AUTHENTICATION OF DEPURATED SALMON FILLETS BY NEAR INFRARED SPECTROSCOPY

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Some species of actinomycetes, fungi and blue-green algae produce semi-volatile off-flavour compounds responsible for earthy-musty odorants in water from aquaculture facilities and tend to bio-accumulate within fish flesh. Although these off-flavour compounds are harmless to human health, high levels within fish tissue lead to an undesirable taste leading to an unmarketable consumption quality. Pre-harvest processes such as depuration can be used to eliminate most of these off-flavour compounds and ultimately enhance salmon quality. To assure quality control and guarantee consumers get exactly what they paid for and not an inferior quality fish, methods to distinguish depurated salmon from those that have not been subjected to any pre-harvest process are required. This study examined the potential of near infrared spectroscopy (NIRS) to discriminate depurated from non-depurated salmon fillets. Sixty two Atlantic salmon were cultured within a commercial scale land-based recirculating aquaculture system (RAS). When salmon reached food-size, twelve salmon were removed from the RAS (non-depurated salmon) and fifty were transferred to partial water reuse systems to be depurated of existing off-flavours for 10 days (depurated salmon). Skin-off fillets were collected from all salmon, vacuum packed and frozen at -20 °C. After thawing, the right-side, anterior third of the fillet was scanned over the visible and NIR range (350-2500 nm) on the flesh of the dorsal muscle. Partial least squares discriminant analysis based on NIR spectra correctly classified 100% of non-depurated and depurated salmon fillets; probably as a consequence of differences in the content of off-flavour compounds, fat and water between both samples, which could have been detected by NIR spectra. Thus, NIRS is a fast, inexpensive, solvent-free and non-destructive technology that can be used for the authentication of salmon with enhanced quality for marketing purposes. Further studies are needed to test NIRS technology for on-line applications in the salmon industry, where portable equipment applied directly on the whole salmon through the skin could be used to authenticate salmon with enhanced quality for marketing purposes.

Figure 1 (on left). Collection of visible and near infrared spectra on salmon fillet

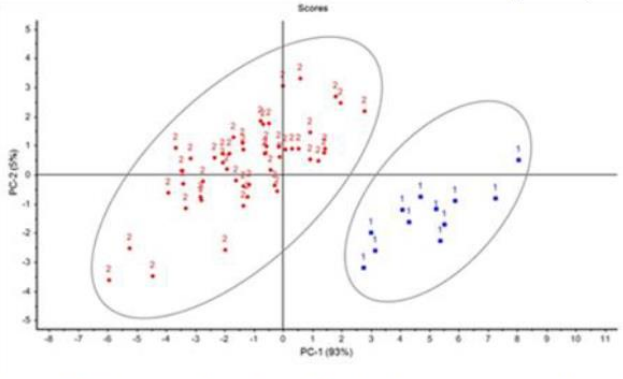

Figure 2. Score plot for principal component 1 and 2 of salmon fillets based on near infrared spectra (1 = non-depurated, 2 = depurated).