

5

Photo credit: Stella Rebellious Foods



## A new manufacturing technology promises a reduction in alternative protein production

A US startup wants to create more affordable meat-free chicken

The United States approved commercial sales of lab-grown chicken in June, joining Singapore as the world's first two nations where cell-cultured food is available. The main drawback to accessing this new food category is its cost – the new type of chicken in the States will be supplying high-end West Coast restaurants rather than grocery stores.

Plant-based meat alternatives also face the challenge of high costs of production, which often makes the products too expensive for consumers to buy regularly. Having realised that most plant-based meats use off-the-shelf manufacturing equipment, former aerospace engineer Christie Lagally put her expertise to work to improve the efficiency of the production process.

Lagally is the founder of Rebellious Foods, a foodtech company creating vegan chicken and developing automated plant-protein meat manufacturing systems and processes. The patented technology cleans up the manufacturing processes, reducing inefficiencies and manual processes and replacing them with smart automation systems.

The company's chicken is available as tenders, patties, and nuggets, and the system – called Mock Two – is designed specifically to produce those sizes and shapes. Because much of it is automated, the new production process can run continuously, making it possible to increase the volume of output without a parallel rise in labour and machine costs.

### Takeaway

Once at industrial scale levels of production, Rebellious Foods' manufacturing technology could produce enough plant-based chicken to make products competitive with animal meat versions. Investors recognising the significance that the technology could have on the global market for healthier proteins recently contributed \$9.5 million (around €8.6 million) in an equity round of funding.

## Cultured meat that's free of any animal components

### This startup is opening up the market with 100 per cent vegan lab-grown meat

In February 2021, Believer Meats made headlines when it announced it had reduced the cost of a single cultured chicken breast to \$7.50. Today, the company has managed to bring the cost down to \$1.70. The company achieved this thanks to their innovative approach and methodology. Instead of using stem cells, Believer Meats uses much faster-growing fibroblasts, which can grow as muscle or fat. In addition to increasing speed of production, the method can produce cell densities that are ten times higher than the industry standard.

Believer Meats also uses a growth medium (the nutrient-rich substance in which the cells are grown) that is completely free of any animal components. Instead of animal protein, the company uses a growth medium containing plant-

based proteins from items such as chickpeas and soy. Not only does this eliminate some of the objections to cultured meat from vegans and vegetarians, it also reduces the cost of the medium. Believer Meats also claims its stainless-steel fermenters continuously remove ammonia-based waste products from the growth medium, which allows the company to recycle more than 70 per cent of the nutrients in the growth medium.

With the prices brought down, the next step for the company is to scale up its technology to supply the mass market. Believer Meats is currently constructing its first U.S. commercial production facility in Wilson, North Carolina, with an anticipated opening in Q2 2024. Once operational, the 200,000-square-foot facility will be the largest cultivated meat production centre in the world with the capacity to produce at least 10,000 metric tons of cultivated meat.

## 7

## A climate-friendly pork alternative

### The product is cultivated using microalgae

The pork sector's carbon footprint, along with other red and processed meats, accounts for 7.1 gigatonnes of CO2 equivalent every year. That's 14.5 per cent of all anthropogenic greenhouse gas emissions. On the other hand, cultivated meat production emits 52 per cent fewer carbon emissions for pork.

Czech food tech startup Mewery is developing a low-carbon cultivated pork that is grown with a microalgae base. To create its meat-free pork, Mewery uses cells harmlessly

taken from a living animal. It then imitates the conditions that make cells grow and divide into muscle and fat cells before feeding the cells with nutrients and growth factors to cultivate larger amounts.

What makes Mewery's approach different is the fact that it uses a growth factor made of microalgae. This stands in contrast to many processes for producing cultivated meat, which use fetal bovine serum (FBS). FBS is both expensive and ethically unsuitable to many consumers. At the end of this process, Mewery can harvest the pork product without having killed a single animal. The company hopes to bring its first products to market in 2026, pending regulatory approval.

## Takeaway

Jack Ellis is Senior Associate Agriculture & Food at Cleantech Group, a research-based company that offers analysis on global cleantech innovation. In his opinion, in addition to the cost of lab-grown meat being prohibitive, another obstacle to wider take up by consumers is the how it looks. "Most people don't think they are an exact replica of meat in terms of taste and texture." However, advances in tech promise to change this, with companies such as Project Eaden adapting spinning technologies from the textile and fashion industries, and Nova Meat, which is using 3D printing.