

# Evaluation of oxidising disinfectants to control *Vibrio* biofilms in treated seawater used for fish processing

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## Abstract

Marine fish-processing plants often use seawater during their operations. Chlorination and UV are commonly used for disinfection of this water but may not be effective in preventing biofilm formation within the water distribution network. These biofilms negatively impact water quality and could lead to contamination of fish products. During a recent study, *Vibrio alginolyticus* strains were detected on processed hake. The presence of most *Vibrio* spp. on fish products is of consumer safety concern and needs to be minimised. Water treatment strategies effective for seawater disinfection but with minimal negative effect on fish quality are required. In this study the effectiveness of chlorine, ozone and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) in the inhibition of mature biofilms or biofilm formation in natural seawater was investigated. Two *V. alginolyticus* strains (V590 and V595) isolated from hake fish as well as the type strains of *V. alginolyticus* LMG 4409 and *V. parahaemolyticus* LMG 2850 were used. Chlorine was ineffective as experiments showed that strains V590, V595 and *V. parahaemolyticus* LMG 2850 could form biofilms even in the presence of 4 mg/l of chlorine. When ozone was used, biofilm initiation and formation were completely inhibited for only 2 strains of *V. alginolyticus*, i.e. LMG 4409 and V590, at 1.6 mg/l or 0.8 mg/l ozone, respectively. Hydrogen peroxide performed the best of all the disinfectants evaluated in this study. Inhibition of biofilm formation was observed for all strains at 0.05% H<sub>2</sub>O<sub>2</sub>. The mature biofilms were more resistant to H<sub>2</sub>O<sub>2</sub> but were all eliminated at 0.2% concentrations. This study indicated that H<sub>2</sub>O<sub>2</sub> is the most effective biocide to prevent biofilm formation in seawater distribution networks and could potentially be used as an alternative or supplementary disinfectant of seawater in marine fish-processing plants.

**Keywords:** *V. alginolyticus*, *V. parahaemolyticus*, biofilms, H<sub>2</sub>O<sub>2</sub>, disinfection, seawater