Market Advisory Council

Advice

Cell-Based Protein of Aquatic Animals

Brussels, 20 September 2023

1. Background

Worldwide, including in the EU[1], there is an increasing number of investments in protein grown directly from cells. Protein from aquatic animals is part of this trend, which can even involve partnerships with producers of conventional fisheries and aquaculture products[2].

The process involves the placing of a sample of cells of aquatic animals in a cultivator, in order to grow the same cell types, which can be arranged in the same three-dimensional structures as the conventional counterparts. The process is essentially the same for all species, regardless of being meat or seafood. In terms of legislative framework, in the EU, these products would require approval under the Novel Foods Regulation[3], including a food safety assessment by the European Food Safety Agency (EFSA) of the nutritional and toxicological properties of the products. In case of genetic modification, compliance with the Genetically Modified Food and Feed Regulation[4] would also be needed. Until now, in the EU, there were no applications from cell-based protein operators.

Several studies have been published on the contribution of alternative seafood to food systems[5]. Private operators have also undertaken their own studies on the matter. Under Horizon Europe, a project call[6] was launched to help understand the environmental, economic and social aspects of cell-based protein, plus the challenges and opportunities to

[1] https://www.foodnavigator.com/Article/2022/08/09/German-startup-presents-its-first-cultivated-seafood-products-in-Europe
[2] https://www.nomadfoods.com/news/nomad-foods-and-bluenalu-collaborate-to-introduce-cell-cultured-seafood-in-europe/
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02015R2283-20210327
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02003R1829-20210327
[5] For example, https://www.frontiersin.org/articles/10.3389/fsufs.2022.750253/full and https://marketac.eu/wp-content/uploads/2021/10/WorldFish-min.pdf.
[6] https://blue-economy-observatory.ec.europa.eu/calls-proposals/cultured-meat-and-cultured-seafood-state-play-and-future-prospects-eu-horizon-cl6-2023-farm2fork-01_en

reduce greenhouse gas emissions, air, water and soil pollution, resource depletion on ecosystems, generation of wastes, and on human health.

2. Appropriate terminology

As a recent sector, clear terminology is still missing in the market and in legislation, particularly when cells of aquatic animals are used. Presently, several different terms are used across scientific articles, projects, news articles, and business communications (e.g., "lab-grown seafood", "cultured seafood", "cultivated seafood", "cell-based seafood").

In the view of the MAC, the terms "cultured" and "cultivated" should not be used, as these terms are generally associated with aquaculture practices, and, as such, could be confusing for consumers. The term "seafood" should also be avoided, as these new products will not be coming from the sea. Therefore, the most appropriate term would be "cell-based protein of aquatic animals". Careful consideration on how the selected term translates in different languages will be needed.

Regardless of the terminology used, the terminologies should be distinct and clear for operators and for consumers. It should be distinguishable from any commercial denomination of the animal from which the issue was extracted. Consumers should be aware that these products are produced through a new technology with a specific nature and method of production, meaning that these are different from the conventional products with which they may already be familiar with.

3. Economic, social and environmental implications

As this new sector does not yet exist in the field of fishery and aquaculture products, it is difficult to know the exact economic, social and environmental implications. Nevertheless, it is important to highlight several preliminary perspectives.

a. Economic implications

In scientific literature, there have been some preliminary considerations on several potential economic implications of this new sector (e.g., concentration of producers in high income

countries, consolidation in value chains, perpetuation of power disparities; price parity with conventional products; competition and substitution of conventional products vs expansion of the global market and supply; displacement of current primary producers vs creation of new employment). In relation to these, it is important to highlight:

- In the short-term, the new products are likely to be expensive. In the long-term, as production costs decrease, the products will likely become cheaper and increasingly compete with conventional ones. The replacement of conventional products will likely lead to economic losses for coastal communities and the associated industries. As the production processes are significantly different, the production costs for "similar end-products" can vary greatly, potentially destabilising the markets and the competitiveness of the fisheries and aquaculture sectors.
- The development of these products should be carried out within the framework of fair competition with conventional products and in compliance with the legislative and regulatory framework.
- If accurate information is provided on the origin and content of the products, consumers and operators will be able to make informed decisions, in the context of a free market economy.
- Overall EU policy options, particularly in the context of the European Green Deal and of the Farm to Fork Strategy, on primary production, imports from third countries, food security, and food information to consumers will also have an impact on the economic sustainability of the EU's conventional production sector.

b. Social implications

In scientific literature, there have been some preliminary considerations on several potential social implications of this new sector (e.g., contribution to food security, including possibility of value chains in inland and urban areas; nutritional value, including food safety, lack of high-quality nutrients present in conventional products, customisation of compounds; reduction of food waste; social and cultural norms and traditions). In relation to these, it is important to highlight:

- When new technology is applied to food production processes, food safety must be one of the foremost concerns[7]. All risks must be assessed, including whether there are reductions in risk, so that the safety and health of consumers are not jeopardised.
- If conventional products are replaced by new products, there would likely be the loss of many jobs and impoverishment of coastal and rural areas dependant on the fisheries and aquaculture sector.
- As the growing of cells for protein requires ingredients, the social impacts of the sourcing of the ingredients by this new industry must be considered.
- If developed in the EU, the new technology can contribute to food security. Nevertheless, if there is a replacement of conventional products, nutrition is affected, as these are unlikely to meet the nutritional value of conventional products. Worldwide, other protein sources are needed to meet the growing global food demand, but the nutritional value of fisheries and aquaculture products – including the role of fish and fishmeal – should not be forgotten (e.g., omega-3 fatty acids).
- For actual product creation, in order to meet consumer sensory and visual expectations, retailer specifications and sanitary thresholds (e.g., shelf life), the cell tissue is further processed, including through the addition of starches (carbohydrates), salts, taster makers, etc. Therefore, further studies are needed on the sustainability and nutritional impacts.

c. Environmental implications

In scientific literature, there have been some preliminary considerations on several potential environmental implications of this new sector (e.g., contribution to food security, including possibility of value chains in inland and urban areas; nutritional value, including food safety, lack of high-quality nutrients present in conventional products, customisation of compounds; reduction of food waste; social and cultural norms and traditions). In relation to these, it is important to highlight:

[7] Recently, FAO published a document on food safety aspects of cell-based food: https://www.fao.org/documents/card/en/c/cc4855en

- For potential comparisons with conventional production methods, an environmental impact assessment of cell-based production methods would be required, including a Life Cycle Assessment.
- In order to prepare for the potential intensification of this new production method, further information would be needed on biodiversity impacts, energy used, and waste and by-products from the industrial processes.
- The growing of cell tissue would take place in state-of-the-art laboratory and production facility environmental, which needs to be built, heated/cooled, and where the feed offered to the cells would likely be water-based solutions with minerals and sugars. Therefore, products may be originating from energy intensive production facilities or terrestrial production system with considerable impacts (water use, pesticide use, fertilisers, genetically modified crops).
- In comparison with other protein sources, fishery and aquaculture products generally have a lower carbon footprint, require little terrestrial surface and freshwater, and benefit from the biological efficiency of aquatic animals[8]. Therefore, comparatively, cell-based production can be expected to require more gas, energy consumption and freshwater, worsening the current environmental situation, if there is a substitution of conventional products. In the case of cell-based production, the impact will depend on the energy sources and inputs.
- This type of production could contribute to the solving of issues related to waste and sustainability, but it would have to be studied more in depth. In any case, the cell-based sector would have to comply with the applicable regulations on waste and sustainability. In terms of food waste, the main factor is the adequate management and use of the products, not the origin. Furthermore, the current contribution of the fisheries and aquaculture sector to the circular economy should not be forgotten (e.g., almost half of the raw materials in fishmeal and fish oil come from by-products from fish processing for human consumption).

[8] https://marketac.eu/health-environmental-value-of-seafood/

4. Rules on labelling and information to consumers

As food products, the provisions on labelling and information to consumers foreseen in the Food Information to Consumer Regulation[9] would be applicable. In accordance with Article 9 of the Novel Foods Regulation, the authorisation of a novel food and update of the Union list shall include, where appropriate "additional specific labelling requirements to inform the final consumer of any specific characteristic or food property, such as the composition, nutritional value or nutritional effects and intended use of the food, which renders a novel food no longer equivalent to an existing food or of implications for the health of specific groups of the population". In the view of the MAC, specific legislation and labelling requirements would be appropriate, while keeping in mind the following:

- As mentioned in section 2, legislative references to this new sector should use clear and appropriate terminology, avoiding confusion with other sectors.
- As this new sector is developing worldwide, the development of the regulatory framework should involve the relevant international agencies and bodies (e.g., FAO, WHO, OIE, OECD, Codex) as well as national food safety authorities, academia, research institutes, the private sector, and other stakeholders.
- Consumers should be able to easily differentiate between cell-based products and conventional ones, identifying the different production methods, origin, composition, and nutritional aspects, in order to avoid any misleading situations.
- Claims about the environmental performance of cell-based products should be substantiated, in line with the aims of the recent legislative proposal on substantiation of green claims.
- The legislative framework should allow for these products to be traceable.

[9] Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers

5. Recommendations

In the context of the ongoing development of a new sector of cell-based proteins, the MAC believes that the European Commission should:

a) In the relevant legislation and public communications, refer to the sector as “cell-based protein of aquatic animals”, while also ensuring that the terms “cultivated” and “cultured” are not associated with it;
b) Assess and prepare for the expected economic, social and environmental implications of the emergence of this new sector, particularly if there is a substitution of conventional products in the market;
c) Develop specific legislation and labelling requirements for this new sector, allowing consumers to easily differentiate between cell-based products and conventional ones, while avoiding any misleading situations;
d) Support more publicly funded research on the social, economic and environmental implications (including nutrition, food safety, and health aspects) as well as on consumer expectations and market forecasts – this should not affect the funds needed to support the sustainable production of conventional protein which must be preserved.