Comunicazione Orale

INFLUENCE OF PLASMA-ACTIVATED WATER ON SODIUM CHLORIDE RELEASE DURING SALTED COD REHYDRATION

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Aim. Plasma-Activated Water (PAW) has emerged as a promising technology in the fish food industry owing to its antimicrobial properties, which contribute to extending the shelf life of products, and its potential to modify mass transfer during food processing. Rehydration of salted cod is a critical step that involves prolonged soaking under refrigerated conditions with repeated water replacements, resulting in considerable water and energy consumption. Therefore, this study evaluated the use of PAW as a rehydration medium for salted cod (*Gadus macrocephalus* and *Gadus morhua*), investigating its ability to enhance sodium chloride (NaCl) release during rehydration to improve the efficiency and sustainability of the process.

Methods. Four independent trials were performed in which salted cod was rehydrated at a fish-to-water ratio of 1:3 (w/v) for 72 h at 4°C, with complete renewal of the soaking water every 24 h. NaCl concentration in the soaking water was determined by argentometric titration (Mohr method) using silver nitrate ($AgNO_3$). A sequential experimental approach was adopted. In Trial 1, the desalination kinetics of salted cod rehydrated in tap water were characterised, Trial 2 verified the reproducibility of NaCl release following water replacement through an independent rehydration experiment. Based on the preliminary desalination trials, the first 8 h of soaking were selected for the remaining experiments. PAW was generated using a dielectric barrier discharge plasma device (Leap100, PlasmaLeap Technologies Pty. Ltd., Sydney, Australia) with compressed air as working gas. In Trial 3, PAW produced from tap water and distilled water was compared to evaluate the influence of the water matrix on NaCl release and to identify the most suitable water source. Finally, Trial 4, evaluated five PAW operating conditions, obtained by varying the applied voltage and discharge frequency while maintaining a constant activation time (240s), to identify the conditions that maximized NaCl release during rehydration.

Results. Trial 1 showed that during salted cod rehydration the first 8 h of soaking corresponded to the period of maximum NaCl release. Trial 2 confirmed the reproducibility of the NaCl release profile following water replacement. In Trial 3, comparable NaCl release profiles were observed for PAW generated from tap and distilled water. Since no substantial differences were detected, tap water was selected for subsequent experiments because of its greater industrial applicability. In Trial 4, four of the five PAW operating conditions resulted in higher NaCl release than the control during the first 8 h of soaking. The highest NaCl concentration was recorded with treatment P2 (4.30% w/v), corresponding to the lowest voltage and discharge frequency conditions, compared with 3.22% for the control, whereas P5, corresponding to the highest voltage and discharge frequency conditions, produced the lowest value (1.52% w/v). These findings identified PAW operating conditions with contrasting effects on NaCl release during the early stages of rehydration.

Conclusions. The results suggest that optimising PAW operating parameters may enhance NaCl release during the early stages of rehydration, potentially reducing soaking time and, consequently, water consumption and refrigeration energy requirements. Future studies will validate these findings under replicated conditions and investigate whether the antimicrobial properties of PAW can further improve the microbiological quality and extend shelf life of rehydrated salted cod.