

P32 - Application of chitosan-based coatings on frozen salmon – Sensory assessment and retail simulation approach

Silva, P¹; Soares, N¹; Barbosa, C^{2,3}; Pinheiro, R²; Vicente, A. A¹

¹Centre for Biological Engineering, University of Minho, Campus de Gualtar, 4710-057, Braga, Portugal

²IPVC-ESTG (Polytechnic Institute of Viana do Castelo – Escola Superior de Tecnologia e Gestão), Avenida do Atlântico, 4900-348, Viana do Castelo, Portugal

³LAQV-REQUIMTE, Faculty of Pharmacy, University of Porto, R. D. Manuel II, Apartado 55142, 4051-401 Porto, Portugal

pedro.silva@ceb.uminho.pt

Due to an increase in fish consumption over the past years, in combination with the perishable nature of fish, the fish industry has given an added focus on the improvement of the currently used fish preservation techniques. Chitosan coatings may add improvements to the traditional water glazing, namely in physical and anti-microbial protection, allowing for shelf life extension.

Nevertheless, during retail storage, frozen fish products can suffer temperature variations that lead to a decrease in quality. These temperature variations can be caused by a multitude of reasons, some of which are easy to control, while others are due to unforeseen circumstances. In either case, thermal stress can often affect frozen fish products and this effect is of considerable importance.

This work was meant to determine the influence of chitosan coatings in the organoleptic characteristics of salmon as well as report a strategy to help mitigate the effects of thermal stress of frozen fish samples. A 15 g/L chitosan solution was applied on frozen salmon samples through dipping at a temperature of 8 °C, with a dipping time of 10 s; water glazing was applied as blank treatment at 0.5 °C, with a dipping time of 40 s. Some of the samples were submitted to retail-simulated thermal stress conditions (i.e. a temperature variation of -15 °C to -5 °C was enforced), and studied during a 70-days long experiment, while others were used to assess the sensory properties of chitosan coatings on Atlantic salmon (*Salmo salar*) and were compared with uncoated and water glazed samples over a six-month storage period at -18 °C. Retail simulation samples were tested for variations in pH, coating loss and color, while samples used for sensory analysis were evaluated by a sensory panel (frozen, frozen+thawed and frozen+thawed+cooked samples were assessed,) regarding its organoleptic properties, and textural analysis, by means of a TPA (texture profile analysis). Samples analysis common to both experiments were microbiological stability, assessed through TVC (ISO 4833-1:2013 standard), and chemical stability, determined as TVB-N (NP 2930:2009 standard). Through coating loss, it was possible to verify that chitosan coatings offer better protection, with water glazed samples becoming virtually unprotected after the evaluation period, with losses of more than 80 % of its glazing, while chitosan coated samples maintained 50 % of its coating. Extrapolating this data to complete loss of water glazing shows an increase in shelf life of at least 26 % in chitosan coated samples. No significant changes between samples were obtained in the other parameters assessed. The anti-microbial effect of chitosan was confirmed through TVC which showed a reduction in microbial counts in chitosan coated samples, while while TVB-N results showed to remain stable, for both experiments. The proven anti-microbial effect of chitosan coated samples in conjunction with a slower coating loss leads to an expected increase in shelf life, even in unforeseen circumstances of temperature change in retail transportation. Textural results from the TPA analysis showed no significant differences between different coatings. Results of the trained panel indicated that for frozen samples chitosan was the preferred choice, while no significant differences existed between chitosan-coated and glazed samples in thawed and cooked samples. Flavor diffusion from the chitosan coating to the samples was assessed by Principal Component Analysis and no correlation between coating type and sample flavor could be established, meaning that no chitosan flavor was detected by the panellists.

Acknowledgements:

This study was supported by the Portuguese Foundation for Science and Technology (FCT) under the scope of the strategic funding of UID/BIO/04469/2013 unit and COMPETE 2020 (POCI-01-0145-FEDER-006684) and BioTecNorte operation (NORTE-01-0145-FEDER-000004) funded by the European Regional Development Fund under the scope of Norte2020 - Programa Operacional Regional do Norte