



**Orchestrating food system microbiomes
to minimize food waste**

MICROORC and its consortium

MICROORC - Orchestrating Food System Microbiomes to Minimize Food Waste, started on November 1st, 2023, funded by the European Union's Horizon Europe research and innovation program under Grant Agreement N° 101136248.

18

Partners

11

Countries

48

Months

5

Million
€ Budget

In MICROORC we will develop sustainable solutions that reduce and prevent food spoilage and food waste, with focus on technologies, services, tools, policies, and practices that are based on monitoring, utilizing, and targeting microbiomes in food and the food processing chain.

MICROORC will support the transition to more sustainable and healthy food systems by considering raw chicken and salmon as well as plant-based meat analogues. To guide and demonstrate the industrial, social, and economic relevance of the MICROORC

innovations, the project will evaluate consumer acceptance and the environmental sustainability aspects of all stages of the product life cycle, identify and help resolve legislative and regulatory challenges to implementation of new technologies, and propose a novel policy framework for microbiome control in the food system.

The tools and technologies developed in MICROORC are positioned at a high level of research and innovation (R&I) maturity and are expected to achieve TRL6-7 by the end of the project.

Five areas are selected for the potential for predicting and extending shelf-life, reduction in food waste and fostering a sustainable food system:



Predictive analytics models incorporating microbiome information to predict shelf-life.



Time-temperature indicators (TTIs), sensing and smart label solutions for dynamic shelf-life labelling.



Rapid detection assays for microbial indicators of food spoilage.



Microbiome based protection technologies to replace synthetic chemicals and increase shelf life and safety



Novel packaging solutions targeting spoilage for sustainable development and increased shelf-life.

Consumer insights to reduce food waste

Reducing food waste is vital, particularly with products nearing expiration. A study conducted by the University of Copenhagen surveyed 400 Danish consumers to gauge their attitudes towards purchasing near-expiry meat and seafood.

The results revealed three consumer segments: those highly willing to buy, selective buyers focusing on meat, and those with low willingness. Factors influencing their decisions include perceived quality, food safety, social

acceptability, and price.

Curious to learn more?

Explore the latest findings from the MICROORC project in the study "[Consumers' willingness to buy meat and seafood products close to the expiry date: an exploratory study from Denmark](#)" conducted by Sujita Pandey, Amanda Bohl, Vittoria Favari, Pietro Mora, Sudikshya Phuyal, Eliška Sojková, Mausam Budhathok, and Marianne Thomsen, in collaboration with the FOODRUS project.

The Consortium

A multinational, multi-actor, and transdisciplinary consortium consisting of 18 partners, including cutting-edge companies and experienced research institutions, has been established. The consortium aims to develop and pilot

tools, technologies, and guidelines that utilize and control microbiomes to combat food waste, facilitating the transition to more sustainable food production and consumption.



PROJECT COORDINATOR

Nofima is a Norwegian leading food research institute that conducts research and development within the fields of aquaculture, fisheries and food. 397 employees with 42 different nationalities. 165 of these have a doctorate degree.

Role in the project: Nofima is the project coordinator and leads work package 2 (Business solutions for shelf life prediction and labelling). Nofima will be involved in all technical work packages (WP2 prediction & labelling, WP3 food cultures, WP4 packaging systems), as well as the WP5 (sustainability) and WP7 (dissemination).

📍 Norway



Universidade Católica Portuguesa (UCP) is a research university distinguished by its humanistic approach, dedicated to advancing knowledge and societal well-being. UCP prioritizes fundamental research, renowned for its research agenda's social impact and its role in shaping policy formulation.

Role in the project: UCP is leading WP4 – Packaging for sustainable food systems and is also engaged in other WPs with a main role in WP3 – Microbiome-based protection for optimized food quality and safety.

📍 Portugal



Oulu University of Applied Sciences (Oamk) is a dynamic, internationally-minded institution with 9,000 students and 460 employees, with research focusing on low-carbon initiatives, digital solutions, and business development.

Role in the project: working in the WP2 participating in the demonstration of use of dynamic smart labels for monitoring shelf-life, designing and developing new or improved solutions and identifying, sourcing, evaluating, developing, and testing suitable sensor technologies.

📍 Finland



Vizelpas SA stands out in the flexible packaging market as a company of excellence in the production of flexible technical films suitable for the food and medical-surgical industries. Vizelpas currently has a covered area of 15,000 sqm, with 210 dynamic employees, and state-of-the-art industrial equipment to adequately respond to the constant challenges of the markets and the customers' expectations.

Role in the project: working in Work package 4 with the leadership of Catholic University from Portugal we have the mission and objective of developing more sustainable plastics, that allow us to increase the self-life food, and reduce their waste. For this purpose, several alternatives will be tested, such as the inclusion of microbiomes in plastic films, minimizing film production processes, and optimizing the concepts of single product and single layer.

📍 Portugal



A world leader in the field of in vitro diagnostics since 1963, bioMérieux is present in 45 countries and serves more than 160 countries with the support of a large network of distributors. In 2022, revenues reached €3.6 billion, with over 90% of sales outside of France.

Role in the project: within WP4, bioMérieux will support food manufacturers in two different ways to better estimate the actual shelf-life of their products. We will be developing rapid, molecular diagnostic assays for the early detection of spoilage organisms in chicken and salmon to help food industries take corrective action in an earlier stage. Additionally, we will support the University of Denmark with our data modeling expertise in the generation of digital twins for chicken and salmon food items which will allow a more accurate prediction of the shelf-life of these products.

📍 France



Department of Food Science at University of Copenhagen research and teach all aspects of food, including production, safety, nutrition, consumer acceptance, sustainability etc.

Role in the project: In WP2 Computational modelling of shelflife using combinations of machine learning and mechanistic models. In WP5 System level environmental, social and economic cost-benefit analysis of MICROORC market entry scenarios using a mixed-method multi-criteria assessment approach.

📍 Denmark



The PNO Group (aka PNO Consultants) is made up of a pool of more than 400 professionals across 9 Member States, which every year supports more than 3.000 clients in their R&D processes, realizing original data-driven and expert-driven analysis and creating over 300 cutting-edge R&D projects. In this project, PNO is represented by CIAOTECH S.r.l., the Italian branch of PNO Consultants, specialized in R&D Advisory, Innovation Management and funding procurement, providing consultancy services to private and public organizations.

Role in the project: PNO is the leader of Work Package 7, Stakeholder outreach, communication, dissemination and exploitation, to design and execute Communication, Dissemination and Exploitation to maximize the MICROORC results and impacts.

📍 Italy



Through our international collaboration programmes with academia, industry, and the public sector, we ensure the competitiveness of the Swedish business community on an international level and contribute to a sustainable society. Our 2,800 employees support and promote all manner of innovative processes, and our roughly 100 testbeds and demonstration facilities are instrumental in developing the future-proofing of products, technologies, and services. RISE Research Institutes of Sweden is fully owned by the Swedish state.

Role in the project: RISE is engaged in Work Package 5 regarding Life Cycle Analysis. RISE is also the leader of Work Package 6. In this Work Package we will explore the legal challenges of the project.

📍 Sweden



The University of Veterinary Medicine Budapest is the only veterinary school in Hungary and has an uninterrupted teaching record for more than two centuries, being established in 1787. Besides UVMB's accredited educational programmes in veterinary medicine and biology, it operates 31 research groups dealing with a wide spectrum of topics, including public health, food safety, food technology, and food waste management. In the MICROORC project, the Department of Applied Food Science represents UVMB, which has experience in implementing various international projects funded by H2020, Horizon, LIFE, HADEA etc. programmes.

Role in the project: Tasks of UVMB are mainly related to the evaluation of consumers' perceptions and acceptance (WP5), the examination of the legislative environment (WP6), and conducting dialogue with policymakers (WP7).

📍 Hungary



Innoscentia is a Swedish based foodtech company focusing on a pressing issue in the food chain: unnecessary waste. The company is developing sensor-based labels for fresh food to indicate the presence of volatile organic compounds associated with spoilage and thereby being able to communicate the actual food status in real time. Innoscentia is based at the Swedish University of Agriculture in Alnarp and has 5 FTEs as of 2024.

Role in the project: Innoscentia is involved in several workpackages of the project but their main task is to test, optimize and deploy their sensor based labels for shelf life extension.

📍 Sweden



Chr. Hansen is a global bioscience company crafting natural ingredient solutions for food, nutrition, pharma, and agriculture. With nearly 150 years of expertise, we drive positive change through microbial solutions. Our technology platforms, backed by 50,000 microbial strains, tackle global challenges like food waste, health, and antibiotic overuse. As a sustainable leader touching over 1 billion lives daily, our purpose is clear: To grow a better world. Naturally.

Role in the project: Chr. Hansen is the leader of the WP3 focusing on developing, prototyping and demonstrating efficacy of microbiome-based solution to improve the shelf life (quality and safety) of fresh chicken, cold smoked salmon and plant-based meat analogues. On the top of the technologist and microbiologist involved in WP3, our experts in sustainability and regulatory will actively participate to WP5 and WP6.

📍 Denmark



Norsk Kylling, owned by REMA 1000, is a Norwegian food manufacturer dominating 30% of the local retail industry. Operating a complete broiler chicken value chain, it's a pioneer, being the world's first to adopt ECC (European Chicken Commitment) standards in 2022, supported by 37 global animal welfare organizations.

Role in the project: The role of Norsk Kylling is to provide data on the production process of poultry, from farm to finished product. Will also collect environmental samples in the production facility and send both samples and product packages to Nofima for analysis. Involved in WP2 and WP4.

📍 Norway

CERMAQ

Cermaq is a leading global salmon producer driving transition of our food system towards healthier and more climate-friendly food. As a Mitsubishi Corporation subsidiary, Cermaq operates farms in Canada, Chile, and Norway, primarily in the Finnmark and Nordland regions. Our salmon, certified to rigorous safety and environmental standards like ISO 22000, Global GAP, and ASC, are distributed across Europe, Asia, and North America.

Role in the project: The role of Cermaq Norway is to provide data on the production process of salmon, from farm to fillet. Cermaq will also collect environmental samples in the production facility and send both samples and product packages to Nofima for analysis. Involved in WP2 and WP3.

📍 Norway



Grupo Lusiaves was founded in 1986 and over the years, it has grown to become one of the largest players in the Portuguese poultry sector. With more than 20 companies and 3,500 direct employees, the group has a wide portfolio that spans from breeding to poultry product distribution. The company places emphasis on animal welfare, sustainability, and social responsibility.

Role in the project: The role of Lusiaves is to provide data on the production process of poultry, from farm to finished product. Will also collect environmental samples in the production facility and send both samples and product packages to Universidade Católica Portuguesa for analysis. Lusiaves will also be involved in pilot demonstrations for food cultures and packaging systems.

📍 Portugal



Ifremer (French Ocean Research Institute), created in 1984, is a public industrial and commercial institution (EPIC), with 1500 employees and 240 M€ annual budget. Ifremer contributes to increase knowledge about the oceans and their resources, to the monitoring of marine and coastal zones, and to the sustainable development of maritime activities.

Role in the project: In WP3, Ifremer leads task 3.3 on the “development and evaluation of food cultures for cold smoked salmon processing”. He will participate to pilot demonstration in smokehouses from CITPPM. Ifremer will also contribute to WP4 on the validation of new functional packaging in combination with protective cultures.

📍 France



CITPPM, representing fish and aquaculture processing trades in France, drives applied research for improved food quality and safety. Collaborating with top research bodies and technical centers, it develops NF standards, codes of practice, and hygiene guides. As a liaison for French and European administrations, CITPPM monitors market products, ensures compliance, and maintains collective databases for industry reference.

Role in the project: CITPPM contributes to two MICROORC work packages: WP3 and WP4. In WP3, CITPPM supplies cold smoked salmon for testing biopreservation solutions, involving three affiliated French companies to account for product variability and production conditions. In WP4, focusing on sustainable packaging, CITPPM conducts shelf life trials with new materials. Pilot demonstrations of the best prototypes will occur on an industrial scale in a cold smoked salmon smokehouse, assessing material performance in filling and closing operations.

📍 France



PRIMOR, part of the Primor Group, excels in the Portuguese charcuterie sector. With over 60 years of experience, it's renowned for quality and innovation, offering a wide range of cold cooked pork and poultry products like ham, bacon, and chorizo.

Role in the project: PRIMOR will develop new plant-based meat analogues (“burger” type and sliced cooked meat alternatives) in collaboration with CHA to address the demand for lower footprint food among consumers. PRIMOR is involved in WP3 and WP4.

📍 Portugal



Noel, a fourth-generation family-run food group in La Garrotxa, Girona, prioritizes customer needs and innovation for over 80 years. We ensure top quality and food safety, leading the Spanish meat sector and industry at large with innovative projects, expanding our product portfolio and sectors globally.

Role in the project: NOEL will develop new plant-based meat analogues (“burger” type and sliced cooked meat alternatives) in collaboration with CHA to address the demand for lower footprint food among consumers. PRIMOR is involved in WP3 and WP4.

📍 Spain

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