



Photo by Unknown Author is licensed under [CC BY-NC](#)

Futures of Food Consumption in 2035 in Europe

Alternative Proteins and Food Processing

December 16, 2025

Prof. Totti Könnölä, Insight Foresight Institute

totti.konnola@if-institute.org

Table of Contents

1	<i>Introduction: Context and Scope of the Exercise</i>	3
2	<i>Development of Four Scenarios</i>	5
3	<i>Scenario 1: Natural and Local – Low in Processing, Low in Alternatives</i>	7
4	<i>Scenario 2. Whole-Food Mosaic – Low in Processing, High in Alternatives</i>	10
5	<i>Scenario 3. High-Tech Savour – High in Processing, High in Alternatives</i>	13
6	<i>Scenario 4. Convenient and Affordable – High in Processing, Low in Alternatives</i>	16
7	<i>Implications for Stakeholders Today</i>	19
8	<i>Conclusions</i>	20
	<i>Annex I: Agendas of the Online Scenario Workshops</i>	22
	<i>Annex II: List of Contributors</i>	24
	<i>Annex III: Driving Forces</i>	25
	General trends and wild cards	25
	Consumer trends, wild cards and weak signals	27
	<i>Annex IV: Scenario Workshop Ideation</i>	29
	Scenario 1: Natural and Local – Low in Processing, Low in Alternatives	29
	Scenario 2. Whole-Food Mosaic – Low in Processing, High in Alternatives	32
	Scenario 3. High-Tech Savour – High in Processing, High in Alternatives	35
	Scenario 4. Convenient and Affordable – High in Processing, Low in Alternatives	40
	<i>Annex V: Emerging Issues and Stakeholder Implications</i>	44
	Scenario 1 – Natural & Local: Emerging Issues and Stakeholder Implications (2025 → 2035)	44
	Scenario 2 – Whole-Food Mosaic: Emerging Issues and Stakeholder Implications (2025 → 2035)	46
	Scenario 3 – High-Tech Savour: Emerging Issues and Stakeholder Implications (2025 → 2035)	48
	Scenario 4 – Convenient & Affordable: Emerging Issues and Stakeholder Implications (2025 → 2035)	51

Note on the vocabulary used:

Scenarios: The scenarios often address both the future states and the pathways from the present to the future. We focus on exploring the future states on how Europe could consume food in 2035.

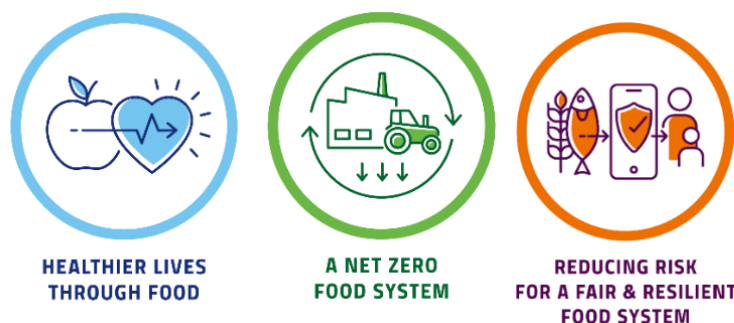
Trends: a trend is a general observable direction in which something is developing or changing gradually over time (e.g. the growing popularity of plant-based diets). Megatrends are long-term, global shifts that reshape economies, societies, and cultures (e.g., accelerating climate change).

Wild cards: a low-probability, large-effect event (e.g. A zoonotic pandemic or supply chain collapse could force an abrupt shift away from conventional meat).

Weak signals: a signal with little or no impact on the present, but with the potential to lead to the identification of major future events (e.g. 3D-printed alternative seafood and meat)

1 Introduction: Context and Scope of the Exercise

Supported by the European Union (EU), **EIT Food** is the world's largest food innovation community – its mission is three-fold:



Its **Consumer Observatory**¹ is Europe's central hub for current and future consumer insights on agrifood topics. The observatory has identified general and consumer-specific trends and other driving forces that provide the basis for the scenario work. The idea is to give further value to those identified factors in sense-making processes that explore how the factors could interact in the future – and then derive implications for stakeholders today.

Last year, our participatory foresight work focused on 'Futures of food consumption and the agrifood ecosystem in 2035 in Europe'². In three online workshops, EIT Food community and foresight experts explored emerging technological opportunities for new products and retail experiences as well as sustainable and healthy consumer choices.

This year, we continued the work and engaged the EIT Food community and broader set of food and foresight experts in three online workshops (Annex I for agendas and Annex II for Participants) in Autumn 2025 to jointly:

- Make sense of how future societal and consumer trends and other factors could interrelate and change food consumption and the agrifood ecosystem
- Explore alternative future scenarios of food consumption and the wider agrifood ecosystem by 2035 and beyond
- Reflect upon the implications of our findings on the current agrifood ecosystem and policy.

Our foresight work continued to explore '**Futures of food consumption and the agrifood ecosystem in 2035 in Europe**', this time with emphasis on technological advances, specifically on consumer acceptance of processed food and functional food as well as alternative proteins. The exploration of alternative proteins led to the development of scenarios for futures where meat consumption has reduced. In more detail:

- With food consumption we refer also to everything related to it, hence extending our scope broadly to the agrifood ecosystem. Even if the problems and solutions may require reflections on different parts of the value chain, our objective is **always to consider the implications on food consumption**.
- **Acceptance of alternative proteins**³ refers here to how well consumers accept consuming alternative proteins, referring to both traditional alternative proteins for European markets (e.g. tofu, seitan, tempeh and molluscs) and novel alternative proteins (e.g. insects, mycoprotein, cultivated meat, precision fermentation). While some view novel proteins as solutions to climate

¹ <https://www.eitfood.eu/projects/consumerobservatory>

² <https://if-institute.org/wp-content/uploads/2025/09/Futures-of-Food-Consumption-in-2035-in-Europe-Briefing-Paper-August-2025.pdf>

³ There is no standard definition of 'alternative proteins' and applications vary depending on the context. In our scenario work we differentiated traditional and novel alternative proteins.

and health challenges, others are deterred by their processed nature or perceived artificiality. Cultural, generational, and regional differences make the future adoption of these innovations also highly unpredictable.

- **Acceptance of processed food and functional food** refers to how well consumers accept consuming highly processed and functional foods, which may be unhealthy or healthy, even highly functional with important health benefits and tailored to deliver added value. This value may take the form of improved nutritional profiles, personalised nutrition adapted to individual needs, preferences, or health conditions, or specific health benefits such as enhanced digestive health, strengthened immune function, reduced risk of cardiovascular disease, improved bone density, or better blood sugar regulation. This may differ from the current perceptions of so-called 'ultra-processed' food, often related to unhealthy diets.

2 Development of Four Scenarios

Scenarios are not predictions of the likely future, but they depict possible futures, even less likely ones. Exploring alternative scenarios helps to expand one's own span of observation further towards the future, and to possible risks and opportunities that otherwise might not be in the immediate attention span, or just being excluded for being unlikely. While the scenarios often consist of a possible future state and the pathway from the present to that future, in this case, **we developed the narratives of the future (written in the present tense, as if we were already in the future)**.

Based on the driving forces for future developments (Annex III), two dichotomic dimensions were defined to provide a starting point for the scenario work. The following dimensions were selected to help differentiate the scenarios:

Key dimensions for the scenarios

DIMENSION 1: ACCEPTANCE OF ALTERNATIVE PROTEINS

+ACCEPTANCE OF ALTERNATIVE PROTEINS

This refers to **high** consumers acceptance of alternative proteins, referring to both traditional alternative proteins for European markets (e.g. tofu, seitan, tempeh, molluscs) and novel alternative proteins (e.g. mycoprotein, cultivated meat, precision fermentation, insects).

- ACCEPTANCE OF ALTERNATIVE PROTEINS

This refers to **low** consumers acceptance of **novel** alternative proteins.

DIMENSION 2. ACCEPTANCE OF PROCESSED FOOD AND FUNCTIONAL FOOD

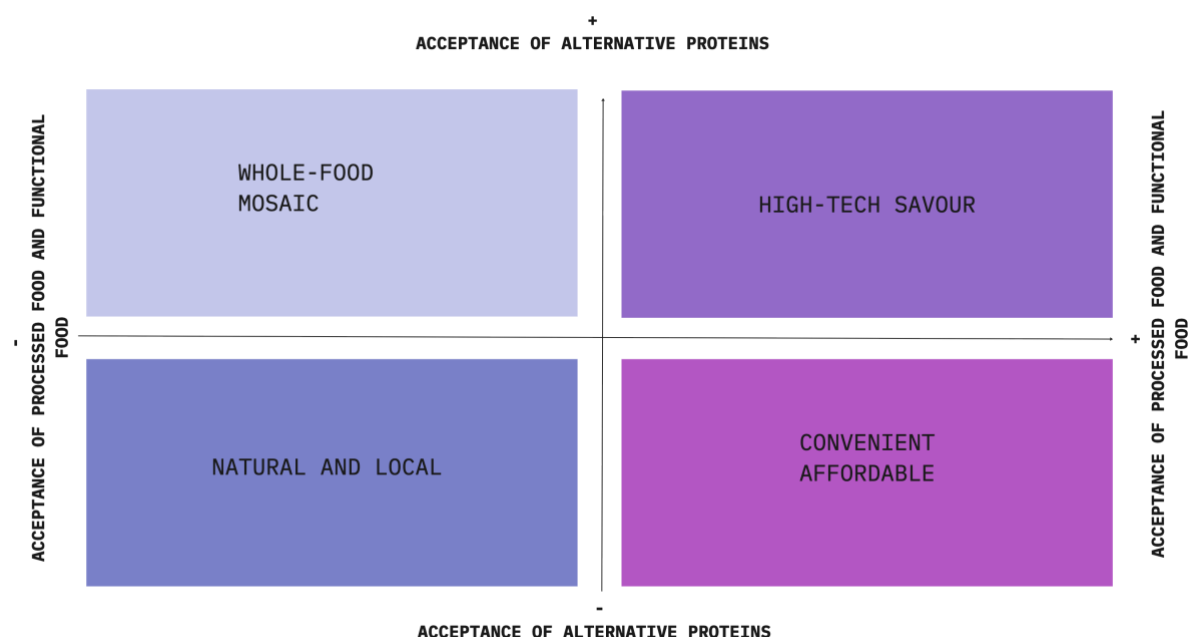
+ACCEPTANCE OF PROCESSED FOOD AND FUNCTIONAL FOOD

This refers to **high** consumer acceptance to consume highly-processed and functional foods.

- ACCEPTANCE OF PROCESSED FOOD AND FUNCTIONAL FOOD

This refers to **low** consumer acceptance to consume highly-processed and functional foods.

These dimensions provided a structure that ensured that each scenario was truly different from the others. While the dimensions were used to identify dominant features, alternative practices could also be considered in scenarios, but always in relation to the dominant features. The scenarios were defined by selecting one of the two extremes of each dimension. Thus, we had 4 starting points for multiple futures.



While the main scenario dimensions provided the structure for the scenario work, scanned driving forces provided ideas on possible future developments and issues to be considered in the scenarios. The observatory identified general and consumer-specific trends, which were complemented with weak signals and wild cards that together provided the basis for envisioning possible alternative futures in 2035 (See Annex III).

In the workshops, participants developed ideas with others about the consumption and agrifood ecosystem in 2035 (See Annex IV). They considered the main scenario dimensions and reflected on how driving forces would interact and affect the consumption and agrifood ecosystem in 2035 in different scenarios. They identified interrelated factors, both general (mega) and consumer trends, as well as wild cards (low probability high impact events) and weak signals (emerging, early signals of change) – and then described the ideas of the future 2035 related to the selected trends. After the workshop, Insight Foresight Institute prepared four scenario narratives based on the workshop contributions, the background document, and the Trends Report of the Consumer Observatory. The narratives were developed with the help of ChatGPT 5 and the images were AI-generated with Dall-E 3 as artistic impressions intended to visualise and bring to life the scenarios. The scenarios are summarised below and detailed in subsequent sections.

Scenario	Quadrant	Pathway from 2025 to 2035	Key Characteristics in 2035
<i>Natural & Local</i>	Low alternatives · Low processed	Geopolitical and climate pressures shorten supply chains; EU mirror clauses, procurement and impact disclosure drive regional self-sufficiency and citizen demand for local, seasonal, minimally processed food.	Europe relies on regional food systems, local production and organic mixed farming supported by transparency and true pricing.
<i>Whole-Food Mosaic</i>	High alternatives · Low processed	Protein diversification accelerates through regulatory clarity, digital traceability and flexitarian norms; public-private R&D expands whole-food alternatives with strong consumer trust and affordability.	Minimally processed alternative proteins and digital productivity tools create sustainable, transparent and diverse diets.
<i>High-Tech Savour</i>	High alternatives · High processed	Regulatory alignment and digital integration enable biotech-based processing; food and health sectors converge as data transparency and efficiency replace traditional farming scale.	Safe-by-design, functional foods produced in automated, data-driven facilities dominate markets.
<i>Convenient & Affordable</i>	Low alternatives · High processed	Food industry reformulates under ESG and cost pressures; VAT adjustments, circular efficiency and stealth innovation maintain convenience while improving nutritional and environmental performance.	Incremental reformulation improves health and sustainability within affordable, processed diets.



3 Scenario 1: Natural and Local – Low in Processing, Low in Alternatives

In a nutshell

- **Pathway to 2035:** Geopolitical shocks push EU guardrails and regional procurement; co-ops scale open precision tech; mandatory impact disclosure unlocks finance; mirror clauses level imports; consumer scepticism keeps innovation practical—so transparent, short, circular chains beat long, leaky ones.
- **Policy and Governance:** Brussels sets clear guardrails and disclosure rules while regions steer procurement and planning, quietly baking true costs and higher welfare into prices and fast-tracking low-risk innovations.
- **Lifestyles and society:** Everyday food culture swings “back to natural”, with seasonal home cooking, occasional meat and high trust in nearby producers, while ultra-processed novelties must prove safety, taste and value.
- **Retail and consumption:** Supermarkets become civic food hubs—regional-first ranges, refill and return, QR-backed impact receipts—making minimally processed staples the convenient, affordable default.
- **Resources and Production:** Mixed, organic farms run on precision services—AI scouting, autonomous weeding, smart irrigation—turning waste to value and managing soil carbon like savings.
- **Agrifood system as a whole:** The system’s metronome is transparency, localisation and circularity: data-verifiable claims align citizen demand, finance and standards, delivering familiar food with radically cleaner footprints.

Pathway to 2035

Geopolitical jolts after 2025—energy swings, fertiliser spikes, twitchy shipping—made resilience the watchword, so Europe shortened chains and leaned into subsidiarity: Brussels set guardrails on origin, safety and welfare; regions used planning and procurement to revive mills, dairies and small slaughterhouses; trade mirror clauses kept imports less competitive and up to EU standards. Innovation went practical: co-ops spread service-model precision tools (AI scouting, robotics, autonomous weeding, drip irrigation). By 2030 mandatory carbon-water-nature disclosure unlocked cheaper finance and insurance for transparent practices while exposing leaky ones.

Pricing shifted the demand, and new habits and culture did the rest. Supermarkets became civic food hubs (regional-first aisles, refill loops, harvest bundles), citizens rewarded provenance and trusted claims, and any novelties struggled to prove safety, taste and value. By 2035 the plate looks familiar—stews, veg, proper bread, occasional meat—while underneath it runs on transparency, short resilient chains and precision tech that turns waste into value.

Policy & Governance

Brussels sets the compass; regions hold the wheel. Public money rewards organic farming, short supply chains and local processing; procurement favours seasonal, minimally processed foods; and mandatory impact disclosure makes performance comparable and financeable. Regulators fast-track low-risk enablers (planning for small facilities, grants for food hubs) while keeping a strict precautionary line on highly processed novelties.

Standards shift prices more than slogans: tighter welfare and eco-criteria bake true costs into meat, tilting demand toward plants without bans. Data policy is boring on purpose—privacy-safe, auditable, open audits—so claims can be tested in public. The result is steady, local and transparent governance that earns trust while raising the bar.

Lifestyles & Society

Everyday culture goes “back to natural”: seasonal cooking, market Saturdays, veg boxes and a taste for simple, recognisable ingredients. Trust sits close to home—producers you can name, labels you can pronounce—while Big Food and biotech bravado meet raised eyebrows.

While some wealthy pay whatever it takes to stick to their old meat-based diets, for most, meat becomes an “occasion”, not a reflex; allotments and backyard hens dot city life; and wellbeing trends favour veggies and walks. Personalisation is GP-backed, and social media scepticism keeps food tech honest—community and craftsmanship trump hype.

Drivers of change

- **International regulatory divergence** — reinforces a slower, “natural-first” path with low tolerance for highly novel formats.
- **Growing scepticism toward highly processed foods** — anchors demand in minimally processed, short-chain staples.
- **Cultural identity in food** — keeps heritage dishes centre-stage, limiting appetite for flashy tech foods.
- **Trust & perception as the adoption bottleneck** — favours nearby producers and clear, simple offers.
- **Transparency, storytelling, and third-party certifications** — makes origin labels and local seals decisive at shelf.
- **Geopolitical food shocks: Supply chain breakdowns** — favours robust, processed staples and on-shored inputs.
- **Global commodity price volatility** — strengthens regional, resilient staples over long, fragile chains.
- **Advances in precision agriculture, automation, and AI-driven decision-making** — improve mixed farms without changing what’s on the plate.
- **Push for regenerative agriculture, circular food systems, and upcycling** — aligns production with nature-positive expectations.
- **Heightened consumer awareness of the environmental and ethical impacts** — rewards short, transparent chains.

Retail & Consumption

Shops shrink the gap from shelf to soil: regional-first ranges, click-and-collect from nearby farms, refill and return as standard. QR codes deliver impact receipts, and short ingredient lists win baskets; anything ultra-processed must work harder to justify itself.

Ranges tilt to whole foods and familiar plant proteins, curated around local culture rather than novelty. Convenience means “planned simplicity”—harvest bundles plus recipe cards—and clearer standards make minimally processed, seasonal lines the value choice. Supermarkets act as civic food hubs; independents thrive on story and service.

Resources & Production

Production looks traditional but runs modern: mixed farms, hedgerows, rotations and cover crops, paired with AI scouting, autonomous weeding, smart irrigation and low-carbon processing delivered via co-ops. Waste becomes feedstock—peelings to biogas, whey to ingredients, prunings to biochar—and disclosure rules reward careful stewards.

Climate pressure drives resilience: drought-tolerant (including gene-edited) varieties where accepted, water-savvy greenhouses, and soil carbon managed like savings. IP spats persist, but productivity and stability improve; Europe hits tougher climate-nature targets by how it produces, not by forcing radical diet swaps.

Agrifood System as a Whole

Three cross-cutting beats set the tempo: transparency (verifiable impact from field to store), localisation (short, trusted chains) and circularity (designing out waste across farming, processing and retail). Retail translates citizen preferences into contracts and specs, aligning producers, financiers and auditors.

Prices nudge rather than preach: higher standards embed more true cost in meat while staple foods regain ground on value and familiarity. Technology hums in the background and directed by safety, competition and energy use. Familiar food on the plate; radically cleaner machinery underneath.



4 Scenario 2. Whole-Food Mosaic – Low in Processing, High in Alternatives

In a nutshell

- **Pathway to 2035:** Geopolitical shocks and zoonotic scares push Europe to de-risk diets by diversifying protein (pulses, fungi, algae and even some insects) and scaling affordable tech.
- **Policy & Governance:** Brussels clarifies a tiered pathway for novel-foods and mirror clauses while Member States pull demand via procurement and tighten competition rules with data portability and FRAND-style access.
- **Lifestyles & society:** Flexitarian becomes the social default—meat as an occasion—while social media drives acceptance of alternative proteins of all sorts, anchored by safety, taste and cultural fit.
- **Retail & consumption:** “Minimally transformed first” rules the shelf, with crystal-clear labels on process and provenance, QR transparency, and curated convenience that normalises new proteins.
- **Resources & Production:** Fields add pulses and soy where agro-ecology allows, insulated sites scale mycelium/algae/insects, and side-streams and up-cycling feed fermenters under strict reporting.
- **Agrifood system as a whole:** Resilience comes from diversification, governed innovation and market fairness, with circular loops turning waste into inputs across the chain.

Pathway to 2035

After 2025, protein anxiety set in: zoonotic scares, fertiliser shocks and twitchy shipping lanes exposed how meat-heavy, import-dependent diets buckle under pressure. The high prices and health concerns plummeted the demand for meat products. Europe hedged by diversifying protein—pulses and soy in the ground, fungi in tanks, algae on land and at sea and even some insects in vertical barns. Capital flooded “alternative-food-tech”; policy toggled between accelerator and brake to keep safety first while speeding trials, and industrial strategy shifted to securing European feedstocks, especially for fermentation to cut overseas exposure.

On the high street, micro-activism (Meat-less Mondays, flexitarian weeks) met retail pragmatism: minimally transformed plant options took centre stage while more novel formats earned trust slowly, via clear labels and familiar recipes. By 2035, Europe eats a broader “protein palette”: stews and salads look comfortably normal, but the beans are local, the tofu is regional, the fungi fillet is audited, and the algae oil in the dressing is EU-sourced—resilience by diversification, not by gimmick.

Drivers of change

- **Policy as an adoption accelerator** — clears a lane for traditional/clean-label alternatives to scale.
- **Capital intensity: Scaling advanced agri-food technologies** — tilts funding to simpler, lower-processing protein routes.
- **Consumer spending pressure** — mainstreams pulses and mycoprotein via value lines.
- **Growth of the alternative protein and functional foods markets** — finances scale-up of familiar alt proteins.
- **Increasing demand for healthier, personalized, and sustainable diets** — lifts whole-food proteins presented in known dishes.
- **Acceleration potential: Precision agriculture** — boosts yields and stability with minimal processing.
- **Wellbeing & Healthy Ageing** — favours protein quality and digestibility in familiar formats.

Policy & Governance

Brussels clarified the pathways for novel-foods (risk tiers, post-market surveillance, trusted labelling of protein origin), while Member States used procurement to pull demand for pulses, mycoprotein and other low-processing options in schools and hospitals. Geopolitical food shocks prompted an EU push to onshore key inputs (sugars/starches for fermentation, amino acids, growth-media components) and to stress-test supply chains; “policy as accelerator or brake” became explicit, with fast lanes for evidence-rich cases and red flags when social acceptance lagged.

With investment concentrating in a handful of platforms, competition policy stiffened: merger scrutiny, data-portability for farm and factory sensors, and fair, reasonable and non-discriminatory (FRAND) access to critical bioprocess IP to avoid monopoly choke points. Public-health levers (front-of-pack labels, sugar and salt targets, marketing rules) guided reformulation without hard bans, and impact disclosure (carbon, water, biodiversity) made performance comparable—unlocking finance for safer, cleaner protein capacity while keeping prices honest.

Lifestyles & Society

By 2035, “rewild the gut” is mainstream language: people swap tips on ferments, fibre and friendly microbes, and a quiet revival of foraging and preservation courses puts old skills to new use. Wearables, basic genomics and microbiome kits feed simple, GP-sanctioned personalisation—less about miracle shakes, more about tailoring familiar foods and weekly habits.

Acceptance widens but not without friction: younger cohorts normalise insect snacks and fungi cuts; others stick to beans-and-grains and balk at high-tech textures. Protests flare—NGOs over animal welfare and greenwash, farmers over market power—yet the centre of gravity holds around safety, taste and cultural fit. Net effect: flexitarianism and plant-based milk and ‘meat’ products become the social default, with meat as an occasional splurge and a lot more curiosity about where protein really comes from.

Retail & Consumption

Meat has become expensive because livestock production faces rising costs from zoonotic risks and unstable global feed imports. At the same time, capital and policy shift toward alternative proteins, shrinking livestock

supply and turning meat into a smaller, premiumised, high-price category. Further preferences for whole foods direct the shift to alternative proteins. Retailers make “minimally transformed first” the rule of thumb: tofu, pulses, lentil pasta and basic mycoprotein sit at eye level; novel products move only with crystal-clear labels and recipe support. QR codes show protein provenance and health flags in plain language, and range resets cluster by “how it’s made” as much as “what it is,” helping shoppers compare like-for-like across animal, plant, fungi, algae and insect.

Convenience is curated: harvest bundles plus protein add-ons, tasting counters for new formats, and loyalty nudges that reward whole-food choices. Public-health nudges (labels, reformulation targets) push down ultra-processed profiles across the aisle. The basket shifts from daily meat plus sides to a rotating cast of beans, grains, veg and a couple of trusted alternatives—familiar meals, broader sources.

Resources & Production

On farms and in sheds, Europe ramps pulses and soy where agro-ecology allows, while insulated, automation-rich sites scale mycelium, algae and insects with tight water-energy loops. Cellular agriculture and vertical farms clear specific use-cases (ingredients, premium cuts, perishables), but capital and energy intensity keeps them focused; most tonnage growth comes from whole-food alternatives and efficient fermentation.

Feedstock strategy becomes decisive: contracts for European sugars/starches and side-stream utilisation buffer against import risks, and process data standards cut vendor lock-in. Environmental reporting bites—every kilowatt, litre and kilo of CO₂e tracked—so sloppy operations exit and startups scale up. By 2035, protein supply is more diverse, steadier and cleaner.

Agrifood System as a Whole

Cross-cutting themes crystallise: **diversification for resilience** (many efficient protein routes, no single point of failure), **governed innovation** (safety first, staged scaling, post-market vigilance), and **market fairness** (antitrust teeth, open data, scrutiny of platform power). Circularity shows up in practice—side-streams into insects and fermenters, algae polishing effluents in wastewater treatment, heat and water recovery—turning waste into inputs across the chain.

The social contract is pragmatic: consumers reward clarity and cultural fit; regulators keep a steady hand on competition and claims; finance backs transparent, auditable plants over hype. Europe’s plates in 2035 look much like 2025—soups, stews, salads—yet the protein beneath is a spread of pulses, fungi, algae and some insects.



5 Scenario 3. High-Tech Savour – High in Processing, High in Alternatives

In a nutshell

- **Pathway to 2035:** We gradually upgraded familiar meals by backing safe-by-design novel proteins and smart reformulation, onshoring feedstocks and using per-portion LCAs so only options with clear health gains and lower footprints scaled.
- **Policy & Governance:** The strong EU set tiered approvals, post-market health checks, plain-language process/origin labels and mirror clauses for imports, while procurement rewards proven outcomes and competition rules plus data portability keep platforms honest.
- **Lifestyles & Society:** It's personal, not preachy—wearables and GP-endorsed apps nudge choices and cut meat consumption, the gut–brain link guides demand, and the stigma around “processed” fades where taste and measurable benefits show up.
- **Retail & Consumption:** Aisles sort by “how it helps”, every pack carries QR metrics (meat, salt and sugar down, fibre up, CO₂e per portion), tasting corners de-risk the new, and dynamic pricing with meal-kit redirect preferences.
- **Resources & Production:** Supply conglomerates and aligns with Pharma and diversifies into mycelium, algae and insect ingredients with closed-loop water and heat, cellular agriculture⁴ for niches, side-streams feeding fermenters, green power and automation driving traceable, lower-impact output.
- **Agrifood system as a whole:** Diversification and processing-for-good (for people and planet) unverifiable markets deliver food that still tastes delicious and contributes to fewer diet-related illnesses, lower emissions and less waste per unit.

⁴ Cellular agriculture is a field of biotechnology that focuses on producing agricultural products from cell cultures rather than traditional farming. It involves growing animal or plant cells in controlled environments to create products like meat, dairy, and other materials reducing the need for raising and slaughtering animals or cultivating plants in fields.

Pathway to 2035

We didn't sell sci-fi suppers; we gradually upgraded familiar food. Off the back of climate jitters, cost-of-living strain and digital confusion, people wanted health, proof and value—so Europe backed safe-by-design protein innovation and functional reformulation that showed benefits on the pack: less meat, salt and sugar, more fibre and micronutrients, and per-portion impact you can scan. With consumers swinging between wellness, convenience and tight budgets, the winning path was innovation plus radical transparency.

By the early '30s, precision fermentation, mycelium, algae and insects supplied ingredients; targeted cellular ag handled niche cuts; and longer shelf-life tech cut binning without wrecking taste. Retail made impact and health auditable; policy made claims verifiable; and wearables nudged daily choices. Come 2035 the plate still looks like home—soups, stews, salads—but underneath it's cleaner, steadier and measurably better for you and the planet.

Drivers of change

- **Public health nutrition strategies** — makes “processing-for-good” the mainstream rule.
- **Consolidation trends** — raises platform power and governance needs.
- **Convergence of technologies** — enables tailored, smart-processed foods.
- **Digital tools for personalized nutrition** — links daily choices to measurable outcomes.
- **Intellectual property debates** — shapes access and licensing in novel proteins.
- **Strengthening laws on environmental impact disclosures** — forces per-portion impact proof.
- **Environmental credentials of new technologies are under scrutiny** — filters which tech products earn shelf space.

Policy & Governance

Brussels normalised governed innovation, especially easing clinical trials for functional foods: tiered risk approvals, post-market surveillance, plain-language origin/process labels and traceable, per-portion LCAs for CO₂e, water and nutrition. With trust stretched by AI noise and greenwash, regulators insisted on verified claims, clearer data rights and privacy-safe personalisation; mirror clauses helped balance imports, and public procurement pulled proven health and footprint gains into schools and hospitals.

Competition policy tried its teeth as food-tech scaled. Data portability, fair access to critical IP and scrutiny of platform power protected many choices but fusions gradually led to ever more powerful conglomerates. True-pricing pilots informed fiscal nudges, while support for practices addressed consumer demand for healthier, more “natural” precision farming—but sometimes pricing people out.

Lifestyles & Society

In 2035 we eat personal, not preachy. People use GP-endorsed apps and wearables to tune meals to sleep, stress, performance and training loads; the gut–brain link moved from blog to clinic, so ferments, fibre and friendly microbes show up in everyday choices. Crucially, functional foods had to feel like they work—energy steadier, digestion calmer—otherwise they didn't last on the shelf. Premium products for personalised health and performance, but also for taste, self-expression and fashion boost innovation.

Generations play it differently: People leans into convenient functional formats (gummies, powders, timed-release snacks), while many households stick to stews and bread—now quietly reformulated. Curiosity about novel proteins rose with clear proof; scepticism about “ultra-processed” stuck around, but softened when labels showed health wins and lower footprints people could trust.

Retail & Consumption

Shops flipped from “what it is” to “how it helps”: eye-level bays for heart-health, protein quality, gut-friendly and low-CO₂e lines; QR codes pulled up salt and sugar cuts, added fibre and impact per portion; tasting corners de-risked the new. Private-label reformulations hit price parity (often better), and multi-channel journeys—store, app, social—stayed frictionless and personalised.

Waste became visible value: dynamic pricing moved near-date stock into meal kits; upcycled ingredients and disappearing/low-impact packaging won space; and freezer-friendly formats made “planned convenience” cheaper than throwing food away. Result: “better for you, better for the planet” is now the easiest basket to build.

Resources & Production

Conglomeration into mega farms contributed to further rural decline. Industry aligned with Pharma and diversified by design. Fields of precision farming carry more pulses where they fit; insulated plants run mycelium, algae and insect lines; and precision fermentation provides dairy/egg analogues with high protein quality and consistent safety. Cellular agriculture found its lane in targeted cuts and ingredients where impact and acceptance stacked up.

Plants run on closed-loop water and heat, feed on local side-streams (whey, molasses, peels), and lock in green power; automation trims inputs and downtime; and traceability is standard. Crucially, operators prove net environmental benefit and food safety over time—not in slides—so sloppy sites exit and best-in-class scale.

Agrifood system as a whole

Three beats drive the whole machine: diversification for resilience (many protein routes from animal farming to a wider range of alternatives), processing-for-good (scale only what improves health and cuts footprints), and farm-to-fact transparency (verifiable claims, open data, portable audits). Circularity shows up end-to-end—waste to inputs, smarter cold chains, longer freshness—so emissions fall while affordability holds.

The social contract is blunt: taste first, proof next, no finger-wagging. Brands earn space with clear evidence. Policymakers referee claims and but have failed to control concentration. Retailers claim to translate citizen priorities in their offering, but the question remains if the priorities are rather those of the industry and retail and if consumers really get not only tastier but also healthier, lower-impact food.



6 Scenario 4. Convenient and Affordable – High in Processing, Low in Alternatives

In a nutshell

- **Pathway to 2035:** Alternative protein allergies spooked consumers, demand collapsed, and the system pivoted to reformulated staples—cheaper, safe and proven on-pack.
- **Policy & Governance:** Tiered approvals, allergy surveillance, per-portion LCAs and mirror clauses, plus affordability-first reformulation via VAT/levies and public procurement.
- **Lifestyles & Society:** Cost is the driver; families keep cultural classics and accept functional processed swaps when taste holds and benefits are felt. Tensions arise when choosing between the prices and quality.
- **Retail & Consumption:** Prices rule and convenience directs choices. **The industry** conglomerates and trust tech (QR/true price) + private-label reformulation lead; bold allergy flags; dynamic pricing and meal-kit redirects preferences.
- **Resources & Production:** Shift from moonshots to efficiency led to Food industry consolidation — alternative proteins complement animal proteins. Pulses/grains, ingredient fermentation, closed-loop plants, strict allergen control, green Power Purchase Agreements.
- **Agrifood system as a whole:** Cost-led, safety-first, efficiency-driven—healthier processed staples, lower emissions and waste by unit, but overall environmental footprint grows and bends tipping points.

Pathway to 2035

We hit the brakes on shiny protein moonshots when allergy clusters linked to several novel concentrates spooked families and insurers. While plant-based foods and proteins from insects (e.g. tropomyosin), fungi, algae, and genetically engineered microorganisms produced some allergies, these were exaggerated by powerful lobbies against alternative proteins. Shelves were rearranged, and demand for alternative proteins collapsed outside niches. With wallets under strain, cost became king, so the winning pivot was brutally practical: reformulate familiar foods to be healthier and cheaper, prove it on-pack, and cut waste.

By the early '30s, policy and procurement hard-wired “processing-for-good”—salt and sugar down, fibre up, per-portion impact disclosed—while plants re-tooled around clean energy and waste-cutting tech. Private label surged as shoppers traded down without feeling they traded off, and by 2035 the plate looks classic again, just quietly upgraded under the bonnet.

Policy & Governance

Brussels went from “accelerate” to “prove it”: tiered approvals, post-market allergy surveillance, plain-language process/origin labels, and per-portion LCAs became standard before a product could scale. Mirror clauses kept imports at the same safety bar. While regulators tightened impact disclosure and they struggled, however, with competition policy and opening the way for industry consolidation and lock-in around the international Food Big Tech.

Crucially, policy aimed at affordability with health: VAT relief or levy-and-rebate for verified reformulation, plus public procurement that prioritised reformulated basics in schools and hospitals. In a cost-of-living era, that blend—evidence first, price in reach—was the only thing that stuck with voters and shoppers alike.

Lifestyles & Society

Households got blunt: “my health, my wallet”. After the scares, families defaulted to stews, breads and broths, taking functional processed swaps where taste held and price dropped. Wearables and GP-endorsed apps nudged choices, but trust hinged on feeling the benefit—steadier energy, calmer guts—not hype.

Inclusion mattered, too: more single-person homes, disability awareness and squeezed incomes reshaped what “good value” meant, pushing brands to prove both price fairness and benefit. The net effect by 2035 is pragmatic: less appetite for novelty, more appetite for proof, especially among those still trading down and buying cheaper imports.

Retail & Consumption

Consumers wanted healthy dishes and lower environmental impact, but only when the maths and the mouthfeel added up. Supermarkets flipped to trust Food Big Tech: QR dashboards with salt-down, fibre-up and CO₂e-per-portion; allergy flags you can't miss; try-before corners focused on reformulated classics rather than sci-fi bites. As shoppers hunted value and hit price-performance parity.

Waste turned into savings you could feel. Dynamic pricing, “leftovers” bundles and meal-kit redirects cleared near-date stock; extended shelf-life and upcycled formats cut binning without wrecking taste. Result: the cheapest, easiest basket is now also the one with fewer spikes and sometimes also with a lighter footprint.

Resources & Production

Drivers of change

- **Climate change intensifies** — pushes shelf-stable, efficient processed lines.
- **Regulatory and consumer pressure for low-waste, low-carbon** — bakes circularity into value tiers.
- **Liability and labeling disputes around genetically edited and cell-cultured products** — keeps novel proteins niche and signposted.
- **Trust and Transparency** — elevates clear QR dashboards and plain-English labels.
- **Severe economic recession** — entrenches price sensitivity and trading-down behaviour.
- **Demand shift due to true pricing** — moves volume to products that prove better health and lower footprints per euro.
- **European-wide Political overturn** — policy swings reweight procurement, VAT/levies and safety communication for processed basics.
- **Divergent global regulatory regimes create uncertainty for cross-border commercialization of novel foods.** — keeps portfolios focused on low-risk alts that clear EU rules.

Factories and farms were filled with AI and robotics for efficiency gains. Plants ran closed-loop water/heat, locked green, and upcycled side-streams like whey, molasses and peels into feedstocks. Safety and efficiency were the licence to operate: per-unit kilowatts, litres and kilos of CO₂e published; allergen segregation and rapid trace standardised; sloppy operators exited. Pulses and grains took some acres that fit; fermentation sites pivoted from meat analogues to ingredients/enzymes; cellular meat shrank to premium niches with clear use-cases, often in high-end restaurants.

Agrifood system as a whole

Three rules steer the ship now: (1) Cost first —policy hard-wires healthier processed staples that stay affordable; (2) Safety without debate—allergy management baked into design and law; (3) Efficiency beats novelty—emissions and waste fall via reformulation, international logistics and circularity rather than protein fashion.

The industry ties it together with transparency: farm-to-fact proof on claims with plain language, radical clarity on pricing, and open audits to keep platforms honest. Europe still eats soups and stews feel like home even if produced by global value chains —only now they last longer, do you good and tread lighter, without breaking the bank.

7 Implications for Stakeholders Today

The four EIT Food CO scenarios outline diverse yet interconnected futures for Europe's food systems, each revealing tensions between sustainability, health, technology, and affordability. Despite their differences, the scenarios converge on a shared insight: the transformation of food systems is already underway, and early, coordinated stakeholder action could determine whether this transition becomes inclusive, resilient, and fair.

The third expert workshop explored emerging issues in each of the four scenarios. Based on these reflections, further deskwork was conducted to develop detailed tables on threats and opportunities and possible stakeholder actions today on each of the scenarios (Annex V). Building on those tables and cross-cutting reflections in the workshop, we synthesise in ten thematic areas the most pressing cross-scenario implications and suggest where collaborative efforts — spanning policy, industry, retail, research, and civil society — could have the greatest leverage today. Rather than prescribing fixed solutions, these themes highlight domains of opportunity where experimentation, partnership, and adaptive governance may shape a sustainable and competitive European food future.

1. Making Healthy and Sustainable Food Affordable for All

Affordability remains a key challenge as food systems evolve. Fiscal measures such as VAT relief, targeted subsidies, and high fat, sugar and salt (HFSS), even meat, levies could help align prices with nutritional and environmental value. Attention to energy and resource costs in food production would help ensure that the transition to healthier diets does not widen inequalities or increase overall prices.

2. Managing Transitions and Safeguarding Farmers' Futures

Every transition produces winners and losers. Farmers could face both opportunities and disruptions as production models diversify. A structured transition management framework might include retraining, diversification incentives, cooperative ownership of new facilities, and social safety nets to ensure that farming remains viable and valued across Europe.

3. Balancing Industrial Efficiency and Niche Innovation

Large-scale industrial food systems may remain dominant, but policies could promote further coexistence with smaller, innovative and regional models. Safeguards might include antitrust measures, fair-access rules, and tailored standards to avoid the crowding-out of alternative producers. Encouraging direct-to-consumer (D2C) and cooperative marketing could rebalance power between retailers and farmers.

4. Strengthening Retail Diversity and Direct Market Channels

Supermarkets may remain powerful actors, yet their role could evolve. Retailers might combine mainstream convenience with regional sourcing and digital marketplaces that connect consumers directly with local producers. Expanding retail diversity through short supply chains and platform-based D2C logistics could enhance transparency and consumer choice.

5. Reframing “Processing for Good” with Scientific Evidence

Processing can either harm or improve nutrition depending on how it is applied. More research on ultra-processed foods and alternative proteins is needed to clarify their real health impacts. Supporting innovation in processing techniques—for example, fermentation and bio-enrichment—could motivate the food industry to use processing to enhance health and sustainability outcomes.

6. Integrating Food Systems within the Broader Bioeconomy

Food systems are intertwined with energy, materials, water and land-use transitions. Coordinated bioeconomy strategies could prevent competition between food, feed, and bio-based materials. Strengthening links with biorefineries, nutrient recycling and cross-sector resource planning would help optimise land and biomass use while ensuring food security.

7. Managing the Energy and Climate Footprint of Food Production

Emerging food technologies such as fermentation, controlled-environment agriculture and precision processing require substantial energy. Integrating renewable energy and circular energy recovery in food manufacturing, setting energy-efficiency standards, and fostering collaboration between food and energy sectors could mitigate new climate impacts.

8. Understanding and Guiding Consumer Behaviour in the Digital Era

Social media, influencers and digital marketing strongly shape dietary norms, especially across generations. Better consumer insight research could support communication strategies that promote sustainable and healthy diets. Collaboration with digital platforms could help align incentives, making the sustainable choice the socially desirable and convenient one.

9. Expanding Protein Diversification to Include Aquaculture

Marine resources— especially shellfish, algae and seaweed—could play a much greater role in future protein diversification. Sustainable aquaculture and blue bioeconomy initiatives may strengthen regional economies and resilience. Policies that ensure traceability, low environmental impact and nutritional quality could bring aquatic proteins fully into the circular food system vision.

10. Coordinating Multi-Level Governance and Transition Partnerships

Transforming Europe's food system requires coordination across silos. European Food Transition Partnerships could further connect CAP, Horizon Europe, future competition fund, ESG and other finance streams, to the extent possible under the next EU Multi-Annual Financial Framework, to align incentives. Cross-actor foresight clusters — for example between EU agencies and EIT Food community — might improve anticipatory governance. Shared KPI dashboards tracking health, sustainability, affordability and resilience could provide a common evidence base for joint action. Involving social partners, consumers and farmers in transition governance would help ensure sustainability, fairness, legitimacy and long-term stability.

8 Conclusions

The four EIT Food CO scenarios of alternative proteins together reveal that Europe's food future will not hinge on a single technological or behavioural breakthrough, but on how effectively diverse innovations are coordinated across social, economic and environmental dimensions. Whether the emphasis is on localisation and culture (Scenario 1), diversification of whole-food proteins (Scenario 2), technological intensification (Scenario 3), or healthier reformulation and convenience (Scenario 4), **each scenario underscores the need to balance health, affordability, and resilience**. The integrated assessment shows that no single actor can drive transformation alone: only through the combined efforts of policymakers, operators active in the food systems especially industry leaders, researchers and consumers can Europe navigate the difficult tensions between sustainability, competitiveness, and social inclusion.

At a structural level, **the scenarios expose several systemic tensions that require early resolution**. These include reconciling the push for healthier diets with persistent inequalities in access and price; managing the concentration of power in processing and retail while ensuring rural participation; and maintaining public trust in an increasingly digital and processed food landscape. Addressing these tensions will depend on new governance models that are both anticipatory and adaptive — capable of coordinating multi-level action while learning from experimentation. Investments in **transparency, circular economy practices, and “processing-for-good” innovation** could become key enablers of such balanced progress.

Ultimately, the scenarios suggest that Europe's food transition is not a matter of if but how. Stakeholders have the opportunity today to design policies, business models and research agendas that make sustainable and healthy options the most convenient and affordable choice for citizens. By aligning the ten thematic action areas identified — from affordability and trust to digitalisation, circularity and cross-agency collaboration — **Europe could position its food system as a global benchmark** for resilience, innovation and fairness. The

foresight work therefore calls for continued dialogue, experimentation and shared commitment to shaping a future in which food serves not only as sustenance, but as a foundation for collective wellbeing and planetary regeneration.

Annex I: Agendas of the Online Scenario Workshops

1st scenario workshop: September 11: 10:00-13:00 CET, online

Time	Session	What to expect?
10:00-10:15	<i>Welcome and introduction</i> <i>Introduction to the Miro board</i>	Introduction to the project and scenario work Getting familiar with the Miro board, online working space
10:15-10:45	<i>Key scenario dimensions</i>	Introduction and discussion on the used scenario structure and driving forces
10:45-11:45	<i>First scenario sprint</i>	Participants relate and adapt the factors to the scenario and propose new related factors and issues
11:45-12:00	<i>Break</i>	
12:00-12:55	<i>Second scenario sprint</i>	Participants relate and adapt the factors to the scenario and propose new related factors and issues
12:55–13:00	<i>Wrap up</i>	Conclusions and next steps

2nd scenario workshop: September 18: 10:00-12:45 CET, online

Time	Session	What to expect?
10:00-10:15	<i>Welcome and introduction</i>	Introduction to the project and scenario work Getting familiar with the Miro board, online working space
10:15-11:15	<i>Third scenario sprint</i>	Participants relate and adapt the factors to the scenario and propose new related factors and issues
11:15-11:30	<i>Break</i>	
11:30-12:30	<i>Fourth scenario sprint</i>	Participants relate and adapt the factors to the scenario and propose new related factors and issues
12:30- 12:45	<i>Wrap up</i>	Conclusions and next steps

3rd scenario workshop: November 4: 10:00-13:00 CET, online

Time	Session	What to expect?
10:00-10:15	<i>Welcome and introduction</i>	Introduction to the scenario work and scenarios Getting familiar with the Miro board, online working space
10:15-11:30	<i>First and second scenario feedback and implications</i>	Participants learn about the scenarios, provide feedback and reflect relate and adapt the factors to the scenario and propose new related factors and issues
11:30-11:45	<i>Break</i>	
11:45-13:00	<i>Third and fourth scenario feedback and implications</i>	Participants learn about the scenarios, provide feedback and reflect relate and adapt the factors to

		the scenario and propose new related factors and issues
12:30- 13:00	<i>Cross-cutting reflections and Wrap up</i>	Participants discuss cross-cutting implications of the scenarios for stakeholders Conclusions and next steps

Annex II: List of Contributors

Although the participants played a key role in the ideation of scenarios, provided feedback on the scenarios and reflected implications for stakeholders, the author takes full responsibility for the results, as well as any limitations or misrepresentations of issues.

Name	Surname
Abbie	Roberts
Alejandra	Bermúdez
Amelie	Bultot
Chidera	Arum
Kezia	Barker
Durk	Bosma
Elena	Barrenetxea González
Elena	Santa Cruz
Arianna	Ferrari
Gema	Palencia Aceituno
Marion	Maignan
Marcin	Tischner
Marie	Breysse
Nagore	Picaza
Monique	Raats
Silvia	Leal Martín
Sonia	Riesco
Totti	Könnölä
Hans	Van Trijp
Viktoria	Soos

Annex III: Driving Forces

Most of the factors collected here are from the Consumer Observatory's Trend Report available here: <https://www.eitfood.eu/reports/consumer-trends-shaping-the-food-system>

General trends and wild cards

Political

- Policy as an adoption accelerator or brake shaping the pace of technological adoption
- International regulatory divergence—such as the EU's precautionary stance versus faster regulatory approval in the US
- Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products

Economic

- Capital intensity: Scaling advanced agri-food technologies (cellular agriculture, 3D printing, high-pressure processing) requires significant upfront investment
- Global commodity price volatility—especially from climate shocks—creates incentives for tech-driven supply resilience (e.g., vertical farming to mitigate crop failures)
- Consolidation trends: Major food multinationals are acquiring startups to accelerate market entry for novel food tech, potentially concentrating innovation in fewer hands
- Consumer spending pressure from inflation drives both budget-focused innovation (low-cost plant-based proteins) and premiumization in niche health/sustainability segments
- Growth of the alternative protein and functional foods markets, attracting significant venture capital and corporate investment

Social

- Trust & perception as the adoption bottleneck: Consumer acceptance varies by region and demography
- Transparency, storytelling, and third-party certifications (e.g., “lab-grown,” “upcycled,” “regeneratively farmed”) play a central role in building trust.
- Cultural identity in food: resistance can emerge when innovations are seen as undermining traditional food heritage.
- Increasing demand for healthier, personalized, and sustainable diets, particularly among younger generations.
- Growing skepticism toward highly processed foods and demand for “natural” and locally sourced products.
- Heightened consumer awareness of the environmental and ethical impacts of food production, influencing purchasing behavior.
- Social media accelerates both hype and backlash—creating unpredictable swings in acceptance that can impact investment viability.

Technological

- Acceleration potential: Precision agriculture (AI + IoT sensors), high-pressure processing, vertical farming, CRISPR-based gene editing, and food waste valorization technologies
- Convergence of technologies—e.g., combining bioengineering with AI-driven flavor optimization—opens up hyper-personalized nutrition and functional food markets.
- Risks include cybersecurity vulnerabilities in connected agriculture systems and intellectual property concentration in a few tech providers.
- Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.
- Development of novel food production methods, including cellular agriculture, vertical farming, and 3D food printing.
- Digital tools for personalized nutrition, leveraging data from wearables, genetic testing, and microbiome analysis.

Legal

- Divergent global regulatory regimes create uncertainty for cross-border commercialization of novel foods.
- Liability and labeling disputes around genetically edited and cell-cultured products remain unresolved in many jurisdictions.
- Data protection laws increasingly apply to personalized nutrition and precision agriculture platforms.
- Intellectual property debates around biotechnology innovations and proprietary strains or processes.
- Strengthening laws on environmental impact disclosures and carbon footprint reporting in the agri-food sector.

Environmental

- Climate change intensifies the need for resilient, resource-efficient production systems like vertical farming, drought-resistant gene-edited crops, and low-carbon processing methods
- Environmental credentials of new technologies are under scrutiny—life-cycle analyses for lab-grown meat or precision fermentation must prove net benefits to gain stakeholder trust.
- Regulatory and consumer pressure for low-waste, low-carbon supply chains is catalyzing investment in upcycled ingredients and biodegradable packaging.
- Push for regenerative agriculture, circular food systems, and upcycling of food waste into value-added products.

Related wild cards (low probability high impact events)

- Collapse of internet
- Severe economic recession
- Severe drought and the collapse of agriculture
- Collapse of the North Atlantic current
- Mass migration

- European-wide Political overturn to the extreme radical left or right
- Geopolitical food shocks: Supply chain breakdowns
- A unified EU strategy to scale alternative proteins
- Demand shift due to true pricing

Consumer trends, wild cards and weak signals

Macrotrends (main axes of consumer change in food systems)

- Sustainability Shift – Sustainable consumption is rising but still hindered by affordability and the “say–do gap.”
- Trust and Transparency – Consumers demand verifiable claims, ethical data use, and honesty in marketing.
- Wellbeing & Healthy Ageing – Longevity, holistic health, and functional foods drive new consumer priorities.
- Tech-Driven Lifestyles – Digital tools, AI, and automation are shaping shopping, eating, and engagement with food.
- Food for Pleasure – Creativity, flavour experimentation, and immersive experiences fuel the “foodie” economy.
- Social Values – Inclusion, diversity, and activism shape brand perception and consumer choices.
- Affordability Reset – Consumers balance cost pressures with a need for quality, trading down but still seeking small indulgences.

Microtrends (specific behavioural shifts and demands)

- From Trash to Treasure – Upcycling, reducing food waste, and dissolvable or smart packaging innovations are gaining traction.
- Action Through Alternatives – Plant-based, lab-grown, and novel foods are explored as healthier, ethical, or sustainable options.
- Pondering Protein – Consumers diversify protein sources, weighing animal, plant, fungi, and algae proteins.
- Farm to Fact – Demand grows for traceability, “true pricing,” and radical transparency in food supply chains.
- Putting the ‘Me’ in Meals – Personalised nutrition using wearables, apps, and genetic insights is expanding.
- Transforming the Eating Experience – AI-powered kitchens, recipe apps, and immersive dining enhance convenience and creativity.
- Every Meal Counts – Economic stress drives value-seeking, private-label growth, and mindful food spending.
- Food on the Mind – Diet is increasingly linked to mental health, gut-brain axis, and emotional wellbeing.

Wild Cards (low probability, high impact possibilities)

- Shelf-life technologies – Could breakthroughs that extend shelf life without compromising “naturalness” redefine consumer trust in processed food?
- Upcycled food acceptance – Will consumers embrace foods made from waste streams, or will scepticism and neophobia block large-scale adoption?

- Generative AI in food – Might misuse of AI (fake claims, over-personalisation, data abuse) trigger consumer backlash and collapse trust
- AI tools for protein modelling and design could create novel, functional proteins (e.g., egg white replacements)
- Meat Becomes a Luxury – Conventional animal meat could become rare and extremely expensive, reserved for elites or special occasions.
- Total Cultural Rejection of Meat – A future in which society broadly considers eating meat as immoral or socially unacceptable.
- Breakthrough in Alternative Proteins – A radical innovation (e.g., precision fermentation, algae, fungi) could outcompete both meat and cultivated options.
- Regulatory Backlash – Governments could suddenly ban or heavily tax meat production due to environmental or ethical crises.
- Global Meat Crisis – A zoonotic pandemic or supply chain collapse could force an abrupt shift away from conventional meat.

Weak Signals (emerging, early indicators of change)

- Celebrity Endorsements Matter – Famous figures supporting cultivated meat increase its credibility among hesitant consumers.
- Air-based protein production: Innovations like Solar Foods' Solein, a protein made via fermentation from air and electricity
- Sea-squirt (tunicate) meat: Scandinavian startup Pronofa is pioneering meat alternatives from sea squirts (tunicata), an invasive marine species
- 3D-printed alternative seafood and meat: 3D-printed salmon fillets (e.g., by Revo Foods)
- Fungal protein mainstreaming: Mycoproteins are gaining recognition in dietary guidelines (e.g., Nordic Nutrition Recommendations)
- Micro-Activism in Food Choices – Small lifestyle decisions (meatless days, flexitarian diets) hint at the gradual mainstreaming of alternatives.

Annex IV: Scenario Workshop Ideation

These tables include only participant contributions in the Blackboard. The rich workshop discussions are reflected in the scenario narratives.

Scenario 1: Natural and Local – Low in Processing, Low in Alternatives

Resources and Production	Retail and consumption	Lifestyles and society	Policy and Governance
Capital intensity: Scaling advanced agri-food technologies (cellular agriculture, 3D printing, high-pressure processing) requires significant upfront investment	Divergent global regulatory regimes create uncertainty for cross-border commercialization of novel foods.	Huge expansion in industrialised animal agriculture to match demand for 'real' meat, with devastating environmental impacts	Liability and labeling disputes around genetically edited and cell-cultured products remain unresolved in many jurisdictions.
Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.	Growing skepticism toward highly processed foods and demand for “natural” and locally sourced products.	Notion of 'culturally appropriate food' taken up within increasing nationalisms/far-right perspectives.	Divergent global regulatory regimes create uncertainty for cross-border commercialization of novel foods.
Strengthening laws on environmental impact disclosures and carbon footprint reporting in the agri-food sector.	Push for regenerative agriculture, circular food systems, and upcycling of food waste into value-added products.	Growth of conspiracy theories around alternative proteins, particularly ones with low existing cultural associations. Advertisers work to avoid 'catchy' names	Risks include cybersecurity vulnerabilities in connected agriculture systems and intellectual property concentration in a few tech providers.
Increasing importance of agri-food technologies	Consumption shifts towards local food markets	European-wide Political overturn to the extreme radical left or right	Policy motivation: Protect farmer income and rural areas
	Trust and Transparency – Consumers demand verifiable claims, ethical data use, and honesty in marketing.	Growth in small-scale backyard livestock keeping in cities, clashes with animal welfare and biosecurity concerns. High resistance to attempted culls and control following avian flu outbreaks	Intellectual property debates around biotechnology innovations and proprietary strains or processes.

Push for regenerative agriculture, circular food systems, and upcycling of food waste into value-added products.		radical right: opposition to everything is perceived against the tradition , or "novel" or "alternative"; protection of animal products	Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products
Climate change intensifies the need for resilient, resource-efficient production systems like vertical farming, drought-resistant gene-edited crops, and low-carbon processing methods	Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products	Adjusted notions of how much meat consumption is needed in the diet, back to meat is a weekly treat, and association of meat to festivities.	Social Values – Inclusion, diversity, and activism shape brand perception and consumer choices.
Intellectual property debates around biotechnology innovations and proprietary strains or processes.	Meat Becomes a Luxury – Conventional animal meat could become rare and extremely expensive, reserved for elites or special occasions.		Total Cultural Rejection of Meat – A future in which society broadly considers eating meat as immoral or socially unacceptable.
Efficient production pushed by innovation	3D-printed alternative seafood and meat: 3D-printed salmon fillets (e.g., by Revo Foods)	Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.	Upcycled food acceptance – Will consumers embrace foods made from waste streams, or will scepticism and neophobia block large-scale adoption?
		Cultural identity in food: resistance can emerge when innovations are seen as undermining traditional food heritage.	
Traditional farming becomes much more efficient thanks to technology:	Risks include cybersecurity vulnerabilities in connected agriculture systems and intellectual property concentration in a few tech providers.	Putting the 'Me' in Meals – Personalised nutrition using wearables, apps, and genetic insights is expanding.	Consolidation trends: Major food multinationals are acquiring startups to accelerate market entry for novel food tech, potentially concentrating innovation in fewer hands
It is not anymore needed to change our diet to achieve environmental sustainability		Capital intensity: Scaling advanced agri-food technologies (cellular agriculture, 3D printing, high-pressure processing) requires significant upfront investment	Acceleration potential: Precision agriculture (AI + IoT sensors), high-pressure processing, vertical farming, CRISPR-based gene editing, and food waste valorization technologies
Technology will allow to go back to tradition (as tradition we understand the food consumption system that existed after WW2)	Every Meal Counts – Economic stress drives value-seeking, private-label growth, and mindful food spending.	Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence	Innovation is in multinational's hands instead of governments

		demand for functional and reformulated products	
		Digital tools for personalized nutrition, leveraging data from wearables, genetic testing, and microbiome analysis.	
	Food for Pleasure – Creativity, flavour experimentation, and immersive experiences fuel the “foodie” economy.		European-wide Political overturn to the extreme radical left or right
		Growing skepticism toward highly processed foods and demand for “natural” and locally sourced products.	geopolitical issues affect the food supply chain
	Regulatory Backlash – Governments could suddenly ban or heavily tax meat production due to environmental or ethical crises.	Social media accelerates both hype and backlash—creating unpredictable swings in acceptance that can impact investment viability.	Geopolitical food shocks: Supply chain breakdowns
		Cultural identity in food: resistance can emerge when innovations are seen as undermining traditional food heritage.	
		Increasing pressures from society to change the food production system	
		Regulatory Backlash – Governments could suddenly ban or heavily tax meat production due to environmental or ethical crises.	
		Food on the Mind – Diet is increasingly linked to mental health, gut-brain axis, and emotional wellbeing.	
		Very high success of plant based diet (with very positive impact on environment): no more societal need for alt protein	
		Social Values – Inclusion, diversity, and activism shape brand perception and consumer choices.	

		Trust & perception as the adoption bottleneck: Consumer acceptance varies by region and demography	
		Return to household traditions and cooking culture in Europe	

Scenario 2. Whole-Food Mosaic – Low in Processing, High in Alternatives

Resources and Production	Retail and consumption	Lifestyles and society	Policy and Governance
Global Meat Crisis – A zoonotic pandemic or supply chain collapse could force an abrupt shift away from conventional meat.	Support for Minimally transformed plant based proteins: tofu/ lentils pasta/	Digital tools for personalized nutrition, leveraging data from wearables, genetic testing, and microbiome analysis.	Growth of the alternative protein and functional foods markets, attracting significant venture capital and corporate investment
Micro-Activism in Food Choices – Small lifestyle decisions (meatless days, flexitarian diets) hint at gradual mainstreaming of alternatives.		Interest in foraging for wild plants grows.	Consolidation trends: Major food multinationals are acquiring startups to accelerate market entry for novel food tech, potentially concentrating innovation in fewer hands
Pondering Protein – Consumers diversify protein sources, weighing animal, plant, fungi, and algae proteins.		Awareness/attention to human 'biome' and notion of 'rewilding the gut' becomes more mainstream	Capital intensity: Scaling advanced agri-food technologies (cellular agriculture, 3D printing, high-pressure processing) requires significant upfront investment
Scaling up whole food protein alternatives		Cross-cultural sharing around food sources and techniques contributes to more positive stance towards asylum seekers/refugees, who are seen to bring alternative food wisdom	polarization in society: protests from NGOs and farmers who do not have accessibility to technology; other farmers are producing low tech food (plant proteins or traditionally fermented food/mushrooms) and are profiting
		Expanding interest in traditional/cross-cultural preservation techniques like pickling/fermenting/drying.	creation of monopoly or strong concentration of economic power- against social sustainability (just distribution of production means)

		Community classes teaching techniques	
Algae and insects as new protein sources: on and off land production		Growing skepticism toward highly processed foods and demand for “natural” and locally sourced products.	Development of novel food production methods, including cellular agriculture, vertical farming, and 3D food printing.
Pulses/soy production increased			problems for those feedstocks that are produced outside Europe
Increase in the production of alternative proteins		Digital tools for personalized nutrition, leveraging data from wearables, genetic testing, and microbiome analysis.	Geopolitical food shocks: Supply chain breakdowns
		Development of novel food production methods, including cellular agriculture, vertical farming, and 3D food printing.	Policy as an adoption accelerator or brake shaping the pace of technological adoption
		Technology will allow a more personalized diet	
		Growth of the alternative protein and functional foods markets, attracting significant venture capital and corporate investment	
		Capital intensity: Scaling advanced agri-food technologies (cellular agriculture, 3D printing, high-pressure processing) requires significant upfront investment	
		Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products	

		Widened consideration of acceptable proteins leads to tensions around notions of keeping animals as pets/sport/leisure, as meat becomes expensive. Conflicts around eating pets	
		Increasing demand for healthier, personalized, and sustainable diets, particularly among younger generations.	
		Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products	
		Same drivers as for the "synthetic flavour" scenario, except for the health consideration.	

Scenario 3. High-Tech Savour – High in Processing, High in Alternatives

Resources and Production	Retail and consumption	Lifestyles and society	Policy and Governance
A unified EU strategy to scale alternative proteins	Telling consumers what to eat causes backlash	Protein consumption depends on the culture/region.	Policy could make meat consumption more expensive
Climate change intensifies the need for resilient, resource-efficient production systems like vertical farming, drought-resistant gene-edited crops, and low-carbon processing methods	Consumption of new food is personal	The tariffs of the EU could have an important effect on imported meat	It would lead to the higher consumption of plant-based food or alternative proteins
Diversification and increase the face of climate change pressure, policy push and reassurance on health/sustainability benefits of novel foods. Plant-based takes an important place	Food on the Mind – Diet is increasingly linked to mental health, gut-brain axis, and emotional wellbeing.	If there is a reduction on meat production, alternative protein could be the solution	Consolidation trends: Major food multinationals are acquiring startups to accelerate market entry for novel food tech, potentially concentrating innovation in fewer hands
Pondering Protein – Consumers diversify protein sources, weighing animal, plant, fungi, and algae proteins.			
Action Through Alternatives – Plant-based, lab-grown, and novel foods are explored as healthier, ethical, or sustainable options.	Increasing demand for healthier, personalized, and sustainable diets, particularly among younger generations.	Protein-enhanced seaweed is farmed in city waterscapes, with some spaces managed as urban commons, and some as private enterprises.	Every food should be safe and affordable
Do we have enough drivers to make that change?	Growing skepticism toward highly processed foods and demand for “natural” and locally sourced products.	Architecture/design attends to creating optimum internal protein absorption enhancing environments	Consumer spending pressure from inflation drives both budget-focused innovation (low-cost plant-based proteins) and premiumization in niche health/sustainability segments

Consumers change habits gradually as climate worsens	Demand shift due to true pricing	Agriculture could develop an added value to the economy of cities	
Farmers will be a part of the food consumption change	Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products	City planners enlarge perceptions of 'edible cities'. Existing foraging in cities expands to demand intentionally planted cityscapes. Some cities experiment with ways of integrating novel/processed forms of protein into urban commons such as 'alt-shrooms' spored around urban trees	
	Diverging trends between consumer-groups --> market diversification, eg. health/plant/nature based solutions vs. tech-trust/processing/flavouring lovers		
tech development, climate pressures - new means to produce	Every Meal Counts – Economic stress drives value-seeking, private-label growth, and mindful food spending.	Hyde new ingredients in existing food	
Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.		Unless technologies develop further, we cannot only rely on them to produce food	
Development of novel food production methods, including cellular agriculture, vertical farming, and 3D food printing.	Agri-food technology transforms consumption	Acceptance of gummies and powders diversifies into range of alternative ways of absorbing and adding protein to diet, from food sprays, to body patches, to food springles. Timed release devices work with wearable technology.	

Consumer spending pressure from inflation drives both budget-focused innovation (low-cost plant-based proteins) and premiumization in niche health/sustainability segments	Capital intensity: Scaling advanced agri-food technologies (cellular agriculture, 3D printing, high-pressure processing) requires significant upfront investment	Convergence of technologies—e.g., combining bioengineering with AI-driven flavor optimization—opens up hyper-personalized nutrition and functional food markets.	
AI tools for protein modelling and design could create novel, functional proteins (e.g., egg white replacements)	Transforming the Eating Experience – AI-powered kitchens, recipe apps, and immersive dining enhance convenience and creativity.		
need for policy action or is this market driven?	Convergence of technologies—e.g., combining bioengineering with AI-driven flavor optimization—opens up hyper-personalized nutrition and functional food markets.	There is a breakdown in understanding between food as a holistic, cultural concept, and isolated nutritional elements like protein. This leads to a divergence between generations and subcultures, with younger generations consumer food as elements, and fears over loss of family and community values embedded in the act of shared eating	
Climate change intensifies the need for resilient, resource-efficient production systems like vertical farming, drought-resistant gene-edited crops, and low-carbon processing methods		Increasing demand for healthier, personalized, and sustainable diets, particularly among younger generations.	
Consolidation trends: Major food multinationals are acquiring startups to accelerate market entry for novel food tech, potentially concentrating innovation in fewer hands	need for policy action or is this market driven?	Food production needs to be increasingly local but also mobile due to the impact of disruptive climate change. Forms of food lab kits are popular, allowing individuals/families to rehydrate/activate nutritional building blocks. For economically deprived	

		communities, historic forms of 'poverty food' are readopted, such as 'soup leathers'.	
Acceleration potential: Precision agriculture (AI + IoT sensors), high-pressure processing, vertical farming, CRISPR-based gene editing, and food waste valorization technologies	Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.		
Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.	Demand shift due to true pricing	Consumer priorities such as price and health drive the food market	
AI drives the globalization of alternative proteins	Main driver would be food cost for consumer: functional food and alt protein would become the cheapest option	Consumer spending pressure from inflation drives both budget-focused innovation (low-cost plant-based proteins) and premiumization in niche health/sustainability segments	
Quantum Computing	Intellectual property debates around biotechnology innovations and proprietary strains or processes.	Wellbeing & Healthy Ageing – Longevity, holistic health, and functional foods drive new consumer priorities.	
	Policy as an adoption accelerator or brake shaping the pace of technological adoption		
Meat Becomes a Luxury – Conventional animal meat could become rare and	Breakthrough in Alternative Proteins – A radical innovation (e.g., precision fermentation, algae, fungi) could		

extremely expensive, reserved for elites or special occasions.	outcompete both meat and cultivated options.		
Action Through Alternatives – Plant-based, lab-grown, and novel foods are explored as healthier, ethical, or sustainable options.	In particular harmonisation of intellectual property rules to limit the ownership by major food companies		
Global Meat Crisis – A zoonotic pandemic or supply chain collapse could force an abrupt shift away from conventional meat.	Growth of the alternative protein and functional foods markets, attracting significant venture capital and corporate investment		
Processed alternatives to meat and fish products to mainstream			
Geopolitical food shocks: Supply chain breakdowns			
AI tools for protein modelling and design could create novel, functional proteins (e.g., egg white replacements)			
Global Meat Crisis – A zoonotic pandemic or supply chain collapse could force an abrupt shift away from conventional meat.			
Regulatory Backlash – Governments could suddenly ban or heavily tax meat production due to environmental or ethical crises.			

Environmental credentials of new technologies are under scrutiny—life-cycle analyses for lab-grown meat or precision fermentation must prove net benefits to gain stakeholder trust.			
Action Through Alternatives – Plant-based, lab-grown, and novel foods are explored as healthier, ethical, or sustainable options.			
More processed, more healthy and more sustainable food			

Scenario 4. Convenient and Affordable – High in Processing, Low in Alternatives

Resources and Production	Retail and consumption	Lifestyles and society	Policy and Governance
Change relies on policy-makers and enterprises. Society does not want to change.	Farm to Fact – Demand grows for traceability, “true pricing,” and radical transparency in food supply chains.	Wellbeing & Healthy Ageing – Longevity, holistic health, and functional foods drive new consumer priorities.	Strengthening laws on environmental impact disclosures and carbon footprint reporting in the agri-food sector.
Cultural identity in food: resistance can emerge when innovations are seen as undermining traditional food heritage.	Trust and Transparency – Consumers demand verifiable claims, ethical data use, and honesty in marketing.	Digital tools for personalized nutrition, leveraging data from wearables, genetic testing, and microbiome analysis.	Regulation on environmental and IP innovation
Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence	Transparency, storytelling, and third-party certifications (e.g., “lab-grown,” “upcycled,” “regeneratively farmed”) play a central role in building trust.	Mindful food spending	Intellectual property debates around biotechnology innovations and proprietary strains or processes.

demand for functional and reformulated products			
Introduce new proteins in the food without making the consumers aware		Every Meal Counts – Economic stress drives value-seeking, private-label growth, and mindful food spending.	
Social Values – Inclusion, diversity, and activism shape brand perception and consumer choices.	(example)		
Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.	Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products		
	Wellbeing & Healthy Ageing – Longevity, holistic health, and functional foods drive new consumer priorities.		
new proteins create allergies -wheat, soy... causing allergies	Development of novel food production methods, including cellular agriculture, vertical farming, and 3D food printing.		
Food for Pleasure – Creativity, flavour experimentation, and immersive experiences fuel the “foodie” economy.	High-tech revolution of food production and consumption		
Transforming the Eating Experience – AI-powered kitchens, recipe apps, and immersive dining enhance convenience and creativity.			

Tech-Driven Lifestyles – Digital tools, AI, and automation are shaping shopping, eating, and engagement with food.	Public health nutrition strategies (e.g., sugar taxes, front-of-pack labeling, reformulation mandates) influence demand for functional and reformulated products		
Self-centred consumption - My experiences, my health, my wallet	Cultural identity in food: resistance can emerge when innovations are seen as undermining traditional food heritage.		
-the food measured, control of new allergies	In the current context of cost parity between processed/ functional food (PFF) and traditional food: other drivers for PFF: environment, health, easy to use...		
Climate change intensifies the need for resilient, resource-efficient production systems like vertical farming, drought-resistant gene-edited crops, and low-carbon processing methods	Trust & perception as the adoption bottleneck: Consumer acceptance varies by region and demography		
	Increasing demand for healthier, personalized, and sustainable diets, particularly among younger generations.		
Advances in precision agriculture, automation, and AI-driven decision-making to optimize yields and reduce resource use.	Assuming a more plant based diet		
	Price as the second driver. First drivers: culture, environment, health, etc.		
Push for regenerative agriculture, circular food systems, and upcycling of	Strengthening laws on environmental impact disclosures and carbon footprint reporting in the agri-food sector.		

food waste into value-added products.			
	Heightened consumer awareness of the environmental and ethical impacts of food production, influencing purchasing behavior.		
Shelf-life technologies – Could breakthroughs that extend shelf life without compromising “naturalness” redefine consumer trust in processed food?	Environmental credentials of new technologies are under scrutiny—life-cycle analyses for lab-grown meat or precision fermentation must prove net benefits to gain stakeholder trust.		
	Functional processed food become part of the daily-life diet		

Annex V: Emerging Issues and Stakeholder Implications

In the implications workshop, the participants reflected the implications of the scenarios for different types of stakeholders. After the workshop further deskwork elaborated further the findings that are here summarised for each scenario.

Scenario 1 – Natural & Local: Emerging Issues and Stakeholder Implications (2025 → 2035)

Emerging issue (opportunity or threat)	Policy & governance	Retail & consumption	Production (agri + industry)	Research & innovation	Cross-cutting / ecosystem actions
THREAT 1 – Food affordability & “two-tier” diet Shorter local supply chains and higher welfare standards increase prices, risking social division and hoarding.	• Embed affordability clauses in regional procurement (price-capped staple baskets). • Public grants for local processing facilities. • Apply targeted VAT relief on minimally processed staples. • Link access to subsidies to impact disclosure.	• Create value-tier local product lines. • Launch fixed-price seasonal baskets and impact receipts showing health / footprint savings.	• Adopt precision-as-a-service models via co-ops. • Valorise side-streams (whey → ingredients, peelings → biogas).	• Quantify cost curves for small-scale processing. • Behavioural trials on planned simplicity meal kits.	• Pilot true-pricing schemes where savings from waste & health benefits fund consumer rebates.
THREAT 2 – Local capacity limits & seasonality risks Full local sourcing may not sustain EU populations year-round.	• Run regional food security stress-tests. • Keep intra-EU trade corridors open. • Develop buffer stocks (pulses / grains).	• Promote seasonality literacy and recipe rotations for local crops. • Use pre-harvest contracts to stabilise supply.	• Integrate pulse rotations & drought-tolerant varieties. • Invest in greenhouses & soil carbon management.	• R&D on storage & preservation for minimally processed foods. • Model nutrient-dense crops for local diets.	• Build shared data platforms tracking regional supply gaps → rapid re-balancing of flows.

THREAT 3 – Political backlash & culture-war risks Organic vs. biotech debate and “food nationalism” polarise policy.	• Mandate plain-language labelling and transparent standards. • Use multilevel geovernance, incl. citizen dialogues, to design mirror clauses to address challenges like compliance with WTO rules, acceptability and feasibility in third countries	• Provide clear provenance storytelling and third-party certifications.	• Keep organic-first framing while using precision tech as back-office enabler.	• Fund social-licence research and trust-tech (auditable QR chains).	• Organise citizen juries on welfare/origin claims to pre-empt polarisation.
OPPORTUNITY 1 – Retail as “civic food hub” & demand shaper Regional-first stores, refill/return, and “impact QR” make local food convenient and transparent.	• Co-fund food hubs and refill infrastructure. • Standardise impact QR schemas.	• Roll-out harvest bundles + recipe cards and click-&-collect from nearby farms. • Develop private-label local ranges.	• Form multi-year contracts with retailers. • Share co-op logistics for short chains.	• Run UX trials on impact labels & waste-cutting packaging.	• Adopt open-audit frameworks to verify sustainability claims.
OPPORTUNITY 2 – Productivity without “tech on the plate” AI, robotics & data tools improve yields and resilience in organic/mixed systems.	• Launch impact-linked finance for precision-service adoption.	• Sign volume commitments for low-impact staples.	• Adopt AI scouting & autonomous weeding through co-ops. • Monetise soil carbon and biodiversity.	• Develop interoperable farm-data standards and low-cost robotics.	• Tie insurance premiums to disclosed resilience metrics (water use, soil carbon).
OPPORTUNITY 3 – Circularity & side-stream valorisation Waste becomes feedstock for new local industries and carbon savings.	• Provide capex support & fast-track permits for valorisation units.	• Offer dynamic pricing / meal-kit redirects for near-date goods. • Expand refill & return systems.	• Create industrial symbiosis loops among local processors (heat, water, biogas).	• R&D on low-processing upcycling compatible with “natural” positioning.	• Publish open carbon-water-nature accounts to unlock green finance.

Scenario 2 – Whole-Food Mosaic: Emerging Issues and Stakeholder Implications (2025 → 2035)

Emerging issue (opportunity or threat)	Policy & governance	Retail & consumption	Production (agri + industry)	Research & innovation	Cross-cutting / ecosystem actions
THREAT 1 – Social & political resistance to novel proteins Polarised politics, lobbying by animal agriculture, and cultural unease with insects/cellular meat slow adoption and fragment trust.	• Adopt a clear, tiered Novel Foods fast-track with post-market surveillance. • EU-wide plain-language standards for process claims; harmonise QR schemas. • “Just transition” pacts with rural funds, reskilling & factory conversion grants.	• Normalise via ‘how it’s made & why it helps’ bays, tasting corners, and third-party seals. • Avoid hype: focus on familiar dishes using new proteins; clear allergen flags.	• Begin portfolio diversification plans; offer voluntary disclosure on safety and impact. • Engage co-ops for shared fermentation/mycelium capacity; pilot factory repurposing.	• Fund trust-tech (auditable QR, portable audits) and longitudinal acceptance studies. • Social science on framing to reduce disgust/novelty barriers.	• Convene citizen juries; commit to transparent open audits; align comms across agencies, retailers and producers.
THREAT 2 – Cost & food inflation risks during scale-up High capex and learning-curve costs for algae, mycelium and fermentation could lift prices before efficiencies arrive.	• Time-limited capex support, green loans first-of-a-kind plants. • Public procurement to anchor demand (Planetary Health plate specs).	• Value-tier alt-protein lines; fixed-price protein baskets. • Dynamic pricing + meal-kit redirects for near-date goods; reduce waste to hold prices.	• Co-locate plants with side-streams (whey, molasses, peels) and green heat/power. • Efficiency KPIs to unlock finance.	• Scale-up toolkits (process intensification, continuous fermentation, modular bioreactors). • LCA benchmarks per protein route.	• True-pricing pilots with rebates funded by waste/health system savings; open cost curves to derisk investment.
THREAT 3 – Safety, biosecurity & misinformation Cellular/insect lines face safety perception hurdles; biosecurity lapses (e.g., insects) and rumours online can trigger backlash.	• EU risk-proportionate biosafety codes for insects/fermenters; rapid recall playbooks. • Pan-EU allergy & adverse-event reporting linked to labels/QR.	• Prominent allergy flags; recall transparency; myth-busting FAQs at shelf and online.	• Tight standard operating procedures (SOP) and containment; third-party audits; robust segregation to avoid cross-contamination.	• Independent safety studies (microbiome, long-term), shared data rooms. • Better rapid tests for contaminants/allergens.	• Joint crisis comms protocols; simulation exercises across regulators, industry and retailers.

OPPORTUNITY 1 – Diversified whole-food proteins at low processing Pulses, fungi/mycelium, algae and selected insects in minimally processed formats become mainstream ‘flexitarian default’.	• Update dietary guidelines and procurement to include whole-food alts; GI/quality schemes for algae/myco/pulse origin. • Accelerate Novel Foods for low-processing routes.	• “Minimally transformed first” ranges; clear protein/AA profiles on front-of-pack; QR provenance. • Education campaigns on protein diversity & menu rotations.	• Expand pulse rotations; contract farming for myco/algae inputs; repurpose dairy/meat plants for fermentation and drying.	• Breeding for nutrient-dense, drought-tolerant pulses; strain selection for myco taste/texture. • Microbiome research linking whole-food alts to health outcomes.	• Regional food hubs matching side-streams to fermenters; fair access (FRAND) to platform capacity for SMEs.
OPPORTUNITY 2 – Digital productivity (IoT, AI, robotics) Precision agriculture and smart plants lift yields/consistency while keeping low processing visible to consumers.	• Impact-linked finance for precision-as-a-service. • Data portability & interoperability rules to avoid vendor lock-in.	• QR “impact receipts” per portion (salt↓, fibre↑, CO₂e); planned-simplicity meal bundles using alt proteins.	• Autonomy for weeding/harvest; predictive maintenance; closed-loop water/heat.	• Open standards for farm-to-plant data; low-cost robotics for SMEs; soil-carbon & water suitable for smallholders.	• Insurance pricing tied to disclosed resilience metrics; open audit trails to earn trust.
OPPORTUNITY 3 – Upcycling & marine/microbial routes Upcycling gains legitimacy; algae and microbial proteins unlock resilient, regional supply with low land use.	• Subsidies/tax credits for algae farming & upcycling units; simplified permitting near ports. • Mirror clauses to keep imports fair on environment/safety.	• Create “upcycled & ocean-smart” aisles; freezer-ready formats; clear origin and method labels.	• Side-stream contracts (brewery, dairy) to feed fermenters; seaweed farms integrated with aquaculture/renewables.	• R&D on clean-label upcycling, marine species safety, and process intensification for microbial protein.	• Industrial symbiosis in coastal zones; nature-positive KPIs (e.g., biodiversity, eutrophication) reported openly.

Scenario 3 – High-Tech Savour: Emerging Issues and Stakeholder Implications (2025 → 2035)

Emerging issue (opportunity or threat)	Policy & governance	Retail & consumption	Production (agri + industry)	Research & innovation	Cross-cutting / ecosystem actions
THREAT 1 – Power shift away from farmers & rural decline Processing/IT capture more value; plants concentrate near cities; risk of farmer disengagement and CAP stress.	• Build a *Just Transition for Agrifood* (CAP) with reskilling, factory-conversion grants and rural innovation hubs. • Competition policy to prevent excessive platform concentration; FRAND access to processing capacity. • Public procurement quotas for rural-made protein ingredients.	• Curate *dual offer*: tech-forward ranges + regional heritage lines; maintain space for short chains and D2C in marketplaces. • Loyalty rewards for rural-origin ingredients.	• Contracts that share upside with growers (indexed pricing, data-sharing). • Site *modular plants* in secondary cities; industrial symbiosis with local utilities.	• Socio-economic impact studies on rural jobs; models for co-op ownership of fermenters/myco plants.	• Rural sandboxes/testbeds; innovation zones linking farmers, SMEs and platform players; mentorship for factory repurposing.

THREAT 2 – Safety, traceability & trust with multi-ingredient, recycled inputs Complex recipes and upcycled streams increase perceived risk; misinformation spreads fast.	• Tiered Novel Foods fast-track with post-market surveillance; mandatory QR traceability to batch/lot; common allergen flags. • Update food safety code for upcycling & recycled inputs; require open audit trails.	• Prominent plain-language labels (health impact, CO₂e/portion, processing level); myth-busting at shelf and online; recall transparency.	• containment & segregation SOPs; rapid testing; third-party audits.	• Long-term health studies (including microbiome); rapid tests for contaminants/allergens; per-portion LCA/health metrics standards.	• Joint crisis-comms playbooks; trust alliances (regulators–retail–industry–NGOs); monitor the conclusions of upcoming SAM study on UPF and align terminology.
THREAT 3 – Affordability & polarisation (two-tier diets) Tech foods may cost more at first; older cohorts prefer ‘natural’; risk of exclusion and backlash.	• Targeted VAT relief for healthier staples; protein baskets with price caps; subsidy design tied to disclosed impacts. • Consumer protection on personalised offers (no health redlining).	• Value-tier tech-foods; tasting corners to bridge generations; education on processing-for-good.	• Scale with side-streams & green utilities to cut OPEX; standard KPIs (kWh, L water, kg CO₂e per kg protein).	• Behavioural research on acceptance levers; design defaults that are tasty, cheap and healthier.	• Citizen juries on rules/claims; community pilots in low-income areas to avoid two-tier outcomes.
OPPORTUNITY 1 – Processing-for-good with faster approvals & guardrails Legible rules + open audits enable safe-by-design novel proteins and functional reformulation.	• Tiered approvals + post-market checks; align mirror clauses; recognize front-of-pack impact scores. • Sandboxes for healthy processing; outcome-based procurement (Planetary-Health plates).	• Aisles by “how it helps”; QR dashboards (salt↓, sugar↓, fibre↑, CO₂e/portion); clear protein content; GLP-1-compatible ranges (on lean proteins, whole grains, fruits, and vegetables).	• Explore repurpose some meat/dairy plants for fermentation; publish open efficiency dashboards; certify safe upcycling.	• TEA/LCA benchmarks per route; microbiome and personalisation trials; standards for per-portion metrics.	• Open audits & data portability to avoid lock-in; independent seals for processing-for-good.
OPPORTUNITY 2 – Digital & IT jobs, startup surge IoT/AI/robotics, MRV	• Impact-linked finance and data portability mandates; rural digital hubs; skills programmes	• Impact receipts and personalised nutrition apps endorsed by healthcare; social media	• Predictive maintenance, autonomous handling, closed-loop water/heat;	• Open standards (APIs) for farm→factory→retail; low-cost robotics for SMEs;	• University–startup–corporate accelerators; testbeds pairing food and

and personalisation create new firms and roles across the chain.	for bio-process engineers & data ops.	normalisation of alt proteins.	MRV pipelines from farm to plant.	secure identity & provenance layers.	IT; prizes for safety-by- design.
OPPORTUNITY 3 – Circular upcycling & marine/microbial routes at scale Safety-certified upcycling + algae/microbial proteins cut land use and add resilience.	• Tax credits and fast permits for upcycling & algae farms; coastal industrial symbiosis; fair mirror clauses for imports.	• Create “Upcycled & Smart” aisles; freezer-friendly, short-ingredient lists; bold origin/method labels.	• Contract side-streams (brewery, dairy) to feed fermenters; integrate seaweed farms with aquaculture/renewables.	• Clean-label upcycling methods; process intensification; safety protocols specific to upcycled inputs.	• Publish open carbon-water-nature accounts; finance tied to verified circularity outcomes.

Scenario 4 – Convenient & Affordable: Emerging Issues and Stakeholder Implications (2025 → 2035)

Emerging issue (opportunity or threat)	Policy & governance	Retail & consumption	Production (agri + industry)	Research & innovation	Cross-cutting / ecosystem actions
THREAT 1 – Affordability gap & unhealthy cheap default Reduced VAT alone won't stop cheap-but-unhealthy from dominating baskets.	• Pair reduced VAT on fruit/veg/legumes with levies on HFSS and reformulation targets. • Use public procurement to set 'Planetary Health' plate specs. • Mandate plain-language FOP labels + QR with per-portion nutrition & CO₂e.	• Value-tier 'better choice' lines at price parity. • Dynamic pricing + meal-kit redirects to cut waste and hold basket prices. • Prominent allergy flags and clarity on processing level.	• Cost-down reformulation (salt/sugar ↓, fibre ↑) without ultra-long ingredient lists. • Use side-streams and green PPAs to cut OPEX. • Tight allergen control & traceability SOPs.	• What makes processing unhealthy vs healthy? Define 'processing-for-good' design rules. • Rapid tests for contaminants/allergens; per-portion LCA metrics.	• True-pricing pilots where health & waste savings fund discounts. • Citizen juries to validate rules and claims.
THREAT 2 – Consolidation & power shift away from SMEs/farmers Efficiency-led, high-processing portfolios risk favouring large incumbents; rural decline.	• Competition policy on data/market power; FRAND access to platforms & processing. • CAP for rural innovation, co-op processing and factory conversions.	• Reserve shelf space for SME/coop lines; retailer ESG targets on health + supplier diversity. • Loyalty rewards for rural-origin ingredients.	• Co-op ownership of modular plants near secondary cities. • Indexed contracts sharing upside with growers.	• Models for co-op equity in fermentation/upcycling; open audit tech to cut compliance costs for SMEs.	• Regional innovation hubs/testbeds; shared services (QA, audits, logistics) for SMEs.
THREAT 3 – Resilience risk from low investment in alternatives If alt proteins stagnate, shocks (zoonoses, supply) hit harder; poultry rises while beef/pork decline.	• Maintain minimum public R&D on low-risk alts (pulses/myco/algae) as insurance. • Keep Novel Foods fast-track for lower-risk routes with post-market surveillance.	• Educate on protein diversity via familiar dishes; stock buffer for pulses. • Clear provenance & method labels to avoid backlash.	• Dual-track capacity (animal + ingredient fermentation) with biosecurity. • Upcycling inputs to stabilise costs.	• Scenario stress-tests on protein security; TEA/LCA for backup routes. • Microbiome & health outcomes for reformulated staples.	• EU friendly-trade corridors for staples; coordinated crisis comms on safety.
OPPORTUNITY 1 – Health-by-default reformulation & functional foods	• Tax/levy mix (HFSS, sugar) + VAT relief for healthy staples. • Procurement rewards	• FOP impact scores + QR dashboards (salt↓ sugar↓ fibre↑ CO₂e/portion).	• Reformulate core SKUs; certify safe upcycling; publish efficiency KPIs (kWh, L, CO₂e/kg).	• Public-private applied research on processing-for-good and clean-label stabilisers.	• Retailer ESG: hard health KPIs; independent seals for 'processing-for-good'.

Smallest shift in habits; push portfolio health via incentives + clear labelling.	'healthier at equal/lower price'.	• GLP-1-compatible ranges; education nudges in apps.		• Faster approvals with post-market monitoring.	
OPPORTUNITY 2 – Digital convenience & jobs/startups Stealth innovation (IoT, AI, robotics, MRV) lifts efficiency; creates IT & bioprocess jobs.	• Impact-linked finance; data portability/interoperability standards. • Skills programmes for bio-process & data ops.	• 'Planned convenience' bundles; personalisation without health redlining. • Social media normalisation of healthier convenience.	• Predictive maintenance; closed-loop water/heat; automated QA. • MRV (Monitoring, Reporting, and Verification) pipelines from plant to shelf.	• Open APIs and provenance layers; low-cost robotics for SMEs.	• Uni–startup–corporate accelerators; prizes for waste-cutting automation.
OPPORTUNITY 3 – Circular upcycling & integrated value networks Cut cost & waste while keeping processed staples affordable.	• Fast permits + credits for upcycling units; fair mirror clauses. • Standard claims for 'upcycled' on labels.	• Create 'Upcycled Value' aisles; freezer-friendly formats; transparent origin/method.	• Contract side-streams (brewery/dairy/produce) to feed fermenters; industrial symbiosis with utilities.	• Clean-label upcycling methods; safety protocols specific to recycled inputs.	• Publish open carbon-water-nature accounts; link finance to verified circularity outcomes.