

Swiss salmon roe: from by-product to a nutritional fatty acid product

Summarize

Introduction: Atlantic salmon is well known to be a fish rich in omega-3 polyunsaturated fatty acids (PUFAs). Studies have shown that omega-3 PUFAs such as EPA and DHA are important for human health and cognitive development. Salmon's eggs, head, skin and organs are rich in these essential substances, but are usually not eaten. This scientific research aims to recognize the values of essential fatty acids and other nutritional values, such as proteins and minerals, in salmon roe and then use them to prepare a culinary product source of PUFAs.

Methods and Materials: The salmon roe was supplied by Swiss Alpine Fish and marinated to reduce the typical taste and smell of raw eggs. Ingredients such as carrots and rosemary were added due to their aroma and antioxidant properties. To produce the salmon roe crackers, the ingredients, 410g flour, 150g marinated salmon roes, 10g chopped rosemary, 75g steamed carrots, 140ml water, 15g fresh yeast and 3g salt were mixed, shaped and dried in the oven, at temperatures lower than 50 °C, to avoid fatty acids oxidation. The analysis measured the contents of water, protein, fatty acids, minerals, carbohydrates and fiber in both the eggs and the crackers. A shelf-life test of the culinary product under different storage conditions was conducted daily, during a period of two months, followed by sensorial tests.

Result: The results of the analysis showed a high content of fatty acids, especially polyunsaturated fatty acids, and other nutrients such as carbohydrates, proteins, minerals and micronutrients in the culinary product. During the drying process, there was an oxidation of 0.68 g out of 1.95 g of DHA and 0.05 g out of 0.6 g of EPA. The best conservation method was in a dry environment with humidity of 30-40 % and temperature of 21-24 °C, in a closed container or a bag under vacuum.

Discussion: In the culinary product was present a high amount of carbohydrates, including fiber; this is due to the use of other ingredients such as flour and carrots. A partial lipids oxidation occurred, DHA oxidated 0.68 g out of 1.95 g and EPA oxidated 0.05 g out of 0.6 g. DHA oxidated more than EPA, probably because of the chemical structure of omega-3 fatty acids that makes them chemically unstable, resulting in an extreme vulnerability to heat even at very low temperatures. However, at the chosen temperature (50 °C) the risk of microbial growth is not prevented. Moreover, under these conditions, the crackers are only dried and not cooked (no starch gelatinization), therefore digestibility is probably very limited. These problems can be overcome by using other methods, such as a higher temperature of the oven. The storage is better in a dry environment in a container or a vacuum bag, which can reduce the contact with humidity and oxygen, so that the shelf life of the product is longer.

Conclusion: It is demonstrated that salmon roe as a by-product can be reused to create a nutritious food product. This product is enjoyable by every group age. Cooking at higher temperatures such as 200 °C for 10 min is one of the best choices to elaborate the product. The storage of this product has been demonstrated through a sensorial test to be better and to have a longer shelf life when it is in a dry environment with 30-40 % of humidity and 21-24 °C of temperature in a container or a bag under vacuum.