

## Fortification of Foods with Fish Components

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Adequate, healthy and balanced nutrition is a fundamental requirement for the health of both individuals and communities. Studies have shown that many diseases are caused by unsuitable nutrients and inappropriate eating behaviours. On the other hand, while there has been a tremendous increase in food consumption over the last 50 years, there is a problem in the balanced distribution of the food supply. While some countries do not have access to sufficient food, health problems can be seen in some countries due to excessive food consumption. For this reason, we have to pay attention to our nutrition.

When we speak about the healthy diet, fish is one of the first foods comes to mind. Fish, a perfect source of protein, lipids, vitamins, and minerals, is a food that should be consumed twice a week according to health specialists. The biological value of fish protein is equivalent to the protein of other meat types. In addition, fish meat has more minerals and less energy. For this reason, fish is regarded as “diet meat”, just as chicken.

On the other hand, fish oil contains highly valuable polyunsaturated fatty acids. These essential fatty acids called “Omega-3” include  $\alpha$ -linolenic acid (ALA), docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA). Aforementioned fatty acids not only reduce cardiovascular disease and cancer risk but also regulate diabetes, hypertension, inflammatory, autoimmune diseases, and neurodegenerative diseases. Considering to today’s western diet, excessive consumption of foods containing omega-6 fatty acids are known to cause various health problems. Therefore, nutritional researches are being investigated to increase food consumption enriched with n-3 fatty acids.

The addition of fish components to the other foods is due to two reasons. The first one is to increase the nutritional value of the food with the rich nutrients of the fish. The other is to utilize unusable parts of the fish. Whatever the reason, food research scientists aim at increasing the nutritional value of foods and extending their shelf lives. Besides, fishery-derived components may have some unfavourable effects on sensorial properties in contrast to positive contributions to the nutritional quality of the foods. For this purpose, scientists should also focused on to improve the sensory characteristics of these products.

Fish protein is obtained in three different types according to protein percentage and purity: hydrolyzate, isolate and concentrate. Hydrolyzate is a protein production method in which proteins are manufactured in the purest form compared to the other types. Obtained fish proteins are usually powdered for stability. The addition of fish protein improves functional properties such as water holding and emulsion capacity, gelation, foam stability, as well as to increase the nutritional value of the food products. Successful applications have

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been reported on the addition of fish protein to the ice cream, noodles, cornflakes, mayonnaise, crackers, bread and biscuits. Various scientists have reported that they have added fish protein to other foods at rates ranging between 3% and 18% and achieved very positive results.

World Health Organization (WHO) recommends that 1-2% of the total daily energy intake of each adult person should be derived from omega-3 polyunsaturated fatty acids (PUFAs). Additionally, while every adult should consume 250 mg EPA+DHA in a day, pregnant women should consume 100-200 mg DHA in addition to that and 7-24 months children need 100 mg DHA in a day according to European Food Safety Authority (EFSA). It is not naturally possible to eat fish every day to meet such a requirement. Omega-3-enriched foods are very important in this respect.

For instance, human milk is rich in EPA which is required for hair and dermal growth. With this design, some commercial companies produce foods containing PUFAs for natal dietary supplementation as well as omega-3-enriched infant formulae. Some dairy products such as milk, yoghurt and cheese can be fortified with EPA and DHA obtained from fish oil. Today, especially bakery products and livestock meats are also enriched in omega-3.

It is a matter for scientists to research how these fish components will be added to the foods. These bioactive components can be added in pure form as well as microencapsulated or nanoencapsulated forms. The point that should not be forgotten is that these bioactive substances are also raw materials. For this reason, studies on their shelf life should be carried out. Another important issue is that there is a need for scientific researches that will provide a way to prevent fishy odour and flavour of the foods produced with fish components.

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