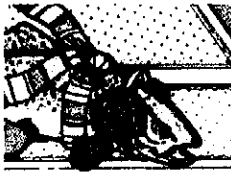


Home Freezing of Fish

FNH-00222



Freezing is the method most people choose for preserving fresh fish and other seafood products. However, this preservation technique is effective only

if the product is handled in such a way that its quality is kept near its peak freshness.

A mistake that many people make when freezing fish and other seafood products is to assume that, once it has been frozen, it will not change. The mere fact that a product has been frozen does not ensure that its quality is protected. Precautions must be taken to guard against flavor and textural changes that can take place during frozen storage of the product. This is especially true for seafood held in a home freezer.

The quality of frozen seafood is directly related to the quality of the starting material. If the seafood you freeze is of poor quality, the seafood you thaw will be of poor quality — perhaps even poorer. Whether the fish comes from commercial sources or sport fishing, care should be taken to ensure that only high-quality fish are considered for use in home freezing.

How Freezing Preserves Quality

When fresh fish is frozen, several processes involved in spoilage are temporarily interrupted. First and foremost, freezing temperatures inhibit the growth of bacteria, which is the main cause of spoilage in fresh fish. By halting the metabolic activity of such microorganisms present in and on the fish, freezing stops this type of spoilage. When a frozen product's temperature rises to the point where bacteria can grow again, however, the bacterial spoilage process starts up again.

Cold temperatures also reduce the activity and reaction rates of enzymes normally present in the gut and tissues of fish.

These include enzymes involved in the digestion and absorption of food in the fish's digestive tract and those involved in tissue maintenance and cell growth. Many of these enzymes continue to function after the fish dies, which can reduce its quality by causing tissue breakdown and changes in its flavor and aroma. Icing down or quickly freezing fresh seafood helps prevent such enzymatic action.

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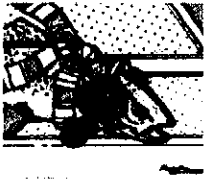
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PRESERVING YOUR CATCH FOR FREEZING



Fish caught on a fishing trip are good for freezing for later use if they are brought home in good condition. Proper preservation begins the moment the fish is hooked and pulled from the water. How you initially handle a fish can greatly affect its quality, taste and storage life.

First of all, the fish should not be allowed to flop around on the ground or in the bottom of a boat, where repeated bumping against raised ribbing and other objects can cause bruising and result in defects in the frozen product.

A fish should be gutted and cleaned as soon as possible. If a cooler of ice is not immediately available, wrap the fish loosely in damp cloth or paper and place it in a shaded area, out of direct sunlight (under a boat seat, for example). Leave space around the wrapped fish for air to circulate and evaporate the moisture from the wrapping material, which will help keep it cool. Keep the wrapping material moist so the wrapped fish stays cool and its skin does not become dry.

Pack your catch in a cooler with plenty of ice before transporting it home. The cooler or ice chest should have a raised false bottom to collect the water from the melting ice. This will keep the fish from floating in and possibly soaking up water in the bottom of the chest. If the trip home is a long one, you should occasionally stop and drain the ice-melt from the chest. Once you are home, the fish should be processed and frozen as soon as possible.

Failure to promptly ice your catch may result in the flesh having a soft, open texture. Severe deterioration is indicated by a condition called "belly burn" in which the ribs have become separated from the flesh. Inadequate bleeding and delayed gutting will cause blood clots to form in the flesh. Such fish are not suitable for freezing.

Cleaning Your Catch

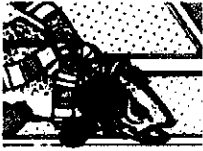
You need a sharp knife and plenty of clean water. Wash the fish to remove all surface dirt and excess slime. Start by opening the fish's body cavity by cutting along the belly from the vent (anus) to gill collar, taking care not to puncture any internal organs.

Next, cut the gills loose from the backbone at the base of the head, and cut them free from the belly next to the pectoral (lower front) fins. Complete removal of the gills will lengthen its frozen storage life. Detach the lower intestine by cutting around the vent or simply trimming it free.

Holding the fish by its gills, pull the internal organs and other viscera from the body cavity. Lastly, cut the kidney membrane along the backbone and remove the blood by scraping it with your thumbnail or a teaspoon.

Further cleaning of the fish will be determined by the form in which it is to be preserved. The fish may be frozen in this form, or you may wish to skin and/or fillet the fish beforehand.

BUYING FRESH SEAFOOD FOR FREEZING



You can also buy fresh seafood products suitable for freezing from commercial sources.

Fresh fish are most abundant and lowest in price during peaks in the commercial harvest, which usually occur shortly after the start of the commercial fishing seasons for the different types of seafood. Watch for sudden drops in prices at the market, or ask your local fish distributor about the harvest seasons for your favorite seafood. Buying and freezing fresh fish for future use at these times can stretch your food budget dollar as well as add versatility to home menu planning.

The secret to success is to purchase only high quality seafood, and then protect and preserve that quality while the product is in frozen storage. A simple set of criteria can be used to evaluate the quality of finfish and other seafood for freezing. The first rule of thumb is don't buy prepackaged products. Next, insist on examining the product using sight, smell and touch.

Sight

Whole Fish: The eyes should be clear and bright. The skin should be smooth and shiny, without cuts or bruises. If the fish has been eviscerated (gutted), examine the belly cavity — especially the region around the backbone — and look for any off-colored areas in the flesh. Fold back the belly flaps and examine the area around

the ribs to make sure that the flesh is firm and that the ribs are firmly imbedded in the flesh.

Processed Fish (Fillets or Steaks):

Look closely at the cut surface of the product. Fillets or steaks should be uniform in color, with no bruises showing in the tissue. Both the skin and cut flesh surface should be moist and shiny and free of blemishes.

Smell

Sniff the product. Each type of seafood — shrimp, clams, oysters and fish — has a characteristic odor that indicates its freshness. In general, it should smell clean and fresh, with no objectionable odors. If its odor has a fermented, ammonia-like or putrid overtone, don't buy it.

Touch

Press the flesh lightly with your finger. The flesh of good quality fresh fish has an elastic texture — it should spring back to its normal shape after you touch it. Cut surfaces should feel smooth, firm and free of soft spots. The slime on the skin portion of the fish should be clear and slippery to the touch, and it should wash off cleanly with water, leaving a clean fish odor. A thick, lumpy slime that is grainy to the touch indicates that substantial bacterial growth has occurred; such products are unsuitable for freezing.

PREPARING FISH FOR FREEZING



Start by thinking in terms of the quantity of fish to be frozen, how the fish will eventually be prepared for eating and how much storage

space you have in the freezer. It is usually best to reduce the volume going into the freezer as much as possible. Unless you plan to eventually bake the fish, to use the head and bones to make soup stock, or to later smoke the fish, you should reduce the fish to the smallest convenient form (fillets, steaks, roasts, etc.).

In most cases, the most convenient form is the fillet. This is especially true for smaller fish, while larger fish can be processed into fillets, steaks or roasts. Processing the fish into its final form before freezing will make the task of packaging easier, and the smaller packages will freeze faster and occupy less space in the freezer.

Wrapping Fish for the Freezer

After a product is in the desired form and ready for freezing, it needs to be properly packaged to protect it against quality loss during frozen storage. Two defects in particular cause most of the problems in frozen seafood products: the development of off flavors due to the oxidation of tissue lipids (fat rancidity), and freezer burn, which is caused by moisture loss and results in desiccation (toughening of the tissue texture). Oxidation is especially a problem in the storage of the high-fat species of fish like salmon, trout and whitefish.

It is imperative that you use the best packaging methods and wrapping material

available to protect the product while it is in the freezer. Vacuum packaging is the recommended method, although plastic wraps, aluminum foil, freezer bags, freezer paper and waxed paper cartons can also be used successfully to package fish and other seafood products.

Vacuum Packaging: The most effective method of protecting seafood against both oxidation and desiccation is to prepare it for freezing with a vacuum packaging device and oxygen-barrier film bags. This procedure normally produces a tight, sealed package without any air in it. Vacuum packing is not in itself a food preservation method but is an excellent way to wrap fish for freezer storage. Vacuum packaging systems designed for home use are currently available for about \$100, not including the cost of bags. While the cost is significant, the system can also be used for packaging other types of food for freezing, such as meats, fruits and vegetables.

Plastic Wraps: Saran film is probably the most frequently used wrapping material and the second-best choice for freezing, especially if the product is double-wrapped. This wrapping method is especially good for packaging large fish, like salmon and lake trout. The plastic wrap, if properly applied, will adhere tightly to the surface of the fish, forming a moisture barrier that reduces the chances of freezer burn. This type of wrap also blocks oxygen transfer and protects the product against oxidation. After wrapping it in plastic, you should wrap the product again with butcher paper or aluminum foil to protect the fragile plastic film.

Freezer Bags: Another popular packaging method is to use heavy-duty plastic freezer bags. The twist-tie and zip-lock types are equally effective. The only difficulty in using plastic bags is eliminating air from the packages. To deal with this problem, put the seafood into the bags, seal and freeze it. After a few days, remove the frozen product from the freezer, open the package and add a small amount of cold tap water. Manipulate the water in the bag until you have eliminated the pockets of air, reseal the package and put it back into the freezer. Use as little water as possible. Do not add water to the bag **before** freezing because seafood will absorb water until it is frozen, which will eventually affect its flavor and texture.

Waxed Paper Milk Cartons: Some people freeze fish in washed waxed paper milk cartons. The fish are placed in half-gallon or quart-size cartons, and water is added until the fish are covered, which in effect removes all air around the product. The carton is then sealed and frozen. While this procedure is an effective means of protecting seafood products, it does have some drawbacks. First, as noted above, the seafood product will absorb water during freezing, which will eventually affect its flavor and texture. Second, because of its bulk, such a package will take some time to freeze, and it takes up more space in the freezer. And finally, when it is thawed, it will be necessary to use all the fish in the carton.

Glazing: Glazing is the process most widely used by commercial processors to protect seafood products against freezer burn during long-term storage. Glazing involves forming a thin coating of ice on the product. After the seafood has been frozen, it is removed from the freezer and

dipped in or sprayed with ice-cold water, which then freezes on the surface of the product, forming a thin layer of ice. Glazing is an effective technique for preventing both dehydration and freezer burn. However, the glaze is fragile and, if bumped or handled roughly, it is likely to chip or crack, which will expose the product to desiccation. Also—like ice cubes left in the freezer too long—the glaze will slowly evaporate during storage in the freezer, so it needs to be renewed every few months. Glazed fish should be tightly wrapped with freezer paper or aluminum foil for added protection of both the glaze and the product.

Labeling

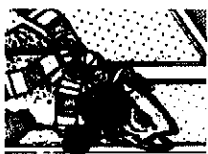
It is also important to label each package before you put it in the freezer. Include the following information:

- The type of fish in the package (salmon or perch, fatty or lean, etc.);
- The quantity of fish in the package (total pounds or number & size); and
- The date it was frozen.

Such labels will help you find the right kind and/or amount of fish or seafood you need when you need it, and the date will help you to rotate your stock and keep your frozen products as fresh as possible.

It is generally a good idea to also prepare a freezer log, listing each item and the date you put it into the freezer. Each item can be scratched from the list as it is removed so that you always have an up-to-date running freezer inventory. Such an inventory and date list helps eliminate the problem of losing track of items that may find their way to the bottom of the freezer and not be discovered until they are long past the time when they should have been used.

FREEZING



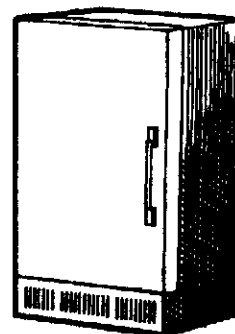
It is best to freeze fish and seafood products rapidly. Turn your freezer down to its lowest (coldest) temperature setting, and don't overload it by trying to freeze too much at one time. If you usually keep the freezer temperature higher than its lowest setting, be sure the seafood is completely frozen before turning the temperature back up to its usual setting.

If seafood is frozen slowly, large ice crystals may develop inside the flesh tissues, which can cause physical damage to the tissue cell structure. Ruptured tissue cells means increased drip-loss during thawing. The moisture loss from thaw-dripping and the associated loss of water-soluble parts of the damaged tissue will, in turn, affect both the texture and flavor of the cooked product.

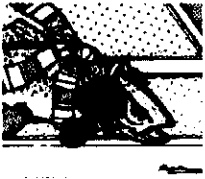
The length of storage time for fish depends on storage temperature, temperature fluctuations in the freezer, method of packaging and packaging materials, moisture and fat content of the fish and the

condition of the fish at the time of freezing. Fish that has remained frozen will be safe to eat for months or longer, but quality inevitably declines with duration.

Colder freezer temperatures slow down deterioration of the fish tissues, but care must be taken that the package is not subjected to temporary warming while the freezer door is open. Temperature fluctuation of frozen fish promotes movement of water, drying of tissue, and the formation of ice crystals. Imperfections in the wrapping allow water vapor to escape which results in the fish becoming tough, dry and discolored. Rancidity may slowly develop in frozen fish, especially in high fat fish such as salmon. Good care of the fresh product followed by proper packaging to exclude oxygen and finally cold stable freezer temperature minimize rancidity quality loss. You can expect your properly packed and frozen fatty fish (salmon, trout) to remain in excellent condition for a least three months and twice that for lean fish. Larger packages and larger fish tend to keep better than smaller packages.



THAWING FROZEN FISH AND SEAFOOD



Proper thawing of frozen seafood is just as important as proper freezing. Improper thawing can greatly reduce the quality of the product. As a rule, seafood should be thawed as quickly as possible, but **never in hot water or at room temperature.**

Cold running water remains the fastest and best means of thawing seafood. If the product is not already in one, put it into a **waterproof** plastic bag, force out all the air you can and seal the bag (it is necessary to expel the air from the bag because air is a good insulator and will extend the thawing time). Place the bag into a pan, kettle or sink and run cold water into the container and over the plastic bag. With thin packages, such as individual fillets, the thawing process should take no longer than 5 to 10 minutes. The thawing process will take longer with thicker packages.

Seafood can also be taken directly from the freezer and cooked. However, if you use this procedure, remember that it will take longer to cook the seafood.

Another acceptable method for rapidly thawing seafood is to use a microwave oven. Be sure to follow the recommendations provided by the manufacturer — different types of microwave ovens put out different amounts of energy over a given period of time.

Slow thawing (overnight) in a refrigerator is an acceptable practice, but excessive drip-loss can occur when this procedure is used. As noted earlier, a large amount of drip-loss can result in a drier and less succulent product.

Thawing seafood products at room temperature should **never** be attempted. Thawing at room temperature is a slow process, and warming the outer product surface can allow bacterial growth and spoilage to occur while the inner flesh is still thawing.

Thawing seafood in hot water is also not recommended. Hot water thawing can both denature tissue proteins and initiate cooking. The end result is a loss of tissue moisture, textural changes and flavor loss.

Refreezing Seafood: A Note of Caution

For best results, keep seafood frozen solid until they are thawed for use. If the seafood thaws before it is needed, it can be refrozen without fear of bacterial spoilage if ice crystals remain in the flesh or if the product has been held constantly under refrigeration. The quality of refrozen seafood will not be as good, but it will be safe to eat. However, if there is any indication that spoilage has begun or if you feel uncomfortable about refreezing the item, discard it.

RELATED ALASKA PUBLICATIONS

The following publications can be obtained from your local Cooperative Extension Service office and are available online at www.uaf.edu/ces.

A Gift For You (FNH-00221A) by Kristy Long, Extension Food Science and Home Economics Specialist, Cooperative Extension Service, University of Alaska Fairbanks.

Storing and Mailing Vacuum Packaged Fish (FNH-00221) by Kristy Long, Extension Food Science and Home Economics Specialist, and Barbara Greene, Retired EFNEP/Nutrition Coordinator, Cooperative Extension Service, University of Alaska Fairbanks.

Canning the Catch (FNH-00128) by Barbara Greene, Retired EFNEP/Nutrition Coordinator, and Sheryl Stanek, Extension Home Economist, Cooperative Extension Service, University of Alaska Fairbanks. An accompanying 30-minute videotape **Canning the Catch** is available for loan.

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