

Cultivated meat

Cultivating collaboration: five key factors for evaluating a media manufacturing supplier for the cell-based food industry

Data about industrialized food production's negative consequences on human health and the climate have given rise to an ever-growing sector: cultivated food alternatives. Plant-based options have existed for decades. Cultivated meat, seafood, and fat products, however, are the most recent entry into the segment.

How are cell-based foods created?

Cultivated foods, grown directly from animal cells, have the potential to drastically decrease negative health and environmental impacts associated with industrialized production systems of animal products. The production of cultivated foods relies on the natural process of tissue generation, recreated under controlled conditions. In similar fashion to other biological processes facilitated under controlled conditions, cells are cultured in a cultivator. With cultivated foods in particular, cells are taken from animals (bovine, poultry, fish, etc.), cultured in a nutrient-rich, animal-free growth medium, and grown into different kinds of specialized cells, such as muscle cells, fiber cells, and fat cells. These cells combine to form tissue that mirrors what is found in conventional food products.

Large-scale manufacturing and commercialization of such products is now possible. However, a main challenge has been the cost of manufacturing customized cell culture growth media for commercial scale-up. Regulatory unknowns and raw material costs are also hurdles that need to be overcome.

The benefits of pharma industry know-how

Key players in the cultivated foods arena will benefit from thought leadership and support from upstream suppliers of the pharma industry. Such experience can help in navigating the regulatory unknowns and assist in lowering end-to-end costs. Establishing the right collaborative relationship with a proven cell culture media manufacturer offers a potential solution to help solve many underlying challenges.

Key factors to consider in evaluating a supplier

While there are many variables to consider when assessing a supplier, the following are the top five to look for.

1. Research and development experience and support

Many media manufacturers have the technology to develop high-producing cell culture media and cell lines. However, it is paramount to seek out a collaborator backed by an equally robust research and development team. Having a reliable extension of your own team in this specific area can offer a crucial skill set in developing new raw materials and help ensure potential cost efficiencies later when manufacturing is scaled. Seek out a company that not only has experience but also provides flexibility in meeting your requirements. This kind of relationship can prove far more fruitful than simply having an "outsourcing" agreement.

2. Raw material quality and consistency

As impurities in raw materials can be amplified during the scale-up process, the quality of your raw materials should be a primary focus when scaling up, especially since the end products in the cultivated meat market are for human consumption. Formulations that work at bench scale are often not as productive when you begin to scale up to larger cultivators. Impurities can impact performance parameters (overall titers, growth of the cells, consistency, etc.), resulting in variable product performance and quality fluctuations from one batch to the other. The media manufacturer must assure you that it can maintain security of raw materials with consistent quality. It is advisable to engage with a manufacturer that has specific competence in the analysis and characterization of raw materials as well, to decrease any potential contamination risks. For the cultivated meat industry, it also means finding a partner who can proactively identify raw materials that will likely be acceptable to regulatory agencies (once they define guidelines for this space).

3. Supply assurance

Through careful planning and in-depth risk mitigation practices, global manufacturing networks are strategically designed to maximize supply assurance and minimize delays. Look for risk mitigation measures that include proactive identification and qualification of new sources of key raw materials; continual investment in targeted areas of inventory to support growth; and the use of demand forecasting intelligence to stay ahead of potential future supply chain disruptions. Detailed customer notification programs for product specification changes are also an important part of a supply agreement and allow you to stay ahead of any potential issues with your manufacturer.

4. Site-to-site manufacturing equivalency

Vendors with a global footprint may claim that their facilities offer equivalency, but it is important to have conversations about how site-to-site harmonization is defined by each vendor. Do media manufacturing sites in different locations used for your product use the same technology and equipment? Does each location source from the same raw material supplier? Is there consistency across sites, in the manufacturing processes, finished product testing, and quality management systems? Collaborate with a manufacturer that can show you evidence of their efforts in each area, so that you can rely on consistent quality products, regardless of the manufacturing site used in each time period.

5. Open communication and transparency

Transparent communication between customer and vendor is critical for the success of a media manufacturing collaboration. Trust must be developed in the early stages of the project (prior to the technical transfer) and maintained as the project moves forward. Timely project management updates and having a single point of contact can help reduce the risk of miscommunication between you and the vendor.

Case study: Aleph Farms and Thermo Fisher Scientific

AlephFarms®

Aleph Farms, founded in 2017, is a leading food technology company that is initially focusing on cultivated steak grown from non-modified cow cells, due to steak's versatile culinary applications and the significant environmental footprint of conventional beef production. In 2018, Aleph Farms became the first company to create a cultivated thin-cut steak, and in 2021 it became the first to create a cultivated ribeye steak.

The company's state-of-the-art process begins with isolation of pluripotent cells from a healthy live cow. After selecting the best cells for the meat cultivation process, Aleph Farms provides them with its in-house recipe of nutrient-rich liquid growth medium feed, comprising sugars, fats, vitamins, minerals, amino acids, and growth factors.

Aleph Farms recently entered into a long-term supply agreement with Thermo Fisher, whereby Thermo Fisher will produce some of Aleph Farms' formulations of high-quality growth media.

To suit the needs of producers of cell-based foods, Thermo Fisher's growth media production will aim to conform to the requirements set by relevant regulatory authorities. Efforts that promote such conformity include the operation of a designated facility for this upstream production. This will also allow for modifications that fit with cost-reduction and scale-up strategies of the cultivated meat sector.

The cultivated meat sector needs a predictable supply of media in the quantities and at the quality and cost adequate to support scale-up. To help foster a strong foundation for the entire sector, this agreement leaves the door open for other cultivated meat companies to access material supply based on their own requirements.

With a secure and stable supply of growth media to produce its cultivated steaks, Aleph Farms is able to improve the resilience and agility of its supply chain and scale up its operations more efficiently, even amidst fluctuating markets.

Its production process can yield thousands of tons of cultivated meat from a single cell bank in a controlled environment, without the need for repeated cell collection from the animal. This makes the supply chain of cultivated meat less susceptible to disruptions caused by external shocks (e.g., a global health crisis, extreme weather events, etc.).

Compared to the production cycle of conventional beef, which takes 15–30 months, the collaboration between Aleph Farms and Thermo Fisher Scientific helps enable a production cycle of approximately 4 weeks in cell culture. This makes the protein supply more resilient and predictable, and less reliant on increasingly scarce natural resources such as land and water.

Thermo Fisher has a full portfolio of capabilities and services, including research and development support, media optimization and analytics services, and complete media manufacturing capabilities. These offerings include both non-CGMP rapid-prototyping media manufacturing of small batches and full CGMP media manufacturing services. The company has proven experience in the cellular agriculture space at large and is represented in the Tufts University Center for Cellular Agriculture (TUCCA) Consortium.

Achieving cost of goods sold (COGS) efficiencies together

Media manufacturers have robust supply chains, decades of experience, and extensive industry knowledge that enable them to produce your medium once you decide to scale up your process.

The right collaborator can use their cell culture experience to help optimize media formulations early on, limiting the number of failed batches and wasted materials associated with process development. In addition, outsourcing your media manufacturing allows you to purchase media in quantities larger than what could potentially be produced in-house, without increased investment. This means you ultimately benefit from economies of scale and lower prices.

Long-term supply agreements may also be created with a vendor of choice to help ensure that costs can be forecasted and kept in check through a transparent collaborative process.

Supply agreements enable target prices for growth media that are more strictly managed and predictable, allowing the cultivated meat industry to be better equipped to design and provide access to nutrient-rich growth media at the needed quantity, quality, and cost—helping to eliminate a key hurdle on the way to commercial viability.

 Learn more about the benefits of a cell culture media manufacturing collaboration today at thermofisher.com/media-manufacturing



For Research Use or Further Manufacturing. Not for diagnostic use or direct administration into humans or animals.

© 2023 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. COL27500 0323