Bio-manufacturing: The future of food production

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The future of food production is bio-manufacturing. Here, we discover Multus is helping it scale

Without humans, just 3% of land-based mammals are wild animals by weight. Global meat production eclipsed 347,000,000,000 kg in 2022 (OECD/FAO, 2023), contributing to more greenhouse gas emissions than cars, trucks, ships and planes combined and using 73% of global antibiotics (K. Tiseo et al., 2020). By 2050, the World Health Organization estimates up to 10 million deaths – the same as cancer – could be caused by antibiotic-resistant superbugs.

Our consumption of meat from intensive farming is literally consuming the planet. Yet, global demand for meat continues to rise. Over the next ten years, meat demand is set to increase by an additional 41,000,000,000 kg per year (OECD/FAO, 2023).

Today's intensive animal farming methods will not feed tomorrow's demand for meat.

Bio-manufacturing and advancing sustainable meat production

Multus, a start-up formed at Imperial College London that exists to enable a paradigm shift in sustainable meat production through scalable bio- manufacturing, has just opened a first-of-its-kind production facility to feed the future of food.

Meat production technologies have been advancing for the past 12,000 years since the domestication of animals. Today, despite the mechanisation of animal slaughter, more efficient feed production and the use of antibiotics and hormones, cows have a feed conversion ratio of 25. That is, 1 kg of beef requires, on average, 25 kilograms of feed to produce (Alexander et al., 2016).

The future of sustainable meat production is through bio-manufacturing – growing meat directly from cells in the form of cultivated meat.

Bio-manufacturing offers a future where everyone has the choice to enjoy socially and environmentally responsible meat with a food system that serves people and the planet. By growing only the meat, and not the rest of the animal, cultivated meat promises to be more resource efficient than intensive farming practices. A life-cycle assessment by CE Delft estimates cultivated beef could have a feed conversion ratio of ~ 4 and use up to 19 times less land than beef (CE Delft, 2023).

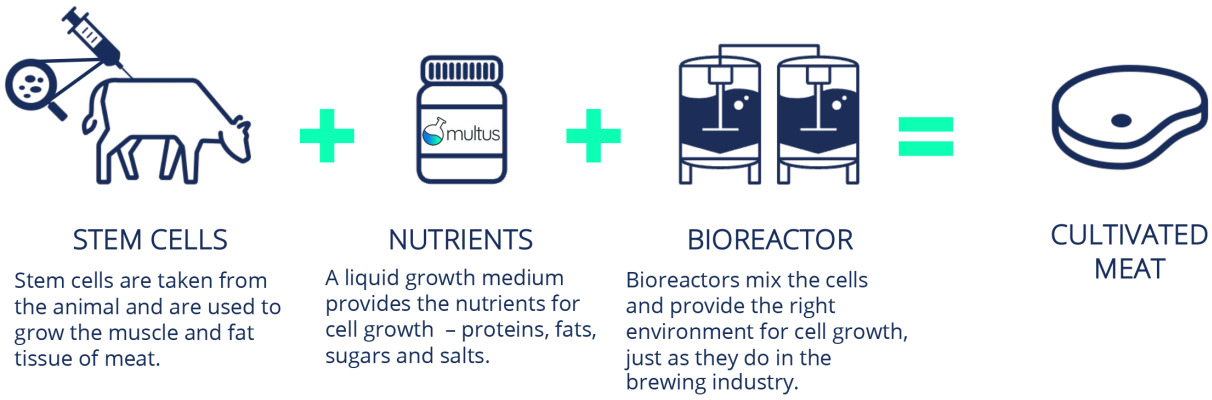

Figure 1: Simplified cultivated meat production process. © 2023 Multus Biotechnology Ltd

Sustainable protein production

Sustainable protein production is at the heart of our global food system's next major tipping point.

International commitments to climate change mitigation are bringing massive investment. At the same time, national pressures on food sovereignty and food security create tailwinds in policy reform, and people desire better nutrition in what they choose to eat. The challenge for the cultivated meat industry is reaching price parity at scale.

Over one hundred companies worldwide focus on producing cultivated meat (The Good Food Institute, 2023). If cultivated meat is to make a dent in the environmental footprint of a trillion-dollar market, global bioreactor capacity needs to be 300-500 times larger than it is today (McKinsey, 2021). At the same time, there is a corresponding increase in demand for growth media – the specialised nutrients that feed cell growth – which is the main blocker for the industry to reach price parity, making up over 80% of production costs (Hubalek, 2022).

Commercial cultivated meat production critically depends on combining affordable and scalable feedstocks to stimulate complex cellular behaviour at scale while eliminating critical supply chain dependencies and meeting important regulatory requirements.

Multus is catalysing the growth media supply chain for cultivated meat production off the back of a €2.5 million grant from the UK Government via the European Innovation Council Accelerator funding program to enable breakthroughs in cost-effective large-scale cultivated meat production. Opening in January 2024, the world's first food-safe (FSSC22000-certified) commercial facility designed to produce growth media for cultivated meat production can support 500,000 kg of cultivated meat production per year.

Producing more sustainable food through bio-manufacturing and supply chain solutions

Multus works with companies globally to accelerate growth media development and supply growth media from lab to commercial scale, enabling cultivated meat producers to focus on their core business – producing more sustainable food.

This supply chain solution requires tight control and risk mitigation in quality, intellectual property, transparency, and flexibility to ensure effective scale-up. De-risking and coordinating the complex supply chain is driving Multus' key innovations in:

- Agricultural feedstocks derived from side streams like grain husks, which have the potential to deliver much lower costs at readily available scale;
- Food-safe formulations optimised by cell type for cell performance;
- Reconfigured manufacturing capacity, built to serve cultivated meat with efficiency and convenience; and,
- Fundamental research into ingredient safety and work with regulators to help establish and understand the impacts of regulatory frameworks for cultivated meat growth media.

Rapid transformation of the global food system

Multus is helping lead the rapid transformation of the global food system towards sustainability as a specialist in growth media development and supply. The first-of- its-kind facility for food-safe growth media supply represents an exciting advance for cultivated meat companies globally to bring new products to market quicker with security around the supply chain, intellectual property, and compliance.

Please Note: This is a Commercial Profile