Study on antibiotic resistance and biocontrol of foodborne pathogens derived from Pangasianodon hypophthalmus

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Title : Study on antibiotic resistance and biocontrol of foodborne pathogens derived from *Pangasianodon hypophthalmus*
(*Pangasianodon hypophthalmus* 由来食中毒細菌の抗生物質耐性と制御に関する研究)

Category : Kou

Thesis Summary

Pangasius hypophthalmus, a freshwater fish found in the Mekong Delta of Vietnam (Sauvage, 1878), plays an economically important role in aquaculture in Vietnam. However, not much is known about bacterial contamination of the fish products during the processing. Moreover, the effectiveness of a novel and effective disinfectant that can eliminate biofilm from these bacteria is lacking. Therefore, the thesis attempts to address these gaps in terms of evaluating the actual microbiological situation, and the effect of slightly acidic hypochlorous water (SAHW) to control biofilm consisted of single and dual species. The result indicated that the microbiological assessment was the same at levels 1–2 in the 2 companies, indicating a poor to moderate food safety performance of these companies. Additionally, the similarity in the microbial safety profiles of the 2 companies revealed the necessity of validating the efficiency of food safety-management systems to improve the safety of the fish product. *Listeria monocytogenes* was detected in 15.6% (45 out of 288 samples) of fish and processing environment samples. Serotypes 1/2b and 4b were dominant in the isolates, and internalin genes *(inlA, inlC*, and *inlJ*) were found in all the isolates. Susceptibility tests for 21 antimicrobials showed that most of the isolates were resistant to cefoxitin, oxacillin, and fosfomycin; some strains were resistant to four antimicrobials. Genotyping of *L. monocytogenes* by random amplification of polymorphic DNA (RAPD) revealed diversity to some extent of the *L. monocytogenes* isolates. The *L. monocytogenes* contamination of fish products appeared to be originated from the wash water, rather than the raw materials. The potential virulent and epidemiologically important serogroups from these strains cause worrisome. Furthermore, *L. monocytogenes* single-species biofilm formation increased with increasing temperatures and times, significantly higher levels at 30 ℃ as compared at 16 ℃ and 10 ℃. The sequential treatment of lysozyme and SAHW showed additional microbiocidal effects on the removal of biofilms, which could not only disturb the exopolysaccharides structures of biofilms but also significantly decreased *L. monocytogenes* viable cells in biofilm (7.5 log CFU/mL reductions). Moreover**,** high efficacy of SAHW in comparison to sodium hypochlorite in removing *L. monocytogenes* and *E. coli* dual-species biofilms was observed on the surfaces of polystyrene plate and the stainless-steel coupon. More than 99 % decrease in viable counts of biofilm cells were observed after 10 min treatment at 25 °C. In conclusion, from the viewpoint of this thesis, the microbial contaminants could initially be spread from the processing environment and wash water in *Pangasius* processing plants. How to control the good performance of food safety management

systems is considered a crucial strategy to assure the safety of final products. Besides, the application of SAHW can be an alternative disinfectant to control biofilm in the processing environment.