

breader, the cooking oil manufacturer, and the supplier of packing materials. This is the reason for early review of a proposed standard by all of these people at the operating level.

Government and industry are anxious to further the acceptability and hence the volume of trade in fish and fishery products. For years it was debated as to what was the best way to accomplish this obviously desirable goal. A number of courses of action have been tried, including mass advertising, tie-in sales, group demonstrations, national and local fish weeks, and other recognized merchandising techniques. The per capita consumption figure of approximately 11 pounds of fish and shellfish per year in the United States could well be increased. Perhaps adequate attention has not been given to an additional tool that the industry's competitors in the agriculture field have been using for about thirty years, namely, an impartial evaluation of rank and uniformity of quality in the product offered in the market place.

The Service has stepped into this field of development of voluntary standards at industry request. It is giving this work its best effort in relation to the personnel and facilities available. The maximum effectiveness of these efforts can only be achieved through industry's interest and vigorous support. This way all concerned can reap the maximum return for the dollars and the thought thus far expended in the first year of this undertaking. The second year's progress will be largely a matter of industry's participation.

The Service acknowledges with thanks the capable assistance of those who helped to bring the draft of the fish stick standards to its current stage and in development of background material needed for preliminary stages of the breaded shrimp standard. This program can be extended to other fishery products as industry interest warrants, and it is the Government's sincere hope that every step will be a long one forward.

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## **Sanitary Standards For Crab Plants**

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EACH YEAR the popularity of crab meat as a seafood delicacy increases. With this increase in popularity comes an increase in production. Today the production of fresh crab meat has become a year-round industry in Florida. Unfortunately, crab meat has been implicated in food-borne outbreaks. It has been recognized by health authorities that the regulations used in sanitary control of the industry are out-dated and do not offer the public adequate protection against potentially dangerous foods.

Crab meat is an excellent example of a food stuff over which a constant supervision must be maintained. The meat of the blue crab that is sold as fresh crab meat consists primarily of muscle tissue. The crabs are cooked live and the meat is picked from the bodies and claws. The picked meat constitutes the muscle tissue and is primarily protein. However, once this protein has been heat treated it breaks down sufficiently to make it a good bacterial growth medium. Cooking breaks the glycogen in the muscle tissue down into simple

sugars which enhance the bacterial growth medium already present.

Due to the picking of all crab meat by hand, each particle of crab meat is afforded an excellent opportunity to become infected with a variety of bacteria. This is the problem faced by the officials who are becoming more aware of the hazards as they observe the occasional food-borne disease caused by crab meat.

The first examination of production methods by public health officials revealed deplorable conditions under which crab meat was produced. It appeared that all of the processing was far from sanitary. Cooked crabs were usually cooled in areas unprotected from flies and rodents. Cooking usually consisted of boiling the crabs, or sometimes cooking them with the addition of steam in wooden boxes with cracks stuffed with burlap. Frequently, cooked crabs were dumped on poorly constructed floors to cool. After the bobbing operation, the backed crabs were dumped onto picking tables that were generally made of bare wood with many filth-filled cracks.

The pickers wore the worst worn and most soiled clothing they possessed. The pans into which they picked the meat were usually badly battered, and if made of enamel were frequently chipped. The picking knives had wooden handles which were frequently wrapped with rags. The crevices between the handles and metal blade portions were often filled with filth. Picking rooms were built without regard to sanitation. The interiors of the rooms were filled with dust catching rough surfaces and ledges and were poorly lighted and ventilated. Nearly always the floors were of wood and in the picking rooms, they were generally littered with crab scraps. The picking tables and handwashing, utensil cleaning and washing facilities were all crudely made and almost always found to be inadequate.

No proper arrangement for cleaning and sanitizing of utensils and other equipment was provided. Most of the meat contacted the hands of the pickers and packers. Generally these employees were women with little or no training in sanitation.

In 1946 the Florida State Board of Health issued new specific sanitation standards in the form of regulations for the control of the handling, packing and the marketing of crab meat. These regulations were more rigid and much further reaching than earlier regulations which dealt with food stuffs in general. These regulations resulted in considerable improvement in the construction and operation of the crab meat packing houses.

The regulations covered both the equipment and the operational procedures within the plant. These were comparable with the standard requirements for good food handling practices. The building now had to offer protection against the elements, insects and rodents. The equipment within the building was to be made of metal suitable for the operation and so designed as to be easily cleaned and sanitized.

Some compromises in the regulations were made so that existing oyster houses could be used for the handling of both oysters and crab meats. This was due to the fact that one area of the state had a marketable production of both oysters and crab meat at different seasons. In all cases basic requirements were to be met such as the supply of potable hot and cold water to all parts of the plant, adequate cleaning, toilet and waste disposal facilities.

Over a ten year period, by observing the employees handling the crab meat, questioning the operators about their operational procedures, some new

concepts evolved. It was found advantageous to minimize the manual and mechanical contact with the product. As an example, originally the pickers put the meat on trays, carried these to a weigher for inspection, then they packed the meat into cans and weighed it. This procedure required the handling of the meat by two people and two pieces of equipment. To minimize the number of contact points the pickers were required to pick the meat directly into the cans, then take the cans directly to the weigher, thus eliminating the picking pans. Next the pickers were required to pick the crab meat directly into the cans and weigh the meat themselves. Seemingly this advance in handling methods turned into a long, tedious educational process.

The 1946 rules and regulations have helped much towards general improvement in construction, plant operation and sanitation. All plants in Florida were carefully surveyed, each operator was given copies of the survey reports and of rules and regulations known as the State Sanitary Code, Chapter XV. The improvements in the plants needed to meet the Sanitary Code requirements were pointed out to the operators as the requirements for certification. This certification was the legal manner of obtaining compliance with the regulations since no plant could operate without this certification.

The response to this procedure was gratifying. Not only did the plants take an interest in their own certification, but they showed interest in their competitors' operation. Periodically, lists of the certified plants were published by the State Board of Health and distributed to all areas within the state and to other interested agencies. As each plant complied with the regulations its name was added to the list of certified producers of crab meat in Florida.

Informal bacteriological surveys of samples of crab meat taken from both the picking tables in the plants and from crab meat in shipment have shown a vast improvement in practically all segments of the industry. Using the Most Probable Number of Coliform organisms as the indicator for the quality of the meat, it has been found that 64 per cent of the first samples of the meat taken from the plants showed the presence of coliform organisms. As each succeeding batch of samples was analyzed this percentage dropped and it is hoped that the future samplings will show meat which may not be bacteriologically sterile but will be completely free of enteric organisms or other possible pathogens.

Another change in the handling of crab meat which would provide added safeguards to consumers involves the packaging method. Fresh crab meat is currently marketed in cans which have perforated bottoms so that the meat may drain, and which have snap-on lids. This type of packaging of fresh crab meat offers little protection during the handling and shipping. It is felt by those working with the industry that in future crab meat should be packed in hermetically sealed cans and be heat treated at temperatures lethal to all pathogenic organisms. This procedure is standard with almost all other canned food processors. It is the feeling of other workers that the crab meat industry must also modernize its thinking and provide quality through the use of the most up to date plant facilities, packaging methods and laboratory quality controls.