safety | EFSA | Provide guidance on potential interventions in poultry for Campylobacter |
| EU-US Safe Food | EC | Share food safety information |
| FADT Subcommittee, Veterinary Countermeasures | ARS, DHS, APHIS, EPA, DoD | IWG |
| Fed Emergency Response Network | Federal | Coordinate Emergency responses to biosecurity: methods validation |
| Federal Experts Security Advisory Panel (FESAP) | Interagency | Security of Select Agent Policies |
| Federal Interagency Committee for Management of Noxious and Exotic Weeds (FICMNEW) | Federal Interagency | Provide Technical Guidance to Federal Invasive Species Response (Weeds) |
| Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP) | Federal Interagency (USDA and DOI Co-Chair) | Provide Technical Guidance to Federal Invasive Species Response (Invertebrates, Vertebrates, Plant and Animal Pathogens) |
| Federal-State Potato Research Program | ARS-National Potato Council | To conduct research on emerging pests of potato in a Federal-State partnership to address high priority areas |
| Feedstock Production Interagency Working Group, Genetic Improvement | Biomass Research & Development Board | Develop Interagency Strategic Plan for Bioenergy |

| ARS Inter-Agency Working Group Participation | | |
|---|---|---|
| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Food Allergy Clinical Guidelines Coordinating Committee | NIAID | Oversee process of developing guidelines on food allergy |
| Food Defense R&D Interagency Committee | USDA | Coordination of Food Defense research and development between DHS, USDA, HHS, and any other pertinent agencies |
| Foreign Animal Disease Threat (FADT) Subcommittee, Basic Research Working Group | ARS, NSF, DHS, HHS | IWG |
| Foreign Animal Disease Threat Subcommittee | NSTC | Coordinate Foreign Animal Disease countermeasures and research |
| Forest Service | Forest Service | Interagency Coordination |
| FSU Animal Health Initiatives | ARS, DoS | Scientific Diplomacy |
| Garden Rose Council | Rose Nursery industry | To coordinate research efforts to address issues of high priority to the Garden Rose industry |
| Global Change Task Force | Office of Chief Economist | Information sharing among USDA agencies with climate change activities |
| Global Foot-and-Mouth Disease Research Alliance (GFRA) | ARS, APHIS, DHS | Global Foot-and-Mouth Disease Research Alliance to support FAO/OIE global control and eradication initiative |
| Global Health Initiative (GHI) Interagency Research Committee | ARS, NIH, CDC, NIFA, OSTP | 1. To identify several high-impact research questions and potential "game changers" in global health; 2. To determine how the GHI Interagency Research Committee (IRC) can facilitate GHI plus partner country implementation of GHI's Principle #7, "Promote Research and Innovation;"3. To identify how individual agencies/initiatives can align current and planned global health research efforts to advance GHI principles and targets; |
| Global Research Alliance on Agricultural Greenhouse Gases | | To bridge gaps in research on agricultural greenhouse gas emissions, and to coordinate such research on an international scale, ensuring that scientists share their findings with research communities and farmers in other countries as well as their own. Shafer is international Croplands coordinator |
| Global Water Cycle Interagency Work Group | Climate Change Science Program (CCSP) | Develop new, innovative science concepts to incorporate into the CCSP global water cycle science plan |
| Human Nutrition Coordinating Committee | USDA | Share information among USDA agencies whose mission includes nutrition-chaired by ARS |
| Human Studies Review Board | EPA | Expert consultation |
| ICT-Prague` | USDA/Czech Republic | Collaborate on food safety research; share food safety information |
| ILSI Carbohydrates Committee | International Life Sciences Institute | Focus on issues of importance to food industry |
| Implementation Team for Joint China National Energy Administration (NEA)-DOE-USDA MOU | Foreign Agricultural Service | Implement Joint NEA-DOE-USDA MOU for advanced biofuels production research. |
| Informal interagency group for responding to OIG study on USDA control of genetically-engineered crop holdings | Office of the Secretary, APHIS, ARS | Developed USDA-wide response to OIG study of how USDA managed holdings of genetically-engineered crops |

| ARS Inter-Agency Working Group Participation | | |
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| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Informal interagency group on OECD biosecurity and biobanks | State Department | Develops US government positions on OECD developed guidelines for biological resource center and related topics |
| Inter Agency Residue | Federal | Share food safety information |
| Interagency Cross-Cutting Group on Climate change and Human Health | USGCRP (OSTP) | Develop priorities, outreach, and strategies for adaptation to climate change |
| Interagency Feedstock Production Working Group | Bioenergy R&D Initiative Board | co-chair, Identify research needs and make recommendations |
| Interagency Grazinglands Working Group | USDA (ARS & NIFA) | Coordinate grazingland activities between USDA & DOI |
| Interagency Native Plant Conservation Alliance (PCA) | DOI | Promote & develop interagency and private partnerships |
| InterAgency Water & Drought Team | USDA | Coordinate REE activities among agencies |
| Interagency Water Group | State Department | Coordinate federal water agencies/international focus |
| Interagency Working Group on Climate Change and Public Health | EPA, NIH | Coordination |
| Interagency Working Group on Domestic Animal Genomics | OSTP | Review progress, needs & opportunities in animal genomics research |
| Interagency Working Group on Harmful Algal Blooms, Hypoxia, & Human Health | NOAA | Coordinate federal activities, re: harmful algal blooms, hypoxia and human health |
| Intergovernmental Risk Assessment Consortium | All Federal agencies- FDA runs it | Share information on risk assessment |
| Intergovernmental Select Agents and Toxins Technical Advisory Board | Interagency | Interagency Coordination |
| International Association for Food Production | IAFP | sharing information on food safety and science issues- yearly meeting and journal |
| International Bioengagement Program | subPCC- State Department | Coordinate international collaborative animal health research and biosafety activities |
| IR-4 | USDA, NIFA, and ARS (participants include university researchers and crop industry reps,) | Generate data needed to develop research data to support new EPA tolerances and labeled product uses for minor crops (specialty crops) |
| IWG Molecular Vaccines | DoD, ARS, NIH, FDA | IWG |
| IWG on Prion Science | NIH, ARS, APHIS, EPA, NSF | IWG |
| JCR: Food Agriculture Sector, DHS Team | DHS | Biosecurity |
| Joint Subcommittee on Aquaculture | OSTP | Coordination of Aquaculture activities across federal agencies |
| Judicious Use of Antibiotics | USDA | Development of action and research goals |
| Methyl Bromide Alternatives Outreach Conference Program Committee | ARS, EPA, and industry | To plan and organize the annual International Methyl Alternatives and Emissions Control Research Outreach Conference |
| Methyl Bromide Quarantine taskforce (NEW) | State /EPA/USDA | To provide technical input to State/EPA policy makers on methyl bromide quarantine issues. |
| Methyl Bromide Technical Options Committee [MBTOC] | United Nations Environmental Programmes | Provide technical input to the signatories of the Montreal Protocol. |
| Microbe Project Inter- Agency Working Group | Federal | Genomics of organisms |
| MOST-SJTU | USDA/China | Collaborate food safety Res |

| ARS Inter-Agency Working Group Participation | | |
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| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| MOU with GIPSA/FGIS | GIPSA/FGIS | To address the research priorities of GIPSA/FGIS in development measurement technologies for grain quality |
| National Barley Improvement Committee/American Malting Barley Association | Barley producers/industry | Barley stakeholder groups |
| National Berry Crop Initiative | Berry industry (ARS and NIFA participate) | To coordinate industry efforts to address issues of importance, including research, to the berry industry. |
| National Clean Plant Network | APHIS | Protects U.S. specialty crop agriculture and the environment from the spread, through asexual propagation, of targeted plant pathogens and pests that cause economic damage |
| National Coalition for Childhood Obesity Research | HHS | Collaboration among USDA, NIH, CDC and Robert Wood Johnson Foundation on prevention of childhood obesity |
| National Corn Growers Assoc./USDA Corn Germplasm Committee | Corn producers/industry | Corn stakeholder group |
| National Culture Collection Initiative | American Phytopathological Society | Develop a National System for Preservation and Distribution of Plant-associated Microbes |
| National Dairy Research Program | Dairy Management Inc., USDA (ARS and NIFA), HHS (National Institutes of Health) and DOD | Coordinate research on issues of importance to the dairy industry |
| National Dairy Research Program, Dairy Management | ARS/NIH/DoD | Partnership to advance research on nutrition and food processing issues of concern to the dairy industry. |
| National Environmental Protection Act Interagency Working Group | EPA | Info sharing, training |
| National Grape and Wine Initiative | National Grape and Wine Initiative (participants include representatives from table grape, raisin, wine, and juice sectors of the grape industry, ARS, NIFA, Extension, universities) | Identify industry needs that can be addressed through agricultural research, identify resources for the research, coordinate and conduct the research, transfer new knowledge and technologies from researchers to the industry |
| National Meeting Program Planning Committee for Plant Breeder Coordinating Committee | Several | Planning 2009 annual meeting at the Monona Terrace Convention Center in Madison, Wisconsin |
| National Oat Improvement Committee | Oat producers, industry | Oat stakeholder group |
| National Plant Breeding Coordinating Committee | NIFA | Support of plant breeding |
| National Plant Disease Recovery System | ARS and Land Grant University Institutions, DHS | As directed by HSPD-9, ARS is lead institution to develop a National Plant Disease Recovery system to respond to intentional and/or natural plant disease outbreaks. |
| National Plant Germplasm Coordinating Committee | ARS, NIFA, ESCOP | Communicates the value of the National Plant Germplasm System and strives to enhance its support |
| National Science and Technology Council | Chair – Ann Mills, Deputy Under Secretary for NR&E | Information exchange between Federal agencies on ecosystem services research, programs, and projects. |
| National Sclerotinia Intitiative | ARS with United Soybean Board, National Sunflower Association, National Canola Association, Peanut Council | To conduct research in partnership with Universities to address white mold related diseases and disorders. |

| ARS Inter-Agency Working Group Participation | | |
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| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| National Sorghum Producers Assoc./USDA Sorghum Germplasm Committee | Sorghum producers, industry, researchers | Sorghum stakeholders |
| National Swine Improvement Federation | Swine Industry and Universities | Coordinate public swine genomics research and develop infrastructure to incorporate genomics information into the swine genetic evaluation system |
| National Vegetable Crops Initiative | NIFA | To develop a strategic plan for the continued growth and sustainability of vegetable crop production in the United States. |
| National Wheat Improvement Committee/National Association of Wheat Growers | Wheat industry, producers, researchers | ARS provides information on the funding needs of the wheat quality labs to the National Improvement Committee to be considered for recommendation to the National Association of Wheat Growers among their legislative priorities |
| NIDDK Advisory Council | NIDDK | Provide advice to NIDDK director -ARS is one of three ex officio agencies represented (DoD and VA are others) |
| NIFA | NIFA | Interagency Coordination |
| NIFA Grant Award External Steering Committee | Kansas State University | Provides scientific and stakeholder input |
| NIFA/ARS Biotech Risk Assessment Grants Program | ARS, NIFA | Biosafety research grant management and ARS/NIFA coordination |
| NIFA-FSRRN | USDA | Share food safety information |
| NIH Nutrition Coordinating Committee | HHS, NIH | Information sharing among NIH Institutes and other federal agencies conducting nutrition research. |
| NIH Trans-Agency Complementary and Alternative Medicine Coordinating Committee | NCCAM | Share information on complementary and alternative medicine research in federal government |
| Northwest Small Fruit Research Center | Northwest Center for Small Fruit Research | To coordinate high impact research which is responsive to the needs of the small fruit and nursery industries in the Northwest US |
| NSABB (National Science Advisory Board for Biosecurity) | Interagency | Coordination |
| NSABB Personnel Reliability Working Group | NIH | Review existing mechanisms and make recommendations for improvements |
| NSTC Subcommittee on Standards | Interagency | Develop standards for CBRN equipment |
| Nutrition Coordinating Committee | NIH | Share nutrition information among HHS agencies -ARS is USDA representative |
| OECD Scientific Collections Activity | OECD (International) | Develop Plan for Managing Collections of OECD Members |
| Office of Dietary Supplements Inter-agency work group | NIH | Information sharing among federal agencies conducting nutrition research and dietary supplements research |
| Office of Pesticide Programs | EPA | Development of research goals |
| Organic Working Group | USDA | Information exchange between USDA agencies on organic programs. |
| OSTP/IWG on Plant Genomes | OSTP | Coordination of plant genomics research among U.S. federal agencies |
| OSTP/IWG on Scientific Collections | OSTP | Develop a Plan for Maintaining Federal Scientific Collections |
| Overseas Biological Control Laboratories | ARS | Administration |

| ARS Inter-Agency Working Group Participation | | |
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| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Pest Information Platform for Education and Extension (PIPEE) Strategic Planning Committee | NIFA, RMA | To develop an integrated national system facilitated by information technology to provide centralized, useful tools with reliable information for IPM practitioners. Mapping of Soybean rust and soybean aphid |
| Pierce's Disease Task Force | Wine and Grape Industry | Coordinate ARS Pierce's Disease Research |
| Plant Breeder Coordinating Committee | Several | The PBCC serves as a forum for issues and opportunities of national and global importance to the public and private sectors of the U.S. national plant breeding effort. |
| POC for ARS Veterinary Workforce Planning Committee | Interagency (All govt agencies with Veterinarians) | Interagency Coordination |
| PROCINORTE | ARS | Scientific Diplomacy |
| Program Planning Committee for Soybean Rust Symposium | ARS | Planning 2009 Soybean Rust Symposium |
| Public Health Pesticide Committee | CDC | Coordination |
| RAC Biosafety Working Group | NIH | Provide support and recommendations to the NIH Recombinant DNA Advisory committee on biosafety issues |
| Rift Valley Fever Coordination | DoS and ARS | Workshop |
| Risk Assessment Consortium | Federal | Share food safety information |
| SARE – Sustainable Agriculture, Research & Extension, National Operations Committee | NIFA | Coordinate and communicate SARE activities among regions and other Federal agencies. |
| Science and Technology task force of JSA | JSA | Develop a strategic research and technology development plan for aquaculture across federal agencies |
| Science of Science Policy Interagency Task Group | OSTP, NSF | Address the need for better tools, methods, and data for improving our understanding of the efficacy and impact of science and technology policy decisions. |
| Scientific Committee for National Foundation for Infectious Diseases | NFID | Coordinate yearly scientific meetings in infectious disease |
| Scientific Forum on Invasive Species | APHIS, FS | Coordinate Research and Response to Invasive Species of Forest Areas |
| Screwworm Eradication Program | APHIS | Coordination of research and operations |
| Secretary's Bioenergy Decision Tool | Office of Energy Policy and New Uses, Office of the Chief Economist | Develop a place-based decision tool that provides information about USDA programs and resources that can be used by rural communities and investors to develop renewable energy projects. |
| Select Agent Tiering Committee | Interagency | Tier Select Agents |
| Small & Beginning Farm Coordinators | USDA | coordinate USDA activities to meet group's needs |
| South Atlantic Methyl Bromide Areawide project | ARS, EPA, and industry | To plan and prioritize research projects. |
| Steering Committee for the Food Safety Research and Response Network | USDA | Facilitate university based research food safety |
| Subcommittee on Sedimentation | USGS, Dept of Interior, Advisory Committee on Water Information, Water Information Coordination Program | Supports development of equipment, methodologies, and calibration for the collection, analysis, interpretation, and interchange of fluvial-sediment data and related technical information. |

| ARS Inter-Agency Working Group Participation | | |
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| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| Sub-PCC on International Bioengagement | DoS, DoD, HHS, and USDA | Interagency Coordination |
| Sugarcane Research Planning Taskforce | ARS | Provides innovative solutions for sustainable sugarcane production. |
| Technical Representative to National Beef Cattle Evaluation Consortium | Beef Industry and Universities | Coordinate cattle genomics research and develop infrastructure to incorporate genomics information into the beef cattle genetic evaluation system |
| Technical Representative to National Pork Board Animal Science Committee | Swine Industry and Universities | Coordinate public swine research for traits relating to production efficiencies, pork quality and genomics |
| Tekes/Academy Finland | USDA/Finland | Collaborate food safety Res; share food safety information |
| Transfederal Biosafety Taskforce | USDA-HHS | Assess the current federal biosafety program, identifies gaps and solutions to improve the biosafety system |
| U.S. Wheat & Barley Scab Initiative | USDA, wheat/barley producers, millers, bakers | Reduce wheat mycotoxins and scab losses |
| Ug99 Wheat Stem Rust Action Team | ARS, APHIS, NIFA, OPMP | Coordinate Ug99 Wheat Stem Rust Response |
| UK-Food Standards | USDA/UK | Collaborate on food safety research; share food safety information |
| UK-International Food Research | USDA/UK | Collaborate on food safety research; share food safety information |
| US Animal Health Association | USAHA | Share information on animal health and related fields |
| US Group on Earth Observations (USGEO) | CENR | Fed agency info sharing & coordination; US rep to International GEO |
| US/EC Taskforce on Biotechnology | USDA, EU | Coordinates US and EC Biotechnology Research |
| USDA Barley Germplasm Committee | USDA | Barley researchers/industry |
| USDA BioEnergy Science Team (BEST) | REE, FS, AMS, OEPNU | Provide science support by ARS, ERS, NASS, NIFA, FS, AMS, and OEPNU to other agencies in the Department. |
| USDA Biotechnology Coordinating Group | USDA (USDA Coordinator, Michael Schectman) | Coordinate Plant and Animal Biotech Regulatory Policy and Research |
| USDA Corn Germplasm Committee | USDA | Corn researchers/industry |
| USDA Global Research Alliance Steering Committee | USDA | |
| USDA Invasive Species Coordinator Committee | USDA (USDA Coordinator Hilda Diaz-Soltero, Director) | Coordinate USDA Invasive Species Response |
| USDA Know Your Farmer Committee | USDA Dep. Sec. | Coordinate efforts to connect citizens with agriculture and nutrition |
| USDA Market-Based Environmental Stewardship Coordination Council | USDA OSEC | Provide agency-level advisory to the USDA Office of Ecosystem Services and Markets and the Secretary, who co-chairs the interdepartmental Environmental Services Board. Establish guidelines and science-based methods to measure the environmental benefits from conservation and land management activities in support of emerging environmental services markets. |
| USDA One Health Joint Working Group | ARS, APHIS, FAS, NIFA | Technical group to support One Health MAC |
| USDA Peoples' Garden | USDA | Promote citizens' involvement with agriculture through the Peoples' Garden |
| USDA Pollinators' Committee | ARS | Coordinating response to pollinators decline |
| USDA Remote Sensing Coordination Committee | Office of Chief Economist | Information sharing among USDA agencies |

| ARS Inter-Agency Working Group Participation | | |
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| **Group name** | **Sponsoring Organization** | **Brief purpose** |
| USDA Rice Germplasm Committee | USDA | Rice researchers/industry |
| USDA Risk Assessment Group | USDA | Share risk assessment info among USDA agencies |
| USDA Sorghum Germplasm Committee | USDA | Sorghum researchers/industry |
| USDA Sustainable Development Council | Chief Economist's Office | Coordinate USDA-wide sustainable activities |
| USDA Water Team | USDA | Coordinate USDA's water activities to meet Secretary's High Priority Performance Goals for Water<br>Chair - Ann Mills, Deputy Under Secretary for NR&E |
| USDA Wheat Germplasm Committee | USDA | Wheat researchers/industry |
| USDA-ARS-FDA | USDA | Collaborate on food safety research; share food safety information |
| USDA-ARS-FSIS | USDA | Collaborate on food safety research; share food safety information |
| USDA-ARS-NIFA | USDA | Share food safety information |
| USDA-wide committee | Committee on Environmental & Natural Resources (NSTC) | Advises Executive Office on science and technology to support water availability |
| US-EC Biotechnology Task Force | OSTP | Foster US-EC science collaborations |
| USGEO Architecture & Data Mgmt Sub Group | | Facilitate data sharing among agencies & others |
| USGEO Policy Sub Group | CENR | Develop US earth observations policy |
| USGEO Strategic Assessments Sub Group | CENR | Assess & prioritize US earth observation needs (air, land, sea) |
| Various committees/ task groups of Office of Environmental Markets | USDA | OEM has a unique role in the federal government's efforts to develop uniform standards and market infrastructure that will facilitate market-based approaches to agriculture, forest, and rangeland conservation. |
| West Coast Methyl Bromide Areawide project | ARS, EPA, and industry | To plan and prioritize research projects. |
| Working Group within the risk assessment consortium on nanotechnology | IRAC | Produce recommendations for federal agencies for research and policy |