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Functional food product development from fish processing by-products

Reza Tahergorabi N C A&T State University, USA

Statement of the Problem: Fish processing by-products (frames, heads, viscera, etc.) can account for 60-70% of the total fish after industrial filleting. The 60-70% of by-products contains highly nutritious fish muscle proteins and fish oil rich in heart-friendly omega-3 fatty acids. The proteins and oil could be recovered and used subsequently in the development of human food products and dietary supplements. The objective was to determine chemical properties of heat-set gels made of the isoelectric solubilization/ precipitation (ISP) protein isolate fortified with ω -3 polyunsaturated fatty acids (PUFAs)-rich oils (flaxseed, fish, algae, krill, and blend).

Methodology & Theoretical Orientation: Fish protein isolate (FPI) was recovered from whole gutted trout using ISP. FPI was used as a main ingredient in heat-set gels made with ω -3 PUFAs oils (flaxseed, algae, fish, krill, and blend).

Findings: Fortification of the ISP-recovered fish protein isolate with ω -3 PUFAs rich oils (flaxseed, fish, algae, krill, and blend) resulted in increased (P<0.05) content of alpha-linolenic (ALA), eicosapentaenoic (EPA) and docosahexaenoic acids (DHA) in the cooked protein isolate gels. The extent of the PUFAs increase, ω -6/ ω -3 FAs and unsaturated/saturated FAs ratios, as well as the indices of thrombogenicity and atherogenicity depended on specific ω -3 PUFAs-rich oil used to fortify the protein isolate gels. Lipid oxidation in ω -3 PUFAs fortified gels was minimal, although greater (P<0.05) than control gels (without ω -3 PUFAs fortification). However, all gels were in the slightly rancid, but acceptable range. The shear stress of ω -3 PUFAs fortified gels was generally greater than the control gels.

Conclusion & Significance: This study indicates a potential application for protein isolates recovered with ISP from fish processing byproducts or whole fish without prior filleting. Fortification of the ISP protein isolate with ω -3 PUFAs-rich oils allows the development of a functional seafood product.

rtahergo@ncat.edu