

Statement for the Record
Federation of American Societies for Experimental Biology (FASEB)
House Subcommittee on Agriculture, Rural Development, FDA & Related
Agencies
March 22, 2007

Federation of American Societies for Experimental Biology
9650 Rockville Pike
Bethesda, MD 20814
(301) 634-7650
<http://www.faseb.org>



Statement for the Record
Federation of American Societies for Experimental Biology (FASEB)
House Subcommittee on Agriculture, Rural Development, FDA & Related Agencies
March 22, 2007

The Federation of American Societies for Experimental Biology (FASEB) is a coalition of 21 scientific societies who together represent more than 80,000 biomedical research scientists. Collectively, the Federation works to enhance the ability of biomedical and life scientists to improve, through their research, the health, well-being and productivity of all people. We appreciate the opportunity to submit testimony on the critical research and scientific training being conducted at the United States Department of Agriculture (USDA).

FASEB strongly supports funding the National Research Initiative Competitive Grants Program in FY 2008 at a minimum of the \$248 million dollar level recommended in the President's 2007 budget and the Agriculture Research Service at \$1.377 billion, which restores the FY 2005 level, adjusted for inflation.

Greater investment in basic and applied agricultural research is essential, as the demand for a safer and more nutritious food supply continues to increase. The United States Department of Agriculture (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 maximization 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.

In recent years, 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 cut since FY 2005. 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.

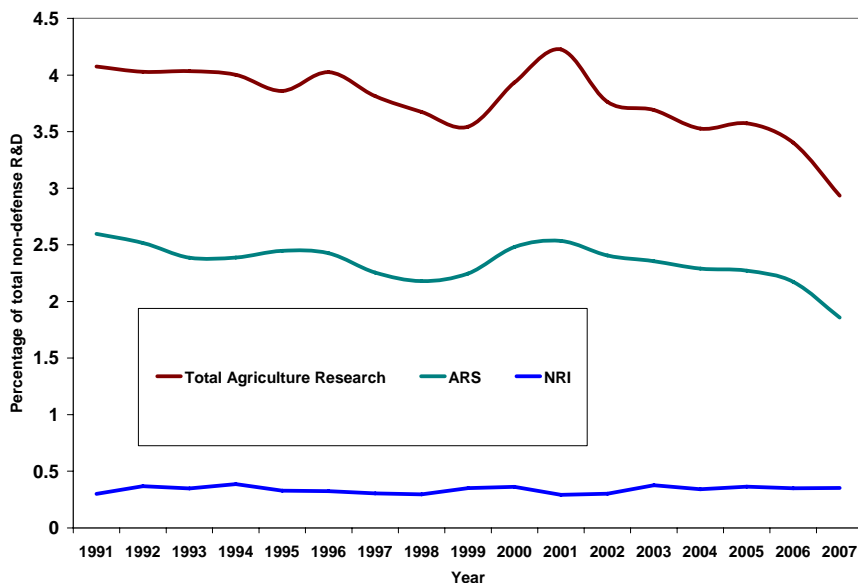


Figure 1: Research at the USDA has been declining in relation to total federal spending on non-defense research & development (R&D), putting our competitive portfolio of agricultural research at serious risk.

Agriculture and the research which advances it remain of crucial importance to our economy and quality of life. Research supported by USDA allows us to develop animal models of human diseases; it protects human life and our food supply from pandemic infection and introduced pathogens; it contributes to our understanding of the nutrition that underlies our health. 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 proven 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 epidemic.

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 best understand the connection between food, the food supply and its production, and the health of our nation. Through its programs in Human Nutrition, focusing on both Optimal Health and Obesity, as well as the related emphasis areas in Food Quality, Value and Safety, and through the research conducted at six Human Nutrition Research Centers (HNRCs) around the country, the USDA is making the connection between what we eat and how we live.

- *Preventing blindness:* Macular degeneration is one of the leading causes of irreversible vision loss in people over age forty. USDA-funded researchers found that females who ate a high proportion of “high-glycemic-index” foods over a ten-year period were more than twice as likely to develop an early indicator of the disease. Such information may be used to prevent the onset of blindness in vulnerable populations.
- *Foods to decrease risk of disease:* High blood homocysteine levels are associated with an increased risk of heart attack, stroke, dementia and some forms of cancer. Scientist at Tufts University found that consuming foods with moderate to high levels of choline, such as eggs, wheat bran, fish, beans and soy products, may prevent unhealthful buildup of homocysteine in the blood. In addition, choline powers the brain, helps convert fat molecules to energy and performs other essential biochemical activities.
- *Monitoring health:* Saliva may be an important biomarker to assess an individual’s health status, by showing changes in diet, physical activity levels and consumption of dietary supplements. Scientists at the National Center for Agricultural Utilization Research in Peoria, IL found that proteins and molecules that comprise saliva change markedly with changes in diet and activity levels.

THE FRONT LINES OF PUBLIC HEALTH AND NATIONAL SECURITY

The primary goal of any successful agricultural biosecurity program is to prevent entry of a pathogen or pest species into a susceptible population of plants or animals. If preventative measures fail, it is imperative to have early detection, rapid and accurate assessment, and immediate implementation of various interventions that prevent spread, control the infection and then begin the recovery phase.

Basic and applied research in agriculture establishes the scientific foundation required to provide a safe, nutritious food supply in a manner that conserves natural resources, promotes sustainable yields, improves human health, enhances the competitive position of US agriculture in the global marketplace, and maintains our ability to feed our population.

- *Keeping produce safe and clean:* As the recent national disease outbreaks involving spinach and tomatoes demonstrate, fresh produce is a vehicle for transmitting food-borne pathogens. There have been 16 outbreaks of *E. coli* O157:H7 illness associated with fresh lettuce or spinach since 1995, and several were associated with pre-harvest contamination. Because produce is eaten raw, it is also a likely target for terrorism. There's no "kill step" when preparing salads or slicing fruit that would occur if they were cooked or preserved. USDA-funded food scientists have categorized the vulnerabilities of fresh fruits and vegetables to terrorists and designed a tracking system for fresh produce growers and packers to help them identify any security breaches.
- *Protecting crops from harm:* When soybean rust was found for the first time in North America in November, 2004, a team of USDA pathologists, Land Grant University faculty, state regulatory officials and Department of Homeland Security agents swung into action. Long dreaded because of the catastrophic crop losses that accompany it, soybean rust's serious economic effects have been averted because previous research had laid the basis for an effective identification and response plan. Currently, fungicides are the only effective option available for management of soybean rust. Soybean rust-resistant cultivars are not available and cultural practices like row width, planting date, and tillage may have minimal or inconsistent effects on soybean rust development. An aggressive strategy of sentinel plots and integrated epidemiological and weather forecasting models coupled to active extension education programs on appropriate agronomic control practices is helping to maintain production levels.
- *Ensuring food safety:* Cooks are taught to store food at cold temperatures to prevent bacterial growth and to cook food thoroughly to kill unwanted pathogens. Research supported through the NRI has brought the disheartening news that *Clostridium perfringens*, an organism causing a common food-borne illness, is capable of surviving heating and cold storage and producing the enterotoxins that cause human illness. The gene for the enterotoxin most likely to cause illness resides on the bacteria's chromosomes (rather than on the more common genetic structure found in microorganisms called a plasmid), and this quality allows it to survive temperatures that would ordinarily destroy it. This knowledge will allow the development of new storage and preparation techniques to ensure that the food we eat is safe from all disease-causing microorganisms.

ANIMALS & AGRICULTURAL RESEARCH: TOOLS IN THE BATTLE AGAINST DISEASE

Livestock species serve not only as invaluable food and production resources, but research to increase our understanding of their basic biology and relationship to humans has made significant contributions to human and animal health. Many livestock species serve a critical role as models for human diseases, allowing scientists to identify the causes of and treatments for a variety of conditions. Fundamental discoveries in animal genomics and physiology have led to improvements in production practices, animal health, and human medicine.

Moreover, zoonotic diseases, which can pass from animals to humans, pose a formidable public health risk, as we have seen from recent outbreaks of SARS, West Nile Virus, and Bovine Spongiform Encephalopathy ("mad cow" disease), as well as from the increasing threat of antimicrobial resistance or an avian influenza pandemic. Animal pathogens can devastate domestic animal populations and/or create severe economic losses through the costs of control and prevention, loss of markets and the interruption of the food supply chain. Although federal agencies like the National Institutes of Health (NIH) and Centers for Disease Control and Prevention (CDC) are addressing human prophylaxis and treatment, it is critically important to monitor and halt these diseases at their source, the animal host.

- *Preventing insect-transmitted diseases:* Scientists at Washington State University are studying genes in cattle that are affected by a bacterial infection, anaplasmosis, transmitted by a tick. They have identified the complete genome of the bacteria causing the disease and are using this knowledge to discover which genes are activated by tick transmission of the infectious agent. Successful completion of the research will fill gaps in knowledge broadly applicable to other vector-borne pathogens and thus lead to new opportunities for development of transmission-blocking methods that could fundamentally alter control worldwide of tick-borne diseases, including Lyme disease, Rocky Mountain Spotted Fever, and babesiosis (related to malaria).
- *Identifying & solving the causes of infertility:* Male infertility is a problem affecting both domestic animal production and human health. USDA-funded researchers at the University of Illinois have identified proteins important in male fertility and have used this knowledge to create a test to quickly evaluate the fertility of semen samples and identify potential problems. Multiple semen samples can be evaluated simultaneously, increasing test power and speed, eliminating normal variations in individual tests, and improving reproducibility of results. The test is also providing scientific insight into the molecular defects that decrease fertility and this knowledge may one day be utilized to create therapies for alleviation of human male infertility. Moreover, ruminant species, especially cattle, are important animal models for understanding basic mechanisms that regulate the development and function of ovarian follicles. In terms of the regulation of follicular development, cattle appear to be more similar to humans than any other non-primate animal model. Therefore, USDA-supported research in this area may lead to new therapies to ameliorate infertility or suggest new methods of contraception for women.
- *Halting animal carriers of disease:* Most emerging diseases that affect human health such as SARS, H5N1 avian influenza, and variant Creutzfeld-Jakob Disease (CJD) were originally animal diseases that acquired the ability to infect people. USDA is funding a global effort to develop the tools needed to create vaccines and tests for infectious animal diseases that threaten agriculture and the food supply. The initiative is focusing on six economically important species: cattle, poultry, horses, swine, catfish, and salmonids. To ensure access by as many researchers as possible, the reagents developed through the research will be stored in cell banks in the US and Europe and marketed by commercial vendors. In addition, the USDA announced in January 2005 the establishment of a research and education project to help prevent an outbreak of avian influenza. Researchers from the ARS, universities in more than a dozen states, and an array of private organizations are participating in the effort, which is working to substantially improve control of the disease in the United States.

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.

As noted at the beginning of our testimony, FASEB strongly supports funding the National Research Initiative Competitive Grants Program in FY 2008 at a minimum of the \$248 million dollar level recommended in the President's 2007 budget and the Agriculture Research Service at \$1.377 billion, which restores the FY 2005 level, adjusted for inflation. We look forward to working with Congress to restore funding to this essential area of research.