

2021 State of Global Policy Report

WITH HIGHLIGHTS FROM THE FIRST HALF OF 2022



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This report covers government support for and regulation of alternative proteins in regions where GFI has a focus. It is comprehensive through the end of 2021 with a short distillation of some global highlights from the first six months of 2022 (page 36).

We are not aware of any significant milestones in regions of the world that are not covered in this report.

Introduction

Governments worldwide are grappling with how to feed growing populations and keep their economies strong in the face of fragile supply chains, intensifying climate events, and the looming threat of future pandemics and antibiotic resistance. Current methods of meat production fuel these threats, and rising global demand will exacerbate them (the UN predicts that global meat production will double by 2050). Shifting from making meat conventionally to making meat from plants or cultivating it from cells (together “alternative proteins”) can solve or significantly ameliorate these external costs of conventional meat production.



Photo credit: Wildtype

There are two primary types of alternative proteins: plant-based and cultivated. Just as the goal with renewable energy and electric vehicles is to make them interchangeable with conventional energy and combustion-powered vehicles, so too are plant-based and cultivated meat focused on winning in the marketplace by producing products that taste the same or better to consumers and cost the same or less, thus requiring no intentional behavior change.

Plant-based meat and seafood are made from plants but reproduce the taste and texture of animal-based products. The foods are focused on fully satisfying meat-eaters. Because their production is so much more efficient than conventionally produced meat, as they scale they should be able to compete on price.

Cultivated meat and seafood are real animal foods cultivated directly from animal cells. The resulting meat is identical to conventional meat (but without the drug residues and other contaminants), and, as with plant-based meat, scaling up should allow prices to come down such that it will compete in the marketplace with conventional meat.

- Alternative proteins are designed to compete with conventional meat and seafood on taste and price.
- To date, no plant-based or cultivated meat product both tastes the same or better to consumers of meat and costs the same or less. Yet the pace of innovation on alternative proteins has been impressive with cost and taste improving rapidly.
- Just like electric cars and renewable energy, alternative proteins are speeding down the cost curve and should prove highly attractive to general consumers as soon as they reach price and taste parity with conventional meat.

Alternative protein facilities at scale will allow producers to switch quickly between different kinds of meat (e.g., chicken or beef) to respond to consumer preferences. And because alternative protein production does not rely on the long planning timelines of conventional animal farming and the concomitant production of less valuable animal parts, alternative protein is inherently less wasteful and more efficient to produce, creating more resilient and efficient supply chains. Alternative proteins also require fewer inputs, such as significantly less water and land, and generate lower greenhouse gas emissions than their conventional counterparts. According to the United Nations Environment Programme, increasing meat consumption and intensification of animal agriculture are two of the seven most likely causes of the next pandemic.

Finally, by creating opportunities for new crop inputs, manufacturing equipment, engineering facilities, products, and marketing, the alternative protein industry will grow economies and create jobs. A [study funded by ClimateWorks Foundation and the UK's Foreign, Commonwealth and Development Office](#) predicts that alternative proteins will add \$1.1 trillion to the global economy and create 9.8 million good-paying jobs by 2050.

Savvy governments are recognizing these advantages and investing in alternative proteins to meet national policy goals, often as part of existing programs on engineering, agricultural innovation, climate science, and economic development. Only five years ago, public funding for alternative protein R&D was close to zero. Today, the total exceeds \$300 million from more than a dozen countries, plus additional hundreds of millions of dollars in government investments in and incentives for alternative protein companies.

The economic benefits of alternative proteins will primarily accrue to the countries that accelerate progress by investing in research and development, providing financial incentives for innovation, and creating clear, efficient regulatory frameworks.

This first-ever State of Global Policy Report showcases the countries that are positioning themselves to become the economic powerhouses of a trillion-dollar global industry.



“We’re going to see these technologies go to places around the world that are more conducive to their development.”

– Former U.S. Secretary of Agriculture Sonny Perdue, explaining why the the U.S. government should prioritize strong alternative protein policies

Emerging leaders

At the front of the pack: Singapore and Israel



Singapore is the only country in the world to have approved the sale of a cultivated meat product, GOOD Meat cultivated chicken, which has been served at select restaurants and eateries there since December 2020. The government has hosted events, sponsored science, funded startups, published articles, and publicly declared their support for alternative proteins as critical to their food security and climate goals.



Israel is an undisputed global force in alternative meat. The nation's leaders have been publicly outspoken about support for the sector and have invested \$18 million in a cultivated meat research consortium. The Israeli government has also funded startups, built pilot plants, and taken steps to ensure a robust regulatory framework. In recent years, Israel's Prime Minister and President were the first heads of state and government in the world to taste cultivated meat.

Leaning into plant-based: Denmark and Canada



Denmark led the world with a \$177 million investment in plant-based proteins in 2021 that will be distributed over nine years. Minister of Food and Agriculture Rasmus Prehn said that he would like Denmark to become an “absolute world leader” in plant-based foods in the coming years.



Canada has invested over \$30 million in plant protein research and nearly \$100 million in infrastructure dedicated to plant proteins.

Providing infrastructure and capital investments: Qatar



Qatar's sovereign wealth fund, the Qatar Investment Authority, led a \$200 million investment round for leading plant-based egg and cultivated meat company Eat Just. Doha Venture Capital, a state-backed investment fund, and the Qatar Free Zones Authority, an independent authority that oversees and regulates the country's free zones, announced plans to construct a \$200-million Eat Just cultivated meat production facility in Doha.

Up and coming: China and the United States



The Chinese government has indicated a strong interest in the alternative protein sector and shows signs of accelerating involvement.



The United States took the first steps toward substantial public investment in alternative proteins by awarding \$10 million to a consortium of universities led by Tufts University and Virginia Tech to study cultivated meat and allocating nearly \$5 million in agricultural appropriations to alternative protein science. Both the federal and state governments are poised to invest more in future years.

Executive summary

Governments are funding alternative proteins to bolster food security, mitigate climate impact, and strengthen their economies. Government support of open-access research not only addresses technological hurdles, but will also grow the sector through infrastructure projects, financial incentives for startups, and workforce development.

- Through the end of 2021, all-time global public alternative protein R&D funding totals approximately \$360 million. Government investments to support the alternative protein private sector, including from sovereign wealth funds, total approximately \$353 million.
 - Israel, Singapore, Canada, and Europe are dedicating significant funds to the sector and planning for more.
 - The United States and China took significant steps in the last year to accelerate investment.
- Denmark, Israel, Canada, Singapore, and likely China are leading the world in overall alternative protein R&D funding.
 - Denmark led the world with a \$177 million investment in plant-based proteins in 2021 that will be distributed over nine years.
 - Israel has invested more than \$20 million in alternative protein research, including \$18 million for a cultivated meat research consortium.
 - Canada has invested over \$30 million in plant protein research.
 - With significant support for infrastructure projects, R&D, and startup support, Singapore is one of the leading global investors in the sector.
 - While exact funding amounts in China are unknown, the Chinese government has expressed an intention to focus on alternative protein expansion as a major part of the nation's five-year agricultural plan.
- Government investment in alternative proteins accelerated in 2021. More than a quarter of total global investment to date came in 2021.
 - In 2021, the U.S. Department of Agriculture awarded \$10 million to establish a center for excellence in cellular agriculture to a consortium of universities researching cultivated meat.
 - More than a third of European grants were in 2021.

- Canadian investment in plant-based research in 2021 comprises almost half of the country’s all-time funding.
- The governments of Singapore and Israel are the most vocal and active in their support for alternative proteins. The science and business development bodies of both governments have hosted events, sponsored science, published articles, and declared their support for alternative proteins as critical to their food security and climate goals. And both governments have significantly funded startups in alternative proteins directly.



Photo credit: GOOD Meat

Governments are simultaneously developing regulatory standards to ensure the safety of alternative proteins and labeling frameworks. By setting fair standards, governments can ensure that alternative proteins are safe for consumption and marketed to consumers responsibly without imposing unnecessary costs on producers or consumers.

- Singapore is the only country in the world to have approved the sale of cultivated meat products—GOOD Meat cultivated chicken nuggets and breasts.
- Many governments, including Japan, Australia, and the United States, are gathering information to inform their regulatory approval processes for cultivated meat. The U.S. Department of Agriculture announced that current safety protocols are “sufficient to ensure the safety of products cultured from the cells of livestock and poultry,” and no further safety regulations are required.
- The Codex Alimentarius (“Food Code”) Commission—a global body that sets guidelines, standards, and codes of practice to protect consumers and ensure fair trade—began to consider ways to harmonize regulations globally.
- Attempts to censor labels on alternative protein products by, for example, banning the use of meat terms on plant-based or cultivated meat slowed in 2021 but saw an upswing in 2022. Previously, they failed to pass (in Europe and some U.S. states), were overturned (in other U.S. states), or were preemptively blocked (in Japan). However, labeling restrictions on alternative meat or dairy products are in place in India, Europe, and several states in the United States.

Public support for alternative proteins

To accrue their myriad benefits, alternative proteins must taste as good or better than conventional meat and cost the same or less. Public support, including research in various areas such as diversifying inputs, improving manufacturing equipment, and optimizing cell lines, is needed to help alternative proteins reach taste and cost parity. Likewise, public support of the private sector such as infrastructure funding, job training programs, and other forms of financial support are also needed to help the industry scale.

A Global Innovation Needs Assessment funded by the [ClimateWorks Foundation and the UK's Foreign, Commonwealth and Development Office](#) articulates why public investment is needed in this sector at this point in its development:

Targeted public efforts are required to accelerate diet shifts to alternative proteins, which will result in substantial socioeconomic and environmental benefits. Public support should be focused on creating an environment in which the private sector can invest with greater confidence and at a lower cost. Cost, affordability, regulatory and consumer acceptance barriers add extra risks to investor decisions, which can prevent the investment landscape from reaching its full potential. Regulatory and consumer acceptance barriers are particularly salient for some protein sources. For proteins that are closer to commercial viability, cost and affordability barriers can prevent full market uptake. Though the public sector needs to ensure that it does not crowd out private investment, it has a role to play in ensuring technologies have sufficient access to finance to scale at the required pace to achieve climate targets.

Public research enables industry-wide advances in areas that individual private companies would not find profitable. Collaborative, open-access research often leads to unanticipated advances on decades-long time scales. Private funding, on the other hand, tends to focus on applied science and commercialization, seeking a short timeline for a return on investment for a small group of shareholders. Government research enabled the development of the internet, GPS, hard drives, touchscreens, and voice-activated virtual assistants like Siri.

Public research can also elevate the baseline from which everyone is starting, addressing industry-wide issues that would otherwise result in research duplication. (For example, both

Beyond Meat and Impossible Foods spent unspecified amounts of money to get an unwanted flavor out of peas.)

As the alternative protein industry grows, government support beyond research funding will become increasingly important for the industry to scale up. Public investment assistance helps companies scale by allowing them to build facilities, commercialize products, and purchase or lease expensive processing equipment or manufacturing facilities for a lower cost of capital than is available for private equity financing. Some governments have already invested in infrastructure, including pilot plants or large-scale research facilities. Others are also supporting alternative proteins through startup funding, debt financing, and job training programs.

Asia

Governments across Asia have invested in alternative protein R&D, infrastructure, startup support, and job training. The Covid-19 pandemic and the rise of livestock diseases such as African Swine Fever have brought new attention to the importance of reducing import dependencies and boosting supply chain resilience through protein diversification. Alternative proteins also present an economic opportunity for the region. Asia is the largest market for alternative proteins. China, India, Japan, Singapore, and South Korea see alternative proteins as a sector in which they can leverage innovation to boost their economic competitiveness, while also maximizing agricultural productivity and producing high-paying jobs across the value chain.

China. With an increasing population and focus on food security, China is expanding from traditional animal agriculture to more diversified protein sources. While China does not disclose its total investment in alternative proteins, the Chinese government has indicated a strong interest in the alternative protein sector and shows signs of accelerating involvement. In December 2021, China’s Ministry of Agriculture and Rural Affairs included cultivated meat in its [five-year plan](#). It provides a blueprint for strengthening innovation in “frontier and cross-disciplinary technologies” and clear guidelines for developing the protein industry and related technologies. China’s Ministry of Science and Technology is funding a Green Biological Manufacturing R&D program which includes an alternative protein project funded at an estimated \$3.1 million.¹

¹ This estimate was calculated by dividing the total budget allocated for the “Green Biological Manufacturing” National Key R&D Program evenly across all projects.

China and Renewable Energy

GFI's white paper, "[*American national competitiveness & the future of meat: Why the United States needs to build up a domestic alternative protein industry.*](#)" co-written with the Breakthrough Institute, draws a parallel between the rise of renewable energy in China and the rise of alternative proteins.



“A lesson can be learned here from past American successes and failures with green energy technologies. Aided by early government funding for basic R&D, U.S. companies led the global market in photovoltaics (PV) throughout the 1960s and 1970s. As late as 1990, the United States produced 32 percent of the world’s solar panels. But that position eroded quickly as first Japanese and then German firms took over the market, each aided by major government interventions. In Japan, the Ministry of International Trade and Industry provided multifaceted support and direction from early on, whereas in Germany the introduction of feed-in tariffs for renewable electricity generated an enormous market that domestic firms stepped up to supply. In the 2010s, highly-capitalized Chinese firms rose to market dominance thanks, in part, to billions of dollars in government-provided credit. Since 2004, the Chinese-manufactured share of global solar panel shipments climbed from 1 to 67 percent, while the US-manufactured share tumbled from 14 to 1 percent. All the while, American funding for basic R&D remained strong, but this could not rescue the domestic PV industry from obsolescence because initial innovation was no longer the key factor. Instead, it was the capacity to produce massively and cheaply, which could be stimulated by both demand and supply-side policies, that determined who won the market.”

India. India will house one-sixth of the world’s population by 2050, and India’s population will account for a significant portion of the global meat demand over the next decades. Just as smartphones overtook telephone lines to bring India into the digital age, a strong alternative

protein industry will give India the chance to overtake industrial animal agriculture and meet Indians' meat demand sustainably.

India's government has supported cultivated meat initiatives in policy, research, and commercialization at the national and state levels.

- In 2019, working with GFI India, the state of Maharashtra funded the Centre of Excellence in Cellular Agriculture, the world's first government research center for developing cultivated meat. The center aims to produce cultivated meat for exports and meet the growing domestic demand for protein. The national government has also funded two research centers—the Centre for Cellular and Molecular Biology and the National Research Centre on Meat—to scale up cultivated meat production and bolster India's position as a protein producer.
- India's Office of the Principal Scientific Advisor [included cultivated meat](#) as one of the areas under its Emerging Technologies Initiative, which identifies technologies of importance to India and forms policy initiatives to support their development.
- The Atal Incubation Center, one of several incubation facilities supported by the [Atal Innovation Mission](#), provides resources to help cultivated meat startups research, develop, and commercialize their products.

India is also focused on alternative protein workforce development. India's Food Industry Capacity & Skill Initiative develops jobs and certification programs to prepare for the "industries of the future" to enable the inclusion of a curriculum for plant protein within existing degrees.

Japan. The Japanese government has said that it aims to shift Japan's traditional agriculture industry toward "[smart agriculture](#)," which includes alternative proteins, by leveraging innovation to increase food security. Japan's aging population, increasing urbanization, and immigration policies have resulted in labor shortages that have impacted the productivity of its agricultural sector, thereby increasing its reliance on food imports. In recent years, meat from land animals has displaced fish as the main protein source in Japanese diets, and demand will likely continue rising. Protein innovation could be a key solution to meet protein demand and ensure economic competitiveness of the Japanese agricultural industry.

The Ministry of Agriculture, Forestry, and Fisheries launched the Food Tech Research Group, a public-private consortium of more than 160 food companies, startups, financial companies, academic institutions, governmental agencies, and other entities to foster exchanges between the government and the private sector and strengthen Japan's food security through technology.

In 2020, Japan declared alternative proteins an “important sector” and formed the Japan Association for Cellular Agriculture (JACA), an official working group on cultivated meat. JACA provides an opportunity for industry, government, and academia to collaborate on guidelines and recommendations for laws applicable to cultivated meat, egg, and dairy products to contribute to their commercialization in Japan. Japan’s Ministry of Economy, Trade, and Industry has funded several cultivated meat research projects, though funding amounts are unknown. Also in 2020, the Japanese government [granted \\$2.2 million to IntegriCulture](#), a startup supplying growth media and other technical solutions to cultivated meat makers to build a production facility.

Singapore. Resource-scarce Singapore currently imports more than 90 percent of its food and sees alternative proteins as a potential solution to meet its “[30 by 30](#)” goal of producing at least 30 percent of its nutritional needs by 2030 and boosting resilience to global food supply shocks.

As a result, Singapore has become a world leader in alternative protein research and infrastructure funding. [Temasek](#), an investment fund that is wholly owned by the Singapore government,² has been one of the top investors in alternative protein companies. While the exact amount is unknown, the fund’s investments are believed to be in the hundreds of millions of dollars, and the fund is an active booster of alternative proteins, following the overall lead of the entire government of Singapore. Singapore may have surpassed all other nations in awarded grant money. Singapore’s leadership is cementing its reputation for food safety and its status as a leading innovation hub, while simultaneously driving economic competitiveness and enhancing food security.

Singapore is a global test-bed for alternative protein R&D, producing climate solutions that can be exported to the region and the world. Singapore dedicated millions to the [Singapore Food Story R&D program](#), which was established in 2019 by the Singapore Food Agency (SFA) and Singapore’s top science and tech agency, the Agency for Science, Technology, and Research (A*STAR), to fund research and development for alternative proteins. Under its “Future Foods: Alternative Proteins” program and “[1st Alternative Protein Seed Challenge](#),” Singapore has funded more than a dozen alternative protein projects. Singapore has also indicated that alternative protein funding could come from other government institutions, such as the ministries of health or education, or the National Research Foundation’s sustainability grants.

² Temasek drives many alternative protein research and development projects in Singapore. Because Temasek is a Singapore-incorporated company and operates under the provisions of the Singapore Companies Act, Temasek investments are not the same as public investments. While Temasek is neither a statutory board nor a government agency, its close ties to the Singaporean government indicate government support of the alternative protein industry by proxy.

Additionally, Singapore has forged partnerships with other countries to collaborate on alternative protein R&D. The New Zealand-Singapore Bilateral Research Programme on Future Foods funds research on plant-based proteins with a focus on algae (including seaweed) and precision fermentation. Similarly, Singapore and Australia have a shared Innovations in Food for Precision Health program that includes research into new plant ingredients for “healthier foods and sustainable planetary diets.” Singapore’s A*STAR also signed memorandums of understanding with the Netherlands’ Wageningen University & Research and the University of Bath, in the United Kingdom, to “explore suitable areas for joint research development in food science and processing,” including cost-effective ways to scale up cultivated meat.

The Singapore government has also been active in building alternative protein infrastructure. In 2020, the Singaporean agri-food firm Life3 Biotech set up the [country’s first local, plant-based protein pilot production facility](#) supported by the SFA and the Singapore Land Authority. A*STAR and fermentation company [Perfect Day](#) announced they would jointly [launch a research and development center in Singapore](#).

In September 2021, Avant, a cultivated seafood company, and A*STAR’s Bioprocessing Technology Institute (BTI) agreed to establish the [Joint Research Laboratory for Cultivated Fish Bioprocessing](#), a research collaboration to scale up Avant’s production. BTI’s executive director said of the project, “Cultivated seafood and meat is an excellent example of how the biomanufacturing sector can pivot to meet emerging needs. The Covid-19 pandemic has highlighted the importance of staying adaptable and innovative.”

Temasek’s Asia Sustainable Foods Platform and A*STAR’s Singapore Institute of Food & Biotechnology Innovation are investing \$21 million in a new [Food Tech Innovation Centre](#), which will provide startups with access to R&D expertise and a pilot-scale facility that includes labs, equipment, and test kitchens.

“Asia is expected to require around US\$1.55 trillion of investment over the next decade to satisfy growing consumer demands for healthier and more sustainable food options. We need to evolve our current capabilities to bolster food security and strengthen supply chains.”

– Yeoh Keat Chuan, deputy head, Enterprise Development Group at Temasek, Singapore

In April 2021, with support from Temasek, Bühler and Givaudan opened a Protein Innovation Centre for food processing companies, startups, and university researchers looking to develop novel plant-based food products.

South Korea. South Korea is land-scarce, has a shortage of young skilled farmers, and is experiencing depletion of domestic protein sources like fish. Protein innovation presents an opportunity for South Korea to address these food and agriculture sector issues. In March 2021, South Korea launched a [national business plan](#) focused on food security and sustainability, with an emphasis on reducing reliance on imports and agricultural sector greenhouse gas emissions. In June 2021, the South Korean Ministry of Agriculture, Food and Rural Affairs [established a \\$70.3 million “Fund of Funds”](#) with several sub-funds dedicated to food and agriculture. The \$13.5 million Green Bio Fund investment mentions plant-based and cultivated meat companies as a key program component, but the amount of support is not yet public.

Australia and New Zealand

Australia and New Zealand’s agricultural sectors, research capacities, and trade markets position them well as leaders in alternative proteins. Specifically, their expertise in plant biology, food science, and regenerative medicine makes them ideal countries for conducting alternative protein research.

New Zealand ranks fourth and Australia ranks fifth globally for biotechnology innovation.

New Zealand’s Ministry for Primary Industries and Plant & Food Research released a [joint report](#) highlighting the potential long-term economic benefits of the plant-based industry on New Zealand’s food production. Australia’s national science agency, Commonwealth Scientific and Industrial Research Organisation (CSIRO), launched a Missions Program in August 2020 focused on key issues facing Australia, including health and well-being, food security and quality, national security, environmental resilience, and natural resource sustainability. In 2021, CSIRO committed [Aus\\$150 million](#) (\$106 million) to three new research initiatives, including a [Future Protein Mission](#) to “drive the immediate plant protein growth opportunity with the Australian market” and “create new alternative protein industries based on advanced biomanufacturing.”³ The Victoria Government’s [Agriculture Strategy](#) also prioritizes alternative proteins.

In 2021, the Federal Government’s Advanced Manufacturing Growth Center Commercialization Fund awarded [Aus\\$1 million](#) (\$680,000) to Harvest B, a plant-based meat company. Australia’s Department of Industry’s Modern Manufacturing Initiative grants program

³ The breakdown of these funds across the three missions is not available.

specifically identifies alternative proteins as a [manufacturing priority](#): “While traditional animal protein will continue to be a significant source, alternative sources may be needed to keep up with demand. Protein is an important requirement for a healthy diet, and there is room to create a diverse protein industry if manufacturers take a unified market approach. As a major producer and exporter of protein, Australia’s food industry is well placed to tap into this opportunity. It can develop novel, differentiated protein products derived from animal, plant, and non-traditional sources.”

Also in 2021, Australia’s Clean Energy Finance Corporation [invested Aus\\$5 million](#) (\$3.4 million) in plant-based and fermentation startup All G Foods, saying “With plant-based proteins and proteins from technology like precision fermentation, we can help feed a growing local and global population while putting less pressure on our environment.”

Brazil

While efforts to secure alternative protein research funding are ongoing, total investment in R&D by Brazil’s federal government shrank by 37 percent between 2013 and 2020, and Covid-19 recovery is still underway. The Ministry of Science & Technology or the Ministry of Agriculture may fund alternative protein R&D in future years.

However, Brazil's public agricultural research ecosystem is increasingly mobilized on the topic of alternative proteins. Embrapa, a 50-year-old think tank affiliated with the Ministry of Agriculture, with 50 research units and a body of 2,500 researchers, has dedicated significant resources to alternative protein R&D over the past three years. By partnering with Brazilian startups such as [Amazonika Mundi](#) for the development of plant-based products using native plants to help preserve Brazil’s biodiversity, and through a focus on the primary research challenges in plant-based and cultured meat, Embrapa has signaled its commitment to advancing alternative proteins in Brazil. In total, Embrapa researchers are currently engaged in six GFI-funded research projects to advance the science of plant-based and cultivated meat.

Canada

Through public financial support, Canada is building a strong plant-based protein supply chain. At both the federal and provincial levels, Canada has spent hundreds of millions to establish a leadership position in plant-based food development.

[Protein Industries Canada](#) (PIC), established in 2018, works to position Canada as a global source of plant protein production. PIC, one of Canada's five innovation Superclusters, co-invests with private industry in plant-based protein projects encompassing R&D, infrastructure, and commercialization and has invested over CA\$25 million (\$19.5 million) in research and infrastructure projects at companies and universities across Canada.

Building on several plant-based research projects previously funded by Canada's Natural Sciences and Engineering Research Council, the Saskatchewan Agricultural Development Fund funded six plant protein projects in 2020 and 2021. The [Saskatchewan Food Industry Development Centre](#), which has an endowment of CA\$8.5 million (\$6.6 million), has expanded its purview to work on optimizing plant-based meats as the demand for plant-based proteins has grown.

In addition to funding research, Canada has supported the construction of facilities through private-sector incentives. In support of their pea and canola processing facility, which produces plant-based meat ingredients, Merit Functional Foods [received CA\\$90 million](#) (\$70 million) in repayable contributions and debt financing from Farm Credit Canada, Export Development Canada, and Agriculture and Agri-Food Canada's Agri Innovate Program in 2021. Canadian Prime Minister Justin Trudeau underscored his support for this funding: "This facility will be a world leader in plant-based proteins and will create good jobs in a fast-growing field. And by using 100 percent Canadian inputs, it will also support farmers who produce the canola and yellow peas used in Merit's products."

Europe

European Union. The EU and several member states have set ambitious climate targets, many of which are focused on agricultural sector emissions. EU member countries investing in alternative proteins include Belgium, Denmark, Finland, the Netherlands, Spain, and Sweden.

The government entities investing span different priority areas, including climate resilience, industrial technology development, and economic affairs. For instance, the Finnish Government Climate Fund invested approximately €10.5 million (\$11 million) in Solar Foods, a company making protein using carbon dioxide, while the Spanish Ministry of Economy and

Competitiveness invested in plant-based startup NovaMeat and cultivated meat startup BioTechFoods.

In total, the European Union and its member countries have committed over €238 million (\$256 million) in alternative protein funding through several initiatives. Of this, \$177 million comes from a single Danish investment that will be distributed over nine years.

While the earliest known alternative protein funding in Europe was in 2005 (the only significant government grant for cultivated meat research until India's grant, referenced above, in 2019), more than a third of European grants were made in 2021. In June 2021, the EU research and innovation initiative [Horizon Europe](#) announced €12 million in dedicated funding to improve the sensory properties and availability of alternative proteins as part of their larger initiative for a "healthier, greener, and more digital Europe." The open-access funding is going to research consortia comprised of companies, universities, and nonprofits.

EIT Food, an independent EU body focused on fostering innovation in the food sector, set protein diversification as one of six core focus areas and distributed over €11 million to plant-based meat, cultivated meat, and fermentation projects between 2018 and 2021.

Denmark. In October 2021, the Danish government announced over 1.25 billion kroner (\$177 million) over nine years [to advance plant-based foods](#) as part of an unprecedented climate agreement for food and agriculture. This funding is the largest investment in plant-based research and development by any European country. The Minister of Food and Agriculture Rasmus Prehn said that he would like Denmark [to become an "absolute world leader" in plant-based foods](#) in the coming years.

A key component is the Fund for Plant-based Food Products, which will support plant-based foods processing and product development, seed development, marketing and export promotion, and knowledge dissemination. The money comes directly from an existing fund that otherwise supports animal production and products.

Denmark also pledged to support farmers through a five-year eco-scheme which will pay 580 million kroner (\$81 million) in bonuses to those who grow plant-based protein crops for human consumption.

Denmark is the first European country to use an instrument of the EU's Common Agricultural Policy to promote a shift to plant-based crops for food. The "eco-schemes" tool rewards adopting sustainable agricultural practices, and each EU member country defines what counts as sustainable.

With this announcement, Denmark explicitly recognized alternative proteins as contributing to a more sustainable food system via a mechanism that will tangibly support farmers to shift toward growing plant-based crops for food.

The government will also formulate a "green proteins" strategy for animals and humans, backed by 260 million kroner (\$37 million) over five years. In addition to plant-based foods, this fund might also support fermentation-derived proteins and cultivated meat, as well as animal feed.

Finland. Business Finland, a government entity for innovation funding and trade, travel, and investment promotion, [funded a \\$2.1 million project](#) with VTT Research and the University of Helsinki to develop plant protein products for the international market. Business Finland also made two grants to Solar Foods, a startup producing a novel protein made using CO2 and electricity. The Finnish Government Climate Fund [granted \\$11 million](#) to Solar Foods for commercial-scale production.

Spain. Few research projects have focused on specific health attributes of alternative proteins. The Spanish government [funded a €5.2 million \(\\$6.3 million\) research project to investigate whether functional ingredients in cultivated meat can help prevent diet-related diseases](#). Specifically, the researchers are exploring the use of different fat modifications to the lipid profile and other functional ingredients in cultivated meat products as a way to reduce consumer exposure to saturated fat in red meat. This research may help prevent colon cancer and dyslipidemia, both of which are prevalent in Spain.

The United Kingdom. In July 2021, the UK National Food Strategy Team published [a review](#) advising that the government invest £50 million in an alternative protein innovation cluster and £75 million in alternative protein startups (\$165 million total). The strategy emphasizes the United Kingdom will fall behind if it does not act now: "So far, the government has been slow to offer support and investment to companies developing novel proteins. As a result, most of this work is currently happening elsewhere. We are in danger of missing a prime opportunity for green growth."

The [UK 2021 Net Zero Strategy](#) also references alternative proteins: “A significant market share for innovations such as alternative proteins will take time to materialize but will align with consumer dietary trends, and the UK already has a lively and growing domestic market that could grow to become another great British food export that competes internationally.

These and other novel methods of food production could create significant opportunities to further promote high-quality British food internationally.”

“Developing cultivated meat is one of the most significant advances we can make, as a country and as a planet, to tackle the scourge of food shortages and climate change.”

– Katrina Hayter, UK director of the Transforming Food Production program

The Middle East

While the alternative protein sector has received attention across many Middle Eastern and north African countries (one [recent study](#) found high demand and consumer acceptance of plant-based meat in Egypt), wealthy countries with strong R&D capabilities are currently leading government support in the region.

Israel. With strong research capabilities and close collaboration among academia, industry, and government, Israel is emerging as a global leader in alternative proteins.

GFI Israel's [national policy plan](#) on alternative proteins aims to leverage the Israeli alternative protein ecosystem into an industry capable of local production and exports. The plan, parts of which have already started, urges the government to invest \$350 million over 10 years for alternative protein research, research center establishment, pilot and scaleup infrastructure, and regulation. It identifies opportunities and barriers for global leadership in this field, estimating that Israel could generate over 50,000 jobs in the sector. The plan and the process that led to its creation could serve as a benchmark for promoting alternative protein national strategies in additional countries.

Between 2011 and 2021, the [Israeli Innovation Authority](#) (IIA) granted \$24 million across the country to aid in establishing alternative protein startups and support more mature startups in building pilot facilities.

In 2021, the IIA granted \$1 million for applied academic research, \$9 million for early-stage alternative protein startups, \$2 million for supporting the construction of pilot facilities for alternative protein startups, and \$500,000 in international programs supporting alternative proteins, such as the [Singapore-Israel Industrial R&D Foundation](#).⁴

In October 2021, the IIA announced the preliminary approval of four innovative consortia, including an \$18 million cultivated meat consortium consisting of 14 companies and nine academic labs, led by Israel's largest food company Tnuva.⁵ The consortium aims to develop more efficient, cost-competitive production methods and pilot scale-up opportunities over three years.

Israel's Ministry of Foreign Affairs and multiple Israeli embassies also worked to advance alternative protein and global collaborations, including with Japan, Singapore, and China.

⁴ Singapore's Enterprise Singapore [also provides funding through this SIIRD initiative](#): "Feasibility studies can receive up to \$50,000 of co-funding support, whereas R&D and pilot projects can receive up to \$1.5 million of co-funding support. SIIRD's programs are open to projects from any industry sector and to all Singapore companies that are registered locally."

⁵ The consortium was officially funded and launched in April 2022.

Israeli diplomats use a “diplomat toolkit” developed by GFI Israel to present Israeli alternative protein technology as an asset that could support Israeli diplomacy globally. The Ministry of Foreign Affairs created two videos focused on Israeli alternative protein innovation. The [first video](#) about cultivated meat featured two Israeli startups, Aleph Farms and Future Meat. The [second video](#) features Israeli plant-based technologies, including Redefine and Zeroegg startups. The videos were published on the Ministry’s social media channels and seven Israeli foreign embassies, reaching a combined follower count of nearly 7 million.

In November 2021, the Israeli Embassy to the United Nations held an Alternative Protein event at the United Nations headquarters in Rome in collaboration with GFI Israel. The event was attended by 80 senior management members and international delegates to the U.N.’s Food and Agriculture Organization, International Fund For Agricultural Development, and World Food Programme.

Qatar. As part of their “National Vision,” Qatar is spending \$200 billion to attract foreign companies and build an international business hub. Like other Middle Eastern countries, Qatar is also looking to find sustainable solutions to food security while establishing itself at the forefront of innovation.

Qatar’s sovereign wealth fund, the Qatar Investment Authority, led a \$200 million investment round for leading plant-based egg and cultivated meat company Eat Just. Doha Venture Capital, a state-backed investment fund, and the Qatar Free Zones Authority, an independent authority that oversees and regulates the country’s free zones,⁶ [announced plans to construct a \\$200-million Eat Just cultivated meat production facility](#) in Doha. “We’re particularly focused on companies shaping the future of their industries, and Eat Just’s team is doing just that,” said Qatar Free Zones Authority CEO Lim Meng Hui of the investment. “Our free zones are characterized by innovation, technology, accelerated growth, and environmental awareness, and Eat Just is a natural partner across all four of these areas. Our food, agri-tech, and biomedical sectors continue to grow rapidly, supported by the world-leading cold chain storage capabilities of our airport and port, and we look forward to working with Eat Just as they establish and scale in the region and worldwide.”

⁶ Free zones generally refer to areas in which corporate taxes and duties are minimal or nonexistent to encourage economic activity.

The United States

American strengths in agriculture, food processing, and biomedical technology, together with exceptional research and development capabilities, give the United States a natural advantage to lead in alternative proteins. However, through the end of 2021, the United States had only invested \$25 million in alternative protein R&D, significantly less than other high-income countries.

Public funding for alternative proteins has thus far come from five different federal agencies—the U.S. Department of Agriculture (USDA), the National Science Foundation (NSF), the Environmental Protection Agency, the National Aeronautics and Space Administration (NASA), and the Department of Energy—and three state governments. More than 60 percent of U.S. alternative protein grants were in 2021, totaling \$17 million, with half for cultivated meat research.

The first major United States public investment in cultivated meat research came in 2020 when NSF [awarded a team of researchers at the University of California, Davis a \\$3.5 million, five-year grant for a project](#) focused in part on developing inexpensive, plant-based, serum-free media at pilot scale, creating three-dimensional tissue structures, and completing a life cycle analysis for cultivated meat production.

USDA awarded the largest grant, \$10 million, in 2021 to a consortium of universities led by Tufts University and Virginia Tech to study cultivated meat.

USDA awarded Tufts University and five other partner schools \$10 million over five years to establish a flagship American cultivated protein research center of excellence.

USDA awarded the grant as a part of a \$146 million investment in sustainable agricultural research projects. This investment was made by USDA's Agriculture and Food Research Initiative's Sustainable Agricultural Systems program—the nation's leading and largest competitive grants program for agricultural sciences.

Tufts University Professor David Kaplan, a renowned cultivated meat expert, will lead the initiative and be joined by investigators from Virginia Tech, Virginia State, University of California-Davis, MIT (Massachusetts Institute of Technology), and the University of Massachusetts-Boston. The new institute will “develop outreach,

extension, and education for the next generation of professionals” in cellular agriculture and lead research that will help expand the menu of climate-friendly protein options and improve food system resilience.



The USDA’s Agricultural Research Service has also funded several in-house research projects with direct applicability to alternative proteins, including research on incorporating pulse ingredients into food applications and the flavor, nutrition, and functional properties of pea protein.⁷

Although government alternative protein funding in the United States is small relative to other countries, champions of alternative proteins are advocating for additional funding in Congress. In a [House Appropriations hearing](#) in April 2021, Committee Chair Rosa DeLauro (D-CT-3) called for “parity in research funding for alternative proteins,” arguing that “the United States can continue to be a global leader on alternative protein science.” In April 2021, Reps. Earl Blumenauer (D-OR-3) and Ted Deutch (D-FL-22) led a letter signed by 20 House members asking for \$100 million for alternative protein research funding, split evenly between USDA and the National Science Foundation. And in December 2021, Rep. Ro Khanna (D-CA-17) wrote to Secretary of Agriculture Tom Vilsack with a request he set aside \$50 million in Covid-19 relief funding for alternative protein research, writing that alternative proteins “can improve the sustainability and resiliency of our food systems” and that their expansion “will create new economic opportunities for American farmers, new benefits for consumers and help reduce agricultural emissions.”

Momentum on alternative protein support at the state level is also growing as states recognize the importance of this field and their potential to be leaders in the sector.

In 2018, the North Carolina Food Innovation Lab (NC-8) [received \\$4.4 million in funding from the state budget](#). The lab focuses on product research and development, pilot plant production, training and workshops, and consulting for the plant-based foods industry.

⁷ It is unknown how much funding has gone to each of these initiatives. A full list of relevant ARS projects and subprojects is available in the appendix.

Bond Pet Foods, Inc. (CO-2), a Boulder, Colorado company that makes pet food using fermentation, [was granted](#) \$250,000 in 2020 by the Colorado Office of Economic Development.

In 2021, California legislators approved a budget that includes \$1 million for alternative protein research at the UC Berkeley Alternative Meats Lab, an alternative protein research and education hub that connects students, entrepreneurs, and industry leaders working in the space, and also offers a project-driven class to undergraduate and graduate students.⁸

Renewable energy in Texas

The white paper “[American national competitiveness & the future of meat](#)” cites the rise of renewable energy in Texas as an example of successful government investment in innovation:

“A positive development has been the success of some states, notably Texas, in leveraging smart policies to encourage domestic wind and solar power. Texas established a renewable portfolio standard in 1999 and followed it up with ambitious administrative rulemaking, then added a \$7 billion investment in transmission capacity in 2005. Coupled with federal investment tax credits, these policies led to a boom in wind turbine installation that quickly made Texas the top wind power producer in the country—a literal windfall for towns across the states’ panhandle and western parts, as well as domestic manufacturers such as General Electric, which recently became the world’s largest wind turbine maker on the strength of the thriving domestic market. Today, Texas continues to lead in new wind installation while also dramatically expanding its solar and storage. From 2011 to 2020, Texas was second only to California in new solar capacity installation and is expected to grow faster than any other state over the next five years. The combined growth of renewables in the state has been spectacular: from 2015 to 2020, wind and solar’s share of electricity consumption doubled to more than 23 percent. Output of conventional generation has held steady, even as its share declined, thanks to rising consumption. In other words, renewables accounted for nearly all the growth but did not displace conventional electricity producers. As with alternative proteins, however, short-run complementarity will eventually give way to displacement.”

⁸ In 2022, California allocated \$5 million from the state legislature to advance alternative protein research at three University of California schools. See “A Look at 2022” section.

Regulation and labeling

The importance of sound alternative protein regulation cannot be overstated. Science-based frameworks that prioritize safety can build consumer trust, and fair administration—free from red tape—can encourage innovators and investors to enter a market and willingly comply with consumer protections.

Many plant-based meats use familiar ingredients and fall readily within existing food regulations. However, cultivated meat and some other alternative proteins (such as heme, an ingredient in the Impossible Burger made via fermentation) can pose challenges that require regulators to adapt existing regulatory frameworks. Governments often have broad regulatory frameworks that apply to all “novel foods,” which usually encompass some alternative proteins. In Singapore, for example, novel foods are defined as “foods and food ingredients that do not have a history of safe use.” Ingredients made through new production methods may also be considered novel foods, even if they are chemically identical to naturally occurring foods, and be regulated under novel foods framework.

Many countries still have a long way to go to produce robust and efficient regulatory frameworks, but early signs in many regions are promising. While Singapore is the only place to have approved the sale of a cultivated meat product, the United States and several other countries are charting a regulatory path forward for cultivated meat products, and Canada, Israel, Australia, and the European Union have all indicated that cultivated meat can be regulated under their novel food frameworks. The United States, India, and the European Union have also approved fermentation-derived ingredients.

In addition to safe and efficient regulations, consumers deserve alternative protein labels that reflect the language they use and understand. Companies should be able to choose their preferred terminology and use descriptive terms like “plant-based meat” and “soy milk.” Labeling restrictions on alternative proteins may cause unnecessary economic harm if companies are forced to produce new and unappealing or confusing labels (e.g., “plant-based disc” and “soy drink”).

In many regions, sometimes driven by conventional agriculture producers, the government has acted to censor labels on alternative proteins to prohibit the use of conventional meat and dairy terms. Canada, India, and several U.S. states have implemented restrictive labeling policies for plant-based foods; however, several censorship attempts have been overturned or blocked, such as in Spain, the European Union, and U.S. states. At the same time, Japan released preemptive regulations allowing plant-based companies to use conventional terms.

Asia

Following a dedicated cultivated meat [framework](#) within its novel food regulations, the Singapore Food Agency (SFA) approved the sale of Eat Just's cultivated chicken bites in December 2020, becoming the first regulatory agency in the world to approve the sale of a cultivated meat product.

SFA approves cultivated meat on a case-by-case basis, based on safety assessments that companies submit that describe potential food safety risks, information on inputs and manufacturing processes, and risk management procedures. Cultivated meat is required to comply with the chemical, microbiological, and labeling requirements under Singapore's broader food regulations and must also include qualifying terms on their labels to differentiate them from conventional meat. This framework places Singapore at the global forefront of food regulation and can provide a blueprint for other regions to develop cultivated meat regulatory frameworks.

SFA, which has an expert working group on novel foods, encourages cultivated meat companies to consult with them early in their R&D process to facilitate the regulatory procedure.⁹

In December 2021, Singapore approved Eat Just's cultivated chicken breast in addition to their chicken bites. The cultivated chicken breast is only available for short periods during pop-up collaborations with local hawker stalls, most recently in the form of chicken satay.



In 2020, Eat Just [became the first alternative protein company to receive regulatory approval for their cultivated chicken](#) from the Singapore Food Agency.

See [here](#) for an overview of Singapore's cultivated meat regulatory process at the 2021 Good Food Conference. Photo credit: GOOD Meat

⁹ While cultivated meat is considered a novel food, plant-based protein alternatives that are based on food ingredients with a history of safe use as food are generally not considered to be novel foods in Singapore.

In April 2021, Singapore announced that it would set up the Future Ready Food Safety Hub (FRESH), a joint initiative by Nanyang Technological University, SFA, and A*STAR, to create a pro-business food regulatory ecosystem that supports innovation and allows the launch of safe novel foods. The key objectives of FRESH are threefold: to close the gap between older regulatory frameworks and novel food production methods (such as meat cultivation and microbial fermentation), to strengthen food safety in Singapore by increasing collaboration between regulators and industry, and to “enable regulatory responsiveness” by exposing regulators to novel food production methods.

While no other regions have approved the sale of cultivated meat, other Asian countries including China, Japan, Thailand, and India have regulatory requirements for various alternative protein production platforms, including labeling.

In June 2021, the Chinese Institute of Food Science and Technology implemented a voluntary [Group Standard for Plant-Based Meat Products](#), which provides definitions, categorization, basic regulatory requirements, and labeling rules for plant-based foods. It specifies that labels should distinguish plant-based meat from “animal meat products” and that modifiers that can clearly indicate that the source of the ingredients is plants or the product simulates a certain “animal meat product” should be used if the category name does not make that clear.¹⁰

The [Japan Association for Cellular Agriculture](#) (JACA) is working toward formalized guidance for cultivated meat within the existing regulatory framework. Depending on the interpretation of existing laws, cultivated meat [might not require](#) a pre-market assessment or approval. In late 2021, Japan [released regulations](#) allowing plant-based companies to use terms such as meat, milk, and eggs on their labels, provided that they use a modifier such as plant-based, dairy-free, or the ingredient name (e.g., oat milk).

In India, cultivated protein products are regulated under the [Approval of Non-Specified Food and Food Ingredients Regulations](#). In September 2021, India’s food regulatory body, the Food Safety and Standards Authority of India (FSSAI), released a call for public comment regarding an [amendment](#) to the Non-Specified Food Regulations that would substantially modify the requirements for obtaining pre-market approval of alternative proteins. The new requirements would include, among other things, fixed timelines for the application process, post-market surveillance on relevant safety parameters, and compulsory animal testing to support health benefit claims.

¹⁰ Translated text: “Products should clearly indicate the product category name adjacent to the product name. If the product category name cannot reflect the true attributes of the product or cannot clearly indicate that the product uses plant raw materials, the product should be jointly named with modified words that can clearly indicate that the ingredients are derived from plants or simulate an animal meat product.”



Astha Gaur, Policy Specialist - Regulatory, GFI India with Inoshi Sharma, Executive Director, FSSAI (Food Safety and Standards Authority of India) at an event on sustainable superfoods by USA Dry Pea & Lentil Council

In September 2021, the FSSAI sought public comment on a draft of [Vegan Food Regulations 2021](#),¹¹ the first regulation globally to introduce a separate set of rules for any food product, food ingredient, or food processing aid produced, manufactured, marketed, or imported as “vegan.” The regulation requires food products marketed as vegan to display a vegan logo on the label in addition to other compliance requirements (including a declaration that the entire product and its ingredients are animal-free and the product has not been tested on animals).

In December 2021, India’s FSSAI [amended the Food Products Standards and Food Additives Regulations](#) to define “analogs in the dairy context”—plant-based milks, cheeses, ice creams, and similar foods—specifically stating that they are not considered milk, milk products, or composite milk products. This amendment requires plant-based dairy products to declare their ingredients and conventional dairy products to display a newly proposed dairy logo.

¹¹ The Vegan Foods Regulations were finalized by the FSSAI on June 10, 2022. See “A Look at 2022” later in this report.

Australia and New Zealand

All foods in Australia and New Zealand are covered by the bi-national [Food Standards Code](#) (FSC), which details requirements for food safety, identification, labeling, handling, and treatment. Foods that meet all requirements in the FSC, which include a range of plant-based meats, do not require pre-market approval. Otherwise, organizations can seek pre-market approval via an application to change the FSC to permit new foods or processes. Food Standards Australia New Zealand (FSANZ) provides [guidelines](#) on what information needs to be provided for different types of pre-market approval.

Cultivated meat and some fermentation-derived ingredients are likely to require pre-market approval as [novel foods](#) or, for foods produced using gene modification technology or including a genetically modified constituent in the final product, as [genetically modified \(GM\) foods](#). Additional or alternative pre-market approvals, such as food additive or nutritive substance approvals, may be required. FSANZ has [not yet received](#) an application for pre-market approval of cultivated meat. It has [approved](#) soy leghemoglobin as a nutritive substance and a GM food. FSANZ's safety assessment of the production process usually lasts at least 14 months.

Australia's Food Standards Code allows for common-sense qualifiers on plant-based meat labels and potentially on any future cultivated meat. [Subsection 1.1.1-13\(4\)](#) of the FSC states, "If a food name is used in connection with the sale of a food (for example in the labelling), the sale is taken to be a sale of the food as the named food unless the context makes it clear that this is not the intention. ... relating to beer, does not prevent the use of 'ginger beer' in relation to the soft drink. Such a product is not beer for the purposes of the Code."

In 2021, the [Australian Parliament](#) sought public comments on the definitions of meat and other traditional animal products to consider the topic of plant-based meat labeling. The Inquiry Committee's [final report recommends](#), among other things, that the Australian Government develop mandatory requirements for labeling plant-based protein products.

Brazil

The Brazilian Health Regulatory Agency (ANVISA) oversees food regulation and labeling. Brazil's food safety authorities have taken steps to begin analyzing the alternative protein regulatory landscape there, but they have not yet produced formal guidance on safety regulations. We expect to see more from Brazil concerning alternative protein regulations in the coming years.

Canada

Canada characterizes cultivated meat and seafood as “novel foods” and requires the submission of detailed information in an application for pre-market approval. The submission requires evidence that the food is safe for consumption, including molecular characterization, nutritional composition, toxicology and allergenicity, and types and levels of chemical contaminants.

A three-part approval is required: (i) a letter of no objection for human food use through the novel food assessment process, (ii) a pre-market assessment for new animal feed (due to the possibility of supply chain crossover and regardless of whether the product is intended for use as animal feed), and (iii) an environmental assessment under the New Substances Notification Regulations. Companies may not market their products in Canada until they have all three approvals.

Fermentation-derived ingredients that do not have a history of safe use are also regulated as novel foods in Canada. Some fermentation-derived products, such as protein extracted from *Fusarium venenatum* fungi, do not meet the [regulatory definition](#) and are not considered novel.

In December 2020, the Canadian Food Inspection Agency [sought public input](#) on plant-based meat labeling in Canada. The [final guidelines](#) require plant-based meat labels to use the phrase “simulated” followed by the meat or poultry type and the phrase “contains no meat” or “contains no poultry” in close proximity to the common name, using a similar text size or having the same prominence. Additional guidelines include nutrition labeling requirements for specifying added vitamins and minerals. For traditional plant proteins like tofu and black bean burgers, the label must “truthfully and accurately” describe the product and a “contains no meat” declaration is optional.

Europe

European companies that want to sell cultivated meat—as well as many fermentation-derived and some plant-based food products—must first apply to regulatory authorities for their products to be approved. Alternative proteins requiring pre-market approval follow specific regulatory frameworks for [novel foods](#) and, in some limited cases, [genetically modified foods](#). In addition, some alternative protein ingredients might require additional [regulatory approval as a food additive or flavoring](#). The time frame for approval can range from 18 months to about three years.

The EU novel foods process includes a risk assessment of the safety and nutritional value of the product conducted by the European Food Safety Authority (EFSA). Once EFSA publishes a positive scientific opinion, the European Commission proposes under what conditions the product in question is allowed to be on the market. A committee of delegates from all 27 EU member states makes the final decision.

Once EU regulators approve a novel food product, it can be sold across all EU countries plus Iceland, Liechtenstein, Norway, and Switzerland. The United Kingdom retained most of the substance of the EU regulatory approval system when it left the European Union in 2021. However, any company wishing to enter the UK market must apply separately to the UK Food Standards Agency.

In October 2021, [EFSA concluded](#) that mung bean protein isolate—the key ingredient in Eat Just’s plant-based egg—is safe as a novel food.¹² Companies making other plant-based and fermentation-derived foods are at different stages in the EU regulatory approval process: Impossible Foods, the Protein Brewery, Nature’s Fynd, and Solar Foods. As of June 2022, no cultivated meat company has applied for EU approval.

On labeling, the European Union and its member countries have also attempted to censor alternative protein labels. In 2017, the European court [upheld](#) the judgment that terms such as “milk” or “cream” cannot be used by plant-based dairy producers. Importantly, the [evidence](#) does not show that consumers are confused by conventional terms on alternative protein labels.

In October 2020, the European Parliament [voted to reject](#) a proposal that would have expanded on the dairy term ban by prohibiting plant-based meat products from using conventional meat terms on their labels across all 27 EU countries. Fifty businesses and nonprofits sent an open letter to the members of the European Parliament opposing the proposal, arguing that it contradicted the EU’s stated sustainability initiatives. In May 2021, a proposal for further EU-wide restrictions on plant-based dairy (banning words like “creamy” and even packaging styles like cartons) was blocked. The Spanish government also rejected an attempt to ban plant-based meat and dairy terms on food labels in November 2021.

Importantly, the evidence does not show that [European] consumers are confused by conventional terms on alternative protein labels.” with a link/source to the evidence.

¹² Its [subsequent approval](#) marked the first time the EU had authorized a novel legume.

The Middle East

Israel. Israel’s National Food Service under the Ministry of Health has maintained that cultivated meat and fermentation-derived foods would come under the regulatory definition of [novel foods](#). Accordingly, foods will be considered for regulatory approval on a case-by-case basis. However, because the existing novel foods framework is generic, the Israeli Innovation Authority and the Food Safety Authority surveyed four alternative protein companies in 2021 to determine what additional safety criteria should be required for regulatory approval. This research will equip the National Food Control Service—the department within the Ministry of Health that oversees food production—to evaluate future applications from alternative protein companies.

Cultivated Meat Gets Rave Israeli Reviews



In 2020, Israeli prime minister Benjamin Netanyahu (right) became the first head of government to try a cultivated meat product. After tasting Aleph Farms’ cultivated steak, Prime Minister Netanyahu said, “It’s delicious and guilt-free. I can’t taste the difference,” adding that “Israel will become a powerhouse for alternative meat and alternative protein.”

Photo credit: GPO Koby Gidon.



In August 2021, GFI Israel joined a briefing to Israeli Prime Minister Naftali Bennett to discuss climate technology solutions ahead of his meeting with U.S. President Joe Biden. The prime minister said Israel must help the world fight the climate crisis using the country’s technological expertise, especially in alternative proteins.

Israel’s Minister of Environmental Protection (right) with GFI Israel managing director Nir Goldstein (left). Photo credit: Israeli Ministry of Environmental protection



In 2021, Israeli president Isaac Herzog (left) became the first head of state in the world to taste cultivated meat. The president sampled cultivated chicken from Israeli company Future Meat at a reception for Israel’s COP26 delegation.

Photo credit: Amos Ben Gershom.

Qatar. In September 2021, the Qatar Free Zones Authority and the Ministry of Public Health [announced plans to grant regulatory approval](#) for GOOD Meat cultivated chicken and formally granted it an export license.

The United States

The U.S. government is gathering information to inform the details of its regulatory framework for cultivated meat, including labeling requirements. While states have passed laws attempting to censor alternative protein labels, the federal government has issued several encouraging signs that it is taking steps to ensure that cultivated meat, which is identical to conventional meat down to the cellular level, is safe and properly labeled.

The U.S. Food and Drug Administration (FDA) has authority over almost all cultivated seafood, consistent with its oversight of conventional seafood. Cultivated meat and poultry, on the other hand, are jointly regulated by USDA and FDA. For those meats, FDA oversees the cell collection, cell banks, and all cultivation inputs and processes, including cell growth and differentiation, much like the agency does for the production of biologics. At the moment of “harvest” from the bioreactors, authority transfers to USDA, which has expertise in regulating meat processing.

In practical terms, this framework means that companies producing cultivated livestock or poultry meat must consult with FDA before bringing products to market, open their facilities to inspection by both agencies, and comply with recordkeeping requirements to allow for oversight authority to be transferred from FDA to the USDA.

Agencies have not yet issued rules or guidance spelling out the details of these requirements, but in 2021, the USDA [announced](#) that the sanitation and Hazard Analysis and Critical Control Point systems used in other kinds of meat processing facilities are “sufficient to ensure the

safety of products cultured from the cells of livestock and poultry” and no further safety regulations are required.

U.S. law requires that food labels be accurate. In 2021, USDA [denied a petition from the U.S. Cattlemen’s Association](#) asking the agency to prohibit alternative proteins from using “beef” and “meat” terms on their labels. The agency [reasoned that it does not have authority over plant-based labels](#). USDA also denied the petition on the grounds that its Food Safety Inspection Service was taking up the issue, as evidenced by [an advanced notice of proposed rulemaking](#) earlier in the year focused on how cultivated meat should be labeled. Notably, USDA has indicated that it will consider applications for premarket label approval prior to completing the rulemaking process, which will prevent individual companies ready for market from long delays.¹³

In recent years, FDA has approved several new ingredients used in plant-based and fermentation-derived products under its [“GRAS” \(Generally Recognized as Safe\) Notification program](#).¹⁴ Through this program, companies submit a notice to FDA showing that their ingredients are “generally recognized as safe” under the conditions of their intended use. Then, FDA grants a “no questions” letter to the company, precluding the need for further premarket approval submissions.

- In 2018, FDA [approved](#) the use of Impossible Foods’ soy leghemoglobin or “heme” protein, which gives Impossible’s products their distinctive blood-like color and taste. Because the flavor enhancer imparts a red color to the food before it is cooked, the company also filed a color additive petition, granted in 2019, which allowed Impossible heme products to be sold raw in grocery stores. In May 2021, Impossible Foods won a court ruling that affirmed that the agency’s initial decision was supported by “substantial evidence.”
- In April 2020, Perfect Day, a startup using fermentation to make animal-free dairy proteins, [received GRAS status](#) approval for their proprietary whey protein, β -lactoglobulin.
- In June 2021, Nature’s Fynd, which makes meatless breakfast sausage and dairy-free cream cheese by fermenting microbes found in Yellowstone National Park, [received a “no questions” letter](#) from FDA in response to its GRAS submission.

¹³ In 2020, FDA issued a request for information on cultivated seafood labeling. The agency does not require premarket approval of foods under its labeling authority but is expected to issue guidance.

¹⁴ According to FDA, any substance that is intentionally added to food is a food additive that is subject to pre-market review and approval by FDA unless the substance is generally recognized, among qualified experts, as having been adequately shown to be safe under the conditions of its intended use, or unless the use of the substance is otherwise excepted from the definition of a food additive.

- In September 2021, Motif FoodWorks [submitted a GRAS notice to FDA](#) for their heme-binding myoglobin protein and received a “no questions” letter in December. Like Impossible, the company also plans to file a color additive petition.

Despite this progress at the federal level, several states have [passed label censorship laws](#) that prohibit the use of conventional terms like “sausage” and “burger” on alternative protein products or require unappealing and misleading descriptors such as “imitation.” Those laws are now subject to litigation, and outright prohibitions on using meat and dairy terms on plant-based product labels are not holding up in court. For example, in 2019, a court in Arkansas held that a lawsuit challenging the state’s label censorship law [would likely prevail on First Amendment grounds](#). Also in 2019 in Mississippi, the state dropped rules that would have enforced the state’s labeling ban and instead replaced them with new regulations that state a plant-based meat alternative won’t be considered “misabeled” if it uses an adjective like “meatless,” “plant-based,” or “vegan” on its labeling. Lawsuits challenging label censorship laws in Missouri and Oklahoma are still underway.

In October 2021, a California court ruled in favor of Miyoko’s Creamery in a lawsuit against the California Department of Agriculture, which had instructed Miyoko’s Creamery to stop using terms such as “butter,” “lactose-free,” and “cruelty-free” on their product label. The court found that evidence of consumer confusion around Miyoko’s labels was “empirically underwhelming” and that the First Amendment protects Miyoko’s labels.

A look at 2022

While 2021 was a banner year for government support for alternative proteins, the momentum continued through the first half of 2022. GFI’s 2022 report will be issued in early 2023 and will cover major developments from the year. Among them:

- China released its [Five-Year Plan Bioeconomy development plan](#), which includes synthetic biology and “synthetic protein.”
- India finalized the [Vegan Foods Regulations, 2022](#), which incorporate most of GFI India’s recommendations.
- India [approved](#) mycoprotein derived from [Fusarium venenatum](#), a protein derived via fermentation with an established history for safe human consumption.
- Japan [convened](#) experts to determine if additional regulations are necessary for cultivated meat.



Varun Deshpande, Managing Director, GFI India with Shri Prahlad Singh Patel, Minister of State for Food Processing Industries (MoFPI) at an industry consultation at the Ministry

- South Korea supported two alternative protein companies, Intake and Space F. The government also announced a discussion group with industry that will pave the way for announcements of cultivated meat regulations in 2023.
- Brazil issued a [decree](#) to eliminate one of the taxes levied on plant-based milks.
- France [issued a decree](#) banning denominations for plant-based meat and fish products.
- The Netherlands [announced a €60 million investment into cellular agriculture](#) as part of a €20 billion National Growth Fund supporting innovative industries.



Ellie Walden speaking in the UK Parliament earlier this year

- The United Kingdom published a [National Food Strategy](#) committing its support for alternative protein research and innovation.
- Israel [granted final approval for an \\$18 million cultivated meat consortium](#), and the country, in collaboration with GFI Israel, launched a \$1.2 million [Alternative Protein Research Grant](#) program.

- Turkey [banned the production of plant-based cheese](#).
- The U.S. state of California granted \$5 million to three public university labs. Many California-based alternative protein companies supported this effort, including UPSIDE Foods, which hosted a tour of their production facility for California policymakers.



Pictured in photo from left to right: Senator Josh Becker; Uma Valeti, Founder and CEO, UPSIDE Foods; Assemblymember Alex Lee; David Kay, Director of Communications, UPSIDE Foods; Assemblymember Ash Kalra; Assemblymember Mia Bonta; Bruce Friedrich, CEO, The Good Food Institute

- A U.S. court [ruled](#) that Louisiana’s label censorship law was unconstitutional.
- South Africa [banned](#) the use of meat-like terms on plant-based product labels.

Conclusion

Global demand for protein will increase as the world's population grows in number and affluence. For that demand to be met in ways that simultaneously meet climate, food security, and global health goals, a fundamental shift in protein production is required. Like the trajectory of renewable energy and electric vehicles, alternative proteins will require government support and private sector incentives to scale at the pace needed.

When compared to all prior years, 2021 saw the most government funding for alternative protein research and development. This level of investment is promising, as are signals from countries that are integrating alternative proteins into their multi-year food and agricultural plans. To reach critical thresholds of mass adoption, however, alternative proteins require far greater government support—support that is right-sized to the impact of food and agricultural emissions globally. Similar to what electric vehicles require to scale, billions of dollars, not millions, are needed.

Government support will need to take multiple forms: open-access research aimed at improving taste and price, infrastructure and manufacturing incentives to help private industry bring costs down, incentives for farmers to grow alternative protein crops, and a policy and regulatory landscape that eases and accelerates the path to market. In 2021, that landscape—specifically labeling that would provide alternative proteins with a level playing field—saw both setbacks and progress. Standard-setting at the Codex Alimentarius Commission will be a critical next step. Governments need to ensure the safety and integrity of products within their borders and work with the international community to foster a system where alternative protein providers can easily market and sell their products in the global economy.

Given the growing urgency to reduce emissions, ensure food security, and protect global health, governments around the world have obligations and opportunities to support their alternative protein sectors with direct funding for research, private sector incentives for R&D and manufacturing, and a clear and fair regulatory regime.

Appendix

Research funding tables

The tables below capture global public funding for alternative protein research and private sector incentives across all three alternative protein production platforms from the earliest known projects through the end of 2021. The tables include research grants for universities, companies, and consortia, as well as in-house research conducted by government agencies.

While the information here is as comprehensive as possible, some funding is likely missing. State-owned investment funds and enterprises, which are especially relevant to Asia, can be opaque. For instance, the total amount Singapore’s government has set aside for alternative proteins is not public. Likewise, smaller amounts of local and state-level funding (across different German or Chinese regions, for example) are not widely reported.

Asia Pacific

Funder	Platform	Recipient Type	Recipient	Year Announced	Amount
<p>Singapore committed tens of millions of dollars in funding for alternative protein research and has awarded numerous grants, but exact figures are unavailable. Singapore may have surpassed all other nations in awarded grant money.</p>					
China					Total: Undisclosed
Ministry of Science and Technology, National Key Research and Development Program of China	Plant-based, Cultivated, Fermentation	University	Jiangnan University (project lead)	<u>2020</u>	Undisclosed.*

**Each of the funded projects is estimated to receive \$3.1 million, which was calculated by averaging the total budget allocated for the “Green Biological Manufacturing” National Key R&D Program.”*

Japan					Total: \$5,508,342+
Japan Science and Technology-Mirai Program (2018-2021)	Cultivated	University	Juntendo University Graduate School of Medicine	2018	Unknown
Real Tech Fund A-FIVE	Cultivated	Company	IntegriCulture	2018	\$2,670,000*
A-FIVE	Plant-based	Company	DAIZ	2020	\$2,838,342
Japan Science and Technology-Mirai Program	Cultivated	University	The University of Tokyo	2020	Unknown

India					Total: \$801,000
Science and Engineering Research Board, Department of Science & Technology	Cultivated	University	Sanjay Gandhi Postgraduate Institute of Medical Sciences	2019	\$67,000
Department of Biotechnology, Ministry of Science and Technology	Cultivated	University	CCMB	2019	\$600,000
Department of Biotechnology, BIRAC, BIG (Biotechnology Ignition Grant)	Cultivated	Company	Myoworks	2020	\$67,000**
Department of Biotechnology, BIRAC, BIG (Biotechnology Ignition Grant)	Fermentation	Company	FemtoFarad	2021	\$67,000**

* Real Tech Fund and A-FIVE are government funds that led the JPY300 million seed funding round for cultivated meat company IntegriCulture, but the exact amounts of their contributions are not a matter of public record.

**Funding amounts are internal figures provided to GFI Israel.

Funder	Platform	Recipient Type	Recipient	Year Announced	Amount
Australia & New Zealand					Total: \$476,576
Australian Research Council	Plant-based	University & company	University of Queensland; Motif Foodworks	2021	\$476,576

Funder	Platform	Recipient Type	Recipient	Year Announced	Amount (USD)
Canada				Total: \$35,600,195	
Natural Sciences and Engineering Research Council of Canada	Plant-based	University	University of Alberta	2016	\$132,641
Natural Sciences and Engineering Research Council of Canada	Plant-based	University	University of Guelph	2018	\$22,517
Natural Sciences and Engineering Research Council of Canada	Plant-based	University	University of Alberta	2018	\$36,393
Natural Sciences and Engineering Research Council	Plant-based	University	University of Saskatchewan	2019	\$1,279,506
Protein Industries Canada	Plant-based	Company	Avena Foods; Big Mountain Foods; Daiya Foods; Bakenology; The Village Bakery	2020	\$5,074,000
Protein Industries Canada	Plant-based	Company	AGT Food and Ingredients; ulivit	2020	\$4,545,000
Protein Industries Canada	Plant-based	Company	Sightline Innovation; DL Seeds; SeedNet	2020	\$1,410,000
Protein Industries Canada	Plant-based	Company	Mera Food Group; Mera Developments; Benson Farms	2020	\$2,867,000
Saskatchewan Agricultural Development Fund	Plant-based	Government Agency	Agriculture and Agri-Food Canada	2020	\$198,000
Saskatchewan Agricultural Development Fund	Plant-based	University	University of Saskatchewan	2020	\$165,000
Saskatchewan Agricultural Development Fund	Plant-based	University	University of Saskatchewan	2020	\$176,000
Saskatchewan Agricultural Development Fund	Plant-based	University	University of Saskatchewan	2020	\$239,000
Western Economic Diversification Canada; Government of Alberta; Industry partners	Plant-based	Government Agency	Food Processing Development Center	2020	\$2,727,000

Protein Industries Canada	Plant-based	Company	Ingredion Inc.; Ingredion Plant Based Protein Specialties (Canada) Inc.; Verdient Foods Inc.; T Base 4 Investments; O.M.D. Food Products	2021	\$10,320,000
Protein Industries Canada	Plant-based	Company	Wamame Foods; Merit Functional Foods; Wismettac Asian Foods; Winecrush Technology	2021	\$2,961,150
Protein Industries Canada	Plant-based	Consortium	YoFiit; Avena Foods Limited; Roquette Canada	2021	\$1,324,725
Protein Industries Canada; New School Foods; Liven	Plant-based	Company	New School Foods	2021	\$759,667
Protein Industries Canada	Plant-based	Consortium	Saskatchewan Food Industry Development Center (Food Center); University of Saskatchewan; Global Agri-Food Advancement Partnership (GAAP); Ag-West Bio	2021	\$545,475
New Frontiers in Research Fund	Cultivated	University	McMaster University	2021	\$202,212
Saskatchewan Agricultural Development Fund	Plant-based	University	University of Saskatchewan	2021	\$198,768
Saskatchewan Agricultural Development Fund	Plant-based	University	University of Saskatchewan	2021	\$201,949

Europe

Funder	Platform	Recipient Type	Recipient	Year Announced	Amount (USD)
European Union					EU Total: \$74,289,779
Horizon 2020 - PROTEIN2FOOD	Plant-based	University	University of Copenhagen, Denmark	2015 (start date)	\$10,777,005
Bio-Based Industries Joint Undertaking (co-funded by European Commission and industry)	Fermentation	Consortium	PLENITUDE - various entities	2019 (start date)	\$17,862,367

Horizon 2020 - Smart Protein	Plant-based	Universities	University College Cork, National University of Ireland, Cork, Ireland	<u>2020</u> (start date)	\$9,996,718
Horizon 2020	Cultivated	Consortium	Meat4All, Spain, France, Portugal	<u>2020</u> (start date)	\$1,562,140
Horizon 2020	Cultivated	Company	ORF Genetics, Iceland,	<u>2020</u>	\$3,000,000
European Maritime and Fisheries Fund	Fermentation	Company	Algama Foods, France	<u>2021</u>	\$2,271,810
React EU	Cultivated	Companies	Nutreco & Mosa Meat, The Netherlands	<u>2021</u>	\$2,306,864
Horizon Europe (HE)	Any	Consortium	Undesignated	<u>2021</u>	\$12,809,905*
EIT Food	Plant-based and fermentation	Consortia	Various projects	<u>2018-2021</u>	\$12,254,697**
United Kingdom					Total: \$2,291,235
UK Research and Innovation (UKRI) under the Transforming Food Production programme	Cultivated	Company	Roslin Technologies	<u>2021</u>	\$1,300,000
UKRI	Cultivated	University	Aston University	<u>2021</u>	\$123,876***
UKRI	Cultivated	University	Aston University	<u>2021</u>	\$123,876***
UKRI	Cultivated	University	University College London	<u>2021</u>	\$123,876***
UKRI	Fermentation	University	University of Nottingham	<u>2021</u>	\$123,876***
UKRI	Plant-based	Consortium	SPG Innovation, Baker Perkins and the University of Leeds	<u>2021</u>	\$113,936***
UKRI	Plant-based milk	University	University of Reading	<u>2021</u>	\$123,876***
UKRI	Plant-based egg	University	University of Leeds	<u>2021</u>	\$134,043***
UKRI	Plant-based	University	Imperial College London	<u>2021</u>	\$123,876***
Finland					Total: \$7,249,892
Business Finland	Fermentation	Company	Solar Foods	<u>2020</u>	\$4,529,892
Business Finland	Plant-based	Consortium & university	VTT Research & University of Helsinki	<u>2020</u>	\$2,720,000

The Netherlands					Total: \$5,731,486
SenterNovem	Cultivated	Consortium	Various entities	2005	\$2,325,486
Dutch Ministry of Economic Affairs	Plant-based	University	Wageningen University	2017	\$3,406,000
Spain					Total: \$4,797,500
Center for the Development of Industrial Technology	Cultivated	Company	BioTech Foods	2021	\$4,490,000
Center for the Development of Industrial Technology	Cultivated	Company	Nova Meat	2021	\$307,500
Belgium					Total: \$4,191,138
Flanders' Food	Cultivated	Company & consortium	Peace of Meat & others	2020	\$4,191,138
Sweden					Total: \$172,000
Vinnova	Plant-based	Consortium	SP Food & Bioscience	2014	\$172,000
European Union + Nations					Total (EU + Nations): \$110,423,099

*GFI Europe estimates that €12 million of the total funding is dedicated to alternative protein research and development

**Funding amount shared by EIT Food in email announcement

***Funding amounts for individual UKRI studentships are not publicly available, but projects are generally awarded £100,000 each per a contact familiar with the funding structure.

Funder	Platform	Recipient Type	Recipient	Year Announced	Amount (USD)
Israel					Total: \$19,577,000
Israeli Innovation Authority	Plant Based, Cultivated, Fermentation	Research grants	Various scientists	2021	\$1,000,000*
Israeli Innovation Authority	Plant Based, Cultivated, Fermentation	Bilateral research grant	International research programs	2021	\$500,000*
Ministry of Agriculture, Chief Scientists Office	Cultivated	Research grant	Volcani Center	2021	\$77,000*
Israeli Innovation Authority	Cultivated	Consortium	Israel Cultivated Meat Consortium (10 companies and 10 academic institutions)	2021	\$18,000,000

*Funding amounts are internal figures provided to GFI Israel.

Funder	Platform	Recipient Type	Recipient	Year Announced	Amount
United States				Total: \$25,389,854+	
U.S. Department of Agriculture					
NIFA (National Institute of Food and Agriculture)	Plant Based	University	University of Missouri (MO-4)	2005	\$319,999
NIFA	Cultivated	Company	Modern Meadow (MO-4)	2012	\$92,488
NIFA	Cultivated	Universities	Tufts University (MA-5)	2021	\$10,000,000
NIFA	Plant-based Milk	University	Mississippi State University (MI-3)	2021	\$481,910
NIFA	Crop Development	Company	ARVEGENIX LLC (now CoverCress Inc)	2021	\$106,489
NIFA	Plant-based	University	Purdue University (IN-4)	2021	\$476,270
NIFA	Plant-based	University	University of Massachusetts Amherst (MA-2)	2021	\$476,270
National Science Foundation					
SBIR	Fermentation	Company	Meati Foods (CO-2)	2019	\$750,000
NSF	Cultivated	University	Tufts University (MA-5)	2021	\$19,999
NSF	Cultivated	University	University of California Davis (CA-6)	2021	\$3,549,236
SBIR (Small Business Innovation Research)	Cultivated	Company	Tender Foods (formerly Boston Meats, Inc.) (MA-7)	2021	\$256,000
SBIR	Cultivated	Company	Novel Farms, Inc. (CA-13)	2021	\$256,000
SBIR	Fermentation	Company	Fybreworks Foods (MN—3)	2021	\$256,000
Department of Energy					
Advanced Research Projects Agency-Energy Small Business Technology Transfer (ARPA-E STTR)	Cultivated	Company & University	Mori & Tufts University (MA-7, MA-5)	2020	\$249,999
ARPA-E STTR	Cultivated	Company	Mori & Tufts University (MA-7, MA-5)	2021	\$250,000
NASA					

SBIR - STTR	Cultivated	Consortium	North Star Research (NY-1)	1999	\$61,639
EPA, NASA, USDA, NSF					
	Fermentation	Company	Nature's Fynd (IL-3)	2013, 2014, 2015, 2018, 2020	\$2,144,308
State Governments					
North Carolina	Plant-based	Consortium	North Carolina Food Innovation Lab	2017	\$4,400,000
Washington State Department of Agriculture	Plant-Based	University	Washington State University (WA-5)	2018	\$243,247
California State Budget	Cultivated	University	University of California Berkeley (CA-13)	2021	\$1,000,000

List of USDA Agricultural Research Service In-House Research Projects Relevant to Alternative Proteins (funding amounts unknown)

- New Sustainable Processes, Preservation Technologies, and Product Concepts for Specialty Crops and Their Co-Products - Sub-objectives 3B and 3C
- New Technologies and Methodologies for Increasing Quality, Marketability and Value of Food Products and Byproducts - Sub-objective 2A
- Developing Accurate and Efficient Laboratory Methods for Testing End-use Qualities of Pulse Crops, Identify Factors Associated with End-use Quality, and Develop Processes to Add Value to Pulses - Objective 4
- Pulse Crop Health Initiative - Priority areas 7-12
- Development of Meat Analogues with Germinated Pulse Protein Extracts
- Utilizing Unique Genetic Diversity to Combine Elevated Protein Concentration with High Yield in New Varieties and Experimental Lines
- MP3: More Protein, More Peas, More Profit
- Flavor, Nutrition and Functional Properties of Pea Protein
- Identification and Characterization of Quality Parameters for Enhancement of Marketability of Hard Spring Wheat, Durum, and Oat
- Improving Physicochemical Properties and Ingredient Functionality of Proteins with High-Power Sonication
- Developing and Utilizing Functionally Enhanced Pulse Proteins as Novel Food Ingredients
- Thermal and Nonthermal Processing of Pulse Protein Concentrates: Impact on Functionality and Nutritional Value
- Improved Processes and Technologies for Comprehensive Utilization of Speciality Grains in Functional Food Production for Digestive Health and Food Waste Reduction

Private-sector incentives

Country	Funder	Recipient	Amount (USD)	Type	Year
Infrastructure, Startup support					
Australia	Clean Energy Innovation Fund	University of Sydney; All G Foods	\$3.4 million	Startup funding	2021
Australia	Advanced Manufacturing Growth Center (AMGC) Commercialisation Fund	Harvest B	\$680,000	Startup funding	2021
Canada	Farm Credit Canada, Export Development Canada, Agri-Food Innovation Fund	Merit Functional Foods	\$70 million	Repayable contributions and debt financing	2021
Israel	The Israeli Innovation Authority	Various	\$9 million*	Startup funding	2021
Israel	The Israeli Innovation Authority	Various	\$2 million*	Pilot plants	2021
Israel	The Israeli Innovation Authority	Various	\$24 million*	Establishing startups and pilot plants	2011-2020
Japan	Japan Ministry of Economy, Trade and Industry	IntegriCulture	\$2,200,000	Pilot plant	2020
Finland	Finnish Government Climate Fund	Solar Foods	\$11,277,700	Pilot plant	2021
Qatar	The Qatar Investment Authority & Doha Venture Capital, Qatar Free Zones Authority	Eat Just	\$200 million**	Pilot plant	2020

South Korea	Ministry of Agriculture, Food and Rural Affairs	The Green Bio Fund investments	\$13.5 million	Startup funding	2021
The United States	North Carolina State Budget	North Carolina Food Innovation Lab (NC-8)	\$4.4 million	R&D, pilot plant production, training and workshops, and consulting	2018
The United States	Colorado Office of Economic Development	Bond Pet Foods, Inc. (CO-2)	\$250,000	Startup	2020

**Funding amounts are internal figures provided to GFI Israel.*

***Eat Just and several Qatari government agencies are collaborating on a cell-cultivation pilot plant, the total cost of which is estimated at \$200 million. Eat Just CEO Josh Tetrick has said a “relevant chunk” of that will come from Qatari state-run agency Doha Venture Capital, but the exact funding formula is not publicly available.*