

Possibilities with Washed Fish Minces as Model Systems for Pro- and Antioxidant Testing

Karin Larsson, Thippeswamy Sannaveerappa and Ingrid Undeland, Chalmers University of Technology, Göteborg, Sweden

The growing interest within the food industry in all-natural antioxidants has led to a need of methods for screening and comparing the antioxidant activity of various natural compounds. Today, a lot of quick methods exist for this purpose (e.g. TEAC, ORAC, FRAP, TOSC, TRAP) but unfortunately there is often a lack of correlation between results from these methods and those obtained from testing the antioxidants in a real food system. Within the fish research field, washed cod mince with an added fish-derived pro-oxidant (mostly haemoglobin, Hb) has emerged as a very useful alternative in antioxidant testing. In addition to more accurate interpretations of the antioxidant effectiveness, also an increased mechanistic understanding is enabled.

The purpose of this study was to compare the oxidation rate in Hb-fortified washed minces from cod, herring and salmon during ice storage and to link the kinetics to their intrinsic differences e.g. in pro- and antioxidants. The cod model was also used for testing of polyphenols and aqueous herring-derived antioxidants (press juice, PJ). Finally, the possibility for also studying protein oxidation in the models was tested. Lipid oxidation was followed as peroxide value (PV), rancid odour and redness loss. Protein oxidation was followed as protein-insolubilization and protein carbonyl formation.

The lipids of all three models oxidized quickly with 20 μM Hb. Small differences in the oxidation rates ranked the models as herring > cod > salmon. These differences were ascribed more pre-formed peroxides and trace elements in the herring model, and more intrinsic antioxidants in the salmon model. Among the added antioxidants tested in washed cod mince, caffeic acid (50 ppm), herring PJ and the low molecular weight fraction of PJ were most efficient. However, differences in the intrinsic α -tocopherol content of the washed cod models affected the results and could prolong the stability. The protein salt solubility was only about 60% from start in washed cod mince, but some further losses were recorded in the presence of Hb. Results are awaited on whether the antioxidants above could prevent this loss.