

## **Development of safe, nutritious and attractive smoked trout with reduced salt content**

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### **INTRODUCTION**

Nowadays, reducing salt (sodium chloride, NaCl) consumption is one of the main priorities for public health authorities around the world. Thus, the World Health Organization (WHO) has adopted a strategy to reduce salt intake by 30 % by 2025 and has recommended an intake of less than 5 g of NaCl/day. However, the actual NaCl consumption in most European countries is 8-12 g and in Asian countries it is up to 15 g. an integral part of the reduction strategy is to limit salt intake from seafood, which is especially relevant for regions with a significant fish and shellfish consumption. Generally, smoked seafood has a high NaCl content, reaching up to 3 g per 100 g. Therefore, the aim of this study was to optimise the development process of smoked trout with reduced NaCl content without compromising quality and safety.

### **METHODOLOGY**

Fresh rainbow trout (*Oncorhynchus mykiss*) was purchased in July 2021 in Portugal. Thirty fish were gutted, filleted, dry salted and hot smoked in two trials. The aim of the first was to select the optimal salting conditions by testing different NaCl concentrations and salting times (2 % and 4 % for 4 h and 6 h). The best salting conditions were then applied in the second experiment with the aim of reducing NaCl content using different combinations of ingredients (100 % NaCl; 50 % NaCl + 50 % KCl; 50 % NaCl + 50 % KCl + masking agent; 25 % NaCl + 75 % KCl + masking agent; 75 % NaCl + 25 % microencapsulated plants + spices (ME); 50 % NaCl + 50 % ME). The contents of water, fat, protein, NaCl, sodium, potassium and chlorides, as well as the water activity, water holding capacity, colour and texture were analysed. Moreover, microbiological (including total viable counts, Enterobacteriaceae, *Listeria monocytogenes*) and sensory analyses (using six panellists and a 9-point scale) were performed.

## RESULTS

Several analyses are still in progress and, so far, the products obtained have been evaluated for chloride content, microbiological safety and sensory scores. Chloride content was significantly lower in formulations with ME (1.2-1.4 g/100 g) than in those using KCl (2.1-2.2 g/100 g). Thus, a daily consumption of a 50-100 g portion of any of the products developed would not exceed the dietary reference value for chlorides (3.1 g/day for adults) established by the European Food Safety Authority (EFSA). Moreover, all obtained fish were safe in terms of the microbiological counts. The lowest salty taste was scored in 50 % NaCl + 50 % ME (2.8, corresponding to slight to moderate saltiness) and the highest in 100 % NaCl (3.9 indicating moderate/adequate saltiness).

## DISCUSSION

Until now, a limited number of studies had been conducted for salt reduction in seafood products. Most of them were focused on lowering NaCl content during processing and utilised NaCl substitutes such as KCl, MgCl<sub>2</sub>, CaCl<sub>2</sub>. However, to date, no study on sodium reduction in seafood either utilised microcapsules with plants and spices or was performed to optimise conditions for developing smoked rainbow trout. The results indicate that replacing NaCl with KCl, with or without a masking agent, and encapsulated plants and spices, in the development of safe, nutritious and attractive smoked trout with reduced NaCl content, is a potential solution towards more healthy diets. Nonetheless, future studies are still required to assess the shelf-life of the new products and to demonstrate their economic feasibility before a wider application by the seafood processing industry.