



Home Freezing of Fish

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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 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 seafoods 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.

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.

Once the fish has been restrained and the hook removed, it is best to keep it alive as long as possible. Most modern sport fishing boats are equipped with a live well designed specifically for this purpose. If a fish is too large for the live well or a live well is not available, the next best method is to use a stringer or a fish basket hung over the side of the boat, or put the fish in a container of clean water.

If a fish dies, it should be gutted and cleaned as soon as possible. In the meantime, remove the dead fish from the water so its flesh doesn't absorb water and swell. 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 ice your catch promptly 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 the fish’s 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 seafoods. 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 seafoods 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 embedded 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, use the head and bones to make soup stock or 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 packing easier, and the smaller packages will freeze faster and occupy less space in the freezer.

Before you freeze the fish, pretreat it to help protect it in storage. Fatty fish especially benefit from pretreatment to prevent rancidity and flavor change. Fat fish should be dipped for 20 seconds in an ascorbic acid solution made from 2 tablespoons crystalline ascorbic acid in 1 quart of cold water. Lean fish may be dipped for 20 seconds in a brine of ¼ cup salt to 1 quart of cold water to firm the fish and to decrease drip loss from thawing. (These pretreatments are not needed if a lemon-gelatin glaze is used.)

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 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 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 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. 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. Glazing is an effective technique for preventing both dehydration and freezer burn. However, the glaze is fragile, and it is likely to chip or crack if bumped or handled roughly, 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.

For an ice glaze, place the unwrapped fish in the freezer. As soon as it is frozen, dip it in near-freezing ice water. Return it to the freezer to harden the glaze for a few moments, then repeat the glazing until an even layer of ice is formed.



For a lemon-gelatin glaze, prepare a mix of $\frac{1}{4}$ cup lemon juice and $1\frac{3}{4}$ cups of water. Dissolve one packet of unflavored gelatin in $\frac{1}{2}$ cup of the lemon juice-water mixture. Heat the remaining $1\frac{1}{2}$ cups of liquid to boiling. Stir the dissolved gelatin mixture into the boiling liquid. Cool to room temperature. When cool, dip the cold fish into the lemon-gelatin glaze and drain.

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 and size); and
- The date it was frozen.

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

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 lengths of time fish can be stored safely are shown in the freezer storage chart (below). Note that lean fish can generally be stored longer than fatty fish, and that large fish can be stored slightly longer than small ones.

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, seafoods 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 seafoods. 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

Fish Freezer Storage Chart Held at 0 degrees F or Lower

Type	Size	Whole Fish	Fish Steaks	Fillets
Fatty	Large	2 months	1 $\frac{1}{2}$ months	1 month
	Small	1 $\frac{1}{2}$ months	1 month	1 month
Lean	Large	6 months	4 months	3 $\frac{1}{2}$ months
	Small	4 months	3 months	2 $\frac{1}{2}$ months

It is also generally a good idea to 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 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) setting; minus 10 degrees F is the recommended temperature setting. 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 normal setting.

If seafood is frozen slowly, large ice crystals may develop inside the flesh, which can cause physical damage to the tissue cell structure. Ruptured tissue cells means increased

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.

Seafoods 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. Cook immediately after thawing.

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

Refreezing Seafoods: A Note of Caution

For best results, keep seafoods 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 spoilage has begun, or if you feel uncomfortable about refreezing the item, discard it.

Related Sea Grant Publications

Home Smoking of Fish by David Stuibler, Mary E. Mennes and C. E. Johnson. Wisconsin Sea Grant publication. Madison: University of Wisconsin, updated 2013 by Suzanne Driessen.

Home Canning of Fish by David A. Stuibler and Mary E. Mennes. Wisconsin Sea Grant publication. Madison: University of Wisconsin, updated 2013 by Suzanne Driessen.

Home Pickling of Fish by David Stuibler and Mary E. Mennes. Wisconsin Sea Grant publication. Madison: University of Wisconsin, updated 2013 by Suzanne Driessen.

Source

National Center for Home Food Preservation, hosted by the University of Georgia, College of Family and Consumer Science, "Freezing Fish" section, especially the information on pretreating and lemon-gelatin glazing. nchfp.uga.edu/how/freeze/fish.html

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