

Measures to be followed for minimizing the risk of contamination of seafood from biofilm:

- For prevention of biofilm formation, a three steps procedure should be followed. First wash the food-contact surfaces with non-ionic detergents, then apply the suitable concentration of sanitizers (e.g. Chlorine), finally wash with potable water and dry.
- The cleaning should be done after each shift of operation. The cleaning of the food-contact surfaces with detergents is very important as the sanitizers including chlorine work more efficiently in absence of dust particles and organic matters. The contact time with chlorine should be at least 15-20 min.
- On regular interval, take swab of food-contact surfaces and examine for the presence of various pathogens by suitable microbiological methods.
- Follow a Good manufacturing practice and strict SSOP protocol.
- Water tank and supply system should be cleaned regularly to avoid biofilm formation there.

- Daily sanitation control record should be maintained properly.
- Always use right concentration of both detergents and sanitizers.

Recommended dose of chlorine

For washing processing table and utensils : 50 ppm

Foot dip water : 100 ppm

Water for sanitation of floor and wall : 100-200 ppm

Water for drain : 250-500 ppm

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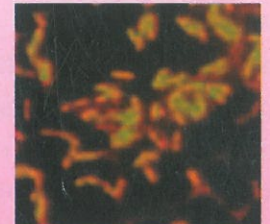
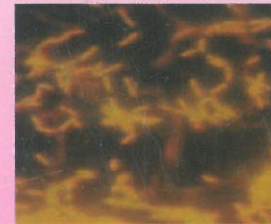
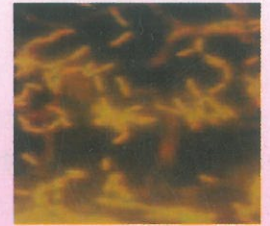
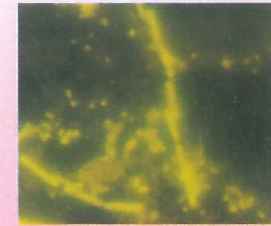
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Biofilm formation of food-borne bacterial pathogens, possible danger and control strategies



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Biofilm:

Microbial biofilm is attachment and colonization of organisms on biotic and abiotic surfaces. Biofilm-forming bacteria secrete an extracellular substances called exopolysaccharide (EPS), which plays a major role in attachment and colonization leading to formation of a complex bacterial matrix. Bacteria in biofilm are very much resistant to antibiotics and different sanitizing agents. In seafood processing plants, bacterial biofilm formation takes place on different surfaces, which generally come in contact with food during processing operation and concentration of the organism in the biofilm may be as high as 10^5 to 10^7 cfu / cm^2 . Biofilm can also be produced on fish skin, chitins of crustaceans, etc. Very often, the attachment of the organisms to the surfaces is very rigid and normal washing with water is not enough to remove those bacteria. There is every possibility that from those areas, biofilm forming bacteria can contaminate the food under process. Hence, the formation of biofilm on different food processing equipments of different seafood processing plants is of great public health concern. A good hygiene practice, proper cleaning and disinfection can minimise the risk of biofilm formation and possible contamination of seafood.

Biofilm producing seafood-borne pathogens:

- *Staphylococcus aureus*
- *Listeria monocytogenes*
- *Campylobacter*
- *Aeromonas hydrophila*
- *Salmonella* spp.
- *Vibrio cholerae*
- *Vibrio parahaemolyticus*
- *Escherichia coli*
- *Bacillus cereus*
- *Pseudomonas aeruginosa*
- *Proteus vulgaris*
- *Shewanella putrefaciens*
- *Klebsiella pneumoniae*
- *Shigella* spp.

Surfaces of seafood processing plants where biofilm forms:

- Equipments
- Conveyor belt
- Floor
- Processing table
- Surfaces of water tank and water supply
- Cutting board
- Any other surfaces which comes in contact with seafood

Disinfectants which can kill bacteria in biofilm:

- Chlorine
- Quaternary ammonium compounds e.g Benzalkonium chloride
- Ozone
- Peracetate compounds
- Peroxide solution (Hydrogen peroxide)

Among the above-mentioned sanitizers, chlorine is extensively used in seafood processing plants of India. Chlorine is available mostly in the form of sodium hypochlorite and calcium hypochlorite. In fact, ozone is much more effective in destroying microorganisms in biofilm, but it is unstable and expensive too.

Things to be considered for choosing sanitizers :

- Safe to use
- Must not leave any harmful residues
- Must destroy the microorganisms
- Should be cheap
- Should not form any scaly deposit if used repeatedly
- Should not corrode surfaces and utensils