FY 2010 Explanatory Notes
Agricultural Research Service

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# AGRICULTURAL RESEARCH SERVICE

## Purpose Statement

The Agricultural Research Service (ARS) was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

ARS is the principal in-house research agency of the U.S. Department of Agriculture (USDA). Congress first authorized federally supported agricultural research in the Organic Act of 1862, which established what is now USDA. That statute directed the Commissioner of Agriculture "to acquire and preserve in his department all information he can obtain by means of books and correspondence, and by practical and scientific experiments." The scope of USDA's agricultural research programs has been expanded and extended more than 60 times since the Department was created.

ARS research is authorized by the Department of Agriculture Organic Act of 1862 (7 U.S.C. 2201 note); Agricultural Research Act of 1935 (7 U.S.C. 427); Research and Marketing Act of 1946 (P.L. 79-733), as amended (7 U.S.C. 427, 1621 note); Food and Agriculture Act of 1977 (P.L. 95-113), as amended (7 U.S.C. 1281 note); Food Security Act of 1985 (P.L. 99-198) (7 U.S.C. 3101 note); Food, Agriculture, Conservation, and Trade Act of 1990 (P.L. 101-624) (7 U.S.C. 1421 note); Federal Agriculture Improvement and Reform Act of 1996 (P.L. 104-127); and Agricultural Research, Extension, and Education Reform Act of 1998 (P.L. 105-185). ARS derived most of its objectives from statutory language, specifically the "Purposes of Agricultural Research, Extension, and Education" set forth in Section 801 of FAIR.

The ARS mission is to conduct research to develop and transfer solutions to agricultural problems of high national priority and to 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.

ARS' major research programs address the following Strategic Goals:

- Goal 2: Enhance the Competitiveness and Sustainability of Rural and Farm Economies -- ARS programs include New Products/Product Quality/Value Added; Livestock Production; and Crop Production.
- Goal 4: Enhance Protection and Safety of the Nation's Agriculture and Food Supply -- ARS programs include Food Safety; Livestock Protection; and Crop Protection.
- Goal 5: Improve the Nation's Nutrition and Health -- ARS programs include Human Nutrition.
- Goal 6: Protect and Enhance the Nation's Natural Resource Base and Environment -- ARS programs include Environmental Stewardship.
- Management Initiative: Electronic Government -- ARS programs include Library and Information Services under the National Agricultural Library.

In addition, ARS has Management Initiatives which apply to providing and maintaining laboratories and facilities for its scientists and staff.

ARS' programs are more fully described under the "Status of Program" section on page 12g-1.

Geographic Dispersion of Offices and Employees

ARS' Headquarters offices are located in the Washington, D.C. metropolitan area. The agency's research is organized under 22 national programs. Field activities are managed through eight area offices. Research is conducted at field locations in the United States, the District of Columbia, Puerto Rico, the Virgin Islands, and several foreign countries. Much of the work is conducted in direct cooperation with State Agricultural Experiment Stations, other State and Federal agencies, and private organizations.

As of September 30, 2008, there were 6,821 permanent, full-time employees including 492 in the headquarters office and 6,329 in the field.

OIG Reports (Completed)

#50501-9-FM, 7/11/08, Management and Security Over USDA Wireless Connections.

#50601-4-Hy, 9/18/08, Adequacy of Internal Controls Over Travel Card Expenditures Follow-up.

OIG Reports (In Progress)

#02601-1-SF, Management Controls Over Research Agreements.

#50601-13-CH, Implementation of Renewable Energy Programs in USDA.

#50601-16-Te, Controls Over Genetically Engineered Animal and Plant Research.

GAO Reports (Completed)

#08-197, 1/24/08, Federal Real Property: Strategy Needed to Address Agencies' Long-Standing Reliance on Costly Leasing.

#08-594, 5/9/08, Offshore Marine Aquaculture.

#08-525, 6/27/08, Use of Encryption By Federal Agencies.

#08-944, 9/4/08, Concentrated Animal Feeding Operations.

#07-1131, 9/24/07, The Design of User Fees.

#08-36, 10/31/07, Influenza Pandemic: Opportunities Exist to Address Critical Infrastructure Protection Challenges that Require Federal and Private Sector Coordination.

#08-31, 11/16/07, Tax Compliance: Federal Grant and Direct Assistance Recipients Who Abuse the Federal Tax System.

#08-306R, 12/17/07, Status of Security at Plum Island Animal Disease Center.

GAO Reports (In Progress)

#120696, Global Positioning System.

#194749, Improving Federal Oversight and Accountability of Federal Grant Funds.

#360855, Veterinarian Capabilities for Disease Prevention, Food Safety, and Defense.

#360871, Coordinated Framework for Regulation of Genetically Modified Agriculture.

#360910, Regulation of Dietary Supplements and Functional Foods.

#360973, Impacts of Increased Biofuel Production in the U.S.

#360978, USDA's Biofuels Efforts.

#369867, Carbon Offsets.

#440674, U.S. Biosurveillance Efforts.

#450547, Improving Federal Agency Use of Performance Information.

#450696, National Pandemic Implementation Plan Action Items Assessment.

#460579, Issues Associated With the Expansion of Biosafety Level 3 and 4 Laboratories.

#460599, Safety Reporting Options for Biosafety Labs.

AGRICULTURAL RESEARCH SERVICE

Available Funds and Staff Years
2008 Actual and Estimated 2009 and 2010

| Item | Actual 2008 | | Estimated 2009 | | Estimated 2010 | |
|---|---|---|---|---|---|---|
| | Amount | Staff Years | Amount | Staff Years | Amount | Staff Years |
| Salaries and Expenses | $1,128,944,000 | 8,064 | $1,140,406,000 | 8,087 | $1,153,368,000 | 8,077 |
| Rescission | -7,902,608 | -- | -- | -- | -- | -- |
| Miscellaneous Fees | 3,253,856 | -- | -- | -- | -- | -- |
| Transfer to Office of Ethics | -- | -- | -- | -- | -- | -- |
| Transfer from Office of Congressional Relations | 127,104 | -- | -- | -- | -- | -- |
| Transfer from United States Department of State | 3,824,000 | -- | -- | -- | -- | -- |
| Total, Salaries and Expenses | 1,128,246,352 | 8,064 | 1,140,406,000 | 8,087 | 1,153,368,000 | 8,077 |
| Buildings & Facilities | 52,082,000 | -- | 46,752,000 | -- | -- | -- |
| Rescission | -329,574 | -- | -- | -- | -- | -- |
| Recovery Act | -- | -- | 176,000,000 | -- | -- | -- |
| Total, Buildings & Facilities | 51,752,426 | -- | 222,752,000 | -- | -- | -- |
| Total, Agricultural Research Service | 1,179,998,778 | 8,064 | 1,363,158,000 | 8,087 | 1,153,368,000 | 8,077 |
| Obligations under other USDA appropriations: | | | | | | |
| Agricultural Marketing Service | 240,877 | 1 | 241,000 | 1 | 241,000 | 1 |
| Animal & Plant Health Inspection Service | 26,533,979 | 64 | 26,596,000 | 64 | 26,596,000 | 64 |
| Cooperative State Research, Education, & Extension Service | 12,625,188 | 31 | 12,655,000 | 31 | 12,655,000 | 31 |
| Departmental Administration | 1,325,757 | 3 | 1,329,000 | 3 | 1,329,000 | 3 |
| Economic Research Service | 3,215,243 | 8 | 3,223,000 | 8 | 3,223,000 | 8 |
| Farm Service Agency | 477,447 | 1 | 479,000 | 1 | 479,000 | 1 |
| Food & Nutrition Service | 1,224,863 | 3 | 1,228,000 | 3 | 1,228,000 | 3 |
| Food Safety & Inspection Servic | 4,118,571 | 10 | 4,128,000 | 10 | 4,128,000 | 10 |
| Foreign Agricultural Service | 464,283 | 1 | 465,000 | 1 | 465,000 | 1 |
| Forest Service | 1,836,379 | 5 | 1,841,000 | 5 | 1,841,000 | 5 |
| Hazardous Waste | 900,000 | 2 | 902,000 | 2 | 902,000 | 2 |
| National Agricultural Statistics Service | 4,204,801 | 10 | 4,215,000 | 10 | 4,215,000 | 10 |
| Natural Resources Conservation Service | 3,325,668 | 8 | 3,333,000 | 8 | 3,333,000 | 8 |
| Risk Management Agency | 679,739 | 2 | 681,000 | 2 | 681,000 | 2 |
| Misc., Other USDA Funds | 155,453 | -- | 156,000 | -- | 156,000 | -- |
| Total, Other USDA Appropriations | 61,328,248 | 149 | 61,472,000 | 149 | 61,472,000 | 149 |
| Total, Agriculture Appropriations | 1,241,327,026 | 8,213 | 1,424,630,000 | 8,236 | 1,214,840,000 | 8,226 |

Available Funds and Staff Years
2008 Actual and Estimated 2009 and 2010

| Item | Actual 2008 | | Estimated 2009 | | Estimated 2010 | |
|---|---|---|---|---|---|---|
| | Amount | Staff Years | Amount | Staff Years | Amount | Staff Years |
| Other Federal Funds: | | | | | | |
| Agency for International Development | 968,307 | 2 | 971,000 | 2 | 971,000 | 2 |
| Department of Defense | 5,074,017 | 12 | 5,086,000 | 12 | 5,086,000 | 12 |
| Department of Energy | 1,392,870 | 4 | 1,396,000 | 4 | 1,396,000 | 4 |
| Department of Health & Human Services | 4,982,185 | 12 | 4,994,000 | 12 | 4,994,000 | 12 |
| Department of Homeland Security | 2,287,393 | 6 | 2,293,000 | 6 | 2,293,000 | 6 |
| Department of the Interior | 1,302,247 | 3 | 1,305,000 | 3 | 1,305,000 | 3 |
| Department of State | 457,083 | 1 | 458,000 | 1 | 458,000 | 1 |
| Environmental Protection Agency | 797,009 | 2 | 799,000 | 2 | 799,000 | 2 |
| National Aeronautics & Space Administration | 1,045,524 | 3 | 1,048,000 | 3 | 1,048,000 | 3 |
| Misc., Other Federal Funds | 54,201 | -- | 54,000 | -- | 54,000 | -- |
| Total, Other Federal Funds | 18,360,836 | 45 | 18,404,000 | 45 | 18,404,000 | 45 |
| Non-Federal Funds: | | | | | | |
| Arizona, University of | 109,726 | 1 | 110,000 | 1 | 110,000 | 1 |
| Arkansas, State of | 100,000 | -- | 100,000 | -- | 100,000 | -- |
| Arkansas, University of | 118,118 | 1 | 118,000 | 1 | 118,000 | 1 |
| Binational Agricultural Research & Development (BARD) | 318,024 | 1 | 319,000 | 1 | 319,000 | 1 |
| California, State of | 863,680 | 2 | 866,000 | 2 | 866,000 | 2 |
| California, University of | 1,119,157 | 3 | 1,122,000 | 3 | 1,122,000 | 3 |
| Colorado State University | 123,783 | 1 | 124,000 | 1 | 124,000 | 1 |
| Cornell University | 121,308 | 1 | 122,000 | 1 | 122,000 | 1 |
| Cotton Incorporated | 1,133,076 | 3 | 1,136,000 | 3 | 1,136,000 | 3 |
| Dairy Management, Inc | 291,388 | 1 | 292,000 | 1 | 292,000 | 1 |
| Florida, State of | 1,570,844 | 4 | 1,574,000 | 4 | 1,574,000 | 4 |
| Florida, University of | 134,548 | 1 | 135,000 | 1 | 135,000 | 1 |
| Georgia, State of | 110,780 | 1 | 111,000 | 1 | 111,000 | 1 |
| Georgia, University of | 428,383 | 2 | 429,000 | 2 | 429,000 | 2 |
| Illinois, University of | 291,588 | 2 | 292,000 | 2 | 292,000 | 2 |
| International Institute of Tropical Agriculture | 114,469 | 1 | 115,000 | 1 | 115,000 | 1 |
| Iowa, State of | 344,620 | 1 | 345,000 | 1 | 345,000 | 1 |
| Iowa State University | 216,094 | 2 | 217,000 | 2 | 217,000 | 2 |
| Kansas State University | 165,155 | 1 | 166,000 | 1 | 166,000 | 1 |
| Minnesota, University of | 324,358 | 1 | 325,000 | 1 | 325,000 | 1 |
| National Pork Board | 345,997 | 1 | 347,000 | 1 | 347,000 | 1 |
| Nebraska, University of | 146,442 | 1 | 147,000 | 1 | 147,000 | 1 |
| North Carolina State University | 108,821 | 1 | 109,000 | 1 | 109,000 | 1 |
| North Dakota State University | 143,198 | 1 | 144,000 | 1 | 144,000 | 1 |

AGRICULTURAL RESEARCH SERVICE

Available Funds and Staff Years
2008 Actual and Estimated 2009 and 2010

| Item | Actual 2008 | | Estimated 2009 | | Estimated 2010 | |
|---|---|---|---|---|---|---|
| | Amount | Staff Years | Amount | Staff Years | Amount | Staff Years |
| Non-Federal Funds: (continued) | | | | | | |
| North Dakota, University of. . . . . | 103,815 | - - | 104,000 | - - | 104,000 | - - |
| Pennsylvania State University. . . . | 108,876 | 1 | 109,000 | 1 | 109,000 | 1 |
| Revocable Permits & Easements. . | 682,501 | - - | 684,000 | - - | 684,000 | - - |
| Sale of Animals & Personal Property (Proceeds) . . . . . | 766,432 | - - | 768,000 | - - | 768,000 | - - |
| South Dakota State University. . . | 182,397 | 1 | 183,000 | 1 | 183,000 | 1 |
| South Florida Water Management District . . . . . | 478,842 | 1 | 480,000 | 1 | 480,000 | 1 |
| Southern Illinois University. . . . . | 105,990 | - - | 106,000 | - - | 106,000 | - - |
| Texas Agrilife Research and Extension Center . . . . . | 260,912 | 1 | 262,000 | 1 | 262,000 | 1 |
| Texas, State of. . . . . | 104,039 | - - | 104,000 | - - | 104,000 | - - |
| United Soybean Board. . . . . | 4,346,805 | 10 | 4,357,000 | 10 | 4,357,000 | 10 |
| Washington State University. . . . . | 100,038 | - - | 100,000 | - - | 100,000 | - - |
| Misc., Non-Federal Funds. . . . . | 3,097,185 | - - | 3,102,000 | - - | 3,102,000 | - - |
| Total, Non-Federal Funds . . . . . | 19,081,389 | 48 | 19,124,001 | 48 | 19,124,000 | 48 |
| Miscellaneous Contributed Funds: | 20,015,721 | 101 | 20,000,000 | 101 | 20,000,000 | 101 |
| Total, Agricultural Research Service. . . . . | 1,298,784,972 | 8,407 | 1,482,158,001 | 8,430 | 1,272,368,001 | 8,420 |

AGRICULTURAL RESEARCH SERVICE

Permanent Positions by Grade and Staff Year Summary
2008 Actual and Estimated 2009 and 2010

| | 2008 | | | 2009 | | | 2010 | | |
|---|---|---|---|---|---|---|---|---|---|
| Grade | Head-quarters | Field | Total | Head-quarters | Field | Total | Head-quarters | Field | Total |
| ES-00 | 15 | 27 | 42 | 15 | 27 | 42 | 15 | 27 | 42 |
| GS/GM-15 | 54 | 608 | 662 | 54 | 608 | 662 | 52 | 591 | 643 |
| GS/GM-14 | 60 | 686 | 746 | 60 | 686 | 746 | 58 | 666 | 724 |
| GS/GM-13 | 123 | 730 | 853 | 123 | 730 | 853 | 119 | 710 | 829 |
| GS-12 | 92 | 522 | 614 | 92 | 522 | 614 | 89 | 506 | 595 |
| GS-11 | 28 | 654 | 682 | 28 | 654 | 682 | 27 | 636 | 663 |
| GS-10 | 1 | 8 | 9 | 1 | 8 | 9 | 1 | 7 | 8 |
| GS-9 | 40 | 1,070 | 1,110 | 40 | 1,070 | 1,110 | 39 | 1,040 | 1,079 |
| GS-8 | 15 | 396 | 411 | 15 | 396 | 411 | 15 | 385 | 400 |
| GS-7 | 38 | 860 | 898 | 38 | 860 | 898 | 36 | 835 | 871 |
| GS-6 | 36 | 377 | 413 | 36 | 377 | 413 | 35 | 366 | 401 |
| GS-5 | 18 | 259 | 277 | 18 | 259 | 277 | 18 | 252 | 270 |
| GS-4 | 7 | 36 | 43 | 7 | 36 | 43 | 7 | 35 | 42 |
| GS-3 | 0 | 10 | 10 | 0 | 10 | 10 | 0 | 9 | 9 |
| GS-2 | 0 | 4 | 4 | 0 | 4 | 4 | 0 | 4 | 4 |
| Other Graded Positions..... | 7 | 0 | 7 | 7 | 0 | 7 | 7 | 0 | 7 |
| Ungraded Positions..... | 0 | 580 | 580 | 0 | 580 | 580 | 0 | 563 | 563 |
| Total Permanent Positions..... | 534 | 6,827 | 7,361 | 534 | 6,827 | 7,361 | 518 | 6,632 | 7,150 |
| Unfilled Positions end-of-year. | 42 | 498 | 540 | 40 | 477 | 517 | 25 | 291 | 316 |
| Total Permanent Full-Time Employment, end-of-year. | 492 | 6,329 | 6,821 | 494 | 6,350 | 6,844 | 493 | 6,341 | 6,834 |
| Staff Year Estimate..... | 504 | 7,903 | 8,407 | 504 | 7,926 | 8,430 | 494 | 7,926 | 8,420 |

# AGRICULTURAL RESEARCH SERVICE

## SIZE, COMPOSITION AND COST OF MOTOR VEHICLE FLEET

The 2010 Budget Estimates propose the replacement of 17 passenger motor vehicles**.** These acquisitions will replace existing vehicles without additions to the fleet. Due to the timing of vehicle receipt and sales through the exchange/sale process, there may be an overlap in the vehicle receipt, replacement, and disposal inventory. However, we are not adding to the overall fleet.

Professional research and technical personnel primarily use the ARS motor vehicle fleet in conjunction with research studies and technical assistance. To conduct daily work, research personnel travel between agricultural research sites, State agricultural experiment stations, farms, ranches, and commercial firms, etc. Most of these sites are in rural locations and require a high degree of mobility. Use of common carriers is not feasible. Studies of cost requirements between private and government vehicles show that it is more economical to use government vehicles than to reimburse employees for the use of private vehicles.

It is ARS policy to pool vehicle use to keep the number of vehicles to a minimum. ARS requires quarterly vehicle operational reports and makes periodic surveys to determine the extent of vehicle use. During the biennial physical inventory process, ARS works to ensure inactive vehicles are removed from the inventory according to Federal property management regulations. This recently occurred at one of the large research centers. The fleet was inactive but was still on-hand. Following regulatory reporting requirements, the fleet was removed from the facility and removed from the official inventory. ARS program managers are responsible for managing budgets and program needs to fulfill the agency's research mission. Replacement is based on program management, vehicle mileage/age, and funding. By Federal regulation, minimum replacement standards for passenger vehicles are three years or 60,000 miles, and for light trucks are six years or 60,000 miles. All proposed replacement vehicles exceed minimum standards.

The composition of the ARS fleet is primarily light duty trucks. Multi-purpose vehicles enable research personnel to haul equipment and transport personnel. Past practices have allowed ARS to decrease the number of passenger vehicles. However, it may be necessary to replace light duty vans with passenger vehicles to help reduce fuel costs. ARS will continue to review its fleet for opportunities to realign the fleet where it is necessary, without affecting the mission. The agency continues to review inventory information to accurately classify the fleet.

There are no identified impediments to managing the motor vehicle fleet in the most cost-effective manner. Unpredictable fuel and maintenance costs present challenges to project operating costs. USDA has experienced problems with electronically collecting fleet costs. However, under the new SmartPay2 contract, USDA has a new fleet credit card backed by VISA, which allows for wider nationwide coverage, especially in rural areas. ARS can rely on electronic data collection, with limited manual data entry. Also, upon implementation of the new property system, USDA will build a modern interface between the bank system and the property system, allowing costs to reside in one system. ARS looks forward to implementation of this process.

Size, composition and cost of agency motor vehicle fleet as of September 30, 2008 are as follows:

**Size, Composition, and Annual Cost**
**(in thousands of dollars)**

| Fiscal Year | Number of Vehicles by Type * | | | | | | | Total # of Vehicles | Annual Operating Cost |
|---|---|---|---|---|---|---|---|---|---|
| | Sedans & Station Wagons | Light Trucks, SUVs and Vans 4X2 | 4X4 | Medium Duty Vehicles | Ambulances | Buses | Heavy Duty Vehicles | | |
| **FY2007** | 299 | 1,472 | 845 | 982 | 1 | 1 | 34 | 3,634 | $3,538 |
| Change ** | 0 | -31 | 3 | 35 | -1 | 0 | 0 | 6 | 316 |
| **FY2008** | 299 | 1,441 | 848 | 1,017 | 0 | 1 | 34 | 3,640 | 3,854 |
| Change *** | -43 | -131 | -19 | -18 | 0 | 0 | -1 | -212 | 231 |
| **FY2009** | 256 | 1,310 | 829 | 999 | 0 | 1 | 33 | 3,428 | 4,085 |
| Change | -3 | -34 | -1 | -19 | 0 | 0 | 0 | -57 | 245 |
| **FY2010** | 253 | 1,276 | 828 | 980 | 0 | 1 | 33 | 3,371 | 4,330 |

NOTES:

***** These numbers include vehicles that are owned by the agency and leased from GSA.

** The significant increase in annual operating cost is due to the high cost of fuel.

*** The significant decrease is the result of a massive clean-up effort by one of our large research centers. The fleet had been inactive for a period of time, but had never been removed from the official inventory. Since the fleet was inactive, there are no significant changes to operating cost.

Statement of Proposed Purchase of Passenger Motor Vehicles

| Fiscal Year | Net Active Fleet at start of Fiscal Year | Disposals | Acquisitions | | | Net Fleet at end of Fiscal Year |
|---|---|---|---|---|---|---|
| | | | Replacements | Additions to Fleet | Total | |
| 2008 | 292 | 55 | 13 | 0 | 13 | 250 |
| 2009 | 250 | 13 | 10 | 0 | 10 | 247 |
| 2010 | 247 | 9 | 17 | 0 | 17 | 255 |

The significant change in disposals in FY 2008 represents the removal of inactive vehicles from the inventory. One of our research centers had a large volume of excess vehicles that had been removed from service but were still on-hand. Until the disposal process was complete and the vehicles were removed from the center, they had to stay on the official inventory. The difference between the "disposals" and "replacements" reflect the realignment of the existing fleet. Due to rising fuel costs, ARS wants to replace minivans/SUVs with station wagons/sedans. Offices can use the vehicles to move smaller equipment as needed and can rely on existing trucks for hauling large equipment.

AGRICULTURAL RESEARCH SERVICE
Proposed Language Changes

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Salaries and Expenses:

For necessary expenses of the Agricultural Research Service and for acquisition of lands by donation, exchange, or purchase at a nominal cost not to exceed $100, and for land exchanges where the lands exchanged shall be of equal value or shall be equalized by a payment of money to the grantor which shall not exceed 25 percent of the total value of the land or interests transferred out of Federal ownership, [$1,140,406,000]$1,153,368,000:[, of which $112,571,000 shall be for the purposes, and in the amounts, specified in the table titled ``Agricultural Research Service, Salaries and Expenses, Congressionally-designated Projects'' in the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act):] Provided, That appropriations hereunder shall be available for the operation and maintenance of aircraft and the purchase of not to exceed one for replacement only: Provided further, That appropriations hereunder shall be available pursuant to 7 U.S.C. 2250 for the construction, alteration, and repair of buildings and improvements, but unless otherwise provided, the cost of constructing any one building shall not exceed $375,000, except for headhouses or greenhouses which shall each be limited to $1,200,000, and except for 10 buildings to be constructed or improved at a cost not to exceed $750,000 each, and the cost of altering any one building during the fiscal year shall not exceed 10 percent of the current replacement value of the building or $375,000, whichever is greater: Provided further, That the limitations on alterations contained in this Act shall not apply to modernization or replacement of existing facilities at Beltsville, Maryland: Provided further, That appropriations hereunder shall be available for granting easements at the Beltsville Agricultural Research Center: Provided further, That the foregoing limitations shall not apply to replacement of buildings needed to carry out the Act of April 24, 1948 (21 U.S.C. 113a): Provided further, That funds may be received from any State, other political subdivision, organization, or individual for the purpose of establishing or operating any research facility or research project of the Agricultural Research Service, as authorized by law.

The change deletes a statement on earmark funding which is not requested in the budget.

AGRICULTURAL RESEARCH SERVICE

Analysis of Change in Appropriation

SALARIES AND EXPENSES

| | |
|---|---|
| Appropriations Act, 2009 | $1,140,406,000 |
| Budget Estimate, 2010 | 1,153,368,000 |
| Increase in Appropriations | +$12,962,000 |

AGRICULTURAL RESEARCH SERVICE

Summary of Increases and Decreases
(On basis of appropriation)

| Item of Change | 2009 Estimated | Pay Costs | Program Changes | 2010 Estimated |
|---|---|---|---|---|
| Product Quality/Value Added | $107,924,000 | +$2,053,000 | +$6,220,000 | $116,197,000 |
| Livestock Production | 86,640,000 | +1,096,000 | -4,358,000 | 83,378,000 |
| Crop Production | 205,011,000 | +3,517,000 | -3,892,000 | 204,636,000 |
| Food Safety | 105,695,000 | +1,808,000 | -- | 107,503,000 |
| Livestock Protection | 83,293,000 | +1,207,000 | -8,425,000 | 76,075,000 |
| Crop Protection | 201,131,000 | +3,114,000 | -3,942,000 | 200,303,000 |
| Human Nutrition | 85,309,000 | +640,000 | +6,371,000 | 92,320,000 |
| Environmental Stewardship | 226,057,000 | +4,442,000 | +3,441,000 | 233,940,000 |
| National Agricultural Library | 21,843,000 | +324,000 | -654,000 | 21,513,000 |
| Funds Included for Homeland Security | [35,454,000] | -- | -- | [33,376,000] |
| Repair and Maintenance | 17,503,000 | -- | -- | 17,503,000 |
| Total Available | 1,140,406,000 | +18,201,000 | -5,239,000 | 1,153,368,000 |

NOTES: Research activities carried out in support of Homeland Security are reflected under the Food Safety, Livestock Protection, and Crop Protection program areas.

AGRICULTURAL RESEARCH SERVICE

Project Statement by Program
(On basis of appropriation)

| | 2008 Actual | | 2009 Estimated | | Increase | 2010 Estiamted | |
|---|---|---|---|---|---|---|---|
| | Amount | Staff Years | Amount | Staff Years | or Decrease | Amount | Staff Years |
| Product Quality/Value Added..... | $104,574,231 | 906 | $107,924,000 | 912 | $8,273,000 | $116,197,000 | 912 |
| Livestock Production..... | 84,440,335 | 483 | 86,640,000 | 487 | -3,262,000 | 83,378,000 | 487 |
| Crop Production..... | 199,715,551 | 1,559 | 205,011,000 | 1,563 | -375,000 | 204,636,000 | 1,563 |
| Food Safety..... | 104,495,000 | 803 | 105,695,000 | 803 | +1,808,000 | 107,503,000 | 803 |
| Livestock Protection..... | 82,015,668 | 536 | 83,293,000 | 536 | -7,218,000 | 76,075,000 | 536 |
| Crop Protection..... | 195,524,141 | 1,376 | 201,131,000 | 1,384 | -828,000 | 200,303,000 | 1,374 |
| Human Nutrition..... | 85,339,000 | 284 | 85,309,000 | 284 | +7,011,000 | 92,320,000 | 284 |
| Environmental Stewardship..... | 221,478,832 | 1,973 | 226,057,000 | 1,974 | +7,883,000 | 233,940,000 | 1,974 |
| National Agricultural Library..... | 23,111,097 | 144 | 21,843,000 | 144 | -330,000 | 21,513,000 | 144 |
| Repair and Maintenance..... | 17,524,102 | -- | 17,503,000 | -- | -- | 17,503,000 | -- |
| Total | 1,118,217,957 | 8,064 | 1,140,406,000 | 8,087 | +12,962,000 | 1,153,368,000 | 8,077 |
| Collaborative Research Program..... | 3,824,000 | -- | -- | -- | -- | -- | -- |
| Miscellaneous Fees..... | 553,505 | -- | -- | -- | -- | -- | -- |
| Funds Included for Homeland Security..... | [35,454,000] | -- | [35,454,000] | -- | -- | [33,376,000] | -- |
| Total Available | 1,122,595,462 | 8,064 | 1,140,406,000 | 8,087 | 12,962,000 | 1,153,368,000 | 8,077 |
| Unobligated Balance..... | 5,650,890 | -- | -- | -- | -- | -- | -- |
| Total Available or Estimate..... | 1,128,246,352 | 8,064 | 1,140,406,000 | 8,087 | +12,962,000 | 1,153,368,000 | 8,077 |
| Miscellaneous Fees..... | (3,253,856) | | -- | -- | | | |
| Rescission/Across the Board Reduction..... | 7,902,608 | | -- | -- | | | |
| Transfer from Office of Congressional Relations..... | (127,104) | | -- | -- | | | |
| Transfer from U. S. Department of State..... | (3,824,000) | | -- | -- | | | |
| Total Appropriation..... | 1,128,944,000 | 8,064 | 1,140,406,000 | 8,087 | | | |
| Staff Years: | | | | | | | |
| Direct | | 8,064 | | 8,087 | | | 8,077 |
| Other | | 343 | | 343 | | | 343 |
| Total, Staff Year Estimate | | 8,407 | | 8,430 | | | 8,420 |

**NOTE**: Research activities carried out in support of Homeland Security are reflected under the Food Safety, Livestock Protection, and Crop Protection program areas.

Justification of Increases and Decreases

ARS' FY 2010 Salaries and Expenses (S&E) Budget recommends an increase of about $13 million, from $1.140 million to $1.153 million. The FY 2010 S&E Budget includes an increase of $36.8 million for research to address high priority Presidential initiatives on preventing childhood obesity, developing new bioenergy feedstocks, assessing and managing climate change, and reducing world hunger. The Budget also includes $18.2 million for pay costs. To finance the program initiatives and additional pay costs, $39.8 million in Congressionally-added earmarks are proposed for termination. These research projects are considered by the Administration to be of lower priority; duplicative or can be accomplished more effectively elsewhere; or can be more efficiently implemented with less overhead costs at another location. Other proposed savings include $1.7 million for the transfer of the Office of Pest Management Policy, and $0.5 million from efficiencies in real property management.

*New Products/Product Quality/Value Added*

ARS is proposing under this program area a net increase of $8,273,000. This includes pay costs, and new and expanded research initiatives totaling $13,053,000, and decreases totaling $4,780,000.

a) An increase of $2,053,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) An increase of $11,000,000 for research to develop New Varieties and Hybrids of Bioenergy Feedstocks with Traits for Optimal Production and Conversion, and create New Production Practices and Systems that Maximize the Sustainable Yield of High Quality Feedstocks.

Need for Change

The Nation needs to utilize its limited agricultural and water resources for the production of biofuels and food, feed, and fiber. This change places significant new demands on the Nation's natural resources to produce crops that efficiently satisfy the needs of all four markets – food, feed, fiber, and fuel – in a sustainable manner. Since, farm, market, and environmental conditions vary greatly across the U.S., different varieties and crop production systems are needed to meet the needs of farmers nationwide who wish to produce biomass for biofuels production. Strategies for controlling pests and supplying plant nutrients are needed to ensure that bioenergy feedstock production is affordable, energy efficient, and does not increase greenhouse gas emissions. Because increased bioenergy production has direct implications for regional land use, water supply, watershed nutrient loading, and the health of fish and wildlife populations, analytical tools are required to assess risks to these resources and choose effective management options. As water quality in many U.S. watersheds has been impaired by agricultural activities, natural resource management strategies are needed to stabilize or enhance water quality as biomass production grows.

ARS is uniquely suited for leading energy feedstock development because of its integrated combination of crop germplasm collections, and its strong energy grass and forage legume genetic improvement and breeding programs. The plant kingdom harbors a vast genetic diversity that awaits application for optimal development and production of new feedstocks. ARS maintains the world's largest seed collection (National Plant Germplasm Collection), a major national resource for storing and protecting that genetic diversity. ARS scientists are uniquely positioned to elucidate DNA profiles

and evaluate useful agricultural traits in seed in the U.S. collection, targeting genes that enhance crop production efficiency and biomass. The latest genetic statistical tools and breeding technology have not yet been applied to grasses and legumes to develop their potential as biofuel feedstock sources. The cost of providing nitrogen fertilizers for agriculture is $10 to $20 billion annually; efficiency of nitrogen use for crop production must be increased. New corn, sorghum, and soybean genome sequence information and genetic resources have recently become available. ARS will exploit this powerful new information and genetic resources to increase nitrogen use efficiency targeting corn, sorghum, oilseeds, and legumes. Also, there is a need to develop energy crop plants with increased photosynthesis efficiency and ability to capture the sun's energy for biomass production.

Outcomes

The new genes and genetic approaches that will be identified will significantly improve and accelerate feedstock development. High quality seeds will be provided more rapidly to farmers and ranchers resulting in a faster start on biomass production to meet national goals. New technologies that enable the sustainable production of bioenergy feedstocks will maintain or enhance the natural resource base and minimize unwanted impacts on markets for food, feed, or fiber. The varieties, hybrids, and crop production systems will be available to farmers nationwide who desire to produce biomass for biofuels production in a sustainable manner. Bioenergy feedstock producers will have affordable, energy efficient, and environmentally sound strategies for controlling pests and supplying plant growth nutrients. Analytical tools will be available for assessing and managing the challenges that bioenergy feedstock production poses to the environment, and water quality will be maintained or enhanced.

The proposed research supports Performance Measure 2.1.1 – Create new scientific knowledge and innovative technologies that represent scientific/technological advancements or breakthroughs applicable to bioenergy.

Means to Achieve Change

- Index and Mine the U.S. Seed Collections for Energy Genes ($246,000). ARS will:
  --DNA profile ("genotype") the National Plant Germplasm Collection of potential energy crop collections (i.e., energy grasses, forage, and high-oil legumes).
  --Develop initial components for an integrated, high volume genotyping pipeline focused on identifying single nucleotide polymorphisms (SNPs) that can be exploited by energy crop breeders.
  --Conduct comprehensive trait ("phenotype") evaluation of the National Plant Germplasm Collection for diverse energy traits in collaboration with crop breeders, agronomists, chemists, and engineers.

- Energy Crop Genetic Improvement, Breeding, and Management ($2,098,200). ARS will:
  --Accelerate genetic selection and breeding of energy grass and forage legume lines and cultivars.
  --Engineer plants to promote microbial symbiosis, or select environmental benefits such as improved nitrogen capture or enhanced carbon sequestration.
  --Ensure that high quality energy seeds will achieve their potential by developing agronomic practices leading to maximum stand establishment, sustainable resource use, effective pest management, and maximum biomass needed to meet U.S. goals for biofuels production.

- Genomic Strategies to Increase Nitrogen Use Efficiency in Energy Crop Production ($600,000). ARS will:
  --Conduct meta-genomics evaluation of microorganisms associated with switch grass to identify and exploit microbial genes for nitrogen fixation.

--Exploit new corn, sorghum, and soybean genome sequence information and diverse genetic mapping resources to identify genes associated with increased nitrogen use efficiency in corn, sorghum, and soybeans.

- Genetic Improvement to Capture the Sun's Energy to Increase Plant Biomass ($600,000). ARS will:
  --Expand genomic and genetic identification of key genes and mechanisms that enhance photosynthetic efficiency and light utilization.
  --Develop an energy crop breeding program to exploit these key genes aimed at enhancing the plants ability to capture the sun's energy to increase biomass.

- Develop Strategies to Integrate Bioenergy Production into Existing U.S. Agricultural Systems ($1,498,800). ARS will:
  --Identify optimal management strategies to incorporate bioenergy production into different agricultural systems in ways that optimize whole farm productivity and profitability, and not disrupt existing food, feed, and fiber markets.
  --Identify agronomic practices and strategies for pest control and nutrient delivery in bioenergy feedstock production using integrated pest management, crop rotations, and alternative source of nutrients such as manure, industrial byproducts, cover crops and biochar.
  --Assess the farm level impacts of incorporating bioenergy production on soil resource quality as well as the impacts on air, water, and wildlife habitat resources.
  --Determine, via life cycle analyses, net energy utilization and carbon balances associated with bioenergy feedstock production.

- Create Decision Support Systems for Sustaining Natural Resource Quality While Expanding Bioenergy Production ($2,337,000). ARS will:
  --Combine existing and new models to determine how to optimize bioenergy production at field, farm, and larger landscape scales with the objective of also minimizing the footprint of expanded feedstock production through minimized water use, minimized nitrogen and phosphorus pollution, and maximized connectivity of conserved land for wildlife habitat protection.
  --Develop region specific models that forecast spatially explicit land use change and allow stakeholders to identify the best areas within larger landscapes to produce feedstocks, determine how these areas vary for different feedstocks that could be grown, and interpret tradeoffs of land suitability and potential environmental costs.

- Develop Water and Greenhouse Gas Risk Assessment and Risk Management Strategies to Ensure Sustainability ($3,620,000). ARS will:
  --Assess conditions and trends in natural resource quality where bioenergy feedstocks will be grown and optimize combinations of conservation and land management strategies at local to regional scales.
  --Determine, via its national network of research watersheds and air quality monitoring sites, the effects of different bioenergy production practices on water quality and greenhouse gas emissions. Present resource conditions will be assessed at different scales and the benefits of alternative management strategies will be quantified.

c) <u>A decrease of $4,780,000 in ongoing research programs to provide savings to finance higher priority research initiatives</u>.

<u>Need for Change</u>

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

HQ, Biotechnology Research and Development Corporation
HQ, National Corn to Ethanol Research Pilot Plant
IL, Peoria, Crop Production and Food Processing
SD, Brookings, Biomass Crop Production

*Livestock Production*

ARS is proposing under this program area a net decrease of $3,262,000. This includes pay costs, and new and expanded research initiatives totaling $3,096,000, and decreases totaling $6,358,000.

a) An increase of $1,096,000 to fund increased pay costs.
Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) An increase of $2,000,000 for research to Reduce World Hunger.

Need for Change

World hunger is a major threat to global stability. Population increases over the next 40 years are projected to occur most rapidly in regions of the world that are currently the most food stressed. The key to meeting the demands of the growing population will be improving animal health and productivity.

Developing animal production systems using low starch forage and phase feeding to produce high quality animal products with lower inputs is a strength of ARS' research that can be applied to countries in need. Developing technologies to identify the animals most fit for a production system will speed selective breeding progress to adapt the animals to local conditions. The development of preventive measures to combat priority infectious diseases of livestock and poultry that impact the livelihood of people in developing countries (a major concern of the Food and Agriculture Organization and the World Organization for Animal Health) is critical. Until recently it was impossible to study the genes responsible for important traits like productivity, health, hardiness, or nutrient efficiency. These challenges are beginning to be met by exploiting the inherent potential in genomes. The development of high resolution genome sequences for cattle, chicken, and swine are providing the necessary infrastructure to conduct genomic selection. Among the traits most important for addressing world hunger will be animal health and feed efficiency.

Outcomes

Animal producers will benefit from reduced feed costs and avoid stock losses from mycotoxins. The health, feed efficiency, and productivity in food animals will be improved through the use of genetics and more efficient production systems.

The proposed research supports Performance Measure 2.2.2 – Develop new technologies, tools, and information contributing to improved precision production systems to meet current and future food animal production needs of diversified consumers, while simultaneously minimizing the environmental footprint of production systems and enhancing animal well-being.

Means to Achieve Change

- Collect Phenotypic Data and Use Genome Sequence Derived Markers to Characterize Germplasm for Traits of Importance in Food Animals **(**$600,000). ARS will:
  --Develop specific and genome-wide markers to determine allelic variation throughout food animal genomes. These markers will form the basis of genome-wide selection.
  --Conduct comparative analyses of genomic data between breeds used in the U.S. with those in countries in need to identify key differences associated with improving phenotypes.
  --Develop analytical models using single nucleotide polymorphic markers in breeds found in nations in need to improve genomic selection and the rate of genetic improvement.

- Use Genetics and Production Systems Approaches to Improve Health, Feed Efficiency and Productivity in Food Animals ($1,400,000). ARS will:
  --Identify genes and gene products that influence animal health, growth, and nutrition.
  --Develop proteomic technologies to characterize mechanisms of biological processes associated with improved feed efficiency.
  --Identify and characterize functional mutations that result in altered immune functions of food animals.
  --Determine whether polymorphisms of genes associated with innate immunity increase protective thresholds, and enhance the health food animals raised under conditions with high exposure to infectious diseases.
  --Identify and select ruminants (i.e., cattle and sheep) that are capable of producing a high quality carcass on a roughage diet with limited or no high starch feeds.
  --Develop production systems to optimize carcass quality with forage-based and low input feeding systems.

c) A decrease of $6,358,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

AL, Auburn, Catfish Genome
AL, Auburn, Vaccines and Microbe Control for Fish Health
AR, Booneville, Endophyte Research
AR, Stuttgart, Aquaculture Fisheries Center
AR, Stuttgart, Aquaculture Initiatives, Harbor Branch Oceanographic Institute
HI, Hilo, Tropical Aquaculture Feeds (Oceanic Institute)

C*rop Production*

ARS is proposing under this program area a net decrease of $375,000. This includes pay costs, and new and expanded research initiatives totaling $5,333,000, and decreases totaling $5,708,000.

a) An increase of $3,517,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) An increase of $1,816,000 for research to Reduce World Hunger.

Need for Change

World hunger is a major threat to global stability. Population increases over the next 40 years are projected to occur most rapidly in regions of the world that are currently the most food stressed. The key to meeting the demands of the growing population will be improving crop health and productivity.

Prevention of grain disease losses is critical to addressing world hunger. Maintaining steady supplies of grain crops, keeping grain marketing channels open, and avoiding grain shortages are essential. Unfortunately, new and emerging grain diseases are putting the world's grain supply at catastrophic risk. A virulent new wheat stem rust mutant, Ug99, has emerged in Eastern Africa that threatens wheat and barley production in Africa and Asia; North and South American wheat production is also at risk. Multiple grain staple crops including corn and sorghum are vulnerable to other fungal pathogens. Food and feed prepared from pathogen infested grains can contain harmful mycotoxins (i.e., aflatoxin, fumonosin, deoxynavalinol). Oats are vulnerable to crown rust, and rice is at risk to blast and sheath blight.

Maintaining and protecting the world's grain supply from these disease threats requires a concerted effort. ARS disease experts are often needed to identify and verify pathogen biotypes and mutants. Geneticists and breeders are needed to identify and incorporate genetic resistance genes into improved germplasm and new resistant varieties. ARS' grain crop germplasm and microbial collections provide invaluable sources of resistance genes and reference species. Often ARS researchers join in international scientific coalitions as has happened with the Borlaug Global Rust Initiative. ARS is uniquely suited for leading grain protection research because of its integrated combination of grain crop and cereal pathogen germplasm collections; its strong, highly productive grain crop genomics and breeding programs; its specialized cereal pathologists; and its national role in grain end-product quality and nutrition research.

Outcomes

As a result of the research, catastrophic losses from new and emerging cereal diseases will be avoided. Risk of grain shortages and high prices due to grain speculation and hoarding will be reduced. New germplasm and varieties with increased genetic protection will be released and made available to other grain breeding programs. Incorporation of more durable genetic protection, particularly in underserved areas, will constrict the international spread of new and emerging pathogens. Grain growers will benefit from reduced yield losses and economic gains, and from increased production with lower input costs. World hunger will be reduced for those in need by a more plentiful, economic, and safe supply of cereal foods.

The proposed research supports Performance Measure 2.2.3 – Expand, maintain, and protect our genetic resource base, increase our knowledge of genes, genomes, and biological processes, and provide economically and environmentally sound technologies that will improve the production efficiency, health, and value of the Nation's crops.

Means to Achieve Change

- Strengthen High Priority Grain Disease Research to Protect the World Grain Supply ($1,816,000). ARS will:
  --Safeguard and expand collections of grain crop germplasm and cereal pathogen collections to conserve diverse genetic resources with needed resistance genes and reference samples.
  --Expand and strengthen cereal pathology research, especially for whole genome mapping and characterization to elucidate the basis for virulence and mutation.
  --Develop advanced bioinformatic and statistical genetic tools, such as grain trait indices, that strategically integrate genomic and phenotypic information to accelerate breeding grain crops.
  --Accelerate and strengthen collaborative international germplasm enhancement and breeding programs to increase disease protection in staple grain crops.

c) A decrease of $5,169,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

AR, Booneville, Center for Agroforestry
AR, Booneville, Dale Bumpers Small Farms Research Center
DC, Washington, Medicinal and Bioactive Crops
GA, Dawson, Water Use Reduction
KS, Manhattan, Karnal Bunt
MD, Beltsville, Potato Diseases
MN, St. Paul, Wild Rice
ND, Mandan, Precision Agriculture Research
OR, Corvallis, Northwest Center for Small Fruits
TX, Lubbock, Sorghum Cold Tolerance

d) A decrease of $539,000 in the Salaries and Expenses account from efficiencies in Real Property Management.

Need for Change

This reduction captures savings associated with surplus assets that are scheduled to exit the Department's inventory.

*Food Safety*

ARS is proposing under this program area a net increase of $1,808,000. This includes pay costs totaling $1,808,000.

a) An increase of $1,808,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

*Livestock Protection*

ARS is proposing under this program area a net decrease of $7,218,000. This includes pay costs totaling $1,207,000, and decreases totaling $8,425,000.

a) An increase of $1,207,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) A decrease of $8,425,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

HQ, Animal Health Consortium
HQ, Lyme Disease 4 Poster Project
FL, Gainesville, Mosquito Trapping Research/West Nile Virus
FL, Gainesville, Termite Species in Hawaii
FL, Gainesville, Vector-Borne Diseases
LA, New Orleans, Formosan Subterranean Termite Research
MD, Beltsville, Poultry Diseases
NY, Greenport, Animal Vaccines

c) Relocation of ARS' Arthropod – Borne Animal Disease Research Laboratory from Laramie, Wyoming to Ames, Iowa.

ARS' Arthropod – Borne Animal Disease Research Laboratory (ABADRL) in Laramie conducts research on infectious livestock diseases transmitted by blood feeding insects and ticks. Research on these diseases, which pose a serious risk to animal and human populations, must be performed in biocontainment facilities. ABADRL's biocontainment facilities are, at best, only marginally adequate to meet current biosecurity requirements.

ARS is proposing to relocate the ABADRL to the National Centers for Animal Health (NCAH) in Ames, Iowa. The NCAH consists of the ARS National Animal Disease Center and the Animal and Plant Health Inspection Service's Center for Veterinary Biologics and National Veterinary Services Laboratory. This world class animal health complex has recently undergone major renovation and has full service state-of-the-art biosecurity facilities to meet ABADRL's needs. The NCAH is USDA's foremost location for livestock animal health, research, diagnostics, and training in the country.

*Crop Protection*

ARS is proposing under this program area a net decrease of $828,000. This includes pay costs totaling $3,114,000, and decreases totaling $3,942,000.

a) An increase of $3,114,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) A decrease of $2,242,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

MD, Beltsville, Biomedical Materials in Plants (Biotech Foundation)
MN, St. Paul, Cereal Disease
TN, Jackson, West Tennessee Mississippi River Cropping Systems Unit

c) A decrease of $1,700,000 for the Office of Pest Management Policy relating to its relocation.

Need for Change

The Office of Pest Management Policy and its associated 10 staff years will be transferred to the Office of the Chief Economist.

*Human Nutrition*

ARS is proposing under this program area a net increase of $7,011,000. This includes pay costs, and new and expanded research initiatives totaling $13,640,000, and decreases totaling $6,629,000.

a) An increase of $640,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) An increase of $13,000,000 for research to Prevent Childhood Obesity.

Need for Change

Obesity is the Nation's fastest growing public health problem impacting every segment of the American population. Two of three adults are overweight, and the number of overweight children has more than doubled in the past 20 years. Obesity and overweight often begin in childhood as eating habits are established. Without intervention, overweight children become obese adults.

The *Dietary Guidelines for Americans* are published by USDA and HHS and form the basis for Federal nutrition policy. They are aimed at children and adults, represent the best science available, and now include physical activity recommendations that emphasize stemming the increase in obesity in this country. Surveys reveal that few Americans follow the *Dietary Guidelines*. ARS proposes to determine the factors that inhibit or encourage adherence to the *Dietary Guidelines*.

Ethnic minorities, who have lower adherence to the *Dietary Guidelines*, are at greater risk of obesity and related health risks such as diabetes, hypertension, and heart disease. Evidence suggests some of this increased risk is due to dietary choices as well as to genetics. ARS will determine how genes interact with environmental factors to influence the risk of obesity on a personal level rather than in broad populations. Single behavioral targets to reduce obesity have consistently failed. ARS proposes to study family-based comprehensive interventions that have a greater potential for social support and success.

Foods that appeal to children and adults which better meet the *Dietary Guidelines* need to be produced. ARS has developed technologies to do this. The agency will focus on foods that increase satiety, decrease caloric density, and increase dietary fiber. Foods include: fruit bars; lower calorie, high fiber fat substitutes; high protein snacks; etc. These technologies are adaptable to a wide variety of healthier foods.

Outcomes

The proposed research will develop effective and sustainable policies that will help reduce obesity in children in the U.S. ARS will build upon existing strengths to address this issue by focusing on prevention of obesity rather than the many failed attempts at treatment. The research will for the first time provide information on what will motivate Americans to follow the *Dietary Guidelines* and on how these recommendations can be made more personalized for various ethnic groups. A portion of the research will develop food technologies that increase profitability for farmers. Success of this proposed research should reduce the health care costs attributable to obesity.

The proposed research supports Performance Measure 5.2.2 – Define the role of nutrients, foods, and dietary patterns in growth, maintenance of health, and prevention of obesity and other chronic diseases. Assess bioavailability and health benefits of food components. Conduct research that forms the basis for and evaluates nutrition standards and Federal dietary recommendations.

Means to Achieve Change

- Determine Barriers and Facilitators to Following the *Dietary* ***Guidelines for Americans*** ($4,000,000). ARS will:
  --Survey 8,400 children and adults in various ethnic groups across the U.S. to determine why most Americans do not follow the *Dietary Guidelines*.
  --Make recommendations for revising the *Dietary Guidelines* based on the survey results.

- Personalize Prevention through Diet, Behavior, and Genomics ($3,000,000). ARS will:
  --Identify genes or genetic markers among ethnic groups that respond to diet and physical activity.

- Develop Family-Based Interventions to Prevent Obesity ($3,937,000). ARS will:
  --Study family centered interventions to prevent weight gain throughout childhood and adolescence.

- Develop Technologies to Produce Healthier Foods ($2,063,000). ARS will:
  --Adapt a fruit bar developed by ARS as an obesity prevention food by fortifying it with fiber, proteins and other nutrients.
  --Produce higher satiety, lower calorie foods.
  --Evaluate products for prevention of excess weight gain in children.

c) A decrease of $6,629,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

AR, Little Rock, Delta Nutrition Initiatives
AR, Little Rock, Sorghum Research
LA, New Orleans, Diet Nutrition and Obesity Research (Pennington)
LA, New Orleans, Phytoestrogen Research
MA, Boston, Human Nutrition Research
TX, Houston, Chronic Diseases of Children

*Environmental Stewardship* (Water Quality)

ARS is proposing under this program area a net decrease of $1,083,000. This includes pay costs totaling $1,165,000, and decreases totaling $2,248,000.

a) An increase of $1,165,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) A decrease of $2,248,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

AZ, Tucson, Southwest Watershed Research Center
CA, Brawley, Water Management Research Laboratory
MO, Columbia, Mid-West/Mid-South Irrigation
MS, Oxford, Seismic and Acoustic Technologies in Soils Sedimentation Laboratory
OH, Columbus, Source Water Protection Initiatives

*Environmental Stewardship* (Air/Soil Quality, Global Climate Change)

ARS is proposing under this program area a net increase of $7,604,000. This includes pay costs, and new and expanded research initiatives totaling $10,857,000, and decreases totaling $3,253,000.

a) An increase of $1,857,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) An increase of $9,000,000 for research on Assessing and Managing Climate Change Risks to Agricultural Production Systems.

Need for Change

As the environment changes, those responsible for producing food, feed, fiber, and fuel need new information to adapt and maintain productivity in the face of new uncertainties. Climate change is threatening the productivity of many crop varieties; altering habitats and geographic ranges of pests that increasingly threaten production, degrade ecosystem services, affect human health, and increase costs of production losses and control measures; and altering water availability. The continued use of current production management practices under changing climate may be insufficient for feeding growing populations; may harm soil, water and air resources; and may compromise economic competitiveness. New crops that thrive under changing environmental conditions and management strategies to reduce greenhouse gas emissions are needed.

Research is needed on commercially viable technologies that enable producers, natural resource managers, and policymakers to determine risks of climate change to agricultural systems and their natural resource foundations, develop adaptation mechanisms, and reduce greenhouse gas contributions of agricultural landscapes to the atmosphere by enhancing carbon sequestration.

Outcomes

Crops that can thrive in new environments will expand the options for ensuring that food, feed, fiber and biofuels production can meet market demands despite the risks of climate change. Life cycle analyses, decision support tools, and management recommendations will increase the availability of desirable agricultural products; strengthen economic competitiveness; and enhance the sustainability of soil, water, and air resources despite the uncertainties of future climatic conditions.

The proposed research supports Performance Measure 6.2.1 – Develop practices and technologies to enhance soil resources and reduce emissions of particulate matter and gases from crop production lands, agricultural processing operations, and animal production systems.

Means to Achieve Change

- Develop New Crop Varieties that Can Thrive under Stress of Weather Variability and Extremes ($1,242,000). ARS will:
  --Develop new crop varieties that are adapted to new conditions of temperature and water availability and respond favorably to additional atmospheric CO2.
  --Develop computer models of crop growth that can predict how crop growth and yield respond to climate change.
  --Test crop varieties for regions of the world where climate change and food security risks coincide.

- Reduce Risks to Agricultural Production and Ecosystem Services from Pest Outbreaks Exacerbated by Climate Change ($1,915,000). ARS will:
  --Link earth observations, weather and climate models, and pest ecology and epidemiology to develop risk management tools.
  --Develop models linking crop growth and yield, pest biology, and climate change to predict pest outbreaks, spread, and severity.
  --Develop risk-based mitigation strategies to prevent climate driven pest outbreaks before they occur.

- Ensure the Availability and Delivery of Adequate Water Quantity and Quality under Changing Climate Conditions ($2,905,000). ARS will:
  --Develop integrated process-based, watershed hydrology models to aid in regional decision-making for improved efficiency of delivery, distribution, and use of water among competing demands.
  --Develop technologies for measuring and monitoring water resources and the effectiveness of improved management strategies.
  --Develop water resource decision support systems incorporating remote sensing information, in-situ environmental measurements, soils maps, topographical data, vegetation cover and land use data, and environmental and climatological model simulations.

- Develop Agricultural Management Strategies for Systems that Are Economically Competitive and Environmentally Sustainable ($2,938,000). ARS will:
  --Assess the interacting effects of management practices with changing climate conditions on production and the sustainability of soil, air, and water resources.
  --Develop integrated, adaptive management strategies and technologies to optimize the balance of yield; ecosystem services such as nitrogen cycling and carbon sequestration; natural resources conservation; and net greenhouse gas emission reductions for U.S. agricultural systems and environments.
  --Conduct life cycle analyses to evaluate the net impacts of management strategies and agricultural systems on production, economic viability, natural resource sustainability, ecosystem services, and greenhouse gas emissions.

c) A decrease of $3,253,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

AL, Auburn, Improved Crop Production Practices
CO, Akron, Central Great Plains Research Station
CO, Akron, Dryland Production
MD, Beltsville, Bioremediation Research
MD, Beltsville, Foundry Sand By-Products Utilization
PA, Wyndmoor, Arbuscular Mycorrhizal Fungi
TX, Bushland, Sorghum Research

*Environmental Stewardship* (Range/Grazing Lands)

ARS is proposing under this program area a net increase of $1,362,000. This includes pay costs totaling $1,420,000, and decreases totaling $58,000.

a) An increase of $1,420,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) A decrease of $58,000 in ongoing research programs to provide savings to finance higher priority research initiatives.

Need for Change

Research projects under this program activity have been identified for termination given that they represent Congressionally-added earmarks. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, will improve program and operational efficiencies, and will serve to restrain Federal spending.

ND, Mandan, Northern Great Plains Research Laboratory

*Library and Information Services*

ARS is proposing under this program area a net decrease of $330,000. This includes pay costs totaling $324,000, and decreases totaling $654,000.

a) An increase of $324,000 to fund increased pay costs.

Need for Change

Funding for pay costs is critical for recruiting and retaining top level scientists and staff, conducting viable research programs, and carrying out ARS' mission. Absorption of these costs reduces the number of scientists and support personnel essential for conducting the agency's research programs. If pay costs are not fully funded, ARS will be unable to fill critical positions and will have to reduce spending for much needed laboratory equipment, supplies, and other materials.

b) A decrease of $654,000 in ongoing operations or activities to provide savings to finance higher priority research initiatives.

Need for Change

ARS is proposing the termination of selected ongoing programs or activities within the Library and Information Services. The programs and activities are not research oriented, and as such, are marginal to ARS' core mission. The savings achieved from these terminations will be redirected to finance the higher priority agricultural research initiatives identified in the FY 2010 Budget, and will serve to restrain Federal spending.

MD, Beltsville, National Center for Agricultural Law (NAL)

**AGRICULTURAL RESEARCH SERVICE**

**Geographic Breakdown of Obligations and Staff Years**
**2008 Actual and Estimated 2009 and 2010**

| Location | 2008 Amount | 2008 Staff Years | 2009 Amount | 2009 Staff Years | 2010 Amount | 2010 Staff Years |
|---|---|---|---|---|---|---|
| ALABAMA, Auburn | $8,594,861 | 59 | $8,587,000 | 59 | $6,958,000 | 59 |
| ALASKA, Fairbanks | 5,241,454 | 32 | 5,424,000 | 32 | 5,424,000 | 32 |
| ARIZONA | | | | | | |
| Maricopa | 9,229,033 | 82 | 9,539,000 | 82 | 9,539,000 | 82 |
| Tucson | 4,134,017 | 40 | 4,551,000 | 42 | 4,551,000 | 42 |
| Total | 13,363,050 | 122 | 14,090,000 | 124 | 14,090,000 | 124 |
| ARKANSAS | | | | | | |
| Booneville | 5,013,439 | 22 | 4,842,000 | 22 | 2,044,000 | 22 |
| Fayetteville | 1,637,197 | 13 | 1,594,000 | 13 | 1,594,000 | 13 |
| Little Rock | 9,457,813 | 11 | 5,560,000 | 11 | 6,338,000 | 11 |
| Stuttgart | 8,546,769 | 75 | 8,621,000 | 75 | 6,716,000 | 75 |
| Total | 24,655,218 | 121 | 20,617,000 | 121 | 16,692,000 | 121 |
| CALIFORNIA | | | | | | |
| Albany | 38,785,639 | 289 | 39,505,000 | 291 | 40,440,000 | 291 |
| Davis | 11,082,853 | 85 | 10,513,000 | 85 | 11,413,000 | 85 |
| Parlier | 12,011,265 | 100 | 11,491,000 | 100 | 11,776,000 | 100 |
| Riverside | 5,709,196 | 48 | 5,652,000 | 48 | 5,366,000 | 48 |
| Salinas | 4,701,877 | 48 | 4,808,000 | 48 | 4,808,000 | 48 |
| Shafter | 1,387,041 | 14 | 1,432,000 | 14 | 1,432,000 | 14 |
| Total | 73,677,871 | 584 | 73,401,000 | 586 | 75,235,000 | 586 |
| COLORADO | | | | | | |
| Akron | 1,936,265 | 21 | 1,963,000 | 21 | 2,016,000 | 21 |
| Fort Collins | 15,108,331 | 146 | 15,482,000 | 146 | 17,432,000 | 146 |
| Total | 17,044,596 | 167 | 17,445,000 | 167 | 19,448,000 | 167 |
| DELAWARE | | | | | | |
| Newark | 2,076,419 | 16 | 2,042,000 | 16 | 2,042,000 | 16 |
| DISTRICT OF COLUMBIA | | | | | | |
| National Arboretum | 9,941,928 | 79 | 11,498,000 | 79 | 11,298,000 | 79 |
| Headquarters Federal Administration | 80,657,876 | 504 | 76,008,000 | 504 | 74,322,000 | 494 |
| Total | 90,599,804 | 583 | 87,506,000 | 583 | 85,620,000 | 573 |
| FLORIDA | | | | | | |
| Brooksville | 1,369,974 | 12 | 1,229,000 | 12 | 1,229,000 | 12 |
| Canal Point | 2,725,288 | 35 | 2,853,000 | 35 | 2,853,000 | 35 |
| Fort Lauderdale | 2,455,014 | 27 | 2,497,000 | 27 | 2,497,000 | 27 |
| Fort Pierce | 12,464,536 | 110 | 10,970,000 | 110 | 10,970,000 | 110 |
| Gainesville | 13,602,980 | 125 | 13,039,000 | 125 | 12,432,000 | 125 |
| Miami | 4,376,704 | 48 | 4,353,000 | 48 | 4,353,000 | 48 |
| Winter Haven | 2,479,704 | 23 | 2,486,000 | 23 | 2,486,000 | 23 |
| Total | 39,474,200 | 380 | 37,427,000 | 380 | 36,820,000 | 380 |

**AGRICULTURAL RESEARCH SERVICE**

**Geographic Breakdown of Obligations and Staff Years**
**2008 Actual and Estimated 2009 and 2010**

| Location | 2008 Amount | 2008 Staff Years | 2009 Amount | 2009 Staff Years | 2010 Amount | 2010 Staff Years |
|---|---|---|---|---|---|---|
| GEORGIA | | | | | | |
| Athens | 27,897,082 | 251 | 27,735,000 | 251 | 27,735,000 | 251 |
| Byron | 3,506,485 | 37 | 3,604,000 | 37 | 3,604,000 | 37 |
| Dawson | 4,269,593 | 44 | 4,396,000 | 44 | 4,396,000 | 44 |
| Griffin | 2,262,224 | 23 | 2,201,000 | 23 | 2,201,000 | 23 |
| Tifton | 9,665,274 | 101 | 9,523,000 | 101 | 9,973,000 | 101 |
| Total | 47,600,658 | 456 | 47,459,000 | 456 | 47,909,000 | 456 |
| HAWAII, Hilo | 11,110,369 | 67 | 10,752,000 | 67 | 9,458,000 | 67 |
| IDAHO | | | | | | |
| Aberdeen | 5,938,910 | 55 | 5,804,000 | 56 | 5,804,000 | 56 |
| Boise | 2,045,420 | 25 | 2,098,000 | 25 | 2,098,000 | 25 |
| Dubois | 2,206,365 | 21 | 2,117,000 | 21 | 2,117,000 | 21 |
| Kimberly | 3,432,142 | 38 | 3,527,000 | 38 | 3,527,000 | 38 |
| Total | 13,622,837 | 139 | 13,546,000 | 140 | 13,546,000 | 140 |
| ILLINOIS | | | | | | |
| Peoria | 34,034,374 | 275 | 35,415,000 | 275 | 35,809,000 | 275 |
| Urbana | 5,881,038 | 45 | 5,276,000 | 45 | 5,816,000 | 45 |
| Total | 39,915,412 | 320 | 40,691,000 | 320 | 41,625,000 | 320 |
| INDIANA, W. Lafayette | 7,593,633 | 71 | 7,619,000 | 71 | 7,619,000 | 71 |
| IOWA, Ames | 48,514,724 | 453 | 47,215,000 | 453 | 51,553,000 | 480 |
| KANSAS, Manhattan | 10,089,602 | 82 | 10,286,000 | 82 | 10,286,000 | 82 |
| KENTUCKY | | | | | | |
| Bowling Green | 2,478,250 | 15 | 2,559,000 | 15 | 2,559,000 | 15 |
| Lexington | 2,571,009 | 18 | 2,607,000 | 18 | 2,607,000 | 18 |
| Total | 5,049,259 | 33 | 5,166,000 | 33 | 5,166,000 | 33 |
| LOUISIANA | | | | | | |
| Baton Rouge | 3,169,013 | 32 | 3,160,000 | 30 | 3,160,000 | 30 |
| Houma | -- | -- | 3,004,000 | 32 | 3,004,000 | 32 |
| New Orleans | 31,207,362 | 215 | 29,726,000 | 190 | 24,664,000 | 190 |
| Total | 34,376,375 | 247 | 35,890,000 | 252 | 30,828,000 | 252 |
| MAINE, Orono | 2,996,782 | 28 | 2,833,000 | 28 | 2,833,000 | 28 |
| MARYLAND | | | | | | |
| Beltsville | 143,131,998 | 986 | 139,998,000 | 988 | 140,328,000 | 988 |
| Frederick | 5,304,378 | 47 | 5,350,000 | 47 | 5,350,000 | 47 |
| Total | 148,436,376 | 1,033 | 145,348,000 | 1,035 | 145,678,000 | 1,035 |
| MASSACHUSETTS, Boston | 15,374,637 | 11 | 15,490,000 | 11 | 16,432,000 | 11 |
| MICHIGAN, East Lansing | 4,819,859 | 41 | 4,522,000 | 41 | 4,522,000 | 41 |

**AGRICULTURAL RESEARCH SERVICE**

**Geographic Breakdown of Obligations and Staff Years**
**2008 Actual and Estimated 2009 and 2010**

| Location | 2008 Amount | 2008 Staff Years | 2009 Amount | 2009 Staff Years | 2010 Amount | 2010 Staff Years |
|---|---|---|---|---|---|---|
| MINNESOTA | | | | | | |
| Morris | 2,776,886 | 32 | 2,590,000 | 32 | 2,590,000 | 32 |
| St. Paul | 6,918,279 | 59 | 6,924,000 | 62 | 7,654,000 | 62 |
| Total | 9,695,165 | 91 | 9,514,000 | 94 | 10,244,000 | 94 |
| MISSISSIPPI | | | | | | |
| Mississippi State | 9,198,334 | 75 | 9,041,000 | 75 | 9,041,000 | 75 |
| Oxford | 13,459,916 | 93 | 13,629,000 | 93 | 13,629,000 | 93 |
| Poplarville | 4,964,086 | 39 | 4,992,000 | 39 | 4,992,000 | 39 |
| Stoneville | 37,358,164 | 298 | 37,996,000 | 299 | 37,767,000 | 299 |
| Total | 64,980,500 | 505 | 65,658,000 | 506 | 65,429,000 | 506 |
| MISSOURI, Columbia | 8,456,048 | 75 | 8,656,000 | 75 | 8,656,000 | 75 |
| MONTANA | | | | | | |
| Miles City | 3,194,423 | 27 | 3,293,000 | 27 | 3,293,000 | 27 |
| Sidney | 4,811,707 | 50 | 5,042,000 | 50 | 5,042,000 | 50 |
| Total | 8,006,130 | 77 | 8,335,000 | 77 | 8,335,000 | 77 |
| NEBRASKA | | | | | | |
| Clay Center | 19,160,536 | 123 | 19,281,000 | 123 | 19,911,000 | 123 |
| Lincoln | 5,796,272 | 61 | 5,787,000 | 61 | 7,046,000 | 61 |
| Total | 24,956,808 | 184 | 25,068,000 | 184 | 26,957,000 | 184 |
| NEW MEXICO | | | | | | |
| Las Cruces | 5,937,890 | 51 | 5,949,000 | 51 | 5,949,000 | 51 |
| NEW YORK | | | | | | |
| Geneva | 4,015,487 | 34 | 3,806,000 | 34 | 3,806,000 | 34 |
| Greenport | 5,395,698 | 29 | 5,139,000 | 29 | 4,223,000 | 29 |
| Ithaca | 10,943,392 | 54 | 10,490,000 | 54 | 10,490,000 | 54 |
| Total | 20,354,577 | 117 | 19,435,000 | 117 | 18,519,000 | 117 |
| NORTH CAROLINA | | | | | | |
| Raleigh | 8,786,010 | 84 | 9,001,000 | 85 | 9,608,000 | 85 |
| NORTH DAKOTA | | | | | | |
| Fargo | 14,576,507 | 124 | 15,322,000 | 124 | 15,322,000 | 124 |
| Grand Forks | 8,825,427 | 55 | 8,581,000 | 55 | 9,481,000 | 55 |
| Mandan | 3,761,848 | 39 | 3,830,000 | 39 | 3,364,000 | 39 |
| Total | 27,163,782 | 218 | 27,733,000 | 218 | 28,167,000 | 218 |
| OHIO | | | | | | |
| Columbus | 1,486,266 | 17 | 1,445,000 | 17 | 1,445,000 | 17 |
| Coshocton | 1,297,922 | 14 | 1,225,000 | 14 | 1,225,000 | 14 |
| Wooster | 5,643,019 | 49 | 4,969,000 | 49 | 4,969,000 | 49 |
| Total | 8,427,207 | 80 | 7,639,000 | 80 | 7,639,000 | 80 |

**AGRICULTURAL RESEARCH SERVICE**

**Geographic Breakdown of Obligations and Staff Years**
**2008 Actual and Estimated 2009 and 2010**

| Location | 2008 Amount | 2008 Staff Years | 2009 Amount | 2009 Staff Years | 2010 Amount | 2010 Staff Years |
|---|---|---|---|---|---|---|
| OKLAHOMA | | | | | | |
| El Reno | 5,242,554 | 50 | 5,271,000 | 50 | 5,721,000 | 50 |
| Lane | 2,039,329 | 19 | 1,928,000 | 19 | 1,928,000 | 19 |
| Stillwater | 3,490,989 | 33 | 3,602,000 | 33 | 3,602,000 | 33 |
| Woodward | 1,549,029 | 16 | 1,618,000 | 16 | 1,618,000 | 16 |
| Total | 12,321,901 | 118 | 12,419,000 | 118 | 12,869,000 | 118 |
| OREGON | | | | | | |
| Burns | 3,012,507 | 27 | 2,551,000 | 27 | 2,551,000 | 27 |
| Corvallis | 12,768,017 | 118 | 11,418,000 | 118 | 11,916,000 | 118 |
| Pendleton | 1,904,045 | 19 | 1,933,000 | 19 | 1,933,000 | 19 |
| Total | 17,684,569 | 164 | 15,902,000 | 164 | 16,400,000 | 164 |
| PENNSYLVANIA | | | | | | |
| University Park | 4,546,660 | 41 | 4,142,000 | 41 | 4,142,000 | 41 |
| Wyndmoor | 33,559,784 | 234 | 34,561,000 | 234 | 34,884,000 | 234 |
| Total | 38,106,444 | 275 | 38,703,000 | 275 | 39,026,000 | 275 |
| SOUTH CAROLINA | | | | | | |
| Charleston | 4,448,825 | 42 | 4,369,000 | 42 | 4,369,000 | 42 |
| Clemson | 2,253,199 | 22 | 2,326,000 | 22 | 2,326,000 | 22 |
| Florence | 4,023,255 | 37 | 4,079,000 | 37 | 4,079,000 | 37 |
| Total | 10,725,279 | 101 | 10,774,000 | 101 | 10,774,000 | 101 |
| SOUTH DAKOTA | | | | | | |
| Brookings | 3,956,716 | 42 | 3,925,000 | 42 | 3,401,000 | 42 |
| TEXAS | | | | | | |
| Beaumont | 1,424,998 | 16 | 1,407,000 | 16 | 1,407,000 | 16 |
| Bushland | 6,663,927 | 46 | 7,286,000 | 46 | 6,879,000 | 46 |
| College Station | 16,307,582 | 151 | 15,909,000 | 151 | 15,909,000 | 151 |
| Houston | 13,862,553 | 7 | 13,912,000 | 7 | 15,213,000 | 7 |
| Kerrville | 5,375,630 | 49 | 5,525,000 | 49 | 6,155,000 | 49 |
| Lubbock | 8,873,753 | 89 | 8,715,000 | 89 | 8,976,000 | 89 |
| Temple | 3,574,522 | 36 | 3,526,000 | 36 | 3,976,000 | 36 |
| Weslaco | 9,960,523 | 106 | 9,405,000 | 106 | 9,405,000 | 106 |
| Total | 66,043,488 | 500 | 65,685,000 | 500 | 67,920,000 | 500 |
| UTAH, Logan | 8,500,024 | 84 | 8,539,000 | 84 | 8,539,000 | 84 |
| WASHINGTON | | | | | | |
| Prosser | 3,799,180 | 30 | 3,265,000 | 30 | 3,265,000 | 30 |
| Pullman | 16,065,602 | 139 | 16,104,000 | 140 | 16,104,000 | 140 |
| Wapato | 4,603,177 | 54 | 4,386,000 | 54 | 4,386,000 | 54 |
| Wenatchee | 2,082,474 | 20 | 2,060,000 | 20 | 2,060,000 | 20 |
| Total | 26,550,433 | 243 | 25,815,000 | 244 | 25,815,000 | 244 |

**AGRICULTURAL RESEARCH SERVICE**

**Geographic Breakdown of Obligations and Staff Years**
**2008 Actual and Estimated 2009 and 2010**

| Location | 2008 Amount | 2008 Staff Years | 2009 Amount | 2009 Staff Years | 2010 Amount | 2010 Staff Years |
|---|---|---|---|---|---|---|
| WEST VIRGINIA | | | | | | |
| Beaver | 7,223,782 | 57 | 7,296,000 | 57 | 7,296,000 | 57 |
| Kearneysville | 6,922,395 | 68 | 6,863,000 | 68 | 6,863,000 | 68 |
| Leetown | 6,872,913 | 31 | 7,116,000 | 31 | 7,116,000 | 31 |
| Total | 21,019,090 | 156 | 21,275,000 | 156 | 21,275,000 | 156 |
| WISCONSIN, Madison | 13,492,766 | 111 | 15,012,000 | 115 | 15,867,000 | 115 |
| WYOMING | | | | | | |
| Cheyenne | 2,131,787 | 24 | 2,272,000 | 24 | 2,272,000 | 24 |
| Laramie | 3,051,448 | 26 | 3,079,000 | 27 | -- | -- |
| Total | 5,183,235 | 50 | 5,351,000 | 51 | 2,272,000 | 24 |
| PUERTO RICO | | | | | | |
| Mayaguez | 2,755,368 | 33 | 2,807,000 | 33 | 2,807,000 | 33 |
| OTHER COUNTRIES | | | | | | |
| Argentina, | | | | | | |
| Buenos Aires | 571,080 | -- | 533,000 | -- | 533,000 | -- |
| France, Montpellier | 3,135,348 | 3 | 3,078,000 | 3 | 3,078,000 | 3 |
| Total | 3,706,428 | 3 | 3,611,000 | 3 | 3,611,000 | 3 |
| Extramural and Funds Administered from Headquarters-Held Funds | 24,033,506 | -- | 52,741,000 | -- | 47,801,000 | -- |
| Repair & Maintenance of Facilities | 17,524,102 | -- | 17,503,000 | -- | 17,503,000 | -- |
| Funds included for Homeland Security | [35,454,000] | -- | [35,454,000] | -- | [33,376,000] | -- |
| Unobligated Balance | 5,650,890 | -- | -- | -- | -- | -- |
| Subtotal, Available or Estimate | 1,128,246,352 | 8,407 | 1,140,406,000 | 8,430 | 1,135,167,000 | 8,420 |
| Miscellaneous Fees | -3,253,856 | -- | -- | -- | -- | -- |
| Rescission | 7,902,608 | -- | -- | -- | -- | -- |
| Transfer from Office of Congressional Relations | -127,104 | -- | -- | -- | -- | -- |
| Transfer from U. S. Department of State | -3,824,000 | -- | -- | -- | -- | -- |
| Pay Costs | -- | -- | -- | -- | 18,201,000 | -- |
| Total, Available or Estimate | 1,128,944,000 | 8,407 | 1,140,406,000 | 8,430 | 1,153,368,000 | 8,420 |

1) Total FY 2008, FY 2009, and FY 2010 Staff Years reflect 8,064; 8,087; and 8,087 funded from Direct Appropriation and 343 from Other funds in each year.

AGRICULTURAL RESEARCH SERVICE
Salaries and Expenses

Classification by Objects
2008 Actual and Estimated 2009 and 2010

| | | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| Personnel Compensation: | | | | |
| Headquarters | | $51,634,191 | $52,631,000 | $53,828,000 |
| Field | | 504,664,622 | 514,413,000 | 526,109,000 |
| 11 | Total personnel compensation | 556,298,813 | 567,044,000 | 579,937,000 |
| 12 | Personnel benefits | 148,724,669 | 151,842,000 | 155,482,000 |
| 13 | Benefits for former personnel | 428,400 | 0 | 0 |
| | Total pers. comp. & benefits | 705,451,882 | 718,886,000 | 735,419,000 |
| Other Objects: | | | | |
| 21 | Travel and transportation of persons | 19,057,798 | 19,581,000 | 19,349,000 |
| 22 | Transportation of things | 1,023,799 | 1,071,000 | 1,062,000 |
| 23.1 | Rent payments to GSA | 5,850 | 0 | 0 |
| 23.2 | Rental payments to others | 1,152,986 | 1,207,000 | 1,196,000 |
| 23.3 | Communications, utilities and misc. charges | 53,388,098 | 54,189,000 | 53,439,000 |
| 24 | Printing and reproduction | 1,813,668 | 1,912,000 | 1,879,000 |
| 25.1 | Advisory and assistance services | 1,099,367 | 1,150,000 | 1,141,000 |
| 25.2 | Other services | 18,028,427 | 15,730,000 | 15,598,000 |
| 25.3 | Purchases of goods and services from Government Accounts | 767,499 | 803,000 | 796,000 |
| 25.4 | Operation and maintenance of facilities | 32,819,471 | 33,407,000 | 32,686,000 |
| 25.5 | Research and development contracts | 136,996,852 | 141,463,000 | 140,241,000 |
| 25.6 | Medical care | 263,614 | 0 | 0 |
| 25.7 | Operation and maintenance of equipment | 8,241,130 | 8,628,000 | 8,544,000 |
| 25.8 | Subsistence and support of persons | 392,198 | 0 | 0 |
| 26 | Supplies and materials | 88,745,678 | 89,940,000 | 88,691,000 |
| 31 | Equipment | 31,022,204 | 31,452,000 | 30,963,000 |
| 32 | Land and structures | 3,470,562 | 3,654,000 | 3,491,000 |
| 41 | Grants, subsidies, and contributions | 18,854,379 | 19,033,000 | 18,873,000 |
| | Total other objects | 417,143,580 | 423,220,000 | 417,949,000 |
| Total direct obligations | | 1,122,595,462 | 1,142,106,000 | 1,153,368,000 |
| Position Data: | | | | |
| Average Salary, ES positions | | $146,788 | $149,626 | 153,028 |
| Average Salary, GS positions | | $66,170 | $67,265 | 68,876 |
| Average Grade, GS positions | | 10.4 | 10.4 | 10.4 |

AGRICULTURAL RESEARCH SERVICE
Buildings and Facilities

SUMMARY OF RECOVERY ACT FUNDING

| Item of Change | 2009 | 2010 | 2011 |
|---|---|---|---|
| Improve Real Property Management..... | $176,000,000 | $0 | $0 |
| Total Available..... | 176,000,000 | 0 | 0 |

Program Implementation Activities:

ARS has established a Coordination and Communication team and charged them with monitoring the implementation of the ARS Recovery Act program to ensure consistent and strict compliance with the intent of the Recovery Act, as well as the OMB Implementation Guidelines. The team is overseen by an ARS Associate Administrator and includes representation from the Research, Education and Economics Undersecretary's Office.

The goal of the ARS Recovery Act program is to reduce the backlog of critical deferred maintenance at ARS facilities. Through completion of $176 million of critical deferred maintenance work at ARS facilities across the country, the Agency's Recovery Act program will create almost 2,500 jobs contributing directly to the principal objective of the Recovery Act. A second objective of the program is to ensure that ARS research programs can be effectively and efficiently conducted at facilities that currently have deferred maintenance needs. This work will reduce the backlog of deferred maintenance at ARS facilities by approximately 56 percent and slow the growth in deferred maintenance throughout ARS.

Total deferred maintenance needs (other than normal minor maintenance) is about $316 million. There are more ARS facilities with critical deferred maintenance needs than the $176 million that ARS was appropriated in the Recovery Act can support. Therefore criteria were developed to determine which facilities would be included in the program. The first criterion was whether or not a facility already had a design in progress or on the shelf for addressing the deferred maintenance work. Having an existing design allows the construction phase of work to begin much earlier than for a facility without a design resulting in faster job creation. All facilities with an existing design that met at least one of the program related criteria below were selected. This represented a total of 15 facilities and $154 million.

1. Unique national resources critical to meeting the needs of US Agriculuture: germplasm repositories, containment facilities, and critical human nutrition clinical facilities;

2. High priority research programs: human nutrition/obesity prevention, climate change, and bioenergy feedstock production;

3. Essential research capacity: locations with a critical mass of scientists that resolve complex problems of agriculture through multidisciplinary research: "utilization centers" and other large campuses; or

4. Research programs critical for ARS support of action and regulatory agencies: biocontrol laboratories, food safety, and watersheds.

The designs for all the facilities in the ARS Recovery Act program will meet current building codes, including those related to energy conservation.

ARS is in the process of developing detailed project implementation plans. The goal is to obligate $47 million by September 30, 2009; an additional $100 million by February 28, 2010; and the balance by April 2010.

# AGRICULTURAL RESEARCH SERVICE

## Status of Program

The Agricultural Research Service's (ARS) research programs address its Strategic Plan Goals: Enhance the Competitiveness and Sustainability of Rural and Farm Economies (Goal 2); Enhance Protection and Safety of the Nation's Agriculture and Food Supply (Goal 4); Improve the Nation's Nutrition and Health (Goal 5); and Protect and Enhance the Nation's Natural Resource Base and Environment (Goal 6). A brief summary of the agency's current research activities and selected accomplishments as well as ARS' Library and Information Services Management Initiative are detailed below.

All of ARS' research programs have been assessed with the Office of Management and Budget (OMB) Program Assessment Rating Tool (PART). The PART findings and improvement plans are summarized at the end of this exhibit.

***New Products/Product Quality/Value Added*** (Goal 2)

Current Activities:

ARS has active research programs directed toward (1) improving the efficiency and reducing the cost for the conversion of agricultural products into biobased products and biofuels, (2) developing new and improved products to help establish them in domestic and foreign markets, and (3) providing higher quality, healthy foods that satisfy consumer needs in the United States and abroad.

Selected Examples of Recent Progress:

High productivity membrane bioreactor. ARS scientists developed a membrane bioreactor to recycle ethanologenic biocatalysts and thereby reduce the cost of cellulosic ethanol production. The membrane bioreactor was tested with a recombinant bacterium that fermented xylose, a major sugar component of cellulosic biomass. The bioreactor exhibited xylose-to-ethanol productivities 60 times better than a traditional batch reactor, showing that a commercial system would require significantly lower capital costs.

Stable recombinant ethanologen. Continuous fermentation processes require significantly less capital investment because they have higher (as much as two times) productivity (g-EtOH/L-hr) as compared with traditional batch fermentation systems. However, it is often difficult to use genetically engineered microorganisms in continuous fermentations because the plasmids that contain the exogenous genes lack sufficient stability. ARS researchers developed a stable, recombinant, ethanologenic bacterium that ferments both pentose and hexose sugars; they tested the stability of this recombinant strain in a continuous fermentor fed with wheat straw hydrolyzate. The bacterium was found to produce ethanol continuously over four months without any loss in productivity, plasmid stability, or cell viability.

Biodiesel coproduct for aquaculture feed. In-situ biodiesel biorefining, a process developed by ARS researchers, produces biodiesel from any lipid bearing material without the need for an oil extraction step. In-situ processing simplifies biodiesel synthesis and substantially expands the sources of oils for producing biofuel. However, for the process to be economically viable, economical uses must be found for the lipid free meal coproduct left after the in-situ reaction. Testing showed the spent meal to be quite suitable as a feed ration in aquaculture.

Efficient xylose-to-ethanol biocatalyst. Although xylose is a major sugar in ligno-cellulosic biomass, yeasts are incapable of converting xylose to ethanol. ARS scientists introduced into yeast a number of genes that express both the enzymes to produce ethanol from xylose and the transport proteins to pump xylose into the yeast cell. The engineered strain efficiently ferments xylose to ethanol, and will help make cellulosic ethanol biorefining commercially viable.

Potato postharvest quality evaluations and release of new potato cultivars. The ability to process after storage is an essential attribute of a successful potato variety. The standardized evaluation procedures developed and used at ARS' East Grand Forks, Minnesota, facility have been an important component of the overall process of evaluation and release of new cultivars by Federal and State cooperators nationwide. In support of Federal and non-Federal public breeding/screening programs, research conducted at this location has analyzed annually between 14,000 and 15,000 samples of advanced breeding lines for storage/processing quality. In collaboration with North Dakota State University and the University of Minnesota, research conducted at East Grand Forks has contributed to the release of two new promising potato varieties: Dakota Crisp and Dakota Diamond. Both varieties offer significant benefits to both producers and processors and should be widely adopted by the potato industry.

Commercial transfer of fruit and vegetable edible film technology. New processing technologies can provide new products that will increase utilization and consumption of fruits and vegetables by American consumers. Researchers in Albany, California, worked with an industrial Cooperative Research and Development Agreement (CRADA) partner to commercialize patent pending, fruit- and vegetable-based films in a variety of final food product applications. One of these applications is the use of the films as healthy, colorful alternatives to the seaweed wrap 'nori' in a novel line of Sunny California rolls on sale at Trader Joe's supermarkets around the country. Films were also sold commercially to a wide variety of upscale restaurants, as well as a healthy, flavorful glaze for hams and turkeys. The CRADA partner will build a film manufacturing plant in Stockton, California.

Economic, energy, and environmental impacts of biomass feedstock production systems. Switchgrass and alfalfa are promising feedstocks for biorefining but their energy balance, environmental impacts, and economics have not been quantified as compared with those of corn. ARS scientists assessed production costs, farm income, net energy use, and environmental impacts of cellulosic ethanol production in the Upper Midwest for four crop systems: continuous corn (with and without stover harvest), continuous switchgrass, and an alfalfa-corn rotation. Although continuous corn had the highest ethanol yield and profit, it was the least energy efficient and led to the most erosion and nitrogen (N) leaching. Alfalfa-corn produced less ethanol and lower profits but was more energy efficient, had less erosion, and virtually eliminated N fertilizer use and leaching. Switchgrass created almost no erosion, was the most energy efficient, and was between continuous corn and alfalfa-corn in N fertilizer use and leaching but it was profitable only when selling prices or yields are high.

Sunflower cultivars with high levels of gamma- and delta-tocopherols. Studies on vegetable oils by scientists in Peoria, Illinois, showed that gamma- and delta-tocopherols were much better antioxidants than alpha-tocopherol. Because sunflower oils contain mostly alpha-tocopherol, the Peoria scientists recommended that ARS plant geneticists develop sunflowers with high amounts of gamma- and delta-tocopherols to enhance the oxidative stability of sunflower oil. In March 2008, a germplasm release of this modification was made through the ARS Germplasm Resources Information Network. This new modified sunflower oil has the potential to help replace trans fats containing hydrogenated oils for high stability uses such as frying, and to produce good quality, healthful foods.

***Livestock Production*** (Goal 2)

Current Activities:

ARS' livestock production program is directed toward (1) safeguarding and utilizing animal genetic resources, associated genetic and genomic databases, and bioinformatic tools; (2) developing a basic understanding of the physiology of livestock and poultry; and (3) developing information, tools, and technologies that can be used to improve animal production systems. The research is heavily focused on the development and application of genomics technology to increase the efficiency and product quality of beef, dairy, swine, poultry, aquaculture, and sheep systems. Current areas of emphasis include increasing efficiency of nutrient utilization, increasing animal well-being and reducing stress in production systems,

increasing reproductive rates and breeding animal longevity, developing and evaluating non-traditional production systems (e.g., organic, natural), and evaluating and conserving animal genetic resources.

Selected Examples of Recent Progress:

RNA interference to inhibit viral disease in chickens. Modern vaccines have reduced losses to viral diseases; however, many viral diseases continue to impact animal productivity and welfare. Additional tools to complement vaccine control methods could aid in further reducing the effects of viral disease. Recently, a system known as RNA interference, or RNAi, has been developed that reduces the expression of specific genes. Scientists at the Avian Disease Oncology Laboratory in Michigan have adapted this technology to reduce the severity of viral infections in chickens by targeting virus genes. The feasibility of this approach was shown in live birds, where Marek's disease virus replication and pathogenesis has been reduced. This method has the potential to inhibit any infectious disease and may offer a valuable tool to control disease.

Whole genome SNP assay development for estimating genetic merit. A research consortium led by the Animal Improvement Programs Laboratory including the U.S. Meat Animal Research Center; the University of Missouri, Illumina, Inc.; the National Association of Animal Breeders (NAAB, a trade group representing cattle artificial insemination organizations in North America); INRA (France); and Merial, Inc., developed, tested, and commercialized a beadchip that assays the genetic identity of an individual at approximately 58,000 genetic markers in the whole genome. Such evaluations were done for more than 10,000 cattle using this beadchip. Further, the association between genetic markers and production traits was estimated. These genetic markers were used to develop a system to predict genetic merit for three major dairy breeds. More than 3,000 DNA samples were extracted from semen to support this work. The initial success of this methodology to enhance selection in Holsteins led to the release of unofficial genome enhanced genetic predictions in April 2008. Genome enhanced evaluations are now provided quarterly to the NAAB.

Diet and management impacts on nutrient losses from dairy farms. Two integrated feed manure management trials and a survey of dairy feed practices were conducted to examine relationships between dairy diets, milk production, manure nutrient excretions, and environmental risks. On Wisconsin dairy farms, approximately 20 to 35 percent of feed protein and phosphorus is secreted into milk and the remaining is excreted in manure. The amount and form of nitrogen and phosphorus losses to the environment were highly influenced by what was fed to dairy cows and by other management practices. For example, feeding protein above recommended levels increased excretions of nitrogen in manure and subsequent ammonia nitrogen loss from barns and field after manure land application. Unnecessary dietary phosphorus supplements dramatically increased total and water soluble phosphorus concentrations in manure and runoff from soil surfaces after manure application. Recommendations to use total mixed rations, balancing rations at least four times per year, and milking thrice daily results in the highest milk yields and the highest levels of feed nitrogen and phosphorus transformed into milk. Dietary options and practices are available that satisfy the nutritional requirements of high producing dairy cows and also produce manure less susceptible to environmental loss.

Selection marker of rainbow trout disease resistance identified. Infectious disease is a substantial source of loss in U.S. rainbow trout aquaculture; improved methods are needed to diminish this problem. At the National Center for Cool and Cold Water Aquaculture, rainbow trout were selectively bred for increased resistance to the bacterial cold water disease agent, *Flavobacterium psychrophilum*. It was demonstrated that resistance persisted throughout their life cycle. It was also found that resistant fish crosses had, on average, a larger spleen size than did susceptible fish crosses. Selecting fish crosses solely based on spleen size was found to predict resistance to the bacterial cold water disease agent, indicating a close link between these two traits. Because spleen size is easy to measure, it may be a useful selection parameter for evaluation in other fish populations.

Reducing total dietary protein in rainbow trout diets by balancing the amino acid profile. Current diets for rainbow trout may be over formulated with protein to meet individual amino acid requirements. Researchers in Hagerman, Idaho, found that when diets are formulated with regard to amino acid instead of crude protein, growth rate can be maintained and total dietary protein can be reduced. Individual amino acids were supplemented to provide a better amino acid balance than that currently suggested in the literature. Supplementing with synthetic lysine, methionine, and threonine reduced total dietary protein by 11 percent; increased protein retained growth by 35 percent. The impact of this research will be to reduce both feed cost, because protein is expensive, and nitrogenous waste released into the environment, because more nitrogenous protein is incorporated into the fish muscle.

Catfish fry have low tolerance for sudden increases in environmental pH. Early life stage (fry) survival of catfish is variable; low survival often cannot be attributed to diseases or malnourishment. Catfish fry are produced in hatcheries, where eggs are hatched and fry are grown for four to 10 days. Fry are then transferred quickly from the hatchery to nursery ponds for further growth. Hatchery water and nursery pond water may have a very different pH. Researchers found that catfish fry have high tolerance for sudden decreases in water pH, but low tolerance for increasing water pH. A sudden increase of only 0.7 pH units can cause 10 percent loss of fry, and an increase of 1.4 pH units will cause 50 percent mortality. Farmers have been advised to monitor pH before stocking fry in nursery ponds and stock only when water pH in the nursery pond closely matches water pH in the hatchery. This simple practice has been widely adopted and will have significant impacts on fry survival in catfish farming.

***Crop Production*** (Goal 2)

Current Activities:

ARS' crop production program focuses on developing and improving ways to reduce crop losses while protecting and ensuring a safe and affordable food supply. The research program concentrates on effective production strategies that are environmentally friendly, safe to consumers, and compatible with sustainable and profitable crop production systems. Research activities are directed at safeguarding and utilizing plant genetic resources and their associated genetic, genomic, and bioinformatic databases that facilitate selection of varieties and/or germplasm with significantly improved traits.

Current research activities attempt to minimize the impacts of crop pests while maintaining healthy crops and safe commodities that can be sold in markets throughout the world. ARS is conducting research to discover and exploit naturally occurring and engineered genetic mechanisms for plant pest control, develop agronomic germplasm with durable defensive traits, and transfer genetic resources for commercial use. ARS will be providing taxonomic information on invasive species that strengthens prevention techniques, aids in detection/identification of invasives, and increases control through management tactics that restore habitats and biological diversity.

Selected Examples of Recent Progress:

Slow wilting trait discovered in soybean drought tolerant germplasm developed. ARS scientists in Raleigh, North Carolina, developed a new generation of soybean breeding lines with extremely valuable drought tolerance. In regional and local testing, two of the lines, N04-9646 and N01-11771, were slow wilting, with a substantial yield benefit when grown under dry conditions. Uncharacteristically, they also yielded reasonably well in environments with minimal plant stress. These long awaited genetic materials, now being used by commercial breeders as parental stock, are likely the most drought tolerant soybean materials in the world. Their impact on soybean production will be fully realized as commercial breeding programs release new cultivars derived from this ARS stock.

Identification of the major gene that determines the level of provitamin A in corn. Dietary vitamin A deficiency causes eye problems in 40 million children throughout the world each year and puts an additional 140 million to 250 million at risk for related vitamin A deficiency disorders and increased

mortality. Breeding to increase levels of provitamin A (biofortification) using existing natural genetic variation in corn is an economical and helpful approach to address this challenge, particularly where children subsist on largely corn-based diets. In collaboration with Cornell and University of Illinois researchers, ARS scientists in Ithaca, New York, have identified a major gene that determines the levels of provitamin A in corn. Natural genetic variants of this gene can increase provitamin A content five fold. Inexpensive markers for the gene were developed that enable crop breeders to genetically select for higher provitamin A content; the markers are now being applied in corn genetic improvement programs in developing countries.

Stripe rust resistance protects U.S. wheat and barley. Wheat and barley stripe rust has caused major yield reductions and economic losses for grain producers in the Pacific Northwest, Midwest, and eastern United States since 2000. ARS scientists in Pullman, Washington; Manhattan, Kansas; and Raleigh, North Carolina, have partnered with regional wheat and barley breeders to identify new sources of stripe rust resistance and develop DNA markers linked to resistance genes. ARS genotyping scientists and variety trial coordinators have facilitated genetic selection and field disease trials. ARS and university geneticists, through the Wheat and Barley Stripe Rust Initiative, have released in 2008 new wheat and barley varieties with significantly improved stripe rust resistance in all affected regions of the United States.

Honey bee viruses. Bee viruses are among the suspected causes of colony collapse disorder (CCD) of honey bees. In an initial survey of bees, ARS and university scientists found that the Israeli acute paralysis virus (IAPV), in particular, seemed to be highly associated with CCD. There was concern that the virus had entered the United States after a quarantine on importing the bees from Australia was lifted; however, additional ARS work showed that the virus was here prior to the lifting of the quarantine. Additionally, other U.S. apiaries have CCD but no IAPV. Although some of these apiaries have other viruses, the body of research, in total, suggests a broad range of causative factors, including pathogens, parasitic mites, pesticides, and other stresses to bee health, e.g., the need to move colonies across country for almond pollination. To further investigate virus involvement, ARS has complied with cooperator requests to improve viral storage methods prior to diagnosis and to develop a protocol for analyzing field samples. Research on the viral causes of bee disease will continue to focus on decreasing the costs of beekeeping and assuring adequate pollination.

More than 500,000 samples of crop genetic diversity conserved and distributed to researchers. During 2008, the 20-plus genebanks in the USDA/ARS National Plant Germplasm System (NPGS) added more than 25,000 new samples, so that a total of more than 509,000 samples of more than 13,100 plant species are now conserved by NPGS genebanks. Scientific interest, especially for germplasm of specialty crops, has increased tangibly during the last few years, with the average number of samples distributed per year by the NPGS now totaling about 140,000—40,000 more than the average a decade ago. These materials are key for the continued progress in crop genetics and breeding that is requisite for future food security.

Genome of commercial transgenic papaya sequenced. The genome of the transgenic papaya cultivar, ‘Sunup’, was sequenced by ARS scientists in Hilo, Hawaii, and their collaborators. The purpose was to better understand the genetic control for key papaya traits, such as flowering. It was also to provide information needed by Japan to consider deregulation of transgenic papaya fruit, which could expand Hawaii’s export papaya market. The resulting genomic information might also elucidate the genetic control for other key papaya traits.

Identification of candidate genes and discovery of new genes for Asian soybean rust resistance. Outbreaks of Asian soybean rust (ASR) have now occurred in all major soybean producing countries and can cause yield losses up to 75 percent. Thus far, only four resistance genes to ASR have been identified. ARS scientists in Ames, Iowa, located and sequenced the chromosomal regions that include two of the resistance genes, finding that the regions contained 23 and three candidate resistance genes, respectively. Researchers are rapidly developing markers for those genes to enable more precise use by breeders. Significantly, those regions also confer resistance to other important soybean pathogens. Therefore, the markers developed for ASR may also benefit research with other important soybean diseases. Furthermore, ARS scientists in

Peoria, Illinois, discovered a new genetic source for soybean rust resistance and confirmed that it is at the same chromosomal location as a currently known resistance gene, but found that it is a different form, or allele of that gene. This new allele should increase the diversity of types of rust resistance in soybean varieties and, via closely linked DNA markers, the new resistance sources can be readily transferred to new varieties.

New methods for plant biotechnology developed that do not require antibiotic resistance genes or foreign DNA. ARS scientists in Lubbock, Texas, have identified a gene coding for a protein of a naturally occurring heat protection system of plant cells and developed a method for selecting transgenic plants. Transformed cells and plants survive a high temperature challenge, whereas non-transformed tissues do not. Other ARS scientists in Albany, California, have transformed wheat with linear DNA that only contains wheat DNA sequences needed for expression of new traits. These new methods enable plant scientists to construct biotech wheat plants that only contain wheat DNA. These new methods eliminate the need to use antibiotic resistant genes as selectable markers for genetic transformation of plants.

Hardy hairy vetch varieties released as cover crop. Purple Bounty and Purple Prosperity are two new varieties of hairy vetch that were developed by ARS in Beltsville, Maryland. These new varieties are hardier and flower earlier than do traditional hairy vetch, adding up to two additional weeks of growth before corn, tomato, pumpkin, and other summer crops are grown in the summer. Organic farmers have been using hairy vetch for decades because it adds nitrogen to the soil without the need for manufactured fertilizers. But previous earlier flowering varieties had limited use north of Maryland because they cope poorly with northern winters. The new varieties allow farmers to grow earlier flowering vetch as far north as Ithaca, New York. The plants, named for their striking purple blooms, may also be attractive to conventional farmers because they cut in half the need for synthetic fertilizers which are made using expensive natural gas.

Reducing weed control costs to organic vegetable producers. Hand labor for weed management in high value organic vegetable crops can cost up to $1,500 per acre. ARS scientists in Salinas, California, and cooperators conducted on-farm research to evaluate the effectiveness and cost of six organic weed management tools to prepare stale seed beds in high density vegetable production. These techniques included organic herbicides, propane flamers, and various cultivation tools. Most techniques controlled more than 70 percent of the weeds and cost less than $230 per acre. However, the organic herbicide was ineffective and cost $1,557 per acre. These findings identified effective methods to help organic producers minimize the need for hand weeding of high value vegetable crops grown in the California central coastal region.

***Food Safety*** (Goal 4)

Current Activities:

Assuring that the United States has the highest levels of affordable, safe food requires that the food system be protected at each stage from production through processing and consumption from pathogens, toxins, and chemical contaminants that cause diseases in humans. The U.S. food supply is very diverse, extensive, easily accessible, and thus vulnerable to the introduction of biological and chemical contaminants through natural processes, intentional means, or by global commerce.

ARS' current food safety research is designed to yield science-based knowledge on the safe production, storage, processing, and handling of plant and animal products, and on the detection and control of toxin producing and/or pathogenic bacteria and fungi, parasites, chemical contaminants, and plant toxins. All of ARS' research activities involve a high degree of cooperation and collaboration both within the USDA Research, Education, and Economics agencies as well as with USDA's Food Safety and Inspection Service (FSIS) and the Animal and Plant Health Inspection Service (APHIS), and with other entities, including the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention, the Department of Homeland Security, and the Environmental Protection Agency (EPA). ARS also collaborates in international research programs to address and resolve global food safety issues.

Specific research efforts are directed toward developing new technologies that assist ARS stakeholders and customers, that is, regulatory agencies, industry, and commodity and consumer organizations in detecting, identifying, and controlling foodborne diseases that affect human health.

Selected Examples of Recent Progress:

Detection of melamine. Detection of melamine contaminated imported food products is a critical issue for the FDA. ARS scientists in Beltsville, Maryland, developed a rapid, nondestructive detection/identification method for melamine and its derivatives in pet foods, based on Raman spectroscopic techniques. A patent disclosure was approved for the method, and a CRADA was initiated, resulting in the development of two prototype hand held devices currently undergoing testing and validation in commercial settings. This work will have a direct impact on the FDA's ability to detect melamine and related contaminants in foods.

Multiplication of *Salmonella enteritidis* in eggs. Although chickens infected with *Salmonella* do not deposit this pathogen inside egg yolks very often, bacteria from the surrounding albumen might penetrate through the membrane that surrounds the yolk, resulting in rapid and extensive *Salmonella* growth in the nutrient rich interior contents of the yolk prior to egg refrigeration. ARS scientists in Athens, Georgia, used a laboratory egg contamination model to assess the ability of *S. enteritidis* strains to multiply on the vitelline membrane or to penetrate this membrane and multiply inside yolks during incubation at warm temperatures (simulating the conditions under a proposed national *S. enteritidis* control program that would allow unrefrigerated storage of eggs on farms for up to 36 hours). Studies determined that *S. enteritidis* were able to penetrate from the exterior of the yolk (vitelline) membrane into the yolk contents during as little as 12 hours of incubation at 30°C. The concentration of *S. enteritidis* after incubation was significantly higher in whole yolks than in yolk contents at both 12 hours and 36 hours. These results demonstrate that extensive bacterial multiplication on the yolk membrane may occur in addition to (and before) penetration into the yolk contents, further supporting regulatory rules that emphasize rapid refrigeration of eggs for protecting consumers from egg borne illnesses by *Salmonella*.

Blade Tenderization. Blade tenderization is a process whereby needles are used to tenderize whole muscle pieces of meat that are then cut into steaks. The potential problem is that the process of tenderization may force cells of pathogenic bacteria that reside on the outside of the whole muscle into the meat. The question was whether cooking would be adequate to kill cells that are inside rather than on the surface of the steaks. ARS scientists in Wyndmoor, Pennsylvania, evaluated cooking blade tenderized steaks on a commercial gas grill to eliminate *E. coli* O157:H7. Steaks were cooked on an open flame gas grill to internal temperatures ranging from 120° to 140°F and showed that, regardless of temperature or thickness, a commercial style gas grill is effective at eliminating cells of the pathogen that may be distributed throughout a steak that was blade tenderized. This information is critical for both regulatory agencies, such as the FSIS program, industry, and consumers.

Micro-crack detection for table eggs. The Agricultural Marketing Service (AMS), asked ARS to develop a method to help graders identify hairline micro-cracks in table eggs. ARS scientists in Athens, Georgia, developed a 20 egg batch process imaging system to detect and enhance small cracks by pulling a small vacuum in the image chamber resulting in an extremely accurate method to detect the cracks. Further enhancements to the system include a user friendly, touch screen database method for recording the number of egg cracks and other egg features that cause downgrades, which the AMS graders are currently documenting. The system will help the graders by increasing their accuracy, removing subjectivity, reducing data transfer errors, increasing their productivity, and dramatically changing the way eggs are currently graded.

Detection of anthelmintic drug residues. Monitoring of veterinary drug residues in meat and milk products is a critical issue for regulatory agencies worldwide. ARS scientists in Wyndmoor, Pennsylvania, developed and validated a new liquid chromatographic tandem mass spectrometric multiresidue method for the simultaneous quantification and identification of 38 of the most widely used anthelmintic veterinary

drugs (including benzimidazoles, macrocyclic lactones, and flukicides) in milk and liver. The procedure utilizes a simple modification of the ARS developed QuEChERS method, which was initially developed for pesticide residue analysis. The new method achieved sufficiently low detection limits of quantitation for all targeted drug residues and was successfully validated for implementation in regulatory monitoring labs in the United States, the European Union, and in other countries.

*E. coli* O157:H7 in cattle fed wet distillers grains. Demand for corn has driven cattle producers to feed other available feedstuffs, such as wet distiller's grains with solubles (WDGS). The use of WDGS in cattle diets has resulted in mixed results relative to *E. coli* O157:H7 prevalence in cattle in small studies; long-term studies with large animal groups have not been performed. ARS scientists in Clay Center, Nebraska, utilizing 600 calf fed steers in the feedlot environment, examined the level and prevalence for *E. coli* O157:H7 on hides and in feces for 245 days through the growing and finishing phases of production. Feeding 14 percent WDGS (on a dry matter basis) in the growing ration was associated with slightly higher prevalence for *E. coli* O157:H7 in the feces as compared to animals fed no WDGS. In the finishing phase, animals that received 40 percent WDGS in their diet had greater prevalence of the pathogen on hides and in feces as compared to those receiving zero percent WDGS, but part of the difference in feces prevalence was associated with one pen of 40 percent WDGS-fed cattle. The impact of the work for industry and regulatory agencies is that higher prevalence of *E. coli* O157:H7 associated with cattle fed high levels of WDGS could result in a greater pathogen load at time of slaughter.

Radiation sensitivity of fresh vegetables. The produce industry is requesting a "kill" step to ensure the microbial safety of fresh produce and gain the confidence of consumers. ARS scientists in Wyndmoor, Pennsylvania, demonstrated that a dose of one kGy radiation can achieve at least 99.999 percent (five log) reduction of *E. coli* O157:H7 inoculated onto the surface of fresh produce. ARS further examined the effect of irradiation on the quality of 13 common fresh cut vegetables (iceberg, Romaine, red and green leaf lettuce, spinach, tomato, cilantro, parsley, green onion, carrot, broccoli, red cabbage, and celery) after irradiation at one kGy. The appearance, texture, and aroma of most of the 13 common fresh cut vegetables were not negatively affected, even after 14 days storage. The vitamin C content was reduced in a few vegetables. No detectable amount of furan (a possible carcinogen) was produced from irradiation. This information is critical to the real world application and implementation of irradiation as a food safety intervention for fresh produce.

***Livestock Protection*** (Goal 4)

Current Activities:

ARS' animal health program is directed at protecting and ensuring the safety of the Nation's agriculture and food supply through improved disease detection, prevention, control, and treatment. Basic and applied research approaches are used to solve animal health problems of high national priority. Emphasis is given to methods and procedures to control animal diseases.

The research program has ten strategic objectives: (1) establish ARS' laboratories into a fluid, highly effective research network to maximize use of core competencies and resources; (2) access specialized high containment facilities to study zoonotic and emerging diseases; (3) develop an integrated animal and microbial genomics research program; (4) establish centers of excellence in animal immunology; (5) launch a biotherapeutic discovery program providing alternatives to animal drugs; (6) build a technology driven vaccine and diagnostic discovery research program; (7) develop core competencies in field epidemiology and predictive biology; (8) develop internationally recognized expert collaborative research laboratories; (9) establish a best-in-class training center for our Nation's veterinarians and scientists; and (10) develop a model technology transfer program to achieve the full impact of ARS' research discoveries.

ARS' current animal research program includes eight core components: (1) biodefense research, (2) animal genomics and immunology, (3) zoonotic diseases, (4) respiratory disease, (5) reproductive and neonatal diseases, (6) enteric diseases, (7) parasitic diseases, and (8) transmissible spongiform encephalopathies.

Selected Examples of Recent Progress:

New chemicals for mosquito control. New active ingredients for mosquito control are seldom developed. As existing active ingredients are eliminated because of regulatory concerns and development of resistance, a gap has developed in the ability to control mosquitoes. ARS scientists at the Mosquito and Fly Research Unit in Gainesville, Florida, worked with the University of Florida to model compounds that repel mosquitoes. More than 2,000 compounds that had been tested at the Unit, formed the database for molecular modeling on a computer. Subsequent synthesis and bioassay of new molecules resulted in seven compounds that are longer lasting than DEET, the most commonly used repellent active ingredient. By performing the discovery phase of toxicant development, ARS is stimulating industry to develop compounds that are needed to fill the gaps for mosquito control.

Multiple approaches to biological control of the imported fire ant. Since its introduction from South America in the early 1900s, the imported red fire ant has spread throughout the southeastern United States, Texas, and parts of California. This stinging pest now threatens human health, livestock, and wildlife in States farther north because of changes in climate, as well as in Hawaii because of frequent shipments from California. ARS scientists at the Imported Fire Ant and Household Insects Research Unit in Gainesville, Florida, and the South American Biological Control Laboratory in Buenos Aires, Argentina, discovered and introduced small flies that attack fire ants. These flies lay an egg on an individual ant, and the fly larva develops inside, eventually killing the ant. During the last year, a fourth species was released, and another species is under evaluation to be certain that it will not affect native species. Another important natural enemy that was discovered and developed by these laboratories is a protozoan pathogen of fire ants (*Thelohania solenopsae*). ARS scientists discovered that the parasitic flies become infected with this ant pathogen, helping to distribute the pathogen to other ant colonies. During the last two years, ARS scientists discovered two entirely new viruses of fire ants and have now determined the details of the natural infection process and described the protein coat of one of them. Another approach to biological control is to use substances within the insect to disrupt vital physiological processes. ARS discovered the first neuropeptide in fire ants, a signaling compound involved in pheromone production. The precise understanding of fire ant genetics enables the targeting of the right strain of parasitic fly or pathogen to the right strain of imported fire ant. New biological control agents such as neuropeptides and viruses offer the promise of further integration of methods to bring imported fire ants into balance with American ecosystems.

Biting midges infected with vesicular stomatitis virus delay feeding. Vesicular stomatitis virus appears in the United States at irregular intervals, disrupting movement of animals and prompting the need to rule out the symptomatically similar foot-and-mouth disease. ARS entomologists at the Arthropod-Born Animal Diseases Laboratory in Laramie, Wyoming, demonstrated that a biting midge that transmits vesicular stomatitis virus to livestock did not feed as successfully when it was infected with the virus. The delay in feeding increases the likelihood that the virus will reach infective levels in more individual midges. Blood feeding is a dangerous time for the individual insect, so a delay increases the likelihood that the midge will be infective by the time it takes a second or subsequent blood meal. Risk estimates of vesicular stomatitis transmission would normally be based on longevity of the midge population taken as a whole. This discovery shows that longevity should be estimated based on the infected population, potentially causing a great change in estimates of risk.

Integration of methods to manage Formosan subterranean termite populations in New Orleans. The Formosan subterranean termite became established in the United States in the 1940s. Since then it has proven to be the most damaging termite species where it occurs, threatening the existence of historical buildings in the French Quarter of New Orleans. ARS has conducted trial programs to reduce the population of Formosan subterranean termites in the French Quarter to levels that no longer threaten historical buildings. Working with academic partners and local institutions (the New Orleans Mosquito and Termite Control Board and the Audubon Institute), ARS has developed methods for risk assessment, surveillance, and control that have finally succeeded in achieving overall population reductions of the termite in the French Quarter. The program monitors flying termites that periodically swarm in a natural

process to establish new colonies. The results show a reduction of 44 to 75 percent of termites in the French Quarter. Individual colonies have been targeted with baits that use a minimum of a very safe pesticide. By targeting efforts to places where colonies are detected by inspection and acoustics, the program has systematically eliminated or controlled colonies from especially problematic buildings and from major sources of termites, such as the Mississippi River levee. Historical buildings in the French Quarter have been saved from destruction, and the strategies developed in the program will be useful throughout the southeastern United States where the Formosan subterranean termite occurs.

Domestic pigs have low susceptibility to H5N1 HPAI viruses. An H5N1 highly pathogenic avian influenza (HPAI) virus that is deadly to poultry and humans has recently emerged in waterfowl. Genetic reassortment of H5N1 HPAI viruses with currently circulating human influenza A virus strains could lead to efficient human-to-human transmission and result in an influenza pandemic. Domestic pigs, which are susceptible to infection with both human and avian influenza A viruses are one of the natural hosts where such reassortment events could occur. ARS scientists at the National Animal Disease Center (NADC), in collaboration with ARS scientists at the Southeast Poultry Research Laboratory (SEPRL), conducted a study in 2- to 3-week old domestic piglets that were intranasally inoculated with four H5N1 HPAI viruses. Swine H3N2 and H1N1 viruses were also studied as a positive control for swine influenza virus infection. Replication of all four H5N1 viruses in pigs was restricted to the respiratory tract, mainly to the lungs. Titers of H5N1 viruses in the lungs were lower than those of swine viruses H3N1 and H1N1. H5N1 viruses were isolated from nasal tissues of infected pigs. A microscopic evaluation of the tissues revealed mild to moderate disease of the lungs of pigs infected with H5N1 viruses, while infection with swine influenza viruses resulted in severe coughing and pneumonia. Pigs had low susceptibility to infection with H5N1 HPAI viruses. Inoculation of pigs with H5N1 viruses varied in results from no clinical signs to mild symptomatic infection restricted to the respiratory tract and tonsils. This is in contrast to mouse and ferret animal models, where some of the viruses studied were highly pathogenic and replicated throughout the body. These results suggest swine have a low susceptibility to these H5N1 viruses and may not play a role in their transmission.

Identification of novel antigens in Johne's disease. Paratuberculosis (Johne's disease) is a chronic wasting enteric disease of ruminants caused by infection with a bacterial pathogen, *Mycobacterium avium* subsp. *paratuberculosis*. Johne's disease results in significant economic losses to the cattle industry due to animal culling, reduced milk production, poor reproductive performance, and reduced carcass value. Diagnosis of cattle infected with Johne's is difficult due to the long incubation time between infection and the onset of clinical disease. ARS scientists at NADC, Ames, Iowa, identified six novel antigens that may be candidates for an improved diagnostic test for Johne's disease. The scientists identified the antigens through the use of a newly developed 96-spot protein assay. Studies using the protein assay have determined that some proteins can be detected as early as 70 days of infection of cattle with the *M. paratuberculosis*. Early diagnosis of infected cattle will allow improved control strategies on a herd basis through isolation and culling of infected animals.

***Crop Protection*** (Goal 4)

Current Activities:

ARS research on crop protection is directed toward epidemiological investigations to understand pest and disease transmission mechanisms and to identify and apply new technologies that increase our understanding of virulence factors and host defense mechanisms. Currently, ARS' research priorities include (1) identification of genes that convey virulence traits in pathogens and pests; (2) factors that modulate infectivity, gene functions, and mechanisms; (3) genetic profiles that provide specified levels of disease and insect resistance under field conditions; and (4) mechanisms that facilitate the spread of pests and infectious diseases.

ARS is developing new knowledge and integrated pest management approaches to control pest and disease outbreaks as they occur. Its research will improve the knowledge and understanding of the ecology,

physiology, epidemiology, and molecular biology of emerging diseases and pests. This knowledge will be incorporated into pest risk assessments and management strategies to minimize chemical inputs and increase production. Strategies and approaches will be available to producers to control emerging crop diseases and pest outbreaks.

Selected Examples of Recent Progress:

Impact of citrus management on California grape growing regions at high risk for Pierce's disease epidemics caused by *Xylella fastidiosa*. Introduction of the glassy-winged sharpshooter insect (GWSS), the vector of *Xylella fastidiosa*, resulted in destructive epidemics of Pierce's disease (PD) at a magnitude not previously experienced in California. The impact of citrus on PD management is being investigated. Citrus is a favored host of the sharpshooter, and complicates management of PD in grapes. ARS scientists in Parlier, California, studied the distribution of grape (PD susceptible) and citrus (host for sharpshooter) in California and analyzed the historical insecticide application databases using geographic information system technology. Three counties—Riverside, Kern, and Tulare (where previous outbreaks occurred)—have the highest level of grape-citrus proximities and appear to be at greatest risk for future epidemics of PD. These findings will facilitate efforts to control PD by identifying areas where GWSS vector populations would reach high levels in close proximity to vineyards if the current areawide program for GWSS control is abandoned. In the absence of insect control in citrus, GWSS populations reach high levels. They subsequently move into vineyards, where they may transmit *X. fastidiosa* to grapes. To assess effects of irrigation schedules on feeding preference and reproduction of GWSS on citrus, moderate levels of continuous, reduced irrigation resulted in reduced feeding, lower population levels, and lowered reproduction. Thus, irrigation management may be useful in reducing GWSS populations in citrus when used in conjunction with other cultural/biological control strategies in an integrated pest management program targeting GWSS.

Development of DNA markers for breeding wheat and barley protection from scab. Robust DNA markers are needed to accelerate resistance breeding for the major wheat and barley disease, fusarium head blight (FHB; scab). ARS researchers in Fargo, North Dakota, in collaboration with researchers at the University of Minnesota and with support of the U.S. Wheat and Barley Scab Initiative, developed robust co-dominant DNA markers from the candidate gene region controlling scab resistance in the resistant line, Sumai 3. These markers were validated and used to screen breeding lines submitted by wheat breeders in the Northern Plains region. These markers will expedite the identification and selection of desirable alleles for FHB resistance in regional wheat breeding programs. ARS researchers in Manhattan, Kansas, have characterized the landrace (Wangshuibai), which has additional genetic resistance to fusarium, and have initiated marker development. ARS researchers in Raleigh, North Carolina, have determined that weather later in the grain fill period impacts mycotoxin development resulting from scab. They have demonstrated that increasing numbers of moist days in the post-flowering period are associated with elevated disease and mycotoxin accumulation. These findings will help breeders screen for resistance to deoxynivalenol development during wet springs and provide more accurate forecasts of mycotoxin levels.

Potential soybean rust resistance sources identified and confirmed. Soybean rust (SBR) causes significant yield losses in areas where it occurs regularly. In international nurseries managed by ARS scientists in Urbana, Illinois, 534 soybean plant introductions (PIs) from maturity groups III through IX that had been selected in greenhouse seedling screens were evaluated for SBR resistance in a field trial at Centro Regional de Investigación Agrícola in Capitán Miranda, Paraguay, during the 2005-2006 growing season. Two lines were immune in both the field and the greenhouse evaluations. In addition, six soybean lines had the consistently lowest level of disease severity across years and locations in Nigeria. In nurseries at the North Florida Research and Education Center, 405 PIs were evaluated for resistance to North American SBR isolates in 2007. The resulting data and ratings from a similar trial conducted in Fairhope, Alabama, were similar and confirmed that 103 PIs showed SBR resistance at both locations and at other sites in the Southeast. Adult plant resistance to SBR must be confirmed in multiple locations and for years to assess the utility of the soybean lines in breeding efforts. These PIs can be used immediately by breeders; the

multiple sources of resistance will permit the eventual construction of resistance gene pyramids which should provide durable resistance to SBR.

Four new areawide pest management partnership projects implemented by ARS. ARS successfully implemented four new 5-year areawide pest management projects that included management of weedy annual grasses on rangelands (Burns, Oregon); the Asian tiger mosquito, a vector of West Nile virus (Gainesville, Florida); navel orangeworm on nut trees (Parlier, California); and a national effort for management of honey bee parasites and diseases and improved honey bee health, survival, and pollination. Partnership teams consisting of Federal, State, and the private sector have been established for each project, with demonstration sites and economic and environmental assessments implemented. Each project has incorporated a proven technology package that is anticipated to yield tens of millions of dollars of savings from losses due to pests as they are fully adopted over the five year period.

Novel insecticidal bacterium patented and licensed for biological control of agricultural pest insects. Thousands of microbes harmful to insects have been discovered but very few have been successfully deployed to control pest insects. ARS scientists in Beltsville, Maryland, have characterized, patented, and licensed a novel bacterial insecticidal isolate (*Chromobacterium subtsuga)*, which is effective against a wide range of agricultural insect pests, including diamondback moth, small hive beetle, southern corn rootworm, southern green stinkbug, and sweet potato whitefly. *C. subtsugae* is a naturally occurring option for organic growers for control of agricultural pests that has been licensed by organic agriculture companies.

Biological control of yellow starthistle. Yellow starthistle (YST) is a serious pest of Western rangelands, infesting over 10,000 hectares in the State of California alone. Cooperators at the California Department of Food and Agriculture Biological Control Program have released *P. jaceae* on YST populations in 41 counties in California. The fungus established and survived into a second season at more than 30 locations; substantial spread has been noted at some release sites. Field monitoring has established that field inoculated plants are damaged by the infections. In 2008, APHIS approved a permit application by the Oregon Department of Agriculture (ODA) for release of *Puccinia jaceae* into the State for biological control of YST; inoculum was supplied to ODA for the releases. The project demonstrates the potential for *Puccinia jaceae* to reduce YST populations in concert with established natural enemies and integrated management practices.

Possible vector of zebra chip potato disease identified. Zebra chip, a new and emerging potato disease, is causing millions of dollars in losses to potato producers and processors in the southwest regions of the United States, Mexico, and Central America. ARS researchers in Wapato, Washington, demonstrated for the first time that zebra chip is associated with the potato psyllid, *Bactericera cockerelli*. In addition, in collaboration with other ARS and university scientists, the integrated pest management program was developed for the management of this insect pest to reduce incidence of zebra chip. As a result, growers in the Lower Rio Grande Valley of Texas, one of the regions seriously affected by the disease, have recently managed to keep zebra chip incidence under manageable levels by applying insecticides targeted against the potato psyllid. Information from this research will help potato producers affected by zebra chip reduce damages caused by this potato disease by focusing on monitoring and controlling this insect pest.

Attractant for detection of Asian longhorned beetle. Asian longhorned beetle (ALB), a very serious invasive insect from China, attacks and kills many broadleaf trees in urban areas, including nine species of maple (e.g., Norway maple, silver maple, sugar maple), and could potentially kill over 30 percent of all trees in urban areas in eastern United States. To eliminate the current large numbers of beetles and prevent them from spreading, a method is needed for detecting the beetle. ARS scientists in Newark, Delaware, found that a specific tree (painted maple) attracted large numbers of beetles. The odors responsible for the attraction were identified and shown to attract male and female beetles. When mixed together and produced as an artificial lure, they can be used to attract beetles to traps hung in trees where they can be killed. The artificial lure has the potential to significantly improve our ability to determine whether, when,

and where beetles occur in the United States, as well as to intercept beetles when they first arrive, prevent their spread, and focus control efforts in areas where the beetle is already killing trees.

Discovery of natural enemy of Brazilian water weed. The Brazilian water weed has become a significant threat to biodiversity and water use in many parts of the United States, notably, the Sacramento Delta and Florida. It does not respond well to herbicide treatments, which are very expensive and environmentally severe. A leaf mining, aquatic fly (*Hydrellia*) was discovered by the South American Biological Control Laboratory in Buenos Aires, Argentina. This fly specifically attacks Brazilian water weed, causing chlorosis and decay. Tests against a number of aquatic plants in the United States have shown that the fly is no threat to native species. Importation of the leaf mining fly will open up large areas of aquatic habitats, allowing native emergent vegetation to reach the surface and outcompete the Brazilian water weed.

Cold temperature fumigation of perishable commodities with phosphine. Imported and exported perishable commodities often must be treated with methyl bromide which often causes damage to the products and shortens shelf life. ARS scientists in Parlier, California, have tested a new application of applying phosphine at cold temperature as an alternative to methyl bromide treatment. Results show that the new treatment has no phytotoxic effects on artichokes, white flesh peaches, and white flesh nectarines. These results will lead to further testing of the applications to establish efficacy to killing target pests, and if successful in showing efficacy, will lead to the opening of imports of artichokes from Chile and the export of peaches and nectarines to foreign countries.

***Human Nutrition*** (Goal 5)

Current Activities:

Maintenance of health throughout the lifespan along with prevention of obesity and chronic diseases via food-based recommendations are the major emphases of ARS' human nutrition research program. These health-related goals are based on the knowledge that deficiency diseases are no longer important public health concerns. Excessive consumption has become the primary nutrition problem in the American population. This is reflected by increased emphasis on prevention of obesity from basic science through intervention studies to assessment of large populations. ARS' research program also actively studies bioactive components of foods that have no known requirement but have health promoting activities.

Four specific areas of research are currently emphasized: (1) nutrition monitoring and the food supply, e.g., a national diet survey and the food composition databank; (2) dietary guidance for health promotion and disease prevention, i.e., specific foods, nutrients, and dietary patterns that maintain health and prevent disease; (3) prevention of obesity and related diseases, including research as to why so few of the population follow the *Dietary Guidelines for Americans*; and (4) life stage nutrition and metabolism, in order to better define the role of nutrition in pregnancy and growth of children, and for healthier aging.

Selected Examples of Recent Progress:

Soy-based infant formula does not impair brain development. Soy infant formula contains phytoestrogens—chemicals with structures similar to those of estrogen. Several countries have banned soy formula based on concerns that these compounds pose a developmental risk to infants. In the first controlled, longitudinal study to examine this issue, scientists at the ARS Center in Little Rock, Arkansas, found that resting brain electrical activity did not differ between infants fed milk-based or soy-based formula during their first six months of life. This is the period during which phytoestrogen exposure from soy formula would be highest for infants. These findings will help reduce parental and food industry concerns regarding the use of soy infant formula.

Whole grain consumption lowers dietary iron absorption. The 2005 *Dietary Guidelines for Americans* emphasized increased whole grain consumption. ARS scientists in Grand Forks, North Dakota, found that women consuming diets designed to meet these dietary recommendations were about one-third less

efficient in absorbing iron from the diet. Whole grains contain phytic acid, a known inhibitor of iron absorption. Because iron deficiency continues to be a problem for children and women of child bearing age in the United States, this new information will be valuable for future revisions of the *Dietary Guidelines*.

New MyPyramid for older adults. Scientists from the ARS center in Boston, Massachusetts, updated the Food Guide Pyramid for Older Adults to reflect the new USDA food pyramid and the *2005 Dietary Guidelines for Americans*. Emphases for older Americans include physical activity, adequate water, and possible use of dietary supplements for a few harder to get nutrients, such as vitamins B12 and D. This information was released on the Internet and in print in an academic nutrition journal.

Sleep deprivation may contribute to the development of obesity and diabetes. ARS researchers in Houston, Texas, discovered that animals with a disrupted circadian clock, or daily cycle, became fatter and heavier on a normal diet than do animals without this mutation. When challenged with a high fat diet, the animals not only gained more weight but also became insulin resistant, a physiological change that is a precursor to diabetes. This information contributes to an understanding of why alterations in the internal biological clock of people, such as working the night shift or sleep disruptions, may result in greater risk for developing obesity and diabetes.

Low vitamin D levels increase risk for heart disease. A growing body of evidence suggests that vitamin D may adversely affect the cardiovascular system, but data from longitudinal studies are lacking. Scientists at the ARS Nutrition Center in Boston, Massachusetts, followed 1,739 people for about five years. Hypertensive individuals who were vitamin D deficient had a two-fold higher incidence of negative cardiovascular events than those who were not deficient. With vitamin D deficiency prevalence among Americans, these findings have broad public health implications.

Foods important to healthy brain aging. Until recently, it was believed that brain cells (neurons) were lost throughout the lifespan and not replaced. Now we know that new neurons can be made, but the rate slows with aging. ARS scientists in Boston, Massachusetts, found that supplementing the diet of animals with strawberries increased the rate of new neuron growth in a brain region important to memory function. They also demonstrated that a diet supplemented with walnut oil preserved cell membrane function in another area of the brain that is involved with short-term memory and spatial navigation. These findings show the importance of including whole berries and nuts in the diet for healthy brain aging.

Analysis of health promoting compounds in foods and dietary supplements. Researchers in Beltsville, Maryland, developed a standardized profiling method that was used to identify 37 phenolic compounds in 17 varieties of beans and 62 phenolic compounds in Ginkgo biloba, one of the most widely used herbal products. Many of these compounds which were reported for the first time will aid researchers in developing consistent preparations and standards of identity for studying the health benefits of foods and supplements.

***Environmental Stewardship*** (Goal 6)

Current Activities:

ARS' research programs in environmental stewardship support scientists at 70 locations. Emphasis is given to developing technologies and systems that support profitable production and enhance the Nation's vast renewable natural resource base.

ARS is currently developing the scientific knowledge and technologies needed to meet the challenges and opportunities facing U.S. agriculture in managing water resource quality and quantity under different climatic regimes, production systems, and environmental conditions. ARS' air resources research is developing measurement, prediction, and control technologies for emissions of greenhouse gases, particulate matter, ammonia, hydrogen sulfide, and volatile organic compounds affecting air quality and

land surface climate interactions. The agency is a leader in developing measurement and modeling techniques for characterizing gaseous and particulate matter emissions from agriculture. In addition, ARS is evaluating strategies for enhancing the health and productivity of soils, including developing predictive tools to assess the sustainability of alternative land management practices. Finding mechanisms to aid agriculture in adapting to changes in atmospheric composition and climatic variations is also an important component of ARS' research program.

The agency's grazing and range land research includes the conservation and restoration of the Nation's range land and pasture ecosystems and agroecosystems through improved management of fire, invasive weeds, grazing, global change, and other agents of ecological change. ARS is currently developing improved grass and forage legume germplasm for livestock, conservation, bioenergy, and bioproduct systems as well as grazing-based livestock systems that reduce risk and increase profitability. In addition, the Agency is developing whole system management strategies to reduce production costs and risks.

Selected Examples of Recent Progress:

Effects of climate change on agriculture, land and water resources, and biodiversity in the United States. The U.S. Climate Change Science Program was directed by Congress to commission production of a Synthesis and Assessment Product (SAP4.3) on the effects of climate change over the next 30 years on agricultural productivity, land and water resources, and biodiversity. ARS scientists from Ames, Iowa; Maricopa, Arizona; Urbana, Illinois; Ft. Collins, Colorado; Temple, Texas; and Clay Center, Nebraska, provided significant authorship of SAP4.3. Yield and water use responses to increased atmospheric $CO_2$ concentrations and increased air temperatures associated with climate change were among the topics of the agricultural sections. The conclusions noted that the net result of increasing $CO_2$ and temperature on yields will likely range from decreases of eight percent to increases of 10 percent, with increases taking place in more northern regions. At the same time, there is likely to be little net effect on crop water use, with slightly decreased water use from elevated atmospheric $CO_2$ balancing the increased water use from higher air temperatures. Domestic and international Federal, State, and local governments; industry; scientists; and the public are using SAP4.3 to help formulate adaptation and mitigation strategies to address the challenges and opportunities of climate change.

Benefits of shallow subsurface band application of poultry litter. Poultry litter is typically land applied by broadcast surface application. This method has a high potential for undesirable transport of litter nutrients off the field and into streams, rivers, lakes, and other bodies of water. ARS scientists in Auburn, Alabama, designed a 4-trench litter applicator field implement that applies litter in shallow subsurface bands in soil. When the poultry litter is applied in subsurface bands, as compared to traditional broadcast surface application, phosphorus and nitrogen nutrients in runoff are reduced by 80 to 95 percent and the yield and fiber quality of cotton increases. Use of the implement by producers and others who apply litter to fields will reduce pollution to bodies of water.

Bioreactor technology as an emergent component for improved water quality. Loss of nutrients from heavily fertilized or manured fields can lead to water quality degradation and hypoxia in waterways. Nutrient contamination is a major water quality concern and its remediation a national priority. A novel approach to drainage water management in areas where diffuse flow is concentrated is to filter the runoff through low cost materials such as industrial byproducts. ARS scientists in Columbus, Ohio, have screened 55 industrial byproducts and have found five that hold promise for removing nitrate, phosphate, and atrazine from drainage waters. ARS scientists in University Park, Pennsylvania, have evaluated filter designs and materials for phosphorus removal; Florence, South Carolina, researchers have denitrified drainage waters using immobilized sludge.

New guide to sensing soil water content for improved water management. Accurate knowledge of soil water content is key to efficient water management in both irrigated and dryland agriculture but existing soil water sensors do not work well under all conditions. ARS scientists in Bushland, Texas, led an international team convened by the International Atomic Energy Agency to assess the accuracy and utility

of the major types of sensors and to produce a book titled *Field Estimation of Soil Water Content: A Practical Guide to Methods, Instrumentation, and Sensor Technology* for use by irrigation and natural resource managers, scientists, and engineers. The guide indicates which sensors are useful under which soil conditions. New knowledge about sensor problems in common soil conditions is being used to develop improved sensors. Also, it was transmitted to the Irrigation Association to guide sensor evaluation in the Smart Water Application Technologies program approved by the EPA.

Utilization of crude glycerin from the biodiesel industry in swine and poultry. Crude glycerin is potentially an energy containing ingredient that may be a viable feedstuff in the swine and poultry industry. ARS scientists in Ames, Iowa, demonstrated that crude glycerin contains an energy concentration similar to that of corn and, depending on its price, can be utilized as an ingredient in swine rations, being included at levels up to 10 percent in the diet. These are the first data published showing the energy value of this product to the swine and poultry industry, and they provide the biodiesel industry with another marketing outlet for a byproduct from biodiesel production.

Inoculation with arbuscular mycorrhizal fungus produces on-farm increases strawberry yield. There are mounting concerns for the sustainability of current, chemically-based, agricultural practices. Small farm profitability, in particular, has been declining and would benefit from innovative, cost-effective means of increasing yields without additional agrochemical inputs. Arbuscular mycorrhizal (AM) fungi are beneficial soil fungi that colonize crop plant roots and help crops take up nutrients from the soil. ARS scientists from the Microbial Biophysics and Residue Chemistry Research Laboratory in Wyndmoor, Pennsylvania, developed a method for on-farm production of AM fungus inoculum. Roots of young strawberry plants inoculated with the AM fungi during the growth period prior to being transplanted in the field had 17 percent greater yield than did uninoculated plants. This translated into a $4,720-per-acre increase of income at a cost of $28 for production of the inoculum. Better utilization of the natural symbiosis between crops and AM fungi via the inoculum will require less chemical fertilizer applications for greater yields, and thus enhance the environmental and economic sustainability of U.S. agriculture.

Crop residue requirements for sustainable soil management assessed. The amount of crop residue needed to sustain soil quality following biomass harvest for off-farm use such as bioenergy is unknown. An examination of published literature by ARS scientists from the Agroecosystems Management Research Unit in Lincoln, Nebraska, found that residue retention rates required for maintaining soil organic matter and supporting soil microbial populations are greater than the amounts needed for erosion control. Additionally, research conducted by Agroecosystems Management Research Unit scientists demonstrated that residue removal on a marginal site reduced corn yields after five years. These findings demonstrate that the amount of corn stover biomass available as a feedstock for cellulosic ethanol production has been overestimated and that residue retention rates for sustainable soil management are greater than previously realized. The results show that the effects of crop residue removal for biomass energy needs to be thoroughly investigated in field trials for each major agroecosystem before biomass energy conversion facilities are built and widespread crop residue removal is initiated.

Periodic irrigation of the soil surface reduces fumigant emissions to the atmosphere. A method to reduce local volatile organic compound (VOC) emissions from soil fumigant applications is needed. VOC emissions are a precursor to the formation of ozone, an air pollutant that has harmful effects on human and environmental health. The emissions also constitute an economic loss for the producer when excessive emissions reduce fumigant effectiveness. A field experiment was conducted in the San Joaquin Valley by ARS scientists from the U.S. Salinity Laboratory in Riverside, California, to measure atmospheric emissions of a soil fumigant after typical injection into the soil of a vegetable grower's field. Irrigation of the soil surface shortly after the fumigant was injected into the soil, and periodically thereafter for several days, resulted in a 50 percent reduction of fumigant loss to the atmosphere when compared with emissions loss from non-irrigated field soil. The results demonstrate a method to reduce regional VOC emissions, which will help the State of California meet EPA National Ambient Air Quality Standards for ozone and growers of specialty crops minimize the loss of crop protection materials.

Saline water reuse for floriculture. Water reuse can extend available fresh water supply and decrease drainage disposal requirements. Whereas many floral and ornamental crops are susceptible to salinity and specific ion toxicity and do not grow well using saline recycled waters, opportunities exist to use such degraded waters on tolerant species or during more tolerant growth stages. ARS researchers in Riverside, California, produced premium stems of snapdragon with moderate saline waters and commercially acceptable stems of marigold with waters of low salinity. Three marigold cultivars maintained high aesthetic value and are appropriate for salt affected landscapes.

Grazing exclusion can increase the fire risk to sagebrush communities. Considerable controversy exists over the role of livestock grazing and prescribed fire to manage sagebrush steppe range land to stop the spread of cheatgrass (an invasive annual grass) and reduce the severity of wildfires in the Great Basin. ARS scientists in Burns, Oregon, evaluated the impacts of fire on sagebrush range land that had either been grazed up until the year of burning (1993) or had been excluded from grazing since 1937. Vegetation characteristics were measured in the 12th through 14th years after burning. Burning caused a huge increase in cheatgrass in the ungrazed areas, but not in the grazed areas. This long-term research provides ranchers and land managers with science-based information in selecting fire and grazing management practices for controlling cheatgrass.

Improved Vavilov Siberian wheatgrass aids effectiveness of weed control and range land revegetation. Vast areas of semiarid range lands with sandy soils are severely disturbed, frequently burned, increasingly eroded, and invaded with troublesome weeds such as cheatgrass. In many cases, reseeding disturbed sandy range lands with genetically improved plant materials that are competitive with weeds is the most effective and economically feasible option. ARS scientists in Logan, Utah, released more competitive Vavilov Siberian wheatgrass for lands dominated by annual weeds. During the establishment year, Vavilov II had higher numbers of seedlings per unit area than did Vavilov I at Yakima, Washington (52 vs. 23 percent); Fillmore, Utah (79 vs. 54 percent); Dugway, Utah (79 vs. 52 percent); and Curlew Valley, Idaho (70 vs. 40 percent). Vavilov II was more persistent than Vavilov I at Yakima, Washington (68 vs. 44 percent); Fillmore, Utah (84 vs. 62 percent); Curlew Valley, Idaho (69 vs. 55 percent); and Malta, Idaho (97 vs. 91 percent). Vavilov II has already been distributed to six Department of Defense facilities. Estimates are that this grass will be a component in seed mixtures for over 40 military facilities encompassing more than one million acres and capture the Siberian wheatgrass market for use on harsh dry range lands to conserve soils and reduce fire cycles.

***Library and Information Services*** (Management Initiative)

Current Activities:

The National Agricultural Library (NAL) accomplished its core mission objectives and planned for future service improvements in digital content and technologies. Fiscal challenges presented a rationale for NAL and ARS management to consider programmatic actions in FY 2009 and beyond needed to allow NAL to continue to fulfill its mandated mission. NAL issued a discussion paper— http://www.nal.usda.gov/about/reports/nal_report_web_041808.pdf — presenting options for satisfying recommendations of recent studies about NAL. NAL continues to explore and implement initiatives to improve and integrate operations and services through cost efficiencies and the application of digital technologies. As part of this effort, NAL continued to plan for development of a coordinated National Digital Library for Agriculture (NDLA) in response to the increasingly complex needs for access to information by USDA mission agencies, the Land Grant University community partner institutions, and the American public. The two NAL goals in the ARS 2006-2011 Strategic Plan are that NAL services and collections continue to meet the needs of its customers, and that NAL and its partners implement the NDLA.

Selected Examples of Recent Progress:

Increased and enhanced services. Searches on the most popular Web search engines (Google, Yahoo, Ask.Com, and MSN) for information covered by 11 NAL information services (nutrition, invasive species, water quality, etc.) displayed the NAL service on the front page of results, often as the first result. NAL's total volume of direct customer services increased to about 91 million transactions. In another important customer service arena, NAL maintained a two-day turnaround time for all document delivery and interlibrary loan requests, and the percentage of document delivery requests delivered digitally continued to increase.

DigiTop, USDA's digital desktop library. NAL continued to refine and expand content offered via its DigiTop service. Since the official launch of DigiTop in 2003, the total USDA investment in DigiTop content is $11.7 million and NAL's investment in computing infrastructure and staff in support has exceeded $3.3 million. Usage of DigiTop resources continues to increase, with article downloads approaching 1.1 million articles—up from 910,000 from the previous year. The recurring cost of DigiTop content licenses has been borne by five USDA agencies and the Office of the Executive Secretariat. NAL will continue discussions with non-participating USDA entities that purchase individual information resources to explore inclusion of these subscriptions in DigiTop and contain total service costs. NAL aims to maximize return on USDA investment and leverage efficiencies of scale by bundling dispersed licenses into a single Department-wide agreement, negotiating better financial terms, widening product availability, and providing a unified access platform. These initiatives are designed to improve the effectiveness and reach of DigiTop for all aspects of Departmental activity. NAL will continue efforts to refine and identify information content to support broad and specialized USDA interests. In addition, NAL will continue to explore collaboration on DigiTop service with other Federal agencies with missions related to USDA.

Web portal partnerships. NAL continued its leadership and participation in Nutrition.gov (www.nutrition.gov), Science.gov (www.science.gov), and Invasivespeciesinfo.gov (www.invasivespeciesinfo.gov) and its work with the National Library of Medicine and other partners on a Web portal for veterinary practitioners and with national and international partners on WorldWideScience.org (www.worldwidescience.org). These partnerships are critical to the fulfillment of NAL's mandate to serve the Nation.

Special collections. A collection was acquired by USDA botanist and first director of the U.S. National Arboretum, Frederick Vernon Coville, relating to his work on blueberry breeding and development of the first hybrid blueberry.

**PART Assessments**

A PART analysis of the New Products/Product Quality and Livestock and Crop Production (Goal 2) research program was conducted by ARS. OMB scored the program 74, "Moderately Effective." ARS is taking the following actions to improve the performance of the program.

- Conducting an independent, external Retrospective Panel Review of ARS' Crop Production programs.
- Re-evaluating the criteria used to determine out-year targets for Goal 2 programs for the purpose of establishing more ambitious targets.
- Reviewing and revising the planning, implementation, and external review processes of the National Research Program 5-year cycle.

A PART analysis of the Food Safety and Livestock/Crop Protection (Goal 4) research program was conducted by ARS. OMB scored the Food Safety Program 82, "Moderately Effective," and the Livestock/Crop Protection program 74, "Moderately Effective." ARS is taking the following actions to improve the performance of the program.

- Conducting an independent, external Retrospective Panel Review of ARS' Veterinary, Medical, and Urban Entomology program.
- Re-evaluating the criteria used to determine out-year targets for Goal 4 programs for the purpose of establishing more ambitious targets.
- Reviewing and revising the planning, implementation, and external review processes of the National Research Program 5-year cycle.

A PART analysis of the Human Nutrition (Goal 5) research program was conducted by ARS. OMB scored the program 82.5, "Moderately Effective." One problem that prevented the program from receiving an "Effective" rating was its lack of ambitious targets for improving the quality of its research projects. ARS is taking the following actions to improve the performance of the program:

- Re-evaluating the criteria used to determine out-year targets for Goal 5 programs for the purpose of establishing more ambitious targets.
- Developing a new Human Nutrition National Program Action Plan to improve the program's effectiveness during the next 5-year program cycle.
- Conducting an independent external Retrospective Panel Review of the program.
- Reviewing and revising the planning, implementation, and external review processes of the National Research Program 5-year cycle.

A PART analysis of the Environmental Stewardship (Goal 6) research program was conducted by ARS. OMB scored, the program 78.5, "Moderately Effective." One problem that prevented the program from receiving an "Effective" rating was its lack of ambitious targets for improving the quality of its research projects. ARS is taking the following actions to improve the performance of the program:

- Re-evaluating the criteria used to determine out-year targets for Goal 6 programs for the purpose of establishing more ambitious targets.
- Conducting an independent, external Retrospective Panel Review of ARS' Global Change and Air Quality programs.
- Reviewing and revising the planning, implementation, and external review processes of the National Research Program 5-year cycle.

AGRICULTURAL RESEARCH SERVICE
Proposed Language Changes

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Buildings and Facilities:

[For acquisition of land, construction, repair, improvement, extension, alteration, and purchase of fixed equipment or facilities as necessary to carry out the agricultural research programs of the Department of Agriculture, where not otherwise provided, $46,752,000, of which $46,752,000 shall be for the purposes, and in the amounts, specified in the table titled "Agricultural Research Service, Buildings and Facilities Congressionally-designated Projects" in the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act), to remain available until expended.]

The change deletes a statement that is no longer required in the language.

AGRICULTURAL RESEARCH SERVICE

Analysis of Change in Appropriation

BUILDINGS AND FACILITIES

| | |
|---|---|
| Appropriations Act, 2009 | $46,752,000 |
| Budget Estimate, 2010 | 0 |
| Decrease in Appropriations | -$46,752,000 |

AGRICULTURAL RESEARCH SERVICE

Summary of Increases and Decreases
(On basis of appropriation)

| Item of Change | 2009 Estimated | Changes | 2010 Estimated |
|---|---|---|---|
| California: Center for Advanced Viticulture and Tree Crop Research, Davis | $2,192,000 | -$2,192,000 | $0 |
| U. S. Agricultural Research Center, Salinas | 2,192,000 | -2,192,000 | 0 |
| Connecticut: Center of Excellence for Vaccine Research, Storrs | 2,192,000 | -2,192,000 | 0 |
| Florida: U. S. Agricultural Research Service Laboratory, Canal Point | 1,096,000 | -1,096,000 | 0 |
| Georgia: Biocontainment Laboratory and Consolidated Poultry Research Facility, Athens | 2,427,000 | -2,427,000 | 0 |
| Hawaii: U. S. Pacific Basin Agricultural Research Center, Hilo | 1,565,000 | -1,565,000 | 0 |
| Idaho: Aquaculture Facility, Hagerman (Billingsley Creek) | 544,000 | -544,000 | 0 |
| Illinois: National Center for Agricultural Utilization Research, Peoria | 2,192,000 | -2,192,000 | 0 |
| Kentucky: Animal Waste Management Research Laboratory, Bowling Green | 1,088,000 | -1,088,000 | 0 |
| Forage Animal Production Laboratory, Lexington | 1,632,000 | -1,632,000 | 0 |
| Louisiana: ARS Sugarcane Research Laboratory, Houma | 2,505,000 | -2,505,000 | 0 |
| Maryland: Beltsville Agricultural Research Center (BARC), Beltsville | 2,192,000 | -2,192,000 | 0 |
| Mississippi: Biotechnology Laboratory, Lorman | 1,176,000 | -1,176,000 | 0 |
| South Central Poultry Research Laboratory, Starkville and Jamie Whitten Delta States Research Center, Stoneville | 3,177,000 | -3,177,000 | 0 |
| Missouri: National Plant & Genetics Security Center, Columbia | 1,633,000 | -1,633,000 | 0 |
| Montana: Animal Bioscience Facility, Bozeman | 2,192,000 | -2,192,000 | 0 |
| Nebraska: Systems Biology Research Facility, Lincoln | 1,088,000 | -1,088,000 | 0 |
| New York: Center for Grape Genomics, Geneva | 2,192,000 | -2,192,000 | 0 |
| Ohio: Greenhouse Production Research, Toledo | 2,192,000 | -2,192,000 | 0 |
| Texas: U. S. Livestock Insects Laboratory, Kerrville | 1,957,000 | -1,957,000 | 0 |
| Utah: ARS Agricultural Research Center, Logan | 4,351,000 | -4,351,000 | 0 |
| Washington: ARS Research Laboratory, Pullman | 2,192,000 | -2,192,000 | 0 |
| West Virginia: Appalachian Fruit Laboratory, Kearneysville | 783,000 | -783,000 | 0 |
| Wisconsin: Dairy Forage Agricultural Research Center, Prairie du Sac | 2,002,000 | 0<br>-2,002,000 | 0 |
| Total Available | 46,752,000 | -46,752,000 | 0 |

AGRICULTURAL RESEARCH SERVICE

Project Statement
(On basis of appropriation)

| | 2008 Actual Amount | 2009 Estimated Amount | Increase or Decrease | 2010 Estimated Amount |
|---|---|---|---|---|
| Total Obligations…… | $19,917,455 | $27,000,000 | -$8,000,000 | $19,000,000 |
| Unobligated Balances: | | | | |
| Available Start of Year…… | -162,940,864 | -194,775,835 | -19,752,000 | -214,527,835 |
| Unobligated Balance Permanently Reduced…… 1/ | | | 49,885,000 | 49,885,000 |
| Available End of Year…… | 194,775,835 | 214,527,835 | -68,885,000 | 145,642,835 |
| Total Available or Estimate…… | 51,752,426 | 46,752,000 | -46,752,000 | 0 |
| Rescission…… | 329,754 | 0 | | |
| Total Available or Estimate…… | 52,082,180 | 46,752,000 | | |

1/ The table on page 12-39 reflects a proposed rescission of unallocated, appropriated funding for projects that have been identified for termination given that they represent Congressionally-added earmarks. No work has begun for any of these projects.

Justification of Increases and Decreases

*Buildings and Facilities*

a) The budget does not include funding for Buildings and Facilities and proposes to cancel $49,884,800 in available balances from prior unrequested projects.

Need for Change

ARS proposes the rescission of unallocated appropriated funds for partially funded new buildings and facilities projects added by Congress, and from unobligated balances of completed facilities. Funding for these projects has been identified for termination given that they have not been fully funded and no work has begun. Partial funding of ARS' new buildings and facilities has not been as efficient as fully funding high priority, national needs such as for ARS' new National Centers for Animal Health in Ames, Iowa.

CA, Davis, Center for Advanced Viticulture and Tree Crop Research
CA, Parlier, San Joaquin Valley Agricultural Research Center
CA, Riverside, U.S. Salinity Laboratory
FL, Ft. Pierce, Subtropical Horticultural Research Center
HI, Hilo, Pacific Basin Agricultural Research Center
ID, Aberdeen, Advanced Genetics Laboratory
ID, Hagerman, Hagerman Fish Culture Experiment Station
KY, Lexington, Forage-Animal Production Research Laboratory
ME, Franklin/Orono, Aquaculture Research Facilities
MI, East Lansing, Avian Disease and Oncology Laboratory
MN, Morris, Soil and Water Laboratory
MN, St. Paul, Cereal Disease Laboratory
MO, Columbia, National Plant and Genetics Security Center
MT, Bozeman, Animal Bioscience Facility
ND, Grand Forks, Human Nutrition Research Center
NM, Las Cruces, Jornada Experimental Range Management Research Laboratory
NY, Geneva, Center for Grape Genomics
NY, Ithaca, Center for Crop-Based Health Genomics
OH, Toledo, Greenhouse Production Research Laboratory
TX, Lubbock, Plant Stress Laboratory
TX, Weslaco, Subtropical Agricultural Research Laboratory
WA, Pullman, Agricultural Research Laboratory

AGRICULTURAL RESEARCH SERVICE
Buildings and Facilities
Proposed Rescission from Unobligated Balances

| NAME & LOCATION | AMOUNT |
|---|---|
| Center for Advanced Viticulture & Tree Crop Research<br>Davis, CA | -7,024,300 |
| San Joaquin Valley Agricultural Sciences Center<br>Parlier, CA | -788,200 |
| U. S. Salinity Laboratory<br>Riverside, CA | -14,400 |
| Subtropical Horticultural Research Center<br>Ft. Pierce, FL | -100 |
| Pacific Basin Agricultural Research Center<br>Hilo, HI | -1,054,600 |
| Advanced Genetics Laboratory<br>Aberdeen, ID | -200 |
| Hagerman Fish Culture Experiment Station<br>Hagerman, ID | -990,000 |
| Forage-Animal Production Research Laboratory<br>Lexington, KY | -3,960,000 |
| Aquaculture Research Facilities<br>Franklin/Orono, ME | -1,995,000 |
| Avian Disease & Oncology Laboratory<br>East Lansing, MI | -63,200 |
| Soil & Water Laboratory<br>Morris, MN | -2,600 |
| Cereal Disease Laboratory<br>St. Paul, MN | -71,500 |
| National Plant and Genetics Security Center<br>Columbia, MO | -8,371,900 |
| Animal Bioscience Facility<br>Bozeman, MT | -3,960,000 |
| Human Nutrition Research Center<br>Grand Forks, ND | -263,000 |
| Jornada Experimental Range Management Research Laboratory<br>Las Cruces, NM | -28,300 |
| Center for Grape Genomics<br>Geneva, NY | -6,564,700 |
| Center for Crop-Based Health Genomics<br>Ithaca, NY | -6,564,700 |
| Greenhouse Production Research Laboratory<br>Toledo, OH | -1,584,000 |
| Plant Stress Laboratory<br>Lubbock, TX | -900 |
| Subtropical Agricultural Research Laboratory<br>Weslaco, TX | -18,500 |
| Agricultural Research Laboratory<br>Pullman, WA | -6,564,700 |
| **TOTAL** | **-49,884,800** |

AGRICULTURAL RESEARCH SERVICE
Buildings & Facilities

Classification by Objects
2008 Actual and Estimated 2009 and 2010

| | 2008 | 2009 | 2010 |
|---|---|---|---|
| Other Objects: | | | |
| 23.3 Communications, utilities and misc. charges… | $1,172,012 | $4,068,000 | $6,357,000 |
| 25.2 Other services…… | 16,761,866 | 58,184,000 | 90,912,000 |
| 25.4 Operation and maintenance of facilities…… | 3,490,971 | 12,118,000 | 18,934,000 |
| 25.5 Research and development contracts…… | 1,621,852 | 5,630,000 | 8,797,000 |
| Total B & F obligations…….. | 23,046,701 | 80,000,000 | 125,000,000 |

AGRICULTURAL RESEARCH SERVICE
Status of Construction Projects as of January 2009

Status of research facilities authorized or funded in prior years and reported as uncompleted in the 2009 Explanatory Notes, are as follows:

NOTE: POR: A study/document that defines the research program, associated space and equipment needs and associated design criteria. DESIGN: The design is either a conceptual design - designated as 35% - or a complete design designated as 100%.

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| California, Albany | 2000 Planning and Design | $2,600,000 | Construction of Phases 1 and 2 of the Research and Development Facility are |
| Western Regional | 2001 Construction | 4,889,220 | complete. Construction of Phase 3A was completed 1st Qtr 2009. The designs |
| Research Center | 2002 Construction | 3,800,000 | for Phases 3, 4, and 5 are complete and updates plus the design of phase 6 are |
| (R&D Facility) | Total | 11,289,220 | scheduled to be complete in the 4th Qtr 2009. |
| California, Davis | 2004 Planning and Design | $2,684,070 | POR was completed in the 2nd Quarter, FY 2007. Lease agreement with |
| Center for Advanced | 2005 Construction | 2,976,000 | University is in progress. |
| Viticulture and Tree Crop Research | 2006 Construction | 3,588,750 | |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 13,310,639 | |
| California, Salinas | 2004 Planning and Design | $4,473,450 | Design (100%) was completed in the 2nd Quarter, FY 2007. |
| Agricultural Research Station | 2005 Planning and Design | 2,976,000 | |
| | 2006 Construction | 3,588,750 | |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 15,100,019 | |
| Connecticut, Storrs | 2008 Planning and Design | $1,869,819 | POR is scheduled to be complete in 4th Qtr, FY 2009 |
| Center of Excellence for Vaccine Research | 2009 Design & Construction | 2,192,000 | |
| | Total | 4,061,819 | |
| District of Columbia | 2000 Planning and Design | $500,000 | Design (100%) of Bladensburg Road Entrance was completed 1st Qtr, 2006. The |
| U.S. National Arboretum | 2001 Design & Construction | 3,322,674 | Administrative Building Modernization design was completed 1st Qtr, 2006. |
| | 2002 Design & Construction | 4,600,000 | The construction of Phase 2, greenhouse and mechanical support space, was |
| | 2003 Design & Construction | 1,688,950 | completed 1st Qtr, 2009. |
| | 2008 Construction | 695,100 | |
| | Total | 10,806,724 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| Florida, Canal Point | 2008 Planning and Design | $521,325 | Funding will be used for POR and Design (35%). |
| Agricultural Research Service Lab | 2009 Planning and Design | 1,096,000 | |
| | Total | 1,617,325 | |
| Georgia, Athens | 2008 Planning and Design | $2,780,400 | Draft POR was completed 1st Qtr 2007. Balance of funds will be used to |
| Southeast Poultry Research | 2009 Planning and Design | 2,427,000 | complete the Design (35%) |
| Laboratory | Total | 5,207,400 | |
| Hawaii, Hilo | 1999 Planning and Design | $4,500,000 | Design of Phases 1 and 2 is complete. Construction of Phase 1 was completed |
| U.S. Pacific Basin | 2000 Construction | 4,500,000 | in the 3rd Quarter, FY 2007. Repackaged phase 2 design (100%) to allow for |
| Agricultural Research | 2001 Construction | 4,989,000 | construction within the available funding is scheduled for completion in the 1st |
| Center | 2002 Construction | 3,000,000 | Qtr, FY 2010. |
| | 2003 Design & Construction | 2,980,500 | |
| | 2004 Construction | 4,831,326 | |
| | 2005 Construction | 2,976,000 | |
| | 2006 Construction | 3,588,750 | |
| | 2008 Construction | 1,737,750 | |
| | 2009 Construction | 1,565,000 | |
| | Total | 34,668,326 | |
| Idaho, Hagerman | 2005 Planning and Design | $992,000 | Lease agreement is in place. POR was completed in the 3rd Quarter, FY 2007. |
| Aquaculture Facility | 2006 Construction | 990,000 | |
| | 2008 Construction | 695,100 | |
| | 2009 Construction | 544,000 | |
| | Total | 3,221,100 | |
| Illinois, Peoria | 2000 Construction Design | $1,800,000 | The modernization of the Chemical Wing was completed in 3 segments. Central |
| National Center for | 2002 Construction | 6,500,000 | Wing Design (100%) is complete. The construction of phases 1 and 2 are |
| Agricultural | 2004 Construction | 2,684,070 | complete. |
| Utilization Research | 2005 Construction | 2,976,000 | |
| (Central Wing) | 2006 Construction | 3,588,750 | |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 21,610,639 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| Iowa, Ames | 2001 Design & Construction | $8,980,200 | The accelerated plan for the completion of the modernization of ARS/APHIS |
| National Centers for | 2002 Design & Construction | 40,000,000 | animal facilities is in progress. The status of major components of the |
| Animal Health | 2002 Construction | 50,000,000 | modernization are as follows: |
| | 2002 APHIS Transfers | 15,753,000 | -Phase 1 Lab/Office (APHIS) was completed in FY 2004. |
| | (Supplemental) | (14,081,000) | -Large Animal BSL-3Ag facilities construction was completed in the 2nd |
| | (Other Transfers) | (1,672,000) | Quarter, FY 2007. |
| | 2002 Construction | 25,000,000 | -Central Utility Plant & Infrastructure, Phase 1 and 2 construction is complete. |
| | 2003 Construction | 32,785,500 | Phase 3 construction was completed in the 1st Qtr, 2009. |
| | 2003 Construction | 110,000,000 | -Construction of the Consolidated Laboratory Facility was completed in the |
| | 2005 Construction | 121,024,000 | 2nd Quarter, FY 2009. |
| | 2006 Construction | 58,212,000 | -Low Containment Large Animal Facility construction was completed in the 1st |
| | Total | 461,754,700 | Qtr of 2009. |
| Kentucky, Bowling Green | 2005 Planning and Design | $2,281,600 | POR is complete for total project. Design (100%) for the |
| Animal Waste Management | 2006 Construction | 2,970,000 | Headhouse/Greenhouse only was completed 3rd Qtr of FY 2008. Lease |
| Research Laboratory | 2008 Construction | 1,390,200 | agreement is in place. The construction award of the GH/HH is scheduled 4th |
| | 2009 Construction | 1,088,000 | Qtr 2009. |
| | Total | 7,729,800 | |
| Kentucky, Lexington | 2005 Planning and Design | $2,976,000 | POR is complete. Lease agreement is in progress. Design (100%) awarded in |
| Forage Animal | 2006 Construction | 3,960,000 | the 4th Quarter, FY 2007 for completion 4th Qtr FY2009. |
| Research Laboratory | 2008 Construction | 2,085,300 | |
| | 2009 Construction | 1,632,000 | |
| | Total | 10,653,300 | |
| Louisiana, Houma | 2004 Planning and Design | $1,342,035 | Design (100%) completed 4th Quarter, FY 2007. Repackaging of design to allow |
| Sugarcane Research | 2005 Construction | 2,976,000 | for construction of some elements within the available funding was completed |
| | 2006 Construction | 3,588,750 | in the 2nd Qtr 2008. Phase 1A construction was awarded in 4th Qtr 2008. |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,505,000 | |
| | Total | 12,281,604 | |
| Louisiana, New Orleans | 1998 Planning and Design | $1,100,000 | The FY 2006 Supplemental funding was appropriated for the design and |
| Southern Regional | 1999 Modernization | 6,000,000 | construction of the Long-Term Restoration (LTR) of facilities damaged by |
| Research Center | 2000 Modernization | 5,500,000 | Hurricane Katrina. Design (100%) for the LTR of facilities was completed 4th |
| (Industrial Wing) | 2006 Supplemental (design) | 4,900,000 | Quarter, FY 2008. Construction award of the LTR is scheduled for the 3rd Qtr, |
| | 2006 Supplemental (construction | 20,000,000 | FY 2009. |
| | Total | 37,500,000 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| Maine, Orono/Franklin | 2001 Planning and Design | $2,494,500 | Construction of all facilities at Franklin (Pump House, Storage Tanks, |
| National Cold Water Marine | 2002 Construction | 3,000,000 | Lab/Office/Tank Bldg.) is complete. POR of the laboratory facility located at the |
| Aquaculture Center | 2003 Construction | 9,090,525 | University Campus in Orono, ME will begin in the 4th Qtr, 2009. |
| | 2004 Design & Construction | 2,684,070 | |
| | 2005 Design & Construction | 2,976,000 | |
| | 2006 Design & Construction | 2,475,000 | |
| | Total | 22,720,095 | |
| Maryland, Beltsville | 1988 Design & Construction | $5,750,000 | Study to evaluate boiler plants, steam lines, and electrical distribution is |
| Beltsville Agricultural Research | 1989 Design & Construction | 6,100,000 | scheduled to be completed 4th Qtr, FY 2009. |
| Center, (BARC) | 1990 Design & Construction | 9,860,000 | |
| | 1991 Design & Construction | 15,999,792 | |
| | 1992 Design & Construction | 16,000,000 | |
| | 1993 Design & Construction | 13,547,000 | |
| | 1994 Design & Construction | 19,700,000 ** | |
| | 1995 Design & Construction | 3,960,000 | |
| | 1996 Design & Construction | 8,000,000 | |
| | 1997 Design & Construction | 4,500,000 | |
| | 1998 Design & Construction | 3,200,000 | |
| | 1999 Design & Construction | 2,500,000 | |
| | 2000 Design & Construction | 13,000,000 | |
| | 2001 Design & Construction | 13,270,740 | |
| | 2002 Design & Construction | 3,000,000 | |
| | 2003 Design & Construction | 4,152,830 | |
| | 2004 Design & Construction | 2,684,070 | |
| | 2005 Design & Construction | 2,976,000 | |
| | 2006 Design & Construction | 3,588,750 | |
| | 2009 Design & Construction | 2,192,000 | |
| | Total | 153,981,182 | |
| **Appropriated under USDA Rental Payments Account | | | |
| Maryland, Beltsville | 1998 Design & Construction | $2,500,000 | Renovation of the NAL building continues. Completed projects include: |
| National Agricultural | 1999 Design & Construction | 1,200,000 | replacement of the computer room HVAC and fire suppression systems; |
| Library | 2001 Design & Construction | 1,766,106 | completion of chiller replacement and brick repairs of three building elevations; |
| | 2002 Construction | 1,800,000 | and 14th floor window replacements. Construction for the deteriorated building |
| | 2003 Design & Construction | 1,490,250 | envelope, repair of brick facade, and replacement of the plumbing system is |
| | 2004 Design & Construction | 894,690 | scheduled for award 3rd Qtr, FY 2009. |
| | Total | 9,651,046 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| Michigan, East Lansing | 1992 Planning | $250,000 | Design (100%) for this multi-phased facility modernization is complete. |
| Avian Disease and | 1993 Planning | 212,000 | |
| Oncology Laboratory | 1998 Planning and Design | 1,800,000 | |
| | Total | 2,262,000 | |
| Mississippi, Lorman | 2006 Planning and Design | $1,980,000 | A lease agreement with Alcorn State University for the new facility is in |
| Biotechnology Laboratory | 2008 Planning and Design | 1,390,200 | progress. POR was completed in 3rd Qtr FY 2008. Design (35%) is scheduled to |
| Alcorn State University | 2009 Construction | 1,176,000 | be completed the 2nd Qtr 2010. |
| | Total | 4,546,200 | |
| Mississippi, Poplarville | 2002 Design | $800,000 | Construction of the Headhouse/Greenhouse was awarded in the 4th Quarter, FY |
| Thad Cochran Southern | 2003 Construction | 9,140,200 | 2007 and completed in the 1st Quarter, FY 2008. |
| Horticultural Laboratory | 2006 Supplemental | 4,300,000 | |
| | | 14,240,200 | |
| Mississippi, Starkville | 2005 Planning and Design | $2,976,000 | Lease agreement is in place. Design (100%) was completed in the 1st Quarter, |
| Poultry Science | 2006 Construction | 4,950,000 | FY 2008. FY 2009 funds are appropriated for both Poultry Science Research |
| Research Facility | 2008 Construction | 1,390,200 | Facility, Starkville, MS and Jamie Whitten Delta States Research Center, |
| | 2009 Construction | 3,177,000 | Stoneville, MS. |
| | Total | 12,493,200 | |
| Mississippi, Stoneville | 2004 Construction | $4,831,326 | Design (100%) is complete. Construction of Phase 1 is complete. Construction |
| Jamie Whitten Delta | 2005 Construction | 2,976,000 | of mechanical, electrical, and plumbing systems for phases 1, 2 and 3, and repair |
| States Research Center | 2008 Construction | 2,780,400 | of deteriorated building envelope, is scheduled for award 1st Qtr, FY 2009. FY |
| | Total | 10,587,726 | 2009 funds are appropriated for both Poultry Research Facility, Starkville, MS |
| Missouri, Columbia | 2004 Planning and Design | $2,415,663 | Design (100%) was completed in the 4th Qtr, FY 2008. |
| National Plant and Genetics | 2005 Construction | 4,960,000 | |
| Security Center | 2006 Construction | 3,687,750 | |
| | 2008 Construction | 2,085,300 | |
| | 2009 Construction | 1,633,000 | |
| | Total | 14,781,713 | |
| Montana, Bozeman | 2005 Planning and Design | $1,984,000 | Lease agreement is in place. Design (35%) was completed 3rd Qtr, FY 2008. |
| Animal Bioscience Facility | 2006 Construction | 3,960,000 | |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 10,005,819 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| Montana, Sidney | 1998 Planning and Design | $606,000 | Construction of Phase 1 (Lab/Office Building) was completed in 2003 and Phase |
| Northern Plains Agricultural | 1999 Construction | 7,300,000 | 2 (Quarantine Lab) was completed in the 4th Quarter, FY 2008. |
| Research Laboratory | 2004 Design and Construction | 2,505,132 | |
| | Total | 10,411,132 | |
| Nebraska, Lincoln | 2008 Planning and Design | $1,390,200 | POR is scheduled for completion 4th Qtr, FY 2009. Design (35%) is scheduled |
| Systems Biology Research Facility | 2009 Planning and Design | 1,088,000 | for completion 3rd Qtr, FY 2010. |
| | Total | 2,478,200 | |
| New York, Geneva | 2004 Planning and Design | $2,415,663 | Design (100%) was completed in the 4th Quarter, FY 2007. |
| Grape Genetics | 2005 Construction | 2,976,000 | |
| | 2006 Construction | 3,588,750 | |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 13,042,232 | |
| New York, Ithaca | 2004 Planning and Design | $3,847,167 | Design (100%)was completed in the 2nd Quarter, FY 2008. |
| Crop-based Health Genomics | 2005 Construction | 2,976,000 | |
| | 2006 Construction | 3,588,750 | |
| | Total | 10,411,917 | |
| Ohio, Toledo | 2005 Planning and Design | $1,984,000 | Design (100%) awarded in the 4th Qtr of FY 2007 with scheduled completion in |
| University of Toledo | 2006 Construction | 1,584,000 | the 4th Qtr FY 2009. Lease agreement is in place. |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 7,629,819 | |
| Oklahoma, Woodward | 2002 Planning and Design | $1,500,000 | Phases 1 and 2 of the three-phased construction project are complete. |
| Southern Plains Range | 2003 Construction | 7,948,000 | |
| Research Station | 2005 Construction | 2,976,000 | |
| | Total | 12,424,000 | |
| Pennsylvania, Wyndmoor | 1997 Construction | $4,000,000 | Modernization of the Center is being accomplished in nine phases, with |
| Eastern Regional Research Center | 1998 Construction | 5,000,000 | construction of Phases 1 through 7 completed. Design to update and |
| | 1999 Construction | 3,300,000 | repackage Phases 8 and 9 is scheduled for completion in the 4th Qtr. FY 2009. |
| | 2000 Construction | 4,400,000 | |
| | 2002 Design & Construction | 5,000,000 | |
| | Total | 21,700,000 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| South Carolina, Charleston | 1988 Feasibility Study | $50,000 | Construction of Phase 1 (laboratory) and Phase 2A (Headhouse) is complete. |
| U.S. Vegetable | 1990 Planning and | | Phase 2B (Greenhouse) construction was awarded in the 2nd Quarter, FY 2007 |
| Laboratory | Construction | 1,135,000 | & completed in the 4th Qtr FY 2008. |
| | 1994 Construction | 909,000 | |
| | 1995 Construction | 5,544,000 | |
| | 1996 Construction | 3,000,000 | |
| | 1997 Construction | 3,000,000 | |
| | 1998 Construction | 4,824,000 | |
| | 2000 Construction | 1,000,000 *** | |
| | 2002 Construction | 4,500,000 | |
| | 2003 Design | 1,390,900 | |
| | 2004 Construction | 3,131,415 | |
| | 2005 Construction | 2,976,000 | |
| | 2006 Construction | 1,980,000 | |
| | Total | 33,440,315 | |
| ***Reprogrammed from Horticultural Crop and Water Management Research Laboratory, Parlier, CA | | | |
| Texas, Kerrville | 2008 Planning and Design | $1,390,200 | POR is scheduled for completion 2nd Qtr. FY 2010. |
| Knipling Bushland Lab | 2009 Planning and Design | 1,957,000 | |
| | Total | 3,347,200 | |
| Utah, Logan | 2008 Planning and Design | $5,560,800 | POR is scheduled for completion 1st Qtr. FY 2010. |
| Agricultural Research Center | 2009 Design and Construction | 4,351,000 | |
| | Total | 9,911,800 | |
| Washington, Pullman | 2004 Planning and Design | $3,936,636 | Lease agreement with University is in place. Design (35%) is complete. |
| ARS Research Lab | 2005 Construction | 2,976,000 | |
| | 2006 Construction | 3,588,750 | |
| | 2008 Construction | 1,869,819 | |
| | 2009 Construction | 2,192,000 | |
| | Total | 14,563,205 | |
| West Virginia, Kearneysville | 2003 Planning and Design | $471,913 | Construction of Phases 1 and 2 (immediate laboratory repairs and renovation) |
| Appalachian Fruit Lab | 2004 Construction | 1,789,380 | was completed in the 3rd Quarter, FY 2007. The construction of the Greenhouse |
| | 2005 Construction | 3,608,896 | was completed the 1st Quarter, FY 2008. POR for the new laboratory is |
| | 2006 Construction | 2,024,550 | scheduled for award 4th Qtr FY 2009. |
| | 2008 Planning and Design | 1,529,220 | |
| | 2009 Planning and Design | 783,000 | |
| | Total | 10,206,959 | |

| Location and Purpose | Year | Amount of Funds Provided | Description |
|---|---|---|---|
| West Virginia, Leetown | 2002 Design & Construction | $2,200,000 | Construction was completed in the 3rd Quarter, FY 2008. |
| National Center for Cool | 2006 Construction | 891,000 | |
| and Cold Water Aquaculture | Total | 3,091,000 | |
| (Broodstock Facility) | | | |
| Wisconsin, Marshfield | 2003 Planning, Design | | Design (100%) of Phase 1 and Phase 2 are complete. Phase 1 (Nutrient Lab) |
| Nutrient Management | and Construction | $2,980,500 | construction was completed in the 4th Qtr, FY 2008. Phase 2 construction |
| Laboratory | 2004 Construction | 3,668,229 | (Animal Holding Facility) was awarded in the 4th Qtr, FY 2007. Phase 2 |
| | 2005 Construction | 4,860,800 | construction is secluded for completion 4th Qtr, FY 2009. |
| | 2006 Construction | 7,920,000 | |
| | Total | 19,429,529 | |
| Wisconsin, Prairie du Sac | 2008 Planning and Design | $2,502,360 | POR was awarded 1st Qtr, FY 2009. Pre-design is scheduled |
| Dairy Forage Agriculture Research | | 2,002,000 | for completion 2nd Qtr., FY 2010 |
| Center | Total | 4,504,360 | |

AGRICULTURAL RESEARCH SERVICE
Summary of Budget and Performance
Statement of Goals and Objectives

ARS has a number of research programs that contribute to its strategic goals and objectives.

| Agency Strategic Goal | Agency Objective | Programs that Contribute | Key Outcome |
|---|---|---|---|
| **Agency Goal 2:** Enhance the Competitiveness and Sustainability of Rural and Farm Economies | Objective 2.1: Expand domestic market opportunities. | New Products/ Product Quality/ Value Added | Key Outcome 2: Technologies to enable dramatic increases in the sustainable production of bioenergy, increased energy security, and reduced energy costs for the agricultural sector. Technologies leading to new and improved foods, fibers, and biobased products that expand agricultural markets and provide new and improved products for consumers here and abroad. |
| | Objective 2.2: Increase the efficiency of domestic agricultural production and marketing systems. | Livestock/Crop Production | Key Outcome 2: Information and technology producers can use to compete more economically in the marketplace. |
| **Agency Goal 4:** Enhance Protection and Safety of the Nation's Agriculture and Food Supply | Objective 4.1: Provide the scientific knowledge to reduce the incidence of foodborne illnesses in the U.S. | Food Safety | Key Outcome 4: Reduction in foodborne illness associated with the consumption of meat, poultry, and egg products. |
| | Objective 4.2: Reduce the number, severity, and distribution of agricultural pest and disease outbreaks. | Livestock/Crop Protection | Key Outcome 4: The knowledge the Nation needs for a secure agricultural production system and healthy food supply. |
| **Agency Goal 5:** Improve the Nation's Nutrition and Health | Objective 5.2: Promote healthier eating habits and lifestyles. | Human Nutrition | Key Outcome 5: Eating habits more consistent with *Dietary Guidelines for Americans*. |

| Agency Strategic Goal | Agency Objective | Programs that Contribute | Key Outcome |
|---|---|---|---|
| **Agency Goal 6:** Protect and Enhance the Nation's Natural Resource Base and Environment | Objective 6.1: Enhance watersheds' capacities to deliver safe and reliable fresh water. | Environmental Stewardship (Water Quality) | Key Outcome 6: Safe, abundant, and reliable water resources. |
| | Objective 6.2: Improve soil and air quality to enhance crop production and environmental quality. | Environmental Stewardship (Air/Soil Quality; Global Climate Change) | Key Outcome 6: Enhanced crop production and improved environmental quality. |
| | Objective 6.3: Conserve and use pasture and range lands efficiently. | Environmental Stewardships (Range/Grazing Lands) | Key Outcome 6: Pasture and range land management systems that enhance economic viability and environmental services. |
| Management Initiative 7(1): **Provide Agricultural Library and Information Services to USDA and the Nation** | Objective 7.1: Ensure provision and permanent access of quality agricultural information for USDA, the Nation, and the global agricultural community via the National Agricultural Library. | Library and Information Services | Key Outcome 7(1): Agricultural information which meets the needs of customers. |
| Management Initiative 7(2): Provide Adequate Federal Facilities Required to Support the Research Mission of ARS | Objective 7.2: Provide for the construction/modernization of new and/or replacement laboratories and facilities, built in a timely manner and within budget. | Buildings and Facilities | Key Outcome 7(2): Laboratories and facilities which meet the needs of ARS' scientists. |

Selected Accomplishments Expected at the FY 2010 Proposed Resource Level

***New Products/Product Quality/Value Added***

- Enable new varieties and hybrids of bioenergy feedstocks with optimal traits.
- Enable new optimal practices and systems that maximize the sustainable yield of high quality bioenergy feedstocks.
- Enable new, commercially preferred biorefining technologies.
- Develop new biobased products.
- Develop technologies leading to new value-added products from crops and crop residues.
- Develop new value added products from animal byproducts.
- Genetically modify cereal seed components for novel/enhanced uses.

***Livestock Production***

- Continue to build populations stored in the National Animal Germplasm Program.
- Use the completed chicken, cattle, and swine genome sequences to identify novel genes impacting the efficiency of nutrient utilization and adaptation to the production environment.
- Use the chicken and cattle haplotype maps to evaluate the efficacy of whole genome selection to facilitate genome enabled improvement while developing the haplotype map for swine.
- Use metagenomics to initially screen the rumen microflora in cattle.
- Develop genome sequence resources for the sheep, rainbow trout, and catfish species.
- Apply a computer decision support system for crop and animal production that reduces production risks/issues.
- Apply biocontrol technologies to crop plants to enhance disease resistance.

***Crop Production***

- Apply new genomic tools to accelerate the genetic improvement of “specialty crops” for superior product quality.
- Test whether new breeding strategies or genetic engineering methods based on knowledge of gene function and expression enhance the effectiveness of crop improvement programs.
- Maintain USDA germplasm collections in a healthy, secure, and easily accessible form.
- Distribute germplasm for research purposes.
- Expand collections of crop genetic stocks important to genomic research.
- Increase crop genetic resource regeneration, and maintenance capacity and activity.
- Secure more wild relatives of crops in gene banks.

***Food Safety***

- Make significant improvements to previously developed food animal surveillance/epidemiology programs.
- Use molecular technologies to elucidate two additional ways to improve control of food pathogens in the preharvest stage.
- Work with industry to initiate implementation of control strategies for mycotoxins based on fungal genomic information.
- Fine tune the program to lower the costs of reducing antibiotic resistance.
- Identify a fungal crop interaction that drives mycotoxin formation which can be adapted to strategies to limit mycotoxin formation.
- Develop sampling systems/protocols for food systems to detect intentional contamination.
- Develop rapid systems for target amplification to detect food pathogens.

- Develop detection and processing intervention systems for chemical or biological contamination of liquid egg products.
- Develop an innovative low cost, optoelectronic portable imaging device for food safety and food biosecurity use.

***Livestock Protection***

- Identify genes that convey specific disease resistance traits.
- Characterize gene functions/mechanisms responsible for disease resistance traits.
- Implement an integrated emerging zoonotic research program (BSE) in pathogenesis, diagnostics, and intervention.
- Implement a technology driven vaccinology research program for control and eradication of biological threat agents.
- Discover genetic profiles that convey protective immunity against infectious diseases/parasites.
- Develop control programs for invasive drug resistant nematodes, protozoa, and pests of livestock and poultry.
- Develop methods for treating wild ungulates to suppress tick vectors of Lyme Disease and Texas Cattle Fever.
- Combine newly discovered attractants into fire ant bait.
- Identify the genetic location for insertion of genes to make male screwworm flies.
- Discover and develop new diagnostic platforms for priority animal diseases.
- Discover and transfer new technologies for protection of animals from priority diseases; animals/humans from biting arthropods; and property from structural pests.

***Crop Protection***

- Develop genomic approaches to control crop diseases, such as soybean rust.
- Provide information on emerging diseases and invasive species that will enhance identification, detection, and control.
- Characterize pathogens and invasive species, and determine key events in disease development and infection processes.
- Develop systems which will increase knowledge of the ecology, physiology, epidemiology, and molecular biology of emerging diseases, invasive insects, and invasive weeds, which will be incorporated into pest risk assessments.

***Human Nutrition***

- Provide updates to the National Nutrient Database.
- Provide reports from the “What We Eat in America” survey.
- Conduct research and publish findings on requirements/bioavailability of nutrients and their role in promoting health/preventing obesity.
- Publish findings on individual nutrition intervention strategies.
- Evaluate dietary patterns useful for preventing obesity.
- Examine the interaction of dietary intake with genetic predisposition for promoting health.
- Release data from dietary supplement database.
- Publish research on normal growth and aging processes that affect nutrient requirements.
- Conduct research on metabolism that impacts nutritional status.
- Conduct research on immunology that interacts with nutritional status.
- Publish research on development of analytical methods for food composition and metabolism of nutrients.

***Environmental Stewardship***

- Develop and evaluate methods and technologies to assess and conserve water availability through more efficient sensing, supply, delivery, and reuse systems.
- Develop and evaluate methods and technologies that reduce or prevent nutrient contamination of surface and ground waters.
- Develop and evaluate methods and techniques that reduce sediment loads to waterways, improve farm land sustainability, and improve or restore stream corridors and riparian ecosystems.
- Develop and assess systems and practices that ameliorate, offset, or mitigate the impact of agricultural production and processing on water resources.
- Develop one decision tool to predict carbon sequestration in soil.
- Develop one management practice and/or control technology to help reduce emissions from agricultural operations.
- Develop one cost effective practice and/or strategy to restore degraded range lands.
- Develop one methodology and/or technology to measure and monitor pasture and range land health.
- Develop one environmentally acceptable practice or technology to control invasive weeds.

Note: ARS utilizes various 'means' and 'strategies' to achieve its performance targets. Over the past several years, it has proposed the redirection or termination of less productive research. In addition, the agency routinely conducts reviews and assessments to help ensure that the performance targets will be realized. These include: National Program Assessments; Office of Scientific Quality Reviews; National Program Workshops/Action Plans; Annual Project Reports; Location Reviews; and Research Position Evaluation System Reviews.

AGRICULTURAL RESEARCH SERVICE

Summary of Budget and Performance
Key Performance Outcomes and Measures

**Goal 2: Enhance the Competitiveness and Sustainability of Rural and Farm Economies.**

Key Performance Outcomes and Measures:

**Objective 2.1: Expand Domestic Market Opportunities.**

- Outcome: Technologies to enable dramatic increases in the sustainable production of bioenergy, increased energy security, and reduced energy costs for the agricultural sector. Technologies leading to new and improved foods, fibers, and biobased products that expand agricultural markets and provide new and improved products for consumers here and abroad.

- Perf. Measure #1: Create new scientific knowledge and innovative technologies that represent scientific and technological advancements or breakthroughs applicable to bioenergy.

- Perf. Measure #2: Develop cost effective, functional industrial and consumer products, including higher quality, healthy foods, that satisfy consumer demand in the United States and abroad.

**Objective 2.2: Increase the Efficiency of Domestic Agricultural Production and Marketing Systems.**

- Outcome: Information and technology producers can use to compete more economically in the marketplace.

- Perf. Measure #3: Develop systems and technologies to reduce production costs and risks while enhancing natural resource quality.

- Perf. Measure #4: Develop new technologies, tools, and information contributing to improved precision animal production systems to meet current and future food animal production needs of diversified consumers, while simultaneously minimizing the environmental footprint of production systems and enhancing animal well-being.

- Perf. Measure #5: Expand, maintain, and protect our genetic resource base, increase our knowledge of genes, genomes, and biological processes, and provide economically and environmentally sound technologies that will improve the production efficiency, health, and value of the Nation's crops.

Key Performance Targets:

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #1 | | | | | |
| a. Units | •Developed an on-farm method for converting agricultural crops and wastes to an energy source.<br>•Developed a system for more efficient harvesting and preprocessing of a biomass crop for energy production. | •Developed new technologies that integrate feedstock refining or preprocessing, conversion, and product recovery processes.<br>•Generated higher value coproducts from current low value production byproducts. | •Developed new crop varieties and agronomic systems that enable the sustainable, high yield production of cellulosic biomass for biorefining to energy and co-products.<br>•Developed new technologies that integrate feedstock refining or preprocessing, conversion, and product recovery processes.<br>•Generated higher value coproducts from current low value production byproducts. | •Enable new varieties and hybrids of bioenergy feedstocks with optimal traits.<br>•Enable new optimal practices and systems that maximize the sustainable yield of high quality bioenergy feedstocks.<br>•Enable new, commercially preferred biorefining technologies. | •Enable new varieties and hybrids of bioenergy feedstocks with optimal traits.<br>•Enable new optimal practices and systems that maximize the sustainable yield of high quality bioenergy feedstocks.<br>•Enable new, commercially preferred biorefining technologies. |
| b. Dollars ($) | $14,415,000 | $14,405,000 | $14,363,000 | $14,562,000 | $24,339,000 |
| Measure #2 | | | | | |
| a. Units | •Developed technologies leading to new value-added products from crops and crop residues.<br>•Developed new value-added products from animal byproducts.<br>•Developed new biobased products. | •Developed technologies leading to new value-added products from crops and crop residues.<br>•Developed new value-added products from animal byproducts.<br>•Developed new biobased products. | •Developed technologies leading to new value-added products from crops and crop residues.<br>•Developed new value-added products from animal byproducts.<br>•Developed new biobased products. | •Develop technologies leading to new value-added products from crops and crop residues.<br>•Develop new value-added products from animal byproducts.<br>•Develop new biobased products. | •Develop technologies leading to new value-added products from crops and crop residues.<br>•Develop new value-added products from animal byproducts.<br>•Develop new biobased products. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | •Genetically modified cereal seed components for novel/enhanced uses. | •Genetically modified cereal seed components for novel/enhanced uses. | •Genetically modified cereal seed components for novel/enhanced uses. | •Genetically modify cereal seed components for novel/enhanced uses. | •Genetically modify cereal seed components for novel/enhanced uses. |
| b. Dollars ($) | $92,031,000 | $90,968,000 | $90,700,000 | $93,362,000 | $91,858,000 |
| Measure #3 | | | | | |
| a. Units | •Developed a single cropping practice that demonstrates how agriculture can be cost effective and compatible with natural resources.<br>•Developed integrated disease management strategies and tools (chemical, cultural, resistant/tolerant varieties, biological control). | •Developed a computer decision support system for crop and animal production that reduces production risks/losses.<br>•Applied novel genomics information to crop plants to enhance disease resistance, product quality, and other important traits. | •Applied a computer decision support system for crop and animal production that reduces production risks/losses.<br>•Applied biocontrol technologies to crop plants to enhance disease resistance. | •Apply a computer decision support system for crop and animal production that reduces production risks/losses.<br>•Apply biocontrol technologies to crop plants to enhance disease resistance. | •Apply a computer decision support system for crop and animal production that reduces production risks/losses.<br>•Apply biocontrol technologies to crop plants to enhance disease resistance. |
| b. Dollars ($) | $77,382,000 | $77,324,000 | $77,097,000 | $78,421,000 | $77,047,000 |
| Measure #4 | | | | | |
| a. Units | •Reached targeted levels of stored germplasm in the National Animal Germplasm Program to declare dairy, beef, swine, and sheep populations secure. | •Reached targeted levels of stored germplasm in the Animal National Germplasm Program to declare goat and aquaculture populations secure. | •Continued to build populations stored in the National Animal Germplasm Program. | •Continue to build stored populations and improve utilization of the National Animal Germplasm Program. | •Continue to build stored populations and improve utilization of the National Animal Germplasm Program. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | •Used the completed chicken and cattle genome sequences to fine map economically important genes influencing meat and milk quality reproduction, and growth. Initiated the swine genome sequencing project.<br>•Identified and characterized genes that affect disease resistance, stress, and other important characteristics affecting the biosecurity of food animal populations.<br>•Increased number of cryopreserved specimens by 10%. | •Characterized cattle germplasm for efficiency of nutrient utilization.<br>•Achieved significant progress in demonstrating economically important traits in improved lines of rainbow trout and North Atlantic salmon.<br>•Used the completed chicken, cattle, swine, and catfish genome sequences to identify novel genes impacting efficiency of nutrient utilization and adaptation to the production environment, including rumen and gut microorganisms.<br>•Completed haplotype maps of the cattle and chicken genomes.<br>•Incorporated traits in trout that improve their ability to use feed that contains a higher proportion of grain. | •Used the completed chicken, cattle, swine, and catfish genome sequences to identify novel genes impacting efficiency of nutrient utilization and adaptation to the production environment.<br>•Completed haplotype maps of the cattle and chicken genomes.<br>•Transferred improved catfish germplasm to the U.S. catfish industry. | •Use the completed chicken, cattle, and swine genome sequences to identify novel genes impacting efficiency of nutrient utilization and adaptation to the production environment.<br>•Use the chicken and cattle haplotype maps to evaluate the efficacy of whole genome selection to facilitate genome enabled improvement while developing the haplotype map for swine.<br>•Use metagenomics to initially screen the rumen micrflora in cattle.<br>•Develop genome sequence resources for sheep, rainbow trout, and catfish species. | •Use the completed chicken, cattle, and swine genome sequences to identify novel genes impacting efficiency of nutrient utilization and adaptation to the production environment.<br>•Use the chicken and cattle haplotype maps to evaluate the efficacy of whole genome selection to facilitate genome enabled improvement while developing the haplotype map for swine.<br>•Use metagenomics to initially screen the rumen micrflora in cattle.<br>•Develop genome sequence resources for sheep, rainbow trout, and catfish species. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | | •Identified and characterized genes that affect disease resistance, stress, and other important characteristics affecting the biosecurity of food animal populations.<br>•Increased number of cryopreserved specimens by 10%. | | | |
| b. Dollars ($) | $85,143,000 | $85,085,000 | $84,835,000 | $86,640,000 | $83,378,000 |
| Measure #5 | | | | | |
| a. Units | •Characterized the structure, function, and mode of action for genes of major crops which are key to determining product quality and resistance to abiotic and biotic stresses.<br>•Applied genetic tools/ genomic data/ bioinformatics systems to accelerating the genetic enhancement of important crop plants for product quality and resistance to abiotic and biotic stresses. | •Tested whether genetic tools/genomic data/bioinformatics systems developed for major crop plants and model plants are applicable to "specialty crops."<br>•Initiated research to devise methods for more precisely manipulating (traditional breeding and/or genetic engineering) the function and expression of genes of major crops which are key to determining product quality and resistance to abiotic and biotic stresses. | •Applied new genomic tools to accelerate the genetic improvement of "specialty crops" for superior product quality.<br>•Tested whether new breeding strategies or genetic engineering methods based on knowledge of gene function and expression enhance the effectiveness of crop improvement programs.<br>•Maintained USDA germplasm collections in a healthy, secure, and easily accessible form. | •Apply new genomic tools to accelerate genetic improvement of 'specialty crops' for superior product quality.<br>•Test whether new breeding strategies or genetic engineering methods based on knowledge of gene function and expression enhance the effectiveness of crop improvement programs.<br>•Maintain USDA germplasm collections in a healthy, secure, and easily accessible form. | •Apply new genomic tools to accelerate genetic improvement of 'specialty crops' for superior product quality.<br>•Test whether new breeding strategies or genetic engineering methods based on knowledge of gene function and expression enhance the effectiveness of crop improvement programs.<br>•Maintain USDA germplasm collections in a healthy, secure, and easily accessible form. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | •Maintained USDA germplasm collections in a healthy, secure, and easily accessible form.<br>•Distributed germplasm for research purposes. | •Maintained USDA germplasm collections in a healthy, secure, and easily accessible form.<br>•Distributed germplasm for research purposes.<br>•Expanded collections of crop genetic stocks key to genomic research.<br>•Increased crop genetic resource regeneration, and maintenance capacity and activity.<br>•Secured more wild relatives of crops in gene banks.<br>•Enhanced capacity to manage key crop digital images. | •Distributed germplasm for research purposes.<br>•Expanded collections of crop genetic stocks key to genomic research.<br>•Increased crop genetic resource regeneration, and maintenance capacity and activity.<br>•Secured more wild relatives of crops in gene banks. | • Distribute germplasm for research purposes.<br>•Expand collections of crop genetic stocks key to genomic research.<br>•Increase crop genetic resource regeneration, and maintenance capacity and activity.<br>•Secure more wild relatives of crops in gene banks. | • Distribute germplasm for research purposes.<br>•Expand collections of crop genetic stocks key to genomic research.<br>•Increase crop genetic resource regeneration, and maintenance capacity and activity.<br>•Secure more wild relatives of crops in gene banks. |
| b. Dollars ($) | $124,000,000 | $123,917,000 | $123,552,000 | $126,590,000 | $127,589,000 |

Note: Space considerations preclude including 2005 data.

**Goal 4: Enhance Protection and Safety of the Nation's Agriculture and Food Supply.**

Key Performance Outcomes and Measures:

**Objective 4.1: Provide the Scientific Knowledge to Reduce the Incidence of Foodborne Illnesses in the U.S.**

- Outcome: Reduction in foodborne illness associated with the consumption of meat, poultry, and egg products.
- Perf. Measure #1: Develop new technologies that assist ARS customers in detecting, identifying, and controlling foodborne diseases that affect human health.

**Objective 4.2: Reduce the Number, Severity, and Distribution of Agricultural Pest and Disease Outbreaks.**

- Outcome: The knowledge the Nation needs for a secure agricultural production system and healthy food supply.
- Perf. Measure #2: Provide scientific information to protect animals, humans, and property from the negative effects of pests, infectious diseases, and other disease-causing entities.
- Perf. Measure #3: 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.
- Perf. Measure #4: Develop control strategies based on fundamental and applied research to reduce losses caused by plant diseases, nematodes, arthropods, and weeds that are effective and affordable while maintaining environmental quality. Develop technically and economically feasible alternatives to preplant and postharvest use of methyl bromide.
- Perf. Measure #5: Provide needed scientific information and technology that is environmentally acceptable to producers of agriculturally important plants in support of exclusion, early detection and eradication, control, and monitoring of invasive arthropods, weeds, nematodes, and pathogens; enhanced sustainability; and restoration of affected areas. Conduct biologically-based integrated and areawide management key invasive species.
- Perf. Measure #6: Provide environmentally sound fundamental and applied scientific information and technologies to action agencies, producers, exporters, and importers of commercially important plant and animal products in support of exclusion, early detection, and eradication of quarantine pests and pathogens that can impede foreign trade.

Key Performance Targets:

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #1 | | | | | |
| a. Units | •Developed food animal surveillance and epidemiology programs, together with other USDA agencies to assure early detection of epizootic pathogens and antibiotic resistance.<br>•Used microarrays to elucidate the means for improved control of food pathogens in the preharvest stage.<br>•Used fungal genomics to identify improved control strategies for mycotoxins during crop production.<br>•Determined the relationship between persistence of antibiotic resistance and increased pathogenicity of microorganisms of concern in one host pathogen system. | •Made significant improvements to previously developed food animal surveillance and epidemiology programs.<br>•Used microarrays to elucidate two ways to improve control of food pathogens in the preharvest stage.<br>•Worked with industry to initiate implementation of control strategies for mycotoxins based on fungal genomic information.<br>•Worked with a livestock producing group to implement a program to decrease the incidence of antibiotic resistance.<br>•Transferred a previously identified mycotoxin control strategy to private industry. | •Made significant improvements to previously developed food animal surveillance/ epidemiology programs.<br>•Used microarrays to elucidate two additional ways to improve control of food pathogens in the preharvest stage.<br>•Worked with industry to initiate implementation of control strategies for mycotoxins based on fungal genomic information.<br>•Fine tuned the program to lower the costs of reducing antibiotic resistance.<br>•Identified a fungal crop interaction that drives mycotoxin formation which can be adapted to strategies to limit mycotoxin formation. | •Make significant improvements to previously developed food animal surveillance/ epidemiology programs.<br>•Use molecular technologies to elucidate two additional ways to improve control of food pathogens in the preharvest stage.<br>•Work with industry to initiate implementation of control strategies for mycotoxins based on fungal genomic information.<br>•Fine tune the program to lower the costs of reducing antibiotic resistance.<br>•Identify a fungal crop interaction that drives mycotoxin formation which can be adapted to strategies to limit mycotoxin formation. | •Make significant improvements to previously developed food animal surveillance/ epidemiology programs.<br>•Use molecular technologies to elucidate two additional ways to improve control of food pathogens in the preharvest stage.<br>•Work with industry to initiate implementation of control strategies for mycotoxins based on fungal genomic information.<br>•Fine tune the program to lower the costs of reducing antibiotic resistance. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | •Fine tuned previously identified strategies to improve their effectiveness in controlling mycotoxins of fungal origin in crops and their food products.<br>•Developed strategies to control toxins of plant origin in food products.<br>•Developed sampling systems and protocols for various food systems to detect intentional contamination.<br>•Developed rapid systems for target amplification to detect pathogens in foods.<br>•Developed detection and processing intervention systems for chemical or biological contamination of liquid egg products.<br>•Developed models to provide simulations of the distribution of bio-security agents in foods. | •Developed strategies to control toxins of plant origin in food products.<br>•Developed sampling systems and protocols for various food systems to detect intentional contamination.<br>•Developed rapid systems for target amplification to detect pathogens in foods.<br>•Developed detection and processing intervention systems for chemical or biological contamination of liquid egg products.<br>•Developed models to provide simulations of the distribution of biosecurity agents in foods. | •Developed strategies to control toxins of plant origin in food products.<br>•Developed sampling systems/protocols for various food systems to detect intentional contamination.<br>•Developed rapid systems for target amplification to detect pathogens in foods.<br>•Developed detection and processing intervention systems for chemical or biological contamination of liquid egg products.<br>•Developed models to provide simulations of the distribution of biosecurity agents in foods.<br>•Developed an innovative low cost, opto-electronic portable imaging device for food safety and food biosecurity use. | •Develop sampling systems/protocols for food systems to detect intentional contamination.<br>•Develop rapid systems for target amplification to detect food pathogens.<br>•Develop detection and processing intervention systems for chemical or biological contamination of liquid egg products.<br>•Develop models to provide simulations of the distribution of bio-security agents in foods.<br>•Develop an innovative low cost, opto-electronic portable imaging device for food safety and food biosecurity use. | •Identify a fungal crop interaction that drives mycotoxin formation which can be adapted to strategies to limit mycotoxin formation.<br>•Develop sampling systems/protocols for food systems to detect intentional contamination.<br>•Develop rapid systems for target amplification to detect food pathogens.<br>•Develop detection and processing intervention systems for chemical or biological contamination of liquid egg products.<br>•Develop an innovative low cost, opto-electronic portable imaging device for food safety and food biosecurity use. |
| b. Dollars ($) | $104,632,000 | $104,748,000 | $104,495,000 | $105,695,000 | $107,503,000 |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #2 | | | | | |
| a. Units | •Implemented an integrated emerging zoonotic research program (BSE) in pathogenesis, diagnostics, and intervention.<br>•Implemented a technology driven vaccinology research program for control and eradication of biological threat agents. | •Implemented an integrated emerging zoonotic research program (BSE) in pathogenesis, diagnostics, and intervention.<br>•Implemented a technology driven vaccinology research program for control and eradication of biological threat agents.<br>•Discovered genetic profiles that convey protective immunity against infectious diseases/parasites.<br>•Developed control programs for invasive drug-resistant nematodes and protozoa of livestock and poultry.<br>•Identified genes that are markers for individual cattle and their progeny who are poor hosts for ticks and the horn fly.<br>•Identified and released new pathogens and predators of imported fire ants based on biological and genetic studies. | •Identified genes that convey specific disease-resistance traits.<br>•Characterized gene functions/mechanisms responsible for disease-resistance traits.<br>•Implemented an integrated emerging zoonotic research program (BSE) in pathogenesis, diagnostics, and intervention.<br>•Implemented a technology driven vaccinology research program for control and eradication of biological threat agents.<br>•Discovered genetic profiles that convey protective immunity against infectious diseases/parasites.<br>•Developed control programs for invasive drug-resistant nematodes and protozoa of livestock and poultry. | •Identify genes that convey specific disease-resistance traits.<br>•Characterize gene functions/mechanisms responsible for disease-resistance traits.<br>•Implement an integrated emerging zoonotic research program (BSE) in pathogenesis, diagnostics, and intervention.<br>•Implement a technology driven vaccinology research program for control and eradication of biological threat agents.<br>•Discover genetic profiles that convey protective immunity against infectious diseases/parasites.<br>•Develop control programs for invasive drug-resistant nematodes, protozoa, and pests of livestock and poultry. | •Identify genes that convey specific disease-resistance traits.<br>•Characterize gene functions/mechanisms responsible for disease resistance traits.<br>•Implement an integrated emerging zoonotic research program (BSE) in pathogenesis, diagnostics, and intervention.<br>•Implement a technology driven vaccinology research program for control and eradication of biological threat agents.<br>•Discover genetic profiles that convey protective immunity against infectious diseases/parasites.<br>•Develop control programs for invasive drug resistant nematodes, protozoa, and pests of livestock and poultry. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | | •Developed antigenic and genetic targets of cattle ticks for development of anti-tick vaccines in cattle. | •Identified genes that are markers for individual cattle and their progeny who are poor hosts for ticks and the horn fly.<br>•Identified and released new pathogens and predators of imported fire ants based on biological and genetic studies.<br>•Developed antigenic and genetic targets of cattle ticks for development of anti-tick vaccines in cattle. | •Develop methods for treating wild ungulates to suppress tick vectors of Lyme disease and Texas cattle fever.<br>•Combine newly discovered attractants into fire ant bait.<br>•Identify genetic location for insertion of genes to make male screwworm flies. | •Develop methods for treating wild ungulates to suppress tick vectors of Lyme disease and Texas Cattle Fever.<br>•Combine newly discovered attractants into fire ant bait.<br>•Identify the genetic location for insertion of genes to make male screwworm flies. |
| b. Dollars ($) | $61,580,000 | $58,661,000 | $54,391,000 | $54,930,000 | $52,372,000 |
| Measure #3 | | | | | |
| a. Units | •Identified genes that are markers for individual cattle and their progeny who are poor hosts for ticks and the horn fly.<br>•Identified and released new pathogens and predators of imported fire ants based on biological and genetic studies.<br>•Developed antigenic and genetic targets of cattle ticks for development of anti-tick vaccines in cattle. | •Completed the bench validation of four new diagnostic tests. | •Discovered and developed new diagnostic platforms for priority animal diseases.<br>•Discovered and transferred new technologies for protection of animals and humans from biting arthropods.<br>•Discovered and transferred new technologies for protection of animals from priority diseases. | •Discover and develop new diagnostic platforms for priority animal diseases.<br>• Discover and transfer new technologies for protection of animals and humans from biting arthropods.<br>•Discover and transfer new technologies for protection of animals from priority diseases. | •Discover and develop new diagnostic platforms for priority animal diseases.<br>• Discover and transfer new technologies for protection of animals and humans from biting arthropods.<br>•Discover and transfer new technologies for protection of animals from priority diseases. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | •Completed the bench validation of four new diagnostic tests. | | •Discovered and transferred new technologies for protection of property from structural pests. | •Discover and transfer new technologies for protection of property from structural pests. | •Discover and transfer new technologies for protection of property from structural pests. |
| b. Dollars ($) | $28,098,000 | $28,091,000 | $28,008,000 | $28,363,000 | $23,703,000 |
| Measure #4 | | | | | |
| a. Units | •Systems were developed which increase knowledge of the ecology, physiology, epidemiology, and molecular biology of emerging diseases, invasive insects, and invasive weeds, which were incorporated into pest risk assessments. | •Developed genomic approaches to control crop diseases, such as soybean rust and wheat striped rust. | •Developed genomic approaches to control crop diseases, such as soybean rust. | •Develop genomic approaches to control crop diseases, such as soybean rust. | •Develop genomic approaches to control crop diseases, such as soybean rust. |
| b. Dollars ($) | $70,095,000 | $78,807,000 | $78,575,000 | $79,623,000 | $79,150,000 |
| Measure #5 | | | | | |
| a. Units | •Conducted research to control sudden oak death, tamarisk (salt cedar) and other weeds, emerald ash borer, yellow starthistle, Asian longhorned beetle, and lobate lac scale.<br>•Improved taxonomic knowledge of invasive species. Characterized pathogens and identified key pathways of infection. | •Provided information on emerging diseases and invasive species that will enhance identification and detection and control.<br>•Characterized pathogens and invasive species, and determined key events in disease development and infection processes and determine possible control measures. | •Provided information on emerging diseases and invasive species that will enhance identification and detection.<br>•Characterized pathogens and invasive species, and determined key events in disease development and infection processes. | •Provide information on emerging diseases and invasive species that will enhance identification and detection.<br>•Characterize pathogens and invasive species, and determine key events in disease development and infection processes. | •Provide information on emerging diseases and invasive species that will enhance identification, detection, and control.<br>•Characterize pathogens and invasive species, and determine key events in disease development and infection processes. |
| b. Dollars ($) | $107,410,000 | $78,807,000 | $78,575,000 | $81,900,000 | $81,113,000 |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #6 | | | | | |
| a. Units. | •Developed production systems with new insect/ disease resistant releases that decrease pesticides use by 15%. | •Developed systems which increased knowledge of the ecology, physiology, epidemiology, and molecular biology of emerging diseases, invasive insects, and invasive weeds, which will be incorporated into pest risk assessments. | •Developed systems which increased knowledge of the ecology, physiology, epidemiology, and molecular biology of emerging diseases, invasive insects, and invasive weeds, which will be incorporated into pest risk assessments. | •Develop systems which will increase knowledge of the ecology, physiology, epidemiology, and molecular biology of emerging diseases, invasive insects, and invasive weeds, which will be incorporated into pest risk assessments. | •Develop systems which will increase knowledge of the ecology, physiology, epidemiology, and molecular biology of emerging diseases, invasive insects, and invasive weeds, which will be incorporated into pest risk assessments. |
| b. Dollars ($) | $21,648,000 | $39,404,000 | $39,288,000 | $39,608,000 | $40,040,000 |

Note: Space considerations preclude including 2005 data.

**Goal 5: Improve the Nation's Nutrition and Health.**

Key Performance Outcomes and Measures:

**Objective 5.2: Promote Healthier Eating Habits and Lifestyles.**

- Outcome: Eating habits more consistent with the *Dietary Guidelines for Americans.*
- Perf. Measure #1: Monitor food consumption/intake patterns of Americans, including those of different ages, ethnicity, regions, and income levels, and measure nutrients and other beneficial components in the food supply. Provide the information in databases to enable ARS customers to evaluate the healthfulness of the American food supply and the nutrient content of the American diet.
- Perf. Measure #2: Define the role of nutrients, foods, and dietary patterns in growth, maintenance of health, and prevention of obesity and other chronic diseases. Assess bioavailability and health benefits of food components. Conduct research that forms the basis for and evaluates nutrition standards and Federal dietary recommendations.
- Perf. Measure #3: Publish research findings not encompassed under the other performance measures for this objective likely to significantly advance the knowledge of human nutrition, extensively influence other researchers in the same or related field, or yield important new directions for research.



Key Performance Targets:

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #1 | | | | | |
| a. Units. | •Studied school-based interventions to prevent unhealthy weight gain in children. | •Provided updates of the National Nutrient Database.<br>•Provided reports from the "What We Eat in America" survey.<br>•Published findings on requirements/ bioavailability of nutrients and their role in promoting health/ preventing obesity. | •Provided updates of the National Nutrient Database.<br>•Provided reports from the "What We Eat in America" survey.<br>•Published findings on requirements/ bioavailability of nutrients and their role in promoting health/ preventing obesity. | •Provide updates of the National Nutrient Database.<br>•Provide reports from the "What We Eat in America" survey.<br>•Publish findings on requirements/ bioavailability of nutrients and their role in promoting health/ preventing obesity. | •Provide updates of the National Nutrient Database.<br>•Provide reports from the "What We Eat in America" survey.<br>•Publish findings on requirements/ bioavailability of nutrients and their role in promoting health/ preventing obesity. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | | •Published findings on community/individual nutrition intervention strategies. | •Published findings on community/individual nutrition intervention strategies. | •Publish findings on individual nutrition intervention strategies. | •Publish findings on individual nutrition intervention strategies. |
| b. Dollars ($) | $11,592,000 | $11,971,000 | $11,936,000 | $12,004,000 | $12,097,000 |
| Measure #2 | | | | | |
| a. Units. | •Determined risk factors for obesity.<br>•Conducted research to determine the factors that influence food choices.<br>•Developed database that reflects food consumption of growing ethnic minorities. | •Evaluated dietary patterns useful for preventing obesity.<br>•Conducted research on requirements/ bioavailability of nutrients to define their role in promoting health/preventing obesity.<br>•Examined interaction of dietary intake with genetic predisposition for promoting health.<br>•Released data from dietary supplement database. | •Evaluated dietary patterns useful for preventing obesity.<br>•Conducted research on requirements/ bioavailability of nutrients to define their role in promoting health/preventing obesity.<br>•Examined interaction of dietary intake with genetic predisposition for promoting health.<br>•Released data from dietary supplement database. | •Evaluate dietary patterns useful for preventing obesity.<br>•Conduct research on requirements/ bioavailability of nutrients to define their role in promoting health/preventing obesity.<br>•Examine interaction of dietary intake with genetic predisposition for promoting health.<br>•Release data from dietary supplement database. | •Evaluate dietary patterns useful for preventing obesity.<br>•Conduct research on requirements/ bioavailability of nutrients to define their role in promoting health/preventing obesity.<br>•Examine interaction of dietary intake with genetic predisposition for promoting health.<br>•Release data from dietary supplement database. |
| b. Dollars ($) | $59,320,000 | $35,834,000 | $35,653,000 | $35,473,000 | $42,281,000 |
| Measure #3 | | | | | |
| a. Units. | •Provided updates on National Nutrient<br>•Released two year data from the "What We Eat in America" survey. | •Published research on normal growth and aging processes that affect nutrient requirements.<br>•Conducted research on metabolism that impacts nutritional status. | •Published research on normal growth and aging processes that affect nutrient requirements.<br>•Conducted research on metabolism that impacts nutritional status. | •Publish research on normal growth and aging processes that affect nutrient requirements.<br>•Conduct research on metabolism that impacts nutritional status. | •Publish research on normal growth and aging processes that affect nutrient requirements. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | | •Conducted research on immunology that interacts with nutritional status.<br>•Published research on development of analytical methods for food composition and metabolism of nutrients. | •Conducted research on immunology that interacts with nutritional status.<br>•Published research on development of analytical methods for food composition and metabolism of nutrients. | •Conduct research on immunology that interacts with nutritional status.<br>•Publish research on development of analytical methods for food composition and metabolism of nutrients. | •Conduct research on metabolism that impacts nutritional status.<br>•Conduct research on immunology that interacts with nutritional status.<br>•Publish research on development of analytical methods for food composition and metabolism of nutrients. |
| b. Dollars ($) | $13,865,000 | $37,861,000 | $37,750,000 | $37,832,000 | $37,942,000 |

Note: Space considerations preclude including 2005 data.

**Goal 6: Protect and Enhance the Nation's Natural Resource Base and Environment.**

Key Performance Outcomes and Measures:

**Objective 6.1: Enhance Watersheds' Capacities to Deliver Safe and Reliable Fresh Water.**

- Outcome: Safe, abundant, and reliable water resources.
- Perf. Measure #1: Develop technology and practices to reduce the delivery of agricultural pollutants by water on farms and ranches and quantify the environmental benefit of conservation practices in watersheds.

**Objective 6.2: Improve Soil and Air Quality to Enhance Crop Production and Environmental Quality.**

- Outcome: Enhanced crop production and improved environmental quality.
- Perf. Measure #2: Develop practices and technologies to enhance soil resources and reduce emissions of particulate matter and gases from crop production lands, agricultural processing operations, and animal production systems.

**Objective 6.3: Protect Forests and Grasslands.**

- Outcome: Pasture and range land management systems that enhance economic viability and environmental services.
- Perf. Measure #3: Improved management practices and technologies for managing pasture and range lands to improve economic profitability and enhance environmental values.

Key Performance Targets:

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #1 | | | | | |
| a. Units | •Developed at least one method to assess and quantify environmental benefits from conservation practices.<br>•Developed two drought assessment tools for use by USDA action agencies.<br>•Developed two methods for evaluation and prediction of the performance of watershed structures. | •Developed a tool that uses remote sensing to assess changes in land use and its impact on water resources.<br>•Developed a tool to evaluate environmental risks and cost effectiveness associated with the selection and placement of conservation practices.<br>•Developed integrated technology for producing watershed scale water use maps.<br>•Developed a cropping system that uses limited water supplies for drought and salt tolerance. | •Developed a tool that uses remote sensing to assess changes in land use and its impact on water resources.<br>•Developed a tool to evaluate environmental risks and cost effectiveness associated with the selection and placement of conservation practices.<br>•Developed integrated technology for producing watershed scale water use maps.<br>•Developed a cropping system that uses limited water supplies for drought and salt tolerance. | •Develop and evaluate methods and technologies to assess and conserve water availability through more efficient sensing, supply, delivery, and reuse systems.<br>•Develop and evaluate methods and technologies that reduce or prevent nutrient contamination of surface and ground waters.<br>•Develop and evaluate methods and techniques that reduce sediment loads to waterways, improve farm land sustainability, and improve or restore stream corridors and riparian ecosystems.<br>•Develop and assess systems and practices that ameliorate, offset, or mitigate the impact of agricultural production and processing on water resources. | •Develop and evaluate methods and technologies to assess and conserve water availability through more efficient sensing, supply, delivery, and reuse systems.<br>•Develop and evaluate methods and technologies that reduce or prevent nutrient contamination of surface and ground waters.<br>•Develop and evaluate methods and techniques that reduce sediment loads to waterways, improve farm land sustainability, and improve or restore stream corridors and riparian ecosystems.<br>•Develop and assess systems and practices that ameliorate, offset, or mitigate the impact of agricultural production and processing on water resources |
| b. Dollars ($) | $65,715,000 | $65,670,000 | $65,476,000 | $66,593,000 | $65,510,000 |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #2 | | | | | |
| a. Units | •Developed two methods for reducing volatile organic compound emissions from agricultural production operations.<br>•Developed methods to predict dispersion of particulate emissions from agricultural production operations. | •Developed at least one management practice and/or control technology that reduce ammonia emissions from animal feeding operations.<br>•Developed at least one decision tool to predict the impact of agricultural management practices on soil quality. | •Developed one management practice and/or control technology that reduce ammonia emissions from animal feeding operations.<br>•Developed one management practice to overcome soil physical property limitations to crop production. | •Develop one decision tool to predict carbon sequestration in soil.<br>•Develop one management practice and/or control technology to help reduce emissions from agricultural operations. | •Develop one decision tool to predict carbon sequestration in soil.<br>•Develop one management practice and/or control technology to help reduce emissions from agricultural operations. |
| b. Dollars ($) | $86,931,000 | $86,871,000 | $86,615,000 | $87,990,000 | $95,594,000 |
| Measure #3 | | | | | |
| a. Units | •Demonstrated that switchgrass production for bioenergy in the Eastern Great Plains is economically viable.<br>•Developed a livestock grazing and fire management system for Great Basin range lands to control a toxic invasive weed, improve range land health, and reduce livestock abortions caused by the weed. | •Developed at least one cost effective practice and/or strategy to restore degraded range lands.<br>•Developed at least one methodology and/or technology to measure and monitor pasture and range land health.<br>•Developed at least one environmentally acceptable practice or technology to control invasive weeds. | •Developed one cost effective practice and/or strategy to restore degraded range lands.<br>•Developed one methodology and/or technology to measure and monitor pasture and range land health.<br>•Developed one environmentally acceptable practice or technology to control invasive weeds. | •Develop one cost effective practice and/or strategy to restore degraded range lands.<br>•Develop one methodology and/or technology to measure and monitor pasture and range land health.<br>•Develop one environmentally acceptable practice or technology to control invasive weeds. | •Develop one cost effective practice and/or strategy to restore degraded range lands.<br>•Develop one methodology and/or technology to measure and monitor pasture and range land health.<br>•Develop one environmentally acceptable practice or technology to control invasive weeds. |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| | •Identified important biochemical processes that limited cell wall digestion in grass species to provide better forages for livestock and bioenergy production. | | | | |
| b. Dollars ($) | $70,680,000 | $70,631,000 | $70,423,000 | $71,474,000 | $72,836,000 |

Note: Space considerations preclude including 2005 data.

**Management Initiative 7(1): Provide Agricultural Library and Information Services to USDA and the Nation.**

Key Performance Outcomes and Measures:

**Objective 7.1: Ensure Provision and Permanent Access of Quality Agricultural Information for USDA, the Nation, and the Global Agricultural Community via the National Agricultural Library.**

- Outcome: Agricultural information which meets the needs of customers.
- Perf. Measure #1: The services and collections of the National Agricultural Library continue to meet the needs of its customers.
- Perf. Measure #2: The National Agricultural Library and partners implement the National Digital Library for Agriculture.

Key Performance Targets:

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #1 | | | | | |
| a. Units | •Increased overall NAL service delivery by at least 15%.<br>•Increased DigiTop access and availability by at least 25%.<br>•Upgraded/enhanced software for accessing, navigating, evaluating, and delivering AGRICOLA database services. | •Upgraded/enhanced software for accessing, navigating, evaluating, and delivering AGRICOLA database services.<br>•Digitized 15,000 document images for web access.<br>•Continued to collaborate with the U.S. Agricultural Information Network libraries and AgNIC partners to preserve digital agricultural information. | •Funding reduction impacted NAL's ability to expand and improve services, effecting document delivery services, print material acquisition, and filling vacant NAL positions. | •Funding level will impact NAL's ability to expand and improve services, effecting document delivery services, print material acquisition, and filling vacant NAL positions. | •Funding level will impact NAL's ability to expand and improve services, effecting document delivery services, print material acquisition, and filling vacant NAL positions. |
| b. Dollars ($) | $16,360,000 | $17,754,000 | $16,337,000 | $16,382,000 | $16,133,000 |

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #2 | | | | | |
| a. Units | •Added at least 3 new AgNIC partners.<br>•Digitized 15,000 document images for web access.<br>•Continued with the U.S. Agricultural Information Network libraries and AgNIC partners to preserve digital agricultural information. | •Increased DigiTop access and availability by at least 25%.<br>•Added at least 3 new AgNIC partners.<br>•Increased overall NAL service delivery by at least 15. | •Funding reduction impacted NAL's ability to develop partnerships and content for the NDLA. | •Funding level will impact NAL's ability to develop partnerships and content for the NDLA. | • Funding level will impact NAL's ability to develop partnerships and content for the NDLA. |
| b. Dollars ($) | $5,453,000 | $5,918,000 | $5,446,000 | $5,461,000 | $5,380,000 |

Note: Space considerations preclude including 2005 data.

**Management Initiative 7(2): Provide Adequate Federal Facilities Required to Support the Research Mission of ARS.**

Key Performance Outcomes and Measures:

**Objective 7.2: Provide for the Construction/Modernization of New and/or Replacement Laboratories and Facilities, Built in a Timely Manner and within Budget.**

- Outcome: Laboratories and facilities which meet the needs of ARS' scientists.
- Perf. Measure #1: Priority buildings/facilities projects are completed on schedule and within budget.

Key Performance Targets:

| Performance Measure | 2006 Actual | 2007 Actual | 2008 Actual | 2009 Target | 2010 Target |
|---|---|---|---|---|---|
| Measure #1 | | | | | |
| a. Units | •Modernized/ constructed selected ARS buildings/facilities. Also, provided security upgrades. | •Repaired/maintained selected ARS buildings/facilities using Repair and Maintenance funds. | •Modernized/constructed selected ARS buildings/facilities. | •Modernize/construct selected ARS buildings/facilities. | •Repair/maintain selected ARS buildings/facilities using Repair and Maintenance funds. |
| b. Dollars ($) | $159,083,000 | $0 | $46,752,000 | $46,752,000 | ($49,885,000) |

Note: Space considerations preclude including 2005 data.

AGRICULTURAL RESEARCH SERVICE

Full Cost by Agency Strategic Goal

Strategic Goal 2: Enhance the Competitiveness and Sustainability of Rural and Farm Economies

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Research and Development | 350,703 | 360,634 | 364,334 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 28,868 | 29,590 | 30,329 |
| USDA Central Charges | 8,639 | 8,820 | 9,006 |
| Task Force, Advisory Committees, and Other Support Costs | 520 | 531 | 542 |
| Total Indirect Cost | 38,027 | 38,941 | 39,877 |
| Total Cost | 388,730 | 399,575 | 404,211 |
| FTE's | 2,948 | 2,962 | 2,962 |

Performance Measures:

Create new scientific knowledge and innovative technologies that represent scientific/technological advancements or breakthroughs applicable to bioenergy.

Develop cost effective, functional industrial and consumer products, including higher quality, healthy foods, that satisfy consumer demand in the United States and abroad.

Develop systems and technologies to reduce production costs and risks while enhancing natural resource quality.

Develop new technologies, tools, and information contributing to improved precision animal production systems to meet current and future food animal production needs of diversified consumers, while simultaneously minimizing the environmental footprint of production systems and enhancing animal well-being.

Expand, maintain, and protect our genetic resource base, increase our knowledge of genes, genomes, and biological processes, and provide economically and environmenally sound technologies that will improve the production efficiency, health, and value of the Nation's crops.

Strategic Goal 4: Enhance Protection and Safety of the Nation's Agriculture and Food Supply

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Research and Development | 344,318 | 351,495 | 344,328 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 28,633 | 29,349 | 30,083 |
| USDA Central Charges | 8,568 | 8,748 | 8,932 |
| Task Force, Advisory Committees, and Other Support Costs | 516 | 527 | 538 |
| Total Indirect Cost | 37,717 | 38,624 | 39,553 |
| Total Cost | 382,035 | 390,119 | 383,881 |
| FTE's | 2,715 | 2,723 | 2,713 |

Performance Measures:

Develop new technologies that assist ARS customers in detecting, identifying, and controlling foodborne diseases that affect human health.

Provide scientific information to protect animals, humans, and property from the negative effects of pests, infectious diseases, and other disease-causing entities.

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.

Develop control strategies based on fundamental and applied research to reduce losses caused by plant diseases, nematodes, arthropods, and weeds that are effective and affordable while maintaining environmental quality. Develop technically and economically feasible alternatives to preplant and postharvest use of methyl bromide.

Provide needed scientific information and technology that is environmentally acceptable to producers of agriculturally important plants in support of exclusion, early detection and eradication, control, and monitoring of invasive arthropods, weeds, nematodes, and pathogens; enhanced sustainability; and restoration of affected areas. Conduct biologically-based integrated and area-wide management of key invasive species.

Provide environmentally sound fundamental and applied scientific information and technologies to action agencies, producers, exporters, and importers of commercially important plant and animal products in support of exclusion, early detection, and eradication of quarantine pests and pathogens that can impede foreign trade.

Strategic Goal 5: Improve the Nation's Nutrition and Health

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Research and Development | 77,023 | 76,793 | 83,599 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 6,313 | 6,471 | 6,633 |
| USDA Central Charges | 1,889 | 1,929 | 1,969 |
| Task Force, Advisory Committees, and Other Support Costs | 114 | 116 | 119 |
| Total Indirect Cost | 8,316 | 8,516 | 8,721 |
| Total Cost | 85,339 | 85,309 | 92,320 |
| FTE's | 284 | 284 | 284 |

Performance Measures:

Monitor food consumption/intake patterns of Americans, including those of different ages, ethnicity, regions, and income levels, and measure nutrients and other beneficial components in the food supply. Provide the information in databases to enable ARS customers to evaluate the healthfulness of the Americn food supply and the nutrient content of the American diet.

Define the role of nutrients, foods, and dietary patterns in growth, maintenance of health, and prevention of obesity and other chronic diseases. Assess bioavailability and health benefits of food components. Conduct research that forms the basis for and evaluates nutrition standards and Federal dietary recommendations.

Publish research findings not encompassed under the other performance measures for this objective likely to significantly advance the knowledge of human nutrition, extensively influence other researchers in the same or related field, or yield important new directions for research.

Strategic Goal 6: Protect and Enhance the Nation's Natural Resource Base and Environment

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Research and Development | 199,814 | 203,872 | 211,220 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 16,447 | 16,858 | 17,280 |
| USDA Central Charges | 4,922 | 5,025 | 5,131 |
| Task Force, Advisory Committees, and Other Support Costs | 296 | 302 | 309 |
| Total Indirect Cost | 21,665 | 22,185 | 22,720 |
| Total Cost | 221,479 | 226,057 | 233,940 |
| FTE's | 1,973 | 1,974 | 1,974 |

Performance Measures:

Develop technology and practices to reduce the delivery of agricultural pollutants by water on farms and ranches and quantify the environmental benefit of conservation practices in watersheds.

Develop practices and technologies to enhance soil resources and reduce emissions of particulate matter and gases from crop production lands, agricultural processing operations, and animal production systems.

Improved management practices and technologies for managing pasture and range lands to improve economic profitability and enhance environmental values.

Management Initiative: Provide Agricultural Library and Information Services to USDA and the Nation

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Information Services | 20,814 | 19,490 | 19,105 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 1,744 | 1,788 | 1,832 |
| USDA Central Charges | 522 | 533 | 544 |
| Task Force, Advisory Committees, and Other Support Costs | 31 | 32 | 32 |
| Total Indirect Cost | 2,297 | 2,353 | 2,408 |
| Total Cost | 23,111 | 21,843 | 21,513 |
| FTE's | 144 | 144 | 144 |

Performance Measures:

The services and collections of the National Agricultural Library continue to meet the needs of its customers.

The National Agricultural Library and partners implement the National Digital Library for Agriculture.

Management Initiative: Provide Adequate Federal Facilities Required to Support the Research Mission of ARS

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Total Cost: | 17,524 | 17,526 | 17,526 |
| FTE's: | -- | -- | -- |

Performance Measure:

Complete priority buildings and facilities projects on schedule and within budget.

Total for Management Initiatives

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Information Services | 20,814 | 19,490 | 19,105 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 1,744 | 1,788 | 1,832 |
| USDA Central Charges | 522 | 533 | 544 |
| Task Force, Advisory Committees, and Other Support Costs | 31 | 32 | 32 |
| Total Indirect Cost | 2,297 | 2,353 | 2,408 |
| Buildings and Facilities | 51,752 | 46,752 | -- |
| Total Cost | 74,863 | 68,595 | 21,513 |
| FTE's | 144 | 144 | 144 |

Total Cost for All Strategic Objectives and Management Initiatives

| Program Items: | 2008 Amount ($000) | 2009 Amount ($000) | 2010 Amount ($000) |
|---|---|---|---|
| Direct Costs: | | | |
| Research and Development | 992,672 | 1,012,284 | 1,022,586 |
| Indirect Costs: | | | |
| Program and Administrative/ Financial Management | 82,005 | 84,056 | 86,157 |
| USDA Central Charges | 24,540 | 25,055 | 25,582 |
| Task Force, Advisory Committees, and Other Support Costs | 1,477 | 1,508 | 1,540 |
| Total Indirect Cost | 108,022 | 110,619 | 113,279 |
| Total Cost | 1,100,694 | 1,122,903 | 1,135,865 |
| FTE's | 8,064 | 8,087 | 8,077 |
| Other Items Not Included in Strategic Objectives: | | | |
| Homeland Security | (35,454) | (35,454) | (33,376) |
| Unobligated Balance | -- | -- | -- |
| Construction/Miscellaneous Fees | 553 | | |
| Collaborative Research Program | 3,824 | -- | -- |
| Repair and Maintenance | 17,524 | 17,503 | 17,503 |
| Total Cost | 1,122,595 | 1,140,406 | 1,153,368 |
| Buildings and Facilities Account | 51,752 | 46,752 | 0 |
| Grand Total, Cost | 1,174,347 | 1,187,158 | 1,153,368 |