



December 2, 2020

The Honorable Pat Roberts
Chairman
U.S. Senate Committee on
Agriculture, Nutrition, and Forestry
328A Russell Senate Office Building
Washington, DC 20510

The Honorable Debbie Stabenow
Ranking Member
U.S. Senate Committee on
Agriculture, Nutrition, and Forestry
328A Russell Senate Office Building
Washington, DC 20510

Dear Chairman Roberts, Ranking Member Stabenow, and Members of the Committee:

The Biotechnology Innovation Organization (BIO) is pleased to submit a statement for the record to the United States Senate Committee on Agriculture, Nutrition, and Forestry hearing on *Agricultural Research and Securing the United States Food Supply*.

Introduction

BIO represents 1,000 members from the biotech ecosystem around a central mission – to advance public policy that supports a wide range of companies and academic research centers that are applying biology and technology to improve the lives of people and the health of the planet. Our members operate at the nexus of environmental, human, and animal health. They are developing biology-based technologies to enhance cultivation and food production and produce sustainable fuels, renewable chemicals, and biobased products. Our growing understanding of the plant, animal, and microbial worlds, in conjunction with supportive policies and regulations, stand to modernize agriculture, energy, and manufacturing.

Innovative breakthroughs can secure our nation’s food supply by reducing greenhouse gas emissions throughout agricultural supply chains; strengthening producers’ resiliency to climate change while increasing production; and tackling hunger and malnutrition by delivering more nutritious offerings to all tables.

Developing these innovative technologies requires robust support from public and private sector research.

Overview

Federal research programs under USDA’s National Institute of Food and Agriculture (NIFA) Agriculture and Food Research Initiative (AFRI) are fundamental to the applied research, extension, and education of food and agricultural sciences to improve rural economies and create new sources of energy. These programs also are essential for the agricultural workforce development that underpins large systems-level approaches needed to maintain America’s global preeminence in food, agricultural, and bioenergy production.

While there has been increasing research and development in biotechnology platform technologies— such as gene editing, synthetic biology, cell culturing, and

fermentation—increased federal funding and improved coordination between federal agencies will be critical to maintain America’s leadership in an increasingly competitive race to generate breakthroughs.

Continued support of land-grant universities and Historically Black Colleges and Universities (HBCUs) is crucial to advance this research and develop young scientists and engineers for the benefit of our nation’s food supply. Finally, we must take steps to ensure the gains from these innovations are broadly shared to fully unleash the transformative potential of science for the benefit of humanity.

Benefits of Research and Development to Securing the Food Supply

Public and private investments in agricultural research and practical applications pay huge dividends to the United States. However federal funding for food and agricultural science has been essentially flat for over 20 years, despite greater needs, and has reportedly declined by about 25 percent in real terms since 2003.¹

As the National Coalition for Food and Agricultural Research (NC-FAR) highlighted, recent analysis by the International Food Policy Research Institute of 292 studies of the impacts of agricultural research and extension published since 1953 found an average annual rate of return on public investments of 48 percent – an extremely high rate of return by any benchmark.²

An ISU Center for Agricultural and Rural Development (CARD) report entitled, *“Measuring Public Agricultural Research and Extension and Estimating their Impacts on Agricultural Productivity: New Insights from US Evidence³”* notes that society must increase agricultural productivity without causing immense environmental damage and hunger to meet the needs of a growing global population. Without question, achieving this goal will require greater investment in agricultural research and extension.

USDA’s Research, Education, and Economics (REE) programs and Agricultural Research Service (ARS) play a critical role in partnering with academia and industry to advance science-based solutions. Research and Extension Programs such as McIntire-Stennis, 1890 Extension, Evans Allen, Hatch Act, and Smith-Lever have been assisting farmers and ranchers in adopting best practices that increase productivity while improving soil, water, and air quality.

USDA’s Biotechnology Risk Assessment Research Grants (BRAG) program generates new information to assist Federal regulatory agencies in making science-based decisions about the potential effects of introducing into the environment genetically engineered organisms. Continuation of programs like BRAG encourage modernized regulatory systems needed to advance innovation.

The need to modernize our nation’s aging food and agricultural science infrastructure, both at USDA labs and universities, deserves attention. Greater funding should be made available to strengthen land-grant universities and HBCUs. Such investments can bolster research and train the next generation of agriculture scientists, researchers,

¹ https://www.ncfar.org/NCFAR_Testimony_FY_20_House_040519.pdf

² <https://www.ncfar.org/need.asp>

³ <https://lib.dr.iastate.edu/agpolicyreview/vol2016/iss1/3/>

farmers, and ranchers to use precision agriculture techniques, deploy new crops, and sequester more carbon in their soil.

Bolstering Agriculture Research and Development of Platform Technologies

Significant investments in platform technologies such as gene editing and synthetic biology aim to ensure agricultural research can meet the challenges of feeding a growing world and tackling climate change.

For example, The use of gene editing for multi-trait seed improvements can increase agricultural production by up to 400 mmt, reduce emissions by up to 30 megatonnes of CO₂, reduce freshwater withdrawals by up to 180 billion cubic meters, reduce the number of micronutrient deficient by up to \$100 million, and generate up to \$100 billion in additional farmer income⁴.

Advancements in animal biotechnology can further our nation's efforts to safeguard animal health, food safety, and the environment. Increasing genomic research in animal agriculture will also unleash enormous progress in terms of food production and security.

Just like animal biotech, research and development of plant protein and cellular agriculture can provide solutions for improving the productivity and environmental sustainability of food, feed, and animal production and addressing the increasing demand for protein in a growing world. These technologies have tremendous potential for expanding our nation's bioeconomy and diversifying our food supply. Supportive research by USDA AFRI can advance the development and optimization of cell lines, cell culture media, scaffolding, and cultivators (bioreactors) for producing meat through cellular agriculture.

Increasing research in synthetic biology will unlock innovations in agriculture and food productions, energy, and manufacturing. Biotechnology companies have identified opportunities to incorporate synthetic biology⁵ in groundbreaking advances in industrial biotechnology manufacturing processes. Companies have begun using science to optimize the processes for producing renewable chemicals, biobased products, and biofuels. With synthetic biology techniques, industrial biotechnology companies can save time by shortening the number of steps used in traditional processes, reducing costs while developing new products. They can also reduce the products' impact on the environment. With proper support synthetic biology can transform our economy.

Because of strong federal support, the United States is a leading nation in the development of synthetic biology. This success and high research productivity are not lost on foreign governments, including China, who are trying to kick-start their biomanufacturing sectors to catch up to, or even leapfrog, the U.S. Our continued growth will be fueled by robust scientific research, strong intellectual property rights, well-functioning technology transfer, dynamic capital investment, science- and risk-based regulation that minimizes obstacles, and public support that embraces the positive influence of biotechnology.

⁴ https://www.ncfar.org/HSS_20200713_Presentation.pdf

⁵ <https://www.bio.org/blogs/synthetic-biology-innovation-industrial-biotechnology>

Supportive grants for research and development and startup will provide significant advances in foundational tool development and practical applications ranging from bioenergy, biomanufacturing, to biomedicine. The recommendations put forward by the National Academies of Sciences Engineering Medicine report, *Safeguarding the Bioeconomy*⁶ can give further guidance in advancing the bioeconomy for the betterment of the U.S. and society.

Benefits of Agriculture Research and Development for Fuels and Manufacturing

USDA's regional perspective also is critical to the development of sustainable fuels, enabling agriculture to be a key contributor in addressing emissions from the transportation sector. Research through NIFA supports the development and production of advanced biofuels compatible with agricultural systems. It convenes researchers, landowners, communities, and private industry to grow bioenergy and develop new biomass crops and supply chains.

Research related to biobased products focuses on developing technologies leading to new and improved non-food products that expand markets for farm products, replace imports and petroleum-based products, and offer opportunity to meet environmental needs. Many of the biobased innovation available today began in university laboratories. Supporting the source of these important developments will be vital to enhancing the growth of the industry. The government should increase opportunities for private sector and university collaboration through ongoing National Science Foundation (NSF), USDA, and DOE funding grants⁷.

Funding of base biological and environmental research also has broad implication in environmental remediation, and reengineering of microorganisms and plants with direct relevance to energy, climate, and the environment and enhancing the sustainability of biobased products and renewable fuels.

Conclusion

Fostering agricultural research will not only secure the United States food supply but will allow the U.S. to advance innovative breakthroughs to enable agriculture to tackle climate change and tackle hunger. However, to truly unleash the transformative potential of science and we must take steps to ensure the gains from these innovations are broadly shared for the benefit of humanity.

BIO looks forward to working with the Committee and Congress in supporting pro-innovation policies that foster research and development technologies to secure the nation's food supply and develop the bioeconomy.

⁶ <https://www.nap.edu/resource/2525/interactive/>

⁷ <https://www.biopreferred.gov/BPResources/files/BiobasedProductsEconomicAnalysis2018.pdf>