

Cultivated meat

An important piece in the puzzle of a sustainable food system.

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Cultivated meat

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Burger by **Mosa Meat**

Cultivated meat

Introduction

As an alternative to industrial animal agriculture, cellular agriculture can offer thousands of kilos of meat grown in a controlled environment using cellular biology and tissue engineering. **The production process is based on “cell culture technology” that has been used in Europe for decades**, for example for growing yeasts for bread baking.



Bacon by **Higher Steaks**

It is commonly referred to as “cell-cultured meat” or “cultivated meat” and is referenced among innovations to support within [Horizon Europe](#) to increase the availability and source of alternative proteins. Cultivated meat is grown from small samples of animal cells outside the bodies of animals. It is real meat, originating from an animal, but without the need to maintain large numbers of animals under industrial conditions. Though the production processes are different, the products of cell cultured and conventionally produced meat are designed to be the same.

The original animal cells are obtained humanely from living animals through biopsies and placed in a growth medium that provides the same nutrients: e.g sugars, proteins, vitamins, minerals, and/or cell-culture factors, and other nutrients as in the natural environment. The growth and development process takes place in bioreactors. The cells, nourished and stimulated by the medium, grow and develop into muscle, fat or other tissues.

Why do we need cultivated meat?

Cultivated meat will enlarge consumers' plates. Some may argue that cultivated meat is unnecessary as plant-based alternatives are already available, and under continuous development. However, It is likely that people will continue to eat meat, and that the dietary shift towards “less and better” meat products with a higher percentage of plant-based food might not progress as quickly as needed.

Cultivated meat is projected to become a major opportunity in the food system.¹ While plant-based products appeal to some consumers, meat is still perceived as a unique food product. The potential of cultivated meat is that it will have the desirable properties

¹ Gerhardt, C., et al. 2019. [“How will cultured meat and meat alternatives disrupt the agricultural and food industry?”](#) AT Kearney.

of conventionally produced meat, and appeal to groups of consumers who are not willing to adopt an only plant-based diet.² Cultivated meat can provide one more important piece in a puzzle of multiple approaches to the necessary transition to a sustainable food system.

State of play

Cultivated meat does not yet fully exist on a commercial level and market introduction will happen stepwise, starting with specialised restaurants.³ It is currently at the pilot scale progressing towards up-scaled production, currently comprising **more than 70 startups**.⁴ In 2020, cultivated chicken meat was the first product to receive approval for commercial sale in Singapore.⁵

The table shows **some of the companies and the products they are developing**:

Company Name	Country of Origin	Type of cultivated meat
Aleph Farms	Israel	Beef (steak)
Because Animals	Canada	Mouse and rabbit (pet food)
BlueNalu	US (California)	Fish (multiple species)
Cubiq Foods	Spain	Chicken (fat)
Finless Foods	US (California)	Bluefin tuna
Future Meat Technologies	Israel	Chicken
Gourmey	France	Foie gras
Higher Steaks	UK	Pork
Integriculture	Japan	Foie gras
JUST	US (California)	Chicken
Meatable	Netherlands	Beef
Memphis Meats	US (California)	Beef, chicken, duck
Mission Barns	US (California)	Duck, chicken, pork (fat)
Mosa Meat	Netherlands	Beef
Mzansi Meat	South-Africa	Beef
New Age Meats	US (California)	Pork
Peace of Meats	Belgium	Duck (fat), foie gras
Shiok Meats	Singapore	Shrimp
SuperMeat	Israel	Chicken
Vow	Australia	Kangaroo, alpaca, goat, lamb
Wild Earth	US (California)	Mouse (pet food)
Wild Type	US (California)	Salmon

² Bryant, C. and Sanctorem, H. 2021. [“Alternative proteins, evolving attitudes: Comparing consumer attitudes to plant-based and cultured meat in Belgium in two consecutive years.”](#) Appetite, 161 (105161), <https://doi.org/10.1016/j.appet.2021.105161>

³ Sanctorem, H. 2021. Overview cultivated meat - a guide for further discussion. Commissioned by Eurogroup for Animals.

⁴ Good Food Institute. 2021. [State of the industry report. Cultivated meat.](#)

⁵ Carrington, D. 2020. [“No kill, lab-grown meat to go on sale for the first time”](#). The Guardian, 2 December, 2020.

⁶ Sanctorem, H. 2021. Overview cultivated meat - a guide for further discussion. Commissioned by Eurogroup for Animals.



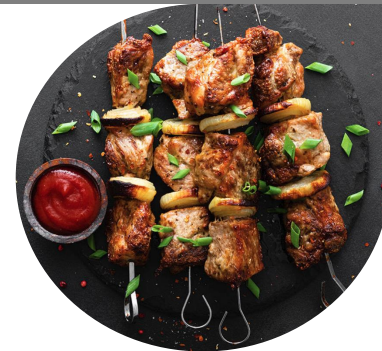
Foie Gras by **Gourmey**



Thin Steaks by **Aleph Farms**

Substantial Land-Use benefits and lower environmental impact

A previous study on cultivated meat assumed the use of fossil fuels and found relatively high greenhouse gas emissions.⁷ However, the results were impacted by the assumption that fossil fuels would still be the main energy source. Taking the shift to renewable energy and the EU goal of decarbonisation by 2050 into account, a recent LCA shows that **cultivated meat can be a more sustainable source of protein than all conventionally produced meat** when produced with solar and wind electricity and geothermal heat. While plant-based food had the lowest environmental impact, cultivated meat produced with renewable energy reduced environmental impact by 93% compared to beef, by 53% compared to pork and by 29% compared to poultry.⁸



Kebabs by **Future Meat Tech**

For land use, cultivated meat is comparable to tofu, with a footprint of around 1.8 m², which is substantially lower than chicken (4.6) as well as pork (6.0) and beef (8.8-31.6). For water use, cultivated meat is comparable to chicken and pork, with a footprint of around 42 m³, and substantially lower than beef (115-258 m³).⁹

The ecological role of animals in cellular agriculture

Cultivated meat would make it possible to both produce meat with the same properties as conventional meat while at the same time preserve biodiversity and traditional breeds. Instead of the focus on productivity in animal breeding, there could be room for traditional, local and robust breeds that can fulfill an ecological role by grazing, while at the same time serving as stocks for cultivated meat. Cultivated meat might still need animals for tissue sampling. Small groups of animals kept for farming in a sustainable food system are more compatible with cultivated meat than with the current industrial farming system that drives deforestation, biodiversity loss and consumes crops that can be used for human

⁷ Lynch, J. and Pierrehumbert, R. 2019. "Climate Impacts of Cultured Meat and Beef Cattle." *Frontiers in Sustainable Food Systems*. <https://doi.org/10.3389/fsufs.2019.00005>

⁸ Sinke, P. and Odegard, I. 2021. LCA of cultivated meat: Future projections for different scenarios. CE Delft.

⁹ Sinke, P. and Odegard, I. 2021. LCA of cultivated meat: Future projections for different scenarios. CE Delft.

consumption.¹⁰

Cultivated meat and public health

Industrial animal farming is the largest consumer of antibiotics. A major benefit of cultivated meat is that it is antibiotic-free and can help save crucial antibiotic use for life-saving human medicine. The COVID-19 pandemic has shown the risks posed by zoonoses, of which current animal production is a driving force. **Cultivated meat, as one piece of the puzzle toward a sustainable food system**, offers an opportunity to decrease antibiotic use and mitigate risks for the spread of zoonoses. Cultivated meat will also be free from trace chemicals and from pathogens such as salmonella.¹¹



Chicken sandwich by **SuperMeat**

achieving the Commission's Food 2030 Initiative for a sustainable food system for a healthy Europe.¹³

There have been some issues raised about whether cultivated meat will have the same micronutrients as conventional meat. Therefore **it will be important for cultivated meat to show the same, or at least a similar, nutritional profile for it to both be a real alternative to conventional meat and to be recognised as meat.**¹² The development of new meat alternatives, such as cultivated meat and other novel food technologies, were identified in a European Commission export report as an important component in

Cultivated meat appeals to consumers not convinced by plant-based food

Cultivated meat is yet not commercially available and therefore only consumer intentions can be surveyed. The consumer groups with the most positive attitude are flexitarians or carnivores.¹⁴ A recent study on Belgian consumer attitudes found that almost half of the respondents had a positive attitude towards either cultured or plant-based meat, but not to both, which indicates that different protein alternatives are needed. Taste and textures were the main barriers to plant-based meat alternatives for meat eaters. The main motivations for meat eater to shift to cultivated meat were social goods such as **avoiding animal suffering, minimising environmental impact, and mitigating global hunger.**¹⁵

¹⁰ Sanctorem, H. 2021. Overview cultivated meat - a guide for further discussion. Commissioned by Eurogroup for Animals.

¹¹ Sanctorem, H. 2021. Overview cultivated meat - a guide for further discussion. Commissioned by Eurogroup for Animals.

¹² Sanctorem, H. 2021. Overview cultivated meat - a guide for further discussion. Commissioned by Eurogroup for Animals.

¹³ European Commission Directorate-General for Research and Innovation. 2018. [Recipe for change: An agenda for a climate-smart and sustainable food system for a healthy Europe](#). Brussels, European Commission

¹⁴ Sanctorem, H. 2021. Overview cultivated meat - a guide for further discussion. Commissioned by Eurogroup for Animals.

¹⁵ Bryant, C. and Sanctorem, H. 2021. Alternative proteins, evolving attitudes: Comparing consumer attitudes to plant-based and cultured meat in Belgium in two consecutive years, *Appetite*, 161 (105161), <https://doi.org/10.1016/j.appet.2021.105161>

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