Meat made from cells, not livestock, is here. But will it ever replace traditional meat?

November 16 2023, by Laura Ungar

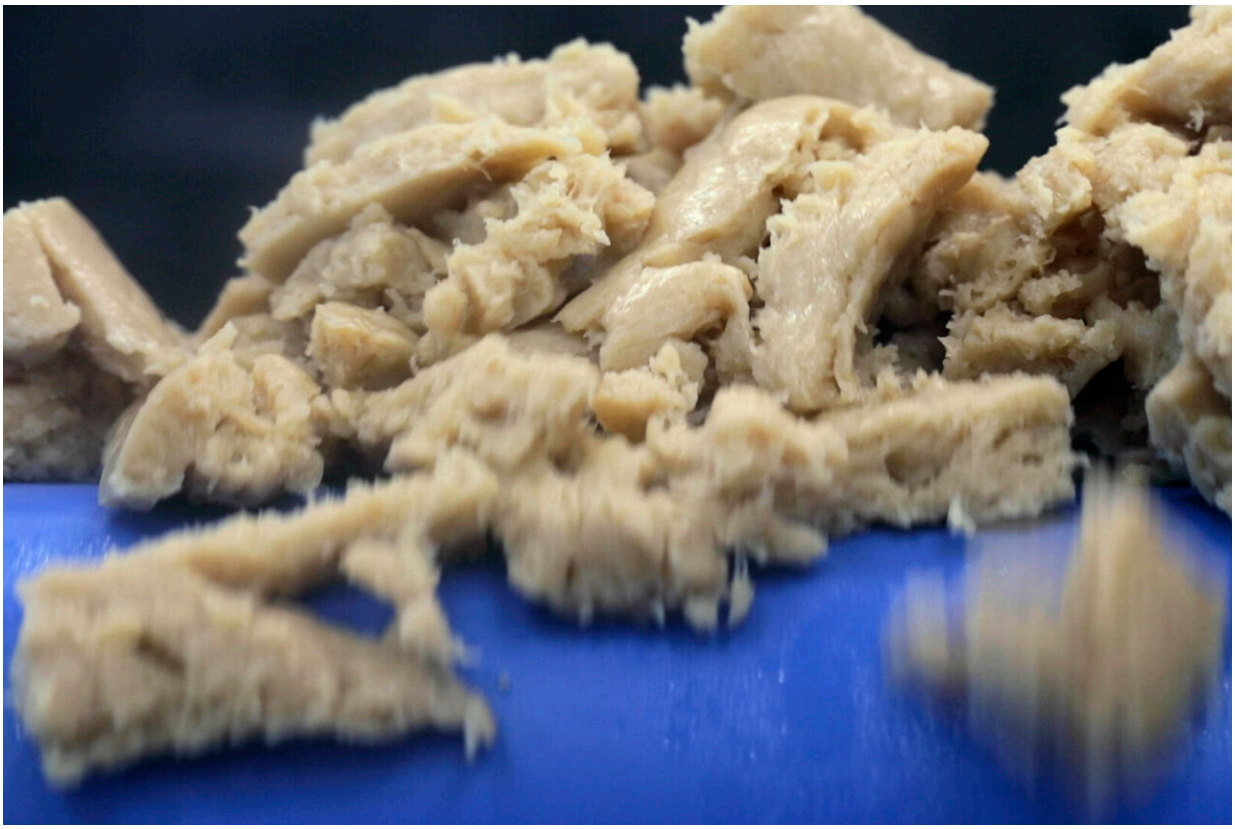
Technicians work with bioreactors at the Believer Meats facility in Rehovot, Israel on Feb. 13, 2023. Animal cells are placed inside bioreactors and bathed in a nutrient-rich broth where they multiply. The paste of cells is harvested and mixed with plant proteins, then pressurized and pushed out to create meat fibers. Credit: AP Photo/Emma H. Tobin

A familiar aroma wafted through the Believer Meats test kitchen earlier this year as Research and Development Chef Andres Voloschin flipped sizzling strips of chicken conjured from cells.

Scientists, not farmers, produced this chicken. More than 150 startups are chasing an ambitious goal: meat that doesn't require raising and killing animals that is affordable and tastes and feels like the meat we eat now. They are part of a young industry aiming to use cell biology to reduce the environmental impact of the world's ever-increasing demand for meat and change global protein production the way electric cars are shaking up the auto industry.

"We are addicted to meat as a species. It's part of our evolution. It's part of our culture," said Believer founder Yaakov Nahmias, whose country, Israel, is an industry hub along with California and Singapore. But "we thought about quantity rather than the environment, rather than sustainability."

Companies making so-called "cultivated," or "cultured" meat, which is also popularly known as "lab-grown" meat, are trying to scale up quickly—partnering with traditional meat companies, drawing more and more investors and breaking ground on new production facilities in the U.S. and elsewhere.



Cultivated chicken is processed at the Believer Meats facility in Rehovot, Israel on Feb. 13, 2023. The company is one of over 150 startups aiming to use cell biology to reduce the environmental impact of the world's ever-increasing demand for meat and change global protein production. Credit: AP Photo/Emma H. Tobin

Wide adoption of meat from cells is nowhere near assured, however. This meat is expensive to make. There are scientific challenges, such as learning how to mimic the complex structure of steak. Government regulation is another obstacle. Only Singapore and the U.S. allow sales of cultivated meat.

And while many people who have tried it say they like it, others find the idea distasteful. An Associated Press-NORC poll found that half of

adults in the meat-hungry U.S. would be unlikely to try it. A majority of those who said they wouldn't said "it just sounds weird."

Even Nahmias' 10-year-old son Oren says he will only eat traditional meat. "I feel bad" for the animals, he said, "but they are yummy!"

HOW CELLS CAN BE TURNED INTO A CUTLET

The science behind this new meat comes from the medical world. The process starts with cells. Depending on the company, the cells may come from a piece of tissue, a fertilized egg or a cell "bank." Various sorts can be used; scientists choose cells that can self-renew and turn into the muscle and fat cells that make up meat tissue. From starter cells they create "cell lines" so they don't have to keep going back to animals.

Believer Meats Research and Development Chef Andres Voloschin works on dishes made from the company's products at a test kitchen in Rehovot, Israel on Feb. 13, 2023. Believer is one of a growing number of companies making cultivated meat, which can be produced without raising and killing animals. Credit: AP Photo/Laura Ungar

These cells are placed inside vessels of various sizes called bioreactors and bathed in a nutrient-rich broth where they multiply. Thick, structured meat also requires a scaffold that helps cells organize into a shape. Changes in the composition of the broth, or media, and cues from the scaffolding, tell immature cells to turn into muscle, fat and connective tissue.

Producing meat this way could dramatically reduce the impact of meat on the environment because it would reduce the need for land for the animals and for feed.

"The most important thing is that this field move forward and start reducing the destruction to our environment associated with current animal agriculture techniques," said Glenn Gaudette, a biomedical engineering specialist at Boston College.

But transforming the ecosystem is a distant vision. Scientists and industry experts say cultivated meats have a way to go before they're indistinguishable from conventional meats, especially when it comes to the texture of products other than burgers or nuggets.

Believer Meats Research and Development Chef Andres Voloschin diplays a dish made from the company's cultivated lamb product at a test kitchen in Rehovot, Israel on Feb. 13, 2023. Believer is one of a growing number of companies making cultivated meat, which can be produced without raising and killing animals. Credit: AP Photo/Laura Ungar

There are vexing scientific hurdles. Gaudette said scientists are still trying to find the best scaffolds for structured meat, which must include a way for oxygen to get to all the cells. Options include animal-based scaffolds such as gelatin and, increasingly, decellularized vegetables like spinach.

Experts expect scientists to overcome the remaining scientific hurdles. But they say shaping human perception may be more difficult.

MEAT GROWN IN A LAB JUST SOUNDS STRANGE

Most people connect meat production with farms rather than science labs—which influences how they view these new products.

In the AP-NORC poll, just 18% of U.S. adults said they are extremely or very likely to try cultivated meat, and 30% said they are somewhat likely. Those under 45 years old are more likely than older adults to try it and men are more likely than women. When those unlikely to try it were asked to choose from a list of reasons why, half said they didn't think it would be safe.

Cultivated chicken is processed at the Believer Meats facility in Rehovot, Israel

on Feb. 13, 2023. More than 150 startups are chasing an ambitious goal: meat that doesn't require raising and killing animals that is affordable and tastes and feels like the meat we eat now. Credit: AP Photo/Emma H. Tobin

That's a concern for respondent Nora Bailey, 31, a mother of three in rural Arkansas.

"I would obviously want to do more research as far as the long-term effects," since early products deemed safe may later be found to be unsafe, she said.

A World Health Organization report noted several potential safety issues, such as microbial contamination at various points in the process, biological by-products and scaffolding that some people might be allergic to. Experts acknowledged a lot more safety testing is needed but noted that conventional meat carries significant food-safety risks, such as potential bacterial contamination during slaughter.

At this point, relatively few people have tried cultivated meat. But since its approval in the U.S. this summer, a small number of diners are eating it for the first time at particular restaurants and special events. People who recently tried cultivated chicken at U.S. company Good Meat's headquarters in Alameda, California, said they liked it and would eat it again.

Employees at Believer Meats work in labs at the company's headquarters in Rehovot, Israel on Feb. 13, 2023. Believer is one of a growing number of companies making cultivated meat, which can be produced without raising and killing animals. Credit: AP Photo/Laura Ungar

Chef Zach Tyndall carries plates of cultivated chicken at GOOD Meat's Alameda, Calif., headquarters on Thursday, Sept. 28, 2023. The company is one of over 150 startups aiming to use cell biology to reduce the environmental impact of the world's ever-increasing demand for meat and change global protein production. Credit: AP Photo/Noah Berger

Tayeba Chowdhury tastes cultivate chicken at GOOD Meat's Alameda, Calif., headquarters on Thursday, Sept. 28, 2023. The company's cultivated chicken, which is grown from animal cells, is approved for sale in the United States and Singapore. Credit: AP Photo/Noah Berger

Ryen Anderson tastes cultivate chicken before sampling it at GOOD Meat's Alameda, Calif., headquarters on Thursday, Sept. 28, 2023. The company's cultivated chicken, which is grown from animal cells, is approved for sale in the United States and Singapore. Credit: AP Photo/Noah Berger

Dave Pirazzini smells cultivate chicken before sampling it at GOOD Meat's Alameda, Calif., headquarters on Thursday, Sept. 28, 2023. The company's cultivated chicken, which is grown from animal cells, is approved for sale in the United States and Singapore. Credit: AP Photo/Noah Berger

Karen Hunt, who joined the taste test because she works nearby said she's not bothered by how it's made, especially when she thinks about how traditional chicken is made.

"When you bite into it, it was moist. It wasn't dry. It did have that kind of feel of chicken, taste of chicken," she said. "I was pleasantly surprised, and it tasted great."