



Supporting a future with safe, nutritious, and sustainable seafood

SEAFOOD<sup>TOMORROW</sup> Final Event, 15.04.2021

# Reduction of water and energy in seafood processing

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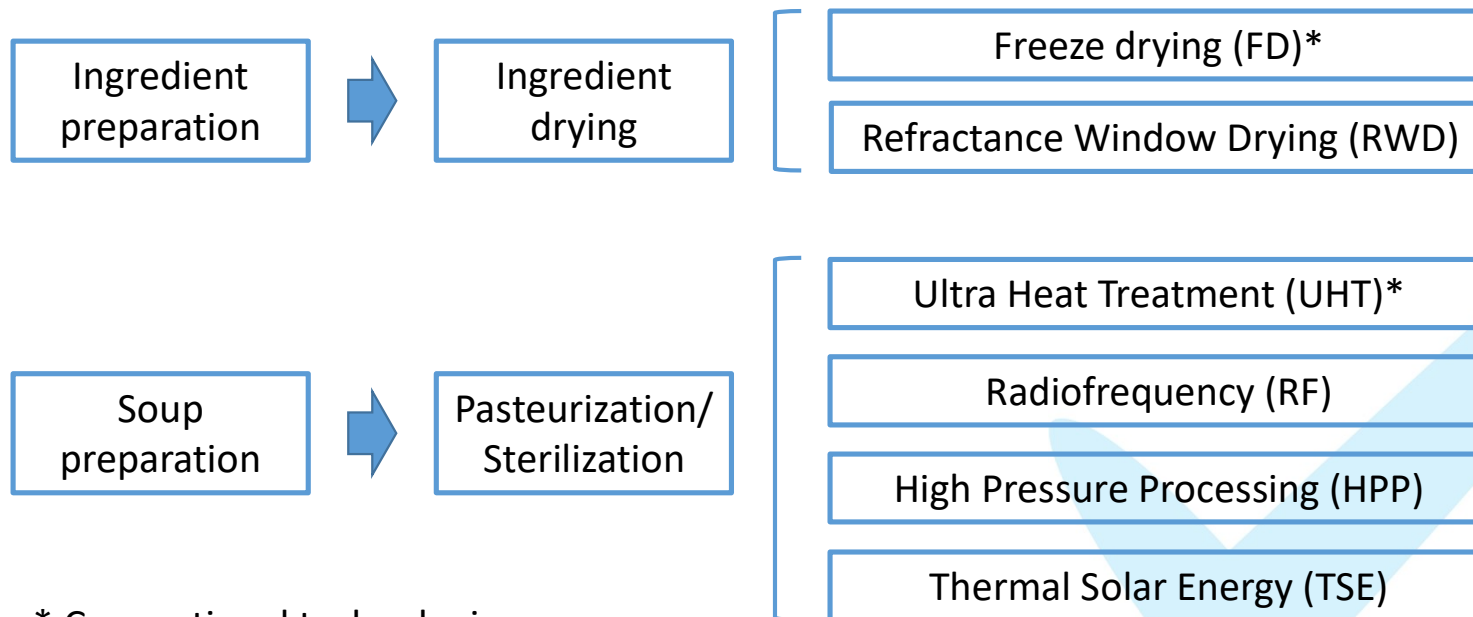
# GENERAL OBJECTIVES



- Sustainability has become a major issue for the seafood industry where large amounts of water and energy are used.
- Conventional processing technologies run on fossil fuels.
- **Objective:** Put into practice two strategies for sustainable industrial processing of seafood products.
  - Saving Energy
  - Saving Water
- Chosen process: elaboration of a ready-to-eat soup by using new technologies



- Elaboration processes and technologies:



\* Conventional technologies



RWD



TSE



RF



HPP



# TECHNOLOGIES



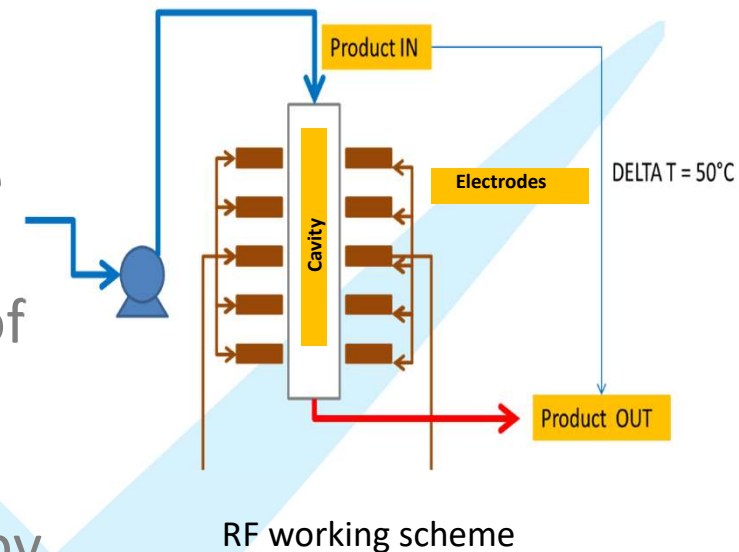
- Refractance Window Drying (RWD):
  - Food products (liquid, purees, pulps) can be dehydrated in 3-6 minutes at relatively low drying temperatures (30-70 °C).
  - Products are spread on a transparent plastic conveyer belt that moves over circulating hot water (95-97°C).
  - Food products have to be liquid and homogenous (smoothies, soups and purees without particles).
  - RWD improves product quality (colour, vitamins and antioxidants) as compared to other conventional drying method.



# TECHNOLOGIES

- Radiofrequency(RF):

- RF uses electromagnetic waves, similarly to MW to heat the product up.
- Unlike conventional heating, RF heating takes place simultaneously in the whole product, reducing overheating and minimizing losses of quality (loss of nutrients, organoleptic properties, etc.).
- The product flows through the cavity (tube) where electromagnetic waves are applied to the product by the electrodes (antennas).



# TECHNOLOGIES



- High pressure processing (HPP):
  - HPP is a non-thermal processing technology in which the food product is subjected to high levels of hydrostatic pressure.
  - Samples are fed into a chamber. Afterward, the chamber is pressurized with the water for a specified process time
  - Pressure inactivates microorganisms and enzymes, increasing shelf life and guaranteeing food safety of the product.
  - HPP can replace traditional pasteurization (heat) in the food industry.
  - HPP minimizes water waste (recycling 80%) and heat damage.



# MAIN RESULTS



- Ingredient (fish, vegetables) drying:
  - RWD 90% less energy than FD but requires certain amounts of water unlike FD
  - RWD good preservation (at least 4 weeks) of colour, vitamins, aroma, nutrients.
  - Lower capital expenditure (50% less)
- Limitations:
  - Limited product thickness (< 1 cm).
  - Scale-up for industrial process (requires more space)
  - Few industrial applications so far (vegetables, spices, herbs, algae and nutritional supplements)





# MAIN RESULTS



- Pasteurization/Sterilization of a fish soup:
  - TSE+RF can save up to 75% of energy and HPP up to 80% of water.
  - RF can save water and energy during cleaning due to lower deposition of dirt.
  - Higher colour stability in HPP and lipid oxidation in HPP.
  - RF has the best appearance, HPP the best odour, texture and taste.
- Limitations:
  - High capital expenditure.
  - HPP requires product manipulation and low throughput.
  - HPP process conditions have to be studied for each product.



# CONCLUSSIONS



- RWD is a very promising technology with low energy use and good product quality, but with few commercial applications.
- RWD needs further development for commercial applications.
- HPP, RF and TSE can replace conventional heating (UHT)
- Commercial equipments are available on the market.
- High capital costs is a barrier for the industry, but better quality of products and lower costs may offset the costs.





# Thank You

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