

Defense Production Act: The Department of Defense should invest in food biomanufacturing to advance national security

A robust, secure, and adaptable food system is integral to military readiness, civilian security, global stability, and the long-term strategic interests of the United States. Biotechnologies for food production can build food security and biosecurity by promoting supply chain resilience and reducing agricultural bioterrorism risks. While many countries are ramping up support for agricultural biomanufacturing, U.S. commitments have remained relatively low.

As the Department of Defense (DoD) plans to invest \$1 billion in biomanufacturing over the next several years, GFI recommends that the DoD prioritize biotechnology-based food production under the Defense Production Act Investments (DPAI) Program.¹ By investing in secure, efficient, and diversified food production methods, DoD can simultaneously address supply chain vulnerabilities, improve defense warfighting capabilities, and advance American leadership in the bioeconomy.

DoD investment in biotechnologies for food production would:

- Advance U.S. supply chain resilience, as production processes like fermentation, plant-based food manufacturing, and cellular agriculture require fewer inputs and supply chain links.
- Mitigate against potential agricultural bioterrorism and reduce food supply susceptibility to animal disease.
- Promote food security and foster overall supply chain diversification by increasing food options.
- Allow the United States to respond to growing global food demand through export, mitigating the risk of future food-related conflict.
- Establish small-scale manufacturing capabilities for U.S. defense forces with the potential for localized food production at military bases abroad, at sea, and in space.
- Enable warfighter performance enhancement by supporting the nutritional status and health outcomes of military personnel.

Emerging food production biotechnologies:

- **Fermentation** is a powerful, flexible process for using microorganisms to produce food products. Biomass fermentation efficiently produces large amounts of protein-rich food, while precision fermentation produces specific proteins, enzymes, flavor molecules, vitamins, pigments, and fats.
- **Plant-based food manufacturing** produces food products from crops and plant ingredients. Plant-based food production is resource-efficient and adaptable, directly converting plants into meat, dairy, and other products.
- **Cellular agriculture** produces food products directly from animal cell cultures. The process of cultivating meat and seafood uses the basic elements needed to build muscle and fat and enables the same biological process that happens inside an animal.

Prioritization of New Foods Production Under the DPAI Program

Growing recognition of food system innovation needs

In 2022, President Biden signed an Executive Order on Advancing Biotechnology and Biomanufacturing, setting out a whole-of-government approach to advance the bioeconomy. The Executive Order specifically highlighted cultivating alternative food sources as a key research and development area.² DoD has similarly recognized the need to accelerate the development of alternative food sources for defense preparedness.³ In line with the federal government's increasing interest in food system innovation, the Center for Strategic and International Studies (CSIS) recently published a report concluding that investment in alternative protein technologies would provide significant strategic benefit to the United States.⁴

Following the Executive Order, DoD announced plans to invest \$1 billion in biomanufacturing infrastructure. DoD subsequently published a Request for Information on investing in biomanufactured products of interest under the Defense Production Act.⁵ DoD's recent "Biomanufacturing Strategy" further underscores biotechnology's overall role in national security and the need for increased public investment into biomanufacturing capabilities.⁶

Despite the growing recognition of the value of biotechnologies for food production, significant gaps remain in research, development, and commercialization support. Through the Defense Production Act Investments (DPAI) Program, DoD can address these gaps to advance food biomanufacturing.

Defense Production Act Investments

The Defense Production Act allows the federal government to shift economic activity toward national defense priorities. Specifically, the DPAI Office can incentivize manufacturers to develop, expand, or modernize production capacity and supply. DPAI tools include grants, loans or loan guarantees, and purchase commitments. In 2023, DoD has made over \$700 million in investments under the DPAI Program to support defense-critical supply chains.⁷

Through the DPAI Program, DoD can make crucial early investments in new food technologies and spur commercial adoption in the civilian market. The alternative protein industry, for example, could use this type of support to improve product development, affordability, and manufacturing capacity. Investing in commercial-scale capacity can address manufacturing bottlenecks and lower production costs, enabling crucial industry scale-up.

Food-production biotechnologies should be technologies of interest under the DPAI Program. Given the potential to increase supply chain resilience, biosecurity, and defense preparedness, DoD should prioritize food production capabilities amongst other objectives that include firepower, fuel, and fabrication.

Recommendations for DPAI Program

Based on industry input, including a recent convening of more than 20 companies and academic institutions, the DPAI Program can best support the food biomanufacturing sector through:

- Offtake agreements with food biomanufacturing companies to secure products for defense personnel, such as DoD procurement of fermentation-based or plant-based meat products.
- Grants for commercial-scale manufacturing facilities for the biotechnology-based food industry, including the construction of new facilities and expansion of existing facilities, to scale up domestic biomanufacturing capabilities.

The Bioeconomy & National Security

The agricultural bioeconomy

In agriculture, prioritizing biotechnology and biomanufacturing can make production more sustainable by harnessing the most effective methods of meeting food demand. Alternative proteins offer sustainable solutions to the increasing demand for protein while addressing resource challenges. For instance, plant-based proteins using crops like soy, peas, or legumes offer a more efficient use of land and water resources.⁸ Beyond resource efficiency, a strong agricultural bioeconomy benefits U.S. national security by promoting supply chain resilience and biosecurity.

Supply chain resilience and agility

Advancing food biomanufacturing capabilities can bolster supply chain resilience and agility. Due to the simplification and localization of production processes, biotechnology-based food production can help reduce supply chain vulnerabilities. Plant-based and cultivated meat, for example, require fewer inputs and supply chain links.⁹ Furthermore, production facility location is adaptable as production is largely untethered from environmental considerations. Given a sufficient workforce, companies can locate manufacturing facilities to achieve supply chain proximity. Alternative protein production at scale can, therefore, improve the food system's resistance to shocks and disruptions.

Biosecurity and food security

Investment in biotechnology-based food production can reduce vulnerabilities in domestic food supply and build U.S. biosecurity. In particular, traditional agricultural practices are susceptible to agricultural bioterrorism—small- or large-scale attacks targeting production infrastructure and the introduction of animal pathogens—which can negatively affect food security, public health, and the economy. Fermentation, plant-based food manufacturing, and cellular agriculture offer reduced susceptibility to animal diseases and can mitigate against potential agricultural bioterrorism.¹⁰

Diversifying food sources further supports food system resilience. Expanding biotechnology-based food options counters ongoing food sector consolidation, decreasing the impacts of potential food shortages or supply disruptions. Moreover, the United States, after a longstanding agricultural trade surplus, has experienced agricultural trade deficits in recent years as imports surpass exports.¹¹ By expanding food biomanufacturing capabilities, we can build food system independence and regain a trade surplus through export. The United States can also respond to growing global food demand and predicted declines in global crop yields due to climate change, mitigating the risk of future food-related conflict.¹²

Defense capabilities

A secure and resilient food supply is crucial for maintaining the readiness and health of military personnel. Defense supply chains shielded from disruptions are necessary to ensure operational continuity. Food-production biotechnologies can increase the security of food supplies for the nation's defense. Fermentation and cellular agriculture, for example, can be employed to produce food locally, at military bases abroad, at sea, or in space, to ensure a secure, consistent, and fresh food supply.¹³ Given their simplified and adaptable production process, reduced perishability, and other factors, these technologies can reduce the costs and risks of food transport.

In addition, advanced food biomanufacturing capabilities can strengthen the U.S. warfighting edge over potential adversaries. The ability to produce food locally and rapidly could enable Armed Forces to deploy faster and stay in the fight longer, expanding defense capabilities. Additionally, foods produced through fermentation or plant-based manufacturing can offer nutritional benefits. Through incorporation into Meals Ready to Eat (MRE) and conventional meals, these foods can support healthy diets for soldiers and other personnel.¹⁴

American competitiveness

DoD's "Biomanufacturing Strategy" identifies the increasing need to support emerging industries in the bioeconomy: "The biomanufacturing revolution is happening now, and the United States will continue to lead the way in biotechnology. ... However, the Nation must act swiftly and deliberately to maintain its competitive advantage."¹⁵ American innovators, researchers, and regulators have historically led the way in food-production biotechnologies. To maintain and strengthen our competitive advantage, we must increase public investment. Countries such as China, Israel, and Singapore are increasingly prioritizing investment in the sector. Worldwide in 2022, governments invested \$635 million in alternative protein technologies, while all-time investment by the United States totals only \$45 million.¹⁶ Investments through the DPAI Program would provide researchers, entrepreneurs, and producers the support needed to maintain American agricultural leadership and ensure a stable and secure food supply.

Job creation and economic growth

Research, development, and commercialization of biotechnologies for food production will spur job opportunities and grow the economy. On a global scale, the alternative protein industry can support up to 9.8 million jobs and \$1.1 trillion in economic value.¹⁷ With proper investment, the United States can lead the way in job creation and economic growth.

Conclusion

Advancing biomanufacturing capabilities for food production should be a top priority for U.S. national security. DoD can invest in food-production biotechnologies under the DPAI Program through company offtake agreements and access to capital for commercial-scale manufacturing facilities.

With sufficient investment, DoD can foster American innovation, strengthen our food system and defense preparedness, and promote national security for future generations. Such investment would build a strong agricultural bioeconomy and allow Americans to fully access a diverse array of products and their associated health, economic, and social benefits.

DoD should not wait for a food supply crisis to begin investing in biotechnology to fortify the U.S. food system. In harnessing the power of domestic biotechnology and biomanufacturing, DoD can position itself to be at the forefront of resilient and future-oriented food system solutions.

About GFI

The Good Food Institute is a 501(c)(3) nonprofit working internationally to make alternative proteins like plant-based and cultivated meat delicious, affordable, and accessible. GFI advances open-access research, mobilizes resources and talent, and empowers partners across the food system to create a sustainable, secure, and just protein supply. GFI is funded entirely by private philanthropic support.

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