

Applicability of Fish Products Innovation, and Importance of Fish Valorisation with Low or Absent Commercial Value

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Introduction

We live in a world of limited biological resources and ecosystems, which are essential to feed people. Consequently, diversifying target species and considering full exploitation are essential for fishery sustainability. The present study focuses on the of three low commercial value fish species (blue jack mackerel, through the development of marine-based food products with added value. A preliminary inquiry with 155 consumers from was conducted to assess fish consumption, the applicability of fish product innovation, and the importance of discarded fish. Five products were developed and investigated for their sensory characteristics and consumer liking by hedonic tests to 90 consumers. The most important descriptors were identified for each product. Sensory evaluations showed a clear tendency of consumers to accept reformulated products, with the introduction of the low-value and unexploited species under study. In fact, the planet's sustainability is one of the most discussed topics worldwide, with particular emphasis on marine resources. Despite the ocean's richness in different fish species, consumers and industries only know a few of them, which are the ones with the highest commercial value. However, underexploited and underutilized fish species may offer added benefits for consumer health, given that their nutritional content as well as sensory attributes are equally pleasant as more commonly consumed fish.

Description

Fish species that are not targeted by fisheries are called, which mean for commercial species caught later; results in marine ecosystem changes, which can be avoided with the exploitation of waste from bio-based industrial processes, including by-products, co-products, and discards (from fisheries), contributing to resource-efficient process improvement.

In Portugal, the most consumed fish species are and shrimp. This consumption preference can be explained by the lack of consumer awareness of other species, which discourages

their purchase. However, this may not be the only explanation, due to the complexity of food choice, which is influenced by many interrelated factors, including social, environmental, political, economic, and cultural aspects. According to Coralo et al. consumers' attitude towards food can be categorized as, claims, and health effects. Therefore, with consumer surveys, it is possible to quantify and measure consumption options and frequencies, which allows a pattern of eating behavior to be traced. Regardless of the population's consumption habits, one of the ways to make a new fish species known is through its use in traditional products or in products that are familiar to the consumer, replacing the more commercial species. After acknowledging population consumption habits and expectations regarding new food products, this information is applied to product development and, subsequently, sensory tests are carried out to assess acceptability and purchase intention. Sensory evaluation allows for the establishment of a target market, the identification of the most important product features the avoidance of wasted effort during product development, quality issues to be dealt with; a comparison between brands, and an attempt at ensuring long shelf-life. Therefore, sensory evaluation is a result of human decision and, consequently, it is an outcome of complex interactions conditioned by personal history, environmental variables, subjective covariates, and object characteristics that also interact with the modality of the survey. In fact, sensory evaluation is essential for both new food product development and food reformulation of existing products.

Food reformulation is considered one of the contributors to achieving population nutrient goals. Therefore, food reformulation can be a way to fish species with low or no commercial value by using them to replace the commercial ones. This both increases the value of underexploited and underutilized fish species and reduces the final price of the reformulated product, with the added advantage of avoiding overexploitation of species with significant commercial value. Therefore, it is important to identify the best time of the year to capture fish considering the product formulation

and, consequently, consumer acceptance, taking into consideration their life history, including their reproductive cycle and growth characteristics. Considering that there is a high probability of market failure when introducing new food products, it is crucial to know in advance the consumer habits and preferences to create or redesign and reformulate a product that satisfies their necessities. One of the approaches to gain this knowledge is to perform a market survey about consumers' diet and the reason for their food choices. Consumer characterization is also important to identify a potential target market segment.. However, regardless of this stability in catches, the number of unsustainable (overfished) stocks has increased with the majority of stocks in the "maximally sustainably fished" category. In Portugal, as in other countries from temperate waters, most fisheries are multi-specific, meaning that besides the target species (usually species with high commercial value) other species are also caught. Among these, some are discarded at sea and others are landed but normally reach a low commercial value. In terms of stock status, many commercial species of more global (European) interest are studied and their stocks are assessed and managed by international organizations (International Council for the Exploration of the Sea—ICES). The other species, the great majority of them, namely those included in this paper, are not assessed and managed and the biological information is scarce and very often totally lacking. The auction prices and then the interest of fishermen to shift their effort to these species, as occurred in the 1990s with the black fishery in Portuguese waters.

Conclusion

Therefore, the present study aims to value by catch species with low commercial and non-commercial value. Among the former, three low commercial fish species were chosen: blue jack mackerel. These species are particularly relevant either because of their high landing values or their first auction prices. Among species of non-commercial value, the comber at through the development of five innovative and differentiating marine-based products in relation to what currently exists on the market. A market survey about fish consumption habits, the applicability of fish product innovation, and the importance of valuing discarded fish was also performed.

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Conflict of interest

The author declares there is no conflict of interest in publishing this article.

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