Fish muscle postmortem change and salting performance. Impact of muscle microstructure on salt transfers

Arno Germond, Christelle Blavignac, Camille Rivard, Laurence Dubreil, Pierre-Sylvain Mirade, Thierry Astruc

Fish muscle postmortem change and salting performance. Impact of muscle microstructure on salt transfers.

Arno Germond[1], Christelle Blavignac[2], Camille Rivard[3, 4], Laurence Dubreil[5], Pierre Sylvain Mirade[1], Thierry Astruc[1]

[1] UR 370, Qualité des Produits Animaux (QuaPA), INRAE, Centre Clermont-Auvergne-Rhône-Alpes, France

[2] Centre d'Imagerie Cellulaire et Santé (CICS), Université de Clermont-Auvergne, France

[3] Synchrotron SOLEIL, L'Orme des Merisiers, Saint-Aubin, 91192 Gif-sur-Yvette, France

[4] INRAE, TRANSFORM, 44316 Nantes, France

[5] Oniris, INRAE, PAnTher, 44300 Nantes, France

Context

Predicting the biochemical and microstructural shifts of fish fillets induced by *postmortem* changes before salting is crucial in maximizing food performance. The current study aimed to better understand the role of trout *postmortem* time on the fillet's salting characteristics.

Methods

Filets were salted after cold storage ranging from 0 to 15 days, with the contraleteral fillets serving as unsalted controls. Physicochemical parameters such as pH, colour protein solubility, and proteolysis were measured. NaCl content was determined by ion chromatography and samples were analysed by FT-IR microspectroscopy. Muscle structure and salt distribution analysis were carried out by histochemistry, X-ray microanalysis, Synchrotron-X ray fluorescence, and SHG imaging.

Results

Although, physicochemical parameters of unsalted filets did not changed *postmortem*, some myofibrillar ruptures were evidenced at D15. This could attributed to the cold storage at 0 degree.

The salt level of the salted filets increased by almost 20% compared to non-aged ones ($p<0.05$). FT-IR microspectroscopy analysis discriminated the D7 from the D0 samples. The salted samples were discriminated from unsalted ones at wavelengths assigned to protein beta-sheet structure (1635 cm^{-1}) and nucleic acids (1747 cm^{-1}). As observed by SHG imaging, NaCl content and in situ Na and Cl was variable demonstrating the barrier role of myoseptes in the diffusion of salt within trout fillets. The organized muscle structure therefore explains the variability of the salt content in fish fillets.

In conclusion, the time of storage has an effect on the salt intake. It is evident that the myocepts reduce the salt diffusion. Therefore, a process which will increase the diffusion is needed. The study demonstrates that Label-free spectroscopy is suitable to characterize the fish filets with a better food performance achieved by adapting processes to the structural and biochemical characteristics of the filet.