



Cultured Meat Production: A Pioneering Frontier for Sustainable and Healthy Protein Sources

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The global food industry is on the cusp of a revolutionary transformation with the advent of cultured meat production. This innovation promises to address some of the most pressing challenges in agriculture and food security [1]. Cultured or, lab-grown or cell-based meat is produced by cultivating animal cells in a controlled environment, eliminating the need for traditional livestock farming. This burgeoning sector holds the potential to significantly contribute to the national Gross Domestic Product (GDP) while enhancing food security and reducing poverty, much like the poultry sector has historically done [2]. The traditional livestock industry, including poultry, has faced considerable obstacles due to the spread of infectious diseases, resulting in substantial economic losses and raising concerns about food safety. High-density

animal farming has exacerbated the transmission of diseases among animals and from animals to humans, posing a persistent threat to public health and economic stability.

Additionally, the overuse of synthetic antibiotics in animal feed has led to antibiotic resistance, prompting a ban on such practices in many European nations and sparking a global search for alternative solutions. In this context, the development of cultured meat offers a groundbreaking solution. The risk of disease transmission is vastly reduced by producing meat in sterile, controlled environments [3]. This method ensures a safer food supply and circumvents the ethical and

Environmental concerns associated with conventional meat production. [4] Eliminating antibiotics and hormones from the production process further enhances the health benefits of cultured meat. Research into innovative treatment options for infectious diseases in livestock has paved the way for advancements in cultured meat technology [5]. For instance, nanoparticles and plant-based solutions have demonstrated significant efficacy against various viral infections in poultry. Essential oils and botanical substances, like *Trachyspermum ammi* (Ajwain), have shown promise as alternatives to antibiotics, exhibiting potent antioxidant and anti-inflammatory properties. These advancements underscore the potential of integrating such novel compounds into cultured meat production to enhance its nutritional profile and disease resistance. Plant-based ingredients and probiotics in cultured meat could replicate the benefits observed in poultry feed, offering a nutritious and sustainable protein source [6].

As research progresses, chitosan, nanoparticles, and propolis could be explored to fortify cultured meat against microbial threats, ensuring its safety and extending its shelf life. Cultured meat production aligns with global sustainability goals by reducing the environmental impact of meat production. Traditional livestock farming is resource-intensive, contributing significantly to greenhouse gas emissions, deforestation, and water usage. In contrast, cultured meat requires fewer natural resources and generates a smaller carbon footprint, making it a viable solution for mitigating climate change and promoting environmental stewardship [7]. As the cultured meat industry advances, fostering interdisciplinary research and collaboration is crucial to overcoming technical and regulatory challenges. Continuous investment in research and development and supportive policies will be essential to scale production and make cultured meat accessible to a

Broader population. Cultured meat production represents a transformative approach to addressing the limitations of traditional livestock farming. By leveraging cutting-edge technologies and novel compounds, this sector has the potential to enhance food security, promote public health, and drive economic growth. As we embrace this innovative frontier, we move closer to a sustainable and resilient food system that nourishes a growing global population [8].

This editorial reflects the current state of research and development in cultured meat production, drawing parallels with the advancements and challenges observed in the poultry sector. It highlights the potential benefits of this innovative approach in addressing global food security and sustainability issues.

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