

MASTER internship proposal

Incorporating recycled bread powder into bakery products

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Context:

Artisanal bakeries produce almost 60% of the bread consumed in France. Due to the difficulty of forecasting the day's sales, and the limited freshness of bread, bakeries generate around 10% more bread than they do sell. This represents 125,000 t/year for France. In 2016, this surplus bread was mostly destroyed (40-60%), the rest being donated to charities or reused as animal feed, whereas the priority given by the French regulatory hierarchy (Garot law 2016) is recovery as food.

The μ COSMOS project, funded by the Agence Nationale de la Recherche, aims to investigate the concept of the circular economy at the food processing stage and on a small scale, based on a case study with real roots in the field: the recycling of surplus and wasted bread from small bakeries in urban areas. It involves four partners: UMR OPAALE, UMR GEPEA, UMR IATE and CEROS.

Recycling stale bread for food is a real scientific challenge. On-site recycling, to prepare products such as puddings for sale at the bakery, can contribute to waste prevention.

The incorporation of bread powder into everyday bakery products such as bread has been tested more recently. The functionalities of bread powder differ considerably from those of wheat flour (partially gelatinized starch, denatured gluten). This affects product structuring, process engineering and, consequently, the quality of the finished product.

Objectives:

The aim of the internship is to study the impact of incorporating recycled bread powder on product structuring and on the properties of the finished product (bread). Bread powder as generated by bakers will be characterized. The physical and organoleptic properties (density, porosity, texture, crumb and crust colour, acrylamide content, etc.) of the bread produced from this powder will be determined. The effect of incorporating this powder on the possible premature aging of the bread will also be studied. Several incorporation rates will be considered. Successive recycling processes will be studied.

Various methods will be used, including calorimetry, DMA, texturometry, rheology, image analysis and acrylamide measurement techniques.

Consumer acceptance of the new product will also be assessed by sensory analysis.

Profile: The candidate will ideally have a background in food process engineering or food science. He/she should be motivated by laboratory experimentation and research careers. An interest in small-scale processing would be a plus.

Practical information: we are looking for interns for a period of 6 months, first semester 2025. Internship allowance: approximately 570 euros. Applicants should submit a CV and cover letter. To apply and obtain further information, please contact us by e-mail:

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