# Biotech-enabled food production protects against agricultural threats

**Leveraging tried and true biomanufacturing techniques like fermentation to efficiently and safely produce proteins and food ingredients provides a buffer against sudden food supply shocks.**

## America's food system is vulnerable to threat

The global food system is more fragile than we may like to believe. Potential food supply risks vary from war and trade restrictions to zoonotic disease, extreme weather events, antibiotic resistance, crop failure, and agricultural bioterrorism.

Even in the absence of an acute, widespread crisis event, sudden supply shocks can dramatically raise food prices for consumers. For example, nationwide egg prices increased an average of 36.8 percent from December 2023 to December 2024 due to avian flu. In some cases, retailers charged up to $8 for a dozen eggs, and in other cases, eggs were either absent from grocery shelves altogether or restrictions were applied to limit purchases. The crisis has led food manufacturers to search for alternative egg ingredients in packaged food products. It has already cost the U.S. approximately $1.4 billion (or two percent of the U.S. poultry industry's total estimated economic value of $77 billion) as of November 2024.

As another example, coconut oil prices have risen 24 percent from 2024 to 2025. Extreme weather conditions in top coconut oil-producing countries have stressed supply, while demand for coconut oil in food and cosmetics continues to rise.

## The bioeconomy provides a buffer

Biomanufacturing—production processes that leverage biological inputs such as plants, animal cells, and microbes—can provide a buffer against sudden food supply shocks. Biomanufacturing is:

- **Flexible:** Biomanufacturing can leverage a wide variety of feedstocks, from corn to date pits to $CO_2$. Equipment used for biomanufacturing food is transferable to other types of industrial goods, so the same production facility that produces food, fuels, and fibers is able to ramp up and transfer production based on demand.
- **Efficient:** In contrast with 20-22 weeks for egg-laying hens to produce eggs, ovalbumin protein made via fermentation can be made in about 3 to 8 days from start to finish, once manufacturing capacity comes online. Coconut trees take one year to begin producing fruit, and 70 percent of coconut oil production takes place in only two countries; a standard commercial run for microbial-derived lipid production takes about 4 to 6 days and can take place anywhere in the world.
- **Location-neutral:** Biomanufacturing can happen anywhere, from the back of a military vehicle to a rural town to the middle of a major city.
- **De-risked:** Biomanufacturing processes like fermentation have been used for decades to produce pharmaceutical, food, and fuel products, including insulin, enzymes, supplements, and ethanol.

> *"With biotechnology, platoons will be able to synthesize food, munitions, and therapeutics directly on the front lines using technologies that could fit in a backpack, instead of relying on materials produced thousands of miles away at home. Biotechnology will save lives on the battlefield and prevent the need for costly or dangerous refuel or resupply missions."*
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> National Security Commission on Emerging Biotechnology Final Report

## The U.S. leads the world in food biotech innovation, but lags in infrastructure

The U.S. has long led the world in biotechnology innovation, boasting more biotechnology patents, companies, and Nobel Prize winners than any other country.

For food biotech specifically, the U.S. also leads in patent filings for fermentation-derived proteins. Despite this innovation lead, we are offshoring food biotech manufacturing; Europe leads in global food biomanufacturing capacity, and China's food biomanufacturing facility count is unknown.

Realizing the benefits of bioindustrial production requires not just research but infrastructure, which requires financing to scale to commercial-scale manufacturing.

> *"For the United States, achieving global biotechnology superiority is an imperative. If America secures its position as the greatest biotechnology power in the world, we will see major gains in five critical areas: defense, supply chains, agriculture, healthcare, and computing."*
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## Targeted investment is required to build biotech capacity

Investments in biomanufacturing capacity are necessary to maintain U.S. leadership. The following policies should be leveraged to boost U.S. biomanufacturing and secure our food supply chains:

- **Grants, voucher programs, and tax incentives** to offset manufacturing and infrastructure planning costs. Such programs may support engineering plans, site selection, techno-economic assessments, life cycle assessments, construction, and equipment purchase and installation.
- **Loans and loan guarantees** with low interest rates and long repayment terms.
- **Investments in public-private fermentation hubs** with shared equipment to reduce CapEx burden on individual companies. These Contract Development and Manufacturing Organizations (CDMOs) can enable efficient commercial scale-up and support regional economies.
- **Incorporation of fermentation-derived protein and oil ingredients into public procurement channels**, including for the military and humanitarian assistance.

Defense agencies, including DARPA, OSC, DIU, DEVCOM, and DLA, are well-positioned to enact these policies.

## Investing in biotech capacity will boost supply chain resilience

The U.S. can hedge against agricultural and other supply chain threats by making smart, catalytic investments in biomanufacturing infrastructure. Such investments will ensure we're equipped to produce quality food at stable prices in the event of a commodity food supply crisis.