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Published on November 8, 2022

Contents

Key takeaways	1
Introduction	2
Regulatory updates	3
Addressing input costs	3
Scaling production	4
Strategies to address consumer acceptance	6

EMERGING TECH RESEARCH

Digesting Key Takeaways from the Cultured Meat Symposium 2022

Mounting enthusiasm for commercialized cultivated meat tempered by regulatory and technological headwinds

PitchBook is a Morningstar company providing the most comprehensive, most accurate, and hard-to-find data for professionals doing business in the private markets.

Key takeaways

- Despite an opaque regulatory process and timeline, legal experts expect cultivated meat to be commercially approved within the next year
- Cell growth media constitutes 50% to 90% of the total cost of cultivated meat. Startups and upstream input suppliers are developing new products and technologies to bring costs down.
- If cultivated meat industry development meets projected growth by 2027, it will still constitute less than 0.1% of global meat production. Additional resources, government support, and collaboration are essential to scaling production.

Introduction

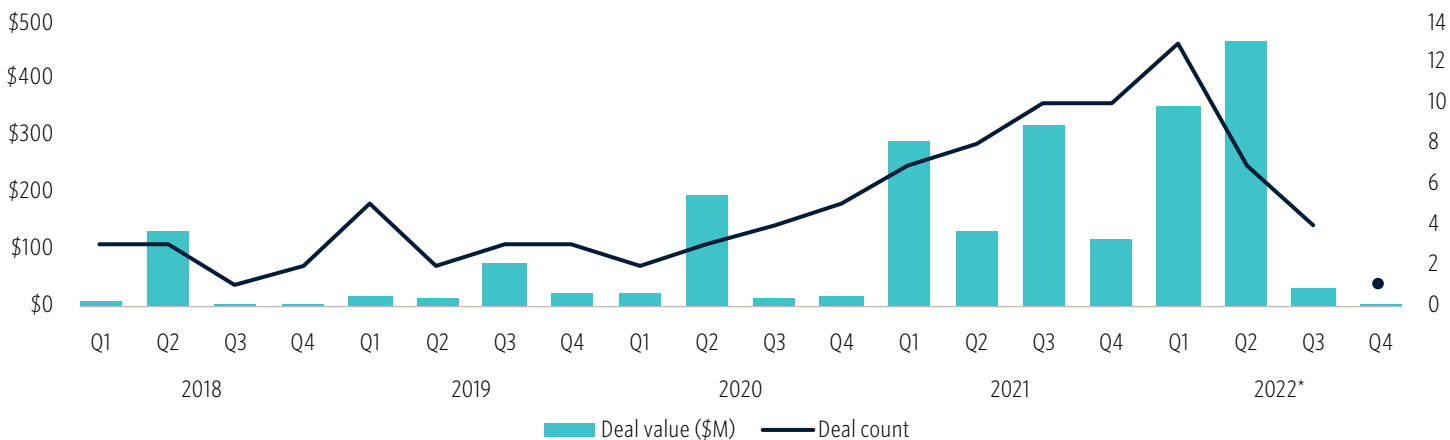
The Cultured Meat Symposium is an annual conference bringing together stakeholders in the emerging cultivated meat industry. Speakers and conference attendees included Silicon Valley investors, cultivated meat startups, such as CULT Food Science and Aleph Farms, and pick-and-shovel technology providers, such as Sartorius AG and Eppendorf, increasingly focusing on this nascent but growing industry. The conference is in its fifth year, and this year’s theme was “Creativity and Commerce.” The concept of creativity was heavily referenced throughout the conference presentations and panels. Conference organizers highlighted two types of creativity relevant to cultivated meat:

- traditional creative approaches to business management, which include marketing, packaging, branding, and design.
- creative approaches to solve technical challenges such as reducing input costs and scaling production.

Ongoing headwinds to cultivated meat commercialization and proliferation include regulatory uncertainty, steep input costs, and headwinds to scaling production.

For a deeper dive on cultivated meat and alternative proteins, see the following analyst notes: [Alt-protein Industry Advances Despite Costs and Red Tape: Analyzing the State of Alternative Proteins](#) and [Reinventing Meat: Lab-grown Protein Is Cultivating Investor Interest](#).

US VC quarterly deal activity in cultivated protein



Source: PitchBook | Geography: US
*As of November 3, 2022

Regulatory updates

Two lawyers from Covington & Burling LLP with a cultivated meat specialty provided a regulatory update at the conference. The upshot is that the regulatory process and timeline is opaque and there are potential headwinds, but both lawyers expect cultivated meat to be approved for commercialization within the next year. Regulation has been a key question to many stakeholders because there is currently no clear regulatory process or timeline, and very little information is provided by regulatory authorities. Regulation is especially complex in the United States because the US Department of Agriculture (USDA) and Food and Drug Administration (FDA) share jurisdiction over land animals including beef, pork, and poultry. The FDA has jurisdiction over all food, meaning that cultivated seafood companies are regulated by the FDA alone, while cultivated land animal meat companies are regulated by both organizations. The FDA exercises regulatory oversight until the “point of harvest,” and the USDA provides oversight thereafter. One cultivated seafood startup described the FDA as “more science-based,” meaning it has a clearer regulatory process, and the USDA as more easily swayed politically, meaning that cultivated meat regulation under the USDA could be negatively impacted by lobbying from hostile trade groups such as the US Cattlemen’s Association. For this reason, cultivated seafood companies may have an easier and faster path to commercialization.

Labeling is a key regulatory consideration. The USDA is currently undergoing a process to establish labeling requirements. The process kicked off a year ago starting with a survey of stakeholders. This is a long-term process, and the lawyers do not expect proposed rules in the near term. The USDA has said they will approve labeling for individual companies before they publish final rules as not to slow down companies from commercializing. The FDA is currently performing a premarket review, mapping out at every level all hazards that could arise and subsequent mitigation efforts. The FDA set a goal of providing draft guidance by December 31, 2022. At the end of the session, the lawyers were asked if they expect to see cultivated meat commercialized in the next year. Both answered in the affirmative. Wildtype supported this expectation, explaining that they were in the final stages of the regulatory process.

Addressing input costs

Cell growth media is a critical component in cultivated meat production, as it contains nutrients necessary for cell proliferation. Growth media is the main cost component of cultivated meat, constituting 50% to 90% of the total cost. Reducing the cost of growth media, or the amount required, is critical to moving cultivated meat towards price parity with traditional animal meat. Several techniques were proposed to accomplish this:

- **Efficient cultivation techniques:** There are multiple cultivation techniques deployed for cell proliferation. Advanced cultivation techniques such as fed-batch culturing or perfusion may reduce the quantity of media required and even enable media to be recycled across batches.

- **Reduce media components:** Growth media is made from 50-70 ingredients. This creates sourcing challenges as well as regulatory challenges. The small number of ingredient suppliers, combined with low ingredient quantities needed by cultivated meat startups, can make sourcing expensive and put startups at the back of the line in terms of supplier priority. Additionally, any non-food related ingredients that end up in the final product will undergo additional regulatory scrutiny, making the approval process complex. Eliminating ingredients will cut down costs, sourcing challenges, and regulatory complexities.
- **Reduce input quality:** Growth media components are most often used for pharmaceutical purposes and are “pharmaceutical-grade,” meaning they are made to meet rigorous requirements, which include additional purification steps and documentation. Eliminating unnecessary steps designed for the pharmaceutical industry can lower cost for food companies.
- **Develop plant-based or “upcycled” alternatives:** Companies like ORF Genetics are already developing plant-based growth factors that are more effective, reducing the amount required, thus rapidly scaling production and reducing costs. Eventually, agricultural or even upcycled sources of growth media may be an essential means to reduce cost and achieve the scale necessary to industrialize cultivated meat production.

Scaling production

The keynote speaker was Justin Kolbeck, cofounder and CEO of cultivated fish startup Wildtype. Justin highlighted the gap between cultivated meat production potential and global meat production with some quick back-of-the-envelope math:

- average cost of an industrial-scale cultivated meat production facility: \$100 million or more
- number of firms that have raised at least \$100 million: five
- number of firms that can build industrial sized plants by 2027: 20
- estimated production capacity per facility: 20,000 tons of meat per year
- estimated global cultivated meat production capacity by 2027: 400,000 to 450,000 tons per year
- current estimated global meat & seafood production: 525 million tons per year
- **total cultivated meat & seafood production as a proportion of global meat & seafood production: 0.086%.**

In other words, even if cultivated meat industry development meets projected growth, it will still constitute less than 0.1% of global meat production. Additional resources, support, and collaboration are essential. Other industries, including semiconductors and electric vehicles, have received major government financial support to secure national security, for example, \$278.2 billion in funding for the CHIPS and Science Act, and in green energy, for example, Tesla's \$465 million loan. A similar case can be made regarding cultivated meat, food security, and food sovereignty. A loan similar to Tesla's green energy loan could prove critical to rapidly scaling infrastructure.

Collaborating among stakeholders, which could include knowledge share or sharing manufacturing facilities, is another strategy to help bring the process to scale. Although most startups in the space are fiercely protective of their intellectual property, the cultivated food space is vast, and startups developing products in different categories such as beef, seafood, and dairy, could share expertise or infrastructure. From an investor perspective, infrastructure collaboration could de-risk an investment and accelerate development.

Top US VC-backed companies in cultivated protein*

Company	VC raised (\$M)	Post-money valuation (\$M)	HQ location
Just Egg	\$863.5	\$1,250.0	Alameda, California
UPSIDE Foods	\$608.2	\$1,312.0	Berkeley, California
Metagenomi	\$276.4	N/A	Emeryville, California
Wildtype	\$116.0	\$449.7	San Francisco, California
BlueNalu	\$84.5	\$60.0	San Diego, California
Demetrix	\$61.0	\$100.0	Berkeley, California
DMC Biotechnologies	\$47.9	\$104.0	Boulder, Colorado
Finless Foods	\$47.7	\$184.0	Emeryville, California
Prolific Machines	\$42.0	\$72.7	San Francisco, California
OMeat	\$40.0	\$111.1	Los Angeles, California

Source: PitchBook | Geography: US
*As of November 3, 2022

Strategies to address consumer acceptance

As commercialization nears, stakeholders need to think about how to educate and engage consumers. There is a tangible concern that one blunder could affect the entire industry. Some startups are catering to fans and enthusiasts by holding private tasting events. However, the vast majority of consumers have little exposure to cultivated meat. One startup has run surveys indicating that 50% of consumers have never heard of cultivated meat. Some participants were under the false impression that Beyond Meat and Impossible Foods were cultivated meat companies instead of plant-based meat companies.

Transparency was identified as an important measure to gain consumer acceptance. An easy option would be to build retail or restaurant operations into production facilities, with clear glass windows looking into the plant. Cultivated meat is often likened to the process of beer brewing, with production facilities acting as microbreweries where consumers could enjoy the product on-site.

Cultivated meat was likened to the genetically modified organism (GMO) debacle. Although GMO technology may be essential to increasing the food supply in light of growing populations and climate change, the technology was vilified. Companies like Monsanto failed to educate consumers and farmers. Neither group understood the benefits, and the technology was conflated with pesticides, contributing to a consumer backlash.

One speaker explained that consumers care about taste, price, and nutrition—in that order. Communication is essential, but the most important factor is developing products that consumers actually want to eat. Although transparency is important, producers shouldn't overload consumers with confusing science. Transparency means revealing everything, while "visibility" means providing consumers with information relevant to them.

One panel focused on auxiliary categories where cultivated meat could penetrate without consumer pushback. Food is deeply emotional, engrained with culture, family, religion, identity, and tradition. This is especially true with dishes such as roast beef or hamburgers in the US, often categorized as "center-of-plate" foods. Auxiliary food categories such as beef jerky and pet foods are large market opportunities and are more likely to avoid such connotations, thus will likely face lower consumer resistance. However, companies developing products for auxiliary markets may face resistance from investors assuming that "center-of-plate" products are a more profitable venture.

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