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NEW WAVE BIOTECH

Lean Startup Meets Food Tech: Does It Work?

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Thank you to all the contributors for generously sharing your time and insights. Your real-world experiences enriched this whitepaper and helped make it a more practical, hands-on guide.

To our reader — we hope this serves as a helpful reference as you build, test, and scale your technology.

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Executive summary

Precision fermentation and biotech-driven innovation hold enormous promise for reshaping the future of food. Yet, the path from concept to commercialisation is often fraught with technical complexity, regulatory uncertainty, and cost-intensive scale-up. In this environment, applying Lean Startup principles—originally designed for software—may seem counterintuitive. But as the food tech ecosystem matures, evidence shows that thoughtful adaptation of lean principles can help innovators navigate risks more effectively and accelerate progress toward the market.

This whitepaper reinterprets the five core Lean Startup principles for food tech, drawing insights from the real-world experience of industry experts, corporates, startups and investors working at the intersection of food and biotechnology. These principles are brought to life with real life case studies, from **Liven**, **MeliBio** and **DeNovo**, showing how teams can systematically de-risk their innovations across desirability, feasibility, and viability.

Rather than aiming for perfection, these companies found ways to test, learn, and adapt in-market. Whether it was validating functionality with customers before scaling production, using **techno-economic analysis (TEA)** to guide R&D priorities, or refining applications based on customer feedback, each example reinforces a common truth: speed alone doesn't win in food tech—**structured learning does**.

The right partners enable this by providing ingredient innovators with crucial technical and commercial support for scaling. For example, **Nurasa** provides access to Singapore's rich innovation ecosystem—including a food-grade CDMO from 100L to 10,000L scale, customer validation platform, regulatory support, public-private partnerships and go-to-market channels. This allows companies to test demand, refine applications, and gather early signals from real-world use cases – aligning technical development with market needs earlier in the journey.

Meanwhile, digital tools like **New Wave Biotech**'s bioprocess design platform, Bioprocess Foresight, allow biotech companies to run simulations that reduce the time and cost of physical iteration. By modelling bioprocesses and production economics, digital tools enable faster, smarter decisions about scale-up, formulation, and investment readiness.

As R&D budgets tighten and timelines shorten, the ability to move efficiently—while balancing vision and practicality—has become a differentiator. Applying Lean principles in food tech doesn't mean cutting corners. It means focusing on the right experiments, involving the right partners, and asking the right questions at the right time.

With the right ecosystem and approach to growth, food tech companies can scale smarter, reduce risk, and build innovations that stand the test of market realities.

Introduction

Imagine clean-label and sustainable food colourings, plant-derived proteins that deliver iron more effectively to the body than meat, or specialty fats that elevate the texture and flavour of dairy – plant-based or conventional. Innovations in biotechnology are making a smarter, greener, and more resilient food supply possible. They offer a sustainable approach with significantly lower carbon and water footprints, a reliable supply chain less vulnerable to climate and geopolitical disruptions, and access to rare or hard-to-source ingredients that were once out of reach.

These breakthroughs come at a pivotal time of heightened risk and opportunity. Economic pressures and shrinking R&D budgets are making it harder for startups and corporates to sustain innovation. Meanwhile, the importance of novel ingredients are increasingly recognised and supported by governments, and the ecosystem has matured – co-manufacturers, service providers, and digital tools are enabling companies to innovate faster and more cost-effectively than ever. These changes present a compelling opportunity to rethink how we approach building and scaling in food tech.

On the cusp of the digital revolution in Silicon Valley, Eric Ries wrote about the Lean Startup, a methodology known for its rapid iteration cycles to accelerate innovation, designed from the start for navigating uncertainty. Food tech is the opposite of software in many ways, with large infrastructure requirements, expensive physical testing and is highly regulated - but are there things from the Lean Startup Methodology that can be applied to food tech?

In this paper, we raise an important question: how can the Lean Startup methodology, originally designed to navigate uncertainty in the software world, be adapted to food tech? Can these principles help create better products, scale faster, or reach markets more effectively? And what challenges might arise when applying them to an industry with unique complexities like regulatory hurdles and production scalability?

The 5 Principles of the original Lean Startup are:

1. Entrepreneurs Are Everywhere
2. Entrepreneurship Is Management
3. Validated Learning
4. Innovation Accounting
5. Build-Measure-Learn

In this whitepaper, we explore how these five core principles of the Lean Startup – built around rapid iteration and navigating uncertainty – can be applied to precision fermentation and food tech. From this, we've reimagined these principles for this fast-evolving industry below.

Principle #1

Entrepreneurs Are Everywhere... But each have their roles

The digital revolution in Silicon Valley of the 1990s and 2000s was largely driven by startups. But food tech innovation today isn't just limited to startups — it's happening across the entire ecosystem. Ingredient companies, food manufacturers, consumer brands, research institutes, and enablers like CDMOs, accelerators, and digital tool providers are all contributing to turning breakthrough science into real-world products.

In addition to nailing the science, bringing a new ingredient to market also requires expertise across multiple domains:

- **Strain engineering** to optimise microorganisms for high-yield, high-functionality protein production.
- **Bioprocess engineering** to fine-tune fermentation and purification at industrial scale.
- **Manufacturing know-how** to turn lab-scale success into cost-effective, high-quality production.
- **Ingredient application expertise** to ensure the product delivers the right taste, texture, and performance in food formulations.
- **B2B marketing and sales** to translate technical innovation into a clear, compelling business case that resonates with customers and end consumers.

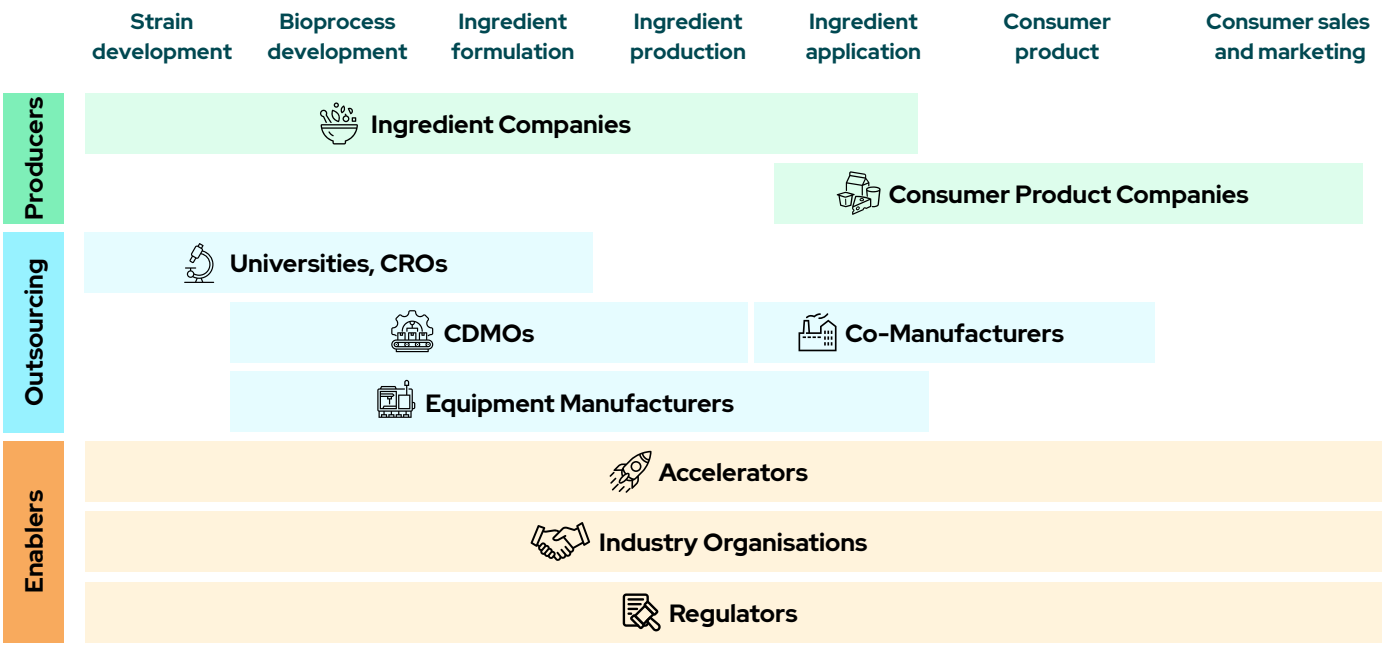
The Food Tech Challenge: High Risk, High Complexity

Unlike software, food tech isn't something we can build in a garage with a laptop and a couple of developers. Every step – **from lab to plate** – is complex, interconnected, and **capital-intensive**.

- **Heavy CAPEX & OPEX** → Scaling isn't cheap. It takes significant investment in infrastructure, talent, and supply chains.
- **Evolving Regulations** → Compliance is an ongoing, high-stakes process with moving goalposts.
- **Unpredictable Timelines** → What works in a lab can fall apart in a factory. Scaling isn't linear, and technical bottlenecks can delay progress by months (or years).
- **Interdependencies Everywhere** → Every decision – on strain, process, formulation, media, scale, production location and target market – creates cascading trade-offs across production, cost, sustainability and performance.

Even the largest, best-funded companies can't own every part of the process. Instead, they focus on their strengths and leverage partnerships to fill in the gaps.

Innovators by Step



How Different Players Innovate

Each type of organisation plays a distinct role in food tech innovation, **shaped by its strengths, constraints, and incentives**:

- **Corporates** → Have deep expertise in specific areas and structured R&D pipelines but struggle to innovate outside their core domain due to risk-averse cultures and shareholder pressures.
- **Startups** → Move fast, pivot quickly, and push technological applications forward but are limited by funding cycles, high burn rates, and lean teams. Because of constrained resources, they often lack in-house capabilities across the full innovation lifecycle. One wrong bet on product-market fit can be an existential threat.
- **Public-funded Institutes & Universities** → Drive breakthrough science but aren't pressured to commercialise. They explore what's possible without immediate application, making them essential for early-stage discoveries.

No single player can do it all – and the best strategies involve orchestrating collaborations between these different actors.

Clarity and Focus: The Key to Winning in Food Tech

With so many moving parts, knowing where to play and where NOT to play is just as important as having a good idea. The companies that succeed in food tech don't try to do everything – they double down on their strengths and build the right partnerships to fill in the rest.

CASE STUDY

Innovating through collaborations

LIVEN

Liven develops animal-free collagen using precision fermentation to make food healthier and more sustainable. But like many food tech innovators, they faced high capital requirements, complex scale-up challenges, and long, unpredictable timelines. Developing a novel ingredient wasn't just about proving it worked—it had to be **functional, cost-effective, and scalable**.

Liven initially focused on alternative protein applications, but soon realised that they would have to get to an incredibly large scale and the low unit costs required to enter the market. At the same time, the value of the health benefits of their collagen was gaining attention from customers in the specialised nutrition and health space - a smaller market where they could demand higher prices.

With these insights, it became clear to Liven that the nutrition and health market provides an excellent opportunity for early commercialisation, while the alternative protein market provides a larger opportunity as they scale. However, innovating in both areas is difficult for a small team, especially when the functionality, scale and cost requirements of the two are so different. Instead of choosing one market too early—or stretching themselves thin—they turned to **strategic partnerships to test both pathways simultaneously**.

- **Validating collagen in hybrid alt-protein applications:** Partnering with Juicy Marbles and New School Foods, Liven tested their collagen in structured plant-based meats, working closely with these companies to refine its performance in real food applications.
- **Exploring specialised nutrition formulations with industry partners:** Collaborating with ALT-PRO Advantage, a sustainable pet food company, allowed Liven to test its collagen in functional treat supporting pet mobility, gathering insights into formulation, regulatory requirements, and market expectations.
- **De-risking scale-up across both applications**: Rather than rushing into large-scale production, Liven used New Wave Biotech's digital simulations to forecast yields, refine cost models, and identify process bottlenecks. This allowed them to make informed trade-offs between optimising production costs for plant-based applications and achieving the required purity and stability for nutraceuticals.

"True innovation in the food industry doesn't happen in isolation. At Liven, we're fortunate to collaborate with mission-aligned brands and technology partners across the ecosystem — combining expertise to create scalable, functional ingredient solutions that fuel healthier, more sustainable food systems for future generations."

Fei Luo, Founder & CEO of Liven

By leveraging partners instead of **building every capability in-house**, Liven **accelerated application development across two distinct markets**, refining their understanding of **scale, cost structure,** and **formulation requirements**. This **allowed them to remain focused on their core innovation while exploring multiple commercial pathways**—without taking on unnecessary risks.

Principle #2:

Entrepreneurship Is Management... and a Balancing Act

Innovation inherently means there will be risks and unknowns to be explored, requiring flexibility and adaptability, while maintaining vision and balancing priorities. However, this is compounded when there are more variables and things that can go wrong. Development of biotechnology-driven food tech is incredibly difficult. Not only does it involve state of the art strain engineering, bioprocess engineering and food science that are complex in their own right, but regulations are still in development and consumer acceptance of novel foods is still unknown. This requires juggling technical feasibility, customer needs, and commercial viability, all while managing complex trade-offs.

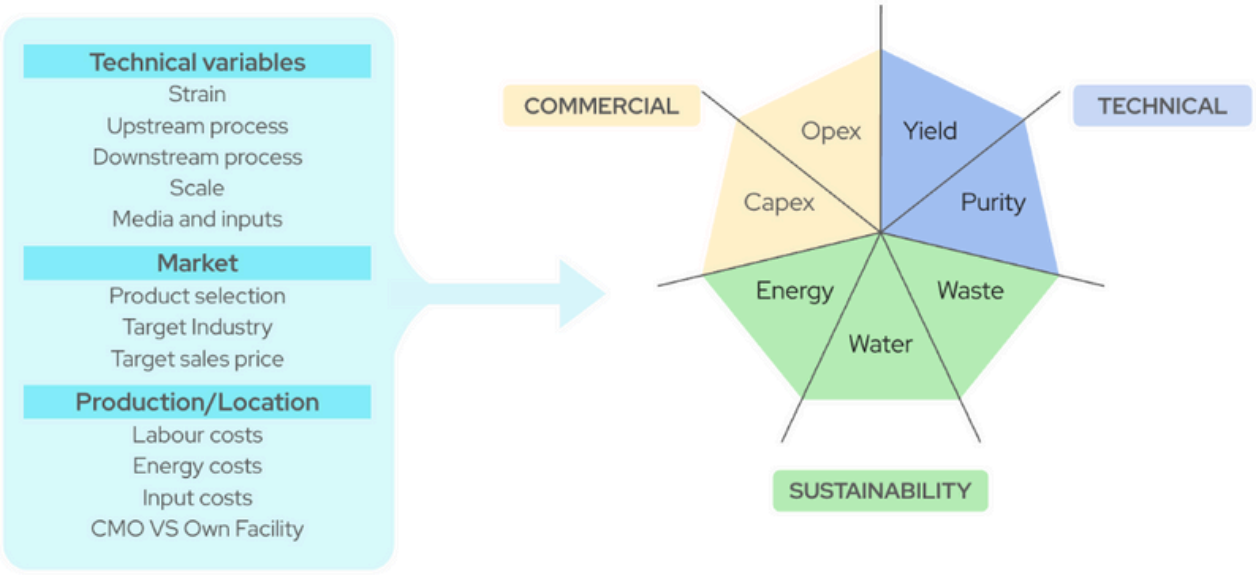


Image credit: New Wave Biotech

Every decision in food tech has ripple effects. **Strain selection and upstream processes** don't just determine what can be achieved in fermentation – they also impact **downstream processing** and **functionality**. The way an ingredient is produced at scale affects everything from cost to **application performance**. Small changes in one area can create major constraints or opportunities elsewhere.

For example:

- **Strain selection and upstream conditions** (e.g. feedstocks, fermentation parameters) determine not only how efficiently an organism produces the target ingredient but also how easily it can be extracted and purified. A strain that produces high yields but requires a costly purification process might not be commercially viable.

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- **Downstream processing decisions** can have massive cost implications. A process optimised for purity might push costs beyond what the market is willing to pay, whereas a slightly lower-purity version that still meets performance benchmarks might make far more commercial sense.

- **Ingredient functionality** influences application at scale – an ingredient with excellent emulsification properties might not perform consistently in high-heat processing, limiting its use in large-scale food manufacturing.

Success isn't about optimising every factor in isolation – it's about balancing all these elements to get to "good enough" across key dimensions while keeping the product scalable and viable.

Science isn't the only risk when innovating in this space. Smart food tech companies don't wait until the science is perfect before testing market fit. Instead of developing in silos, they validate all three dimensions – **technical feasibility**, **market desirability** and **economic viability** – in parallel. To do this effectively requires:

- **Balance Across Dimensions**: Like all businesses, balancing customer needs, technical feasibility, and commercial viability is at the heart of food tech decision-making. However, there are complex interdependencies between these areas. For instance, prioritising customer needs alone might lead to developing a product with great sensory appeal but unmanageable production costs. On the other hand, focusing too much on technical feasibility without understanding the product specifications a customer needs could result in a technically excellent product with no market fit.

- **Testing in Sync - Validate Dimensions Concurrently**: Successful innovators synchronise validation efforts across dimensions to avoid wasted time or resources. This means clearly mapping out key assumptions to de-risk and prioritise goals to hit before the next phase, facing the tradeoffs head on.

Companies often excel in different areas – some are strong in R&D, others in manufacturing, and others in market execution. Strong technical teams often focus on optimising the science first, but without early commercial validation, even the best innovations risk missing the mark. Engaging customers and industry partners early – such as through real-world product testing, or mapping out regulatory hurdles – helps refine positioning and surface unexpected challenges before major resources are committed.

For those prioritising innovation and production, partnerships can serve as an extended arm to test market traction before they reach the maturity to grow an internal commercial team. A partner like Nurasa provides a structured pathway to test demand in Singapore's food ecosystem, support regulatory approvals, refine applications and determine the best go-to-market pathway by leveraging a diverse consumer base. This enables companies to iterate faster, gathering real-world feedback that informs both technical development and go-to-market strategies.

CASE STUDY

Balancing Innovation & Execution

MeliBio is transforming the honey industry by creating sustainable, bee-free alternatives. Through focused execution, they quickly transitioned from concept to commercialisation, prioritising plant-based honey to enter the market efficiently. However, precision fermented products are integral to their future vision. As Co-Founder and CEO Darko Mandich points out, "Precision-fermented ingredients are crucial for expanding our product portfolio, allowing us to develop unique offerings like functional and complex honeys, as well as other products that bees are known for making. These innovations enable us to differentiate in the market and contribute to building a world where humans and bees thrive."

Right from the start, Darko secured 100 Letters of Intent to show the business demand and **breadth of honey applications**, allowing them to clearly identify the markets they were targeting before committing significant investment. For Customer No.1 they selected Eleven Madison Park, an innovative Michelin star restaurant, forming a **co-development partnership** that provided them with honest feedback and demonstrating the different ways their Mellody plant-based honey can be used and applied in the real world.

Simultaneously, MeliBio **partnered with fermentation platform** Pow.Bio to develop precision fermentation ingredients to expand their product portfolio. By the end of 2024 this partnership enabled MeliBio to increase their yield by a staggering 1300%.

This dual approach allowed MeliBio to validate market demand, build sales channels, collaborate with chefs and food scientists to refine product attributes and gather customer feedback – all while laying the groundwork for future innovation. MeliBio avoided tunnel vision by addressing immediate commercial needs without compromising long-term technical goals.

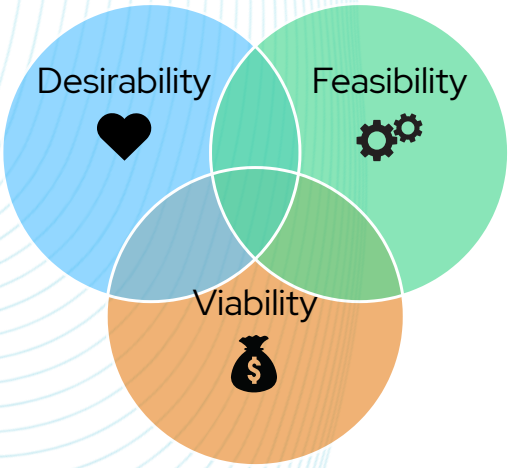
For instance, MeliBio engaged with regulators early on to accelerate approval timelines. In parallel, they partnered with distributors and co-manufacturers to scale production efficiently, enabling them to deliver customer samples and secure early traction. This focus on scalability didn't come at the expense of R&D – they continued to optimise their strain development for future cost and performance improvements.

To date, the company has raised around $10M in total funding including a strategic investment from Oisix, a FoodTech investor from Japan, and is now carried by 400 stores across the US. As the company grows, MeliBio is evolving from a tech-heavy startup to a more commercially balanced organisation. By hiring experienced commercial leaders and fostering alignment between technical and market teams, they are embedding a customer-focused culture that bridges innovation with real-world application. Their journey highlights the importance for food tech innovators to navigate trade-offs and synchronise efforts across technical, market, and operational dimensions in order to achieve meaningful impact.

Principle #3

Validated Learning – Measuring What Matters

As the business mantra goes, 'If it can't be measured, it doesn't exist.' But, with food tech innovation, progress isn't measured by outputs or features but by learning – **specifically**, **learning how to build a sustainable business**.



This requires focusing on the three core areas we touched on earlier:

- **Desirability -** understanding what customers want
- **Feasibility -** ensuring the solution works
- **Viability -** making it economically viable

Desirability

Understanding What Customers Want

Customer needs in food tech are often complex and multi-layered, requiring innovators to look beyond surface-level assumptions. While sustainability is an appealing feature, it rarely stands alone as the key driver. Customers tend to prioritise practical benefits like:

- **Supply Chain Stability**: Ingredients that guarantee consistent availability despite global disruptions.
- **Commercial Impact**: Solutions that reduce overall production costs, either through lower ingredient cost-in-use or indirectly through production efficiencies.
- **Functionality**: Solutions that enhance taste, texture, or shelf life.
- **Marketing Potential**: Products that allow for cleaner labeling or health claims.

Getting to the heart of these priorities means engaging customers early and framing the innovation process around their operational needs and pain points. Clarity and specificity are essential to finding the right fit.

> **We believe innovators who are clear in how they articulate their value proposition and mission statement, create a very collaborative and transparent product development process. That is a big part of the route to joint success.**
>
> Jurgen Kennedy, Regional Director, AAK

Feasibility

Ensuring It Works

- **Functionality**: Does the product meet application-specific requirements, such as stability, shelf life, and performance under specific processing conditions?
- **Process Integration**: Can it be seamlessly adopted into existing manufacturing workflows without requiring costly modifications or new equipment?
- **Scalability**: Can production be scaled up efficiently without compromising quality or consistency?

Feasibility testing often reveals trade-offs that need to be managed carefully, requiring a clear prioritisation of resources and timelines. Beyond technical performance, **regulatory approval is often the biggest bottleneck** – a crucial but sometimes underestimated feasibility factor.

> **"Regulatory timeline can be the critical path and bottleneck – choosing the right regulatory framework at the start sets the parameters for feasibility."**
>
> Thomas Kirsch, Biotech Programme Director, Givaudan

This avoids costly surprises and ensures that technical feasibility aligns with real-world constraints.

Viability

Making the Economics Work

A great product is only valuable if it can be produced at a cost that makes sense for both the manufacturer and the customer. Key considerations include:

- **Target Price**: Does the product offer enough unique value – such as stability, functionality, product claims or cost savings – to justify the cost?
- **Production cost**: Can it be produced, scaled, and delivered in a way that hits the customer's target cost-in-use?
- **CapEx**: How much upfront investment does this require, and how does this affect the overall company finances? In particular, production involving novel processes that require first-of-a-kind (FOAK) facilities to be built, could have a big cost and risk impact.

> **"How do we arrive at our cost targets? It really starts with our customers, what can they afford in terms of cost in use. If we add an additional ingredient to a flavour, how much will this ultimately cost the consumer? Will the consumer be willing to pay for it based on the performance?"**
>
> Thomas Kirsch, Biotech Programme Director, Givaudan

Addressing these questions early helps guide decision-making, ensuring resources are directed toward the most promising opportunities.

CASE STUDY

Hyperfocusing on Key Metrics

DeNovo is developing precision-fermented lactoferrin, a high-value protein traditionally sourced from dairy. Instead of creating a new-to-market ingredient, they focused on producing an existing, in-demand product more efficiently and cost-effectively than animal sources.

DeNovo's Co-Founder & COO Richard Grieves was clear from the start that taking both product and technical risk at the same time is a dangerous game. "If you fix an existing product, you can get information from potential customers on the specifications they look for," he highlighted. Instead of inventing something entirely new, they picked a high value protein with existing demand, a known price point, and clear specifications. "Competing with whey pricing was impossible, but lactoferrin had a path."

This decision shaped everything. With a fixed ingredient target, they could engage customers early, get clear specifications with commitment to purchase as long as they hit the targets set, and focus R&D on hitting those benchmarks – ensuring feasibility and viability weren't an afterthought. "If you know what customers need, you don't waste time on things that don't move the needle." This helped them avoid the common trap of chasing vanity metrics.

Many food tech startups burned through VC money expecting fast results, but DeNovo kept their burn rate low, compounding technical gains instead of raising big and spending fast. "Having too much money is a risk – you end up making bets you shouldn't." Instead, they secured early offtake commitments, ensuring every milestone aligned with a real market opportunity.

Their approach wasn't "move fast and break things" but "think slowly, act quickly." By systematically de-risking desirability, feasibility, and viability, they turned a high-risk idea into a structured plan to reach market.

Principle #4

Innovation Accounting - Turning Metrics into Decisions

In food tech innovation, progress isn't about checking off milestones – it's about ensuring every step moves towards building a sustainable business. That's where the Lean Startup brings in the concept of innovation accounting. First, key targets are set (Principle #3): what customers need (Desirability), whether the product works (Feasibility), and if it makes economic sense (Viability). Then, the focus shifts to tracking whether these targets are being met, adjusting when needed, and making timely pivots before it's too late.

Above tracking the right metrics, innovation accounting means creating a **common language** that aligns technical and commercial teams. Too often, R&D and business functions operate in silos, leading to misalignment between what is being developed and what the market actually needs. A strong innovation accounting framework ensures scientific and business decisions feed into each other rather than running on separate tracks. In larger organisations, this happens through structured stage gates; for leaner teams, it's about consistently revisiting key assumptions and knowing when to push forward or pivot.

The goal isn't to track everything but to focus on **metrics that validate critical assumptions** and drive real decisions. Critical assumptions are things that must be true for your proposition to work. This could include:

- Technical assumptions - e.g. We will be able to reach end product yields of 10g/L at 100,000L scale
- Commercial assumptions - e.g. Customers are willing to pay $100/kg
- Production assumptions - e.g. We are able to produce at a unit cost of $30/kg, assuming energy and labour costs don't increase by more than 10%

"Find your benchmarks – stability, cost structure, supply chain... find the Coke to your Pepsi right away."

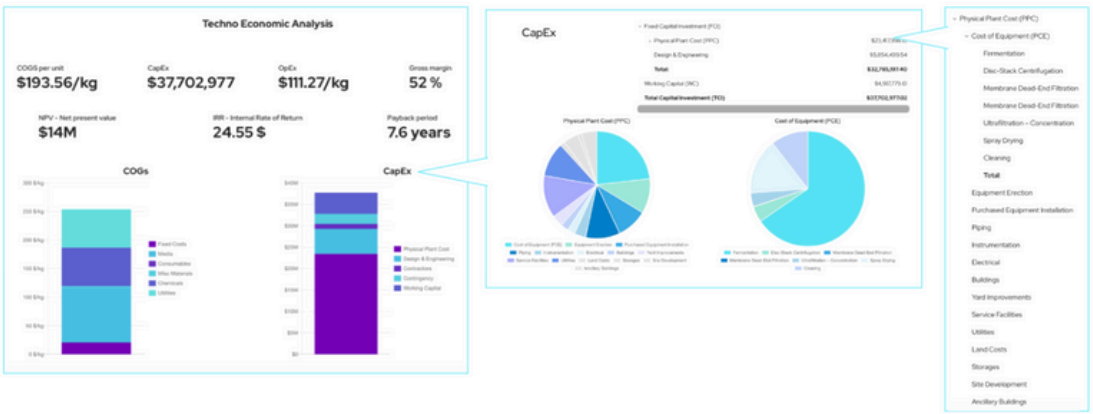
Auroni Majumdar, VP of R&D Global Open Innovation at CJ

Clear benchmarks help align teams and serve as an anchor for tracking progress. Once benchmarks are established, food tech innovators can consistently measure progress against them to inform when they should carry on track and when they need to adjust course.

One of the most effective ways to do this is through a **Techno-Economic Analysis (TEA)**. Beyond a tool for securing investment or approvals, **TEA provides a structured way to test whether an ingredient can realistically hit cost-in-use targets and identify where to focus R&D efforts**. It helps teams quantify trade-offs, estimate the feasibility of optimisation within a given timeframe, and decide whether it makes sense to pivot to a different market or application.

> **"Techno-Economic Analysis shows how the product will perform in the target market. Value of new food is not in question anymore – the biggest question is how you make sure it's cost-effective in interaction with the final product and final market."**
>
> Joana Campos, Senior Bioprocess Engineer at Tetra Pak's New Food Department

TEA doesn't just validate technical progress – it's a **decision-making tool that connects R&D progress with commercial realities**. When used effectively, TEA helps avoid wasted resources, ensuring that every experiment contributes to **a clear, commercially viable path forward.**



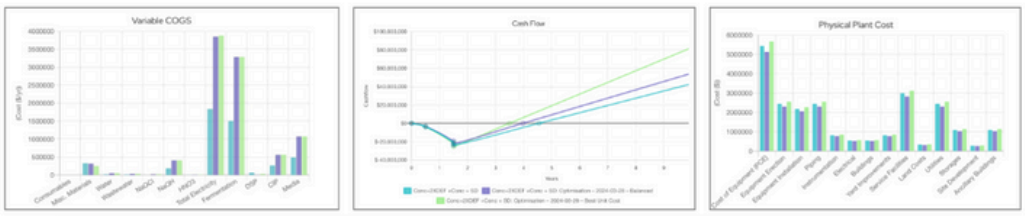
A TEA can help teams understand the cost structure and viability of a process
Credit: New Wave Biotech

However, traditional TEA can be time-consuming, reliant on static assumptions, and difficult to iterate as new data emerges. To address this, some teams are turning to digital tools that bring more agility and predictive power into the process.

Platforms like New Wave Biotech's Bioprocess Simulation software enable users to dynamically test different technical, commercial, and production scenarios to understand how changes affect yield, cost, and sustainability. These tools allow for rapid exploration of what-if scenarios and support decision-making at both the lab and strategy level.

Dynamic analysis tools can help innovators understand how different factors relate to each other and affect viability, scalability and sustainability.
Credit: New Wave Biotech

These advanced platforms can even suggest technical process improvements that optimise for commercial targets, based on prior data and machine learning. In this way, TEA becomes more than a periodic analysis – it evolves into a living, iterative tool that guides day-to-day R&D choices, aligns teams around shared goals, and accelerates time to market for viable solutions.



Process	Yield (kg)	Yield (%)	Purity (%)	Solids Purity (%)	Concentration (g/L)	Unit Cost ($/kg)	Unit Energy (kW/kg)	Cost ($)	Time (hrs)
Conc+2XDEF +Conc + SD	838.08	95.26	95.56	100.00	60625.96	289.60	1.88	242705.71	68.19
Conc+2XDEF +Conc + SD: Optimisation – 2024-03-28 – Balanced	853.94	98.36	96.83	100.00	87485.44	277.18	4.17	236694.06	38.22
Conc+2XDEF +Conc + SD: Optimisation – 2024-03-28 – Best Unit Cost	1139.32	98.97	73.03	100.00	7366.74	224.40	11.08	255659.26	67.19

By comparing TEAs of scenarios, innovators can make more informed decisions and derisk their ventures before investing precious money and time
Credit: New Wave Biotech

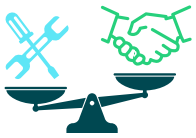
Principle #5

Build, Measure, Learn... Failing Cheaply in an Industry That's Not Cheap

The Lean Startup approach tells us that turning an idea into a viable product is an ongoing cycle of testing, learning, and refining. But in food tech, where every experiment comes with high costs and long timelines, moving fast and breaking things isn't an option. The challenge is how to test efficiently, fail cheaply, and improve smarter.

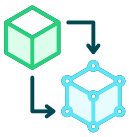
The **Build-Measure-Learn** approach borrowed from software needs adaptation for food tech where physical materials, regulatory constraints and production realities create limitations. The key is designing experiments that don't just test but **minimise risk, maximise learning, and ensure resources are spent in the right places.**

How to Fail Cheaply in Food Tech



Know Where to Build and Where to Partner

Scale Down to Scale Up



Embrace Digital Tools

1. Know Where to Build and Where to Partner

Building a new capability takes time – whether it's expanding into new categories, entering new geographies, or scaling up production. It requires hiring teams, building commercial expertise and understanding a new set of customer dynamics.

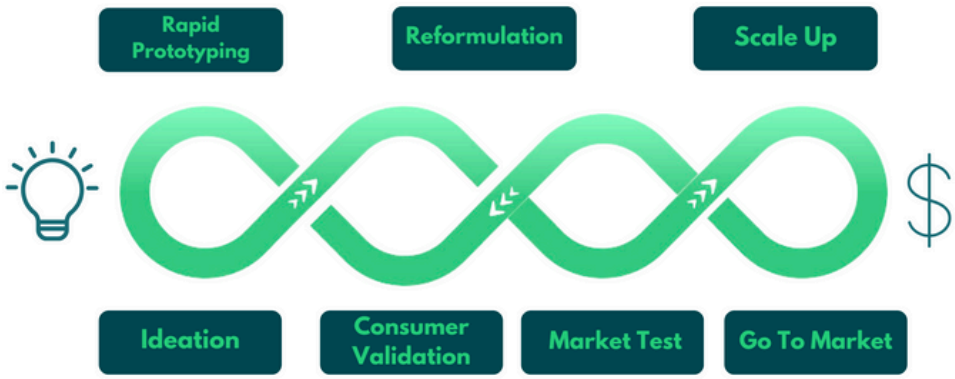
A commodity ingredient company moving into value-added applications for chefs faces a completely different landscape in terms of pricing, distribution, and customer engagement. What's the primary selling point? Lower salt and fat for health benefits, ease of use for chefs, or consistent quality for manufacturers? The answer isn't always obvious,

and figuring it out through real-world testing can make the difference between a product that sticks and one that struggles to gain traction.

Few food tech companies can, or should, do everything in-house. The most successful ones focus on core competencies while leveraging external partners for non-core activities. Instead of committing fully to a commercial team and infrastructure before knowing the best path forward, companies can **test multiple go-to-market pathways through a partner.**

However not all partnerships work. Misaligned incentives, unclear success metrics and mismatched timelines often waste time and resources. Smart teams define what they want to specialise in, set clear expectations, protect critical IP, and ensure that partnerships fill gaps without adding unnecessary risk.

> **"Validation doesn't have to start big. A quick test with the right customer can give just enough confidence to keep moving — before investing in full-scale sensory or consumer trials. At NuFood Concept Studio, we shape the right test for the right stage, based on what our partners actually need."**
>
> Konnie Lo, Category Marketing Manager, Nurasa



Nurasa provides technical and commercial support through a structured pathway, enabling companies to iterate and scale faster with real-world feedback.
Credit: Nurasa

2. Scale Down to Scale Up

Scaling too soon without fully understanding process limitations can be an expensive mistake. Instead of running large commercial-scale production trials, companies should consider the key conditions and assumptions to validate, and can simulate real-world conditions in smaller setups to predict scale-up challenges early.

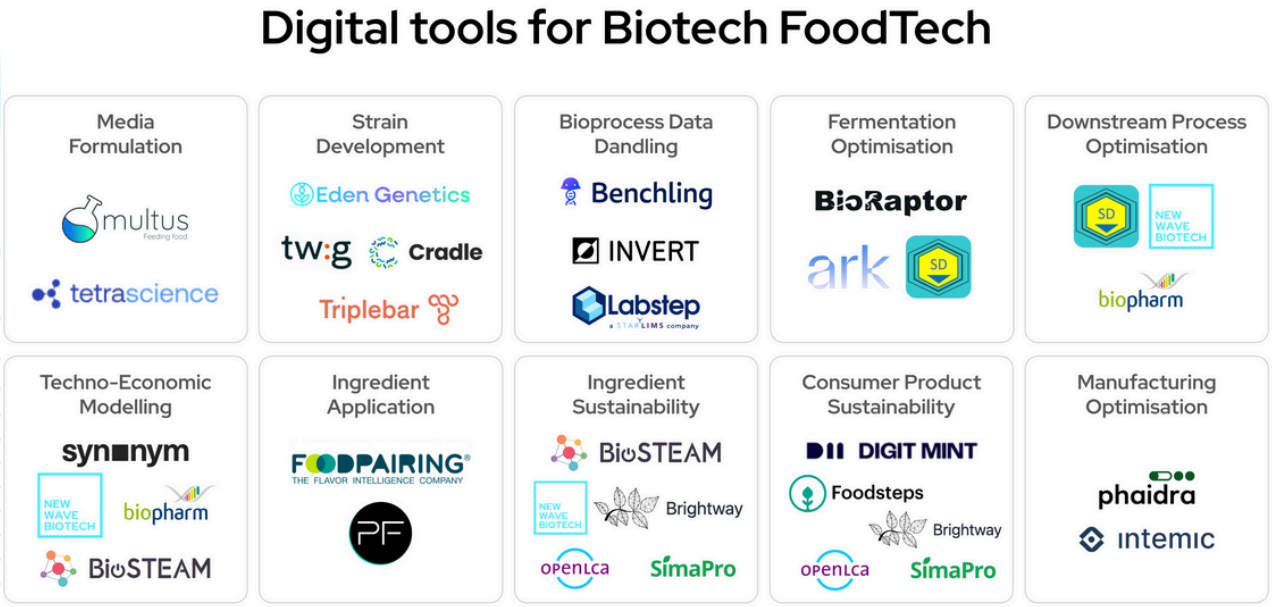
This is where CDMOs play a critical role in providing much needed infrastructure and expertise, without high CapEx and additional headcount needed. For example, ScaleUp Bio is one of the APAC region's few **good manufacturing practice (GMP) food-grade CDMOs** with **100L to 10,000L fermentation capacity.** Ingredient innovators can rigorously test and optimise process performance at a small to intermediate scale—before committing to commercial runs. Processes optimised at 100L are then brought to 1,000 and 10,000L scale. This allows teams to refine parameters and catch scale-sensitive issues early, helping to reduce technical risk and avoid expensive surprises during commercial production.

"Good companies think about scale down to scale up. You know what your full-fledged commercial plan will be, and you test what could go wrong in the cheapest and fastest way. A 1,000L fermentation run is expensive and can go very wrong, so you might mimic conditions that occur at scale – such as pH shifts, substrate limitations, oxygen fluctuations, or temperature changes – to see how microorganisms react under stress. On the downstream processing side, where continuous operation is possible, it's about running meaningful tests with limited material, using proxies to quantify uncertainty."

Carolina Villa, Principal, Nucleus Capital

3. Embrace Digital Tools

Physical testing is slow and expensive. Digital tools, including AI-driven simulations, computational modeling, and digital twins, help teams predict how formulations, fermentation conditions, or processing steps will behave, reducing costly trial-and-error experimentation.



In food tech, where every experiment is expensive, success comes from failing smart, not fast. The best companies minimise risk by focusing on core strengths, leveraging partnerships to test go-to-market strategies, using small-scale validation to predict large-scale challenges, and integrating digital tools to reduce costly trial-and-error. Rather than avoiding failure, the goal is to design experiments that extract maximum learning with minimal waste.

Final Thoughts

Innovation in food tech comes from **turning great ideas into scalable, sustainable businesses**. The Lean Startup principles offer a powerful framework, but applying them to food and biotech requires adaptation. Unlike software, where a simple code update can pivot an entire product, food tech deals with **physical**, **capital-intensive** and **highly regulated processes**. The key is moving **smart** and de-risking efficiently.

Across these five principles, a few common themes emerge:

- **Validated learning drives real progress:** Every experiment should be tied to clear, meaningful metrics whether it's customer adoption, technical feasibility or commercial viability.

- **Collaboration is critical:** No single company can succeed in isolation. Strategic partnerships – whether with suppliers, co-manufacturers, or digital platforms – can help companies iterate faster, reduce risk and maximise resources.

- **Failure isn't the problem – wasting time and money is:** The most successful food tech innovators focus on failing cheaply and learning quickly, whether by running small-scale tests, leveraging AI-driven simulations, or structuring pilots for maximum insight.

While the challenges in food tech are real, so are the opportunities. With the right balance of **vision**, **execution**, and **adaptability**, the next generation of food innovators can **build smarter**, **scale faster**, and **create real impact**.

About the authors

Nurasa is a wholly owned subsidiary of Temasek - supporting the commercialisation of sustainable nutrition ingredients, offering ingredient innovators access to go-to-market program, regulatory guidance, product development support, and fermentation scale-up via its food-grade CDMO, ScaleUp Bio. For more information, hello@nurasa.com

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