

Canning Smoked Fish at Home

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Introduction

Smoked fish is a delicacy in the Pacific Northwest. Whether the fish is caught or purchased, it can be smoked and canned successfully at home. This bulletin provides instructions for lightly smoking fish in preparation for canning and for the canning process itself. Another bulletin, *Smoking Fish at Home—Safely*, PNW 238, provides instructions for fully smoking and heating fish that is safe to eat without further treatment. Those instructions, however, produce a fish that tends to be too dry and strong-flavored after canning.

Fish is highly perishable, and even smoked fish has a short shelf life. Refrigerator storage of fully smoked fish is limited to 2 weeks. For long-term storage, smoked fish must be frozen or canned. Freezing is a quality storage option, but canning is preferred by many people who smoke fish at home.

Canning smoked fish requires a processing time of 110 minutes in a home pressure canner to destroy *Clostridium botulinum* spores and guarantee safety. This lengthy heating time means that the quality of home-canned smoked fish will differ from that of smoked fish that has not been canned. Canning tends to cause moisture loss from the fish, alter its color, and intensify the smoked flavor. However, it's not safe to reduce the processing time to lessen these undesirable quality changes. Instead, you reduce the amount of heat applied during the smoking procedure prior to canning. Otherwise, the canned smoked fish will be too dry and the smoke flavor may be too strong.

Lightly smoked fish must be canned immediately or refrigerated for NO more than 1 day before canning to ensure that it will remain safe and of top quality. Because the light smoking procedure does not fully cook the fish, don't eat it before canning. Some harmful bacteria could survive the shorter smoking process. They'll be destroyed during canning.



Photo by Nellie Oehler

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Preparing fish for smoking

Cleaning and cutting

You will need about $\frac{2}{3}$ pound of smoked fish for each pint canning jar. About $1\frac{1}{2}$ to 3 pounds of whole fish will yield this amount of smoked fish, depending on the yield of meat from the fish after the head, tail, fins, and entrails are removed.

Be sure to use good-quality, firm fish. Smoking and canning won't improve poor-quality fish.

Keep fish refrigerated or on ice prior to smoking and refrigerated after you smoke it but prior to canning.

Different species of fish require different preparation techniques. For salmon, the backbone is removed and the fish split; small bones are not usually removed. Sturgeon, rockfish, cod, sablefish (black cod), herring, and flatfish such as halibut, sole, and flounder should be filleted or cut into steaks of uniform size.

1. Remove blood and scales (bones and skin, if desired). Rinse well with fresh, cool, potable water.
2. Cut fish into pieces that will fit vertically into pint canning jars, about 1 inch shorter than the jar height. Salt will be more uniformly absorbed if pieces are similar in size.

Salting

Brining involves soaking fish in a strong salt solution (brine) before smoking. Brining flavors the fish, gives it a good surface texture, and retards surface spoilage to some extent.

1. For each 2 to 3 pounds of prepared fish, dissolve 1 cup salt in 7 cups cold water.
2. Soak thin pieces of fish ($\frac{1}{2}$ inch at the thickest point) for about 5 to 10 minutes. Soak larger, thicker pieces of fish ($\frac{1}{2}$ - to 1-inch thick) 30 to 45 minutes.

If you want less salt in the finished product, reduce the brining time and smoke no longer than 1 hour. Be sure to can or refrigerate lower-salt fish immediately after smoking to ensure safety. If refrigerated, the smoked fish must be canned within 1 day.

Smoking fish prior to canning

Small, factory-made smokers are suitable for smoking fish that will be canned. Lightly smoked fish doesn't have to reach the internal temperature required for ready-to-eat products (150° to 160° F for at least 30 minutes).

Although heat isn't needed to smoke fish for canning, some heat is helpful if you desire a drier product. The temperature of home smokers will be 140° to 160° F as a result of the combined heat of burning chips and a hot plate. These temperatures are high enough to dry the fish if airflow isn't severely restricted.

- Smoke only the amount of fish that you plan to can the same day.
- Smoke fish for up to 2 hours, depending on the level of smoke flavor you desire.

Judging doneness of smoked fish

Lightly smoked fish isn't cooked and it isn't safe to eat, so don't taste it to see whether it's done. The best way to judge doneness is to measure weight loss. Weight is lost as moisture evaporates from the fish during smoking.

A 10 percent weight loss after smoking will yield a moist, good-quality product after canning. (The moisture loss in most ready-to-eat smoked fish is generally 20 to 30 percent.) Lightly smoked oily fish such as black cod and chinook salmon will seem to be very moist because of their higher fat contents.

You can measure weight loss with a kitchen scale. Calculate percentage loss by comparing the weights of a piece of raw fish before and after smoking as follows:

1. Weigh a piece of fish before smoking (A).
2. Weigh the same piece of fish after smoking (B).
3. Subtract the ending weight (B) from the beginning weight (A) to calculate weight lost (C).
4. Divide the weight lost (C) by the beginning weight (A) to calculate (D), the fraction of weight that was lost.
5. Multiply (D) by 100 to calculate percent weight loss (E).

For example:

$$\begin{array}{r} 8 \text{ ounces beginning weight (A)} \\ - 7 \text{ ounces ending weight (B)} \\ \hline 1 \text{ ounce weight lost (C)} \end{array}$$

$$1 \text{ ounce (C)} \div 8 \text{ ounces (A)} = 0.125 \text{ (D)} \\ 0.125 \text{ (D)} \times 100 = 12.5\% \text{ (E)}$$

This 12.5 percent weight loss would yield a fairly moist piece of smoked fish after canning. A fish with a 20 to 30 percent weight loss would be too dry after canning.

Note: If your smoked fish cannot be canned immediately, refrigerate it for processing no later than the next day. If

you have to wait longer than this before canning the smoked fish, freeze it. Frozen smoked fish must be thawed until no ice crystals are present before canning. Thaw fish in the refrigerator, not on the kitchen counter.

Canning smoked fish

Supplies

Pressure canner, 16- or 22-quart size. Don't use smaller pressure saucepans because safe processing times haven't been determined for them. If you use a dial-gauge canner, be sure the gauge was tested for accuracy within the past year. Follow the processing procedure described in this publication even if your pressure canner's use and care manual gives instructions that differ. It is particularly important to use the amount of cool water specified here and to vent the canner.

Pint canning jars. Don't use quart jars or tin cans. Safe processing recommendations for tin cans or quart jars have not been determined. Although half-pint jars can be safely processed for the same length of time as pints, the quality of the product may be less acceptable, and the jars might float inside the canner.

Two-piece metal canning lids. Follow the manufacturer's instructions for lid preparation.

Procedure

1. If smoked fish has been frozen, thaw it in the refrigerator until no ice crystals remain.
2. Measure 4 quarts (16 cups) of cool tap water and pour it into the pressure canner. (Note: The water level probably will reach the screw bands of pint jars. **Do not decrease the amount of water or heat the water before processing begins.** Doing so could result in underprocessing because the canner will heat up and cool down more quickly.
3. Pack smoked fish vertically into jars, leaving 1 inch headspace between the pieces and the top of the jar. The fish may be packed either loosely or tightly. Do not add liquid.
4. For a good seal, clean jar rims with a clean, damp paper towel before putting on the lids. Moisten the towel with vinegar when you pack fatty fish.
5. Secure the lids with screw bands tightened to the manufacturer's specifications. Put the jars into the canner on a rack. Jars may be double-stacked if another rack is used to separate layers in the canner. Half-pint jars may float initially.
6. Fasten the canner lid securely. Heat the canner on a high range setting until steam escapes from the air vent.

7. Vent the canner by allowing a steady stream of steam to escape for 10 minutes. This prevents cold spots in the canner that cause underprocessing.
8. Place the weight on the vent port or close the petcock and adjust the heat to reach the required pressure. Process pint jars for 110 minutes (1 hour and 50 minutes) at the correct pressure for your elevation as shown in the table below.

Recommended pressures for canning smoked fish

Weighted gauge canner	
Sea level to 1,000 feet	10-pound weight
Above 1,000 feet	15-pound weight
Dial gauge canner	
Sea level to 2,000 feet	11 pounds pressure
2,001 to 4,000 feet	12 pounds pressure
4,001 to 6,000 feet	13 pounds pressure
6,001 to 8,000 feet	14 pounds pressure

9. At the end of the processing time, turn off the heat. (If using an electric range, remove the canner from the heating element.) Let the canner cool slowly. When the pressure returns to zero, remove the weight from the vent port or open the petcock. Wait 10 minutes, then unfasten the lid and remove it with the underside facing away from you so that steam does not burn your face. Remove the jars and place them on a towel, leaving at least a 1-inch space between jars during cooling. Leaving jars in the canner for an extended time could result in spoilage or a stuck lid.
10. After cooling the jars 12 to 24 hours, test the seals. You can test for a correct seal in three ways:
 - Tap the lid with the bottom of a metal spoon. Correctly sealed jars will make a ringing, high-pitched sound.
 - Press on the middle of the lid with a finger or thumb. If the lid springs up when you release your finger, the lid is *unsealed*.
 - Hold the jar at eye level and look across the lid to check for a depression in the center of the lid (that is, the lid curves down slightly in the center). This depression indicates the jar has a vacuum and is sealed.

Unsealed jars can be reprocessed within 24 hours. Use new lids, and process again for 110 minutes at the recommended pressure. Because reprocessing could affect quality, a better option would be to either refrigerate the contents and consume them within 2 weeks or freeze the fish for later use.

Jars of underprocessed fish also may be safely reprocessed within 24 hours after canning. Use new lids and process for 110 minutes at the recommended pressure. If not reprocessed within 24 hours, the canned fish should be discarded even if there are no signs of spoilage.

Storing canned smoked fish

Label and date jars and store them in a clean, cool, dark, dry place. Storing the jars in direct sunlight, in areas that are hot (such as near hot pipes, a range, or a furnace), or in areas where they might freeze (such as in uninsulated garages) could affect quality or cause spoilage.

Examining jars of smoked fish

Before using canned smoked fish, examine jars for signs of spoilage such as discoloration, an unnatural odor, unsealed lids, or liquid that spurts out when the jar is opened. If you have any reason to suspect the canned smoked fish is unsafe, discard it. Unsafe jars may not show signs of spoilage. Don't taste food that shows signs of spoilage or that you suspect may have been improperly processed.

If any of the following situations applies, the fish has been underprocessed and should not be eaten.

- If canned in an oven
- If canned in a boiling water canner
- If canned for too little time in a pressure canner
- If canned at the wrong pressure
- If canned in the wrong size canner
- If canned in jars larger than 1 pint

Disposing of suspect jars

Carefully discard any jar of suspected unsafe food to prevent possible illness to you, your family, or your pets in one of two ways:

- If the suspect jars are still sealed, write on the jar "Poison: Danger. Do Not Eat." Place sealed jars in a heavyweight garbage bag. Close and place the bag in a regular trash container or dispose of it in a nearby landfill.
- If the suspect jars are unsealed, open, or leaking, detoxify them before disposal.

Detoxifying unsealed suspect jars

Detoxification procedures are designed to inactivate the botulinum toxin and must be followed carefully to

be effective and to protect the person handling the suspect food. After detoxification, special procedures are needed to ensure that the work area is free from toxin and that the jars can be reused.

Wear rubber or heavy plastic gloves when handling suspect foods and cleaning up. Remove the jar lids then carefully, without splashing, place the suspect jars on their sides (along with the lids) in a stock pot, pan, or boiling water canner (8 quart volume or larger). Wash your gloved hands well. Carefully add water until the level is 1 inch above the jars. Put a lid on the pot and heat the water to boiling. Boil for 30 minutes to detoxify the food. Cool and discard the food and lids. Wash the jars and pot.

Spray or wet contaminated surfaces (such as counters and cutting boards) with a household chlorine bleach solution (1 part unscented 5% to 6% sodium hypochlorite bleach to 5 parts clean, room temperature water) and let it stand for 30 minutes. Wipe the treated surfaces with paper towels and put the towels in a plastic bag before discarding them in the trash. Rinse surfaces well with wet paper towels to remove any remaining bleach.

Soak metal utensils in a mild chlorine solution (1 teaspoon bleach to 1 quart room temperature water) for 30 minutes. Rinse with water.

Taking extra safety precautions

An invisible toxin formed by the bacterium *Clostridium botulinum* can form in canned food during storage if canning instructions haven't been followed exactly. If you're confident you've followed the instructions exactly but want to take an additional safety precaution, you can heat the food before eating for an extra margin of safety. Two heating methods destroy the *Clostridium botulinum* toxin, boiling and heating in the oven.

Boiling

Open the jar of fish and examine the contents for spoilage as described above. (If spoilage is evident, detoxify as described above.)

Boil home-canned food for 10 minutes on the range so that every part of the food reaches the boiling temperature. If your location is above 1,000 feet of elevation, add an additional minute of boiling for each additional 1,000 feet of elevation to compensate for lower boiling temperatures at higher altitudes.

Heating in the oven

The quality of fish heated in the oven may be better for most uses because oven-heating fish results in fewer texture changes than boiling.

1. Open the jar of fish and examine the contents for spoilage as described above. (If spoilage is evident, detoxify as described on page 4.)
2. Insert a meat thermometer upright into the center of the contents in the jar. The tip should be at the approximate center of the fish.
3. Cover the jar loosely with foil and place it in an oven preheated to 350°F.
4. Remove the jar from the oven when the thermometer registers 185°F. It will take about 30 to 35 minutes to reach this temperature.
5. Let the foil-covered jar stand at room temperature for 30 minutes. This will let the temperature become uniform throughout the jar.
6. Serve the fish hot or refrigerate it immediately and use it within 3 to 4 days. (Do not place the canning lid back on the jar.)

If you prepare canned fish in a casserole, bake it at 350°F and check the temperature at the end of the cooking time as described above for jars.

Microwave heating of canned fish is not an acceptable substitute for the margin-of-safety heating processes described above. Home microwave heating is too uneven.

It is important to note that margin-of-safety reheating is not intended as a recommendation for consuming foods that are incorrectly processed. It is dangerous to handle canned foods that may contain the botulinum toxin. Discard them as directed above.

Further readings

The following publications are available at most county Extension offices in Idaho, Oregon, and Washington. Check your telephone directory for the office nearest you (usually listed in the “Government” pages, in the “County” section).

Smoking Fish at Home—Safely, PNW 238.

Canning Seafood, PNW 194.

Fish Pickling for Home Use, PNW 183.

Home Freezing of Seafood, PNW 586.

They also can be viewed at any of these websites:

www.cals.uidaho.edu/edcomm/catalog.asp

extension.oregonstate.edu/catalog/

pubs.wsu.edu

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