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## IMPORTANCE OF HYGIENE AND SANITATION IN FISH HANDLING

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Fresh fish has a natural complement of bacteria of aquatic origin. During handling fish gets contaminated with various types of bacteria, some of these bacteria have sanitary significance. These micro-organisms are not originally present in fresh fish caught from offshore waters but contamination occurs during handling of the material in unhygienic conditions. If the time-temperature conditions are favourable, these bacteria can grow and multiply at a fast rate leading to spoilage. Consumption of such fish is dangerous as it can lead to food poisoning and problems of public health. Hygiene and sanitation, therefore play a vital role in fish handling.

### **Bacterial of public health significance in fish handling**

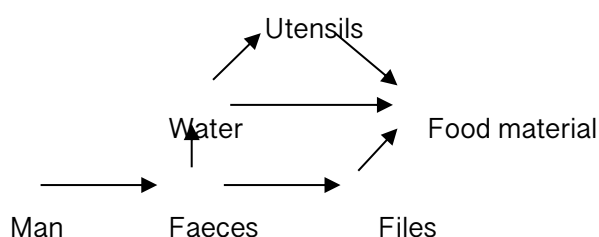
Handling and resultant contamination introduce a variety of bacteria into food. Some of these bacteria which are important from public health point of view, along with their primary habitats are listed in Table 1.

Table 1 Bacteria of public health significance and their habitats

Bacteria	Primary habitat
<i>Escherichia coli (E.Coli)</i>	Gut of man
<i>faecal streptococci</i>	Gut of man & animals
<i>staphylococcus aureus</i>	Skin, sweat, eargum, nasal drips and throat of man
<i>Salmonella</i>	Also present in ulcers, wounds and carbuncles in human beings.
<i>Shigella</i>	
<i>V.cholerae</i>	Gut of man and animals
<i>Clostridium wechii</i>	Gut of man
	Gut of man
	Soil, water, dust and intestinal tract of man and animals

Many of these microorganisms escape from the primary source into nature through excreta of man and animals. through various other vectors such as flies, birds, animals and forces of nature like wind and rain they spread in land and water, and finally into food as shown below:

### Route of contamination of food materials by bacteria of public health significance



### Sanitary and hygiene precautions to be followed in fish handling

If we are careful, we can effectively check these routes and prevent contamination and spreading of diseases. Such preventive measures are called sanitation and hygiene methods, some of which are listed below;

#### Use only Potable Water or clean Sea Water for washing fish

Harbour waters and shore waters are often contaminated with sewage and harmful enteric bacteria. This water shall not be used for washing fish or fish-contact surfaces. Always use only potable water or clean sea water from outer sea for washing and processing fish.

#### Never put fish on sand or any unclean surface

In certain areas of the country, there is a practice of sorting on sea beaches where even faecal matter gets dispersed. This is a sure source of contamination of fish with diseases-producing microorganisms. All operations on fish shall be done only on smooth and clean surfaces, which are sufficiently above the ground level and free from wind-blown dust and flies.

#### Construction and maintenance of buildings for fish processing to achieve sanitation

- I. Buildings should be in an area where potable water and electricity are readily available.
- II. The building and the sections inside should be oriented in such a way that wind does not blow the dust into the plant or to the food material handled inside.
- III. The premises of the building should be kept neat and clean.
- IV. The roof of the building shall be of simple construction with smooth and clean surface.
- V. It is preferable to give concrete roofing with smooth and washable surface
- VI. The walls shall be of solid construction using brick and cement and shall be smooth and washable but water resistant. Walls shall be preferable lined with white ceramic tiles
- VII. The roof-wall joints, wall-floor joints and wall-to-wall joints shall be rounded in order to prevent pests and dirt settling on them.
- VIII. The walls shall be well polished and where ever possible fitted with glazed tiles, at least to a height of four feet from floor, to facilitate easy cleaning.
- IX. The floor of the hall shall be smooth, cemented and free from crevices.
- X. The slope of the floor shall be in such a way that water easily runs into the drain. Preferable the direction of waste water flow shall be opposite to the flow of material.

Where ever possible the water from processing tables and equipment shall be led through pipes into the drain, without spilling on the floor.

### **Lighting and Ventilation**

Lighting shall be adequate for reasons of both safety and efficient working. If natural light is not adequate. It can be supplemented with artificial lights, which are similar to natural light. Light bulbs and fixtures over the product shall be protected to prevent contaminator in case of breakage and harbourage insects and pests. All electrical fittings in the factory building shall be washable.

### **Ventilation**

Adequate ventilation is an important factor in the design and operation of a sanitary fish processing plant. Exhaust fans shall be installed wherever necessary. A relative humidity of 60-70% and a temperature of 20-25°C are the ideal conditions in a fish handling hall, fish stall or market, Ventilation is also essential to prevent condensation of moisture and fungal growth on roof and walls.

### **Water supply**

There shall be plentiful supply of potable water in fish handling and marketing area. The water shall be annually tested and certified for potability /IS 4251/EU Norms. The microbiological quality of the water shall be checked at least once in three months. The level of free chlorine in the process water shall be <2 ppm. Non-potable water supply for fire control and similar purposes shall be through separate lines, which can be identified by different colour code to avoid cross contamination.

### **Ice**

Ice shall be prepared from potable water chlorinated to a residual level of <2 ppm. Dragging of ice through walking floors will lead to bacterial contamination of the ice block and if contaminated ice is used for icing it will in turn contaminate the fish with bacteria of public health significance, Ice shall be stored only on elevated floor where walking shall not be permitted. Preferably ice blocks may be stored in separate insulated rooms, over raised platforms or suitable tubs or boxes. Sawdust, gunny bags, tarpaulins etc. shall not be used for covering or protecting ice.

Ice crushing on floor is not advisable, ice crushing machines may be used for this purpose. Crushed ice shall be collected directly into tubs lined inside with stainless steel or aluminium and ice shall always be stored and handled in such a way that bacterial contamination is avoided.

### **Utensils for fish handling**

It is not advisable to handle fish on the floor. Tables may be used for this purpose. Table tops shall be of stainless steel, or any other noncorrosive, nonreactive, smooth and washable material. All fish contact surfaces shall be smooth, water resistant and free from pits and

r=crevices. They shall withstand normal repeated cleaning. Wooden, enamel and wire mesh utensils are not advisable for handling fish. Bamboo baskets, cane baskets and such other containers that are difficult to be cleaned shall not be used.

Utensils that are used for inedible and contaminated materials shall be separately identifiable by some mark or colour so that they are not used for handling edible products.

#### **Washing of utensils and fish contact surfaces**

On constant use, the utensils get a coating of fish slime, which can harbour harmful bacteria. All the utensils and fish contact surfaces shall be washed at frequent intervals using suitable detergents such as teepol, followed by disinfection using sodium hypo chlorite solution having a residual chlorine strength of 100 ppm and giving a minimum contact time of 15 minutes. The washing shall be done before and after each shift as well as whenever there is visible spoilage of any dirt on the contact surfaces.

#### **Workers' hygiene and health**

Fish handlers shall be provided with clean uniforms while on work. They may wear clean overalls and head and mouth covers. They shall be trained to be appreciative of the need for a high standard of cleanliness in fish handling. Before starting the work, all those who have to handle fish, shall wash their hands from elbow down using soap followed by disinfection using 20-50 ppm chlorine. The process may be repeated each time they leave their work sport and return for work or when over their hands become contaminated. Talking, spitting, eating and use of tobacco shall be prohibited in the premises where fish is handled.

Workers can be healthy carriers of many dangerous bacteria including *salmonella*, *shigella*, *V.cholerae* or *S.aureus*. These workers will contaminate the material which they handle thereby creating serious public health hazards. The management shall, therefore, take proper care to see that the workers having cut or injury on their palms as well as those suffering from any disease are kept away from work. The workers shall be subjected to a medical examination at an interval of at least one year, particularly to identify the carriers among them. Wherever possible workers shall be provided with prophylaxis against contagious diseases particularly typhoid.

#### **Rodent control measure**

Rodents are known to spread many diseases such as plague, endemic typhus fever, infectious jaundice and salmonella food poisoning. Most of these are transmitted from infected rodents to man through their urine and droppings. Therefore, all possible precautions have to be taken to prevent the entry of rodents to the fish handling areas.

Multiplication of rats and mice depends upon the food and harbourage available to them. Therefore, the only permanent and lasting means of control is the elimination of food source and harbourage areas. The processing area shall be made rodent-proof. As a guide to rodent

proofing it may be noted that rodents have exceptional skills to climb jump and squeeze in as indicated below.

- Rodents can squeeze in through a hole of less than 2 cm
- They can climb vertically through wires and pipes
- They can jump both horizontally and vertically from any flat surface.
- They can jump to 15m down without being killed

So, all efforts shall be made to bait, trap and kill rodents in factory premises but without resorting to the use of toxic chemicals.

#### **Fly control measure**

Flies transmit a number of bacteria from the surroundings to the food. Therefore, the doors and windows of the fish handling areas may be fitted with fly proof net of 4mm mesh size. Further, the doors shall be self –closing. All outside opening doors and chutes shall have automatic air curtain to prevent entry of insects. For rodent and fly control toxic or poisonous substances shall not be used.

#### **Waste disposal**

Timely non-disposal of waste from fish handling premises often poses serious problems as it attracts flies and creates an unhealthy surrounding. There should be an efficient and prompt system of waste disposal from such areas.

#### **Storage of toxic substances**

Fumigants and other toxic substances meant for use in the fish handling areas shall be stored in locked cabinets and handled only by properly trained personnel having a thorough knowledge of the hazards including the possibility of contamination of food products. Poisonous rodenticides and insecticides are not permitted in fish handling areas. Fumigation shall be resorted to only when there is a need.

#### **Toilet facilities**

Proper construction, maintenance and supervision of toilet facilities are also part of sanitation in a food processing plant. Such facilities should be adequate in number and shall be cleaned and disinfected daily at frequent intervals. The roof-wall Joint of the lavatories shall be tight so as to avoid harbouring of flies and rodents. The lavatories shall be fitted with self-closing doors. The recommended number of toilets in relation to the number of workers is given in Table 2. All toilets shall be fly proof.

Table2 toilet facilities required in a food processing factory

Number of workers/shift	Number of toilets required
1 to 9	1
10 to 24	2
25 to 49	3
25 to 100	5