



# BEEF WATCH

## FOOD SAFETY HAZARDS

**THIS BEEF WATCH EDITION WILL FOCUS ON FOOD SAFETY HAZARDS AND THE REGULATORY CONSIDERATIONS FOR CULTURED MEAT PRODUCTS.**

### ASSESSING THE POTENTIAL FOOD SAFETY HAZARDS OF CULTURED MEAT

The technology of cell-based food products such as “cultured meat” in large-scale production systems is currently under development in different regions of the world. The Food and Agriculture Organization (FAO) and the World Health Organization (WHO) have engaged technical experts in a process of international collaboration with a view towards consumer protection ahead of widespread availability of these products around the world.<sup>1</sup>

The panel of technical experts is working to identify the potential food safety hazards, as the first phase of a risk assessment for these novel food products.

There are four steps in cell-based production systems: (1) cell selection, (2) cell proliferation and differentiation in large-scale biomass production systems, (3) harvesting, and (4) food processing and formulation.<sup>1</sup>

Each step has a number of known and potentially new food safety hazards and regulatory concerns.

#### 1. Food Safety Hazards – Biological, Physical and Chemical

Some food safety hazards in the cultured meat production processes require controls with tools approved for the production of conventional foods. Tools include well-designed training of personnel, good manufacturing practices, hazard analysis critical control points (HACCP) systems; and with methodologies for the end-product risk assessment.

**2. Allergens** – According to the analysis of the Food Standards Agency of the U.K., 2 hazards in the cultured meat process may arise if producing cells of inadequate quality, or after producing proteins that are of a different cell type. There is a potential for some people to develop allergic reactions to these new proteins in cultured meat products.

**3. Nutritional Hazards** – The nutritional profile of cultured meats may differ from natural meat, and a potential absence of important nutrients is a concern. Cultured meat products are prepared with the support of a scaffold of different ingredients on a media formulation that provides the nutrition to the cells. This nutrition formulation may directly affect the final composition and may produce a different nutritional profile when compared to natural meat. The Food Standards Agency of the U.K.<sup>2</sup> reports that a potential absence of important vitamins and minerals in cultured meats is a concern because those attributes of conventional meats are the result of a natural biological process that occur within the body of the living animal. One possible solution to address this gap would be to add vitamins and minerals to the cultured meat, similar to food fortification. This option needs a careful evaluation to confirm the bioavailability of those nutrients for human consumption.

#### What other unforeseen potential risks are on the horizon?

Animal muscles are highly complex structures and are comprised of a matrix of amino acids, fatty acids, micronutrients and other bioactive compounds. It is unlikely that cell-based products can replicate the composition of the natural meat it is trying to simulate. Discussions about labelling requirements on cell-based products and the use of the word “meat” as a descriptor are ongoing to ensure consumers easily differentiate these novel products, once available.

### Food safety hazards and regulatory concerns at different phases of cultured meat production systems<sup>1</sup>

	CELL SELECTION Cell sourcing, isolation, preparation & storage	PRODUCTION Cell proliferation and differentiation	HARVESTING Cell/tissue harvesting	FOOD PROCESSING & FORMULATION
Hazard/Concern	<ul style="list-style-type: none"> <li>• Transmission of zoonotic infectious diseases</li> <li>• Microbial contamination</li> <li>• Chemical residues &amp; by-products</li> </ul>	<ul style="list-style-type: none"> <li>• Microbial contamination</li> <li>• Chemical residues &amp; by-products</li> <li>• Biological residues &amp; by-products</li> </ul>	<ul style="list-style-type: none"> <li>• Microbial contamination</li> <li>• Chemical and biological residues &amp; by-products</li> <li>• Physico-chemical changes</li> </ul>	<ul style="list-style-type: none"> <li>• Microbial contamination</li> <li>• Chemical and biological residues &amp; by-products</li> <li>• Processing contaminants</li> <li>• Physico-chemical changes</li> </ul>
Potentially New Hazard/Concern	<ul style="list-style-type: none"> <li>• Carryover of cryoprotectants (used for cell storage)</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of (epi)genetic drift in cell lines due a constant sub-culturing</li> <li>• Potentially allergenic scaffolds or microcarriers</li> </ul>	<ul style="list-style-type: none"> <li>• Culture medium residues</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>

Source: <sup>(1)</sup> FAO, The Food Safety Aspects of Cell-based food. 2023

### Additional Resources

1. FAO/WHO. The Food Safety Aspects of Cell-based food, Rome 2023. [Food safety aspects of cell-based food - FAO/WHO publication launching webinar and Food safety aspects of cell-based food \(fao.org\)](#)

2. Food Standards Agency of the United Kingdom, Hazards in Cultured Animal Cells. Version 1.4. November 2022. [Identification of hazards in meat products manufactured from cultured animal cells](#)