

## PROMISEANG: A groundbreaking European project to revolutionize protein production through microbial fermentations

MADRID, 23<sup>rd</sup> October 2023

A dynamic European consortium has embarked on a visionary mission to create sustainable, nutritious, and innovative protein solutions to meet the ever-growing global demand. PROMISEANG, an ambitious four-year project, officially launched in September 2023, aspires to develop alternative proteins derived from microbial fermentations. The project aims to transform the way we produce food, feed and other bio-based products, fostering collaboration among academia, industry, food system stakeholders and public authorities.

With the world's population projected to exceed 9 billion by 2050, a staggering 70% increase in food production is required to satiate the surging demand for proteins. Current protein sources are **predominantly farm animals**, resulting in significant environmental impacts. At current consumption levels, 1.25 billion tons/year of meat and dairy would be needed to meet global demand by 2050. **Fish and other marine foods are also an essential source of proteins** and marine foods have seen a threefold increase in per capita consumption over the last six decades. Certain regions, like Iceland, Norway and Southeast Asia, already rely heavily on marine foods as main protein sources. However, the overexploitation of marine stocks, with over 35% being wasted each year, demands a sustainable solution.

**PROMISEANG** project seeks to redefine the future of protein production, aligning with the Europeans Commission's [Green Deal](#) and the [Farm2Fork](#) strategies. While the last two decades have witnessed some progress in alternative protein development, including plant-based proteins, new animal sources (i.e., insects) and biotechnological innovations (e.g., cultured meat), **biomass fermentation is emerging as the promising avenue**.

Biomass fermentations draw inspiration from natural processes, resembling centuries-old methods used for food processing, such as bread and cheese production. This method offers numerous advantages, including independence from seasonal constraints, minimal land usage, reduced water consumption and significantly lower greenhouse gas emissions. Fermentation stands out as one of the fastest-growing technologies for alternative proteins, as 80% of alternative protein fermentation companies have emerged in the last five years.

Current fermentation-based protein technologies mainly use edible crops and freshwater to produce proteins and other valuable compounds. However, the use of food waste streams and by-products to produce microbial protein is an emerging area and a more sustainable approach.

**PROMISEANG** seeks to capitalize on this trend by introducing **zero-waste procedures** for alternative protein production through microbial fermentation, involving fungi, yeast and bacteria. The consortium will explore underutilized marine side-streams, such as marine invertebrate and macroalgae discards, and industrial biowastes, as raw materials for fermentation. Besides, research on novel microorganisms with the capacity of performing fermentation in new conditions (e.g., high salt medium) will be investigated. This innovative approach will generate protein-enriched microbial biomass, known as **single cell proteins (SCP)**. Additionally, this project will extract other **seven biocompounds**, including lipids, chitosan, carrageenan, polyphenols, among others, from marine and microbial biomass side-streams.

The primary objective of **PROMISEANG** is to leverage these ingredients to develop a wide range of sustainable products tailored to meet market demands. This includes **nutritious, high-value foods and feeds**, as well as **non-food applications like biomedicine and cosmetics**. **PROMISEANG** will formulate and validate four food products, two feed end-applications and two pharmacological and cosmetic purposes using the proteins. Simultaneously, non-protein

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biocompounds will find their way into four food and two biomedical and cosmetic applications. Rigorous testing, including sensory assessments, *in vitro* and *in vivo* assays, will ensure the quality and effectiveness of these products.

Besides, **PROMISEANG** sets a multi-actor line, engaging a wide range of stakeholders from the protein-related systems, all collaborating to drive research and innovation in a demand-driven, reliable and socially relevant manner. These include fisheries, aquaculture producers, fermentation developers, food and feed industries, biocarrier developers and governmental bodies. **PROMISEANG** is committed to raising awareness about food waste upcycling and microbial fermentation for protein production through scientific-based guidelines and workshops, involving numerous actors and partners across Europe.

**PROMISEANG** is a 48-month Research Innovation Action funded by the Research Executive Agency (REA) under Grant Agreement nr. 101112378. The project started in September 2023 and will last for 48 months, until August 2027. It is coordinated by University of Vigo (Spain) and counts on a consortium formed by 11 partners from 5 different European countries: University of Vigo (Spain), Association of Instituto Superior Técnico for Research and Development (Portugal), MOA Foodtech (Spain), Prof. Waclaw Dabrowski Institute of Agriculture and Food Biotechnology (Poland), Contactica S.L (Spain), University of Veterinary Medicine Budapest (Hungary), CENTIV GMBH (Germany), Spanish National Research Council (Spain), Biozoon Food Innovations GmbH (Germany), International Iberian Nanotechnology Laboratory (Portugal), Conservas Rianxeira S.A.U. (Spain)

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