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Microbiological Analysis and Breeding toward Improvement of Quality and Stability of Salt-Cured Fermented Fish Products

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Summary

Salt-curing of fermented fish products is an important manufacturing process to repress putrefaction and contamination by undesirable microorganisms, simultaneously providing a taste improvement and sufficient length of preservation period. Nowadays, however, many food manufacturers are going to reduce the concentration of salt in their products, with an increasing concern for unhealthy aspects of salt such as high blood pressure. This reduction of salt concentration is sometimes resulting in the unexpected food poisoning such as the case for Japanese pickles contaminated with the pathogenic *Escherichia coli* strains. In light of this situation, it is now needed to carefully review and reinvestigate the true role of salt in food production and preservation through the scientific approach, for the future safety of the salt-cured fermented foods. In this study, fish sauce, which normally contains not less than 20 % of salt, was investigated for the change of microbiota depending on the various salt concentrations (0-30 (w/w) %). The samples were evaluated for 16S ribosomal DNA-based microbiota analyses, as revealed by culture-based strain isolation and Illumina MiSeq-based next generation sequencing analyses. Gram-negative putrefactive bacterium *Proteus* sp. and enterococci, possibly originated from squid organ, were isolated from the fish sauces with the salt concentrations less than 5 %, thus the spoilage was ongoing under low salt concentrations. Ten % salt could not stably repress the bacterial growth but 15 % salt was enough effective to reduce the viable counts of microorganisms, indicating that limiting point for bacterial control exists around this range. *Tetragenococcus* and *Staphylococcus* were dominantly isolated from the fish sauces containing more than 15 % salt, but the viable counts were quite low at these high salt concentrations. The MiSeq dataset revealed that *Mycoplasma* unexpectedly increased in the fish sauces with 5 % salt concentration, indicating that they might specifically grow under this condition. Taken together, this study provided rational information that microbiota dynamically changed depending on the salt concentration, and that the concentration around 15 % is necessary to stably exert the controlling effect on bacterial growth in squid organ-based fish sauce.