

FEASTS: Multi-Stakeholder Map and Engagement Plan

Deliverable 4.2

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Executive Summary

Cultured Meat and Seafood (CM/CSF) offer a promising alternative to conventional animal proteins but face challenges in economics, regulation, technology development, and consumer acceptance. The FEASTS project supports the sector by generating neutral, multidisciplinary knowledge and engaging diverse stakeholders to foster ethical, sustainable, and widely accepted solutions.

This report underpins FEASTS' stakeholder engagement by offering a detailed, evidence-based analysis of the CM/CSF stakeholder landscape and setting out a coordinated, principled engagement plan. The aim is to enable inclusive, informed, and effective participation of diverse stakeholders throughout the project's lifetime and beyond.

The stakeholder analysis section provides a structured high-level overview of the key stakeholder groups, their motivations, challenges, and engagement needs. Illustrative persona profiles are included for selected groups, offering insights to inform targeted communication and engagement strategies. The analysis is derived from a multi-method approach including expert input, literature reviews, stakeholder mapping, and in-depth persona interviews, ensuring a robust and nuanced understanding of the sector's complex stakeholder ecosystem.

The report identifies and profiles core lifecycle stakeholders:

- Suppliers and producers are key to CM/CSF development, driven by sustainability, ethics, and market potential. They face high costs, scale-up barriers, and regulatory uncertainty. Targeted support on scalable technologies, regulatory clarity, market trends, and collaboration is essential to accelerate innovation and establish viable, sustainable production pathways.
- Distributors—while currently less engaged due to the early commercial stage of CM/CSF—will be essential to future market integration, managing logistics, retail placement, and food service channels. Their engagement will depend on product viability, consumer demand, and regulatory clarity.
- Consumers represent the largest and most diverse stakeholder group whose acceptance ultimately drives market success. Their attitudes are influenced by a mix of environmental, ethical, health, and sensory motivations but constrained by perceptions of unnaturalness, unfamiliarity, and price sensitivity. Building consumer trust requires transparent, accessible communication and tailored messaging that addresses concerns and highlights benefits.

- Waste managers need to clarify how to handle biological and chemical waste streams specific to CM/CSF production. Their engagement should be supported by coordinated management strategies, clear waste composition data, and circular economy approaches.
- Government and regulatory authorities play a pivotal role by defining safety standards, approval processes, and labelling requirements. While in the EU, the first products are still in the approval process, precedent exists in regions like Singapore. Engagement with authorities must emphasise clear safety evidence, compliance requirements, and societal and environmental benefits of CM/CSF.
- Investors and accelerators provide crucial capital and business expertise but contend with early-stage market risks and regulatory uncertainties. Their involvement depends on transparent market intelligence, risk assessments, and technology readiness data to inform sustainable investment.
- Research and development actors are vital for technical innovation, regulatory compliance, and scalability, needing harmonised safety data, cross-sector collaboration, and sustained funding.
- Media and the general public influence awareness and acceptance but currently face confusion from inconsistent terminology and mixed messaging. Effective engagement requires clear, trustworthy information emphasising environmental, health, and ethical benefits.
- Vocational education and training stakeholders are key to developing the skilled workforce needed for CM/CSF's interdisciplinary challenges, demanding stronger cooperation between educational institutions and industry.
- The conventional meat and seafood sector experiences uncertainties and concerns but holds opportunities to diversify, improve sustainability, and participate in an inclusive future food system through proactive engagement.

Building on this detailed landscape, the report presents the FEASTS Stakeholder Engagement Plan, a structured and principle-driven framework guiding meaningful engagement throughout the project. This plan mandates inclusive, cross-disciplinary participation aligned with stakeholder interests and the project's scope across EU and selected international contexts. The plan includes a practical, step-by-step engagement process supported by materials and strategies to address common challenges, enabling project partners to effectively plan, implement, monitor, and adapt engagement activities.

In conclusion, this report provides a comprehensive stakeholder analysis and engagement framework for the emerging CM/CSF sector, with next steps focusing on improving coordination, updating tools, deepening stakeholder insights, and fostering transparent collaboration to support sustainable development.

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List of Abbreviations

CM/CSF – Cultured Meat and Cultured Seafood

EU – European Union

FBS – Fetal Bovine Serum

FEASTS – Fostering European Cellular Agriculture for Sustainable Transition Solutions

GDPR – General Data Protection Regulation

IP – Intellectual Property

LCA – Life Cycle Assessment

LLDPE – Linear Low-Density Polyethylene

NGO – Non-Governmental Organisation

OECD – Organisation for Economic Co-operation and Development

R&D – Research and Development

TEA – Techno-Economic Analysis

1. Introduction

1.1 Cultured Meat and Seafood in the Global Food System

The global food system is facing increasing pressure from a growing population, climate change, and resource constraints. Conventional livestock and aquaculture industries contribute significantly to greenhouse gas emissions, land and water use, and biodiversity loss. In this context, Cultured Meat and Cultured Seafood (CM/CSF) have emerged as potential solutions by providing an alternative protein source produced through cellular agriculture. CM/CSF involve growing animal tissue from stem cells in bioreactors, eliminating the need for conventional animal farming. This technology promises to reduce the environmental footprint of food production, improve animal welfare, and enhance food security. However, its widespread adoption is contingent on overcoming scientific, economic, regulatory, and consumer acceptance barriers. CM/CSF technologies have advanced significantly over the past decade, with multiple startups and

research institutions refining production processes. The sector has transitioned from early-stage research to commercial pilot projects, with some companies now receiving regulatory approvals (Lanzoni et al. 2024). Singapore was the first country to approve the sale of CM in 2020. In the following years, companies in the United States (2023) and Israel (2024) also received regulatory approvals for specific

Cultured Meat and Seafood (CM/CSF) refers to a diverse range of new food products made possible by innovative production methods that use animal cells grown in cell culture conditions rather than whole animals. Some products may be like traditional foods e.g. chicken fillets, pork sausages [salmon, fish fillets], etc. while others may expand consumer choice to exotic species or entirely novel food experiences (FEASTS, 2024).

products, while Europe continues to face a complex regulatory landscape (Lanzoni et al. 2024). The potential benefits of CM/CSF include environmental and climate protection, as these technologies can reduce greenhouse gas emissions, land use, and water consumption. They also offer the promise of improved animal welfare by removing the need for industrial-scale livestock farming. Furthermore, CM/CSF can contribute to a more stable food system by providing an alternative protein source

that is resilient to climate change. Despite these advantages, several challenges remain. The projected high energy requirements of cultured meat production could undermine its environmental benefits, particularly if fossil-based energy sources are used for large-scale operations (Lynch & Pierrehumbert, 2019). In addition, high production costs and unresolved scalability issues—particularly related to energy use and infrastructure—continue to restrict the commercial viability of cultured meat (Lynch & Pierrehumbert, 2019). Regulatory frameworks differ significantly between regions, creating uncertainty for producers. Finally, consumer acceptance is still uncertain and shaped by cultural attitudes, ethical concerns, and perceptions of naturalness.

1.2 The FEASTS project and Stakeholder Engagement in FEASTS

The FEASTS project is a collaborative research initiative funded under the EU's Horizon Europe programme, running from December 2023 to November 2026. Comprising a consortium of 35 independent institutions from 16 countries, FEASTS aims to deliver a comprehensive, unbiased knowledge base on CM/CSF and their integration into the food system. Key research and innovation activities include investigating sustainable production technologies, assessing nutritional, health, and regulatory aspects, addressing food safety concerns, and exploring ethical considerations. Environmental, economic, and social life cycle analyses will feed into dynamic systems models to enhance understanding of cellular agriculture's multifaceted impact on the environment and the food value chain.

Stakeholder engagement is a cornerstone of FEASTS, recognising that the successful development and implementation of CM/CSF technologies require input from all

A **stakeholder** is any individual or group involved in, affected by, or influencing the cultured meat and cultured seafood (CM/CSF) lifecycle—whether directly, indirectly, or through a broader interest in its development.

actors in the food system. Engaging stakeholders ensures that diverse perspectives are considered, fostering solutions that are ethical, sustainable, and socially accepted.

FEASTS activities particularly involve consumers, farmers and aquafarmers,

value chain actors, policymakers, and related research projects as will be further discussed in section 3.2.1.

1.3 Relevance and Overview of this Report

A key component of the FEASTS project is stakeholder engagement. Establishing a sustainable CM/CSF industry requires the collaboration and mutual understanding of a broad and diverse range of stakeholders. Recognising these groups, their roles, and their interests is essential to identifying effective ways of engaging, informing, and involving them in the transition toward more sustainable protein systems. Including a diversity of stakeholders ensures that relevant perspectives, needs, and expertise are considered from the outset.

Early and continuous involvement of stakeholders not only strengthens their sense of ownership and commitment but also helps reduce resistance and foster long-term cooperation. Stakeholder collaboration enables knowledge-sharing, cross-sectoral learning, and the emergence of innovative approaches that can enhance the overall outcomes of FEASTS. In addition, understanding stakeholder positions helps anticipate potential conflicts or concerns and provides a basis for adapting CM/CSF products and strategies to better reflect stakeholder needs and expectations.

This report is designed to support stakeholder engagement throughout the FEASTS project. It is structured in two main parts, each with distinct yet interconnected objectives.

The first part presents an overview and analysis of the stakeholder landscape across the CM/CSF lifecycle worldwide, with a particular focus on Europe. It provides a high-level mapping of the stakeholder environment and outlines the distinct perspectives of different stakeholder groups that should be taken into account in research and innovation activities. The report identifies key stakeholder categories and assesses their current level of engagement with CM/CSF, motivations to engage further, barriers they may face, and the necessary steps to encourage more active involvement. This analysis is complemented by the development of persona profiles that represent stakeholders such as suppliers, producers, distributors, consumers, and (aqua)farmers. These profiles offer nuanced insights that can inform project activities, communication strategies, and targeted engagement approaches. The stakeholder mapping and analysis serve as an informational resource for all project partners and other CM/CSF actors. It enables them to better understand the perspectives and concerns of stakeholders, integrate relevant actors early on, and tailor communication strategies to foster trust and acceptance. Moreover, it forms

the foundation for developing a targeted, feasible, and effective stakeholder engagement plan.

The second part of the report sets out a stakeholder engagement plan aligned with the AA1000 Stakeholder Engagement Standard. This plan defines the mandate, purpose, and scope of stakeholder engagement within FEASTS. Building on the analysis in the first part, it identifies relevant stakeholders and recommends levels of engagement suited to their roles and interests. The engagement plan also provides an overview of ongoing and planned engagement activities in FEASTS and outlines how these can be extended or tailored to ensure inclusivity and coherence across the project. It offers practical guidance for consortium partners, helping to establish a shared standard for engagement and to leverage synergies across work packages. The stakeholder engagement plan functions as the overarching engagement strategy for FEASTS. It ensures that all relevant stakeholder groups are appropriately included, that engagement activities are coordinated across project partners to avoid redundancy and reduce stakeholder fatigue, and that resources such as stakeholder contacts and best practices are shared efficiently. It also guarantees that ethical and regulatory standards are upheld throughout stakeholder engagement processes.

2. Stakeholder Analysis and Persona Profiles

2.1 Purpose, Scope, and Target Group

Purpose

This section identifies, maps, and profiles stakeholders within the lifecycle of CM/CSF. It serves following distinct purposes:

- **Navigate Stakeholder Dynamics** – The section equips readers with insights into stakeholder motivations, barriers, and engagement needs to refine their project activities and outreach strategies.
- **Enhances Inclusivity** – It encourages a broad and balanced representation of stakeholders, helping to design project and engagement activities that acknowledge diverse needs and interests.
- **Facilitates More Effective Communication** – It provides insights that allow to frame messages and approaches in ways that resonate with different stakeholder groups.
- **Makes Stakeholder Perspectives More Tangible** – It uses persona profiles to illustrate stakeholder viewpoints in a vivid, accessible way, helping to better understand and relate to different perspectives.
- **Foundation for Targeted Engagement** – Ensures that the FEASTS stakeholder engagement plan is informed by a structured understanding of the relevant stakeholder groups and their perspectives.
- **Information Resource** – Offers a structured overview of stakeholder perspectives that can be useful beyond the project, supporting broader discussions on CM/CSF.

Scope

This section presents the stakeholder analysis and persona profiles conducted within the FEASTS project, with a defined scope limited by following factors:

- **Analysis on Group Level** – The stakeholder mapping is conducted on a systems-level and spans the full lifecycle of CM/CSF. Due to this large scope, it is structured around stakeholder categories and types rather than individual organisations.

- Focus on Stakeholder Perspectives – As CM/CSF products are not yet on the market in Europe, the analysis explores stakeholder views on an anticipated CM/CSF lifecycle rather than real-world experiences.
- Snapshot in Time – Given the evolving nature of CM/CSF research and development, the analysis reflects the current knowledge base and stakeholder perspectives (May – December 2024), which are anticipated to further develop over time.
- Uneven Coverage Across Countries and Stakeholder Groups – Not all countries and stakeholder groups are equally represented due to varying levels of research and engagement across regions.
- Focus on Key Stakeholder Groups for FEASTS – Persona profiles highlight selected stakeholder groups particularly relevant to FEASTS, including suppliers, producers, distributors, consumers, and farmers & aquafarmers.
- High-Level Overview – The section provides a comprehensive overview of all stakeholder groups. In-depth analysis of specific groups is covered in other FEASTS tasks (e.g., T4.4 on consumers, T4.5 on farmers and aquafarmers).

Target Group

This section of the report is intended for both the FEASTS project consortium and the broader CM/CSF research and innovation community. It provides a comprehensive overview of stakeholder needs, concerns, and interests, along with illustrative persona profiles. These insights are designed to support project activities within FEASTS and to inform the work of other actors across the CM/CSF field.

Beyond these groups, this section also offers valuable insights for the wider meat, seafood, and alternative protein sectors. As CM/CSF aims to become part of this evolving system, understanding stakeholder perspectives on this emerging component can help inform activities across the broader food landscape.

2.2 Methodology for identifying, mapping, and profiling Stakeholders

The stakeholder identification, mapping, and profiling process followed a structured approach involving systematic data collection and analysis. This section details the methodologies employed to ensure a comprehensive understanding of the stakeholder groups in the CM/CSF lifecycle.

Data was collected, analysed, and triangulated from four sources:

A. Stakeholder Mapping Survey and Database

The FEASTS consortium comprises partners from various stakeholder groups, including the scientific community, industry, civil society, and experts in technology and innovation. Many of these partners possess extensive experience, established networks within the CM/CSF sector, and a comprehensive understanding of relevant stakeholders. Consequently, the first phase of data collection centred on leveraging this collective expertise.

To facilitate this process, an Excel-based survey was developed in cooperation with key project partners. The survey was designed to gather essential information, including organisation names, organisation types, and their level of engagement with CM/CSF. At the project's outset, all consortium partners contributed relevant contacts and were encouraged to update the database regularly.

Based on the collected data, stakeholders were systematically categorised into groups and sub-groups aligned with the CM/CSF lifecycle. This classification was refined through iterative feedback loops within the FEASTS consortium. Organisations were assigned to relevant groups, with those belonging in multiple categories being included in each applicable group.

- Stakeholder groups within the lifecycle of CM/CSF
 1. Suppliers
 2. Producers
 3. Distributors
 4. Consumers
 5. Waste managers

- Stakeholder groups affecting or affected by the lifecycle of CM/CSF
 6. Government and Regulatory Authorities
 7. Investors and Accelerators
 8. Research and Development (R&D)
 9. Conventional meat and seafood system
 10. Media and General Public
 11. Education and capacity building

Within each group and sub-group, the geographic distribution, data volume, and accuracy were analysed. Additional research was conducted to address data gaps and correct any inaccuracies.

The survey informed the overall stakeholder map developed within FEASTS (see Figure 1 and Table 2). It initially provided insights into the perspectives found within these groups, and it was ultimately transformed into an anonymous stakeholder database that will be continuously updated. The database serves to support stakeholder engagement activities within FEASTS (see [section 3.3.2](#)).

B. Literature Review

A literature review was conducted to extract relevant insights from peer-reviewed scientific publications and high-quality reports from research and innovation initiatives. A total of approx. 150 publications were analysed. This review served to provide a comprehensive understanding of stakeholder perspectives within each stakeholder group.

Given that the literature on CM/CSF is still emerging, the analysis was conducted at the group level (supplier, producer, distributor etc.). However, where available, information offering insights into specific stakeholder sub-groups (e.g., specific information on cell line suppliers, technology suppliers, or raw material suppliers) or particular countries/regions was highlighted in the analysis and results.

To develop a literature database, publication databases such as EBSCOhost and Google Scholar and AI- powered literature search tools such as Semantic Scholar and Research Rabbit were utilised. The database was shared within the FEASTS consortium, allowing partners to contribute additional literature to further enrich the collection.

The collected publications were analysed thematically, guided by four research questions formulated for each stakeholder group separately:

1. What is the status quo of engagement with CM/CSF of the stakeholder group?
2. Which factors motivate or drive the stakeholder group to engage with CM/CSF?
3. Which factors pose barriers preventing the stakeholder group to (further) engage with CM/CSF?
4. What kind of information or resources does the stakeholder group need to enhance their engagement with CM/CSF?

Additionally, it was also considered whether there are any notable differences based on world region (EU vs. World), the development trends over time, country-specific variations, or other relevant factors. The analysis was supported by Artificial Intelligence (AI) tools, including Open WebUI and ChatGPT. To maintain data security and confidentiality, closed-access articles were analysed exclusively using tools that operate locally and do not share information online. Additionally, all AI-generated results were rigorously verified against the original sources to ensure accuracy and reliability.

The findings from the literature review contributed to the results presented in this report and informed the development of the persona profiles.

C. Meetings with Experts within the FEASTS Consortium

As CM/CSF remains an emerging research field, the literature review did not yield sufficient data for all stakeholder groups, and the depth of available information varied across groups.

To address these gaps, following activities were conducted:

- Focus on information needed in FEASTS consortium: Meetings were held with all partners identified as users of the analysis results to better understand their specific interests and information needs. Special attention was given in the data collection and analysis to stakeholder groups of particular interest, including suppliers, producers, distributors, consumers, farmers, and aquafarmers.
- Building on research efforts within FEASTS consortium: Select stakeholder groups were examined in greater detail by project partners during the analysis period. Ongoing exchanges with these partners helped refine the

understanding of these groups, validate collected data, and identify potential gaps, ultimately strengthening the overall findings.

- Focus group on the topic of waste management in December 2024: Limited information was available on the “waste managers” stakeholder group. To fill this gap, a focus group was organized within the FEASTS consortium made up of partners who had previously worked on this topic. The session included eight participants and was facilitated using a MIRO board, which structured and documented the discussions and outcomes.

D. Persona Interviews

Based on discussions with consortium partners, specific stakeholder groups were identified as being of particular relevance to the FEASTS activities and the development of the CM/CSF sector. These groups were selected for a more in-depth analysis and the development of persona profiles. They include suppliers, producers, distributors, consumers, aquafarmers and farmers.

To develop the personas, a structured and iterative methodology was followed. The process began with defining key criteria that the persona profiles should address, including the questions outlined in part B above, i.e. the status quo of their engagement with CM/CSF, motivations and barriers to engage with CM/CSF, as well as further information and resources needed to enhance their engagement. Interviewees were identified using a combination of the stakeholder database developed within the consortium as well as snowball sampling to ensure diverse and relevant representation across the sector. For consumer personas, a survey based on the segmentation analysis undertaken by Aarhus University in Deliverable 4.1 (Chrysochou et al., 2025) was used to identify interviewees. This survey was distributed through contacts in the target countries for the consumer personas, i.e. Denmark, France, and Germany, accompanied by a request for further distribution among their contacts.

Between November 2024 and February 2025, we conducted in-depth interviews with a total of 13 interviewees representing different stakeholder groups, listed in an anonymised fashion in Table 1 below. The interviews were held online on Microsoft Teams, with each interview lasting around 60 minutes. The transcripts were first anonymised and any identifying factors were removed, after which they were systematically analysed to identify recurring themes, following the questions outlined above. A fixed number of personas was then defined, each representing a distinct

perspective within the cultured meat and seafood sector. Persona profiles were then iteratively refined, drawing directly from interview data as well as the literature review to ensure both authenticity and depth. The resulting personas are grounded in empirical data, context-sensitive, and designed to support strategic planning, stakeholder engagement, and communication within the FEASTS project.

	Group	Sub-group	Organisation type	Country	Identifier
1	Suppliers	Cultured ingredient supplier	B2B company	United Kingdom	Interviewee 1
1	Suppliers	Cultured ingredient supplier	Start-up	Germany	Interviewee 2
3	Producers	Producer full product	Small company	Netherlands	Interviewee 3
4	Producers	Food processor	Mid-sized company	Germany	Interviewee 4
5	Distributors	Food distributor	Mid-sized company	Singapore	Interviewee 5
6	Distributors	Restaurant chef	Small company	France	Interviewee 6
7	Consumers	N/A	N/A	Germany	Interviewee 7
8	Consumers	N/A	N/A	Germany	Interviewee 8
9	Consumers	N/A	N/A	France	Interviewee 9
10	Consumers	N/A	N/A	France	Interviewee 10
11	Consumers	N/A	N/A	Denmark	Interviewee 11
12	Conventional meat and seafood system	Farmers	NGO	Netherlands	Interviewee 12
13	Conventional meat and seafood system	Aquafarmers	Research institution	Portugal	Interviewee 13

Table 1: Overview of Interviewees

2.3 CM/CSF Stakeholders and Persona Profiles

The FEASTS stakeholder map (see figure 1) outlines the actors involved across the lifecycle of CM/CSF, which includes key stages such as input supply, production, distribution, consumption, and waste management. Suppliers provide essential materials like cell lines, growth media, and bioreactor components. Producers—comprising start-ups, incumbents, and research institutions—develop CM/CSF products. Distributors ensure the movement of goods from producers to consumers, while consumers influence market uptake. Waste managers oversee the handling, recycling, or disposal of sector-specific waste, including biowaste, single-use plastics, and packaging.

Beyond these core lifecycle actors, broader stakeholder engagement is critical. Stakeholders in the outer circle of the map influence multiple phases of the CM/CSF chain, shape the sector's overall enabling conditions, or are significantly impacted by the development of a CM/CSF lifecycle. Regulatory authorities govern safety, labelling, and authorisation processes. Investors and accelerators enable early-stage development and scaling. Research & Development (R&D) institutions drive innovation and improve process efficiency and product quality. The conventional meat and seafood industry may engage competitively or cooperatively. Vocational training and education bodies contribute to skills development. Media and the general public shape discourse, framing consumer perceptions and influencing social acceptance.

To reflect these differences, the FEASTS project categorises stakeholders into two groups:

- Core lifecycle stakeholders, directly involved in producing, distributing, consuming, and disposing of CM/CSF.
- Ancillary stakeholders, who shape the regulatory, economic, social, and technological environment of the sector.

Each stakeholder group was defined in the analysis and in collaboration with FEASTS partners further specified into sub-groups (see Table 2).

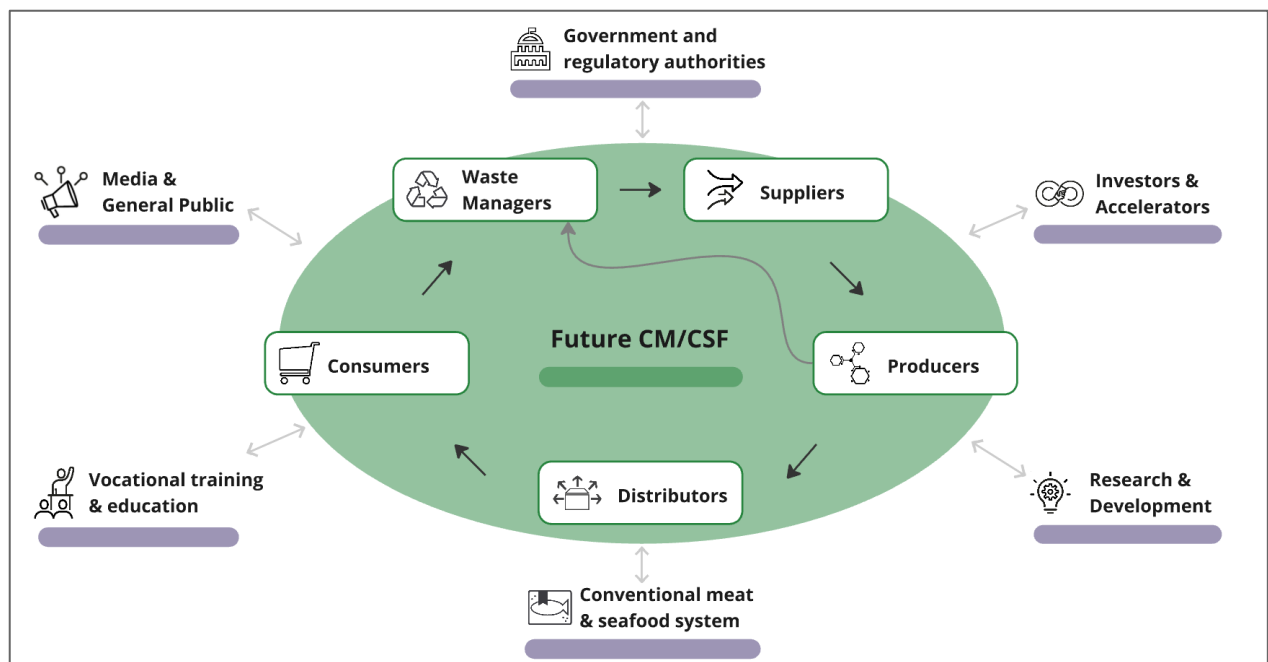


Figure 1: Stakeholders in the CM/CSF Lifecycle

Groups	Definition	Sub-Groups
Inner Circle		
Suppliers	Entities that provide essential inputs for the production of CM/CSF.	• Animal cell (line) providers (e.g. isolated cells, cell lines) • Infrastructure providers (e.g. bioreactors, lab equipment, production facilities) • Technology providers (e.g. tissue engineering platforms) • Raw materials (e.g. growth factors, feedstock media) • Data providers/ Analytics providers • CM/CSF-unspecific supplies (e.g. energy, water, vitamins, minerals) • Relevant NGOs and Interest Groups
Producers	Entities directly involved in the manufacturing of CM/CSF products.	• Producers of CM/CSF ingredients (B2B) (cultured fat, tissues etc. sold to food processors) • Producers of CM/CSF products (B2B) (full CM/CSF products sold to food processors) • Producers of CM/CSF products (B2C) (full CM/CSF products sold to distributors) • Food processors using CM/CSF ingredients and products • Relevant NGOs and Interest Groups
Distributors	Entities that facilitate the distribution and sale of CM/CSF products.	• Food retailers and supermarkets • Restaurants, delivery services, catering, and canteens • Relevant NGOs and Interest Groups
Consumers	Individuals who (potentially) buy and consume CM/CSF products.	Sub-groups based on segmentation analysis presented in Deliverable 4.1 (Chrysochou et al., 2025) • Consumers prioritising taste and texture of food products in purchasing decisions • Consumers prioritising safety of food products in purchasing decisions • Consumers prioritising price of food products in purchasing decisions • Consumers prioritising environmental sustainability of food products in purchasing decisions • Consumers prioritising naturalness of food products in purchasing decisions • Consumer NGOs and Interest Groups
Waste managers	Entities responsible for the proper disposal/recycling of waste generated in the CM/CSF life-cycle	• Disposal and recycling companies for production waste • Disposal and recycling companies for consumption waste • Relevant NGOs and Interest Groups

Groups	Definition	Sub-Groups
Government & Regulatory Authorities	Entities defining policies, regulations, and standards that impact the activities within the CM/CSF life-cycle.	• Food safety authorities (international, EU, national, local) • Environmental authorities (international, EU, national, local) • Economic authorities (international, EU, national, local) • Agricultural and Fishery authorities (international, EU, national, local) • Innovation authorities (international, EU, national, local) • Aerospace authorities (international, EU, national) • Relevant NGOs and Interest Groups
Investors & Accelerators	Commercial entities supporting activities within the CM/CSF life-cycle with resources.	• Venture Capitalists • Banks and Financial Institutions • Start-Up Accelerators, Consultants • IP and Legal Services • Relevant NGOs and Interest Groups
Research & Development	Entities and individuals that research and develop activities within the CM/CSF life-cycle.	• Universities • Research institutes • R&D departments of companies/ Incumbent companies • Relevant NGOs and Interest Groups in Research and Development
Media & General Public	Entities and individuals who inform, influence, and shape public perception and understanding of CM/CSF.	• Scientific media • Business/Industry media • Public media; social media • NGOs and Interest Groups • General Public
Vocational Training & Education	Entities and individuals who equip individuals and communities with knowledge, competencies, and critical perspectives related to CM/CSF	• Schools • Vocational Institutions • Universities • Providers of Trainings and Capacity Development (commercial) • Providers of Trainings and Capacity Development (not for profit) • Relevant NGOs and Interest Groups
Conventional meat and seafood system	Entities involved in the current meat and seafood lifecycle, influenced by the rise of CM/CSF.	• Livestock farmers and aquafarmers • Other conventional farmers (e.g. fruit & veg) • Conventional food processing (meat processing, seafood processing) • NGOs and Interest groups of the conventional meat/seafood system

Table 2: Stakeholder Groups and Sub-Groups in the Lifecycle of CM/CSF

2.3.1 Suppliers for CM/CSF Production

Suppliers are stakeholders responsible for providing the key inputs necessary for producing and scaling CM/CSF. This group includes suppliers of processed materials (e.g., culture media and scaffolds), raw material providers, but also equipment manufacturers, and the energy sector. Their contributions can be broadly categorised into CM-unspecific supplies—such as general energy and laboratory infrastructure—and CM-specific inputs like food-grade media and specialised bioreactors tailored for cellular agriculture. Due to the limited availability of CM/CSF-specific supplies on the market, many companies and start-ups combine production with in-house development of these components, leading to blurred boundaries between producers and suppliers. Relevant sub-groups include biotechnology producers, tissue engineers, and food technologists, who contribute to innovations such as bioprinting. sub-groups such as biotechnology firms and tissue engineering companies focusing on scaffolds, bioreactors, and cell culture optimisation (Suthar & Devkatte, 2020). Additionally, food technologists contribute to innovations such as bioprinting. This technique is particularly promising for replicating structured products like whole-cut meats and seafood fillets. Key actors in the supplier landscape include Mosa Meat (Netherlands), UPSIDE Foods (formerly Memphis Meats, USA), and SuperMeat (Israel).

Over the past decade, supplier engagement with CM/CSF has increased in response to growing interest in sustainable food technologies. Since 2014, tissue engineering applied to food production has gained momentum, reflecting global efforts to reduce the environmental impact of conventional livestock farming (Tsai & Lin, 2022). Despite this trend, supplier participation remains limited due to high input costs, lack of standardisation, and the technological complexity of CM/CSF processes.

One of the most critical challenges used to lie in sourcing culture media (Mateti et al., 2022). While fetal bovine serum (FBS) remains in use in some early-stage academic research—particularly for induced pluripotent or embryonic stem cell lines—it is generally not used in commercial production processes any more. Most companies have transitioned to serum-free or animal-free alternatives, recognising the ethical and economic limitations of FBS for scalable production. Scaffolding materials remain expensive and are not yet adapted for food-grade, large-scale use (Suthar & Devkatte, 2020). Equipment suppliers face comparable barriers, as most bioreactor technologies originate from pharmaceutical contexts and are ill-suited for the cost and volume requirements of the food industry (Liu et al., 2022).

Country-level developments illustrate the uneven progress across regions. In the Netherlands, Mosa Meat has developed internal supply capabilities and early supplier partnerships. In India, the Good Food Institute has supported the establishment of a supplier ecosystem. Vertically integrated models—such as those used by UPSIDE Foods and SuperMeat—reflect both the absence of mature supplier markets and the need for in-house solutions to ensure technological control.

Within this landscape, biotech and food-tech actors are central to advancing techniques like bioprinting, which may overcome limitations in texture and structure of CM/CSF products (Kang et al., 2020). However, these technologies remain in developmental stages and are not yet optimised for cost or scalability. Yuen (2017) underscores that suppliers are not passive intermediaries, but active co-developers of core technological infrastructure. Yet, their sustained engagement depends on greater investment, regulatory clarity, and stronger cross-sector collaboration.

Suppliers' motivations and drivers to engage with CM/CSF

- Market demand for ethical and sustainable alternatives: Consumer demand for meat alternatives that are both sustainable and ethically produced creates clear commercial incentives. Suppliers recognise the opportunity to contribute to production of food products that align with consumer values such as animal welfare and environmental stewardship (Kang et al., 2020; Bonny et al., 2015).
- Technological innovation and application fit: The CM/CSF sector is rich in demand for novel technologies—particularly in areas like cell culture media, bioreactor systems, and scaffolding solutions. Suppliers with relevant biotech and food-tech expertise are drawn to the opportunity to apply and adapt their technologies for a new, high-tech food production sector (Suthar & Devkotte, 2020; Yuen, 2017).
- Environmental sustainability and global food security: Suppliers are motivated by the urgent need to reduce the environmental footprint of traditional meat production, including greenhouse gas emissions, land and water use, and biodiversity loss. The potential of CM/CSF to contribute to sustainable development goals and address global food security challenges makes it an attractive sector for proactive engagement (Tsai & Lin, 2022).
- Regulatory and investment signals: Growing private investment in cultured meat startups and landmark regulatory approvals (e.g., in Singapore and the United States) reduce perceived risk and validate the long-term potential of

CM/CSF. These signals encourage suppliers to explore market entry and product development tailored to the sector's needs (Mateti et al., 2022; Blois, 2022).

- Anticipation of long-term profitability: Despite high initial development costs, suppliers are incentivised by projections of future profitability as CM/CSF technologies mature. The anticipated cost reductions, economies of scale, and market expansion contribute to positive business cases for early involvement (Tsai & Lin, 2022; Broad, 2020).
- Cross-sector alignment and institutional support: Suppliers are also encouraged by increasing collaboration between research institutions, industry actors, and NGOs (e.g., the Good Food Institute). These partnerships offer technical guidance, knowledge sharing, and strategic alignment, creating a more accessible and structured entry pathway for new suppliers (Suthar & Devkatte, 2020).
- Opportunity to shape an emerging industry: Beyond supplying inputs, some suppliers see the opportunity to co-shape the development of CM/CSF technologies themselves. The early-stage nature of the sector allows for active participation in setting technical standards, influencing value chains, and building long-term innovation ecosystems (Yuen, 2017).

Barriers to suppliers' engagement with CM/CSF

- Commercial and market uncertainty: Suppliers are hesitant to engage due to societal scepticism about the commercial viability of cultured meat, lack of cost competitiveness with conventional products, and uncertainties regarding future demand and profitability. These concerns are compounded by competition from both the traditional meat industry and established plant-based alternatives, which are already well known and accepted by consumers (FEASTS Stakeholder Database; Broad, 2020; Bonny et al., 2015; FEASTS Webinar, 2025).
- Regulatory complexity and entry barriers: Suppliers face significant obstacles in understanding and complying with novel food regulations, securing approvals, and navigating unclear legal pathways. In the regulatory framework for novel foods in the EU, specifications for CM/CSF production are not yet fully sufficient. These regulatory uncertainties, combined with difficulty in identifying investors for scale-up facilities, create a high-risk environment for engagement (FEASTS Stakeholder Database; Yuen, 2017; Bonny et al., 2015; Goes et al., 2022).

- Technological and infrastructural challenges: The production of CM/CSF requires highly specialised and costly infrastructure, including bioreactors and controlled growth environments. Suppliers also face challenges related to the lack of scalable tissue engineering methods, inefficient bioreactors, and automation bottlenecks. These factors hinder commercial feasibility (Tsai & Lin, 2022; Kang et al., 2020; Liu et al., 2022; Goes et al., 2022; Bonny et al., 2015).
- Dependence on controversial inputs: The perceived use of animal-derived culture media, such as fetal bovine serum (FBS), raises ethical concerns and may act as a barrier to social acceptance. Even though FBS is largely absent from commercial production today, the association with early-stage research practices leads some suppliers to hesitate, fearing reputational risks linked to ethically controversial methods (FEASTS Stakeholder Database).
- Lack of public funding and information access: The CM/CSF sector remains a research niche with limited public funding and scarce open-access information. This restricts the ability of suppliers—especially smaller actors—to understand opportunities, risks, and technical requirements (FEASTS Stakeholder Database).
- Capital intensity and scale-up risk: Entering the CM/CSF industry often requires substantial capital investment, particularly in equipment and scale-up capabilities. Combined with long timelines to profitability and high investment risk, this deters many suppliers from committing resources (Goes et al., 2022; Bonny et al., 2015).

What is needed for suppliers' further engagement with CM/CSF?

To effectively engage with the CM/CSF sector, suppliers require targeted information and exchange that enables them to align their technologies, processes, and business models with the demands of this emerging field. One of the most critical needs is on technological aspects, particularly regarding the cellular and tissue engineering techniques that underpin CM/CSF production. Suppliers must understand the biochemical and physical conditions required for cell growth and differentiation, as well as scalable production systems such as reusable bioreactor designs and advanced culture media formulations (Tsai & Lin, 2022; Suthar & Devkotte, 2020).

A key area of focus is the development of non-animal-based, cost-effective culture media, which are essential for reducing production costs and improving the ethical

profile of CM/CSF products. Suppliers need up-to-date knowledge of alternatives to foetal bovine serum (FBS) and insight into how these substitutes affect cultured cell performance. This enables more effective innovation and better alignment with producer requirements and consumer expectations (Liu et al., 2022; Tsai & Lin, 2022).

Beyond technical knowledge, suppliers require clarity on the regulatory frameworks governing CM/CSF production and commercialisation. Given the novelty of these products, regulatory pathways are often ambiguous or inconsistent across jurisdictions. This lack of clear legislation risks polarising the public debate—similar to previous cases involving novel foods such as insects or algae—thereby creating an additional barrier to market development. Transparent guidance, including legal definitions for cultured meat and its labelling, is essential to ensure compliance with food safety standards and support integration into legally compliant production systems (Tsai & Lin, 2022; Blois, 2022). This understanding is also key to enabling collaboration with producers seeking reliable, regulation-aligned inputs.

Suppliers would also benefit from greater insight into market dynamics, including current technological gaps, industry standards, and consumer expectations. This knowledge helps align R&D and product strategies with the evolving needs of both producers and end-users, including attributes such as cost efficiency, sustainability, and cell line compatibility (Yuen, 2017).

Finally, support in adapting to rapid technological change is essential. Many suppliers are unfamiliar with the pace of innovation in cellular agriculture and may struggle to adjust to new production paradigms. Mechanisms such as knowledge transfer, training, and multi-actor collaboration platforms can strengthen supplier capacity and support their contribution to the scale-up of CM/CSF technologies (Blois, 2022).

In conclusion, suppliers need a combination of in-depth technical knowledge, regulatory clarity, market and consumer insights, and structured support systems. Bridging these information gaps is essential to enabling supplier engagement and building the infrastructure required to bring cultured meat and seafood to commercial scale. Figure 2 presents a persona profile of a supplier and a food processor that summarise their engagement, motivations, barriers, and needs for more information to enhance engagement, developed from the literature review and persona interviews.



The Technological Enabler

Background

"We create the tools that make cultured meat viable—without scalable technology, the entire industry remains stuck in the lab."

Elias Novak

42

CEO & Founder,
BioTissue Solutions



Supplier



Norway



**Engagement
with CM/CSF:**

Supplier of a
biotech solution
to cultivated
meat companies
(B2B).

1

Motivations to further engage with CM/CSF

- Believes CM/CSF represents a viable path to more sustainable protein production.
- Sees potential for significant **cost reductions** through improved bioprocessing methods.
- Interest in pushing the boundaries of **cell culture efficiency** and reducing the reliance on **scaffolds**.
- Excited by **recent breakthroughs** showing comparable **taste and texture** to conventional meat.

2

Barriers to engage with CM/CSF

- **Technological bottlenecks** in developing specialised bioreactors.
- High **capital expenditures** required for building scalable bioreactors.
- **Insufficient regulatory framework** for CM/CSF production and slow regulatory approvals.
- Many food manufacturers are hesitant to adopt new bioprocessing approaches without **proven cost benefits**.

3

Information needed to further engage with CM/CSF

- Research and development for **optimising bioreactors** for large-scale production.
- **Clearer regulatory pathways** to accelerate market entry.
- Increased **pre-competitive collaboration** opportunities.
- Clearer **industry standards** for process validation.



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Figure 2: Persona profile of a supplier.



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2.3.2 Producers of CM/CSF Products

Producers in the context of CM/CSF are companies and organisations that are currently, or plan to be, involved in the production or integration of CM/CSF products and ingredients. This stakeholder group includes start-ups, established food companies, research institutions, and food processors that may use CM/CSF-derived ingredients as components in prepared or hybrid products. While no company is yet fully ready to enter the market with commercial-scale CM/CSF products, many are actively developing prototypes and working to overcome key scientific, technical, and economic barriers. Producers are central to the sector's innovation landscape. Prominent organisations include Mosa Meat (Netherlands), SuperMeat and Aleph Farms (Israel), GOOD MEAT by Eat Just, and UPSIDE Foods (United States), Shiok Meats (Singapore), and ICT in collaboration with the Good Food Institute (India) (Mateti et al., 2022; Suthar & Devkotte, 2020).

Globally, producer engagement with CM/CSF has increased substantially over the past two decades. Since the early 2000s, advances in cell culture methods and scaffolding technologies have accelerated development (Kang et al., 2024). The introduction of the first cultured meat burger in 2013 marked a milestone that spurred public and private R&D investments. Ongoing developments include improved cell proliferation and differentiation, as well as the application of 3D printing for structured meat products (Zhu & Wu, 2022). Countries such as the Netherlands and China have made significant strides in isolating and expanding pig muscle stem cells for cultured meat (Zhu & Wu, 2022). Regions like Europe and Asia are currently leading in industrial research and development activities (Kang et al., 2024). In the Nordic countries (Denmark, Norway, Sweden, Iceland, and Finland) as well as in Central and Eastern Europe, engagement has been comparatively slower. Although cultured meat entered the public discourse as early as 2008, significant momentum has only emerged in the last five to seven years. This recent progress has been supported by increased public funding and the establishment of startups and multi-actor initiatives (Rasmussen et al., 2024). Slower uptake is partially linked to structural factors such as lower population density and the availability of conventional agricultural land (Rasmussen et al., 2024).

Current activities among producers are largely focused on overcoming cost and scalability challenges. Efforts include the development of more efficient bioreactor systems, alternative growth media, and the creation of prototypes such as cultured burgers and chicken nuggets (Suthar & Devkotte, 2020; Mateti et al., 2022). In parallel,

producers are pursuing environmental performance improvements, including better energy and water efficiency and reductions in greenhouse gas emissions (Lima & Cunha, 2020). While the technological foundation has matured considerably, commercial viability remains a central challenge due to high production costs and the need for industrial-scale infrastructure (Post, 2017; Glufke Reis et al., 2020; Guan et al., 2021; Stout et al., 2023).

Producers' motivations and drivers to engage with CM/CSF

- **Technological innovation:** Producers are drawn to the opportunity to lead in a fast-growing sector that is reshaping food production. Advances in cell culture, scaffold development, and bioreactor design enable innovation, particularly in scaling production. Countries like China, the Netherlands, and Nordic regions are actively pursuing leadership in this space (Rasmussen et al., 2024; Zhu & Wu, 2022; Kang et al., 2024).
- **Sustainability:** Producers are motivated by the potential of cultured meat to reduce the environmental footprint of conventional livestock farming. Key benefits include lower greenhouse gas emissions, reduced land and water use, and the elimination of antibiotics—supporting more resource-efficient and resilient food systems (Rasmussen et al., 2024; Zhu & Wu, 2022; Kang et al., 2024; Suthar & Devkotte, 2020; Mateti et al., 2022; Glufke Reis et al., 2020; Post, 2017; Lima & Cunha, 2020; Lavon, 2022; Negulescu et al., 2022).
- **Government support and public funding:** Public programs such as “GrowPro” and “CleanPro” in the Nordic region incentivise producer involvement by reducing financial risk in a field still at the pre-commercial stage (Rasmussen et al., 2024).
- **Market demand and consumer trends:** Growing demand for ethical, sustainable, and health-oriented food motivates producers to position themselves early in the CM/CSF market. Eco-branding and differentiation strategies target environmentally conscious consumers and support competitive positioning (Kang et al., 2024; Suthar & Devkotte, 2020; Mateti et al., 2022; Glufke Reis et al., 2020; Post, 2017; Lima & Cunha, 2020; Guan et al., 2021).
- **Food security and global protein demand:** Cultured meat promises a scalable, controlled method to meet rising global protein needs without further burdening natural resources. Producers are motivated by CM/CSF's potential to enhance food security amid growing global meat consumption (Suthar & Devkotte, 2020; Mateti et al., 2022; Lavon, 2022; Negulescu et al., 2022).

- Animal welfare and ethical concerns: Ethical motivations—particularly reducing animal suffering—play a key role. CM/CSF enables animal-free meat production and aligns with changing societal values, opening access to ethically driven markets (Suthar & Devkotte, 2020; Mateti et al., 2022; Glufke Reis et al., 2020; Post, 2017).
- Cost reduction and operational efficiency: Producers aim to reduce production costs through innovations in media formulation, bioprocessing, and bioreactor technologies. Eco-efficiency and circular economy principles are also being used to lower costs while improving environmental performance (Lima & Cunha, 2020; Negulescu et al., 2022).

Barriers to producers' engagement with CM/CSF

- Societal skepticism and market uncertainty: Many producers report that societal skepticism about the commercial viability of cultured meat remains a key barrier. Uncertainty regarding consumer demand and market acceptance discourages investment and slows development (FEASTS Stakeholder Database).
- Cost barriers in production inputs: A consistent and critical challenge is the high cost of producing cultured meat, particularly due to expensive cell culture media, growth factors, and infrastructure. Extended in vitro cultivation can reduce cell health, lead to variability in growth and differentiation rates, and compromise scalability (Rasmussen et al., 2024; Zhu & Wu, 2022; Kang et al., 2024; Liu et al., 2022; Glufke Reis et al., 2020; Post, 2017; Lima & Cunha, 2020; Guan et al., 2021).
- Engineering and process scale-up challenges: Producers face substantial hurdles in developing robust, scalable production systems. These include maintaining stem cell function, creating 3D tissue networks, developing appropriate scaffolds, and reducing reliance on animal-based materials. Efficient bioreactor technologies and scalable biomanufacturing processes are still in early stages (Zhu & Wu, 2022; Kang et al., 2024; Liu et al., 2022; Negulescu et al., 2022; Guan et al., 2021).
- Regulatory uncertainty and legal complexity: While CM/CSF falls under the novel food Regulation (EU) 2015/2283, this regulation is not specialised on CM/CSF. Producers could use more specialised guidance on how to go through the approval process for CM/CSF products. Some producers report readiness to

commercialise but are held back by delays or ambiguities in novel food regulation (Kang et al., 2024; FEASTS Stakeholder Database).

- Cultural and societal resistance: In some regions, such as the Nordics, strong traditions in conventional farming and hunting create resistance to alternative proteins like cultured meat. These cultural norms affect both consumer acceptance and institutional support (Rasmussen et al., 2024). Similarly, in southern Europe, deeply rooted culinary and agricultural traditions tied to artisanal meat products and natural diets could be a contributing factor to both consumer scepticism and institutional hesitancy.
- Limited public R&D funding: A lack of early and sustained public support has hindered the pace of innovation and reduced the ability of producers to establish robust research programmes (Rasmussen et al., 2024).
- Scientific and interdisciplinary hurdles: Key scientific barriers include addressing regulatory and consumer concerns related to genetically modified (GM) cell lines—particularly in regions like the EU, where GM technologies face stricter regulations and public scepticism. Additional challenges include knowledge gaps in seafood-specific cell biology and the environmental implications of sterilisation protocols. Producers also face hurdles in cross-sector coordination and interdisciplinary communication (FEASTS Stakeholder Database; Stout et al., 2023).
- Lack of consumer-ready sensory quality: The taste and texture of hybrid or plant-based components still require improvement to meet consumer expectations, limiting near-term market readiness for CM/CSF products (FEASTS Stakeholder Database).

What is needed for producers' further engagement with CM/CSF?

To effectively engage in the production and commercialisation of CM/CSF, producers require a broad set of information across technical, regulatory, environmental, and market domains. A key priority is the development of cost-effective, sustainable cell culture media, which remain among the most expensive inputs in CM/CSF production. Producers need data on serum-free, animal-free alternatives and the use of plant-based or side-stream materials from other food industries (Rasmussen et al., 2024; Kang et al., 2024; Suthar & Devkotte, 2020). Additionally, more efficient cell culture techniques are required to ensure long-term stem cell stability and reduce reliance on costly growth factors (Zhu & Wu, 2022; Liu et al., 2022; Post, 2017).

Equally important is access to advanced bioreactor and tissue engineering technologies. Producers seek scalable, energy-efficient bioreactors that support reliable cell proliferation and differentiation at industrial volumes (Zhu & Wu, 2022; Kang et al., 2024; Negulescu et al., 2022). Technologies such as 3D printing and novel biomaterials are also needed to replicate the texture and structure of conventional meat (Zhu & Wu, 2022). Complementary to this are techno-economic models that guide viable production strategies and cost reduction (Suthar & Devkotte, 2020; Negulescu et al., 2022).

Another central requirement is regulatory clarity and policy support. Producers need guidance on approval processes, labelling standards, and legal frameworks across jurisdictions. Transparent regulation is essential for reducing uncertainty and supporting commercialisation (Kang et al., 2024; Lima & Cunha, 2020; Guan et al., 2021). Government funding—through subsidies and targeted grants—is also needed to foster innovation in this pre-commercial sector (Rasmussen et al., 2024).

From a market perspective, producers require insights into consumer expectations around taste, safety, and ethics. Understanding these preferences is vital for aligning product development with demand (Glufke Reis et al., 2020; Post, 2017; Guan et al., 2021). In addition, data on environmental performance—such as resource use and waste output—help producers meet both regulatory standards and consumer values (Lima & Cunha, 2020; Negulescu et al., 2022).

Finally, producers benefit from interdisciplinary collaboration and structured knowledge exchange. Cross-sector coordination and practical, problem-solving tools are crucial to address complex technical and regulatory hurdles. Access to innovation frameworks enables producers to contribute to a competitive, sustainable CM/CSF ecosystem (Stout et al., 2023).

In conclusion, producers need an integrated knowledge base covering technical solutions, regulatory frameworks, consumer insights, and pre-competitive collaboration. Closing these information gaps is essential for enabling effective engagement and scaling CM/CSF production. Figure 3 and Figure 4 present persona profiles of a producer (full product) and a producer (hybrid product) that summarise their engagement, motivations, barriers, and needs for more information to enhance engagement, developed from the literature review and persona interviews.



The Cultivated Meat Pioneer

Background

"We have the science, we have the vision—now we need to make it affordable, scalable, and delicious."

Dr. Anika Patel
45
Chief Scientist, NextGen Meats



Producer (Full Product)



Netherlands



Engagement with CM/CSF:

Producer of cultivated meat products sold B2B and B2C.

1

Motivations to further engage with CM/CSF

- Motivated by pioneering a growing food technology market and align with **global trends** toward more sustainable and innovative food systems.
- Driven by the potential of cultured meat to **lower environmental impact** and **replace inefficient livestock farming**.
- Furthering technological consolidation of production methods for CM/CSF.
- Further developing **strategic partnerships and collaborations** with adjacent sectors, e.g. the meat sector and learning from advances in the pharmaceutical sector.

2

Barriers to engage with CM/CSF

- Despite advances in technology, **commercial viability** remains a challenge due to high production and scaling costs, particularly for cell culture media.
- **Technological and investment constraints** hinder further scale-up of production.
- **Regulatory uncertainty** as well as difficulty in being granted **regulatory approval** for consumer tasting.
- Tension between rapid commercialisation and thorough technology development.
- **Uncertainty** in securing further venture capital investment.
- **Lack of public funding** programmes, grants, and investment.
- Growing **political pushback** in some countries (e.g. bans against CM/CSF).

3

Information needed to further engage with CM/CSF

- **Advances** in cost-effective, serum-free **growth media**, as well as more efficient, specialised **bioreactors**.
- **Consumer research** on how to frame cultivated meat as a desirable product.
- Clear and conducive **regulatory frameworks**.



Figure 3: Persona profile of a producer (full product).



The Market-Driven Innovator

Background

"Hybrid products are the bridge—100% cultivated will take time to develop, but we can start by making plant-based products taste amazing with cultivated fat."

Johan Eriksson
38
Founder & CEO, Hybrid Eats



Producer (Hybrid Product)



Austria



Engagement with CM/CSF:

Producer of hybrid meat alternatives combining cultivated fat with plant-based proteins, marketed B2B and B2C.

1

Motivations to further engage with CM/CSF

- Sees hybrid products as a more **affordable and practical solution** compared to full cultivated meat.
- Driven by **consumer trends**—knows that taste and price are key drivers for adoption.
- Aims to help the plant-based industry overcome **sensory limitations** by incorporating cultivated fats.
- Motivated by recent developments that minimise animal cell input and **improve animal welfare**.

2

Barriers to engage with CM/CSF

- **Technological limitations** to scale up.
- **High costs** for production and scaling.
- **Lack of a regulatory framework** for novel foods as well as difficulty in being granted regulatory **approval** for consumer tasting.
- **Financial risks** through the need to rely on uncertain venture capital investment.
- **Lack of public funding** programmes, grants, and investment.

3

Information needed to further engage with CM/CSF

- More **research and development** to consolidate cell cultivating techniques.
- More opportunities for controlled **consumer tastings** critical for validating hybrid products and refining formulations.
- **Regulation** to accelerate market entry.



Figure 4: Persona profile of a producer (hybrid product).



The Strategic Observer

Background

"We are all aware that meat consumption has a huge negative impact on the environment and that overall meat consumption is far too high. However, we as meat alternative producers also see that many consumers are not convinced by plant-based alternatives.

The quality does not meet their expectations, or it is not close enough to real meat. That is why I believe that cultivated meat can also persuade those who insist on eating real meat—not made from peas or soy."

Martina Hoffmann

50

Director of Product
Innovation, GreenProtein
Foods



Food Processor



Germany



**Engagement with
CM/CSF:**

Plant-based
producer exploring
cultivated-meat-
enhanced hybrid
products, to be sold
B2C.

1

Motivations to (further) engage with CM/CSF

- Wants to maintain her company's position as an **innovation leader** in meat alternatives.
- Recognizes the **limitations of current plant-based meat substitutes**, particularly in sensory attributes and taste.
- Sees potential in CM/CSF-enhanced products to be adopted by **consumers** who have previously not been open to try meat substitutes.
- Interest in **sustainability**—cultivated meat aligns with long-term ESG goals.

2

Barriers to engage with CM/CSF

- **Cost and scalability**—cultivated meat is still too expensive compared to traditional meat.
- **Regulatory uncertainty** in the EU—lengthy approval processes discourage investment.
- **Consumer acceptance** remains an issue - the term 'lab-grown meat' has taken hold in Germany, suggesting cultivated meat is unnatural and artificial. This may make consumers hesitant to try CM/CSF.

3

Information needed to further engage with CM/CSF

- **Market projections**—when will cultivated meat reach cost parity with traditional meat?
- **Case studies** of successful hybrid product launches.
- **Clearer regulations** for novel food approval in the EU.



Figure 5: Persona profile of a food processor.

2.3.3 Distributors of CM/CSF products

Distributors in the context of cultured meat and seafood (CM/CSF) are entities responsible for the logistics, sales, and delivery of CM/CSF products across the supply chain. This stakeholder group includes wholesale distributors, logistics providers, and specialised food service distributors that manage the movement of products from producers to retailers, restaurants, and end consumers. Their role is critical to ensuring that CM/CSF products are delivered efficiently, safely, and in compliance with food safety and regulatory standards.

Sub-groups within the distribution sector include food retailers and supermarkets, such as grocery chains and online food retailers, which are key channels for reaching a wide consumer base and shaping public acceptance of CM/CSF products. Another important sub-group consists of restaurants, meal delivery services, and institutional canteens, which introduce consumers to CM/CSF through prepared meals in diverse settings, including schools, hospitals, and workplaces. Together, these actors play an essential role in integrating CM/CSF into mainstream food environments and facilitating early market access.

The engagement of distributors with cultured meat and seafood (CM/CSF) remains limited, reflecting the early stage of commercialisation in this sector. Since large-scale production methods are still under development, most CM/CSF activities are confined to experimental and pilot phases, leaving no established role for commercial-scale distributors at present (Suthar & Devkatte, 2020; Negulescu et al., 2023). As a result, supply chain infrastructure—including cold-chain logistics, storage, and retail distribution—has yet to adapt to the specific requirements of CM/CSF products. Nevertheless, distributors are expected to be among the most affected stakeholder groups once CM/CSF products enter broader markets, given their central role in the food supply chain (van Hout, 2020, p. 19). Lessons from the plant-based protein sector illustrate the importance of early distributor involvement: partnerships such as Impossible Foods with Dot Foods and Beyond Meat with Whole Foods were crucial to achieving market reach, although long-term success remains uncertain (Mohorčich & Reese, 2019, p. 7).

Currently, real-world distribution remains minimal. Huber's Butchery in Singapore became the first outlet worldwide to sell cultured meat to consumers (GFI, 2023). In the United States, CM/CSF products from Upside Foods and GOOD Meat have debuted exclusively in select restaurants, further underscoring the limited

distribution scope (GFI, 2023). According to Ye et al. (2022, p. 7), the absence of upscaled production and distribution models also constrains the ability to define regulatory requirements related to product safety and handling. In summary, while the involvement of distributors is currently marginal, their future engagement will be critical for the successful commercialisation of CM/CSF.

Distributors' motivations and drivers of engagement with CM/CSF

- Strategic positioning in a transformative market: CM/CSF is viewed as a high-potential sector that could contribute to global food security while reducing reliance on land, water, and other natural resources. Distributors are drawn by the opportunity to be part of a technologically advanced and forward-looking industry (Negulescu et al., 2023).
- Scalability and future profitability: While still pre-commercial, cultured meat holds promise for future profitability through economies of scale. Distributors anticipate commercial benefits once production scales and prices become competitive (Negulescu et al., 2023).
- Sustainability and shifting consumer values: Distributors are motivated by the growing demand for sustainable and ethical food products, as well as by the potential of CM/CSF to reduce the environmental and health impacts associated with conventional meat production (Suthar & Devkatte, 2020).
- Ethical and social pressure: As awareness grows about the emotional and cognitive capacities of farm animals, distributors face increasing moral scrutiny from the public and advocacy groups. Animal welfare has become a prominent political and social concern, often targeting food retailers directly (Treich, 2021).
- Systemic critique and industry self-reflection: Distributors are under pressure for their role in a meat system criticised for unsustainable practices and failing to reflect "true costs" in pricing. Some actors, including Dutch retailers, have acknowledged these shortcomings and are motivated to engage in more responsible alternatives like CM/CSF (Treich, 2021; van Hout, 2020).
- Portfolio diversification and consumer segmentation: The expanding alternative protein market allows distributors to broaden their offerings, reach health- and sustainability-conscious consumers, and reduce reliance on conventional meat products. This includes responding to demand for plant-based and innovative protein solutions (Swan, Yap et al., 2023).

- Urban logistics and niche market opportunities: CM/CSF enables local, near-city production models that reduce transportation costs and storage needs. It also allows distributors to cater to niche markets, including ethically motivated vegetarians and consumers interested in exotic or novel meat types (Joshi et al., 2020).
- Health, safety, and regulatory preparedness: Distributors see potential in CM/CSF to meet rising expectations for food safety and hygiene, especially as awareness of health risks linked to conventional meat grows. Regulatory alignment and novel food approvals offer an emerging framework to support market entry (Lavon, 2022; Choudhury et al., 2020).

Barriers to distributors' engagement with CM/CSF

- Limited availability of CM/CSF products: A major barrier for distributors is the limited availability of cultured meat due to high production costs and technical bottlenecks. The expense of bioreactors and cell culture media, combined with the economic risks of scaling production from laboratory to industrial levels, currently prevents CM/CSF from reaching commercial-scale volumes necessary for consistent distribution (Suthar & Devkatte, 2020; Negulescu et al., 2023).
- Regulatory uncertainty: The lack of clear and established regulatory frameworks for the production, safety, and distribution of CM/CSF creates significant uncertainty. Without reliable guidelines, distributors are hesitant to invest in infrastructure or logistics for a product whose legal status, labelling, and compliance requirements remain unsettled across many jurisdictions (Negulescu et al., 2023; Lavon, 2022).
- Consumer safety concerns and acceptance barriers: Distributors face challenges linked to consumer concerns about the safety and unfamiliarity of CM/CSF products. Issues such as the use of animal-derived components (e.g., fetal bovine serum), the novelty of lab-based production methods, and unease around the sensory qualities of cultured meat can delay market readiness. Addressing these concerns requires the development of clear safety standards, ethical production methods, and positive sensory experiences (Swan, Yap et al., 2023; Choudhury et al., 2020; Joshi et al., 2020).
- Cultural resistance and limited public awareness: Beyond safety, psychological and cultural resistance presents a significant barrier. Many consumers are unfamiliar with the concept of cultured meat, and perceptions of

it as unnatural or artificial persist. Without widespread public education and normalisation of CM/CSF, distributors may be reluctant to integrate such products into mainstream channels (Joshi et al., 2020).

Information needed by distributors to further engage with CM/CSF

To effectively engage with the cultured meat and seafood (CM/CSF) sector, distributors require a comprehensive and multidisciplinary set of information. A fundamental need is greater clarity on the scalability and cost-effectiveness of CM/CSF production. Without transparent techno-economic assessments, including data on bioreactor designs and infrastructure requirements, distributors lack the strategic information necessary to plan logistics, pricing, and market entry (Suthar & Devkotte, 2020; Negulescu et al., 2023). Distributors must also be informed about cost-reduction strategies and technological advancements that would make large-scale distribution financially viable (Negulescu et al., 2023).

Another critical information need relates to regulatory frameworks. Distributors require guidance on national and international legal standards for the safe handling, transport, and retail of CM/CSF products. This includes compliance with food safety standards, labelling rules, and novel food regulations to ensure legal certainty and market access (Suthar & Devkotte, 2020; Swan, Yap et al., 2023; Choudhury et al., 2020; Lavon, 2022). Staying informed about upcoming changes in regulatory policies is vital to avoid delays and ensure seamless integration into existing distribution systems.

Distributors also need access to consumer insights, including public perceptions, preferences, and sensory expectations regarding CM/CSF. Understanding how consumers evaluate taste, safety, naturalness, and ethical considerations is essential for effectively marketing these products. Particular attention should be given to addressing psychological resistance and fostering trust in cell-cultured foods (Choudhury et al., 2020; Lavon, 2022; Joshi et al., 2020).

Additionally, information on sustainable production methods and innovations such as serum-free media is important for distributors aiming to align their operations with sustainability goals. This alignment not only satisfies increasingly eco-conscious consumers but also strengthens corporate social responsibility narratives (Swan, Yap et al., 2023).

From an operational perspective, distributors must acquire or collaborate with technical expertise in biotechnology, as well as food safety and cold-chain logistics specific to CM/CSF, including storage, transport, and quality assurance (Joshi et al., 2020). Furthermore, distributors require robust supply chain management systems adapted to the unique handling characteristics of CM/CSF, ensuring timely delivery and consistent product quality (Choudhury et al., 2020).

In conclusion, distributors need a broad range of information that includes techno-economic data, regulatory clarity, consumer perception insights, sustainability indicators, and supply chain expertise. Only with access to this integrated knowledge base can they confidently plan investments, adapt logistics, and ensure that CM/CSF products reach consumers in a way that is efficient, safe, and aligned with market expectations. Figure 6 and Figure 7 present persona profiles of a food distributor and a restaurant chef that summarise their engagement, motivations, barriers, and needs for more information to enhance engagement, developed from the literature review and persona interviews.



The Strategic Distributor

Background

"This is an investment in the future. Right now, it's a bet, but in ten to fifteen years, this could see great adoption."

Jason Tang
48

Managing Director, Specialty
Food Distributor



Distributor



Netherlands



Engagement with
CM/CSF:

Interest in
distributing CM/CSF
products in Europe
in the future, as his
company is doing in
Singapore.

1

Motivations to (further) engage with CM/CSF

- **Early-mover advantage** in the market—being one of the first distributors of CM/CSF products positions his company as an **innovation leader**.
- Belief that the **current food system is unsustainable**, and CM/CSF will play a key role in the future.
- Interest in **high-end restaurants** as key customers who are eager to try novel, exclusive ingredients.
- **Strategic positioning** to build expertise and credibility in CM/CSF, ensuring long-term business relevance.
- Potential **long-term profit opportunities** once production scales and costs drop.

2

Barriers to engage with CM/CSF

- Absence of **regulatory approval** in the EU market does not enable his company to engage in this new opportunity in Europe as they are in e.g. Singapore.
- **Lack of large-scale production**; supply remains extremely limited and inconsistent.
- **High costs** mean distributors cannot make traditional profit margins on CM/CSF products.
- Need for significant **customer education**—chefs and restaurant buyers require detailed explanations and tastings.
- Skepticism from mainstream food service players, who hesitate to commit without proven consumer demand.

3

Information needed to further engage with CM/CSF

- Reliable **supply chain data**—when, where, and in what quantities will CM/CSF products be available?
- More transparency from CM/CSF producers on **cost reduction strategies** to help distributors plan pricing.
- **Market research on consumer acceptance** to help position CM/CSF effectively.
- Clearer **regulatory timelines** in different markets to plan distribution strategies.
- Support from CM/CSF brands to conduct **customer education** through tastings, chef workshops, and PR efforts.



Figure 6: Persona profile of a food distributor.



The Progressive Chef

Background

"If I can create a dish with consistent, high-end products that wows my guests and is better for the planet, why wouldn't I?"

Pierre Lemoine

42

France

Executive Chef at Michelin-starred restaurant in Paris



Distributor



Paris, France



Engagement with CM/CSF:

Experimenting with CM/CSF products in collaboration with innovative producers to bring sustainable, cutting-edge dishes to high-end diners.

1

Motivations to (further) engage with CM/CSF

- Passion for **innovation** in gastronomy, seeking novel ingredients that **elevate fine dining**.
- Interest in **sustainability** and reducing reliance on **traditional meat** due to **ethical concerns** and environmental impact.
- The potential for a **more consistent product** compared to conventional meat, eliminating issues like veins or unpredictable fat content.
- Recognition that **cultivated alternatives** can help maintain access to ingredients like foie gras, which face increasing regulatory bans.
- Desire to stay ahead of **culinary trends** and **differentiate from competitors**.

2

Barriers to engage with CM/CSF

- Lack of **regulatory approval** in key markets like France, preventing him from integrating it into his menu.
- Concerns about **consumer perception and acceptance**, as high-end diners expect traditional quality and authenticity.
- Uncertainty about **pricing**—cultivated meat is expensive, and passing costs onto customers in an already premium dining space is challenging.
- **Limited availability**; even if he wants to experiment, supply constraints make it difficult to incorporate CM/CSF into a standard offering.
- Need for **hands-on experience** with CM/CSF to understand how it behaves in different cooking applications.

3

Information needed to further engage with CM/CSF

- Clear **updates on regulatory progress** and timelines for approval
- Guidance on how to **communicate** CM/CSF origins and benefits to skeptical diners.
- In-depth technical **training sessions** or workshops for chefs to better understand CM/CSF cooking properties.
- Access to **stable, high-quality supply** with pricing models that fit into fine dining menus.



Figure 7: Persona profile of a distributor (restaurant chef).

2.3.4 Consumers of CM/CSF products

Consumers are the end-users of cultured meat and seafood (CM/CSF) products and include a broad spectrum of individuals ranging from potential early adopters to those with traditional dietary preferences. This stakeholder group is the broadest and most diverse, in demographics but also in values, food habits, and openness to food innovation. Sub-groups within this stakeholder category include vegetarians, environmentally conscious consumers, health-driven individuals, and neophobic segments wary of novel food technologies (Pakseresht et al., 2022). While consumers are not directly involved in production or distribution, their perceptions and purchasing behaviour are decisive for the market viability of CM/CSF.

Since the first public trial of cultured meat in 2013, global consumer awareness has steadily increased (Rosenfeld & Tomiyama, 2023; Tsvakirai, 2024). In Europe, an online survey conducted by GFI Europe and YouGov in July 2024 showed that in all surveyed countries, at least 1 in 3 respondents have heard of cultured meat (GFI Europe, 2024). Overall, consumer engagement remains in a formative stage globally, with significant variation across regions. Studies indicate that willingness to try or purchase CM/CSF is comparatively higher in China, Brazil, Singapore, the United States, and the Netherlands, while countries such as France, Italy, and Ethiopia display stronger resistance, often due to concerns about food naturalness, safety, and cultural acceptance (Siddiqui et al., 2022; Lewisch & Riefler, 2023; Tsvakirai, 2024).

Demographic patterns further influence consumer engagement. Younger consumers—particularly Millennials and Gen Z—are generally more receptive to cultured meat, partly due to lower levels of food neophobia and greater alignment with sustainability narratives (Pakseresht et al., 2022; Szejda et al., 2021; Hocquette et al., 2022). Generation Alpha also shows high potential: they are more accepting of new food technologies, less concerned about artificiality, and more focused on benefits like sustainability and animal welfare (Euromonitor International, 2022). Men are more likely than women to express willingness to purchase CM-based products such as hamburgers (Pakseresht et al., 2022). While vegetarians and flexitarians often reduce conventional meat consumption, they do not necessarily prefer cultured meat over plant-based alternatives, highlighting the complexity of consumer choice in this domain (Terano et al., 2023). However, they remain an important group to engage, as there may be vegetarians motivated by reducing animal suffering, while still enjoying the taste of meat or seafood, for whom this novel technology could broaden options.

Despite rising interest, consumer acceptance remains tentative. Key concerns include unfamiliarity with the technology, questions about food safety, perceived unnaturalness, and doubts about taste and texture (Zhang et al., 2020; Liu et al., 2022; Deliza et al., 2023). These issues are particularly relevant given that most consumers have not encountered CM/CSF products firsthand, and their attitudes remain susceptible to influence (Lin-Hi et al., 2023). Given the lack of availability of CM/CSF products, for many consumers it remains little more than a concept, enabling malleability to disinformation campaigns as seen in e.g. Italy, resulting in a ban of CM/CSF products at national level. Nonetheless, studies consistently show that targeted information provision can significantly improve acceptance—for example, increasing willingness to try cultured meat from 24.2% to 45.5% when basic facts are provided (Zhang et al., 2020).

Consumers' motivations and drivers to engage with CM/CSF

- **Environmental sustainability:** Many consumers are drawn to CM due to its potential to reduce greenhouse gas emissions, conserve land and water, and lower the environmental footprint of conventional livestock farming. This motivator is especially relevant in countries with strong environmental movements, such as the Netherlands, Germany, and the USA (Rosenfeld & Tomiyama, 2023; Szejda et al., 2021; Lewisch & Riefler, 2023; Tsvakirai, 2024; Liu et al., 2023; Zhang et al., 2021).
- **Animal welfare and ethics:** The elimination of animal slaughter is a powerful ethical motivator for consumers who are concerned with animal rights. Cultured meat offers a cruelty-free alternative aligned with growing societal concern over farm animal treatment (Pakseresht et al., 2022; Rombach et al., 2022; Lewisch & Riefler, 2023; Hocquette et al., 2022).
- **Health and food safety:** Cultured meat is perceived as healthier due to the potential absence of antibiotics, reduced contamination risk, and the potential for tailored nutritional content. These factors appeal particularly to health-conscious and educated consumers (Rosenfeld & Tomiyama, 2023; Szejda et al., 2021; Lewisch & Riefler, 2023; Tsvakirai, 2024; Liu et al., 2023; Deliza et al., 2023; Terano et al., 2023).
- **Food security:** CM is seen as a scalable solution to meet growing global protein demand, especially in regions with limited agricultural resources. Its potential to

support long-term food system resilience motivates engagement (Lewisch & Riefler, 2023; Siddiqui et al., 2022).

- Innovation and curiosity: A significant number of consumers—particularly in innovation-forward regions like North America—are motivated by the novelty of CM. Willingness to try it is often rooted in interest in food technology and new experiences (Rosenfeld & Tomiyama, 2023; Rombach et al., 2022; Tsvakirai, 2024).
- Social influence and normalisation: Acceptance of CM increases as it becomes socially normalised. Peer behaviour, family context, and cultural familiarity influence consumer attitudes and adoption (Lin-Hi et al., 2023).
- Taste and familiarity: For some consumers, particularly meat lovers, taste remains a central motivator. CM's ability to closely mimic the sensory experience of conventional meat enhances its appeal over other alternatives (Cornelissen & Piqueras-Fiszman, 2023; Lin-Hi et al., 2023).
- Informed engagement: Consumers with more awareness of the environmental, ethical, and technological context of CM are more likely to accept it. Education campaigns and transparent communication can therefore drive engagement (Rosenfeld & Tomiyama, 2023; Zhang et al., 2020).

Barriers to consumers' engagement with CM/CSF

- Perceived unnaturalness: A major barrier across numerous regions is the widespread belief that cultured meat is "unnatural," often provoking feelings of disgust. This perception is especially prevalent in countries like France, Italy, Germany, the UK, and Ethiopia, and among older consumers or those with traditional food preferences (Rosenfeld & Tomiyama, 2023; Rombach et al., 2022; Szejda et al., 2021; Lewisch & Riefler, 2023; Tsvakirai, 2024; Falowo et al., 2022; Cornelissen & Piqueras-Fiszman, 2023; Lin-Hi et al., 2023; Liu et al., 2023).
- Food neophobia and emotional resistance: Many consumers exhibit food neophobia—fear of new or unfamiliar foods—especially when associated with advanced technologies. This is often coupled with emotional resistance or disgust, particularly in traditional food cultures (France, Italy) and among specific consumer segments like meat eaters or older individuals (Rosenfeld & Tomiyama,

2023; Rombach et al., 2022; Cornelissen & Piqueras-Fiszman, 2023; Lin-Hi et al., 2023; Liu et al., 2023; Tsvakirai, 2024).

- Distrust in science and food safety: In some countries, including Austria, South Korea, and others, a lack of trust in scientific processes, food industry transparency, and perceived health risks contribute to hesitation toward CM/CSF (Lewisch & Riefler, 2023; Lin-Hi et al., 2023; Tsvakirai, 2024).
- Lack of awareness and information: A significant proportion of consumers, especially in countries like South Africa, are unfamiliar with CM/CSF. This lack of exposure leads to scepticism regarding its safety, production process, and benefits (Rosenfield & Tomiyama, 2023; Falowo et al., 2022; Lin-Hi et al., 2023).
- Price sensitivity: The current high production costs of CM/CSF translate into premium pricing, which many consumers—particularly non-early adopters—are unwilling to pay. This is a major barrier to mainstream market adoption (Rosenfield & Tomiyama, 2023; Rombach et al., 2022; Szejda et al., 2021; Liu et al., 2023).
- Cultural and religious constraints: Cultural norms and religious dietary rules influence acceptance of CM/CSF, with barriers noted in Muslim and Hindu populations and in countries where conventional meat holds cultural significance (Lewisch & Riefler, 2023; Falowo et al., 2022; Siddiqui et al., 2022; Tsvakirai, 2024).
- Sensory doubts: Concerns regarding the taste, texture, and overall sensory appeal of CM/CSF remain widespread, particularly among those who prefer conventional meat. These doubts undermine the willingness to try or adopt CM/CSF (Pakseresht et al., 2022; Rosenfield & Tomiyama, 2023; Cornelissen & Piqueras-Fiszman, 2023; Zhang et al., 2021).
- Health and nutritional concerns: Although some consumers view CM/CSF as healthier, others worry about its long-term health effects, nutritional value, and food safety, especially when the product is perceived as overly processed or artificial (Szejda et al., 2021; Lin-Hi et al., 2023; Liu et al., 2023; Terano et al., 2023).
- Economic and ethical doubts: Additional concerns include the economic consequences for traditional farming communities and ethical questions of the industrialisation of cell-cultured food (Siddiqui et al., 2022; Tsvakirai, 2024; Hocquette et al., 2022).
- Terminological confusion and communication gaps: Negative associations with terms like “lab-grown meat” and the use of technical jargon in communication

further alienate consumers and contribute to a perception of CM/CSF as foreign or unsafe (Lin-Hi et al., 2023; Gousset et al., 2022; Deliza et al., 2023).

Information needed by consumers to further engage with CM/CSF

To effectively engage with cultured meat and seafood (CM/CSF), consumers require comprehensive, transparent, and accessible information across a range of topics, including safety, sustainability, nutrition, and cultural alignment. A key requirement is detailed education about the production process. Many consumers remain unfamiliar with how CM/CSF is made, which contributes to scepticism and food technology neophobia. Transparent communication that demystifies the technology and emphasises health and environmental benefits is critical to fostering acceptance (Pakseresht et al., 2022; Rosenfield & Tomiyama, 2023; Szejda et al., 2021; Liu et al., 2022; Gousset et al., 2022).

Clear, consistent messaging—free from overly technical language—can improve trust and counteract negative associations with terms like “lab-grown” or “artificial.” Studies emphasise the value of using positive framing, such as “cultured” or “clean” meat, to reduce perceived unnaturalness (Rosenfield & Tomiyama, 2023; Lewisch & Riefler, 2023; Lin-Hi et al., 2023). This strategy should be coupled with accurate labelling that highlights key product attributes, such as the absence of antibiotics, reduced pathogen risks, and alignment with environmental and animal welfare goals (Szejda et al., 2021; Siddiqui et al., 2022; Liu et al., 2023).

Sensory attributes—taste, texture, and appearance—are also a priority for consumers. Consumers must be assured that CM/CSF products match or exceed the sensory quality of conventional meat. Marketing strategies that focus on flavour, familiarity, and emotional appeal can help overcome resistance rooted in disgust or neophobia (Rombach et al., 2022; Tsvakirai, 2024; Cornelissen & Piqueras-Fiszman, 2023; Lin-Hi et al., 2023).

Price remains a central concern. Consumers are unlikely to pay a premium for CM/CSF products unless they perceive clear personal and societal benefits. In all five consumer interviews the CSCP conducted across France, Germany, and Denmark, consumers indicated that the price should be the same or lower than the conventional meat or seafood counterpart. Therefore, pricing strategies and affordability are crucial aspects of consumer engagement, especially in lower-income regions (Rombach et al., 2022; Tsvakirai, 2024; Liu et al., 2023). Additionally, cultural sensitivity

plays a role in how products are introduced. Tailoring communication to reflect local food values, religious considerations, and traditional dietary habits is important for gaining acceptance in diverse markets (Lewisch & Riefler, 2023; Tsvakirai, 2024; Falowo et al., 2022).

Beyond messaging, educational campaigns—led by both public institutions and private stakeholders—are needed to enhance awareness of CM/CSF’s environmental, health, and ethical impacts. These should include clear descriptions of production methods, nutritional content, and regulatory oversight, as well as reassurance on food safety (Deliza et al., 2023; Terano et al., 2023; Zhang et al., 2020; Hocquette et al., 2022).

In conclusion, consumers require a multidimensional information approach that combines transparent education, positive framing, cultural alignment, and affordability. Addressing concerns about safety, taste, price, and unfamiliarity—while emphasizing CM/CSF’s sustainability and ethical advantages—will be essential to foster informed, long-term consumer engagement with cultured meat and seafood. Figure 8 to Figure 13 present persona profiles consumers prioritising different factors in their food purchasing decisions that summarise their engagement, motivations, barriers, and needs for more information to enhance engagement, developed from the literature review and persona interviews.



The Practical Traditionalist

Background

"If it looks good and tastes good, I might give it a try, but I don't see why I should switch if it doesn't beat what I already have."

Lars Nielsen
54
Environmental Consultant



Consumer



Denmark



Naturalness



Omnivore



Married, adult children



Countryside

1

Motivations to engage with CM/CSF

- Concerned about environmental impact of meat production, but believes reducing consumption and **supporting local farming** is a better solution.
- Acknowledges that CM/CSF claims to reduce animal suffering and land use, but **doubts** whether industrialised food tech can ever truly be **ethical or sustainable**.
- **Skeptical** that CM/CSF can meet **nutritional needs** without heavy processing, additives, or unintended consequences.

2

Barriers to engage with CM/CSF

- **Perceives CM/CSF** as technological overreach into nature.
- **Strong skepticism** about highly **processed foods** and unnatural production.
- **Lack of information** on safety, nutritional value and health benefits.

3

Information needed to further engage with CM/CSF

- **CM/CSF label** to clearly mark and certify CM/CSF products.
- **Transparency** on production processes and safety regulations, e.g. on the packaging or through media.
- Independent, **long-term studies** proving safety and **minimal processing**.
- Clear communication on how it **compares nutritionally** to traditional meat.

Figure 8: Persona profile of a consumer (prioritises naturalness).



The Ethical Innovator

Background

"If we can feed people sustainably and stop animal suffering, I see no reason not to embrace cultured meat."

Claire Dubois
42
Sustainability Activist &
NGO Worker



Consumer



France



Environmental
sustainability



Vegan-leaning
flexitarian



Single



City

1

Motivations to engage with CM/CSF

- Strongly motivated by **animal welfare** concerns and the **environmental footprint** of industrial farming.
- Believes CM/CSF can play a role in **global food security**.
- Open to **new technologies** if they genuinely reduce environmental harm.

2

Barriers to engage with CM/CSF

- Concerned about potential **pollution** from **CM/CSF production** facilities.
- **Skeptical** about **long-term safety** and the presence of chemical additives.
- Questions whether CM/CSF will remain **ethical** if it becomes a large-scale industrialized business. Would prefer to buy from small-scale CM/CSF producers as they are seen as more ethical.

3

Information needed to further engage with CM/CSF

- **Research** on the **ecological impact** of CM/CSF compared to traditional meat.
- **Assurances** that CM/CSF does not rely on environmentally **harmful processes**.
- **Ethical certifications** and independent reviews of production methods.



Figure 9: Persona profile of a consumer (prioritises environmental sustainability).



The Cautious Environmentalist

Background

"Less land use, fewer emissions—great, but I still need to be convinced it's better for my health."

Gabriele Hoffmann
60
Retired Engineer



Consumer



Germany



Safety



Omnivore



Married, adult children



Countryside

1

Motivations to engage with CM/CSF

- Aware of the **environmental benefits**, particularly in reducing land use and emissions.
- Open to new food solutions if they improve **sustainability**.
- Prefers **regionally produced** and eco-certified food.

2

Barriers to engage with CM/CSF

- **Distrusts** the long-term health impacts of CM/CSF and industrial-scale food innovations.
- Believes **technological food solutions** are **risky** and unnecessary.
- **Concerns over additives**, ultra-processing, and potential unknown health risks.

3

Information needed to further engage with CM/CSF

- **Independent research** proving CM/CSF is safe and minimally processed.
- **Clear regulations** ensuring transparency in production and labeling.
- **Assurance** that CM/CSF offers tangible **environmental benefits** beyond just marketing claims.

Figure 10: Persona profile of a consumer (prioritises safety).



The Quality-Seeking Flexitarian

Background

"If it's clean, natural, and tastes like real meat, I'd happily enjoy steak again, knowing it is cultured."

Sophie Martin
28
Marketing Manager

 **Consumer**

 **France**

 **Taste and texture**

 **Flexitarian**

 **Single**

 **City**

1 Motivations to engage with CM/CSF

- Interested in **reducing meat consumption without sacrificing taste or quality.**
- Believes CM/CSF can be a **healthy alternative** with fewer contaminants.
- Wants an **ethical alternative** to traditional meat but is not ready to fully switch to plant-based diets.

2 Barriers to engage with CM/CSF

- Worries about CM/CSF being highly **processed** and **unnatural.**
- **Uncertainty** about how it compares in **taste and texture** to real meat.
- **Prefers recognisable cuts** of meat rather than reconstituted or hybrid products

3 Information needed to further engage with CM/CSF

- **Clear ingredient lists and transparency on processing levels.**
- **Taste tests** and consumer reviews proving it matches real meat.
- **Product availability** in well-known supermarkets and restaurants.

Figure 11: Persona profile of a consumer (prioritises taste and texture)



The Tech-Savy Early Adopter

Background

"It's the future—if it's safe, nutritious, and affordable, why wouldn't I try it?"

Henrik Larsen
35
Software Developer



Consumer



Denmark



Price



Omnivore



Married, young children



City

1

Motivations to engage with CM/CSF

- Fascinated by **food innovation** and eager to try new technologies.
- Sees CM/CSF as a **logical step** towards sustainable and ethical food systems.
- Interested in how CM/CSF can be **customised for health benefits** (e.g., low-fat options).

2

Barriers to engage with CM/CSF

- **Price sensitivity** - would choose traditional meat if CM/CSF is significantly more expensive.
- **Lack of availability** - it should be available in local supermarkets and convenient to access.
- **Prefers whole cuts** of meat rather than processed products.

3

Information needed to further engage with CM/CSF

- Competitive pricing compared to traditional meat.
- Assurance of consistent quality and nutritional benefits.
- Needs more information about the long-term health effects.
- **More visibility** in mainstream **dining** and **retail options**.



Figure 12: Persona profile of a consumer (prioritises price)

2.3.5 Waste managers of CM/CSF Production and Consumption

Waste managers in the context of CM/CSF are stakeholders responsible for handling waste generated across the entire product lifecycle, including upstream production processes and post-production stages such as packaging and distribution. This includes the management of inputs (e.g., valorising organic waste as feedstock for production to support circular economy principles) and outputs (e.g., handling the waste resulting from CM/CSF laboratories and facilities). Waste types include biological and organic matter (e.g., spent media, cell debris, microbial contaminants), single-use plastics from stirred tank reactors, sterilisation byproducts, scaffolds (if not eatable), biotechnical residues, wastewater, and packaging materials. Sub-groups within this stakeholder category can be distinguished based on their specialisation in production waste (e.g., bioreactor effluents or scaffold disposal) or consumption waste (e.g., post consumption packaging or uneaten food waste). Notably, some waste streams more closely resemble pharmaceutical byproducts (such as those from antibody production) than those found in conventional food sectors, underscoring the need for new waste management strategies. While CM/CSF production avoids certain conventional waste types—such as animal excrement or non-edible by-products like bones and fur—it creates new challenges, including the disposal of growth media and genetically modified organisms (GMOs) (CSCP Waste Management Focus Group, 2024).

Regarding current engagement, the waste management sector's involvement in CM/CSF remains limited and fragmented. Although some individual producers have initiated internal discussions on waste handling and recycling—such as the treatment of spent media or bioreactor effluents—there is no coordinated industry-wide approach. Most discourse remains confined to isolated waste streams rather than integrated solutions. Furthermore, the volumes that are currently handled in prototyping production are not large enough to warrant a fully-fledged waste management approach (Informant 3, 2024). A key barrier is the lack of cross-sector dialogue and standardised practices. For example, while best practices for wastewater treatment exist in the pharmaceutical sector, they are rarely adapted for CM/CSF contexts. Additionally, there is ongoing discussion about the reusability of inputs (e.g., media recycling) and the potential to create value-added products from side-streams, though these concepts are still underexplored.

Waste management in CM/CSF is increasingly being considered in Life Cycle Assessments (LCAs) and Techno-Economic Analyses (TEAs), yet gaps remain in

defining externalities and in understanding how CM/CSF waste compares to that from conventional livestock systems. For instance, large traditional meat processors like Tönnies in Germany still face unsolved challenges with conventional waste (e.g., pig blood disposal), suggesting that the CM/CSF sector should proactively address its emerging waste streams rather than replicate legacy issues (CSCP Waste Management Focus Group, 2024).

Waste managers' motivations and drivers to engage with CM/CSF

- Practical and legal requirements: Operating a CM/CSF plant will create waste streams that need to be dealt with, both in a practical way to ensure smooth operation, as well as to fulfil legal requirements for waste collection and treatment.
- Defined and contained waste streams: CM/CSF waste is more likely to be clearly defined and managed within controlled environments, reducing unpredictability and contamination risks typically associated with traditional animal waste (CSCP Waste Management Focus Group, 2024). This enables effective revalorisation of waste streams.
- Reduced environmental impact: Cultured meat production presents an opportunity to significantly reduce waste compared to conventional meat systems. This includes minimising animal waste and the environmental burden of large-scale farming operations (Meyer et al., 2024; CSCP Waste Management Focus Group, 2024).
- Lower hazard profile: Waste from CM/CSF processes is often non-animal-derived and therefore less problematic in terms of pathogens or zoonotic disease transmission. There are also no animal disease risks, which further simplifies waste handling (CSCP Waste Management Focus Group, 2024).
- Enhanced monitoring and regulation: Due to its origins in highly regulated laboratory settings, CM/CSF waste management benefits from better monitoring and early awareness of hazardous waste streams (CSCP Waste Management Focus Group, 2024).
- Reduced biological waste complexity: Cultured meat production tends to generate less and more homogenous biological waste, which depending on the process could make it easier to treat and recycle compared to the diversified and voluminous waste of livestock operations (CSCP Waste Management Focus Group, 2024).

- Reduced marine pollution: Cultured seafood (CSF) eliminates bycatch and fishing debris, which are major contributors to marine waste and biodiversity degradation in conventional seafood production (CSCP Waste Management Focus Group, 2024).
- Lower aquaculture feed waste: In contrast to traditional aquaculture, CSF processes generate significantly lower volumes of feed-related waste, thereby contributing to more efficient use of resources (CSCP Waste Management Focus Group, 2024).
- Process optimisation potential: The goal of maximizing nutrient uptake in cell culture media presents opportunities for waste reduction and recovery of valuable byproducts through technological optimisation (CSCP Waste Management Focus Group, 2024).
- Well-characterised chemical and cell waste: Waste managers benefit from clearer categorisation of CM/CSF waste types (e.g., chemical and cell-based waste), facilitating the development of specialized disposal or recycling methods (CSCP Waste Management Focus Group, 2024).
- Elimination of maturation-stage waste: Waste generated during the meat maturation processes in traditional systems (e.g., blood, fat trimmings) is avoided in CM/CSF production, offering a cleaner waste profile (CSCP Waste Management Focus Group, 2024).

Barriers to engage with CM/CSF for waste managers

- Added chemical waste: CM/CSF production introduces new types of chemical waste, including residues from culture media and reagents, which require specialised handling and raise environmental concerns (CSCP Waste Management Focus Group, 2024).
- Increased plastic waste: The reliance on single-use plastics—such as those used in stirred tank reactors (STRs) and filtration systems—adds to the burden on existing waste management systems, especially when incineration of materials like linear low-density polyethylene (LLDPE) is the primary disposal method (CSCP Waste Management Focus Group, 2024).
- Geographically dispersed waste generation: As CM/CSF production may occur at multiple, potentially decentralised sites, managing waste streams across

different locations becomes logistically complex and costly (CSCP Waste Management Focus Group, 2024).

- Decommissioning of traditional infrastructure: A shift from conventional meat and seafood production to CM/CSF could leave behind underutilised or obsolete waste management infrastructure (e.g., facilities built to process animal waste), raising questions about how to repurpose or decommission them sustainably (CSCP Waste Management Focus Group, 2024).
- Wastewater contamination and hormones: Wastewater from CM/CSF facilities may contain hormones or other biological residues requiring advanced treatment methods, posing regulatory and environmental challenges (CSCP Waste Management Focus Group, 2024).
- Resource-intensive growth media: CM/CSF relies on nutrient-rich growth media that can be expensive and energy-intensive to produce. This introduces inefficiencies and increases the environmental footprint of waste associated with media disposal (CSCP Waste Management Focus Group, 2024).
- Antibiotics in the waste stream: If antibiotics are used in CM/CSF production, their presence in waste could contribute to antimicrobial resistance. Conversely, avoiding antibiotics may lead to higher volumes of organic waste, presenting a trade-off in waste management (CSCP Waste Management Focus Group, 2024).
- Lack of natural recycling loops: Unlike traditional livestock systems where waste products can be repurposed (e.g., organic, antibiotic-free manure for fertiliser), CM/CSF processes lack established recycling pathways, limiting its current circularity potential (CSCP Waste Management Focus Group, 2024).
- Uncertainty around chemical spillover: There is limited understanding of how chemical reagents used in production might carry over into final products or waste streams, complicating safety assessments and disposal strategies (CSCP Waste Management Focus Group, 2024).
- High media waste volumes: Compared to pharmaceutical production, CM/CSF generates larger volumes of media waste, necessitating new approaches to manage and recycle these nutrient-rich liquids effectively (CSCP Waste Management Focus Group, 2024).
- Diluted waste streams: The composition of CM/CSF waste streams is often highly heterogenous, which complicates waste concentration, treatment, and energy-efficient processing (CSCP Waste Management Focus Group, 2024).

Information needed by waste managers to further engage with CM/CSF

To enable meaningful engagement with cultured meat and seafood (CM/CSF) systems, waste managers require comprehensive and precise information across several domains. One key need is a deeper understanding of how nutrient-rich growth media can be reused or optimised. Tools such as digital twins and model-based concepts—e.g., soft sensors—can help estimate non-measurable system states and enable near-complete utilisation of media components. This would support circularity and reduce waste generation during production processes (CSCP Waste Management Focus Group, 2024).

Clarification is also needed regarding the volume, composition, and recyclability of waste generated during critical production phases, such as cell line development and harvesting. Questions persist about whether these organic and chemical waste streams can be valorised or reintegrated into the system. This includes waste from media recycling, cell debris, and growth factor degradation, as well as the broader economic implications of managing this waste downstream (CSCP Waste Management Focus Group, 2024).

Plastics used in CM/CSF production—e.g. from single-use stirred tank reactors (STRs)—pose a major environmental concern. Waste managers require data on potential alternatives to conventional plastics and comparative assessments of single-use versus multi-use systems. Concerns also include the prevalence of microplastics in final products and the potential for harmful degradation byproducts (CSCP Waste Management Focus Group, 2024).

In parallel, understanding the accumulation and environmental fate of potentially hazardous components—such as insulin, antibiotics, and hormones used in media—is critical. Waste managers need data on their persistence, potential spillover into final products, and implications for wastewater treatment and biosafety (Waste Management Focus Group).

Comparability between CM/CSF systems and traditional animal production is another pressing concern. To accurately evaluate environmental benefits or drawbacks, standardised life cycle assessment (LCA) baselines are required. These baselines must be tailored to different value chains, e.g., poultry, pork, or seafood, and different farming methods (e.g. small-scale/intensive, organic/conventional,

fisheries/aquaculture) to ensure fair and scientifically robust comparisons (CSCP Waste Management Focus Group, 2024).

Further, there is interest in exploring avenues for waste valorisation, including the use of algae or other biological systems to mitigate waste impacts, and improving energy efficiency through heat recovery processes. Waste managers also require insight into how the food system transition toward CM/CSF will affect existing infrastructures, including the role and impact of losing conventional livestock by-product streams (CSCP Waste Management Focus Group, 2024).

In sum, waste managers need a robust evidence base to engage effectively with CM/CSF systems. This includes data on waste volumes and recyclability, media and growth factor reuse, plastic alternatives, environmental impact comparisons, and safety considerations related to chemical residues. Transparent, comparable, and forward-looking information will be essential to ensure safe, sustainable, and economically viable waste management practices in this emerging sector.

2.3.6 Government and regulatory authorities

Government and regulatory authorities are national and supranational entities responsible for shaping the policy environment in which the CM/CSF sector evolves. They define the legal frameworks, public health standards, economic incentives, and innovation strategies that directly influence the development, production, and commercialisation of CM/CSF. This stakeholder group is not homogenous but includes a variety of institutions with different mandates across the production lifecycle. These include food safety authorities responsible for risk assessment, labelling, and product approvals (e.g., EFSA in Europe or the FDA in the United States); environmental authorities setting sustainability targets and waste regulations; economic authorities shaping taxation, trade, and market access; agricultural and fishery ministries responsible for reconciling traditional protein sectors with emerging alternatives; and innovation authorities offering funding and policy incentives for technological advancement. A more peripheral but increasingly relevant group includes aerospace agencies contributing research on closed-loop food production systems, which may be transferable to CM/CSF technologies. These actors play a decisive role in both enabling and constraining sector growth, from early-stage R&D to market entry and post-market monitoring. Their engagement determines not only whether products are deemed safe and legally marketable, but also how quickly the industry can scale, attract investment, and gain consumer trust. As such, the CM/CSF sector depends on proactive regulatory frameworks that balance innovation with safety, and agility with scientific rigor.

To date, regulatory engagement with CM/CSF has varied significantly across regions and institutional contexts. In the United States, the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) have established a joint regulatory framework since 2019. The FDA oversees the early stages of production, including cell line development and cultivation, while the USDA is responsible for later-stage processing, labelling, and market release (Servick, 2019; Roy & Mandal, 2020). In contrast, the European Union regulates CM/CSF under the Novel Food Regulation (EU 2015/2283), requiring extensive safety assessments, labelling approval, and harmonisation across Member States (Roy & Mandal, 2020). Although this framework is in place, no CM/CSF product has yet reached the EU market. The first application for approval was submitted in July 2024.

Elsewhere, countries like Singapore have taken a pioneering role by approving the first cultured meat product for sale in 2020, positioning themselves as regulatory leaders

in the field (Liu et al., 2022; Ong et al., 2021). Similarly, Japan and Israel have demonstrated active support through investment in infrastructure and the development of dedicated research hubs (Roy & Mandal, 2020). In India, the government has initiated early-stage collaborations, such as the partnership between the Institute of Chemical Technology (ICT) and the Good Food Institute, although formal regulatory frameworks are still emerging (Roy & Mandal, 2020). Across all regions, regulators continue to face challenges in adapting existing food safety and trade regulations to accommodate novel cell-based products. These include questions related to naming conventions, ethical considerations, inter-agency coordination, and ensuring public trust. As most approvals to date have been granted on a case-by-case basis, efforts are now underway to develop more standardised procedures that can keep pace with industry growth while safeguarding public health (Chiriki & Hocquette, 2020; Bomgardner, 2018; Bhat et al., 2019).

Government and regulatory authorities' motivations and drivers to engage with CM/CSF

- **Public health and food safety:** Reducing risks associated with zoonotic diseases, antibiotic resistance, and contamination from persistent pollutants like dioxins and PCBs are key public health motivations for regulatory engagement. Cultured meat offers a controlled production environment that supports higher safety standards and may enhance long-term health outcomes (Roy & Mandal, 2020; Jagadeesan & Salem, 2020; Bomgardner, 2018; Smetana et al., 2023).
- **Food security:** With global population growth and decreasing availability of arable land, cultured meat is seen as a strategic solution for food security. Authorities are interested in supporting CM/CSF as a sustainable protein source that can meet growing demand without overexploiting natural resources (Jagadeesan & Salem, 2020).
- **Public investment potential:** A significant but often underemphasised driver for government engagement in the CM/CSF sector is the ability to control public investment decisions. Governments can catalyse innovation by funding public R&D in low-TRL (Technology Readiness Level) research, which can significantly lower the cost and risk for private sector investment. Similar to the role of public investment in sectors like renewable energy and electric vehicles, governments can help foster the development of high CAPEX industries like CM/CSF, not only by supporting early-stage research but also by aiding in the scaling up of the industry through blended finance mechanisms (e.g., grants, loans, and equity).

investments). This transformative role is crucial for developing a resilient and sustainable sector capable of meeting future food production challenges.

- **Economic growth and green industries:** Governments are motivated by the potential for economic growth, particularly in emerging green industries. The CM/CSF sector represents a significant opportunity to create jobs, spur innovation, and develop new markets.
- **Innovation and technological leadership:** Cultured meat represents a frontier of food innovation. Regulatory bodies, particularly in regions like the US and EU, are driven by the desire to remain leaders in food technology, fostering innovation through supportive frameworks that balance safety with scientific advancement (Roy & Mandal, 2020; Jagadeesan & Salem, 2020; Servick, 2019).
- **Contribution to reach climate targets:** With stagnant reductions in the agrifood industry's environmental impact, especially in Europe, governments have an increasing interest in exploring alternative food production methods that support climate goals. The CM/CSF sector offers the potential to significantly reduce greenhouse gas emissions and other environmental impacts compared to traditional livestock farming. Governments are thus motivated to support the sector as a way of achieving climate targets, especially as agriculture remains one of the most challenging sectors in reducing emissions.
- **Maintaining consumer trust and marketability:** Governments aim to build and maintain public confidence in food systems through transparent evaluation processes, labelling standards, and clear safety regulations. The joint oversight by FDA and USDA in the US, for example, reflects a coordinated approach to ensure public acceptance and protect consumer health while supporting market readiness (Ong et al., 2021; Servick, 2019; Smetana et al., 2023; Chiriki & Hocquette, 2020).
- **Corporate lobbying:** Regulatory engagement may be driven by lobbying pressure from tech companies and investors who see cultured meat as a promising emerging market (Stephens et al., 2018).

Barriers to government and regulatory authorities' engagement with CM/CSF

- **Lack of regulatory frameworks:** In many countries, the absence of clearly defined regulatory structures hinders government engagement with cultured meat and seafood (CM/CSF). India, for example, is still in the early stages of

developing such frameworks, leading to uncertainty and limited formal action (Roy & Mandal, 2020).

- Novelty and technical complexity: The emerging nature of cultured meat technologies presents challenges for regulators, who often lack experience in evaluating full-scale applications. The diversity of product types and associated safety protocols complicates the assessment process, while the lack of harmonised international standards further impedes regulatory development (Ong et al., 2021).
- Consumer acceptance and scepticism: Regulatory bodies are cautious due to uncertainties surrounding public attitudes toward cultured meat. Negative perceptions of novel or genetically modified foods may deter governments from proactively supporting CM/CSF, especially where consumer trust is fragile (Jagadeesan & Salem, 2020).
- Economic viability and scalability: The high costs of cultured meat production and current limitations in scaling technology hinder regulatory support. Governments are reluctant to invest in or promote an industry that has yet to demonstrate economic sustainability or widespread consumer demand (Jagadeesan & Salem, 2020).
- Corporate lobbying: A significant barrier to engagement is the influence of existing agrifood interests (e.g., farming lobbies) that push against regulatory approval. An example of this is the ban on cultured meat in Italy, where significant pressure from traditional agrifood stakeholders led to the government imposing a moratorium on the production and sale of cultured meat products. This reflects the resistance from established industries to the adoption of alternative food technologies that could disrupt traditional farming practices.
- Religious and ethical concerns: In culturally diverse regions, the acceptability of cultured meat under religious dietary laws poses additional regulatory challenges. Debates within Islamic and Hindu communities on whether cultured meat is halal or otherwise permissible introduce uncertainty for national food authorities (Jagadeesan & Salem, 2020).
- Scientific and public uncertainty: In the United States, uncertainty about the scientific basis for regulation and potential public response has slowed the development of robust regulatory strategies, even where interest in CM/CSF is high (Smetana et al., 2023).

- Regulatory complexity and public perception: Developing new frameworks while ensuring alignment with existing food safety protocols is a complex task. Regulators must also contend with public perception and industry lobbying, both of which can slow legislative and policy progress (Servick, 2019).
- Delayed clarity and competitive pressure: Until recently, the U.S. lacked clear procedures for regulating CM/CSF products and production. While additional legislation may not be required, the absence of dedicated laws tailored to this sector creates delays. With countries like Israel, Japan, and Singapore advancing rapidly, delayed regulatory engagement risks placing governments at a competitive disadvantage (Bomgardner, 2018).
- Political resistance: In countries like Italy, political resistance impedes progress on cultured meat regulation, limiting opportunities for NGO advocacy and slowing policy development (FEASTS Stakeholder Database).
- Religious and cultural concerns: Dietary laws and religious considerations (e.g., halal, kosher) introduce regulatory complexity and may slow approval processes in some regions (Post, 2012).

Information needed by government and regulatory authorities to further engage with CM/CSF

To effectively oversee and regulate the emerging field of cultured meat and seafood (CM/CSF), government and regulatory authorities require a robust and multidimensional evidence base. A primary need is comprehensive scientific and safety data to determine whether cultured meat is equivalent to conventional meat in terms of nutritional value and safety for consumption. This includes long-term health assessments and detailed analysis of micronutrient content to ensure nutritional comparability (Roy & Mandal, 2020; Jagadeesan & Salem, 2020). Regulatory agencies must also build rigorous evaluation systems that align with established food safety standards and adapt to the novelty of cultured products (Bhat et al., 2019).

Another key requirement is structured collaboration with industry stakeholders. Ongoing input from producers and researchers is critical to identify potential hazards and implement mitigation strategies early in the regulatory process (Ong et al., 2021; Servick, 2019). Such dialogue not only facilitates better rulemaking but also supports

regulators in anticipating technical developments and aligning safety protocols with innovation cycles (Bomgardner, 2018).

Labelling represents a central issue in fostering consumer trust. Authorities must develop precise definitions and standards for the transparent labelling of cultured meat to ensure both clarity for consumers and fairness within the market (Roy & Mandal, 2020). Transparency, supported by robust labelling frameworks, strengthens public confidence and mitigates the scepticism often associated with novel food technologies.

Moreover, governments need access to advanced modelling tools and data infrastructures that allow them to assess the broader societal impacts of cultured meat. These include tools for environmental risk assessment, economic impact modelling, and public health forecasting, which together support informed decision-making (Jagadeesan & Salem, 2020; Smetana et al., 2023). This should be accompanied by international harmonisation of regulatory standards to avoid fragmented market access and to facilitate global trade in cultured meat and seafood products (Liu et al., 2022).

In conclusion, government and regulatory authorities require a combination of scientific data, stakeholder collaboration, clear labelling systems, advanced risk assessment models, and internationally aligned regulatory frameworks. These components are essential not only to ensure product safety and consumer protection but also to enable a supportive and innovation-friendly environment for the CM/CSF sector to grow responsibly and sustainably.

2.3.7 Investors & Accelerators

Investors and Accelerators in the CM/CSF sector encompass a diverse group of stakeholders who contribute financial capital, strategic direction, and technical expertise to support the development and commercialisation of cultured meat and seafood technologies. This group includes venture capitalists, who fund startups with high-growth potential; banks and financial institutions, which provide loans and credit to facilitate company expansion; startup accelerators, which offer structured programs including mentoring and seed funding to early-stage companies; and consultants, who supply targeted advice on business development, regulatory strategy, and technical implementation.

These stakeholders are essential to the financial backbone and innovation capacity of the CM/CSF sector, playing a pivotal role in enabling research breakthroughs, scale-up efforts, and market entry. Notable corporate actors such as Nestlé, JBS, and Cargill have already invested in or acquired CM-related ventures, underscoring the strategic relevance of these technologies (Dutra da Silva Conte Junior, 2024). In parallel, public-sector involvement in the form of grants and funding programs has further catalysed the engagement of private capital.

The status quo of investor engagement shows a strong, though cautiously optimistic, trajectory. Since 2020, global investments in cultured meat companies have exceeded 490 million USD, with the broader alternative protein sector receiving up to 3.1 billion USD in funding (Vissing-Jorgensen, 2024; Cullen, 2021). North America leads in financial activity, followed by Europe and a rapidly growing Asia-Pacific region. The surge in capital flow reflects growing confidence in CM/CSF's long-term viability and its potential to reshape the global protein market—particularly in view of predictions that cultured meat could constitute up to 35% of global meat consumption by 2040 (Cullen, 2021).

Nevertheless, investment enthusiasm is tempered by notable concerns. Technological uncertainties—particularly those related to production scalability and cost reduction—as well as a lack of clear regulatory frameworks in many regions, act as barriers to broader financial commitment (Liu et al., 2022; Choudhury et al., 2020). High capital intensity and the need for long development timelines deter more risk-averse investors, despite the sector's compelling ethical and environmental narrative. In some cases, cultured meat producers are even perceived as carrying "sin stock" characteristics similar to conventional meat companies, potentially increasing their

cost of capital and affecting portfolio inclusion decisions (Niszczoła & Blaszczyński, 2023).

Despite these challenges, the momentum in investment and accelerator involvement continues to grow. Cultured meat's ability to meet rising global demand while addressing animal welfare, environmental sustainability, and public health concerns positions it as an attractive, albeit complex, opportunity for forward-looking investors worldwide (Gagnon et al., 2023; Jagadeesan & Salem, 2020).

Investors and accelerators' motivations and drivers to engage with CM/CSF

- **Market potential:** Investors are primarily motivated by the market potential of cultured meat as a viable alternative to conventional meat. The opportunity to tap into growing consumer demand for sustainable and ethical food options presents significant financial incentives and the prospect of high returns on investment (Vissing-Jorgensen, 2024).
- **Economic forecasts and long-term growth:** Projections estimating the alternative protein sector to reach a market value of 290 billion USD by 2035 underscore the substantial growth prospects that attract investor interest. Cultured meat, as a subset of this sector, represents a high-potential long-term opportunity for both institutional and private investors (Cullen, 2021).
- **Innovation and ethical appeal:** Investors are also motivated by the technological and ethical innovation embedded in cultured meat. The ability to support a paradigm shift toward sustainable and humane food production, combined with promising economic returns, positions the sector as both a profitable and socially responsible investment opportunity (Dutra da Silva Conte Junior, 2024).
- **Sustainability and food security:** Cultured meat is perceived as a promising solution to sustainability challenges and global food insecurity. The potential to mitigate the environmental impacts of traditional livestock farming—such as greenhouse gas emissions, land degradation, and water scarcity—makes the sector especially attractive to investors aiming to align their portfolios with long-term environmental goals (Gagnon et al., 2023).
- **Disruptive potential and global impact:** Investors are drawn to the transformative nature of cultured meat technologies, which promise to reshape global food systems. The sector's potential to address pressing concerns like

animal welfare and climate change while satisfying increasing global protein demand enhances its strategic investment value (Choudhury et al., 2020).

- Environmental motivation: The ecological benefits of cultured meat production—such as reductions in greenhouse gas emissions, land use, and water consumption—are central motivators for environmentally conscious investors. These benefits offer a pathway toward more sustainable global food systems and position cultured meat as a frontrunner in climate-aligned innovation (Cullen, 2021).

Barriers to investors and accelerators' engagement with CM/CSF

- High production costs: One of the primary barriers for investors is the high cost associated with cultured meat production. Although companies like Future Meat Technologies have made progress in reducing unit costs, the price per pound remains too high for widespread commercialisation. These financial constraints are compounded by technical challenges such as limited bioreactor capacity and difficulties scaling production systems efficiently (Vissing-Jorgensen, 2024; Cullen, 2021; Choudhury et al., 2020).
- Long investment horizons and infrastructure needs: Cultured meat requires significant upfront capital for research, development, and infrastructure. The long payback periods typical of biotech and food innovation sectors discourage risk-averse investors, especially when returns remain speculative (Choudhury et al., 2020; Dutra da Silva Conte Junior, 2024).
- Regulatory uncertainty and delays: Investors face hesitancy due to an unclear and evolving regulatory landscape, particularly in Europe and North America. Approval processes for novel foods like cultured meat can take up to 18 months, adding to uncertainty and delaying market entry. The lack of harmonised international standards further complicates investment decisions (Gagnon et al., 2023; Cullen, 2021; Bhat et al., 2019).
- Market and consumer acceptance risks: Cultural scepticism, consumer concerns about cell-cultured food, and ethical or religious objections pose risks to market adoption. Investors are cautious about public reception, especially in markets where meat alternatives are not yet normalised (Jagadeesan & Salem, 2020; Choudhury et al., 2020; Dutra da Silva Conte Junior, 2024).
- Information gaps and transparency issues: Some investors report difficulties obtaining reliable data from cultured meat companies, which hampers their ability

to conduct robust life cycle assessments (LCAs) and evaluate environmental claims. This opacity affects due diligence and undermines investor confidence (FEASTS Stakeholder Database).

- Sociocultural and ethical investment concerns: Some investors classify cultured meat stocks as ethically complex or "stigmatised," similar to traditional meat producers. This perception may lead to exclusions from certain ESG portfolios, driven by psychological and ethical motivations that go beyond financial risk assessment (Niszczoła & Blaszczyński, n.d.).
- Political and economic instability: Broader macro-level uncertainties—including political disruptions, inflationary pressures, or trade tensions—also deter investors from committing to emerging food technologies like CM/CSF, which are seen as vulnerable in volatile policy environments (Stakeholder Excel, 30-EIT Food; Dutra da Silva Conte Junior, 2024).

Information needed by investors and accelerators to further engage with CM/CSF

Investors and accelerators play a pivotal role in the development and commercialisation of cultured meat and seafood (CM/CSF) by providing the financial capital and strategic expertise required for growth. However, their ability to effectively engage with this emerging sector is contingent on access to a range of specific and reliable information that addresses the unique risks and opportunities of this novel domain.

First and foremost, clarity on regulatory frameworks is essential for reducing uncertainty and enabling long-term investment planning. Investors need detailed knowledge about the procedures for obtaining market approval, particularly in jurisdictions like the EU where regulatory pathways are complex and time-consuming. Transparent safety standards and labelling regulations are necessary to build investor confidence in the sector's compliance and scalability potential (Vissing-Jorgensen, 2024; Cullen, 2021).

In parallel, information on cost-effectiveness and technological progress is a critical determinant of investor engagement. Stakeholders require updated data on innovations that can drive down production costs, such as improvements in bioreactor efficiency, media optimisation, and scale-up technologies. These developments are necessary to improve the commercial viability of CM/CSF and

assure investors of the feasibility of achieving competitive pricing in the future (Liu et al., 2022).

Market intelligence is another key need. Investors seek a robust understanding of consumer demand, acceptance trends, and ethical or cultural considerations that may affect market penetration. Insight into behavioural shifts and emerging market segments helps evaluate the return on investment and guides strategic positioning within the broader alternative protein sector (Dutra da Silva Conte Junior, 2024).

Beyond market and technical data, investors also require support in navigating ethical and reputational dimensions of their investment choices. As an experimental study has shown that CM/CSF stocks are perceived to carry unethical attributes similar to conventional meat products, stakeholders need clearer frameworks to evaluate the alignment of CM/CSF investments with environmental, social, and governance (ESG) principles (Niszczoła & Blaszczyński, n.d.) This includes indications on whether investment decisions in CM/CSF may lead to missed opportunities or long-term portfolio disadvantages (Niszczoła & Blaszczyński, n.d.).

In conclusion, to meaningfully engage with the CM/CSF sector, investors need a transparent and harmonised regulatory environment, detailed insights into cost-reduction strategies and technological innovation, accurate consumer behaviour data, and guidance on the ethical positioning of CM/CSF investments. Closing these knowledge gaps will be crucial for unlocking the financial support necessary to scale the industry and achieve its sustainability and public health promises.

2.3.8 Research & Development

Research and development (R&D) represents a cornerstone of progress in the cultured meat and seafood (CM/CSF) sector. This stakeholder group encompasses activities ranging from techno-economic analyses (TEAs), which assess market potential and societal readiness, to the development of laboratory techniques that enable the cultivation of muscle and fat tissues from animal cells. It includes a diverse set of actors such as universities, research institutes, and private sector R&D departments within both startups and conventional food or biotech companies. Universities typically provide foundational research and talent, while research institutes contribute specialised expertise in areas like tissue engineering or bioreactor design. Corporate R&D teams, meanwhile, focus on the development of scalable and commercially viable solutions, often bridging scientific discovery with product development.

Globally, the R&D landscape for CM/CSF has seen rapid growth since the early 2000s. Countries such as the United States, the Netherlands, and Singapore have become major hubs of innovation. Singapore's pioneering role, exemplified by its regulatory approval of cultured chicken, has helped solidify its reputation as a leader in both research and commercialisation (Ong et al., 2021). Similarly, the Netherlands has long supported research in cellular agriculture, underpinned by strong academic-industry collaboration. In the field of cultured seafood, the United States, Portugal, and Australia are emerging as key players, with research focusing on improving the understanding of cell differentiation processes for various aquatic species (Bomkamp et al., 2023). While the knowledge base for cultured meat is comparatively mature, research on aquatic species is still evolving. In particular, zebrafish and other model organisms are being used to explore the biology of fish and invertebrate cell types, contributing to advances in muscle and fat cell cultivation.

Over time, there has been a shift from basic scientific exploration to more applied research, including hazard identification, safety testing, and process optimisation. Workshops and multi-stakeholder collaborations are increasingly common, reflecting the need for stakeholder engagement to address complex challenges such as cost reduction, media optimisation, and regulatory readiness. In this context, R&D continues to play a critical role in shaping the future viability of the CM/CSF sector at both regional and global levels.

Research and development's motivations and drivers to engage with CM/CSF

- **Technological innovation:** The challenge of developing scalable and efficient CM/CSF production systems motivates researchers to innovate in areas such as bioreactor design and cell culture media. These technical barriers present opportunities to create transformative solutions that could enable mass production of cultured proteins while maintaining quality and cost-efficiency (Ong et al., 2021).
- **Public and regulatory demand:** The growing need for robust food safety standards drives R&D engagement. Researchers aim to develop safety protocols that align with regulatory frameworks, ensuring that CM/CSF products meet legal standards and are safe for public consumption. These efforts also support consumer acceptance by building trust in novel food technologies (Ong et al., 2021).
- **Sustainability and ethics:** Research and development (R&D) in the cultured meat and seafood (CM/CSF) sector is strongly motivated by the goal of creating more sustainable food systems. Researchers are drawn to the environmental benefits of reducing land use, water consumption, and greenhouse gas emissions associated with traditional animal agriculture. Ethical considerations, such as minimising animal suffering, further reinforce R&D efforts in this space (Ong et al., 2021).
- **Sustainability in seafood:** In the cultured seafood sector, sustainability concerns extend to the ecological impact of conventional seafood production. Researchers are driven by the need to reduce environmental damage from overfishing, habitat destruction, and bycatch, seeking alternatives that can sustainably meet rising global demand for seafood (Bomkamp et al., 2023).
- **Species-specific technological challenges:** The unique cellular and tissue structures of aquatic species present specific scientific challenges, spurring innovation in cellular biology and tissue engineering. R&D is motivated by the opportunity to replicate the texture and nutritional profile of conventional seafood using novel biotechnological methods (Bomkamp et al., 2023).

Barriers to research and development's engagement with CM/CSF

- **Product optimisation:** One limitation is the current state of the final product, which still requires further refinement in taste, texture, and nutritional quality to

achieve broader consumer acceptance and meet commercial standards (FEASTS Stakeholder Database).

- High R&D costs: Cultured meat and seafood research is capital-intensive. Key cost drivers include the development of scalable bioreactor systems, formulation of growth media, and implementation of rigorous safety assessments, all of which present financial barriers to sustained R&D (Ong et al., 2021).
- Limited funding opportunities: Research initiatives in the CM/CSF sector face financial constraints, as there are relatively few targeted funding schemes available, especially in public R&D frameworks (FEASTS Stakeholder Database).
- Research niche and lack of transparency: CM/CSF remains a highly specialised research niche with limited public funding and a shortage of openly accessible data and protocols, which restricts knowledge exchange and collaborative innovation (FEASTS Stakeholder Database).
- Regulatory uncertainty: Divergent and evolving regulatory landscapes across global regions—particularly between Europe and Asia—create complexity for researchers who must navigate different safety, labelling, and approval standards (Ong et al., 2021).
- Technological uncertainty in scaling: Meat and seafood producers face significant technological uncertainties regarding how to scale cultured meat/seafood production in ways that match the efficiency of traditional systems (Fraeye et al., 2020; Wilks et al., 2021).
- Lack of standardised safety testing methods: The absence of established and harmonised safety testing methodologies tailored to CM/CSF products poses a major challenge. Conventional food safety protocols are insufficient to fully address the novel risks and characteristics of these emerging products (Ong et al., 2021).
- Lack of established protocols in seafood research: Compared to mammalian cell systems, cultured seafood research lacks standardised protocols, particularly for key biological processes such as cell differentiation and tissue maturation, making experimental design and comparison difficult (Bomkamp et al., 2023).
- Biological complexity of seafood species: The diverse and complex biology of fish and aquatic invertebrates adds further difficulty to cell line development and tissue engineering, slowing progress in cultured seafood R&D (Bomkamp et al., 2023).

- Need for public engagement and education: A lack of widespread understanding among consumers and public institutions continues to hinder the sector. Educational efforts are necessary to counter misinformation and build informed support for CM/CSF technologies (FEASTS Stakeholder Database).
- Political resistance and misinformation: In the European Union, some local politicians contribute to public scepticism by spreading misinformation, which undermines research legitimacy and slows down public acceptance and funding momentum (FEASTS Stakeholder Database).

Information needed by research and development to further engage with CM/CSF

To effectively engage with the cultured meat and seafood (CM/CSF) sector, R&D stakeholders require access to critical technical, regulatory, and financial information that supports the safe and scalable advancement of these technologies. A primary need identified in the literature is the development of standardised safety assessment protocols. Current methods used in conventional food safety do not fully account for the novel materials and processes in CM/CSF production, such as synthetic growth media and scaffold components. R&D actors require robust and harmonised frameworks to evaluate potential risks and to ensure that residual inputs do not pose health concerns in the final products (Ong et al., 2021).

In addition, the sector requires scientific evidence on the nutritional content, health benefits, and food safety of cultured meat in order to assess how to integrate these products into existing production and supply chains. This includes data needed for quality control, product standardisation, and compatibility with current distribution infrastructures (Fraeye et al., 2020; Siegrist & Hartmann, 2020).

A further challenge for researchers is the limited availability of shared data across institutions and companies. Increased collaboration between academia, private industry, and regulatory authorities is essential to close existing knowledge gaps and facilitate the development of comprehensive safety and quality standards (Ong et al., 2021). Such collaboration would accelerate innovation and reduce redundancy in parallel research efforts.

Another major barrier is the scarcity of dedicated funding for long-term R&D. While private investments are growing, public funding remains limited, particularly for fundamental and safety-related research. Sustained financial support is needed to

investigate the long-term impacts of CM/CSF consumption, both from a health and environmental perspective (Ong et al., 2021).

From a technical standpoint, researchers require refined and scalable protocols for inducing the differentiation and maturation of relevant cell types, particularly in seafood species. This includes improved methods for cultivating muscle and fat cells in vitro, which are central to replicating the texture and nutritional properties of conventional meat and fish (Bomkamp et al., 2023). To this end, cross-species insights from developmental biology—using model organisms like zebrafish—can provide valuable guidance for understanding cell behaviour and tissue formation in aquatic species (Bomkamp et al., 2023).

In conclusion, the R&D sector's ability to contribute to the development of the CM/CSF industry hinges on the availability of standardised safety testing methods, increased cross-sectoral data exchange, scientific evidence for supply chain integration, stable long-term funding, and scientific advances in cellular biology. Meeting these needs will be instrumental in ensuring the safety, scalability, and consumer acceptance of cultured protein technologies.

2.3.9 Media & General Public

The stakeholder group of media and the general public encompasses a wide array of actors and communication channels that shape, distribute, and receive information about the CM/CSF sector. This group includes scientific media that disseminate research findings, business and industry media focusing on market developments, public media that inform the wider population, and social media platforms that facilitate public discourse and opinion shaping. Additionally, public relations and press departments within CM/CSF companies and institutions play a crucial role in directing narratives and framing sector-related developments for external audiences.

Globally, media engagement with CM/CSF has evolved significantly over the past decade. In the United States and the United Kingdom, for instance, media coverage has been steadily increasing since the first public presentation of a cultured burger in 2013, peaking around 2019. The framing of such innovations in the media—especially when highlighting societal and environmental benefits—has played a central role in shaping public attitudes, though the use of varied terminology (“lab-grown,” “clean,” or “cultured” meat) has contributed to public confusion and inconsistent perceptions (Painter et al., 2020; Chriki et al., 2020; Webster & Talarczyk, 2021).

Despite this growing coverage, public familiarity with CM/CSF remains limited in many regions. In the US, only around 7% of consumers are very familiar with cultured meat, and similar figures are reported in the UK (Szejda et al., 2021). Younger generations, such as Millennials and Gen Z, tend to be more open and better informed about the technology than older groups, who often express greater scepticism and traditionalist views on food (Kantor & Kantor, 2021). While the environmental framing of CM/CSF tends to improve consumer willingness to try and purchase these products, persistent concerns about unnaturalness and food safety continue to hinder broader acceptance (Bryant & Dillard, 2019; Dai et al., 2024).

In Singapore, where the government has approved the commercial sale of cultured chicken, public engagement is increasing but remains clouded by misinformation and confusion between cultured and plant-based meats (Ho et al., 2023). This highlights the important role of public media and education in clarifying key concepts and building consumer trust. Across all regions, it is evident that media coverage—especially that initiated by industry milestones or governmental action—serves as a key driver of public awareness and engagement (Tomiya et al., 2020).

The media and general public's motivations and drivers to engage with CM/CSF

- **Environmental concerns:** Cultured meat is perceived as significantly less harmful to the environment than conventional meat due to its potential to reduce greenhouse gas emissions, water usage, and land use. This narrative was present in up to 64% of media articles (Painter et al., 2020) and is a consistent driver for public support across the US, UK, and Singapore (Szejda et al., 2021; Ho et al., 2023; Tomiyama et al., 2020; Chriki et al., 2020). In the UK specifically, environmental benefits were rated as equally or more important than personal health in consumer motivations (Szejda et al., 2021).
- **Health considerations:** The public is motivated by the potential health benefits of cultured meat, such as being free from antibiotics and pathogens, potentially lower fat content, and fewer risks of zoonotic diseases (Szejda et al., 2021; Kantor & Kantor, 2021; Ho et al., 2023). Health-related narratives appeared in 19% of media articles (Painter et al., 2020), and were especially influential among US consumers, where personal health ranked above environmental concerns (Szejda et al., 2021). Framing the product as healthier also increases willingness to engage (Bryant & Dillard, 2019).
- **Ethical and animal welfare concerns:** Many consumers — particularly vegetarians and vegans — are drawn to cultured meat due to its cruelty-free nature and minimal animal involvement. These ethical motivations were noted in 45% of media articles (Painter et al., 2020) and are frequently highlighted by the media and scientific literature (Webster & Talarczyk, 2021; Chriki et al., 2020).
- **Food security and global supply:** Cultured meat is seen as a potential solution to global food insecurity and rising protein demand, especially in contexts with limited natural resources. In Singapore, for instance, the local population perceives cultured meat as a way to strengthen food independence by reducing reliance on imports (Ho et al., 2023). Globally, 29% of media coverage discussed cultured meat as a technology to “feed the world” (Painter et al., 2020; Chriki et al., 2020).
- **Media framing and sensory appeal:** Public willingness to try and adopt cultured meat increases when it is framed positively — e.g., as the “best burger” in terms of taste, or as a societal good. Framing focused on environmental or health benefits generates more support than when the product is presented through high-tech or artificial narratives (Kantor & Kantor, 2021; Bryant & Dillard, 2019; Painter et al., 2020).

- Societal and climate benefits: Consumers respond positively to the idea that cultured meat could help mitigate climate change and contribute to societal good. This includes reducing agricultural emissions and helping transition to sustainable food systems (Webster & Talarczyk, 2021; Bryant & Dillard, 2019; Chriki et al., 2020).

Barriers to the media and general public's engagement with CM/CSF

- Limited access to trustworthy and independent information: Journalists often rely on press releases or company materials, which may emphasise promotional narratives. Independent, peer-reviewed data on nutrition, environmental impact, or scalability is relatively scarce, making it difficult to verify claims or present a balanced view.
- Scientific complexity and low subject familiarity: Journalists may lack the technical expertise required to interpret complex biotechnological processes. This can lead to oversimplified or inaccurate reporting, further fuelling misinformation or public confusion.
- Lack of consistent terminology: Inconsistent use of terms such as “lab-grown,” “clean,” “cell-based,” or “cultivated” meat complicates public understanding and media communication. Without clear, standardised language endorsed by scientists, industry, and regulators, journalists struggle to provide accurate and accessible reporting (Webster & Talarczyk, 2021).
- Restricted product availability and lack of experiential reporting: Due to regulatory constraints and high production costs, most journalists and consumers cannot access CM/CSF products for tasting or review. This limits experiential coverage that could otherwise engage audiences through relatable, sensory storytelling.
- Commercial confidentiality and limited transparency: Many CM/CSF companies operate under tight intellectual property controls, restricting access to production sites, technical staff, or process details. As a result, journalists often face difficulties conducting investigative or in-depth reporting.
- Historical scepticism toward food technologies: Lingering public distrust, shaped by past controversies around genetically modified organisms (GMOs), continues to influence media coverage and public opinion. CM/CSF is often situated within a broader scepticism towards food-tech innovations (Webster & Talarczyk, 2021).

- Ideological and political polarisation: In some regions, CM/CSF has become politicised, with certain parties or media outlets framing the technology as a threat to national identity, traditional farming, or food culture. This polarisation reduces space for balanced reporting and hinders constructive public discourse.
- Lack of media toolkits and targeted communication resources: Few companies or institutions have developed high-quality, media-friendly materials such as visuals, explainer videos, or FAQs tailored to non-specialist audiences. This absence limits the media's ability to convey complex topics effectively and accessibly.

Information needed by the media and general public to further engage with CM/CSF

To enhance engagement with cultured meat and seafood, the media and general public require targeted, accessible, and trustworthy information that addresses their concerns, clears misconceptions, and resonates with societal values. A central need identified across studies is clear and transparent labelling, ideally endorsed by trusted regulatory agencies such as the FDA, USDA, or FSA. This enhances consumer confidence and ensures clarity about product identity and safety (Szejda et al., 2021; Painter et al., 2020).

Educational content plays a critical role in reducing knowledge gaps. Many consumers remain unfamiliar with the CM/CSF production process, often confusing it with plant-based alternatives. Educational campaigns should highlight environmental and health benefits, correct misunderstandings about terminology, and explain the distinction between cultured and plant-based products (Ho et al., 2023; Webster & Talarczyk, 2021; Chriki, 2020).

Framing and language significantly influence public perception. Studies show that terms like “cultured” or “cultivated meat” are preferred over “lab-grown” or “cell-based meat,” which are often associated with artificiality and scientific detachment (Szejda et al., 2021; Kantor & Kantor, 2021; Bryant & Dillard, 2019). Positive framing emphasising taste, ethical benefits, and sustainability improves public receptiveness, whereas overly technical messaging may increase skepticism (Tomiya, 2020; Dai et al., 2024).

Additionally, health and safety information is essential. Consumers need assurance that CM/CSF products are not only safe but potentially healthier than conventional

meat—free from antibiotics, with reduced risk of zoonotic diseases (Kantor & Kantor, 2021; Dai et al., 2024; Goodwin, 2013). Misconceptions about unnaturalness or risk can be reduced through transparent communication and data-backed comparisons with conventional meat.

Cultural and regional considerations must also be taken into account. In markets like Singapore and the US, information regarding religious certification (e.g., halal status) and alignment with identity values (e.g., eco-conscious masculinity) can shape consumer willingness to engage (Ho et al., 2023; Dai et al., 2024). A one-size-fits-all communication strategy will likely fail to address these contextual differences.

The media and general public need clear, consistent, and positively framed information about the safety, production process, benefits, and distinctions of CM/CSF. Trustworthy regulatory labelling, accessible education materials, and culturally sensitive messaging strategies are essential to foster informed and supportive public engagement (Szejda et al., 2021; Bryant & Dillard, 2019; Dai et al., 2024; Chriki, 2020).

2.3.10 Vocational Education and Training

Vocational education and training is essential for ensuring the further growth of the cultured meat and seafood sector. Education and skills development refers to all population-oriented practices and programmes aimed at equipping individuals and communities with knowledge, competencies, and critical perspectives related to cultured meat and seafood. This includes both formal education settings—such as schools, vocational institutions, and universities—and informal learning through public awareness campaigns, advocacy initiatives, and NGO-led outreach. Stakeholders in this space range from educators and academic researchers to vocational training providers, NGOs, and marketers. Most importantly, this domain serves to build the workforce needed to sustain and grow the CM/CSF sector.

As an emerging and interdisciplinary field, CM/CSF combines elements from cell biology, bioprocess engineering, food science, ethics, and sustainability. As such, the education and skills development sector plays a dual role: preparing future employees for the technical demands of the industry and fostering societal literacy about the technology's implications. However, due to its novelty and scientific complexity, engagement with CM/CSF within the education sector remains limited and uneven.

At present, engagement from the vocational education and training sector with CM/CSF is at an early stage. While several universities—particularly in the Netherlands, Germany, the US, and Singapore—have introduced CM/CSF into their academic curricula or supported related research projects, there is limited structured training at the vocational level. Most existing programmes in food technology, biotechnology, or meat processing do not yet include content specific to cellular agriculture.

In the realm of workforce development, there is a significant demand for skills. Cultured meat and seafood companies frequently cite challenges in hiring personnel with appropriate cross-disciplinary training—particularly individuals who can bridge biotechnology with food production and product development. Most relevant expertise currently resides in adjacent fields such as biomedical engineering or fermentation science, requiring on-the-job retraining or company-specific upskilling.

The education and skills development sector's motivations and drivers to engage with CM/CSF

- Alignment with future-oriented industries: Educational institutions are motivated to engage with CM/CSF as it represents a forward-looking, innovation-driven sector that aligns with sustainability goals and food system transformation.
- Student interest and demand: Younger generations, particularly Gen Z, are increasingly conscious of climate change, ethical food production, and health. CM/CSF appeals to these values and offers an exciting, interdisciplinary field of study.
- Workforce development and skills anticipation: Vocational institutions are under growing pressure to anticipate future skill demands. CM/CSF is recognised as a promising sector for job creation, prompting interest in curriculum development and training opportunities.
- Opportunities for interdisciplinary teaching: CM/CSF provides an entry point to teach complex, cross-cutting themes such as biotechnology, environmental science, ethics, and innovation in an integrated and applied way.
- Institutional positioning and innovation branding: By engaging with CM/CSF early, education providers may enhance their reputation as progressive and future-oriented institutions, attractive to funders, partners, and prospective students.
- Public engagement and scientific literacy: NGOs, science museums, and education-focused organisations see CM/CSF as a tool to raise public awareness around food systems, sustainability, and new technologies.

Barriers to the education and skills development sector's engagement with CM/CSF

- Uncertainty around feasibility and timelines: It remains difficult for institutions to determine when CM/CSF will reach technological and commercial maturity. This makes it challenging to justify investment in long-term educational planning (FEASTS Stakeholder Database).
- Lack of established curricula and frameworks: There is an absence of standardised educational content or qualifications specifically focused on CM/CSF, particularly within vocational education and training systems.

- Shortage of qualified trainers and interdisciplinary expertise: Many educators lack the background or confidence to teach the biological, technical, and ethical dimensions of CM/CSF, limiting institutional capacity.
- Low visibility of career pathways: The sector remains relatively unknown to students and jobseekers, with few clearly defined professional roles or training routes leading into CM/CSF employment.
- Limited collaboration with industry: Most CM/CSF companies have not yet established partnerships with education providers, resulting in missed opportunities for internships, guest lectures, or joint curriculum development.
- Resource constraints and competing priorities: Education providers—especially in vocational and secondary contexts—face tight budgets and multiple competing topics for curriculum inclusion. Emerging technologies like CM/CSF may not be seen as an immediate priority.

Information needed by the vocational training and education sector to further engage with CM/CSF

To support meaningful engagement with CM/CSF, the vocational training and education sector requires accessible, interdisciplinary teaching materials that can be adapted for different age groups and learning contexts. These should include case studies, hands-on activities, and media resources that cover both the science and societal implications of CM/CSF.

Clarity on the current and projected labour market needs is also essential. Vocational training institutions in particular would benefit from guidance on what skills, certifications, and practical competencies are required by employers in the CM/CSF space. This information would help align existing courses or inspire the development of specialised modules.

Educators also need trusted, up-to-date data on the environmental, ethical, and nutritional dimensions of CM/CSF. Being able to teach from a position of scientific rigour and neutrality is key to ensuring public trust and informed debate.

Finally, there is a strong need for institutional partnerships between CM/CSF companies, research centres, and education providers. These partnerships could support teacher training, guest lectures, student internships, and collaborative curriculum development—ensuring that educational initiatives are aligned with technological realities and industry expectations.

2.3.11 Conventional Meat & Seafood System

The current meat and seafood system comprises a wide range of stakeholders involved in the production, processing, and distribution of conventional animal-based products. These actors include livestock farmers, aquafarmers, crop farmers supplying feed and inputs, and food manufacturing companies that process and package meat and seafood products. This sector is characterised by established supply chains, regulatory frameworks, and consumer markets that have evolved over centuries. Notable organisations representing these stakeholders include the Copa Cogeca, and the Global Aquaculture Alliance. The emergence of cultured meat and seafood presents both opportunities and challenges for this stakeholder group, necessitating an evaluation of their engagement with these technologies.

The meat and seafood industries remain largely reliant on conventional farming methods, which are resource-intensive, requiring extensive land, water, and energy inputs (Saavoss, 2019). These industries are observing cellular agriculture developments with interest but remain hesitant to adopt them due to technological and economic uncertainties. While some governments actively promote research into CM/CSF as part of sustainability strategies (Moritz et al., 2023; Rodríguez Escobar et al., 2021), global engagement remains fragmented. Countries like the United States and Israel are at the forefront of research and commercialisation, while others adopt a wait-and-see approach, dependent on further technological validation and market feasibility (Bhat et al., 2020; Fraeye et al., 2020).

The emergence of cultured meat and seafood (CM/CSF) presents both opportunities and challenges for this stakeholder group. While the sector plays a central role in current food systems, it faces increasing scrutiny over its environmental impact, animal welfare issues, and long-term sustainability. As cellular agriculture technologies gain traction, the conventional meat and seafood industry is prompted to reflect on its future role and explore areas of collaboration, adaptation, or resistance.

Engagement from the conventional meat and seafood sector with CM/CSF remains limited and cautious. While a few major meat corporations—particularly in the United States, the Netherlands, and Asia—have invested in or acquired stakes in CM/CSF start-ups, these moves remain the exception rather than the norm. Most small and medium-sized farmers and aquafarmers are either unaware of the technology or

perceive it as a distant or disruptive innovation with little immediate relevance to their operations (Interviewee 12, 13).

Interviews with informants from the conventional meat and seafood sector highlight a significant gap in information and understanding (Interviewee 12, 13). Many conventional actors are unfamiliar with the processes behind CM/CSF or conflate them with plant-based alternatives. Those who are aware of the technology often express scepticism, citing concerns over feasibility, regulation, consumer trust, and potential job losses. While large multinational corporations may have the capacity to diversify their investments, smaller producers—particularly those operating in rural or economically constrained regions—have little margin to explore emerging technologies without substantial institutional support.

In some cases, farming and aquaculture representatives have publicly voiced concerns about cultured meat's implications for food culture, rural economies, and national identity. At the same time, the industry is beginning to recognise the potential for CM/CSF to offer niche market opportunities or to complement conventional products through hybrid formats or alternative protein diversification.

The conventional meat and seafood system's motivations and drivers to engage with CM/CSF

- **Diversification and future-proofing:** Some large-scale farmers and aquafarmers see CM/CSF as a way to diversify their portfolios and include additional revenue streams in the face of climate risk, shifting consumer preferences, and policy-driven sustainability targets.
- **Strategic investment opportunities:** A few industry leaders are investing in cellular agriculture start-ups as a hedge or innovation strategy, aiming to be part of the next wave of food technologies.
- **Sustainability and public image:** Engagement with alternative protein innovation may support producers in improving their environmental credentials and demonstrating responsiveness to societal concerns, particularly among younger consumers.
- **Governmental and policy incentives:** In countries where CM/CSF aligns with national sustainability or innovation strategies, conventional producers may be incentivised through funding calls, research partnerships, or transition schemes.

- Animal welfare improvements: For aquafarmers and livestock producers concerned with ethical practices, CM/CSF presents a theoretical pathway to reduce animal slaughter while maintaining product continuity.

Barriers to the conventional meat and seafood system's engagement with CM/CSF

- Perceived threat to livelihoods and cultural identity: Many farmers and aquafarmers see CM/CSF as a fundamental threat to traditional practices, rural economies, and long-standing cultural values around animal husbandry and food. Family-owned, small-scale farmers and aquafarmers exhibit a greater threat perception than industrial, large-scale farmers and aquafarmers (Interviewee 12, 13).
- Lack of knowledge and awareness: There is limited understanding of how CM/CSF is produced, regulated, or positioned in the market. Misconceptions and conflation with GMOs or synthetic foods persist.
- Uncertainty about feasibility and market timing: Farmers and aquafarmers are unsure when or whether CM/CSF will become a competitive reality. Without clear commercial timelines or use cases, they are hesitant to invest or adapt.
- Limited access to transition support: Small and medium-sized famers and aquafarmers, in particular, lack access to funding, training, or institutional support to engage with CM/CSF in a meaningful or constructive way.
- Fragmented policy environments: Inconsistencies across national and regional policies regarding CM/CSF development and labelling make it difficult for conventional actors to understand where the sector is heading and see their future in it.
- Risk of market displacement: Farmers and aquafarmers fear being sidelined in policy discussions and future food systems planning, especially if CM/CSF becomes politically or economically favoured without inclusive consultation.

Information needed by the conventional meat and seafood system to further engage with CM/CSF

For the current meat and seafood system to engage meaningfully with CM/CSF, stakeholders require access to key information. Safety data and long-term health

studies are essential for policymakers to assess the viability of cultured products and ensure consumer protection (Post, 2012). Public education and outreach campaigns are also necessary to counter misconceptions and foster acceptance (Bryant & Barnett, 2020).

Environmental impact assessments comparing cultured and conventional meat can provide stakeholders with data on sustainability benefits (Post, 2012). Clear regulatory frameworks are critical for ensuring safety and transparency in production, labelling, and marketing (Stephens et al., 2018). Additionally, industry actors need insights into the economic feasibility of CM/CSF, including cost structures, technological advancements, and consumer demand trends (Saavoss, 2019).

Scientific evidence on the safety, nutritional value, and quality of cultured meat and seafood is another key requirement, as traditional producers seek assurances that these products meet regulatory and consumer standards (Fraeye et al., 2020; Siegrist & Hartmann, 2020). Finally, understanding consumer preferences, including taste perceptions, ethical considerations, and willingness to pay, is essential for determining how cultured products can be positioned within existing markets (Siegrist & Hartmann, 2020; Chriki & Hocquette, 2020).

Figure 13Figure 16 present persona profiles of farmers and aquafarmers that summarise their engagement, motivations, barriers, and needs for more information to enhance engagement, developed from the literature review and persona interviews.



The Traditionalist Livestock Farmer

Background

"I don't believe in cellular agriculture on farms. It's not a farm thing, it's an industrial one."

Christophe Dubois
52



Pig farmer



France



Against CM



Engagement with CM:

No prior engagement with CM.

1

Motivations and drivers to engage with cultured meat

- Preserving **cultural heritage** and regional **farming traditions** and differentiating their products from cultured meat.
- **Skepticism** towards **perceived "artificial" alternatives** in food production; however, if consumer and/or market demand shifts to cultured meat, could be open to additional revenue streams while maintaining traditional farming.

2

Barriers to engage with cultured meat

- Sees cultured meat as a direct **competitor** to his business. Perceives billionaires as financing this innovation, and does not want the industry to be in the hands of a few billionaires.
- **Distrust** in the technology and its long-term effects.
- Concern about regulatory and market shifts that could **devalue traditional farming**.
- Desire to maintain **consumer trust** in traditional meat.

3

Information needed to further engage with cultured meat

- Facilitate an understanding that **farmers can have a role to play in the transition** to cultured meat. Take them along the journey and show a clear role for them with positive financial impact. Show that CM could be a support/an alternative to the economic pressures facing livestock farmers today.
- Underline that the growing demand for meat will **not be met with traditional livestock farming**. Government schemes could support CM production on top of traditional livestock farming to support farmers to diversify production to meet this demand.
- Evidence that CM will not replace traditional farming, but can **complement it** and safeguard EU food sovereignty.



Figure 13: Persona profile of a farmer (with reservations on CM/CSF)



The Pragmatic Farmer-Entrepreneur

Background

"If there's money in selling cultivated meat, why not? I need to diversify my revenue streams to bolster uncertainties and manage risk."

Lieke De Witte
42



Cattle farmer



Netherlands



Pro CM



Engagement with CM:



No prior engagement with CM.

1

Motivations and drivers to engage with cultured meat

- Sees selling cultured meat as potential **new revenue stream**.
- Clear distribution channels can provide the **economic certainty** needed for investing in means of cultured meat production.
- Believes that **technology can solve shortcomings** in business models and farm operations.
- Interest in **innovation** and future-proofing her farm.
- Sees possibility of integrating the production of cultured meat in **agro-ecological approaches**.

2

Barriers to engage with cultured meat

- **Uncertainty** about regulations and financial investment needed.
- **Lack of knowledge** on how farmers could integrate CM into their business model, including a lack of expertise and skills.
- **Risk aversion**—CM is still in early development, and large investments feel risky.

3

Information needed to further engage with cultured meat

- Clear **guidance** is needed on the market possibilities for farmers, the quantities and demand expected. Further information on the technical implementation, cost structure, type of products, distribution, and marketing is needed.
- **Business models** demonstrating with clear return on investment (ROI) how traditional farmers can profit from CM. Important factors to consider are the ROI in 5-10 years, the farm's cash flow, possibility to scale, and general conditions such as prices and offers.
- Availability of **government support programmes (e.g. subsidies)** can support taking the risk for farmers willing to engage in CM-related ventures.



Figure 14: Persona profile of a farmer (positive outlook on CM/CSF).



The Heritage-Driven Aquafarmer

Background

"People trust fresh seafood from the sea, not something grown in a lab. Our way of farming is already sustainable."

Giulietta Rossi
55



Small-Scale Mussel Farmer



Italy



Against CFS



Engagement with CSF:



No prior engagement with CSF.

1

Motivations and drivers to engage with cultured seafood

- Rather interested in **maintaining the reputation of aquaculture** as a natural, high-quality food source, in contrast to the perceived "unnaturalness" of cultured seafood.
- Cultured seafood could be seen as a potential backup plan if **changing ocean conditions** threaten traditional mussel farming.
- **Market demand** for alternative seafood options could move to explore CSF as a complementary revenue stream.
- Additional **land licensing** for aquafarming is a challenge, so CSF could circumvent this issue.

2

Barriers to engage with cultured seafood

- As a family-run farm, focus on **maintaining traditional practices** over technological innovations.
- CSF is not yet seen as a **threat** to traditional aquaculture due to the lack of technological readiness, but may be seen so in the future.
- **Lack of knowledge and awareness** of potential integration points for aquafarmers in the CSF value chain.
- The **lack of legislation** is a problem affecting the current sector, which is heightened in CSF, making it less promising.
- **Existing investments** may hinder engagement.
- Distrust in the long-term **sustainability claims** of CSF.

3

Information needed to further engage with cultured seafood

- Information on potential hybrid **business models** that integrate CSF without abandoning traditional aquaculture.
- **Government support programmes (subsidies)** for CSF production could lead to consideration of CSF as an additional revenue stream.
- **Scientific comparisons** of the sustainability of CSF versus traditional aquaculture.



Figure 15: Persona profile of an aquafarmer (with reservations on CM/CSF)



The Market-Oriented Aquaculture Investor

Background

"If cultivated seafood can reduce costs and scale up, I'm interested. Consumers want sustainability, and we need to deliver."

Henrik Olsen
38



CEO, Large-Scale Salmon Farm



Norway



Pro CM/
CFS



Engagement with CM/CSF:



No prior engagement with CSF.

1

Motivations and drivers to engage with cultured seafood

- **Investment potential**—positioning his company at the forefront of innovation.
- Value of advanced technology and more **control over production**.
- Interest in reducing environmental impact while maintaining profitability: CSF as an opportunity to **meet sustainability and market demands**, including consumer expectations for sustainability.
- CSF as an opportunity to demonstrate **responsible production**.

2

Barriers to engage with cultured seafood

- Current CSF technology is **not cost-competitive** with traditional aquaculture.
- **Lack of infrastructure** and **skilled workforce** for transitioning to CSF production.
- **Regulatory uncertainties** about how cultivated seafood will be integrated into existing legislation.
- The **level of investment** needed and any **existing investments** that may inhibit further investing into new technologies.
- Health and nutrition important aspects for consumers - this needs to be ensured in CSF development.

3

Information needed to further engage with cultured seafood

- **Cost-benefit analyses** comparing large-scale aquaculture and CSF production.
- Clear **roadmaps for integrating CSF** into existing aquaculture business models.
- Understanding of future **regulatory approaches** for CSF.
- **Government incentives** for early adopters of cultured seafood production.



Figure 16: Persona profile of an aquafarmer (positive outlook on CM/CSF)

3. FEASTS Stakeholder Engagement Plan

The integration of CM/CSF into our diets holds significant potential for a more sustainable and ethical food system. Given the environmental and ethical concerns associated with conventional meat and seafood production, CM/CSF presents a viable alternative that could contribute to climate change mitigation, food security, and reduced environmental impact.

However, the sector is still in its early stages, with no fully CM/CSF products on the market apart from hybrid products that combine cultured ingredients with other components. To ensure a comprehensive and unbiased understanding of its potential, challenges, and implications, it is essential to engage a diverse range of stakeholders with varying roles, perspectives, and concerns.

This stakeholder engagement plan provides a structured framework for stakeholder engagement within FEASTS, ensuring that interactions are systematic, inclusive, and purpose-driven. It is guided by the AA1000 Stakeholder Engagement Standard (AccountAbility, 2015) and the AA1000 AccountAbility Principles Standard (AccountAbility, 2018), which establish key principles for meaningful engagement:

- Inclusivity: Ensuring the engagement of all relevant stakeholders rather than a select few.
- Materiality: Identifying and prioritising the issues most important to stakeholders.
- Responsiveness: Addressing stakeholder concerns and input while providing transparent feedback.
- Impact: Identifying, monitoring, evaluating, and communicating the effects of activities on stakeholders and the broader ecosystem.

The stakeholder engagement plan defines the mandate, purpose, and scope of engagement in FEASTS, outlines planned activities, and aligns them with the recommended engagement levels derived from the stakeholder analysis. Additionally, it provides practical guidance and support materials to facilitate effective stakeholder interactions throughout the project.

3.1 Mandate, Purpose, and Scope of Engagement in FEASTS

Mandate and Ownership

Stakeholder engagement is a core element of FEASTS, with many activities mandated by the Grant Agreement and others added to support and enhance the delivery of project tasks. Ownership for engagement is shared across work packages and tasks.

FEASTS is, particularly, supported by a collaborative platform managed by Work Package 7 that includes an external Stakeholder Board and a network of related projects and initiatives. This platform fosters alignment with ongoing research, promotes international collaboration, and helps define shared priorities for future-proof sustainable food systems.

Additionally, Work Package 4 has a central role in stakeholder engagement. Task 4.1 provides the overarching framework through stakeholder mapping and this engagement plan, while other tasks engage specific groups—such as consumers (T4.3), value chain actors (T4.4), and farmers and aquafarmers (T4.5)—or address cross-cutting issues like ethics in collaboration with multiple stakeholders (T4.2).

Other tasks across the project involve external stakeholders to inform their activities and ensure they reflect stakeholder needs and realities. [Section 3.2.1](#) provides an overview of all planned stakeholder engagement activities, including those mandated in the Grant Agreement, and additional engagements introduced by partners to strengthen their work.

This Stakeholder Engagement Plan provides an overarching overview, guidance, and recommendations for stakeholder engagement within FEASTS. However, the responsibility for carrying out specific engagement activities remains with the respective task leaders.

Purpose

Purpose of Stakeholder Engagement in FEASTS

Stakeholder engagement in FEASTS serves to ensure that the project's research, innovations, and outcomes are grounded in diverse real-world perspectives and

contribute to the development of fair, sustainable, and future-oriented food systems that include CM/CSF.

More specifically, stakeholder engagement in FEASTS aims to:

- Ensure a comprehensive and unbiased knowledge base by involving a wide range of stakeholders to bring in diverse perspectives and validate or complement research findings through their insights.
- Enhance understanding of CM/CSF within the food system by facilitating dialogue around its societal, environmental, and economic implications, and addressing knowledge gaps, concerns, and misconceptions.
- Co-create (business) opportunities for food system actors by collaboratively exploring roles, pathways, and strategies within a food system that includes CM/CSF.
- Support a food-systems thinking approach by fostering interdisciplinary and cross-sector collaboration that captures the complexity of food system interactions and aligns project outcomes with real-world challenges and opportunities.
- Promote resilience, equity, and sustainability by ensuring that stakeholder voices are part of shaping what a fair and sustainable future for CM/CSF looks like, and by identifying key barriers and enablers to their integration.
- Facilitate transparent decision-making and future policy development by offering stakeholders a platform to express expectations, concerns, and recommendations, and by integrating these inputs into the project's outputs to support evidence-informed policymaking.

Not every engagement activity in FEASTS addresses all of these objectives simultaneously. However, collectively, the project's stakeholder engagement activities contribute to achieving these overarching purposes.

Purpose of this Stakeholder Engagement Plan

This Stakeholder Engagement Plan serves as a practical framework to support and enhance stakeholder engagement across the FEASTS project by providing structure, guidance, and consistency.

In particular, it offers strategic guidance by outlining the purpose, scope, and responsibilities of stakeholder engagement in FEASTS. It includes recommendations

on which stakeholders to involve, how to engage them, and how this aligns with existing and planned engagement formats.

It also supports the coordination of engagement activities by making transparent which stakeholder groups are involved, in which formats and topics, and by which project partners. This transparency helps identify synergies across tasks, plan joint activities, facilitate internal knowledge exchange, and avoid stakeholder fatigue.

Moreover, this report serves as a reference document for all project partners, ensuring a coherent and coordinated approach across work packages. By offering guidance on processes and formalities, it helps maintain consistency across engagement activities and avoid duplication of effort—ultimately strengthening the quality, inclusiveness, and impact of FEASTS' engagement work.

Scope

The scope of stakeholder engagement in FEASTS is defined along three dimensions: subject matter, geographical reach, and timeframe.

Subject Matter

Stakeholder engagement in FEASTS focuses on CM/CSF, its impact on current food systems, and its role in shaping future food systems. The specific topics of engagement are derived from the FEASTS project tasks and span a range of issues. These include consumer perspectives on product characteristics and marketing, the potential roles of farmers and aquafarmers in future CM/CSF value chains, ethical considerations, regulatory landscapes, business models, and the sustainability implications of CM/CSF integration. A comprehensive overview of engagement topics by task is provided in Table 3.

Geographical Scope

The primary geographical focus of FEASTS is the European Union, and most stakeholder engagement activities target EU-based stakeholders. However, perspectives from selected non-EU countries—such as Singapore, Israel, the United States, and the United Kingdom—are also included where relevant. These contributions are valuable for enriching the dialogue, broadening understanding, and bringing in international insights that can inform developments within the European context.

Timeframe

All stakeholder engagement activities outlined in the FEASTS Grant Agreement are scheduled to take place within the project's duration (December 2023 – November 2026). Nevertheless, many project partners are engaged in CM/CSF research and policy discussions beyond FEASTS, and therefore anticipate continuing stakeholder engagement after the project concludes. The project's sustainability and exploitation strategy, as well as its task on synergies with other initiatives, will assess how engagement activities can be extended or built upon post-project to ensure continued impact and relevance.

3.2 Engagement Levels, Approaches, and Activities in FEASTS

The stakeholder engagement activities in FEASTS have been structured to align with the project's objectives and evolving understanding of stakeholder dynamics. While the key engagement activities were initially defined in the FEASTS Grant Agreement, they have been further specified and extended within the respective tasks during the first year of the project to better support its goals.

At the same time, a [stakeholder analysis](#) was conducted to develop a comprehensive understanding of key stakeholder groups within the CM/CSF lifecycle and their relevance to FEASTS. This analysis allowed for a broader and more structured view of which stakeholders are of core importance to the project.

In this section, these two elements are brought together to ensure a strategic and well-informed approach to stakeholder engagement:

- Section 3.2.1 provides an overview of the currently planned engagement activities, reflecting the status quo as of April 2025.
- Section 3.2.2 outlines the recommended engagement levels and approaches, derived from the stakeholder analysis.
- Section 3.2.3 presents recommendations for the further development of stakeholder engagement, based on 3.2.1 and 3.2.2.

3.2.1 Planned Engagement Activities in FEASTS

Stakeholder engagement is a core element of all research and innovation-oriented work packages in FEASTS. Most tasks involve stakeholders primarily through consultation activities at the beginning—such as surveys, interviews, and focus groups—and through informing them about results towards the end.

For particularly relevant stakeholder groups, more intensive engagement is foreseen. Companies involved in cultured meat and seafood (CM/CSF) production participate in dialogue-oriented workshops and roundtables; consumers collaborate through Living Labs that foster co-creation of user-centred products and marketing strategies; and farmers and aquafarmers are engaged in dialogues to explore their potential role in the CM/CSF value chain. Policymakers are involved in targeted workshops to inform policy development based on FEASTS findings. In parallel, knowledge exchange with other researchers is promoted through a dedicated workshop series and bilateral collaborations across related tasks. These efforts are supported by an expanding external stakeholder group, which provides opportunities for ongoing, hands-on collaboration across the project. Table 3 presents a comprehensive overview of all planned stakeholder engagement activities in FEASTS as of April 2025.

Task	Partner	Purpose	Involved stakeholders	Geographical scope	Method	Time
WP 1 / WP 7	IST-ID/ NH / EIT	External Stakeholder Board	All relevant stakeholder groups	Europe	Involvement in peer review, knowledge exchange, joint article development, etc.	M6-36
T2.1	Lund University	Develop Food Systems Thinking Approach	tbd	worldwide	Min. 4 Stakeholder Workshops	M25
T2.2	New Harvest	Pre-competitive space definition: Discuss and further develop strategy outline & prioritization	tbd	worldwide	Feedback & workshop/roundtable	M25
T2.4	New Harvest	Determine Intellectual Property (IP) issues for companies around data-sharing	CM/CSF producers	worldwide	Interviews & workshops/roundtables	M19+
T3.1	Bruno Cell	Cell line development: Determine state of the art	CM/CSF R&D and producers	worldwide	Survey	M10-12
T3.1	S2Aqua	Aquatic species cell line development: Determine industry state of the art	CM/CSF R&D and producers	worldwide	Survey	M10-12
T3.1	S2Aqua	Education and stimulating discussion on Cellular Agriculture (What can we expect?)	Doctoral students	Portugal	Roundtable	M12
T3.2	acib GmbH	Determine media usage and strategies for media optimization	CM/CSF R&D and producers	worldwide	Survey	M11-14
T3.2	acib GmbH	Contribute to develop future research plans on alternative proteins in Austria	Austrian alternative proteins stakeholders	Austria	Participation in workshop organised by Austrian Ministry of Agriculture	M16-18
T3.2	acib GmbH	Discuss applicability of cellular agriculture for Austria	Austrian alternative proteins stakeholders	Austria	Participation in roundtable organised by Austrian Ministry of Agriculture	M11
T3.3	Fraunhofer IME	Gather information on bioreactors for CM /CSF production	CM producers (focus bioreactors)	Worldwide	Survey	M6-15
T3.4	TUM	Gather feedback on developed CM production process	CM/CSF producers (incl. ex-employees), Researchers	Worldwide	Interviews	M9-22

Task	Partner	Purpose	Involved stakeholders	Geographical scope	Method	Time
T4.1	CSCP	Gather information on stakeholder perceptions to create stakeholder personas	Suppliers, Producers, Consumers, Distributors, (Aqua)farmers	Europe + Singapore	Interviews	M16
T4.2	INNOV	Exploring ethical issues regarding animal welfare, ecological sustainability and food culture	FEASTS partners (details see EIA report)	Europe	Online Workshop	M10
T4.2	INNOV	Exploration of ethical value space in the context of CM/CSF	Consumers, representatives of animal welfare and new food (details see EIA report)	Austria, Germany	In-Person Workshop	M16
T4.2	INNOV	Exploration of ethical value space in the context of CM/CSF	Consumers, producers, farmers, CM/CSF experts, and representatives for social cohesion, animal welfare and environmental protection.	Europe	Workshop	M18-M24
T4.2	INNOV	Develop recommendations for ethical design of CM/CSF system	Consumers, producers, farmers, CM/CSF experts, and representatives for social cohesion, animal welfare and environmental protection	Europe	2 Workshops	M25-M30
T4.2	EHU	Discuss ethical issues	Tbd - experts in relevant fields	tbd	Workshop	M24

Task	Partner	Purpose	Involved stakeholders	Geographical scope	Method	Time
T4.3	AU	Gather information on consumer perceptions and drivers of acceptance	Consumers	Denmark, France, Germany	Survey	M3-M12
T4.3	AU/ ShakeUp/ CSCP	Design CM/CSF products and marketing strategies from the perspectives of consumers	Consumers	Denmark, France, Germany	Living Labs with 2 workshops and 2 co-creation activities	M18-M30
T4.3	AU/ VM/ Gourmey/ CF	Assess marketing strategies that foster consumer engagement	Consumers	Denmark, France, Germany	Online workshops + field experiments	M18 – M33
T4.4	UNIBO	Gain a better understanding CM/CSF Value Chains	CM/CSF Value Chain actors (Companies, Researchers, NGOs, Service providers etc.)	Europe, selected other countries	Interviews	M15 – M32
T4.5	RF	Analyse business models of livestock farmers	Livestock farmers	Netherlands, Germany, France, Italy, Spain, Poland, Denmark, Belgium	Interviews	M6 – M16
T4.5	Agricoltura Cellulare Italia	Building up network and understanding perspectives of Italian farmers	Italian farmers	Italy	Facilitated contacts and supported 4 interviews of RF in Italy	M6-8
T4.5	RF	Farm-Scale Cultivated Meat Production: Capacitating Livestock Farmers for a Just Transition	Livestock farmers, further relevant stakeholders	tbd	Workshop or Roundtable	M33

Task	Partner	Purpose	Involved stakeholders	Geographical scope	Method	Time
T4.5	S2A	Analysing business models of aquafarmers	Aquafarmers	Netherlands, Portugal, Denmark, Norway, Italy, Spain, France	Interviews	M6 – M16
T4.5	Bruno Cell	Building up network and understanding perspectives of Italian aquafarmers	Italian aquafarmers	Italy	Facilitated contacts and participated in one interview of S2A in Italy	M9-15
T4.5	S2A	Aquafarm-Scale Cultivated SF Production: Capacitating Aquafarmers for a Just Transition	Aquafarmers, further relevant stakeholders	tbd	Workshop or Roundtable	M33
T5.2	INL	Exchange insights with European Food Safety Association (EFSA)	EFSA	Italy	Meetings	M18+
T5.2	INL	Evaluate risks and risk levels	Diverse CM/CSF stakeholders	diverse	Interviews	M18+
T6.2	Wageningen	Understand the production processes of various industrial partners and scale down experiments being conducted within universities involved in CM/CSF production	Academia and Industry	Europe	Interviews	M18+
T6.3	Ecoinnovazione	Collect insights on stakeholder categories (e.g. workers, local community, value chain actors, society)	diverse stakeholders	tbd	Survey	tbd
T6.3	Ecoinnovazione	Collect insights on stakeholder categories (e.g. workers, local community, value chain actors, society)	diverse stakeholders	tbd	Focus groups	tbd
T7.1	EIT Food	Engagement of the Stakeholder Board members as “ambassadors” to support in the dissemination activities	Confirmed members of External Stakeholder Board	Europe	Online meetings, provision of materials	M18-M36

Task	Partner	Purpose	Involved stakeholders	Geographical scope	Method	Time
T7.1	EIT Food	Outreach to target groups	All mapped stakeholder groups	Focus: Europe	Results presentations, best practice webinars with Q&A sessions	M18-M36
T7.1	EIT Food	Media outreach	Media and consumers	Focus: Europe	Media kits, interviews, pitches	M18-36
T7.1	EIT Food	Final event: Present the project's results, challenges and possible ways of dealing with them	All stakeholder groups	Focus: Europe	Conference with policymakers' participation	M36
T7.2	CNTA	Internal webinar presenting related projects with synergies to FEASTS	Researchers	Europe	Webinar	M12-M18
T7.2	CNTA	Series of workshops with related projects to exchange achieved project results	Actors involved in research and innovation projects related to FEASTS	Europe	Workshop series	M12-M18
T7.3	SAFE	Determine opportunities and collect stakeholder concerns	Institutional actors (e.g., European Commission, European Parliament) and CM/CSF supply chain actors (farmers, producers, and consumers)	Europe	Workshop (hybrid format)	M15

Task	Partner	Purpose	Involved stakeholders	Geographical scope	Method	Time
T7.3	SAFE	Define possible routes for an exploitation strategy	Institutional actors (e.g., European Commission, European Parliament) and CM/CSF supply chain actors (farmers, producers, and consumers)	Europe	Workshop	M26
T7.3	Vital Meat	Present technology and role of cellular Agriculture in Europe	European Parliament	Europe	Information session	M12
T7.5	IST-ID	Presenting and exploiting project results (focus: policymakers)	Policymakers + other stakeholders (tbd)	Europe	Dialogue workshop in final workshop	M36

Table 3: Overview of Planned Engagement Activities in FEASTS (April, 2025)

3.2.2 Strategic Engagement Levels and Approaches

Engagement levels define the nature of the relationship with stakeholders and the degree of their involvement in the project. An inclusive, targeted, and impactful engagement strategy aims to tailor engagement levels both to the needs and interests of the stakeholder groups and to the purpose and scope of engagement as defined by the project.

The methods and approaches used to engage stakeholders should align with the corresponding engagement level—higher levels of engagement require more intensive and participatory approaches, while lower levels may rely on informing stakeholders or monitoring their interests.

Table 4 provides an overview of possible engagement levels and corresponding engagement approaches, based on the recommendations of the AA1000 Stakeholder Engagement Standard (AccountAbility, 2015, p. 24).

Recommended engagement levels for FEASTS were derived from the stakeholder analysis presented in [section 2.3](#) of this report, alongside the project's defined stakeholder engagement purposes and scope. The engagement levels were tailored to each stakeholder group to ensure the most effective and impactful engagement strategies. Table 5 provides an overview of the recommendations, providing an overview of why specific engagement levels are recommended to be targeted for each stakeholder group within the FEASTS project.

Level of Engagement	Methods of Engagement
Remain Passive No active communication	• Stakeholder concern expressed through protest • Letters • Media • Websites etc.
Monitor One-way communication: stakeholder to project	• Media and internet tracking • Second-hand reports from other stakeholders possibly via targeted interviews
Advocate One-way communications: project to stakeholder	• Pressure on regulatory bodies • Other advocacy efforts through social media • Lobbying efforts
Inform One-way communication: project to stakeholder, there is no invitation to reply	• Bulletins and letters • Brochures • Reports and websites • Speeches, conferences, public presentations
Consult Limited two-way engagement: project asks questions, stakeholders answer	• Surveys • Focus groups • Meetings with selected stakeholder/s • Public meetings • Workshops
Involve Two-way or multi-way engagement: learning on all sides but stakeholders and project act independently	• Multi-stakeholder forums • Advisory panels • Consensus building processes • Participatory decision-making processes • Focus groups • Online engagement tools
Collaborate Two-way or multi-way engagement: joint learning, decision making and actions	• Joint projects • Joint ventures • Partnerships • Multi-stakeholder initiatives • Online engagement tools
Empower New forms of accountability; decisions delegated to stakeholders; stakeholders play a role in shaping project agendas	• Integration of stakeholders into governance, strategy and operations of the project

Table 4: Levels and Methods of Engagement (source: AccountAbility, 2015, p.24)

Stakeholder Group	Recommended Levels of Engagement	Rationale
Suppliers	• Monitor developments • Inform about project findings • Consult on developments and needs • Involve in dialogue on developments • Collaborate for joint learning and actions	Suppliers play a foundational role in shaping inputs and production processes. Their early insights and collaboration are key to understanding upstream challenges, fostering innovation, and identifying sustainability opportunities.
Producers	• Monitor developments • Inform about project findings • Consult on developments and needs • Involve in dialogue on developments • Collaborate for joint learning and actions	As central actors in CM/CSF development, producers are crucial for identifying practical barriers, exchanging on solutions, and ensuring the feasibility and relevance of project outputs.
Distributors	• Monitor developments • Inform about project findings • Consult about developments and needs • Involve in dialogue on developments	As future value chains for CM/CSF are not yet established and no products are on the European market, intensive engagement is premature. Light involvement ensures market-relevant insights are captured and transferred.
Consumers	• Inform about project findings • Consult on needs • Involve in dialogue on developments • Collaborate for user-centred co-creation	Understanding consumer needs, preferences, and values is essential for developing acceptable and desirable CM/CSF products and communication. Co-creation ensures user-centred outcomes and strengthens legitimacy.
Waste managers	• Monitor developments • Inform about project findings • Involve in dialogue on developments & needs	As large-scale CM/CSF production and consumption are yet to begin, waste-related challenges remain mostly hypothetical. Early dialogue enables forward-looking input and helps embed circularity and responsible waste treatment from the outset..
Government & Regulatory Authorities	• Monitor developments • Advocate for fact-based discourse • Inform about project findings • Involve in dialogue on developments and consequences for regulations • Collaborate to develop policy advice	Policy and regulation will shape the future of CM/CSF. Engaging authorities supports evidence-based decision-making, anticipates regulatory needs, and aligns project outcomes with policy priorities.

Stakeholder Group	Recommended Levels of Engagement	Rationale
Investors & Accelerators	• Monitor developments • Inform about project findings • Consult on developments • Involve in dialogue on developments • Collaborate for joint learning and actions	Investors and accelerators are key drivers of research and innovation in this emerging sector. Their strategic perspective and expertise are essential for understanding developments, identifying needs, and supporting the future development of CM/CSF.
Media & General Public	• Monitor developments • Inform about project findings • Involve in dialogue on developments	Transparent communication and inclusive dialogue are vital to build public understanding, address concerns, and support informed discourse on CM/CSF.
Research & Development	• Monitor developments • Inform about project findings • Consult on developments • Involve in dialogue on developments • Collaborate for joint learning and actions	R&D actors are key partners for cross-project learning and knowledge integration. Their engagement strengthens scientific quality and fosters synergies across disciplines and initiatives.
Vocational Training & Education	• Inform about project findings	Informing this group supports the development of future skills and education pathways aligned with evolving roles and labour needs in the food system.
Conventional meat and seafood system	• Monitor developments • Advocate for fact-based discourse • Inform on project findings • Consult on developments and needs • Involve in dialogue on developments • Collaborate to co-create future food systems/ business models	Engaging with conventional actors is crucial for fostering dialogue, identifying shared interests, and exploring pathways for transition. Their insights and collaboration are key to stimulate fact-based dialogue on the creation of resilient and inclusive future food systems.

Table 5: Recommended Levels of Engagement in FEASTS per Stakeholder Group

3.2.3 Recommendations for Engagement Activities in FEASTS

The following recommendations were developed by comparing the currently planned stakeholder engagement activities in FEASTS with the recommended engagement levels derived from the stakeholder analysis. This comparison helped identify opportunities to strengthen collaboration, address gaps, and align engagement efforts more closely with strategic objectives.

Key Recommendations

A. Leveraging Synergies to Reduce Stakeholder Fatigue and Increase Efficiency:

Several tasks within FEASTS involve similar stakeholders and utilise similar engagement levels and methods. To maximise impact and avoid duplication of effort, it is recommended that partners review who is engaging which stakeholders and explore opportunities for combining activities. By leveraging existing engagement efforts, partners can expand upon each other's work, moving engagement levels from informing to more active involvement or empowerment, without overburdening stakeholders.

Three support efforts aim to facilitate the process of leveraging synergies:

- [Stakeholder Engagement List](#): A searchable file has been developed to track which stakeholder groups are engaged in which way by whom across the project, helping to identify overlapping efforts and synergies.
- [Stakeholder Database](#): This tool provides visibility into which partners are in contact with which stakeholders, allowing for better coordination and synergy.
- Core Contact Persons: Assigning core contact persons within the FEASTS consortium to specific stakeholder groups will facilitate knowledge exchange and ensure that engagement activities are aligned.

B. Completing Gaps in Engagement Levels per Stakeholder Group:

To ensure that FEASTS involves all relevant stakeholder groups and sub-groups as identified in the stakeholder analysis, planned engagement activities can be adapted in three key ways.

- Engaging underrepresented stakeholder groups in the External Stakeholder Board, which plays a crucial role in guiding FEASTS activities.
- Collaboration with other projects and initiatives that work closely with specific stakeholder groups can help fill engagement gaps, a process already initiated through synergies workshops and expected to continue in the coming months.
- Extending participant groups for already planned activities such as the ethics workshops, consumer living labs, and value chain activities to ensure that all relevant groups and sub-groups, as identified in the stakeholder analysis, are adequately represented and engaged in the project.

To ensure that stakeholders are engaged to the recommended engagement levels, planned engagement activities can be adapted to move to higher levels. For instance, planned workshops and roundtables could incorporate co-creative elements to achieve the 'Involve' or 'Engage' levels.

All recommendations will be shared with project partners for discussion and refinement to ensure that FEASTS follows an inclusive, targeted, and impactful approach to stakeholder engagement. Task 4.1 will continue to monitor the progress of planned engagement activities, promoting alignment with the strategic engagement levels and encouraging adaptations as necessary.

3.3 Support for Stakeholder Engagement in FEASTS

This section offers practical guidance for project partners and other stakeholders involved in CM/CSF to plan and carry out stakeholder engagement activities. It begins with an overview of key steps and considerations for designing and implementing engagement activities, whether in person or online. It then presents support materials to assist with planning, implementation, and compliance with formal requirements. In addition, it discusses common risks and challenges associated with stakeholder engagement and outlines strategies to mitigate them. The section is complemented by the Annex, which includes tools and templates referenced throughout. Overall, the aim is to provide a shared structure that ensures quality, regulatory compliance, and efficiency.

3.3.1 The Engagement Process

This section presents a prototypical process for engaging stakeholders throughout the FEASTS project. The framework is designed to guide consistent, high-quality engagement practices, whether the activity involves information provision, surveys, interviews, workshops, roundtables, or co-creative Living Labs. Tips and good practices are included for each stage of the process. Furthermore, a check list for the process can be found in [section 3.3.2 Support Materials for Engagement](#). The process builds upon the Plan, Prepare, Implement, and Act/Review/Improve process recommended by the AA1000 Stakeholder Engagement Process (see figure 16).

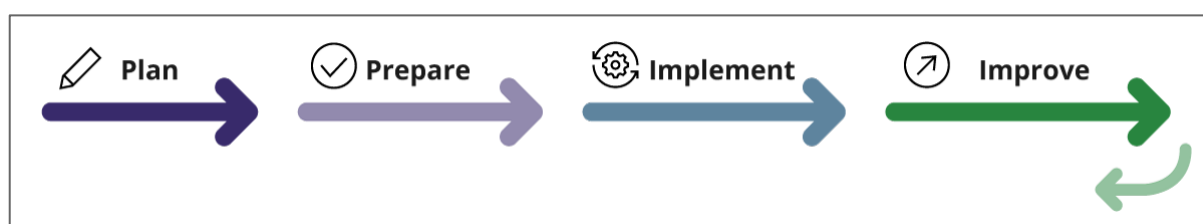


Figure 17: The Stakeholder Engagement Process (based on AccountAbility, 2015)

A. Plan

Effective engagement begins with a clear purpose and thoughtful design. This stage focuses on defining the objectives, identifying relevant participants, and selecting suitable approaches.

Key steps:

- Clearly define the purpose and expected outcomes of the engagement.
- Use the stakeholder mapping and your previous research insights to identify all relevant stakeholder groups, ensuring inclusive participation.
- Select appropriate engagement approaches tailored to participant needs and the engagement objectives. If useful, tailor previously defined engagement approaches to current project activities and the recommendations provided in this report.
- Align the activity with project timelines and other work package activities.
- Allocate sufficient resources (staff, time, budget) for preparation and implementation.

Tips:

- Consult the [FEASTS Stakeholder Engagement List](#) to explore synergies with other partners and check for participants' prior involvement.
- Use the [FEASTS Stakeholder Database](#) to identify relevant individuals or organisations.
- Leverage the diverse networks and expertise within the consortium—reach out to project partners for advice or support.
- Coordinate with the FEASTS Communication and Dissemination team to explore opportunities for public outreach.
- Establish a draft agenda using the [FEASTS script template](#) to structure flow, methods, roles, and timing.
- Choose venues or digital tools that are accessible and inclusive.
- Align the duration of your activity with the engagement purpose and the availability of participants. Keep online meetings concise to reduce fatigue and increase participation.
- Consider translating materials or using interpretation when engaging across language barriers.

B. Prepare

Thorough preparation is key to a successful engagement activity. This phase involves finalising the agenda, preparing materials, and handling all logistics and communications.

Key steps:

- Finalise the agenda, including facilitation methods, timing, and responsibilities. Use the [FEASTS script template](#) as a guide.
- Develop clear and accessible briefing materials so participants understand the purpose, context, and expectations.
- Invite participants at least 4–6 weeks in advance and confirm attendance.
- Communicate how data will be collected, stored, and used; obtain [informed consent](#) accordingly.
- Organise all logistical elements, such as the venue, catering, accessibility, or digital platforms for online sessions.
- Assign and brief team members for key roles—such as facilitators, note-takers, and technical support.

Tips:

- Tailor communication to different stakeholder groups and use a variety of channels (email, phone, social media, or existing networks).
- Make use of the FEASTS stakeholder network via the [stakeholder database](#) to broaden outreach.
- Send reminder messages with practical details a few days before the activity.
- For online sessions, organise a test run with facilitators and co-organisers.
- Use interactive tools like polls or shared whiteboards to increase engagement.
- Prepare back-up options in case of technical issues (e.g. printed slides or alternative platforms).
- If appropriate, share a short pre-engagement questionnaire or reflection prompt to stimulate input.

C. Implement

This phase is about delivering the engagement activity, ensuring inclusive participation, and capturing valuable input.

Key steps:

- Welcome participants and clearly explain the session's purpose, structure, and ground rules.
- Ensure that all participants signed the [consent form](#) and [participant list](#), and fill in an [anonymous participant survey](#) to capture participant data during the session.
- Facilitate the activity using [interactive and engaging methods](#) (e.g. group work, brainstorming, polling), encouraging balanced participation.
- Ensure multiple perspectives are heard—diversity enriches project insights.
- Document key insights, questions, and recommendations in a structured and transparent way.
- Remain flexible to adapt the flow as needed, while staying focused on objectives.

Tips:

- Use an ice-breaker or quick round of introductions to create a welcoming environment.
- Include short breaks in longer sessions to help maintain focus and energy.
- Actively encourage contributions from all participants, paying attention to underrepresented voices.
- Avoid steering discussions—create space for genuine input and reflection.
- Assign a note-taker and, if appropriate consent is obtained, capture photos for documentation or communications.
- Use online whiteboards like Miro or Mural to facilitate interaction in online sessions
- Use tools like Mentimeter or Slido at the end to gather feedback and assess participant satisfaction.

- Ensure facilitation remains neutral and respectful. If needed, use structured turns or talking tokens to balance discussion.
- More facilitation/implementation tips can be found in our [support materials](#).

D. Act, Review, and Improve

Closing the loop demonstrates accountability and drives ongoing improvement. This stage involves follow-up, integration of results, and internal learning.

Key steps:

- Compile outcomes into a structured engagement report. Ensure compliance with data protection requirements, including anonymisation where appropriate.
- Integrate results into relevant project activities and deliverables, allowing stakeholder input to inform next steps.
- Conduct a debrief with the organising team to capture lessons learned and share insights with other partners.
- Archive relevant materials for project documentation and future knowledge exchange, in line with data protocols.
- Update the [FEASTS Stakeholder Engagement List](#) and the [Stakeholder Database](#) to update project partners on your implemented engagement activities and contacts.

Tips:

- Send a thank-you note shortly after the session, summarising outcomes and next steps.
- Share selected insights through project newsletters, social media, or community channels to maintain visibility and interest.
- Schedule a short debriefing session with team members to discuss what worked and what could be improved.
- Use each activity as a learning opportunity—adjust methods and formats based on feedback.
- Consider a brief follow-up survey to assess participant satisfaction and gather suggestions.

- Where appropriate, invite participants to future stages of the project—this fosters continuity and shared ownership.

3.3.2 Support Materials for Engagement

To support the effective planning, preparation, implementation, and review of stakeholder engagement activities, the FEASTS project provides a variety of resources designed to streamline and enhance the process. These materials, which include templates, databases, and tools, are aimed at helping project partners align their engagement strategies with the project's objectives, ensure inclusivity, and manage engagement efficiently. This section outlines the key support materials available, offering practical guidance. Please refer to the previous [section 3.2.1](#) for guidance on how to use them throughout the engagement process.

FEASTS Stakeholder Engagement List

The list is a central resource where all project partners record their planned engagement activities. This Excel file outlines key details such as the purpose, participant group, and timeline of each activity, and it serves as a tool to identify potential synergies and opportunities for knowledge exchange across the project. It can be accessed on the FEASTS MS Teams server under WP 4, Task T4.1, and should be updated regularly as engagement activities evolve to ensure it remains an up-to-date resource for all partners.

FEASTS Stakeholder Database

The database is a comprehensive Excel file that houses information on relevant stakeholder organisations. Project partners have populated it with organisation names, searchable by stakeholder type and country, alongside insights on their relevance to the FEASTS project and their potential contributions. This tool helps partners identify stakeholder contacts and reach out to relevant organisations with the support of the listed contact person. It is also available on the FEASTS MS Teams server under WP 4, Task T4.1, and should be regularly updated to maintain its utility for the entire consortium.

Plan, Prepare, Implement, Improve Checklist

The checklist is a structured tool designed to guide project partners through the stages of an engagement activity. The checklist follows the key phases outlined in the

prototypical engagement process above and serves as a practical guide to ensure that all steps are covered. It is intended to be used throughout the lifecycle of an engagement activity to help partners stay organised and track their progress. This checklist can be found in [Annex 1](#).

Engagement Activity Script

The script is a template designed to help structure and plan engagement activities. It includes sections for defining the purpose, identifying participants, and outlining the location, as well as a detailed table for planning the facilitation methods, roles, and timing of the activity. This script supports the preparation process by enabling partners to make proactive decisions about the methods and roles necessary to achieve a successful session. It is particularly useful for workshops, roundtables, co-creation sessions, and focus groups, and can be found in [Annex 2](#).

Participant Consent Form

The Participant Consent Form is a critical tool for ensuring compliance with the European General Data Protection Regulation (GDPR). It outlines the nature of the activity, how participants' data will be used and stored within the FEASTS project, and participants' rights regarding data processing. This form is required for all engagement activities that involve people, ensuring that participants provide active, informed consent before participating. Consent form templates tailored to various engagement formats were developed in the beginning of the project and can be accessed on the FEASTS MS Teams server under General, FEASTS Common Files.

Participant List

This template supports the documentation of the names and signatures of participants in engagement activities with identifiable participants. This list is necessary for reporting on engagement activities and must be retained until the project's reporting obligations are fulfilled. It is recommended that the list only include participant names and signatures, as including additional demographic information would require further GDPR considerations. A template for a participant list can be found in [Annex 3](#).

Anonymous Participant Survey

This template helps to collect categorical information from participants (e.g., demographics, participant group) in a way that respects their privacy. This survey complements the participant list by gathering anonymous data to support the

project's reporting requirements to the EU. The survey can be administered using anonymous survey tools during engagement activities. A draft version of the survey, which can be adapted to specific participant groups and reporting needs, is available [in Annex 4](#).

Interactive Engagement Methods

This resource provides links to reports and websites that offer insights into effective interactive methods for stakeholder engagement. These resources help partners explore different ways to make their engagement activities more dynamic and participatory. By consulting these resources, partners can find creative approaches to encourage active participation and ensure that engagement activities generate meaningful insights. The relevant links and publications can be found in [Annex 5](#).

3.3.3 Engagement Challenges and Mitigation strategies

Based on the stakeholder analysis conducted within the FEASTS project, alongside lessons from previous multi-stakeholder initiatives and relevant literature, the following Table 6 outlines typical engagement challenges and risks. These are structured by stakeholder group and accompanied by suggested mitigation strategies. The aim is to anticipate possible barriers to participation and ensure more inclusive, effective, and sustained engagement throughout the lifecycle of the project.

Stakeholder Group	Potential Challenge/Risk	Mitigation Advice
All	Participation fatigue	Align and/or stagger engagement activities across tasks; offer diverse formats (surveys, workshops, interviews) and clear timelines
All	Creating expectations of involvement that the project is unable to fulfil	Clearly define scope of participation upfront; communicate transparently about project limitations
All	Lack of balance between weak (silent) and strong (active) stakeholders	Use targeted outreach and inclusive facilitation techniques
All	Disruptive stakeholders/ Conflict between participating stakeholders	Use skilled moderators; set clear ground rules and encourage respectful dialogue
All	Technical barriers in online interactions	Dry-run technical activities. Provide onboarding support.

Suppliers/ producers	Unwillingness to engage as afraid to share confidential business information	Offer Chatham House Rule settings; ensure confidentiality and clarify how input will be used
Suppliers/ producers	Unwillingness to engage as annoyed by processes of publicly funded projects	Highlight benefits of engagement (e.g. visibility, influence, network access); Assure non-identifiable disclosure.
Distributors	Uninformed/ Lack of knowledge on CM/CSF	Share brief and tailored background info; offer low-barrier entry formats like webinars or Q&As
Distributors	Unwillingness to engage as topic considered not relevant yet	Emphasise long-term market relevance; present concrete use cases or scenarios
Consumers	Uninformed/ Lack of knowledge on CM/CSF	Provide transparent, engaging educational content; collaborate with trusted public communicators
Consumers	Unwillingness to engage due to perceptions that CM/CSF contradicts personal values or food traditions	Use framing based on shared values (e.g. health, environment); involve consumer advocacy groups
Waste managers	Uninformed/ Lack of knowledge on CM/CSF	Provide examples of relevant waste streams and outline potential roles in circular CM/CSF systems
Waste managers	Unwillingness to engage as topic considered not relevant yet	Emphasise innovation potential and future regulatory requirements; offer entry points via associations
Government/ policy	Unwillingness to engage due to perceptions that CM/CSF contradicts cultural values or food traditions	Present CM/CSF in relation to policy priorities (e.g. climate, food security); include success stories
Government/ policy	Disruptive engagement as own agenda counters CM/CSF	Ensure transparency of all viewpoints; avoid exclusion but manage influence through balanced panels
Government/ policy	Disempowered engagement because of internal disagreements on whether to support	Identify champions and neutral conveners; enable informal dialogue across ministries or departments
Aquafarmers/ Farmers	Unwillingness to engage as topic considered not relevant/ perceived to disrupt current business models / perceived to contradict cultural values or food traditions	Recognise concerns; frame CM/CSF as complementary or part of diversification and development strategy
Science	Unwillingness to engage as afraid others steal own work	Clarify IP handling and co-authorship options; ensure transparency on how input is attributed

Table 6: Engagement Challenges and Mitigation Strategies

4. Conclusions and Next Steps

The CM/CSF lifecycle is in an early development stage, with numerous elements of the supply and production chain still evolving. While there is a growing range of suppliers and producers involved in the sector, many of these players are still integrating and consolidating their operations, and it remains uncertain how the business models for specialised suppliers or production will continue evolve. Additionally, the question of whether producers will focus on full-fledged CM/CSF products or rather on specific CM/CSF ingredients remains. Additionally, scaling production remains a significant challenge, as technical, logistical, and regulatory hurdles must be overcome for CM/CSF products to be produced at a competitive scale.

As CM/CSF products are not yet on the market in Europe, many stakeholders, particularly distributors, consumers, waste managers, policymakers, and the media have limited knowledge of the sector. However, the concept of cellular agriculture already triggers strong reactions, particularly in consumers, along with a mix of hopes and concerns about its potential impact. This highlights the importance of fostering a fact-based discourse on CM/CSF that will clarify the role these products can play within the existing food system. Moreover, it is crucial to bring key lifecycle actors together, from suppliers and waste managers to producers and consumers, to further develop and refine the CM/CSF value chain. This collaborative effort will help in shaping the sector's future and ensuring that it contributes to shaping a resilient, equitable and sustainable food system.

The FEASTS project has already made significant strides in engaging stakeholders, and there is potential for even greater coordination across project partners to maximise resources for targeted and inclusive stakeholder engagement. The stakeholder engagement list and database are critical tools to support this coordination, enabling a better overview of engagement activities and facilitating synergies. In addition, the persona profiles presented in this report offer invaluable insights into the diverse perspectives within key stakeholder groups, such as suppliers, producers, and consumers. These profiles will be can be used to enrich planned engagement activities, such as Living Labs, policy dialogues, and communication events.

Moving forward, it will be important to further develop the coordination of stakeholder engagement activities within FEASTS, ensuring that all stakeholders are included, and the communication efforts are aligned. The persona profiles should be actively used in engagement activities to foster a more nuanced and empathetic understanding of stakeholder needs and concerns. Stakeholder engagement is an ongoing process of learning and adaptation, and the project will continue to discuss and refine recommendations and support tools with partners. Additionally, updating the stakeholder engagement list and database will be key to ensuring the most relevant and up-to-date information is available.

There are also opportunities to expand the understanding of certain stakeholder groups, such as waste managers and those involved in vocational education and training, where insights are currently limited. Collaborating with other projects, like CARMA or EPICSHIFT, will be crucial for complementing and broadening these insights. Finally, as resistance to CM/CSF technology can sometimes arise from concerns within the conventional meat and seafood system, efforts should be made to clearly communicate how CM/CSF can complement and enrich existing production methods. This transparency is vital for countering resistance and fostering a conducive landscape for the continued development of the sector, while enabling long-term cooperation across stakeholder groups.

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Annex

Annex I: Plan, Prepare, Implement, Improve Checklist

Item	Responsible	Deadline	Status/Comments
A. Plan Phase			
Define purpose of the engagement activity			
Define key participant groups			
Define engagement approach and format			
Develop preliminary agenda/ preliminary script			
Define date and location of engagement activity			
Allocate resources to the engagement activity			
B. Prepare Phase			
Identify potential participants/ check FEASTS stakeholder list for contacts			
Communicate with participants to win their participation			
Identify and confirm potential external speakers/panellists			
Finalise the agenda/ complete the script			
Book a suitable location & catering services			
Organise logistics (if necessary)			
Prepare event materials and technical setup			
Prepare participant list and anonymous participant survey			
Develop feedback questionnaire and organise documentation of activity			
Collect consent from participants (see participant consent form)			
Send final information to participants			

Item	Responsible	Deadline	Status/Comments
C. Implement Phase			
Check the facilitation materials/technical equipment			
Pilot, dry-run, or practice for the engagement activity			
Have participants sign the participant list and consent form			
Collect information on the participants with anonymous survey			
Run the engagement activity			
Capture insights from the engagement activity (recordings/ notes/ pictures as per consent form)			
Encourage/ collect participant feedback			
D. Improve Phase			
Send follow-up communication (Thank you email; next steps)			
Organise and analyse meeting outcomes (notes/transcripts/...)			
Share results and achievements publicly (website, LinkedIn etc.)			
Share results and lessons learned within FEASTS consortium			
If applicable, refine methods/ approaches for future engagement			

Annex II: Engagement Activity Script Template

Details of Engagement Activity

Method/ Approach	e.g. Workshop / Roundtable / Co-Creation Session
Date / Time	
Purpose	• Please list the purpose(s) of your activity here
Participants	• Please list the (groups of) participants here
Location	
Language	
Format	In person / online
Organiser	Organisation leading the activity

Meeting Agenda and Facilitation (including sample text)

Time	Point/Topic – What to discuss?	Method – How to discuss?	Materials – What is needed?	Facilitating roles
XX	1. Welcome and Introductions	Speech/ Interactive Introductory Round / Warm-up activities	...	1. Facilitator 2. Maybe Speaker who welcomes participants
XX	2. Introduction to FEASTS and/or CM/CSF	1. Presentation with visuals 2. Questions & Answers (Q&A) – Ask participants if they have questions	Meeting presentation	1. Facilitator 2. Time keeper
XX				
XX				
XX	7. Summary and Take Away's	Possibility to note down key take away's on a flipchart (or digitally on a Menti/Mural board or the presentation)	Maybe: Flipchart + Marker	1. Facilitator 2. Someone who notes down key take away's

Annex III: Participant List Template

Name of Meeting:

Date of Meeting:

No.	First, last name	Signature
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2		
3		
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Annex IV: Anonymous Participant Survey Template

Please feel free to tailor the following questions to characterise your participant group to your planned activity. Just ensure the questions remain broad and non-specific enough to protect the anonymity of participants.

This anonymous survey is designed to gather information on participants needed for monitoring and reporting purposes. The data collected will remain confidential and will not be linked to any personal identities.

Question 1: Which age group do you belong to?

- ☐ 18-34 years
- ☐ 35 - 54 years
- ☐ 55 - 69 years
- ☐ 70+ years

Question 2: Which gender do you consider yourself?

- ☐ Female
- ☐ Male
- ☐ Non-binary / Third gender
- ☐ Other / Prefer not to say

Question 3: Which relationship do you have in regard to CM/CSF?

- ☐ Supplier of ingredients for CM/CSF production
- ☐ Producer of cultured food products or cultured ingredients
- ☐ Producer of food products with cultured ingredients
- ☐ Distributor of cultured food products or products with cultured ingredients
- ☐ (Potential) consumer of cultured products/ products with cultured ingredients
- ☐ Active in the field of research on CM/CSF
- ☐ Active in the field of policymaking concerning CM/CSF
- ☐ ...

Question ...

Annex V: Links to Interactive Engagement Methods

- Interactive Engagement Methods
 - [Essential Meeting Facilitation Toolkit from SessionLab](#)
 - [SessionLab Online Library with Interactive Engagement Methods](#)
 - [Seeds for Change Facilitation Toolbox](#)
 - [The Commons Social Change Library Facilitation Toolbox](#)
- Tips for organising in-person and online workshops
 - In-Person: [Mural Guide to in-person workshops](#)
 - Online: [Mural Guide to remote workshops](#)
- Overviews of online tools that can support digital engagement:
 - [SessionLab Article on online support tools](#)
 - [Workshopper Article on online support tools](#)
- Templates for online tools
 - [Menti \(meeting presentations and surveys\) templates](#)
 - [Miro \(online whiteboard\) templates](#)
 - [Mural \(online whiteboard\) templates](#)



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