Practical Aspects of Shrimp Freezing

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Several thousand years ago a Chinese farmer accidently discovered the process of preserving food by cooking, or so says Charles Lamb in his "Dissertation on Roast Pig". The story says that the farmer's house burned, a suckling pig was caught in the fire and roasted; the farmer burned his fingers in trying to retrieve the pig, stuck his fingers in his mouth to relieve the burn, and thereby tasted the flavor of roast pig for the first time. The story further states that there was an epidemic of fires until it was found that pigs could be roasted without burning the house down.

The ancients of Rome depended on the spices of the Far East to preserve their food and to cover up the odor and taste of food already spoiled.

Several millenniums ago a snow and ice slide in Alaska entombed a prehistoric mammoth which stayed in its icy tomb until the early part of the 20th century, when it was uncovered by another slide disclosing it to a hunter's dog, who began to gnaw away on this ancient carcass. The dog's master noticed the strange meal the dog was having and tried eating some of the mammoth meat himself. The meat was found to be unspoiled but strong and dry; it was a poor freezing job but it did preserve the meat.

Mankind has searched for centuries to find better methods of preserving foods and many of the methods used resulted from accidents such as related in the foregoing incidents, whether these incidents be true or whether they be merely fables.

Freezing is only one of the methods of preserving foods, but it has been fairly well demonstrated that freezing retains more of the natural flavor of food than many of the other common methods. The technical reason for this fact is that the cellular structure of the food is less affected by freezing than nearly any other method of preservation.

Many of us members of the freezing industry have learned what we know about shrimp freezing by having experimented with various methods and procedures; some of us have learned through our pocket books that some methods were inadequate, to say the least. It is the personal opinion of the writer that there is little difference between freezing shrimp on plates or by a blast of cold air, providing the temperatures are similar. The larger the container in which the shrimp are frozen, the more affective the blast of air method becomes as compared to the plate method. Furthermore, the smaller the container the faster the shrimp will freeze. However, the smaller the container the more the labor cost involved in the operation. Theoretically, the best method would be to freeze each shrimp individually, and in fact, some of the processors are doing just that. However, we must keep in mind that costs should be kept as low as possible in order to obtain and maintain the largest number of consumers.

From our own experience, and from a consensus of technical data available, we have found that a temperature of 25 to 40 degrees below zero F., is a practical temperature at which to freeze shrimp. This temperature is low enough to freeze the shrimp so rapidly that the cellular breakdown is kept at a minimum. Theoretically, the lower the temperature the better the freezing

job, but again we must take economics into consideration. Our engineers tell us that the cost of lowering temperatures becomes progressively more expensive the lower it becomes. For example, it is considerably more expensive to lower the temperature one degree from minus 15 to minus 16 degrees than it is from plus 15 to plus 14 degrees.

Further experiments on our part have shown that shrimp will freeze at plus 10 degrees F., and if used within a period of three or four months will be found to be in a satisfactory condition. A greater amount of cellular breakdown occurs when the shrimp are frozen at plus 10 degrees than when frozen at lower temperatures, with the result that the shrimp becomes rancid in taste faster than when frozen at the recommended temperature.

Since freezing is only the first protective step in preserving shrimp by this method, we are also greatly concerned about further treatment. The frozen product must be protected from air while in storage, in transit, in the merchants show case, in the kitchen, and in fact all times after freezing, until it is consumed. If improper protection is given at any time during this period the product will reach the consumer in an inferior condition and all in the industry suffer.

The most important step after freezing is to protect the shrimp from air. Cold continually "hunts" for moisture and will remove it from the frozen shrimp unless the product is hermetically sealed. The protective material must be as nearly vapor-and moisture-proof as possible. One of the most popular methods of protecting shrimp is by glazing, which is the application of a thin film of frozen water, either by spraying a mist on the frozen product, or by immersing the product in cold water. A film of ice is formed which prevents the moisture being drawn from the shrimp during storage. If shrimp are stored over a long period it is essential that they be inspected periodically and reglazed before all of original glaze has disappeared. Under normal storage conditions, and with proper application of the glaze, shrimp should remain in a satisfactory condition for a period of eight to ten months.

Another method of protecting the shrimp from dehydration, which is popularly known as freezer burn, is to wrap the container with some filament of a moisture-and vapor-proof nature. Several different filaments now in use are cellophane, pliofilm, polyethylene, parchment, aluminum foil, and waxed paper. Each of these filaments is manufactured in many varieties and each variety has different properties which are not apparent to the eye. For example, there are said to be fifty odd types of cellophane alone, each with different properties, devised for many different uses. It is therefore imperative that the protective filament used be moisture- and vapor-proof, and cold resistant. A filament designed for wrapping fresh produce or vegetables is not suitable for shrimp, one of the desired characteristics of the filament produced for wrapping vegetables, is that it "breathes", allowing gases generated by the produce to escape from the package. The exact opposite is desired for frozen food protection. It is customary to use a filament for over-wrapping consumer packages because of the greater eye-appeal for the housewife. Glazing, on the other hand, is ordinarily used on the institutional package since it is more economical and eye appeal not so important.

The master carton in which the wrapped or glazed shrimp is placed offers further protection if it is properly constructed from suitable material. A corrugated carton is commonly used.

Maintenance of a low temperature is desirable at all times, while the product is in storage or in transit. Free circulation of cold air is imperative for the maintenance of low temperatures. If there should be a hinderance to the free flow of air a temperature differential of 20 to 25 degrees may be observed in a small room or trailer.

Our experiments with various types of shrimp indicate that there is very little difference in the freezing characteristics of shrimp, be they white, pink, red or brown.

Statistics show that an increasingly greater percentage of shrimp each year is being marketed peeled and de-veined, breaded, or cooked. It may well be that we may see the day when practically all of the shrimp will be sold in this manner. Just as few housewives now go to the poultry market for an undressed chicken, so may she sometime demand that she purchase all of her shrimp in prepared condition. Fortunately for the industry as a whole, shrimp in a prepared form lends itself readily to freezing. All of the freezing and protective proceedures which apply to shrimp in the shell apply as readily to prepared shrimp.

The question of freezing, thawing, and refreezing of shrimp is of a somewhat controversial nature. Our experiments have satisfied us that it is entirely practical to thaw, process, and refreeze shrimp, if they are properly handled. It is our opinion that this factor has been extremely important in stabilizing and expanding the shrimp market. The breaders have been a boon to the shrimp industry. The demand for shrimp for breading has become so great that it cannot be met during periods of low production. It is imperative that the breaders have a constant source of supply for them to continue to operate, and it is the frozen stock of shrimp which carried them through periods of slack production. However, thawed shrimp will deteriorate more rapidly than shrimp which have not been frozen, and require more careful handling.

The cold storage industry is constantly seeking new and better methods to serve the shrimp industry. Competition will weed out those who are not alert and who fail to keep up with new developments. Freezing will not resurrect any spoiled shrimp but if this delicacy reaches the freezer in a fresh condition we will seal in its pleasant flavor by proper freezing methods.