

**TESTIMONY OF THE FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY
HOUSE APPROPRIATIONS SUBCOMMITTEE ON AGRICULTURE AND RELATED AGENCIES – FY 2009
MARCH 20, 2008**

“[P]ublic agricultural research undertaken today will begin to noticeably influence agricultural productivity in as little as 2 years and...its impact could be felt for as long as 30 years.” –Economic Research Service report, September 4, 2007

The Federation of American Societies for Experimental Biology (FASEB) is grateful for the opportunity to submit testimony for the record in support of the vital research programs of the United States Department of Agriculture (USDA). FASEB comprises 21 scientific societies representing more than 80,000 life science researchers, and our mission is to advance biological science through collaborative advocacy for research policies that promote scientific progress and education and lead to improvements in human health. FASEB enhances the ability of biomedical and life scientists to improve—through their research—the health, well-being and productivity of all people.

Greater investment in basic and applied agricultural research is essential, as threats proliferate and demands for a more nutritious food supply continues to increase. The USDA funds research through its intramural arm, the Agriculture Research Service (ARS), and competitive grants program, the National Research Initiative (NRI). The ARS support allows optimization of the competitive funds offered through the NRI by providing essential research facilities via its research centers across the country. These symbiotic programs provide the infrastructure and continuous generation of new knowledge that allow for rapid progress towards meeting national needs.

A recent report by the Economic Research Service (ERS) found “strong and consistent evidence that investment in agricultural research has yielded high returns per dollar spent” citing mean rates of returns of 53 percent.¹ However, our nation’s investment in agricultural research has been declining (Figure 1), threatening our ability to sustain the vitality of our research portfolio. The NRI has not yet reached even half of its initial authorization of \$500 million, and ARS funding has been waning. Continuation of this neglect will inevitably undermine the success of the USDA’s research programs. Thus it is imperative that the breadth and competitive nature of the NRI portfolio be maintained and expanded to ensure our nation’s excellence in agricultural research and the well-being of all Americans.

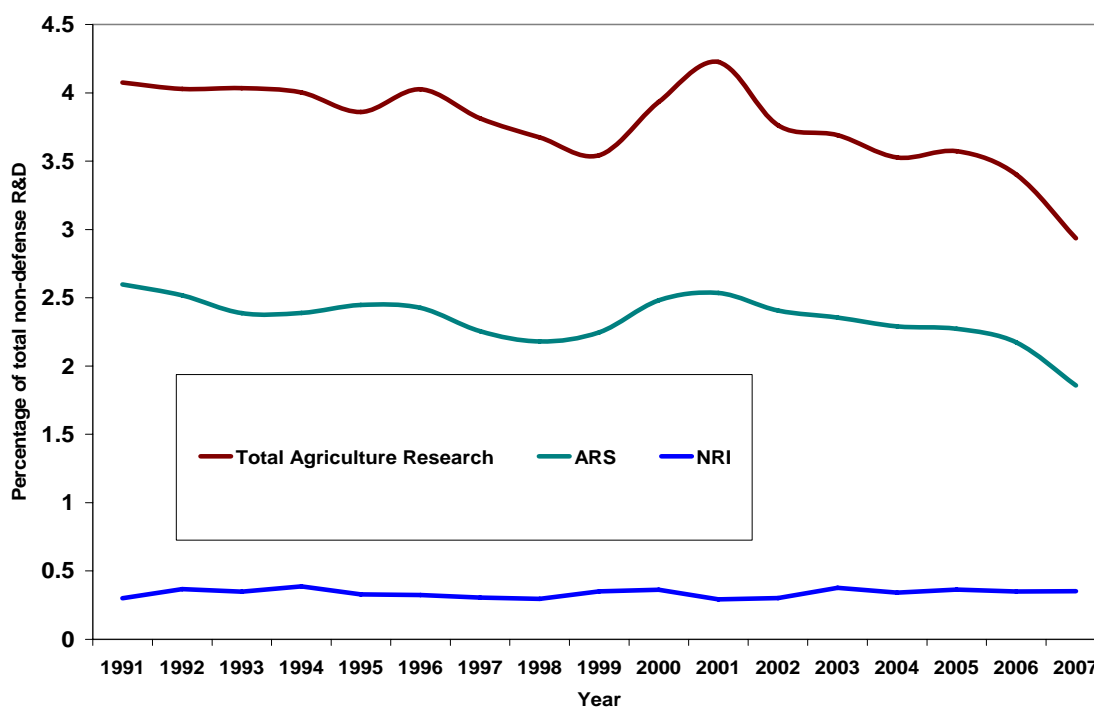


Figure 1: Research at the USDA has been declining in relation to total federal spending on non-defense research & development (R&D), putting our competitive portfolio of agricultural research at serious risk.

¹ Fuglie, KO and Heisey PW. (2007) *Economic returns to public agricultural research*. USDA Economic Research Service, Economic Brief # 10. <http://www.ers.usda.gov/Publications/EB10/>

Agriculture and the research which advances it remain of crucial importance to our economy and quality of life. Research supported by USDA contributes to our understanding of the nutrition that underlies our health; it protects human life and our food supply from pandemic disease and introduced pathogens; it allows us to respond quickly to emerging issues like Colony Collapse Disorder or foot-and-mouth disease; and has led the way in development of bioenergy resources. Below are a few examples of the important contributions resulting from USDA-funded research.

HUMAN NUTRITION, HEALTH, AND POLICY

Nutrition is the foundation upon which human and animal health is built, and whose mysteries fascinate the American people like no other aspect of science. This is perhaps most evident in the daily news stories that seek to uncover the optimal diet required to maximize health or minimize risk of disease. Research has identified the critical role that nutrition plays in a myriad of health conditions, from cancer to heart disease to diabetes. Perhaps the most striking evidence of the importance of nutrition to health is the alarming increase in the rates of obesity in this country, especially in children and adolescents. Further research is essential as we seek to understand the causes, both innate and environmental, of this public health crisis.

The USDA is uniquely positioned to conduct nutrition and food-related research because of its singular perspective on the entire food system, from crop to livestock to food supply to human consumption. No other agency has the capacity to understand the connections among food, the food supply and its production, and the health of our nation. Through its research programs, the USDA is making the connection between what we eat and the healthfulness of our lifestyle.

- ***Folate and colon cancer:*** Folate, a B-complex vitamin, is strongly implicated in the prevention of colorectal cancer. It has been estimated that the risk of developing colorectal cancer in people consuming the largest amounts of dietary folate is 30-40% lower than in people consuming less folate. NRI-supported scientists are investigating the mechanisms by which differences in folate intake can protect against cancer and other diseases, which may provide evidence for increasing the Dietary Reference Intake values for folate. This is a necessary first step in developing effective public health measures which would use folate as a cancer preventive measure and improve the health of the nation.
- ***Obesity:*** Our country is facing a rising storm of health problems related to increasing rates of obesity, in both adults and children, including diabetes, hypertension, and heart disease. The direct and indirect costs of obesity represent a \$100 billion annual burden on the U.S. economy. The USDA is funding cutting edge research at universities across the nation, where scientists are examining genetic and metabolic factors that influence obesity, including the balance of protein, fat, and carbohydrate, dietary calcium and milk intake, the roles of the hormones leptin and ghrelin, as well as the effects of conjugated linoleic acid, and new and genetically modified foods. Unique research projects linked to dietary interventions are being carried out in rural towns in three states in the West, in African American communities in the South, and in Native American communities.
- ***Functional foods for disease prevention:*** Antioxidants have been shown to be of primary importance in preventing age-related disease and health problems, including cancer and coronary heart disease, two of our nation's leading causes of death. USDA-funded scientists are working to develop functional foods, rich in antioxidants, which could provide nutritional benefit while protecting against disease. Scientific data suggests that processing of wheat could maximize the antioxidant capacity of this cornerstone of our food supply. Researchers have developed a processing procedure to enhance the antioxidant availability in wheat-based food ingredients that involves no chemical or organic solvents and generates no waste. These processing procedures require no special equipment or operation and may be easily scaled up for commercial production.

SAFETY OF OUR FOOD SUPPLY

Over the past year, our national attention has focused on food safety and the security of our food supply. The research programs of the USDA are at the forefront of developing new technologies to protect our food supply and discovering new ways to detect and neutralize threats to our crops, livestock, and food products. Research activities range from food-borne illnesses to microbial resistance to food processing safety to biosecurity at our borders. Moreover, projects funded by NRI and ARS are addressing concerns not only related to our domestic supply of foods, but also those items that we import from international partners. As the United States forges new ties and reinforces existing relationships in our

increasingly global economy, it becomes even more critically important to ensure agricultural research is delivering the knowledge to protect our citizens and the foods they eat.

- **International food safety:** Concerns have been raised about the safety of food products and goods imported from other nations. Researchers at the University of Minnesota are setting up models to examine the role of the role of imported food products in the local and global dissemination of food-borne pathogens. Using epidemiological data, these models will enable development of intervention to reduce the risk of disease outbreaks due to food imports. Meanwhile, another team of NRI-funded scientists is developing edible food sensors, made of luminescent nanoparticles. These tiny sensors will be able to screen foods for a host of safety and quality issues, from presence of bacteria and toxins to pH, in a rapid, easy-to-use and inexpensive manner.
- **Preventing Salmonella outbreaks:** The multibillion dollar American poultry industry loses 10 to 15% of its potential income to disease annually. Additionally, microbes that infect poultry represent a major human health risk, particularly *Salmonella* which causes over one million cases of illness and results in 500 deaths in the U.S. each year. Using sophisticated DNA technologies, USDA-funded scientists are identifying the genes related to disease resistance and response in poultry. Understanding the genetic basis for the immune response to *Salmonella* and other diseases may lead to breeding of disease-resistant birds, as well as vaccine development.
- **Biohazard detecting cloth:** Through use of nanotechnology, NRI-funded scientists at Cornell University have created a cloth that has the ability to detect bacteria, viruses, and other biohazards. When the cloth contacts a contaminant or hazardous substance, a dye is released, providing a rapid response test that allows visualization of the threat with the naked eye. This has applications in detecting foodborne diseases at food preparation or manufacturing sites, screening for bioterror agents like anthrax, and even confirmation that operating rooms or medical facilities are clear of pathogens.

RESPONDING TO EMERGING THREATS

When beekeepers across the country began to report the alarming and mysterious loss of 50-90 percent of bees from their hives, the USDA took the lead in mobilizing research resources to find the source of what is now known as Colony Collapse Disorder (CCD). This is only one example of how a unique and emerging agricultural threat can swiftly challenge our nation's economy, health or food supply. A new outbreak of foot and mouth disease in Europe, the looming specter of pandemic avian flu, and the continuing threat of mad cow disease all illustrate the need for the research resources required to address new and emerging pathogens and diseases. Only with an adequately funded agriculture research infrastructure can our nation be prepared to react and rapidly counter threats to our health and food supply.

- **Virus implicated in colony collapse disorder:** Scientists funded by the USDA have recently announced discovery of a virus that may be linked to Colony Collapse Disorder (CCD), which has decimated bee colonies across the country. Bees are essential for the pollination of nearly 100 fruit and vegetable crops worldwide, and play an integral role in U.S. agricultural products representing an estimated economic value of more than \$14.6 billion. Identification of Israeli Acute Paralysis Virus (IAPV) as a marker for CCD is a breakthrough step in solving this major agricultural problem. The USDA has also announced a strategic CCD Research Action Plan which will focus, among other things, on ways to improve the general health of bees to reduce their susceptibility to IAPV, CCD, and other disorders.
- **Avian influenza:** Avian influenza is a threat to both the multibillion dollar U.S. poultry industry and to human health. A major challenge in dealing with this disease is being able to differentiate between infected birds and vaccinated birds, as well as to be able to rapidly differentiate between different strains of avian flu. Through DNA microarray technology, USDA funded scientists are developing fast and accurate tests that will be cost effective for producers and allow more rapid response to outbreaks of avian influenza worldwide.

BIOENERGY AND CLIMATE CHANGE

Bioenergy has the potential to not only reduce our dependence on foreign oils but to provide a clean, sustainable fuel source that may help mitigate global climate change. The USDA funds research projects that produce science-based knowledge and technologies supporting the efficient, economical, and environmentally friendly conversion of biomass, specifically agricultural residuals, into value-added industrial products and biofuels. Furthermore, USDA-funded research is responding to the issue of climate change by contributing to our understanding of the causes and effects of this phenomenon and how to best protect our natural resources. Agricultural and forestry resources are vitally important to

both our development of biobased resources and our ability to address the threat of climate change. As such, agricultural research is essential to addressing these national priorities.

- ***From switchgrass to biofuels:*** Switchgrass has great potential to be a major biofuel source for the U.S. – it grows quickly, is readily adaptable to diverse conditions, and it efficiently captures the energy of the sun, converting it to cellulose which can be used as a clean alternative fuel source. Unlike other crops, we know very little about the genetics of switchgrass, information that is critical for enhancing breeding and maximizing the potential of this important bioenergy crop. University of Georgia scientists, funded by the NRI, are creating a genetic resource library and mapping out genetic traits that will allow producers to select lines with higher biofuel potential.
- ***Cost effective biodiesel:*** Biodiesel is a clean burning and renewable fuel produced from plant oils and animal fats. Unfortunately, biodiesel is currently expensive to produce because of high feedstock costs, high manufacturing costs, and the requirement to dispose of a low-purity glycerol byproduct. NRI-funded researchers are seeking ways to improve the biodiesel production process and develop alternative approaches for the byproduct glycerol. Through use of sophisticated distillation technologies and catalysts, they are developing manufacturing process that will lower the costs of producing biodiesel, lead to a better-quality biodiesel product that exceeds current standards, reduce waste formation, and eliminate the troublesome by-product.
- ***Predicting the effects of climate change:*** Global climate change is likely to affect the croplands on which we are dependent for food. At the USDA's Rainfall Manipulation Plots facility, researchers are able to alter temperature and precipitation over grasslands to simulate estimated climate change outcomes. These long-term studies are providing invaluable information on how crops will react to complex ecosystem changes associated with climate change. Understanding the impact of this phenomenon can greatly enhance the ability of producers and policymakers to prepare for or mitigate negative effects.

A VISION FOR THE FUTURE

The focus on agricultural research resulting from reauthorization of the Farm Bill presents a unique opportunity to strengthen and enhance our national system of agricultural research.

- ***National Institute of Food and Agriculture:*** FASEB fully endorses the establishment of a National Institute for Food and Agriculture (NIFA), within the USDA, dedicated to funding competitive, peer-reviewed basic research in agriculture. This is an unparalleled opportunity to enhance our system of supporting high quality, fundamental research, allowing advancement of current knowledge and bolstering the superiority of American agriculture. However, in order to ensure success of such an endeavor, NIFA must be fully funded, in contrast to the current trend of underfunding that has plagued current agricultural research programs.

THE UNITED STATES IS BEST SERVED THROUGH INVESTMENT IN AGRICULTURAL RESEARCH

From the critical basic research supported at universities throughout the nation to the important work carried out by the Human Nutrition Research Centers, USDA research programs deserve to be supported at the highest level possible. We must maintain and magnify the breadth and competitive nature of the agricultural research portfolio, to ensure the United States' economic vitality and the well-being of all Americans.

FASEB FEDERAL FUNDING RECOMMENDATION

FASEB supports funding the USDA's National Research Initiative Competitive Grants Program in FY 2009 at the \$257 million level recommended in the President's 2008 budget and the Agricultural Research Service at \$1.377 billion, which restores the FY 2005 level, adjusted for inflation.

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