

Prioritizing Agricultural Research in the 2023 Farm Bill

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Agricultural R&D drives domestic and international growth and stability

Public investment in agricultural research has been the foundation for growth in agricultural productivity for more than a century. This has led to an abundant and affordable food and fiber supply throughout most high-income countries and helped fuel dramatic progress in reducing food insecurity and supporting livelihoods in many areas of the world. According to the US Department of Agriculture (USDA), increased productivity due to research breakthroughs and innovation has been the main contributor to economic growth in US agriculture in recent decades. Between 1948 and 2019 US farm output increased by 175 percent, growing at an average annual rate of 1.42 percent. US farmers are producing 2.7 times what they were growing 70 years ago, using approximately the same amount of inputs (see figure 1).

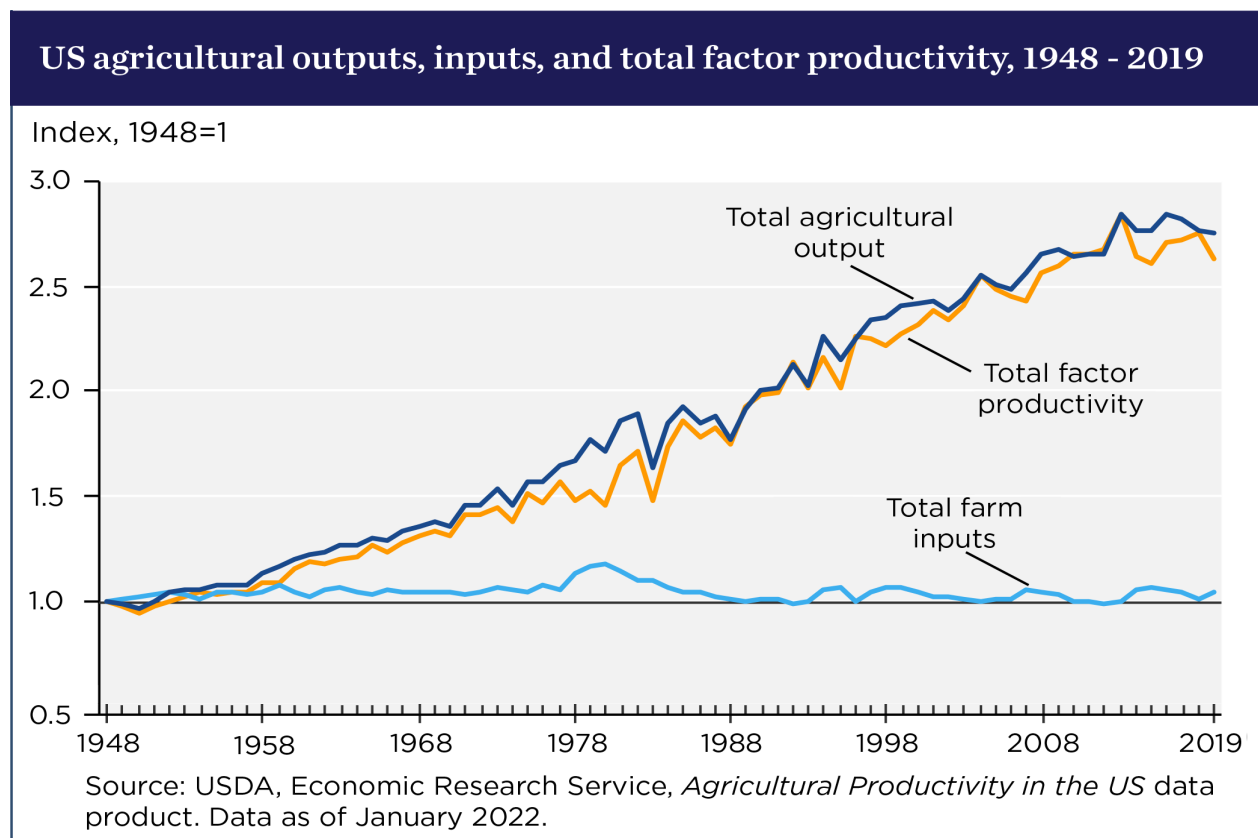
Agricultural research funding generates significant returns on investment, making

it a highly effective and beneficial use of taxpayer dollars. Research supported by the USDA Economic Research Service (ERS) shows that every \$1 invested in public agricultural research and development (R&D) from 1900 to 2011 generated \$20 in benefits to the US economy, on average. These benefits reach all Americans and include improvements in rural development, nutrition, food safety, quality and affordability, natural resource management, market efficiency, and policy.

Despite these accomplishments, more innovations are needed to help US farmers, who earn only \$0.08 for every dollar spent on food production. High costs for inputs like fertilizer as well as costs beyond the farm gate like labor, processing, and distribution make it hard for farmers to make ends meet and invest adequately in their operations to meet the growing challenges to agricultural production now and in the future.

The anticipated 2023 Farm Bill offers a once-every-five-year opportunity to scale up funding for public agricultural R&D. This funding would lock in key resources to help farmers get the tools they need to expand productivity, speed adaptation to changing

Figure 1



conditions, mitigate rising input costs—and aid the search for sustainable alternatives—and innovate to feed a growing global population more efficiently.

Beyond our borders, US investment in public agricultural R&D also dramatically influences global food security, nutrition, and political stability in other countries, providing an essential national security benefit. The United States invests in international agricultural R&D through a number of initiatives, including support for CGIAR, the world's largest publicly funded agricultural research network committed to driving innovations in lower- and middle-income countries (LMICs). With studies showing a \$10 return for every \$1 invested in CGIAR over time, support for CGIAR can improve global food security by giving farmers, particularly smallholders, the knowledge and tools needed to thrive in a changing climate.¹

Ultimately, these investments can help prevent food shortages and famines abroad and reduce US spending on humanitarian food aid, which climbed to \$15 billion in 2022 from \$3.26 billion in 2014, according to the US Agency for International Development (USAID). Furthermore, investments in agricultural R&D can help reduce conflict and migration linked to insufficient farming livelihoods across borders. Just witness the crisis at the US southern border, where scores of Central American migrants are seeking refuge after fleeing poverty, conflict, and extremely high levels of malnutrition in their home countries due in large part to the collapse of agricultural production.

Despite the benefits, US agricultural research funding is declining as other countries gain an advantage

Over the last few decades, US public funding for agricultural research has fallen in inflation-adjusted terms, even as public funding for a range of other critical research areas, including medical and energy issues, has exploded by nearly 150 percent. Since 1995 agricultural research funding from federal and state governments has declined 20 percent, from about \$6.5 billion to \$5.2 billion as of 2019.² As a result, federal research funds for USDA's research and statistical agencies (i.e., Agricultural Research Service (ARS), National Institute of Food and Agriculture (NIFA), Economic Research Service (ERS), and National Agricultural Statistics Service (NASS)) have grown at a much slower rate in recent decades than comparable research-focused entities in other parts of the federal government. As shown in figure 2, combined funding for research at those four USDA agencies grew at an annual rate of less than 2.5 percent in nominal terms between 1995 and 2021, while funding for wide-ranging research under the auspices of the National Science Foundation (NSF) grew at an annual clip of 5.1 percent. Medical research funding for the National Institutes of Health (NIH) grew at a robust 5.4 percent over the same period.³ This lack of support for agricultural research has serious

Box 1: Public research investments are needed to complement private-sector innovations

While private-sector R&D is beneficial and important to cultivating high-value opportunities, the private sector invests deeply in a limited set of areas where it can profit in the short term. For instance, total US corn yields in bushels per acre have increased more than 360 percent since 1950 thanks largely to significant research investments by the private sector. Other major row crops in which the private sector heavily invests have seen similarly significant gains. However, other commodities in our food supply that are important for good nutrition have seen significantly less investment and, consequently, smaller production, nutrition, and efficiency gains. These commodities—including wheat, sorghum, rice, animal-sourced foods, and specialty crops—are more vulnerable to pests, disease, labor issues, and climate shocks. Since the private sector is not as incentivized to invest in them, public R&D is necessary to support continued production advances that help keep the farm families that produce them in business and consumer prices low. Public investment is also needed to support research in areas that benefit society broadly but offer less clear monetary returns, such as environmental, animal health, and food safety research.

implications, stymying desperately needed innovations as many important and potentially groundbreaking projects go unfunded or underfunded. In fact, less than half of research proposals from universities that are recommended for USDA funding are awarded under the agency's Agriculture and Food Research Initiative (AFRI) due to congressional funding shortfalls (see table 1).

This decline in US public funding for agricultural research threatens the global competitiveness of US agribusinesses as other major agricultural powerhouses—China, Brazil, and India—have all ramped up spending in recent decades (see figure 3). China surpassed the United States as the leading public provider of agricultural research funding globally in 2008, then passed the now 27-member European

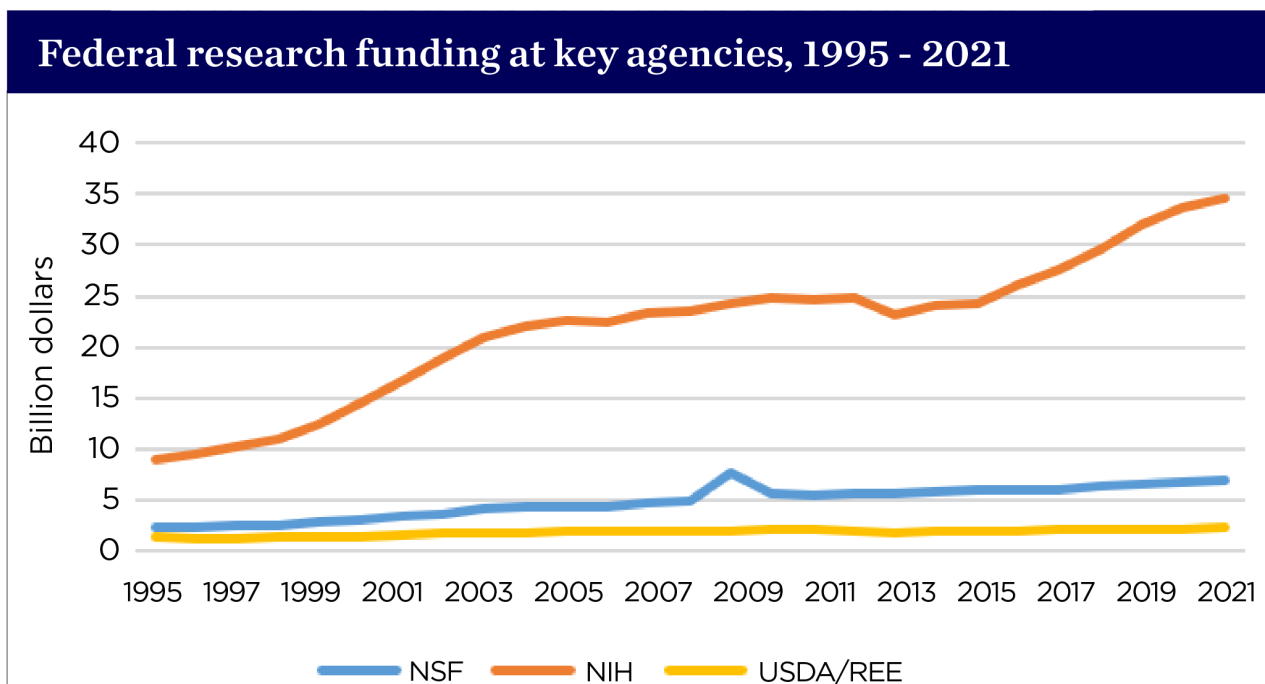
Union in 2011. While still trailing the United States in total annual spending, both Brazil and India have increased their funding for agricultural research in recent years.

These funding trends must be reversed quickly, as multiple studies show that there are frequently long lags between research investments and the commercialization and adoption of new agricultural technologies or practices, with lead times sometimes in the decades.⁴ To meet present and future agricultural challenges, policymakers must use the 2023 Farm Bill to fund agricultural R&D and fuel science-based solutions. US farmers, ranchers, and foresters need innovative and powerful tools to feed the world and support themselves and their communities' access to affordable, nutritious food.

Table 1

Research applications from universities funded by AFRI		
<i>Less than half of research proposals from universities that are recommended for USDA funding are awarded due to congressional funding shortfalls.</i>		
Applications requested	2,787	\$1.36 billion
Recommended for funding	1,614	\$845 million
Awarded	719	\$377 million
<i>Source: AFRI FY 2020 Annual Review</i>		

Figure 2

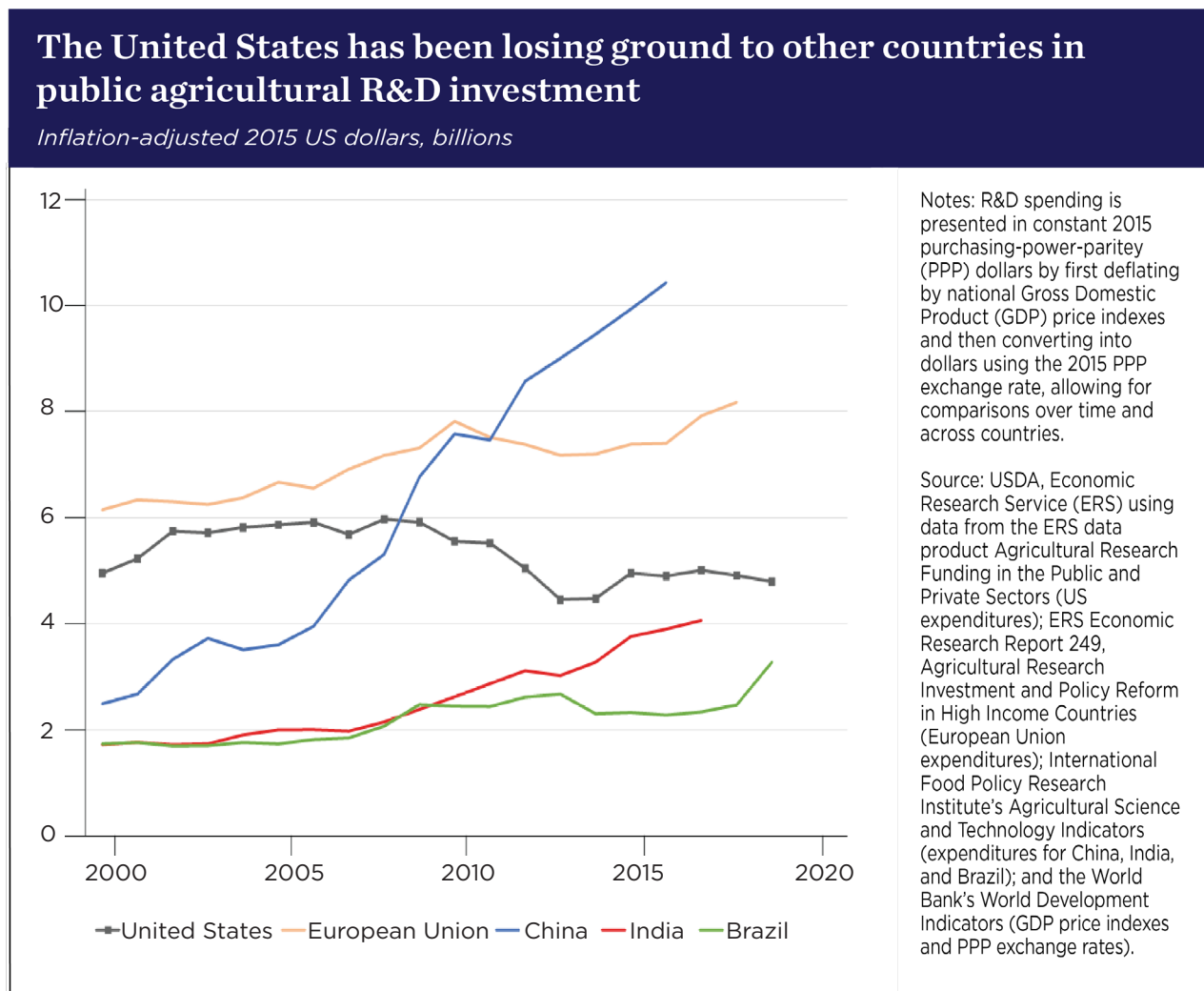


Box 2: The public and private sectors can work hand in hand: The Foundation for Food and Agriculture Research

Congress established the Foundation for Food and Agriculture Research (FFAR) as a public-private partnership for agricultural research in the 2014 Farm Bill. Its mission is to increase public agriculture research investments by leveraging the extraordinary scientific and financial resources in agriculture outside of government—often in the private sector. Every dollar that FFAR spends on research requires a matching investment, thus increasing the impact of public funding. To date, FFAR has matched every dollar of federal investment with an average \$1.40 in nonfederal funding.

FFAR's role as a public-private initiative allows farmers and the private sector to be included at every stage of the research process. This enables FFAR to focus its investments on deployable, user-focused research at the precommercial stage and helps align research priorities to limit redundancies in public and private research. Moreover, FFAR has the capacity for rapid response and the flexibility to fund international research that benefits US farmers, including work at CGIAR. FFAR receives mandatory funding in the Farm Bill and is viewed as a good investment, as it complements the work of USDA and more than doubles federal taxpayer dollars, incentivizing private, state, and other nonfederal investments toward public agricultural research.

Figure 3



Policy recommendations

The upcoming Farm Bill debate will offer a unique opportunity to bolster US support for agricultural research, development, and extension in service of US farmers and consumers as well as smallholder farmers in LMICs, who also stand to benefit from productivity gains. The recommendations below offer specific ideas for refining and strengthening Farm Bill program authorities.

- 1. Provide regular increases for agricultural research funding for the four USDA research and statistical agencies.** Increases should follow the approach proposed in the America Grows Act, which would steadily raise funding for all four USDA agricultural research agencies for the next 10 years. This approach was successful in increasing public funding at NIH for health research over six fiscal years (1998 to 2003) and should be duplicated for agriculture.
- 2. Reauthorize and provide robust funding to FFAR and broaden its mandate so it can serve as the foundation for agricultural research across the US government.** FFAR should be funded so it can continue to incentivize R&D investment from nongovernment funders, including private industry, toward public agriculture research in the precompetitive stage. Other US agencies such as the Defense Advanced Research Projects Agency (DARPA), Advanced Research Projects Agency–Energy (ARPA-E), National Science Foundation (NSF), and others should be encouraged to utilize FFAR to leverage scientific resources outside government, when advantageous, to solve global food and agriculture challenges that may impact national security.
- 3. Examine how USDA has used its new authority under section 7101 of the Agriculture Improvement Act of 2018 to engage in international research collaborations.** A report to Congress from USDA about the number, subject matter, and international partners involved in these collaborative efforts would help inform future debates about USDA’s role in different forms of international agricultural research.
- 4. Reauthorize the Agriculture Advanced Research and Development Authority (AgARDA) to develop technologies that address global food and agriculture challenges.** Funding agencies within USDA are largely committed to existing missions defined by stakeholders and Congress and have few resources and little opportunity to address new needs. AgARDA is a pilot effort for a new Advanced Research Projects Agency (ARPA)-style research agency in the USDA authorized by the Agriculture Improvement Act of 2018 (Farm Bill) to focus solely on agriculture. Reauthorizing and fully funding AgARDA at the authorized level would help infuse much-needed research funding into agriculture in line with national security goals.
- 5. Expand authorities within USDA’s Foreign Agricultural Service aimed at agricultural development to ultimately reduce the need for emergency food aid.** The authorities for the Food for Progress program established in 1985 and the Scientific Cooperation Research Program (SCRIP) authorized in 1977 should be updated to reflect the need to bolster developing countries’ agricultural research, education, and extension capabilities to help modernize developing countries’ agricultural sectors.
- 6. Expand and strengthen knowledge sharing and peer support programs for agriculture such as extension in LMICs.** Enhanced extension efforts should be incorporated into the international R&D process to ensure that smallholder farmers have the information they need to adapt to a changing climate, protect their livelihoods, and feed their communities. Toward this end, the Farm Bill should continue to support scientist-to-scientist and educational programs such as the Farmer-to-Farmer program, the International Agricultural Education Fellowship Program, and other fellowship opportunities. These programs are highly impactful because they facilitate local capacity building and education and benefit extension systems that deliver solutions directly to farmers.
- 7. Ensure agricultural research programs focus on improving nutrition outcomes as well as productivity gains.** Public agricultural research must look at nutrition and diet as a critical component of agriculture and the US and global food systems. Research topics to support could include

investigating changing micronutrient content of crops as a result of climate change, shifting food accessibility, and solutions to increase the supply of nutritious foods such as fruit, vegetables, and animal-sourced foods, including meat, dairy, and eggs.

8. Provide more consistent support for USDA Climate Hubs to improve data

and research sharing and collaboration.

Congress should provide a consistent source of funding for USDA Climate Hubs to increase their capacity to share relevant climate data with USAID and engage in collaborative international work due to the nature of climate change.

Endnotes

- 1 Julian M. Alston et al., “The Magic of CGIAR Research: Harvesting \$10 for Every \$1 Invested” (paper commissioned by the Supporters of Agricultural Research Foundation (SOAR), October 2020), https://static1.squarespace.com/static/6346ea27d121155417d78c6a/t/638fa226f5bcaa50fba95ec1/1670357547152/soar_cgjar_key_findings_final.pdf.
- 2 Kelly P. Nelson and Keith Fuglie, “Investment in U.S. Public Agricultural Research and Development Has Fallen by a Third in Recent Decades, Lags Major Trade Competitors,” *Amber Waves*, June 6, 2022, <https://www.ers.usda.gov/amber-waves/2022/june/investment-in-u-s-public-agricultural-research-and-development-has-fallen-by-a-third-over-past-two-decades-lags-major-trade-competitors>.
- 3 “Federal Funds for R&D,” National Science Foundation, various years, <https://www.nsf.gov/statistics/fedfunds>.
- 4 Julian M. Alston et al., “Research Lags Revisited: Concepts and Evidence from U.S. Agriculture” (paper presented at 2008 annual Economic History Association meetings), 2008, <https://doi.org/10.22004/ag.econ.50091>.

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