

BACTERIA IN PROCESSED FISH—

THE PROBLEM AND THE SOLUTION



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IN recent months much have been heard on the bacteriological quality of processed fish. Bacteriological standards for food materials including fresh and processed fish have been prescribed by many countries. Processed fish exported from India has very well met these standards as is evidenced by very few rejections in U. S. A., Canada or other countries where food laws are generally strictly enforced. When, however, sudden enforcement of prescribed bacteriological standard by the Australian authorities were announced, almost a panic seized the industry. Perhaps the suddenness of the enforcement and worry about the large volume of material already afloat on its way to Australia caused the panic. But it should be remembered that the prescribed Australian standards are in no way more rigorous

than the requirement in some other countries where India exports such products. The sudden imposition of the bacteriological checks in Australia, has, however done one good thing to the Indian fish-processing industry in that it has forcefully drawn attention to the necessity of maintenance of high bacteriological quality of its products.

Bacteria, because of their association with disease, always create a sense of fear in our minds particularly if they are present in food as many of dreadful diseases are caused by food-borne micro-organisms. But most of the bacteria we come across are really harmless and none of the human food in natural condition and even in its soundest state, is completely free from bacteria. But it is the quantity and the type of bacteria present in a food material which

determine whether the particular food will be considered to be safe or not. After the food material is harvested and before it is consumed, the extent and type of bacterial load on it will depend not only on the number and type of bacteria originally present in it at the time of harvesting but on subsequent contamination during handling and processing and also on the environmental conditions during storage and transport. Thus it will be seen that the bacterial load quantitatively and qualitatively in a food material is dependent on the conditions of handling, processing, storage and transport of the particular food material and it can be easily controlled if few simple precautions are taken. Bacteriological standards specified for fish and fish products in most of the countries have two important features. One is the specification for total count. The significance of total count and desirability of having limits for it are debatable. While it will be generally agreed that the total count will be a rough indicator of the quality of raw material and the conditions of handling and processing, particularly from sanitation aspect, a much lower total count but comprising pathogenic bacteria will make the food really dangerous while a much higher count may not present a health hazard and may only affect the organoleptic qualities which should be otherwise tested. The limits of total count of 2,00,000 to 2,50,000 as generally specified are, however, reasonable because processed fish prepared from sound raw material by standard techniques under sanitary conditions should not have a higher total bacterial count. Another feature of the bacteriological specifications is the permitted tolerance for the specific types of bacteria like E.

coli, Staphylococci, Salmonella etc. These are disease-causing bacteria and their presence results from direct or indirect contact with human excreta. It will be generally agreed that presence of such types of bacteria in a food material has to be discouraged. As the tolerance of such bacteria in fish has necessarily to be nil or very little, the processing factories have to take special care so that products do not get contaminated with them. This requires careful surveillance on the cleanliness of all the materials and surfaces with which the fish will come in contact throughout the different stages of handling—before, during and after processing. The factors which increase the chances of bacterial contamination like unclean surroundings of the processing factory, faulty lay-out of the factory, defective construction of processing equipment etc. are to be carefully examined and defects eliminated. As in a fish processing factory human handling of the materials is necessary at various stages of production, personal hygiene of the workers is an important factor in determining the spectrum of the bacterial load.

I hope the requirements given above will not give the impression that it is difficult to attain the conditions which will ensure that bacterial load in processed fish is kept within the prescribed limits. What is needed is a clear understanding of the problem and when this is achieved the follow-up actions will not be found difficult. The Central Institute of Fisheries Technology has been engaged in the study of the quality-control problems in the fish processing industry and has studied specially the problems of bacterial contamination. These studies

have revealed that even with existing facilities the bacterial load both in general as well as of the specific species can be kept within the prescribed limits if few precautions are taken. The use of sufficient amount of clean water is the first requirement in fish-processing to check bacterial contamination of the product. That the fish-processing industry in India is quite aware of this requirement is clear from their efforts to arrange for substantial augmentation of the potable water supply to the factories in Cochin area. However, no such effort is evident to improve the water-supply condition at the peeling centres. Surveys carried out by this Institute have shown that very few of the peeling centres have supply of desired quality of water. At some places, the water used can be marked as 'dirty'. The sanitary condition in many of the peeling centres leave much scope for improvement. As it has been observed that more of the contamination with bacteria particularly of the pathogenic type takes place at the peeling centres any care taken here to reduce the chances of bacterial contamination will pay rich dividends. Simple steps like chlorine-treatment of the water used and introduction of an effective programme of cleaning of the processing tables, utensils, floors etc. will greatly eliminate the chances of contamination with pathogenic bacteria and significantly reduce the total bacterial load on the peeled prawns. Central Institute of Fisheries Technology, has, after careful study and experimentation, recommended the amount of free-chlorine which should be maintained in the water used for washing of unpeeled and peeled prawn and also drew up a programme of cleaning the floors of the peeling sheds as well as utensils, tables

surfaces etc. which will come in contact with prawn.

Next, if not equal, in importance in the maintenance of bacteriological quality of processed fish is the use of sufficient amount of ice. Ice by lowering the temperature of fish keeps down the rate of growth of bacteria present with the fish at the time of netting or subsequently introduced from the surroundings. It should be pointed out that ordinary ice does not kill bacteria but only keeps down the rate of multiplication. If the water used in making of ice is contaminated with bacteria, this will also contain these bacteria in dormant state. When such ice is used while melting it will add these bacteria to the fish. In the studies carried out by Central Institute of Fisheries Technology, a number of cases were observed where ice was not made of good potable water. It was also observed that ice was sometimes dragged over dirty floors or stored in dirty places. All these conditions contributed to make ice polluted and such ice when used on fish contribute significantly to bacterial load on it. Proper handling of ice and use of only clean ice are essential requirements if the ice is to serve its purpose of controlling the bacterial load on fish.

The care which has to be taken to reduce the chances of bacterial contamination at the peeling centres or during transport is also to be bestowed much more rigorously at the processing plants where the fish will be processed finally for the consumers. It should be mentioned here that although due to various practical considerations prawn-processing industry in India has often separated peeling and further process-

ing, two being carried out at different locations—for the purpose of better control of quality, peeling should be considered as an integral part of processing and should be carried out in the processing factories itself under proper technical supervision.

In the processing again, utmost care should be taken to ensure bacteriological cleanliness of the water used in the factory. Processing factories generally get the required water from the municipal supply or from deep tube-wells, which will be considered to be satisfactory from bacteriological point of view. But sometimes due care is not taken in storage of the water. Overhead tank if not properly closed will allow contamination with bird-droppings, dirt and host of foreign materials. Even when closed tanks are not cleaned regularly they will in due course gather sufficient sediment with organic substances which will be a source of bacterial contamination.

Where the municipal water supply is limited the industry quite often has to make alternative arrangements. Special care is necessary when such water comes from shallow tube-well or ordinary well. It will be advisable to treat this water with chlorine so that available free-chlorine content is at least 5 ppm. Higher chlorine concentration should be maintained when such water will be used for cleaning the equipment and utensils in the processing factory. As a general rule within the limits set by the processing requirements all the water used in processing factory should be chlorinated.

Proper lay-out and construction of the factory premises from the point of

view of sanitation, and use of equipment of sanitary construction are two important contributors in the maintenance of the necessary bacteriological standards of the processed fish. These aspects are often neglected. It should be realised that the bacteria being invisible to unaided eye, apparently clean premises and equipment may be potential sources of bacterial contamination.

—The maximum permissible number of pathogenic bacteria in processed fish being either very little or nil nothing should be left to chance. One of the factors which does not often get the necessary attention is the personal hygiene of the workers directly handling fish in various stages of processing. It should be noted that pathogenic bacteria particularly enteric bacteria are mainly contributed by the human beings. Unclean habits of personnel or any disease they are suffering from are likely to leave imprints on the processed food such persons handle. It will be unreasonable to expect production of processed fish of high quality particularly from the bacteriological point of view, if it is not ensured that persons handling it in the factory do not contribute to the load of pathogenic bacteria.

To see that all the controls and precautions necessary to meet the requirements of the specified bacteriological standards for processed fish, continuous technical supervision is essential. Bacteria are ubiquitous. To prevent their admission in food is a continuous challenge to the technical personnel of the processing factory. The task cannot be left to the occasional check by a government laboratory or to the

analysis report of the inspectorate for preshipment inspection. The work of the government research laboratory or the government inspection-staff will only supplement the regular quality control checks by technical staff in the factory. For this purpose, the factory must not only have properly qualified and trained technologists but also suitable equipped laboratory and testing facilities. Any amount spent on these will pay rich dividends in the higher quality product and greater consumer-confidence.

In conclusion, it should be stated that it is not difficult to meet the pre-

scribed bacteriological standards for cooked prawn or any other processed fish if the problem is clearly understood and appreciated and few controls are initiated and necessary precautions are taken. These steps are neither inordinately expensive nor too complicated. They are easy and simple. The industry in freezing and canning of fish in India always have had a progressive outlook. It confidently met the challenge on the quality of its products and had dominant position in the world market in canned and frozen prawns. There is no doubt that it will continue to do so in future also.



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