



Research Paper

Investigating the Profile of Fatty Acids, Nutritional Value and Biochemical Factors in Farmed and Marine Sturgeon Fish (*Huso Huso*) Fillets in Mazandaran Province

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Extended Abstract

Introduction

The Caspian Sea is one of the key habitats for sturgeon species, particularly the Persian sturgeon (*Huso huso*), which plays a crucial role in the fishery and aquaculture industries. Over 92% of the global sturgeon catch comes from this region. Given the environmental challenges and the declining population of wild sturgeons, aquaculture has become an essential method for maintaining sturgeon stocks. However, the comparison of the biochemical and fatty acid profiles between farmed and wild sturgeons remains under-researched. This study aims to compare the nutritional value, biochemical composition, and fatty acid profiles of the flesh of farmed and wild Persian sturgeon from the Mazandaran province to assess the potential of farmed sturgeons as a viable alternative to wild ones.

Methods

For this comparative study, 30 farmed Persian sturgeons were randomly selected from three different farms in Mazandaran province, with an average weight ranging from 3 to 4 kilograms. Additionally, 30 wild sturgeons were caught from three different fishing centers in the Caspian Sea. The fish were processed by removing the head, fins, and gut, followed by skinning. After cleaning and drying the fillets, they were vacuum-sealed and frozen at -20°C until further analysis. The following biochemical tests were performed: protein content (Kjeldahl method), total fat (Soxhlet method), moisture (oven drying), ash (electric furnace

method), and fatty acid profile (Gas Chromatography). Data were analyzed using one-way ANOVA and Duncan's multiple range test ($p < 0.05$) with SPSS software.

Results and Discussion

The biochemical analysis revealed no significant difference between the farmed and wild sturgeons in terms of protein, total fat, ash, and moisture content, indicating similar nutritional values. However, specific fatty acid profiles exhibited notable differences. The levels of saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA) were significantly higher in wild sturgeons. For instance, wild sturgeons showed higher levels of omega-3 fatty acids, such as eicosapentaenoic acid (EPA, C20:5n-3) and docosahexaenoic acid (DHA, C22:6n-3), compared to their farmed counterparts. In terms of individual fatty acids, palmitic acid (C16:0) was found to be significantly higher in farmed sturgeons, while omega-3 fatty acids such as alpha-linolenic acid (C18:3n-3) and EPA were more abundant in the wild fish. The lack of significant differences in the general biochemical composition (protein, fat, moisture, and ash content) between farmed and wild sturgeons suggests that farmed sturgeon could be a suitable alternative to wild-caught sturgeon from a nutritional perspective. However, the differences in fatty acid profiles, particularly the higher omega-3 content in wild sturgeons, reflect the impact of the fish's diet. Wild sturgeons tend to consume a more diverse range of food, which results in higher concentrations of essential fatty acids, particularly those beneficial for human health. Farmed sturgeons, depending on their diet, exhibit more variability in the composition of essential fatty acids. These findings are consistent with previous studies indicating that wild fish generally have a better fatty acid profile due to their natural diet, while farmed fish tend to have more saturated fats due to the controlled nature of their feeding regimen.

Conclusion

This study demonstrates that the nutritional composition of farmed Persian sturgeon is comparable to that of wild sturgeon, with similar levels of protein, fat, moisture, and ash content. However, farmed sturgeons have a less favorable fatty acid profile, particularly with lower levels of omega-3 fatty acids. While farmed sturgeon offers a sustainable and reliable source of protein, efforts should be made to improve their diet in aquaculture to enhance their omega-3 content. Given the declining wild sturgeon populations and the potential health benefits of omega-3 fatty acids, enhancing the nutritional quality of farmed sturgeon could significantly contribute to the food industry and human health. Further research is necessary to optimize feeding strategies in aquaculture to improve the fatty acid profile of farmed sturgeons while maintaining their overall nutritional value.

Keywords: Nutritional value, Biochemical composition, Sturgeon fish, Cultured fish, Wild fish

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