THE ARRIVAL OF CELL-CULTURED MEAT

By Henk Hoogenkamp

The colossal global meat industry is increasingly facing multiple challenges ranging from interrelated ethical, environmental, and business concerns. In the future, the words "meat" and "animal" will be decoupled. Meat without animals is the new notion of cellular biotechnology using stem cells and bioreactors as the basic platform to grow healthy and nutritious cultured meat.

Human food consumption is projected to almost double by 2050 and demand is growing exponentially. Cultured meat products are an "and", not an "or" solution, and is the latest in a long history of optimizing food production methods. Meeting the world's protein needs will require contributions from large-scale production methods, including protein regeneration, all the way to small-scale animal farming. Cultured meat and fish products will all play an important role in contributing to food security.

The primary concern of the meat harvest traditionalists is that cultured meat does not involve raising and slaughtering animals. However, seen from a different perspective, cultured meat is an opportunity -not a threat- because it represents a new and better manner to provide much needed food for the global supply chain.

Global Challenges

Bioprocessing is the new way forward to produce meat without intensive livestock farming. In the future, many high-value ingredients and products will be bio-manufactured, including cell-free methodologies for developing more sustainable food for everyday life and overcome the limitations of traditional products that need significantly more water, energy, and land space. Hence, for companies to stay relevant, it will be essential to diversify outside of conventional product portfolios to assemble nutritious food products. These bio-manufactured products should preferably be bioidentical, using methods such as "precision-fermentation-made-animal-free" with the same taste, functionality, and nutritive profile as the traditional products.

Picture: Mosa Meat, Netherlands

Growing meat without the use of animals is a rapidly emerging highly innovative technology. The goal is to remove the animal from meat production. The time has come for the world to move past the need to slaughter animals and instead embrace new food platforms such as "plant-meat" and cell-cultured meat. The true benchmark for cultivated meat and cultivated fish lies in high output quantities at a cost-efficient scale.

Startups: The Movers & Shakers of Change

The cell-cultured protein industry continues to generate momentum. Currently, more than 80 startups are working on developing cultivated meat and seafood. It seems that multinational life science companies, as well as the legacy food and meat processing industry, now -finally- understand the potential of this emerging technology.

Even the world's largest legacy food company Nestle, has announced plans to enter this rapidly emerging industry. Singapore has become the first country to approve the commercialization of cultured meat and fish. Local player

Shiok Meats has introduced a cell-based crustacean and is also set to launch a cultured minced shrimp product in 2022.

Better and More

Human civilization was largely enabled by the domestication of livestock animals. In the future, cellular biotechnology is going to be the second domestication not only in producing large quantities of cell-cultured meat and fish, but also in growing leather, silk, perfumes, as well as vaccines and organs.

Traditional animal agriculture has almost reached its maximum capacity, and new technologies like cultured meat and bioengineered proteins are needed to lower environmental impact. As the global meat demand continues to grow with approximately 2 percent each year, deforestation and wildlife habitat are in the middle of public outcry. For example, cease destruction of the Amazon rainforest, and instead use it to facilitate the growth of human food, while diverting fresh-water sources to drought-prone regions. Smarter ways to produce food and meat for the daily diet will need implementation to alleviate some of these pressures.

Several cultured meat companies are planning to commission the first high-volume cultured meat production facility by 2025. Cell-cultured meat and fish may hit competitive cost and environmental benchmarks by 2030. Initially, Asia, North America, and the EU countries are seen as strategically valuable markets to launch cell-based meat and seafood products.

Accelerated Change

The use of animals as prime food providers can be seen as the main driver of catastrophic global collapse of biodiversity, and thus responsible for causing irreversible damage to the fragile ecosystem. By reducing livestock animals as food providers, the rapid decay of atmospheric cattle methane emissions will effectively improve climate conditions. To reinvent the current food systems, it will therefore be essential to halt the biodiversity collapse and slow-down or reverse climate change.

The controversy between meat consumption and climate change is heating up. The most compelling argument to eat less slaughtered animal meats is that it is healthier and better for the environment. Cattle and hog farmers are an easy prey for the anti-meat activists and are being subjected to criticism that's often deeply unfair. Yet, most -if not all- western countries are under pressure to significantly reduce greenhouse gas emissions by 2030. Adhering to the EU targets, it will be necessary to tackle emissions head-on, including the traditional agricultural methods. After all, after transport emissions, agriculture is the second-largest emitter at approximately 14% of the total emissions.

China Calling the Shots

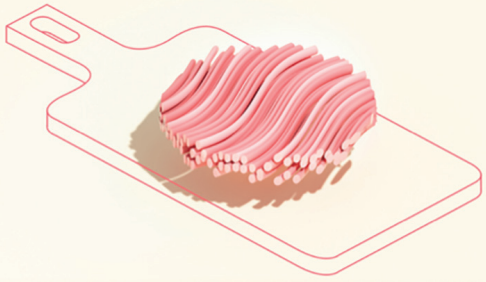
When talking about slaughtered meat consumption, something must be done, sooner rather than later. Take China for example: In the 1960s, the average Chinese person consumed less than 5 kilos of meat annually. Fast forward, in 2020 it reached an astounding 63 kilos. In 2022, China will consume 28% of the world's meat - 51% of all pork produced in the world.

Looking at these huge numbers, transformative protein selections will become important. "Plant meat" and "plant milk" are one of the choices, as well as cultured meat and fish. These choices need to be made to reduce man-made greenhouse gases. It will be crucial to improve biodiversity and boost alternative protein sources such as cultured meat and fish, soy, corn, wheat, fava, and pea to meet the strict emission targets over the next decade. China's sign-off on carbon emissions will be essential for global reductions. If not, all other attempts will fail.

Cell-cultured Meat

The production of conventional meat in modern times is far from natural. "Consumption animals" are routinely given antibiotics and hormones so that they grow much faster and larger than they would naturally. Unsanitary outgrow farming and slaughtering conditions may increase the risk of contamination from feces, as well as other bacteria and viruses. Unlike in factory-farmed meat, there is no use of contaminants and antibiotics in cultured meat products, which does contribute to antimicrobial resistance in human pathogens. Cultured meat and fish avoid all those issues: it has many benefits for human health and environmental advantages, including "no-animal-to-food" conversion as well as huge savings on clean water and animal feed. Another major advantage of cultured food is that the manufacturing companies will only produce the parts of meat or fish that consumers eat. In other words, they effectively reduce food waste, while providing year-round availability.

Picture: Mosa Meat, Netherlands



Cell-cultured meat can be described in only four words: Cells > Scaffolds > Media > Bioreactors. In basic terms, cultured meat replicates conventionally produced meat through stem cell and tissue culture. Cultured meat will become a main disruptor to the current conventional "animal-grown" meat industry. Cultured meat is poised to significantly expand humanity's capacity to feed a growing global population, while not only preserving the culinary traditions and preferences, but also protecting the planet. By its very nature, cultured meat will reduce the need to breed, raise, and slaughter animals, with the bonus of significantly lessening the suffering of billions of animals. It should also be said that approximately 99 percent of all animals used for food are intensively bred and "farmed". Hence, these products can be considered as industrially grown and harvested.

About the author:

Henk Hoogenkamp,
Proteins, Advisory, Boards, Author