Priorities for plant-based and fermentation-enabled protein ingredient optimization

An executive summary of research priorities and actions for accelerating progress in protein innovation

Executive Summary

As global demand for protein continues to rise, advancing ingredient innovation can help diversify protein sources, create a safer and more resilient food system, meet nutritional needs, contribute to farmland health, and drive economic growth in communities around the world. To drive such innovation, the Foundation for Food & Agriculture Research (FFAR) and the Good Food Institute (GFI) have joined forces to identify research funding priorities for plant-based and fermentation-enabled protein ingredient optimization.

Ingredient optimization is essential to achieving taste and price parity between plant-based and fermentation-enabled proteins, and conventional protein. Taste and price parity between plant-based and fermentation-enabled proteins and their conventional meat counterparts is necessary to achieve consumer adoption at the scale required to realize the real-world environmental, public health, and food security advantages of these innovative proteins.

From May through July 2025, FFAR and GFI conducted a global survey and co-convened an in-person workshop aimed at gathering input—in total, from 87 respected experts representing different disciplines and regions around the world—to shape the research agenda and zero in on the most promising research funding opportunities. (See appendices for more details about the survey and workshop, including participants and their disciplinary and geographic representation.)

Primary objectives of the FFAR-GFI partnership

- Identify and prioritize promising research opportunities to improve plant-based or fermentation-derived ingredients that can enhance functionality, nutritional value, sensory attributes, processing efficiency, and food safety.
- Understand what time, funding mechanisms, research infrastructure, and collaborations are necessary to accelerate innovation.

Key research areas identified

- ingredient sourcing
- protein enrichment innovation
- multifunctional ingredients
- strategic research catalysts that can improve efficiency, reproducibility, and impact across the value chain

Specific research areas and recommendations

Ingredient sourcing optimization	• Upcycle sidestreams into food ingredients • Develop regional crops • Breed crops for improved quality and yield • Tailor cell lines for fermentation and plant cell culture
Low cost, mild processing protein enrichment innovation	• Upcycle sidestreams into fermentation feedstock • Streamline downstream processing of fermentation products • Tailor bioreactors for food development • Reduce off-flavors, antinutrients, and other undesirable compounds in plant protein ingredients • Scale low-energy plant protein extraction • Create value-add, small-scale processing technologies
Multifunctional, palatable, nutritious ingredients	• Create nutritious formulations • Leverage hybrid ingredients for complementary functions • Design desirable flavors and colors • Engineer proteins for optimal function and taste • Texturize plant proteins using low-energy, reproducible methods • Incorporate fat and nutrients into texturized food matrices
Strategic research catalysts	• Standardize procedures and methods • Control variability • Relate structure-function of plant- and fermentation-enabled ingredients and their sensory evaluation • Leverage neural networks, artificial intelligence, and machine learning for next generation protein development • Develop high-throughput analytics techniques to expedite R&D • Optimize commercially-relevant technoeconomic analyses and life cycle assessments

Cross-sector calls to action

Across these research areas, topline calls to action emerged—each underscoring the importance of greater cross-sector collaboration in moving the entire field forward:

Optimize products with the consumer in mind

Find and advance solutions that improve taste, nutrition, and affordability through targeted research that resolves persistent technical and sensory challenges.

Improve open-access data and infrastructure availability

Make it easier for scientists to learn from and build on each other's work, and have the tools, facilities, and support to do so.

Build public-private partnerships

Creatively leverage strengths, systems, assets, and expertise that exist across sectors.

Leverage existing systems

Tap into established agricultural supply chains, processing infrastructure, distribution networks, and regulatory frameworks, so the industry can reduce costs, shorten development timelines, and increase market reach.

Support systems-level agriculture

Seek opportunities to integrate plant-based and fermentation-enabled protein ingredient innovation into farmland health and vibrancy to deliver environmental and economic benefits.

Ensure food safety and regulatory compliance

Pursue research that prioritizes public health and a safer, more secure supply chain.

What's at stake and what's needed

Protein innovation—spanning plant-based and fermentation-derived ingredients—is recognized by leading experts as essential to addressing challenges in agriculture, climate, biodiversity, food security, and global health. Critical research investment is needed to accelerate breakthroughs in the field and ensure that we meet consumer needs, lower costs, and reduce environmental impacts. Addressing these challenges will enable larger-scale production and commercialization, create new economic opportunities and benefits for farmers and others on the frontlines of food production, and contribute to a safer, more secure, and resilient food system.