

# Newsletter

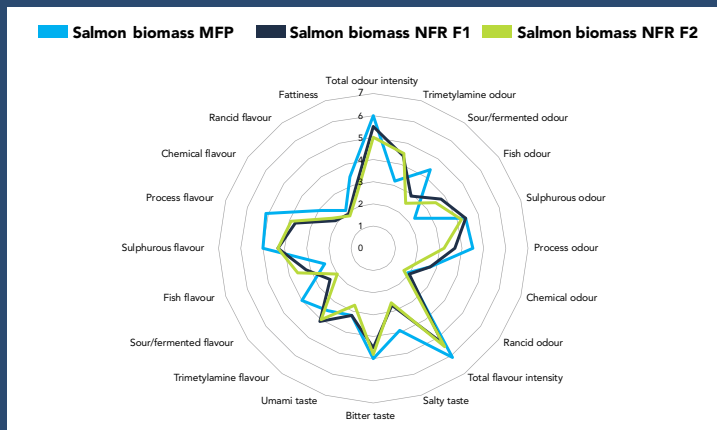
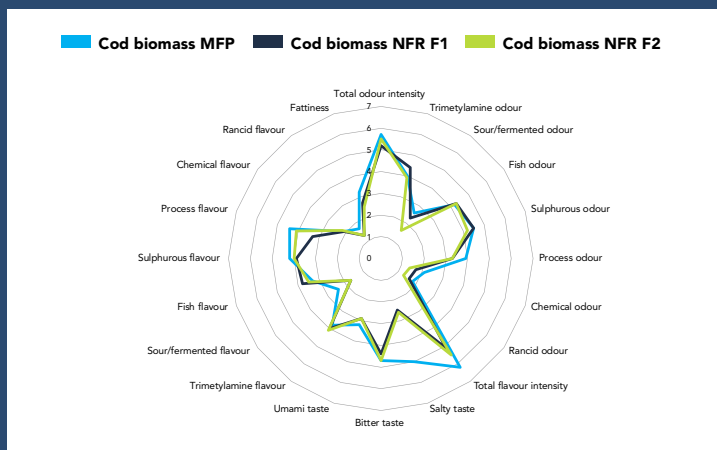
Issue 3, 2025

**BLUE WAYSE**

blue ways to a sustainable Europe

## Fish hydrolysate with improved nutritional and sensory properties

Nanofiltration led to significant changes in 14 of the 20 sensory properties of cod and salmon hydrolysates, assessed by the trained sensory panel at Nofima, including a slight reduction in the total intensity of odour and flavour. Another positive effect of using these membranes was that we observed no significant change in bitterness, unlike previous results by Steinsholm et al. (2021) <https://doi.org/10.1111/1750-3841.15855>, which showed a significant increase in bitterness after nanofiltration. Despite the significant reduction in TMA levels by nanofiltration, this was not evident in the sensory evaluation. This suggests a complex relationship between TMA flavour and chemistry, as previously discussed by Aspevik et al (2021) <https://doi.org/10.3389/fnut.2021.695151>



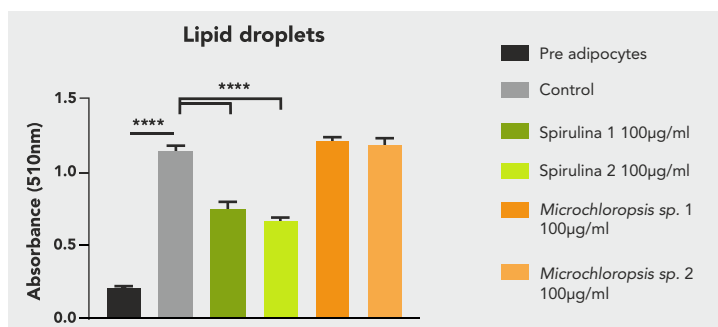
Mean sensory values of hydrolysates based on cod (top) and salmon (bottom) sidestream biomass after microfiltration (MFP) and nanofiltration (NFR F1 and F2).



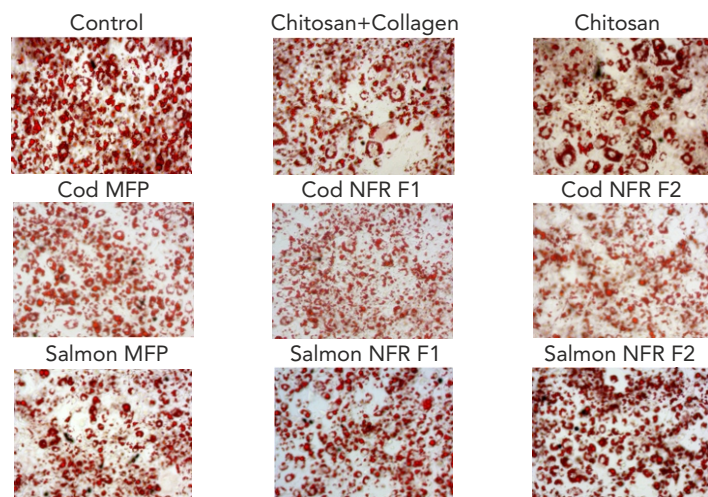
Photo: Nofima

## Health product development

The University of Crete tested in adipocyte cultures selected extracts from Seagarden (shrimp biomass-derived chitosan), Nofima (salmon and cod biomass hydrolysates) and the University of Valancia (UEVG) (A4F provided Spirulina and *Microchloropsis* sp.) and documented their anti-obesity effects. Clinical trial preparations are underway, with volunteer recruitment by Lund University in progress and protocols submitted for approval.



Quantification of lipid droplets by Oil Red O staining of pre-adipocytes and adipocytes treated with microalgal extracts. Spirulina extracts significantly reduced lipid droplet formation compared to the control.



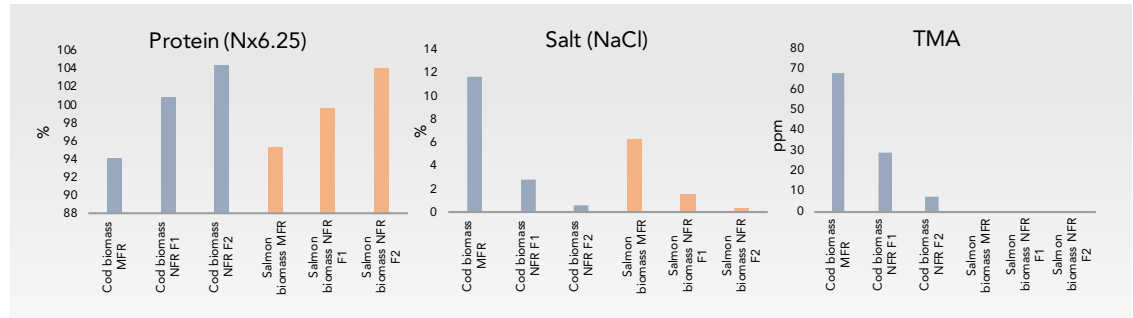
Photos: University of Crete

Lipid droplets stained by Oil Red O in mature adipocytes. Adipocytes treated with the extracts have reduced number and size of lipid droplets compared to control adipocytes. Microscope images were obtained using a ZEISS microscope at 20x magnification.



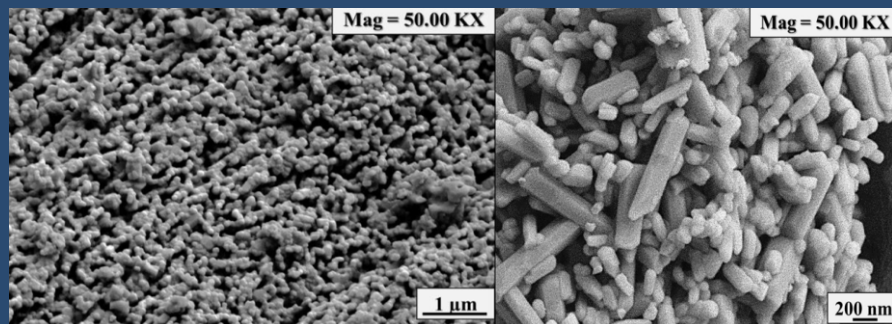
## Fish protein hydrolysate purification and sensory profile improvement

Nanofiltration of salmon and cod hydrolysates performed by Nofima increased markedly protein/amino acids levels, primarily due to the removal of among other salt (NaCl). The filters lead to different desalting degrees and removal of compounds that contribute to taste and odour intensity.



## Collagen extraction from salmon bones

CNR successfully extracted collagen from salmon bones in its native form at high degree of purity, them suitable for cosmetic applications, particularly in skincare. Collagen supports skin elasticity and hydration, while HA and  $\beta$ -TCP provide high eco- and biocompatibility and can be used safely in sun care formulation as booster (i.e., in combination with sunscreen active principles) of the SPF factor, to enhance the performance of UV-filters.



SEM-FEG images of calcined (unextracted) and extracted salmon bones.

## List of Publications and other dissemination produced by the project - Open Access

- UVEG-Book chapter** Salgado-Ramos, M., Calleja-Gómez, M., Sebastià, A., Pallarés, N., Martí-Quijal, F. J., Liu, Y., Barba, F. J., & Castagnini, J. M. (2025). Production of fish protein hydrolysate by enzymatic method. In N. Nirmal, C. Santivarangkna, A. E.-D. A. Bekhit, & F. J. Barba (Eds.), *Fish Protein Hydrolysates* (pp. 57–67). Elsevier. <https://doi.org/10.1016/B978-0-443-21654-1.00003-3>
- UVEG-Book chapter** Liu, Y., Sebastià, A., Calleja-Gómez, M., Castagnini, J. M., Salgado-Ramos, M., Martí-Quijal, F. J., Barba, F. J., & Pallarés, N. (2025). Biological activities and health benefits of fish protein hydrolysate. In N. Nirmal, C. Santivarangkna, A. E.-D. A. Bekhit, & F. J. Barba (Eds.), *Fish Protein Hydrolysates* (pp. 231–248). Elsevier. <https://doi.org/10.1016/B978-0-443-21654-1.00009-4>
- CNR-Scientific article** Iafisco, Michele, et al. "Alkaline extraction of collagen and calcium phosphates from fish bones: influence of source and extraction conditions." *Biomass and Bioenergy* 209 (2026): 108900.
- UVEG-Scientific article** Liu, Y., Berrada, H., Castagnini, J. M., & Barba, F. J. (2025). Supercritical fluid extraction prior pulsed electric fields to improve high-added-value compounds recovery from salmon side streams: Evaluation of protein, bioactive peptides and minerals. *Food Chemistry*, 467. <https://doi.org/10.1016/j.foodchem.2024.142283>
- UVEG-Scientific article** Liu, Y., Castagnini, J. M., Berrada, H., & Barba, F. J. (2025). High-added-value compounds recovery from supercritical fluid extraction-defatted European sea bass (*Dicentrarchus labrax*) viscera by lactic acid bacteria (*L. plantarum* and *L. casei*) assisted fermentation. *Food Chemistry*, 473, 143085. <https://doi.org/10.1016/j.foodchem.2025.143085>
- UVEG-Review article** Liu, Y., Wang, M., Castagnini, J. M., Barba, F. J., & Asensio-Grau, A. (2025). The impact of microalgae-derived bioactive compounds on gut microbiota modulation. *Current Opinion in Food Science*, 66, 101365. <https://doi.org/10.1016/j.cofs.2025.101365>

### Funded by



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