Some Aspects of Fishery Sanitation*

LESLIE A. SANDBOHZER

U. S. Department of the Interior, Fish and Wildlife Service
Technological Laboratory, College Park, Maryland

The purpose of this report is to indicate some of the aspects of sanitation in the fishery industries with the idea of acquainting sanitarians in other food industries with some of the problems involved. Unlike most other foods, seafood is produced at its primary source, in an uncontrollable environment. This is not true of a product such as milk, for example, where control can be practiced all the way from the pasture to the bottle delivered to the consumer's door. Because of this factor which is peculiar to the fisheries, and the added fact that fish, after removal from the sea, cannot be handled and processed like milk or cereals or meat in its usual forms, fishery sanitation has developed slowly and along lines different from those in other food industries. The further fact that the fisheries, for the most part, have grown without careful developmental planning, has made the problems of sanitation more difficult in most instances than would be the case in the dairy industry.

Although the fundamental principles of sanitation are applicable to all food production, the manner in which they can be applied to the fisheries vary somewhat from the usual practices. It is important to bear this in mind because too frequently sanitarians attempt to apply the standards for milk production to fishery problems. This leads to misunderstandings and difficulties which do little or nothing to improve the quality of the product. For this reason it is hoped that this brief discussion will lead to a better understanding of the fishery sanitation problems.

Size of Industry

In terms of food production, how important are the fisheries? Without becoming concerned with the most recent figures, let us look at some pre-war averages. In an average year the total production was about 4,400 million pounds. Of this total, 1,500 million pounds were canned, 340 million pounds were filleted, 150 million pounds were cured, 130 million pounds were frozen whole, 680 million pounds were sold fresh and the remaining 1,600 million pounds were made into meal, oil, and other byproducts. This required the full-time effort of 65,300 fishermen and the part-time aid of 59,500 others. These employment figures at the primary level do not include persons working in processing plants. The capitalized value of the fishery resources of the United States is 5,855,000,000 dollars (See U. S. Department of the Interior, Fish and Wildlife, Service, 1945, Fishery Resources of the United States of America). The average annual production of oysters alone (1938–1940) was 89.8 million pounds which is equivalent to the edible meat obtainable from 160,360 beef cattle. These figures clearly indicate the economic importance of the fisheries. They also show the fisheries to be an important segment of the total food production picture.

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Water Quality

The problems of fishery sanitation arise, in some cases, before the fish are caught. The quality of the waters from which they are taken is of primary importance in the case of shellfish and to a lesser extent this is also true of certain tin fish. This matter of standards of water purity will be shown later to be a more complex matter than is ordinarily supposed. From a bacteriological viewpoint, the waters where shellfish are harvested must meet the standards for drinking water. This is necessary because clams and oysters are frequently eaten raw. The bacteriological quality of the water will also be of importance in the keeping quality of certain fish after catching (sardines) or in the determination of cooking time of crabs or lobsters.

The chemical purity of the water is also important. Industrial wastes may impart off-flavors or odors in certain instances (blue-pike from certain sections of the Great Lakes). Such wastes also contribute to a decrease in fish production, as in the case of the east coast shad. Paper mill wastes have had a detrimental effect on oyster production certain areas. Sports fishing has also been influenced by industrial pollution. Both the bacteriological and chemical quality of the waters influence subsequent aspects of the fisheries. Where live storage of crabs, lobsters, clams, etc. is concerned, water quality is of primary importance. This is also true when natural waters are used in processing. Water quality therefore, is one of the major concerns of the fishery sanitarian.

Handling the Catch

The methods of catching and handling fish are many and varied. Gear varies from the single hook and line to complicated trawls and drags. These varied technics each present problems of sanitation. One might anticipate that a small boat fishing inshore with hooks and lines might produce top quality fish because the catch can be landed almost as soon as caught. This is usually not the case however, since the boats are too small to carry ice or refrigeration in warm weather and their size prevents them from fishing during the winter. Large otter-trawls may bruise or otherwise injure the fish and this increases the susceptibility of the flesh to bacterial invasion. Stowage in the hold or on deck offers further difficulties. Icing must be adequate and must not damage the fish. Bilge water must be kept away from the catch. The period of transport must not be excessive. These are but a few of the problems which arise at the time of catching.

The discharge of the cargo also presents problems. In some instances fish are unloaded by the use of forks very similar to hay-forks. As long as the forking is confined to the head of the fish, a satisfactory product is obtained. But fish which have been stabbed through the viscera may be of poor quality. Failure to protect the catch from flies, vermin, gulls, etc. leads to poor quality, and this is equally true when the fish are exposed to direct sunlight or high temperatures. These and other factors enter the sanitary picture before the fish are ready for processing and each unfavorable condition influences the primary quality of the final product.

Processing Plants

Fish processing plants, generally speaking, are accumulative rather than built with any particular plans in mind. As business expanded, new additions were made to existing facilities, the type of construction depending upon the immediate needs. Hurricanes and tidal waves offer the best solution to most of the sanitation problems of most of the fish-handling facilities. Big establishments such as the city fish
piers in Boston and Gloucester or the modern plants of the larger producers are exceptions to this general rule. The majority of small operators, however, are working under constructional handicaps which will probably remain for some disaster to remedy.

Since such plants are usually located on a waterfront, it is customary to dispose of wastes by dumping them overboard on the assumption that the tides will remove them. This fallacious reasoning leads to accumulations of filth under the docks and in the piling. Overboard toilets are also a menace to good sanitation.

Waterfront buildings, unless of recent construction, are not rodent-proof, and a continual campaign against rats and mice is almost necessary. It is extremely difficult to rat-proof old buildings, and the use of poisons is dangerous in food-producing establishments. So the rodent problem is not one of easy solution. This is also true in regard to insect infestations. Proper use of DDT, however, can effectively eliminate roaches, flies, water bugs, etc. Possibly similar methods can be worked out for rodent control but at present residual treatments are not available.

Where plants are located in areas where public water supplies are not available or where such supplies are too costly, the water used in processing fish may be a problem. The installation of proper toilet and washing facilities needs constant attention. Tidal flushing of septic tanks may make them ineffective, particularly where such tidal action is frequent and regular. Tidal back-washes of ordinary privies also leads to unsanitary conditions. Another sewage problem is the "exclusiveness" of the flush toilet. In certain instances the sole sanitation installation is reserved for the aristocracy of the establishment and the hoi-polloi use a catch-as-catch-where technic, which may be democratic but leaves much to be desired from a sanitation standpoint.

**Need for Sanitation**

Where a seafood commodity is produced entirely by hand is consumed without further cooking, we have a situation which is quite analogous to that of raw milk. This is the case of fresh crabmeat or raw oysters. In addition to the above factors, there is the health of the worker to be considered. State and federal regulations are not rigidly enforced in this regard, dependence being largely upon the bacteriological content of the final product. There is little logic to be found in this method and such a procedure would be strongly frowned upon in the production of certified milk. Most seafood workers are proud possessors of cards indicating that they are free of venereal disease but no one has ever become infected with such disease through seafood despite the undisputed pleasure of fish-eating.

The transportation of seafoods, management of the retail store, and a variety of other aspects of fishery sanitation cannot be discussed here because of the shortage of time. The problems are many and varied. Only by continual research and education can they be solved and even then it will require considerable time. Fishery sanitation rests today where milk sanitation rested in 1910. It is believed that the gap can be bridged in less than 40 years but it will require all the help that can be borrowed from the other food industries to do it.

To this end the Fish and Wildlife Service appreciates this opportunity to make milk sanitarians aware of some of these fishery problems, since it will be through contacts of this type that we can more effectively improve the sanitation of the fisheries.