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Published on September 15, 2023

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Emerging Sustainable Investing Opportunities: Cultivated Protein

How cultivated protein can create a double bottom line of financial returns and positive social and environmental impact

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

- Cultivated protein may present an answer to the question of how to feed a growing global population while reducing the climate impact of animal agriculture.
- The financial return potential of this opportunity is supported by strong anticipated consumer demand, solid ROI potential with respect to IP and technological development, and government funding and regulatory support.
- Cultivated protein has the potential to create positive environmental impacts in the areas of climate change and pollution mitigation and biodiversity loss prevention as well as social impacts in terms of helping to address world hunger, improve animal welfare, and create quality jobs.

Introduction

VC, often serving as the incubator of emerging technologies, is well positioned to invest with positive social and environmental Impact goals in mind. VCs can use their expertise and resources to foster businesses that have the greatest potential for both Impact and returns, especially with an eye toward companies for which success necessarily marries the two. This fact has not gone unnoticed by VCs, which comprise 42.7% of the total count of impact funds raised since 2007.¹ Yet the landscape of potential opportunities is expansive and rapidly evolving, making it difficult to keep track of which have the greatest financial—and Impact—return potential.

Emerging opportunities often go beyond the investment areas traditionally associated with sustainability, such as solar energy or electric vehicles, to encompass a host of lesser-known technologies. Even within the familiar themes, there are niche investment opportunities developing. In this analyst note series, we explore opportunities across emerging technology verticals such as foodtech, mobility tech, and carbon & emissions tech that we believe are poised to perform well in the next decade, both from financial-return and Impact-return perspectives. In doing so, we hope to guide VCs pursuing the "[double bottom line](#)" through the complex landscape to the most fruitful opportunities.

For each analyst note in the series, insights are developed in collaboration with a PitchBook Emerging Technology analyst covering the relevant vertical, using their subject matter expertise and previous research, as well as some external resources, to inform our perspective on the space. We discuss the opportunity's major drivers of return potential, as well as the investment risks and obstacles it faces. We also explore its social and environmental Impact potential, how the opportunity fits into various IRIS+ Impact themes,² and potential metrics to help quantify those Impacts. Ultimately, the aim of this research is to give VCs and their LPs a better understanding of how the opportunities align with their return and sustainability goals and provide companies operating in these spaces a sense of how to optimize and communicate their social and environmental Impact.

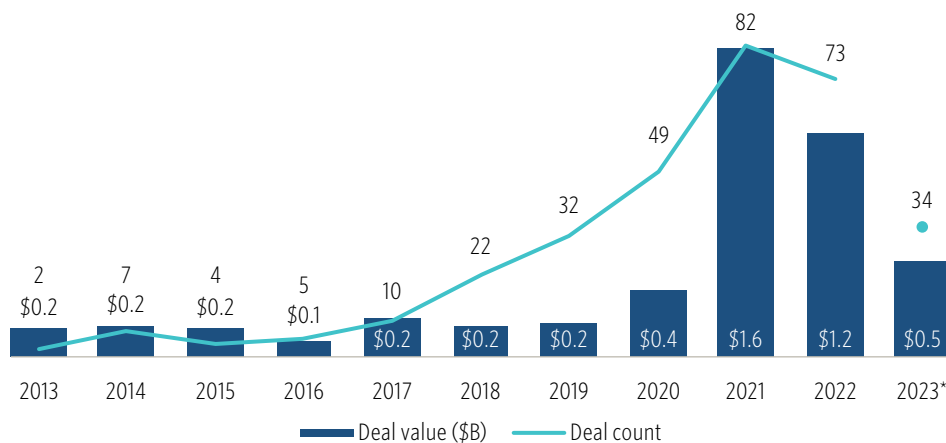
This analyst note focuses on cultivated protein, which is meat, seafood, dairy, and egg products created in labs using cultivated animal cells rather than through slaughter, harvesting, or fishing.³ While alternative protein, such as the plant-based products created by Impossible Foods or Beyond Meat, is well known among investors and consumers alike, cultivated protein is a subset of this category on the cutting edge of foodtech. Since 2013, 136 VC-backed companies have entered the cultivated protein space, with \$4.8 billion in investment.

1: For more Impact fundraising data, check out our [Q4 2022 Analyst Note: Impact Investing Update](#).

2: The Impact Reporting and Investing Standards (IRIS+) framework, created by the Global Impact Investing Network (GIIN), is an industry-leading methodology aiding investors in sorting Impact investments by the different types of Impact they are targeting. You can learn more about the IRIS+ categories, what they include, and what they do not in "[IRIS+ Thematic Taxonomy](#)," [Global Impact Investing Network, April 2023](#).

3: For in-depth information on cultivated protein, download our [Q3 2021 Analyst Note: Reinventing Meat](#).

Cultivated protein VC deal activity



Source: PitchBook • Geography: Global
*As of August 21, 2023

Financial return potential

The current standard methods of animal protein production are resource-intensive and environmentally unsustainable. As the global population continues to grow, demand for animal protein will exceed what can feasibly be supported by those methods. Simultaneously, governments are attempting to rein in their contributions to climate change, including through agriculture, which could further limit the supply of animal protein. Cultivated protein may be part of the answer, as it allows for increased animal protein production without the same magnitude of environmental cost.

There are three key factors influencing cultivated protein's return potential. First, cultivated protein products are expected to experience strong consumer demand, which will increase over time. Demand for environmentally sustainable and cruelty-free food products has been climbing over the past decade.⁴ Cultivated protein is anticipated to mimic the taste and nutritional profile of animal products more accurately than plant-based alternatives, catering to the population more concerned with animal welfare and environmental impacts. Supporting demand predictions is the fact that other plant-based meat alternatives have had success on the market already, and many of the same drivers of demand for plant-based protein will likely exist for cultivate protein.⁵ Further, cultivated protein providers will probably have the upper hand in winning over meat eaters compared to plant-based alternative producers, as the product they are selling is actually meat, even if not produced through livestock slaughter.

Second, the intellectual property and technology necessary to produce these products, once developed, has a substantial return-on-investment (ROI) potential,

4: "Consumers Care About Sustainability—and Back It Up With Their Wallets," McKinsey & Company, Sherry Frey et al., February 6, 2023.

5: "Beyond Meat's Value Soars to \$3.8 Billion in Year's Top US IPO," Bloomberg, Deena Shanker et al., May 2, 2019.

which is expected to increase with time. Companies developing cultivated protein started off by using off-the-shelf medtech or biotech machinery and have experienced difficulties scaling production due to technological limitations. However, as the cultivated protein ecosystem grows, we are observing incumbent input and equipment startups and incumbent suppliers developing product lines for the cultivated meat industry that will ultimately increase product quality and reduce input and production costs.

Lastly, cultivated protein companies have already received government funding and regulatory support in some geographies, including the US, Singapore, and the Netherlands, among others, and this support is anticipated to continue to grow over the next decade.⁶ Beyond food system sustainability concerns, governments across the world were rattled by the Russia-Ukraine war and its effects on the global food supply chain, sparking conversations around food sovereignty and security. The addition of cultivated protein to a national food supply diversifies—and shortens—the supply chain, which could create a case for government subsidies such as those provided to the traditional meat and dairy industries.⁷ Government funding can help improve profit margins at various stages of growth, depending on how it is administered, so its effect on return potential will vary from one initiative to another.

On the other side of the coin, there are four central risks or obstacles to consider. First, there are adoption risks due to the costs of the cultivated protein products, which are high because of the cost of production, and thus may be price prohibitive to consumers. However, with competition, input, and process improvements, prices are likely to fall, becoming less of a barrier to adoption. Further, as climate change-induced extreme weather events exacerbate competition for the inputs used for human food crops and animal agriculture crops, cultivated protein products may become relatively less expensive compared to traditional animal protein.

Second, there are adoption risks due to the novelty or “unnaturalness” of the product. While other types of alternative protein have found success in restaurants and grocery stores and amassed a consumer following, cultivated protein is still nascent and relatively untested in the marketplace. Only two companies are approved to sell them by the USDA, and both are carefully controlling consumer experiences by partnering with celebrity chefs at high-end restaurants, so practical case studies are very limited. Resistance to genetically modified organisms (GMOs), highly processed, and nonorganic products has grown in recent years, as consumers are concerned about the negative health impacts they may present. These apprehensions will likely translate to cultivated protein as well. This obstacle may further be fueled by efforts to stoke fear from the traditional livestock industry to protect its market share. However, as with GMOs and highly processed foods, once the novelty wears off, the products will probably become normalized to a large portion of the population, as long as the products are, in fact, not harmful to consumers.

Third, there is competitive risk, which will increase over the next decade as more players enter the space. As occurred with other plant-based meat alternatives,

⁶: “Government Investment in the Opportunities of Alternative Proteins,” *Emerging Proteins NZ*, September 2022.

⁷: “Saving the Planet: The Market for Sustainable Meat Alternatives,” *Sutardja Center for Entrepreneurship & Technology*, Indira Joshi et al., November 10, 2015.

the landscape will become more competitive once consumer demand, and the necessary technologies, are more established. Because of this, there is somewhat of a first-mover advantage in terms of brand recognition, as there was with Beyond Meat and Impossible Foods. Companies will likely also have to compete with products created by big names such as Nestlé,⁸ Hormel Foods, Cargill,⁹ and Kellogg, which have already explored other alternative proteins, and some of which have already invested in cultivated protein.

Finally, there is a regulatory risk to cultivated protein. Generally speaking, the EU has more stringent food regulations and arduous approvals processes compared to the US and other geographies. Cultivated protein companies may not be able to penetrate all desired markets, given these obstacles. As more studies are conducted on the long-term effects of cultivated protein consumption, the regulatory landscape may either grow more friendly or more hostile toward these products. Recent approvals suggest it would more likely be the former than the latter, but it is impossible to predict for certain.

Environmental and social Impact potential

Relevant IRIS+ categories¹⁰



Agriculture



Air



Biodiversity & Ecosystems



Climate



Employment



Water

Cultivated protein has a low-to-moderate positive environmental Impact potential at present, which will likely scale to a high environmental Impact potential a decade from now when adoption has increased and technology improved. These potential environmental Impacts are multidimensional. In terms of the primary Impacts, animal agriculture is a major contributor to global greenhouse gas emissions (GHGs), comprising approximately twice as much of the total GHG output of agriculture and land use as plant-based foods.¹¹ In addition to CO₂ emissions, it contributes

⁸: "Nestlé Explores Emerging Technologies for Cultured Meat," Nestlé, July 13, 2021.

⁹: "Cargill Invests in Cultured Meat Company Aleph Farms," Cargill, May 14, 2019.

¹⁰: "IRIS+ Thematic Taxonomy," Global Impact Investing Network, April 2023.

¹¹: "Global Greenhouse Gas Emissions From Animal-Based Foods Are Twice Those of Plant-Based Foods," Nature Food, Xiaoming Xu et al., August 14, 2021.

nitrous oxide and methane, both of which trap more heat in the atmosphere than carbon, making them more harmful in the context of global warming. Research has shown that cultivated meats have the potential to outperform conventional meat benchmarks on most environmental indicators, including air pollution and nitrogen-related emissions, and its carbon footprint is substantially lower than beef.¹² When combined with renewable energy, cultivated protein is a sustainable alternative to all conventional meats.

Runoff from traditional farms also exacerbates water pollution, biodiversity loss, and wetlands destruction.¹³ As cultivated protein production facilities are generally indoors, operators have control over wastewater, effluents, and other byproducts, and can prevent releases that create negative environmental impacts. As production efficiencies improve, renewable energy continues to proliferate, and consumers adopt these products in place of conventional animal protein, the impacts of these environmental sustainability improvements will theoretically intensify. The biggest obstacles to these outcomes are adoption risk, as the scale of impact will be substantially smaller if consumers cannot or will not replace traditional animal protein with cultivated ones for financial or other reasons, and regulatory risks, as discussed in the "Financial return potential" section.

From a social impact perspective, cultivated protein has three main opportunities, which together have a low-to-moderate impact potential that is expected to escalate to a moderate-to-high impact potential in the next 10 years with greater adoption and more efficient production. The first major opportunity is to feed the global population more sustainably. According to the UN Food and Agriculture Organization, the world will need to produce 60% more food to feed a population of 9.3 billion people,¹⁴ which we are predicted to exceed by 2050.¹⁵ Our present level of food production cannot be maintained given current farming practices, so solutions such as cultivated protein can help prevent the number of people going hungry from continuing to grow. Affordability is a key factor in this equation, so potential impact will increase as affordability does.

The second major opportunity is the potential to vastly improve animal welfare. Cultivated protein has the obvious effect of increasing the supply of animal protein without needing to slaughter more animals, although some animal cells are harvested for production. Additionally, it may also push more meat producers up the spectrum toward better animal welfare practices. Free-range and pasture-raised products, among other classifications related to the health and welfare of the animals from which the food is derived, already sell at a premium, so more producers may go this route as they must compete with the arguably harm-free lab-grown meat. The amount of traditional animal protein replaced by cultivated protein will have a direct relationship to the scale of this impact, so it will grow as consumption does.

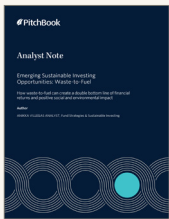
12: "Ex-Ante Life Cycle Assessment of Commercial-Scale Cultivated Meat Production in 2030," *The International Journal of Life Cycle Assessment*, Pelle Sinke et al., January 12, 2023.

13: "Environmental Impacts of Agricultural Runoff," *Wisconsin Department of Natural Resources*, n.d., accessed September 6, 2023.

14: "Feeding the World Sustainably," *UN Chronicle*, José Graziano Da Silva, June 2012.

15: "World Population Projected to Reach 9.8 Billion in 2050, and 11.2 Billion in 2100," *UN Department of Economic and Social Affairs*, 2017, accessed September 6, 2023.

Other notes in the Emerging Sustainable Investing Opportunities series



Waste-to-Fuel

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Transit Tech

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The final social Impact opportunity is related to the quality of employment provided by cultivated protein companies compared to factory farms. Working conditions in factory farms are often dangerous, with high employee injury rates as well as severe mental health Impacts associated with slaughterhouse work.¹⁶ By eliminating live animal handling and slaughter from the production process, cultivated protein companies create safer work. The Impact potential associated with this opportunity will scale as cultivated-protein-producer operations do, either replacing some slaughterhouse jobs or preventing new ones from being created.

Other than the adoption and regulatory risks already mentioned, one of the most significant threats to achieving these positive social Impacts is uncertainty around the health effects of long-term cultivated protein consumption. Feeding the hungry is only positively impactful insofar as what the hungry are being fed is not harmful to them. While theoretically similar to traditional animal products, extensive studies on its impact on human health have yet to be conducted. Although regulators such as the US Food and Drug Administration have deemed some forms of lab-grown meat safe to eat, industry participants and consumers alike will be awaiting confirmation that these protein alternatives are nutritionally comparable to standard animal products.¹⁷

Potential Impact metrics

As discussed in our [Q2 2022 Analyst Note: ESG, Impact, and Greenwashing in PE and VC](#), many GPs and LPs consider measurement a necessary component of an Impact investment program. The following metrics can be used to quantify the positive social and environmental Impacts discussed in the report, including by companies pitching their positive Impacts to sustainability-oriented GPs, and GPs collecting Impact metrics on their portfolios for internal tracking and monitoring, among others:¹⁸

- Pounds of cultivated protein sold by the company.
- Tons of CO2 emissions prevented by cultivated protein product consumption compared to traditional animal products.
- Tons of nitrous oxide emissions prevented by cultivated protein product consumption compared to traditional animal products.
- Tons of methane emissions prevented by cultivated protein product consumption compared to traditional animal products.
- Amount of livestock that would have been required to produce the quantity of alternative protein sold by the company.
- Number of jobs created by the company.

¹⁶: "The Psychological Impact of Slaughterhouse Employment: A Systematic Literature Review," *Trauma, Violence & Abuse*, Jessica Slade et al., July 7, 2021.

¹⁷: "Lab-Grown Meat Is Safe to Eat, FDA Says," *Smithsonian Magazine*, Will Sullivan, November 21, 2022.

¹⁸: These metrics are tailored to the specific opportunity discussed, and as such, some of them will not aggregate meaningfully at the LP portfolio level. You can read more about the use of customized versus standardized metrics in "[Assessing Comparability: The Indicators Dilemma](#)," *EVPA*, Gianluca Gaggiotti, et al., September 12, 2022.