

Title Use of chitosan dips in retarding lipid oxidation in Atlantic salmon fillets during frozen storage

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Abstract

Atlantic salmon has a high content of omega-3 fatty acids, which play important roles in promoting human health. However, these fatty acids are highly susceptible to oxidation. The objective of this study was to evaluate the effects of various chitosan dips on lipid oxidation in frozen Atlantic salmon fillets. During this 5-mo study, we examined the effects of chitosan concentration (0.5% and 1.0%, w/v) and size, (high molecular weight (HMW), low molecular weight (LMW), and enzymatically degraded chitosan) on antioxidative efficacy of the dip. The effects of adding 1.0% ascorbic acid (AA) to the HMW chitosan dip were also evaluated. All chitosan solutions were prepared in 3.0% acetic acid. A total of 10 treatments were examined including an undipped fillet control and an acetic acid control. Fillets were dipped and stored at -20 °C for 150 d. On d 1, 30, 60, 90, 120 and 150, samples were subjected to TBA instrumental color (L^* , a^* , b^*), and GC headspace analysis of propanal, hexanal, and total volatiles. “L” values increased and “a” values decreased during frozen storage, with the undipped control treatment having significantly ($p < 0.05$) lower “L” values than the treated samples. The 0.5% HMW chitosan with 1.0% AA had significantly ($p < 0.05$) lower TBA values than all other treatments. The 1.0% HMW chitosan with 1.0% AA treatment also remained low throughout the study. Levels of propane, an omega-3 fatty acid oxidation product, increased during storage, reaching a high of 24.73 nmol/g in the 1.0% HMW chitosan treatment on day 150. The 1.0% HMW chitosan with 1.0% AA treatment was the most efficient treatment in preventing propanal development. These results indicate that oxidation in salmon fillets was most successfully retarded during frozen storage with the combined use of HMW chitosan and 1.0% AA.