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China's Biomanufacturing Boom

Opportunities and Risks for Microbial Protein Producers

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Table of Contents

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Executive Summary

Fermentation-powered ingredients and proteins—also known as “alternative” or “new proteins” and collectively referred to hereafter as “alt proteins”—are a promising area of innovation to meet current and future protein needs within environmental limits. The category’s success will depend on achieving the cost and scale required for widespread adoption.

As companies search for pathways to lower costs and accelerate commercialisation, China offers capabilities that are difficult to ignore. China’s industrial fermentation ecosystem is among the largest and most developed in the world. Decades of investment in fermentation-based industries in China have created a manufacturing sector with vast production capacity, experienced technical talent, established supply chains, and competitive operating costs.

For international companies considering manufacturing in China, there are two simultaneous trends that matter. Firstly, Chinese companies and the Chinese government are committed to manufacturing novel foods at a competitive price point, more so than any other country on earth. This is directing China’s pre-existing strengths in fermentation into novel foods, and genuinely dropping prices. This is likely to create a swathe of highly competitive Chinese startups in the future. Secondly, global geopolitical tensions are creating significant uncertainty around supply chains, technology collaborations, end market access, and tariffs. Novel foods, given their small size in the global market, have rarely been directly targeted–but they could get caught up in broader government actions.

Layered on top of these two trends is the inexperience that many international novel food startups have with China. However, the country is navigable. There are several examples of international novel food startups successfully manufacturing in China today.

This report examines how international companies can leverage China’s capabilities to accelerate scale-up and commercialisation, while navigating the associated risks and trade-offs.

Figure 1: Examples of recent alt protein facilities and partnerships in China (publicly disclosed)

Facilities				
Novel food company	**Chinese manufacturing partner (where relevant)**	**Product**	**Current capacity**	**Planned capacity**
Fushine 富祥药业		Mycoprotein	1,200 tonnes	20,000 tonnes
MOR2 MEAT	广州双桥股份有限公司 GUANGZHOU SHUANGQIAO COMPANY LTD	Mycoprotein		20,000 tonnes
Angel		Yeast protein	11,000 tonnes	20,000 tonnes
CALYSTA PROTEIN WITHOUT LIMITS	ADISSEO A Bluestar Company	Microbial protein	20,000 tonnes	
Jupeng Bio 巨鹏生物	内蒙古伊泰集团有限公司 YITAI INNER MONGOLIA YITAI GROUP CO.,LTD	Microbial protein	20,000 tonnes	
中谷君创		Mycelium protein		18,500 tonnes
NXW NUTRITION FROM WATER	JSPC	Microalgae-based protein	Commercial-scale production run completed	
Nourish Ingredients	CABIO®	Precision-fermented fats	Production capacity to formulate 170,000 tonnes of finished products containing fermentation-derived fat	

Today, China offers capabilities across the full scale-up journey, from pilot production to commercial manufacturing. Chinese alt protein players such as Fushine Biotech and Angel Yeast have invested in large-scale fermentation capacity, while established fermentation players have begun partnering with alt protein startups to support development and commercialisation (see Figure 1). Chinese companies are also developing strengths beyond manufacturing by investing in strain development, process optimisation, and the development of technological capabilities to drive forward alt protein innovation.

China will affect all global stakeholders in novel food. It is a potential market, a potential manufacturing destination, a future source of world-leading innovators, and it is often involved in the geopolitics of supply chains and manufacturing.

There is a spectrum of possible approaches to engage with China in alt proteins, ranging from market exploration and relationship building, to pilot projects, contract manufacturing arrangements, and deeper strategic partnerships. Each company must determine the level of engagement that best aligns with its technology, business strategy, and risk tolerance. The risks of various engagement options should be weighed alongside the potential costs of non-engagement with this strategically important market.

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Introduction

To achieve large-scale adoption, alt proteins must reach cost and taste parity with conventional animal products. While recent scientific progress has been substantial, many companies continue to face a more fundamental challenge: manufacturing at the scale required to compete with incumbent food products. In fermentation, pathways to rapidly scaling alt proteins increasingly lead to China.

There is a huge opportunity for China to transform alt proteins over the next five years. The country is committed to building its novel protein production capacity, which both domestic and overseas companies have started tapping into. The Chinese companies Fushine Biotech, Angel Yeast, and More Meat are each constructing 20,000 to 30,000 tonne production facilities. This is just the tip of the iceberg: major domestic fermentation companies from adjacent industries are also beginning to repurpose existing capabilities towards novel foods, creating additional partnership opportunities for global alt protein startups.

The rise of renewable energy as a domestic economic engine illustrates how China's commitment to industrial-scale production of a nascent industry can succeed. Moreover, China's approach to emerging technologies has historically involved coordinated support across the entire value chain, rather than focusing on manufacturing alone.

The implications of these actions extend far beyond just companies that choose to manufacture in China. As Chinese startups, incumbent manufacturers, and internationally backed ventures leverage China's fermentation ecosystem, companies that remain outside these networks may find themselves outcompeted by businesses that scale faster, reduce costs more quickly, and swiftly bring products to market.

This report examines the forces driving China's food biomanufacturing expansion, and the implications for international alt protein companies considering manufacturing in China, including the opportunities and trade-offs involved.

China's Novel Food Revolution

China's novel food transformation is underpinned by two main factors:

ECONOMIC

Low prices in traditional fermentation, chemicals, and pharmaceuticals, **pushing companies in adjacent areas to alt proteins** to seek innovation in new areas.

STRATEGIC

Driven by the belief that large-scale biomanufacturing, including for alt proteins, will become **central to global manufacturing** and contribute to addressing **food security concerns.**

The Economic Push

Drivers pushing Chinese companies into new industries

China produces much of the world's fermented industrial and pharmaceutical products.[1] However, a combination of slow domestic economic growth, structural oversupply, and intense global competition has created substantial price pressure for bulk fermentation products.

China's economy has faced multiple headwinds since the start of the COVID-19 pandemic. The dominant narrative of the past six years has been one of mounting pressure on traditional economic engines, though there are nascent signs of recovery.

For most of the past three years, factory-gate prices have been negative in China across the economy. 41 months of decline in the Producer Price Index (PPI) (see Figure 2) reflects an environment of weak demand and excess supply, which has driven structural oversupply and forced manufacturers to sell their goods at lower prices. The percentage of Chinese companies reporting losses rose from 17 percent in 2021 to 25 percent in 2025.

In response to these structural challenges, Chinese policymakers have increasingly emphasised a development strategy focused on "new quality productive forces," with a focus on technological innovation and emerging industries as new drivers of growth.

More recently, the PPI returned to positive territory between March and May 2026. This improvement may have been driven by temporary factors, including higher energy prices following conflict in the Middle East and semiconductor shortages, rather than a sustained recovery in underlying demand. Whether this marks a structural turning point or merely a cyclical rebound remains uncertain.

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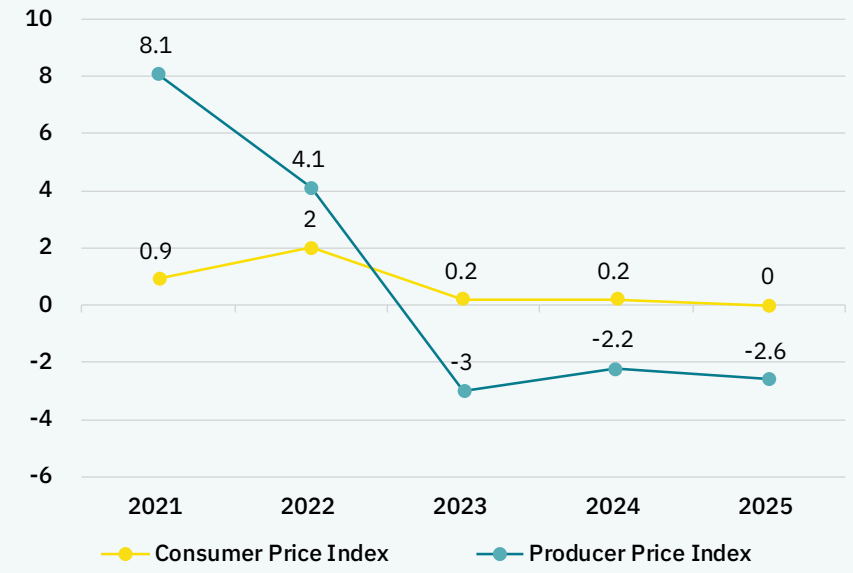
[1] While it is widely referenced (e.g. SCSP, SCIE) that China possesses 70 percent of the world's fermentation capacity, the underlying references all link to each other and the original source of this claim is hard to locate and verify.

Figure 2: Consumer and producer price inflation (% change year-on-year)



Understanding price indices:

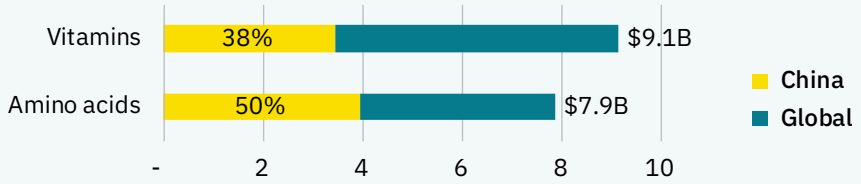
The Consumer Price Index (CPI) measures changes over time in the prices paid by consumers for goods and services. It reflects changes in household purchasing power and the overall cost of living.

The Producer Price Index (PPI) measures changes in prices received by producers for goods at the factory gate before products reach consumers. It is an indicator of cost pressures within the industrial economy.

Source: National Bureau of Statistics of China

Amino acids and vitamins

Figure 3: 2024 global exports and China's share (US$ billions)



As of 2024, China accounted for approximately 38 percent of global vitamin exports and 50 percent of global amino acid exports.

Source: UNdata

The decline in factory-gate prices affecting China's industrial manufacturing sector is reflected in the economics of fermentation-derived products. Amino acid markets have experienced significant price declines. Between January 2022 and November 2025, prices paid for amino acids in Europe dropped significantly (see Figure 4). Over the same period, certain vitamins have experienced overcapacity. In 2025, Chinese producers of vitamin C slowed or stopped plants in response.

Figure 4: European prices for key amino acids

Amino Acid	Price in Jan 2022 (Eur/kg)	Price in Nov 2025 (Eur/kg)
70% L-Lysine Sulfate	~€3.6	~€1
DL-Methionine	~€3.2	~€2.4
L-Threonine	~€4.6	~€1.1
L-Valine	~€8.5	~€2.3
L-Tryptophan	~€9.5	~€4

Source: EFFAMALL

Geopolitical developments have accelerated the challenges of overcapacity and falling prices. While China ships products globally, amid escalating tariff disputes, China's exports to the U.S. declined by 20 percent in 2025. Reduced access to key export markets has limited the ability of industries to absorb growing production volumes, leaving more products to compete in domestic and alternative export markets. According to one confidential fermentation manufacturer in China, "Disrupting U.S. export flows has really exacerbated the overcapacity problem. So we're seeing major overcapacity [across traditional bioindustries]."

Biopharmaceuticals

Biopharmaceutical manufacturers in China also face overcapacity. Historically, pharmaceutical companies have shown limited interest in food applications. While pharmaceuticals are typically produced in much smaller volumes, they command far higher prices than food ingredients. However, with the expansion

of biopharmaceuticals capacity in China, combined with intense competition in biosimilars (off-patent biological drugs that are broadly analogous to generics), the attractiveness of some pharmaceutical manufacturing markets has lessened. This has encouraged some manufacturers to explore adjacent markets to leverage their existing fermentation capacity, including alt proteins, particularly where applications may attract market premiums.

Alt proteins as a response to market pressures

Alt proteins offer the prospect of greater margins and growth than many intensely competitive traditional fermentation markets. Government support (see next chapter) further encourages diversification into this sector.

Case study: Jiangshan Pharmaceutical Company (JSPC)

JSPC is a Chinese biomanufacturing company with extensive experience producing both pharmaceutical and nutraceutical ingredients, and is best known as a global leader in the vitamin C industry. In 2015, Jland Biotech was spun out of JSPC, and is now a global leader in recombinant protein production for food, cosmetic, and medical device applications. JSPC was previously under the ownership of DSM, the Dutch multinational. After DSM's exit in 2024, JSPC began exploring new growth opportunities and product areas. As JSPC's Chairman said in March 2024:

"The company will no longer treat the pursuit of scale as its primary objective. While continuing to strengthen, deepen, and refine its position in the vitamin C market, it will also develop new productive forces suited to local conditions, target the new frontier of synthetic biology, cooperate with leading domestic and international synthetic biology companies and relevant research institutes, and progress toward building a leading synthetic biology industrial base in China."

JSPC has enjoyed a very strong working relationship with its sister company, Jland Biotech, which has significant gene editing and strain engineering capability.[2] Combined, these companies are working on a new product portfolio, including but not limited to functional foods and cosmetics ingredients.

JSPC is redirecting some of its capacity towards alt proteins. In March 2026, JSPC announced a partnership with the Portuguese startup Nutrition from Water (NXW) to produce NXW's microalgae-derived protein "Marine Whey." The partnership leverages JSPC's large-scale fermentation infrastructure and will target thousands of tonnes of production over the next three years at what NXW's CEO describes as "margin positive unit economics."[2] NXW did its tech transfer with JSPC in December 2025, and completed a commercial-scale trial production run in a six-tonne fermentation tank in May 2026. The JSPC engineering team expects additional cost reductions for NXW as they scale.[3]

Beyond this specific partnership, JSPC shareholders have also announced plans to build a new dedicated synthetic biology manufacturing facility with 50-70,000 square metres of building floor space.

There are many other examples of Chinese fermentation manufacturers diversifying into alt proteins. The startup Nourish Ingredients has partnered with Chinese biomanufacturing company Cabio Biotech to manufacture Nourish's precision-fermented fats. As Nourish's CEO James Petrie said in a media interview in August 2025, "Cabio Biotech remains our current manufacturing partner for [the product] Tastilux, with production capability to meet 170,000 tonnes of end-product demand ... When it comes to [the product] Creamilux manufacturing, while we can't share official details yet, we're preparing for our first commercial-scale run with our partner and expect progress to be quick."

[2] Author discussion with NXW CEO in April 2026.

[3] Interview with JSPC representatives in April 2026.

Fushine Biotech, a subsidiary of Fushine Pharmaceutical Company Ltd., is another example of a Chinese biopharma contract development and manufacturing organisation (CDMO) that is diversifying into alt proteins. Fushine is currently constructing an industrial-scale facility and expanding its current 1,200 tonne mycoprotein capacity to a 20,000 tonne plant in Jingdezhen.

Another (confidential) international company has contracted a large Chinese biopharmaceutical CDMO to carry out its fermentation, which marks the first time the CDMO in question has expanded into the food space.[4]

Emerging startups and a growing scientific moat

The historical path to technological leadership for many Chinese companies has been to first establish scale and cost competitiveness in mature industries, before expanding into higher-value, adjacent sectors. Huawei, for example, began in 1987 as a reseller of telecommunications switching equipment before growing into a global communications technology leader. Contemporary Amperex Technology Co., Ltd (CATL) was a manufacturer of standard consumer electronics batteries before becoming China's leading electric vehicle (EV) battery manufacturer. And BYD started as a low-cost nickel cadmium battery maker before evolving into the world's largest EV company three decades later.

China's industrial fermentation sector appears to be following a comparable path. Having developed world-leading scale and manufacturing capacity in mature markets such as amino acids and vitamins, a growing number of manufacturers are seeking to deploy their capabilities in higher-value segments.

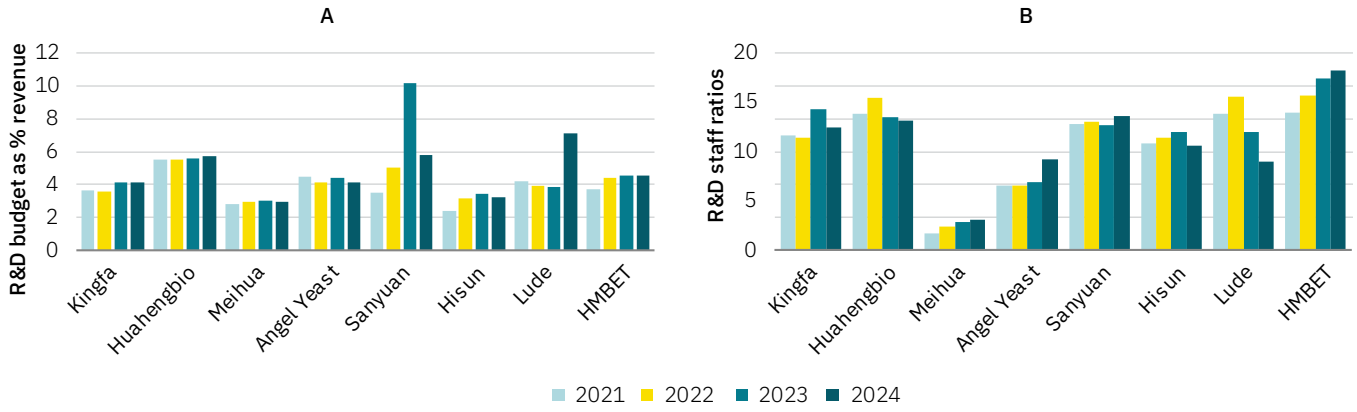
To facilitate this transition, Chinese companies are either acquiring or setting up advanced R&D teams. A team at the Australian National University studied eight publicly listed bioindustrial firms (see Figure 5)–four of which do food or food ingredients–and found that almost all had flat or declining profits, but their R&D budgets and research teams were growing (see Figure 6). These investments may seem unusual for companies with declining profits in mature industries, where profitability pressures often result in reduced R&D investment. Instead, these companies appear to be building scientific moats based on a combination of high-end science coupled with large-scale, low-cost manufacturing. This is similar to the strategy of JSPC and Fushine mentioned earlier, which are moving to higher technology areas, with representatives from both companies saying that scientific advancement is key to their development.

Figure 5: Eight publicly listed bioindustrial firms

Firms	Main products
Kingfa (金发科技)	One of China's largest advanced materials companies. Produces biodegradable materials (PLA, PBAT blends), engineering plastics, modified plastics, carbon-fibre composites, recycled materials, automotive lightweight plastics, etc.
Huahengbio (华恒生物)	Fermentation-based bioindustrial products, including amino acids (L-alanine, L-valine), vitamin precursors, pharmaceutical/industrial fermentation intermediates, and emerging high-value bio-based chemicals.
Meihua (梅花生物)	One of the world's largest amino-acid fermentation companies.
Angel Yeast (安琪酵母)	Produces baking yeast, yeast extracts, nutritional yeast, fermentation nutrients, brewing yeast, and animal nutrition ingredients from large-scale yeast fermentation.
Sanyuan (三元生物)	One of the largest producers of erythritol, other sugar alcohols, and fermentation-based sweeteners used in food, beverages, and specialty ingredients.
Hisun (海正生材)	One of China's biggest providers of PLA.
Lude (路德科技)	Focuses on environmental waste-to-resource technologies.
HMBET (美邦科技)	Produces biodegradable polymer materials (e.g. PLA) and specialty chemicals such as THF.

[4] Interview with company in April 2026 (confidential).

Figure 6: R&D budgets (A) and staff ratios (B) for eight selected bioindustrial firms



Source: All data collected from the companies' annual reports;

A new generation of novel food startups is also emerging in China, including More Meat (mycoprotein), Joes Future Food (cultivated meat), Guoke Xinglian (human milk proteins), and Zoto Bio (bio preservatives). Many of these companies are investing heavily in developing their own R&D capabilities. For example, More Meat initially licensed a strain from Quorn to produce mycoprotein, but has since developed its own proprietary strains and gene bank. The evolution from adopting foreign technology to developing their own IP mirrors a broader trend across China's biotechnology sector.

Chinese startups are also, unsurprisingly, plugging into the domestic manufacturing system. More Meat is creating a joint venture (JV) with large fermentation company Guangzhou Shuangqiao (under the name "Moli Workshop (Guangzhou) Biotechnology Co., Ltd.") to build a 20,000 tonne per annum mycoprotein facility. The construction started in mid-2025 and first commercial runs took place in June 2026. It is now one of the biggest mycoprotein facilities in the world.

The Strategic Pull

The strategic prioritisation of alt proteins

The second driver of China's novel food transformation is strategic. While alt proteins have only recently emerged as a policy focus, they sit at the intersection of two areas that the Chinese government has prioritised for decades: food security and biotechnology.

Historically, China's food biotechnology efforts focused on improved breeding for crops and livestock. Broader biotechnology policy centred on areas such as pharmaceuticals, traditional fermentation (e.g. vitamin C and glutamic acid), biofuels, and marine biotechnology.

Historical experiences with food shortages, together with more recent food safety incidents, contributed to a cautious regulatory approach towards novel foods. As a result, the sector developed more slowly than other areas of biotechnology despite China's strong capabilities in industrial fermentation.

Views towards novel foods began shifting in 2021. Several factors appear to have contributed. Confidence in China's food safety had grown, and there was a recognition that alt proteins were part of a broader push to develop strategic biomanufacturing capabilities. Novel foods also aligned with efforts to strengthen control over critical parts of the food supply chain, including protein production and animal feed.

> "China cannot allow the recent, steady gains we have achieved in grain production to lull us into a false sense of security. We should not forget about the suffering caused by previous famines just because we have managed to recover. Rather, we should recognise that the issue of food security is a red line that would trigger terrible consequences were it ever to be compromised."
>
> *Speech of President Xi Jinping in 2013 at the Central Rural Work Conference*

This shift soon became visible at the highest levels of government. In a 2022 speech, President Xi Jinping explicitly referred to microorganisms as sources of food:

"...advance biotechnology and the bioeconomy, and derive calories and protein from plant, animal, and microbial sources."

Then in 2024, the State Council released a document focused on "Building a Diversified Food Supply System." This document explicitly spotlighted the use of synthetic biology in industrial food production, reflecting the government's acknowledgement that new ingredient sources will be needed to bolster food security, while projecting an openness to experiment with new production methods:

- "Foster **strategic emerging bio-industries** and **encourage the development of new types of food"**
- "Actively **develop synthetic biology** and prudently advance the **industrialisation of new types of food."**
- "[Build] a diversified food supply system that **advances plants, animals, and microorganisms in parallel."**
- "Accelerate breakthroughs in **frontier technologies** such as microbiomics."
- "Expand new types of feed protein sources and **promote the application of microbial protein."**

Alongside these food security policy changes, China has also begun to prioritise biomanufacturing as a key pillar of future industrial development. This is expected to culminate in the release of a standalone biomanufacturing Five-Year Plan (FYP), which will run alongside China's broader 15th FYP (2026-2030). FYPs are the Chinese government's primary mechanism for setting national priorities and directing policy support, investment, and regulatory attention. The decision to develop a dedicated biomanufacturing plan signals the growing importance of this sector within China's industrial strategy. While the plan has yet to be released, preparatory documents suggest biomanufactured foods and alt proteins will feature prominently:

> ***"The leading enterprises will play a driving role, simultaneously focusing on upstream product creation and downstream applications in food, pharmaceuticals, and bio-based materials, accelerating the construction of a biomanufacturing product matrix and enterprise matrix, and promoting the 'stringing together' of the biomanufacturing industry chain."***

The "stringing together" of the industrial chain is a key part of the text. China is designing a system that will enable any researcher working on a bio-based product to move through the levels of development from research to commercial production quickly. This policy applies equally to alt proteins as to other biomanufactured products. The system is designed to incubate a swathe of Chinese startups across biomanufacturing, so there is a high likelihood that it will produce a wave of new Chinese alt protein companies over the next five years.

Chinese government departments published multiple documents in 2025 and 2026 to turn that policy into reality. While details remain scant, the key policies are outlined in Figure 7.

Figure 7: Examples of governmental plans to push biomanufacturing

Plan	Details	Food-related components
A network of scale-up platforms	This is a list of 43 scale-up platforms announced in late 2025, with the likelihood of more in 2026.[5] Details are scant. It simply lists a company and the main service area the facility will be focused on (e.g. food additives). There are no size or funding indications in the announcement. This is designed to signal what kind of facilities should be built and to support those that are underway.	About half of the organisations awarded projects are listed as working on food additives. The announcements do not specify final products (likely to allow for a wide range of use cases).
A list of model products targeted for bio-based production	The first tranche, comprising 36 products, was published in August 2025, with additional products likely to be announced in 2026 and beyond.[6] This is a signal to local governments, universities, and companies about which product types to support. There is no funding indication in the announcement.	10 of the 36 products in the list are foods or food additives. Three products in the announcement are directly related to alt proteins: β-Lactoglobulin (Chanjin Biotech); *Fusarium brachygibbosum* protein (Fushine Biotech) to produce mycoprotein; and yeast protein (Angel Yeast).
A first tranche of 16 model projects to integrate AI into biomanufacturing	A list of "ideal" type projects published in July 2025. 13 of the 16 projects focus on AI-powered bio-design tools, and others integrate into manufacturing itself. This is to signal the type of AI x Bio that should be prioritised. No funding amounts listed.	Only one project is specifically focused on food (although others could be used for food): "Building efficient cell factories to achieve the production of vanillin" (Xi'an Healthful Biotechnology)
Notice on "Collecting Biomanufacturing Innovation Tech Directions in Food Processing"	This notice, published in August 2025, signals that the government will collect model projects and publish a first tranche in the future.	These will likely all be food projects.

[5] Dirk van der Kley, "China releases list of 43 companies to build biomanufacturing pilot plants," 20 November 2025.

[6] Dirk van der Kley, "China Targets 36 Biomanufactured Products," 6 January 2026.

The translation of political priority into actual capability

Policy priorities need to be translated into investment, innovation, and production by companies. The fermentation firms discussed in the previous sections are operating within a broader ecosystem that is strongly influenced by China's policy direction.

When the central government sets technology priorities in China, it is a signal to lower-level governments, universities, research organisations, financiers, companies, and other parts of the system to funnel resources into that technology. These actors then compete to capture market share and secure favourable positions within the emerging industry. The result is often rapid scaling, intense competition, falling prices, and, in some cases, substantial overcapacity.

The importance of government support is not just about immediate subsidies (although those exist), but the broader policy certainty it creates. Firms gain confidence that favourable measures will be in place, such as preferential purchasing, regulatory support, and continued political backing for the sector. As a result, when companies look across the spectrum of potential pivot industries, they are more inclined towards those with explicit government support.

At the regulatory level, China has made it easier to get approval for the sale of alt proteins derived from genetically modified microorganisms (GMMs). In 2023 and 2024, the National Health Commission (NHC) increasingly approved GMM-produced ingredients.[7] In 2024, a formalised process for approval of GMM-derived products was announced, which has led to several approvals of GMM-derived products in China, with more in the pipeline. Companies that have received approval for a novel food product include Fushine Biotech for *Fusarium venenatum* mycoprotein and Angel Yeast for yeast protein. Every company interviewed for this report had high confidence that the government will act quickly as new regulatory challenges related to alt proteins emerge.

The role of subsidies

Subsidies are also a factor in the aforementioned goal of "stringing together" the biomanufacturing industrial chain. Typically, as industries become more mature in China, the government drops the direct subsidy rate, as has been seen for sectors like electric vehicles. Documents published on Chinese government websites in 2025 have stated that China needs to "actively resolve the cyclical mismatch of excess supply over demand in certain industries."

However, the story is different for emerging technologies such as biomanufacturing. China's leading economic development body, the National Development and Reform Committee (NDRC), wrote in their 2026 annual report, "In emerging industries, we will allow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[7] USAID, "NHC Approves New Food Materials and Additives including GMM Derived Enzymes," March 20, 2024.

appropriate surplus capacity and encourage competition and innovation." The only way to get sustained surplus capacity is with some level of subsidisation.

There have been few, if any, public announcements on subsidies for alt proteins. Some of this is due to general government opacity. Large capital expense subsidies are discussed behind closed doors. It is possible, but not definitive, that new greenfield facilities for alt proteins receive subsidised funding. What's clear is that local governments across China are beginning to develop publicly available biomanufacturing subsidy regimes. These are not specifically targeted at alt proteins, but rather all biomanufactured products, and would also apply to alt proteins. Two examples are shown in **Figure 8.**

Figure 8: Examples of local government biomanufacturing subsidy regimes

Province	Example of subsidies
 **Heilongjiang Province**	From February 2026, the Heilongjiang government offers: • 30% reimbursement of total investment for pilot facilities (more for biomanufacturing pilot facilities selected as national projects). • 20% of annual service amount for already-built facilities. • 20% subsidy for enterprises that purchase technology transfers from local universities and startups. • 20% subsidy for "high-tech industrialisation projects" in biomanufacturing. • Subsidies for digital labs and production lines. There are upper limits on the total value of subsidies for each category.
 **Hubei Province**	The Yichang city government in Hubei announced it "took the lead in establishing a synthetic biology industrial park." The government wrote that it will "strengthen the provision of key factors," which typically means support for land, utilities, facilities, and infrastructure. The government also laid out direct cash subsidies for certain milestones, such as enterprises that obtain approval for a national-level pilot-scale platform, drug approvals, and support for exporting internationally, among numerous other subsidies. These are relatively small—from roughly US$100,000 to US$2.1 million—though a company can earn more than one direct cash subsidy.

In China, funding is more linked to the government than ever. As one Chinese venture capitalist put it, "purely commercial venture funds are becoming increasingly rare in China today." VCs have found it more difficult to raise capital from traditional limited partners. As a result, many funds now rely on the government or state-owned financial institutions as investors, even if the sticker states it is a private fund.

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From Scarcity to Abundance in Novel Foods

Novel protein production has been limited in scale because of high costs and limited demand. China is poised to rapidly expand global novel food capacity, with significant amounts of steel going into the ground for new commercial-level production by startups, as well as large companies repurposing traditional fermentation for novel food uses. In June 2026 alone, China will add a 20,000 tonne mycoprotein facility (Fushine in Jingdezhen) and another 20,000 tonne mycoprotein facility in Guangzhou (More Meat).[8] Both companies plan to keep growing. By comparison, Marlow Ingredients in the UK operates the largest mycoprotein facility globally, with an annual production capacity exceeding 67,000 tonnes. On this trajectory, it will not be long until China claims the top spot.

Part of this shift reflects greater technological maturity across the sector. But the bigger story is China's industrial commitment. Over the past 25 years, nearly every major green manufacturing transition has scaled through China.

The types of novel foods being produced right now are not necessarily one-for-one replacements for conventional animal products, but include applications such as ingredient fortification and animal feed. However, if these companies succeed, it is likely that a wave of other companies will follow, and scale will bring down costs for a host of other food applications.

[8] Author discussion with More Meat (Guangzhou) Biotechnology Co., Ltd in April 2026.

Why is China so efficient and cost-effective?

Construction of biomanufacturing facilities is much faster and more affordable in China. A general rule of thumb expressed by Chinese companies interviewed for this report is that the USD value of facility construction in the U.S. will cost roughly the same number in RMB in China (e.g. a US$100 million facility in the U.S. will cost RMB100 million, equivalent to ~US$15 million, in China). A presentation from Cathay Biotech, a company that makes a wide range of biomanufactured products, suggests capital expenditure costs in the U.S. and Western Europe are substantially higher than China.[9]

It is tempting to explain away the low cost through subsidies, but there is much more to it. Chinese construction and manufacturing companies are highly experienced at building new fermentation facilities, and they are located close to the building materials supply chain. There is a strong government culture towards reducing red tape and costs for manufacturers, which spurs innovation, rapid scaling, intense competition, and falling prices. On top of this, there are lower wages, more affordable land, and, of course, subsidies.

Large fermentation firms in China believe there are large process savings to be made by applying some of their learnings from vitamin and amino acids processes. An interview with a technical representative at the world's leading vitamin C producer, JSPC (see previous case study), highlighted that improvements to processes such as spray drying, steam use efficiency, and increased density would drop costs for protein—as has been achieved in other fermented products over decades. A (confidential) international company that did its tech transfer to a Chinese partner for a fermented product in December 2025, and expects to see its first commercial run completed in the middle of 2026, said, "We have been thoroughly impressed with our partner so far … It would have taken two times as long and double the cost if we had done it elsewhere."[10]

In many of the fermentation companies pivoting towards alt proteins, there is a culture of streamlined decision-making. In an interview, a representative from Fushine Biotech said, "We're developing so fast because our decision line is pretty vertical. It's just a couple people making the decision and it is getting decided very quickly."[11]

Governments are also determined to lower costs for businesses. This is manifested in something as technical as steam prices, as demonstrated in an interview with a Hunan biomanufacturing company (based near the Jinshi scale-up facility mentioned above): "Steam prices have been declining year by year. When we first arrived, it was 320 yuan/tonne, and now it's down to 220 yuan/tonne [the interviewee did not specify the timeframe, but the interview was in 2025 and the company started early work in 2022]. The government is coordinating and supporting businesses in developing green power systems, and our company will begin construction on a 4.6 MW photovoltaic project this year. These practical measures are helping businesses reduce costs and increase efficiency."

One challenge facing Chinese companies is that meat prices in China have—similar to industrial applications such as amino acids—fallen in recent years due to overproduction. Price reductions for alt proteins will be driven by a combination of science and engineering. For example, More Meat has a huge gene bank of fungi that it will deploy in manufacturing. The companies interviewed for this report are confident they can reduce their costs significantly with scale.

[9] The speech is not publicly available, but elements of it have been reproduced in the link in the paragraph. The graph in the article does not give specific numbers, but the size of the capital expenditure bands for the U.S. and EU are several times the size of those for China.

[10] Author discussion with company in April 2026 (confidential).

[11] Interview with Fushine Biotech in April 2026.

Opportunities

Structuring partnerships with Chinese companies

There is no single model for overseas companies engaging with Chinese manufacturers. The appropriate partnership structure depends largely on where a company's competitive advantage resides and how much support it requires to reach commercial scale. The framework below translates competitive advantages into potential partnership models, though a company may bridge multiple models.

Primary source of competitive advantage	Manufacturing support required	Recommended traits of Chinese partner	Typical partnership model
Robust strain that is better than competitor strains for similar products	**Low**	Experienced CDMO that has produced for foreign firms	**1** Contract manufacturing (CMO/CDMO)
Proprietary processes that confer advantages over competitors	**Medium**	Experience using the same strain and supporting process optimisation	**2** Co-development partnership (foreign companies provide process knowledge)
Product formulation, applications, branding, or market access	**High**	Interested in co-developing the product and market, and has experience scaling up a wide range of products	**3** Co-development partnership (foreign companies provide branding and customers)
Mature technology requiring dedicated assets and long-term scale	**High**	Looking to invest in new facilities that match the proposed product and process profile	**4** JV or dedicated facility (often occurs after co-development)

1) CDMO

Companies with value concentrated in a proprietary strain, ingredient, or production technology may prefer a traditional contract manufacturing arrangement. Under this model, the foreign company retains ownership of its core IP and uses a Chinese manufacturer primarily for scale-up and production. This approach is particularly attractive for companies with mature strains and well-developed production processes that require limited technical modification during commercialisation.

One such international company told this report's author that they have kept the same strain throughout the manufacturing process, and changes have largely been on the process itself. They have contracted a Chinese CDMO partner to do this work, and have treated it purely as a manufacturing partnership. The valuable IP—the strain—remains wholly within the international startup, with the initial pilot-scale work being conducted outside of China.

2) Co-development: Foreign companies provide process knowledge (the strain is not the key IP)

For other companies, the challenge is not simply manufacturing, but adapting a technology to commercial-scale conditions. Fermentation processes often require significant optimisation during scale-up, creating opportunities for co-development between startups and manufacturing partners.

For example, if a company's key value is in the element of process development (i.e. downstream processing), then a traditional CDMO may not be the right route because the value is in processing, which is what CDMOs do. In this case, it could be worthwhile to partner with a firm that already uses the foreign company's organism and co-develop the process at scale.

3) Co-development: Foreign companies provide branding and customers

There is another type of international company that can add value: one that has significant international branding or potential customers.

The aforementioned NXW-JSPC partnership provides one example of this approach. NXW provides the strain, which JSPC is scaling up. NXW will develop the international market, and JSPC will develop the local market.

This co-development model may be particularly attractive for international companies whose core strengths lie in downstream product positioning, applications, and go-to-market execution. Amy Shi, International Business Development Representative at JSPC, says: "We have found that international partnerships work best when each party focuses on what it does best. JSPC's strengths lie in tech transfer, strain and process optimisation, scale-up, downstream manufacturing, and supply chain execution. Meanwhile, our partners often bring deep understanding of consumer and customer needs, application development capabilities, and strong commercial relationships across the food ecosystem. Rather than trying to replicate each other's capabilities, we believe there is tremendous value in combining complementary strengths. This allows manufacturing partners like us to focus on industrialisation and reliable supply, while enabling our partners to remain at the forefront of product development, branding, and market creation once the product leaves the factory."

4) Joint ventures (JVs)

At the furthest end of the collaboration spectrum are JVs and dedicated manufacturing partnerships. These structures may be most appropriate for companies with mature technologies that require dedicated production assets (often when a product reaches a certain manufacturing scale).

Under this model, the foreign company contributes technology and know-how, while the Chinese partner contributes manufacturing expertise, local relationships, and operational capabilities. Calysta's JV with Adisseo (formerly a French firm, acquired by the China National Chemical Corporation in 2006) to produce protein for animal feed is one example. In Calysta's case, Calysta's IP and process knowledge was developed outside of China and then applied to the JV's facility in Chongqing. According to the CEO, Calysta has "completely exited our UK site and we're exiting the US lab in San Mateo, California as well, because we don't need them anymore. We're concentrating our activities on manufacturing and selling."

Ultimately, the decision of which approach to take is less about choosing a specific legal structure, and more about determining which capabilities a company wishes to retain internally, and which capabilities can be provided more effectively by a partner.

Accessing the Chinese market

If a company is manufacturing alt proteins or adjacent products for the Chinese market over the long term, there are significant political and economic reasons to manufacture in China. The economic reasons are obvious: China offers fast, affordable, high-quality production, and production will be co-located with the market.

China's strategic reasons centre around the country's drive for self-sufficiency. Companies that manufacture outside China may risk tariffs or crimped market access on non-Chinese food products. The exception might be for companies that produce a truly unique product not manufactured in China, though there is a high likelihood that a Chinese startup will soon enter that market too.

Another important development for companies manufacturing outside China but selling to the domestic market to be aware of is that China is steadily reducing its reliance on food imports. In early 2026, it introduced a new quota system for beef imports, imposing tariffs on volumes above the quota. This was different to previous cases of China blocking agricultural imports due to political reasons (such as China's wide-ranging market blocks on Australia between 2021 and 2024) or safety reasons. The 2026 quotas were simply about China's own self-sufficiency. As President Xi Jinping said in 2025, "China must be self-reliant and feed itself." The political direction is clear, and it will apply to alt proteins as much as conventional foods.

If historical trends in other sectors are mirrored in biomanufacturing, there may be future support for Chinese-manufactured alt proteins in the domestic market. China has a long history of supporting consumer purchases of new Chinese-made technology. The Chinese government provided a range of direct consumer subsidies to electric cars

and plug-in hybrids manufactured in China (including by foreign companies). Broader biomanufacturing is such a high priority that one could expect it to follow a similar path.

The other side of selling in China is finding consumers. All of the companies interviewed for this report are selling business-to-business (B2B). Selling to experienced Chinese companies leverages their deep brand knowledge in the highly competitive Chinese consumer market. While demand for many alt protein categories remains uncertain, several companies interviewed for this report spoke of encouraging signs of commercial interest in early fermentation-derived protein products in China.

Managing IP

Despite major improvements in China's IP protection regime, intellectual property risks remain a critical consideration.

The biggest source of protection for an overseas company is to find a local player that is both large and already works with numerous foreign companies. That company relies on trust from repeat foreign business and has a vested interest in being seen as a reliable partner.

In practice, there are a range of different ways to structure agreements to protect IP with partners in China. One common approach is for pre-existing IP—such as strains, standard operating procedures (SOPs), technical documentation, and other know-how transferred into China—to remain entirely owned by the international company, while process improvements generated during scale-up work may be owned by the Chinese company. These can include an increase in protein content, improved nutritional value, or other documentable manufacturing optimisations developed during commercialisation. Such arrangements create mutual dependence, with each party controlling a different component of the overall production process. The ownership and transfer of these process improvements can also be defined contractually at the outset. For example, if the partnership is terminated, the international company may retain the option to purchase the scale-up IP from the Chinese partner and transfer production elsewhere.

This model is particularly relevant for companies working with established fermentation companies, which have process R&D and engineering capabilities, and may support downstream process design. However, it may not suit companies that already have a mature, commercially validated strain and associated process know-how. In such cases, companies may prefer engaging a Chinese manufacturer solely through a CDMO arrangement.

Considerations and Risks

Trade-offs as a foreign company manufacturing in China

While the decision to manufacture in China can offer a level of protection against Chinese protectionism driven by domestic self-sufficiency policies, it comes with trade-offs that companies have little ability to control. Some of the salient trade-offs are outlined below:

1 U.S. investors, in particular, are wary of Chinese manufacturing for their portfolio companies. Several foreign companies operating in China interviewed for this report shared that their plans for Chinese manufacturing were a red line for many U.S. investors. The gas fermentation startup Calysta is one notable exception, as it has U.S. investors and is manufacturing in China, but much of its early investment happened in the 2010s. It is possible in the future that if a number of startups manufacture in China successfully, then U.S. investors may change their position. However, this remains speculative at present.

The mitigation step for this is to seek non-U.S. investors. NXW's aforementioned partnership with JSPC has been fundraised primarily in Europe. It is not impossible to fundraise outside the U.S. and should be a consideration if a company plans to manufacture in China.

2 Political tensions could make firms a target for Chinese authorities. In previous years, the Chinese government has punished foreign companies located in China for the perceived indiscretions of their home country. For example, following South Korea's deployment of the THAAD missile defence system in 2017, Chinese authorities targeted South Korean firms such as Lotte through regulatory inspections, and 80-90 percent of Lotte's supermarkets in China were forced to temporarily close. Similar forms of economic retaliation have been used during diplomatic disputes with Canada, Norway, Lithuania, and other countries. More recently, the Chinese government has shied away from punishing foreign manufacturers in China to foster a welcoming foreign investment environment. In addition, smaller companies are highly unlikely to be targeted, so companies should weigh this low-probability risk against the advantages of access to China's manufacturing ecosystem.

One mitigation step is to have manufacturing facilities inside and outside China. This is only feasible once a company reaches a certain scale. This step also partially mitigates points three and five below.

3 Exports from China to the U.S., EU, and to a much lesser extent India and ASEAN, could be hit with unexpected and highly variable tariffs or bans. These can occur in two ways.

The first is the American approach under President Trump of applying broad tariffs on most Chinese goods sold in the U.S., which would apply to alt proteins manufactured in China. Tariffs can also impact Chinese suppliers and those downstream of them, as their base costs can change overnight. The calculation for many companies may be that it is still much quicker and more cost-effective to manufacture in China, even with tariffs applied.

The second approach is the typical EU approach of applying anti-dumping tariffs to specific products. Until a few years ago, this mainly applied to non-bio products such as solar panels, wind turbines, ceramics, and bicycle components, but this has since been expanded. In 2025, the EU applied a roughly 50 percent anti-dumping tariff on Lysine (an amino acid) for five years. In 2025, the EU also applied anti-dumping tariffs of between 34 and 233 percent (depending on the producer) on Erythritol, a sweetener, for five years.

This is the tip of the iceberg for bio- and chemical-related anti-dumping tariffs. A senior EU official speaking to the *Financial Times* said, "There is a huge volume of cases ... Chemicals now account for almost half of new trade defence cases." It is possible there will be wide-ranging tariffs on bio-based producers exporting to the EU at the same time that China is trying to develop new biomanufactured products.

It seems unlikely that alt proteins will soon be the direct subject of EU anti-dumping tariffs given the small initial volumes. But Chinese companies that make both traditional fermented products and novel foods could have some of their products affected by anti-dumping tariffs, and those Chinese companies could be partners of foreign alt protein firms. That could lead to retaliatory tariffs by China that end up harming foreign alt protein producers operating in China.

ASEAN and India have also steadily applied more anti-dumping tariffs to Chinese goods (as well as goods from other countries). India has imposed several anti-dumping tariffs on bio-based goods. For example, in 2025 it imposed tariffs of up to US$20.87 per kg on Vitamin-A Palmitate from China, and at lower levels from the EU and Switzerland.

As above, the main mitigation step is to have multiple manufacturing sites and markets. Beyond this, companies have few options to ameliorate this risk, so the calculus is that the U.S., EU, and (to a lesser extent) India will not target niche areas like alt proteins; that the cost advantages of Chinese manufacturing will outperform tariffs; or that companies are confident in other sources of market demand for their China-manufactured products.

4 Long term, there is a possibility that U.S. export controls are applied to Chinese use of U.S. biology tools such as CRISPR, high-end foreign bioreactors, U.S. biological design tools, and U.S. databases.

The first separation of these ecosystems is already occurring. The U.S. is concerned about overreliance on Chinese biopharmaceuticals research, manufacturing, and sequencing. Under the FY2026 National Defense Authorization Act, federal agencies—and, after a transition period, recipients of federal grants and contracts—are prohibited from procuring biotechnology equipment or services from designated "biotechnology companies of concern." BGI, MGI, Complete Genomics, and WuXi AppTec are listed companies of concern and cannot provide services to recipients of U.S. government funding. In practice, this limits the ability of U.S. universities, hospitals, research institutes, and contractors to use these firms.

As biotechnology and biomanufacturing become more central to the global economy, including food, the list of targeted companies could grow. Over the longer term, the U.S. could resort to export controls as it has done for semiconductors. China is aware of this risk and is working hard to create alternatives to U.S. tools and bioreactors.

This measure seems unlikely to directly impact an alt protein company manufacturing in China in the next few years, but there are bigger trendlines in biotechnology that could end up affecting business.

5 In a worst-case scenario, U.S. and Chinese tensions could escalate beyond politics and economics into conflict in East Asia. It is difficult to predict the likelihood of such a scenario, but the possibility is mitigated by the significant damage this would cause to the global economy, and to those conducting trade between China and the rest of the world. In this environment, all of the risks outlined above could happen at once, creating a cascade of foreseen and unforeseen outcomes.

This would be potentially devastating no matter where a company manufactures. Even companies manufacturing outside China still rely on the Chinese ecosystem for components or enzymes, which could be cut off in a conflict scenario. The mitigation measures are not particularly different from those mentioned above, and should involve choosing a partner in China that is experienced in navigating global trade; having multiple manufacturing facilities where possible; and selling into multiple markets. Such risk mitigation may need to happen after a few years of manufacturing.

Other considerations

Commitment to collaboration

Successful scaling will require monthly visits to China for several years, or a local presence. It is unlikely that specifications for lab and pilot scale can simply be left with a Chinese partner or CDMO given the novelty of scaling alt proteins. Amy Shi, International Business Development Representative at JSPC, says: "One thing we have found to be essential is face-to-face collaboration on the shop floor. Fermentation scale-up is ultimately a physical process, and many of the practical constraints and opportunities only become apparent when scientists and engineers work side by side. Laboratory protocols and data packages are indispensable, but successful tech transfer requires much more than documents. Early engagement with production teams, frequent site visits, and direct interaction between R&D scientists and manufacturing engineers help align expectations and accelerate problem-solving. In our experience, these relationships are just as important as the technology itself."

Building trust

Both NXW and All G are foreign startups manufacturing in China. Two senior members of the NXW team worked in China for a decade, which has been vital to navigating their partnership with JSPC and broader knowledge and networks in the Chinese ecosystem. All G hired a dedicated engineer on the ground with extensive experience in China, and they have someone of Chinese background on their team in Sydney. The All G team said that both team members have been invaluable for solving problems as they arise.

The risks of non-engagement

Many discussions of China focus on the risks of engagement, including IP leakage, geopolitical tensions, regulatory uncertainty, and dependence on foreign manufacturing partners. Yet, there is an equally important risk: remaining outside a market that may become the industry's centre of manufacturing scale and cost reduction.

If China succeeds in scaling alt protein production in the same way it has scaled industries such as vitamins, amino acids, and other fermentation-derived products, not to mention solar photovoltaics and EV batteries, companies that choose not to engage may preserve greater control over their technology, but could struggle to compete on cost, speed, and scale. The strategic question is not whether engagement with China is risk-free (it is not), but whether the risks of participation outweigh the risks of non-engagement. Importantly, engagement need not be an all-or-nothing decision. Companies can pursue a spectrum of approaches, ranging from relationship building and pilot projects, to manufacturing partnerships or strategic investments, thus allowing them to test opportunities, build optionality, and scale involvement as conditions evolve.

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