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FISHERY FACTS-5

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service



sportsman's guide to handling, smoking, and preserving coho salmon

SHEARON DUDLEY, J. T. GRAIKOSKI, H. L. SEAGRAN, and PAUL M. EARL

SEATTLE, WA

June 1973

NMFS Extension Publication

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FISHERY FACTS-5

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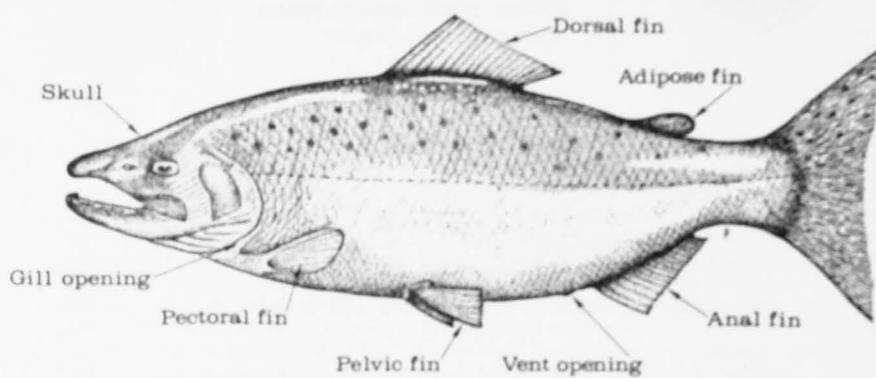
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External characteristics of the coho salmon.

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NOTE

This publication is a slightly revised version of "Sportsman's Guide to Handling, Smoking, and Preserving Great Lakes Coho Salmon," by the same authors, published as U.S. Department of the Interior, U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries Circular 346, September 1970. The original edition is out of print.

SPORTSMAN'S GUIDE TO HANDLING, SMOKING, AND PRESERVING COHO SALMON

**SHEARON DUDLEY, J. T. GRAIKOSKI,
H. L. SEAGRAN, and PAUL M. EARL**

INTRODUCTION

In 1966, the Michigan Department of Natural Resources introduced the coho salmon (*Oncorhynchus kisutch*) to Lake Michigan (Tody, 1968). The success of the Michigan program encouraged other states bordering the Great Lakes to also introduce this species. Most recently the states of Massachusetts and New Hampshire have planted coho salmon in streams tributary to the Atlantic Ocean. Angler success in the fall of 1972 showed that a reasonable number of these fish returned to their parent rivers as adults. More widespread plants are being considered by these and other New England states.

The coho (also called the silver or Pacific) salmon grows rapidly and averages six to ten pounds at maturity, which it reaches about 1½ years after entering "open water" as a smolt.

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The coho is considered a prize fish because of its sporting and eating characteristics. Proper care of the fish after it is caught will insure the sportsman of a top quality food fish.

Since the coho is an introduced species and not a native to the Great Lakes and New England, guidelines are needed for handling, preserving, and effectively utilizing this fish. This brochure provides such guidelines for the sportsman so that he can have a high-quality product. We emphasize particularly the smoking process as one possible method of using the coho salmon effectively. We also include methods of preparing the fish for normal table use and for frozen storage for later use.

We first briefly consider some general guidelines and then with these guidelines as a basis, consider some specific guidelines for handling coho.

GENERAL GUIDELINES

To preserve the high quality and value of coho after capture, you need to recognize that your initial handling practices will have a significant and lasting effect. After coho die, spoilage bacteria multiply rapidly and cause a breakdown and deterioration of the flesh. Low temperature slows this process. Therefore, keep the temperature of your coho as low as you reasonably can—that is, near 32° F., the temperature of melting ice—at all stages in their preparation for the table.

The proper care of coho must start the moment you capture them. The unbroken flesh of the fresh coho is essentially sterile, so any change of quality that subsequently takes place is due to improper handling practices. As soon as you take coho from the water, place them in containers and pack flaked or crushed ice firmly around them (fig. 1). If ice is not available, you can use a substitute such as Gel-ice¹ for a short period. Such products are temporary substitutes for ice and are available at variety stores.

If you keep your coho in a refrigerator that does not go down to 32° F., you still can attain this temperature by packing your coho in ice.

Before turning to the specific guidelines, let us reemphasize the extreme importance of keeping your coho cold—that is, near

¹ Trade names referred to in this publication do not imply endorsement of commercial products.

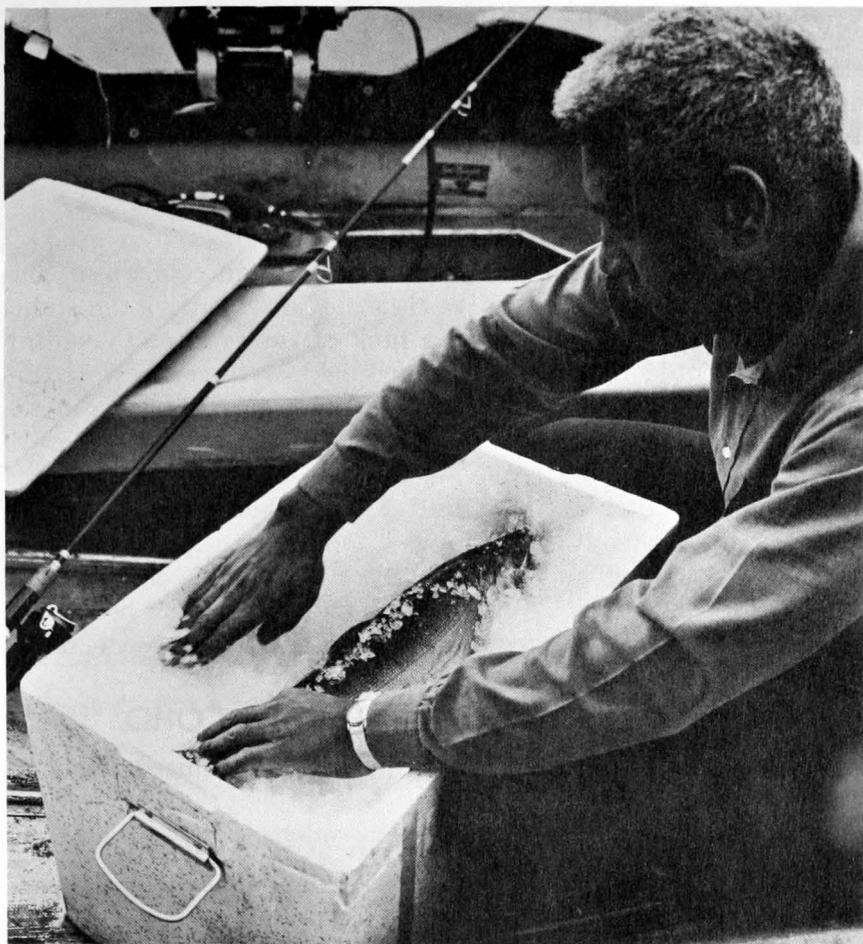


Figure 1.—Pack ice firmly around the coho.

32° F.—and of consuming them promptly. In general, the lower the temperature without freezing up to the time you cook them and the more promptly you eat them after capture, the better they taste.

SPECIFIC GUIDELINES

In this section, we consider washing the coho and removing the slime, removing the parts that will be discarded (such as the guts), and preparing various coho products.

WASHING AND REMOVING SLIME

Wash the coho thoroughly before gutting them. Do the washing while they are still in the round to remove as much debris and surface-growing bacteria from the skin as possible. This step helps to limit the invasion of bacteria into the exposed flesh once you cut into the fish.

Coho have a heavy layer of slime that is not easily rinsed off by water alone. Washing the individual coho in cold water containing a small amount of active chlorine helps remove the slime. You can incorporate chlorine in a tank of rinse water by adding a common liquid hypochlorite compound.² After you wash the coho in the chlorine solution, rinse them several times in clean, chilled water.

Another method for removing heavy slime is to dip the coho quickly in hot water at about 180° F. The hot water coagulates the slime and makes it easier for you to remove. After you have dipped the coho, rinse away the slime with cold, clean water; quickly chill the coho in a slurry of ice and water; and hold them in the ice water until you are ready to butcher and eviscerate them.

REMOVING UNUSED PARTS OF COHO

Following are the steps in removing the unused parts of coho:

1. Insert the point of a sharp knife at the vent opening and slit along the belly wall, extending the cut through the base of the lower jaw. Take care not to puncture the entrails (fig. 2).
2. Cut away and discard the vent opening (fig. 3).
3. With the point of your knife, slit the membrane along the backbone and scrape out the dark kidney material (fig. 4).
4. Remove the gills by cutting them loose at the base of the skull and between the lower jaw and the pectoral fins (fig. 5).
5. Use clean water containing chlorine² to remove all blood and slime (fig. 6).

² Use common hypochlorite household bleach—1 tablespoon of the liquid bleach in 4 gallons of water. Caution: Do not use bleaches other than hypochlorite types. If in doubt, read the label concerning recommended uses.

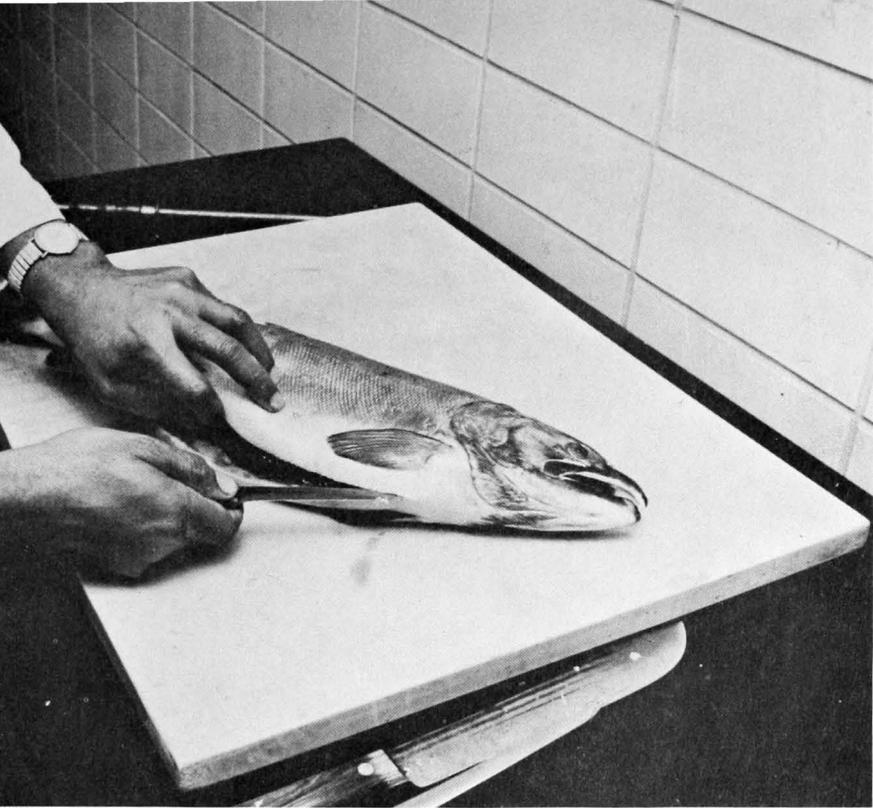


Figure 2.—Slit along the belly wall to open the coho.

Figure 3.—Cut away the vent opening.



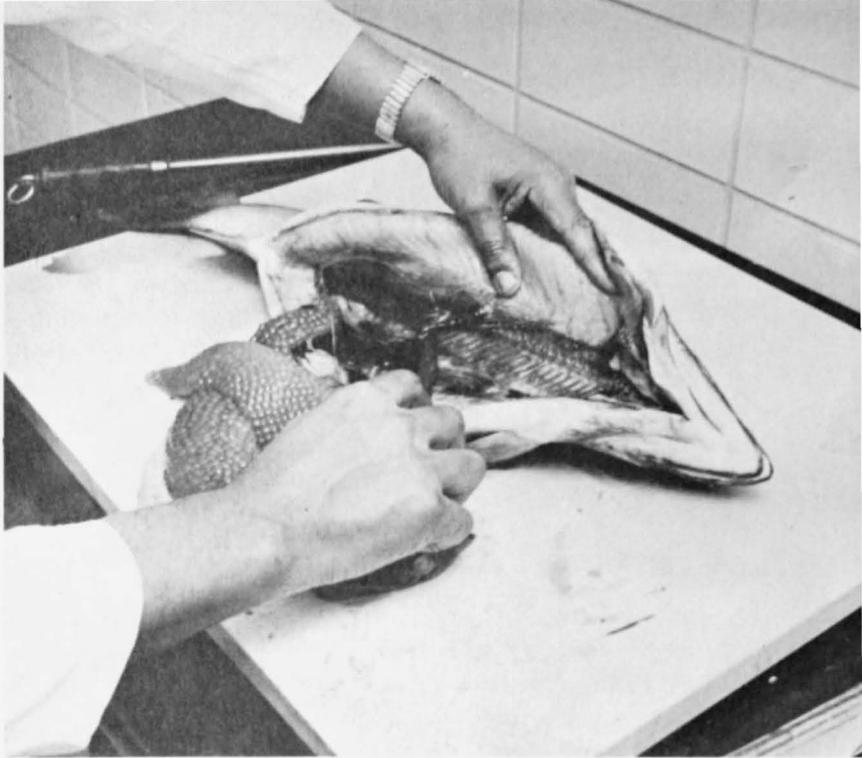
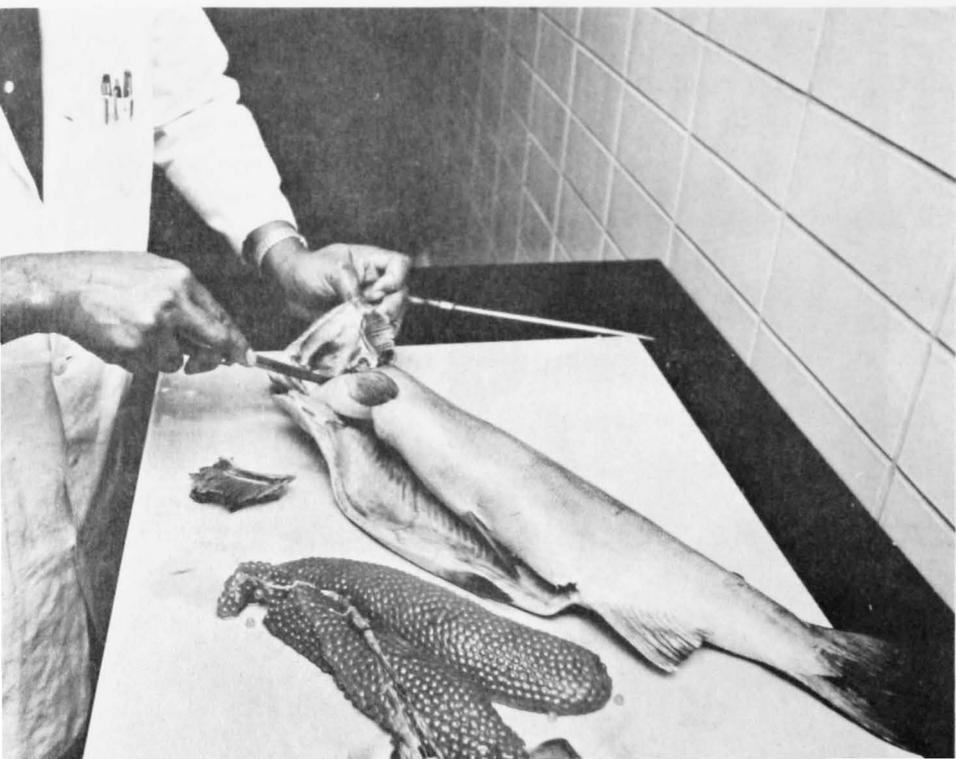


Figure 4.—Slit the membrane covering the backbone and scrape out the k

Figure 5.—Remove the gills.



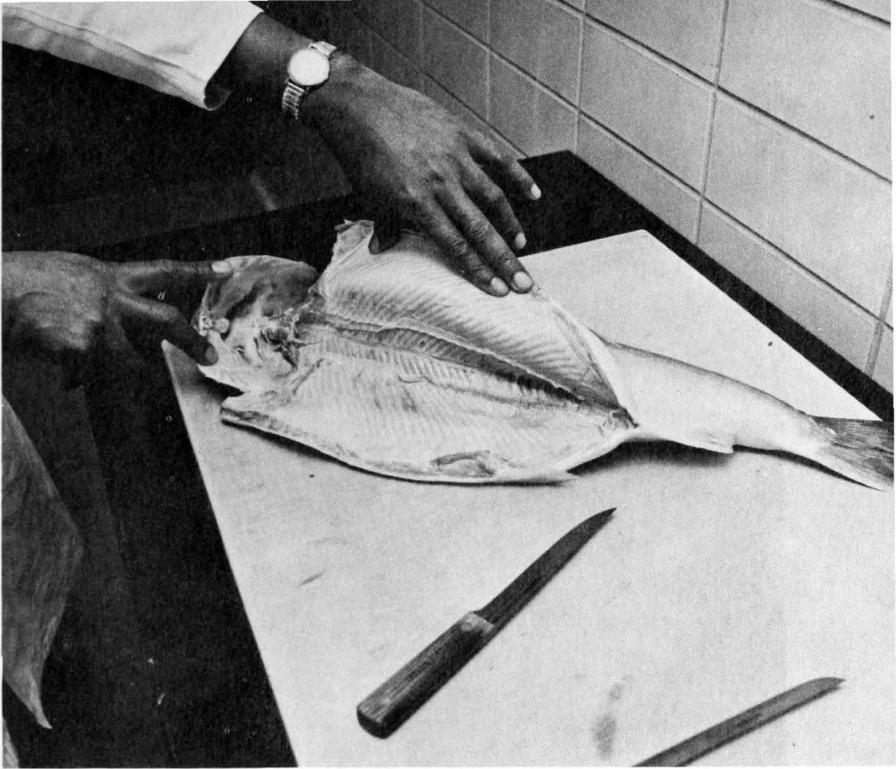


Figure 6.—Fish after evisceration and chlorine wash.

6. If you do not plan to freeze or use the coho immediately, pack crushed or flaked ice in the cavity as well as around the outside (fig. 7).
7. If you desire, trim excess fatty tissue from the back, sides, and belly wall. By so doing, you produce a better product if undesirable flavors or environmental contaminants have accumulated in the deposits of fat. The fish may also be skinned for the same purpose. These procedures are described under "Filleting and Skinning."

PREPARING COHO PRODUCTS FOR USE

The products considered here are fresh, smoked, or frozen.

Fresh Coho

In this section, we consider methods for preparing steaks and fillets and ways of cooking and serving them.



Figure 7.—Fill the belly cavity with ice, and pack it firmly around the coho as well.

Preparing steaks and fillets.

Steaking.—Large fish, such as coho, are usually steaked. Steaks are excellent for broiling, frying, smoking, or canning.³ The following steps are suggested for steaking coho:

1. Cut off the head of the eviscerated coho by making a straight, even cut just below the gill opening (fig. 8).

³ Suggested canning procedures may be found in Fish and Wildlife Service Conservation Bulletin 28 (Jarvis and Puncchar, 1957).

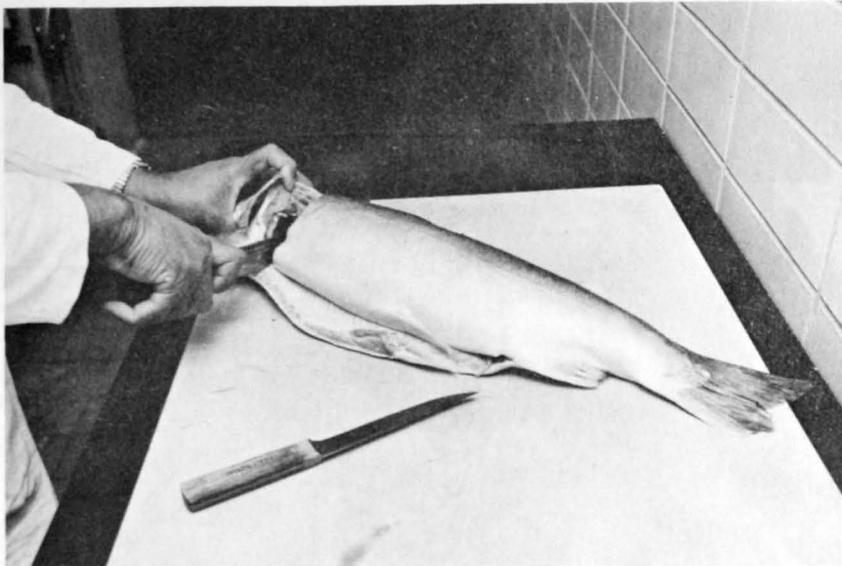


Figure 8.—Remove the head with an even cut.

2. Trim away all fins, making smooth cuts. Trim the belly flap of excess fatty tissue and uneven edges.
3. Cut the coho into uniform steaks about $1\frac{1}{2}$ inches thick (fig. 9). For pan frying, the steaks may be about $\frac{3}{4}$ inch thick.

Filleting and skinning.—Fillets make ideal portions for broiling, frying, baking, or smoking. To do a good filleting job, it is particularly important to use a large, very sharp knife. Proceed as follows:

1. Cut off the head of the eviscerated coho as described under "Steaking" (fig. 8).
2. Cut along the skeleton down the back of the coho from the head to the tail (fig. 10A). Hold the sharp cutting edge of the knife firmly against the backbone as the knife passes along, leaving the dorsal fin and a very narrow strip of skin adhering to the bone. The flesh will be cut free as the knife follows the contour of the bone structure (fig. 10B).



Figure 9.—Cut steaks 1½ inches thick.

3. Remove the bone from the opposite side in one continuous motion with the knife along the side of the backbone (fig. 10C).
4. Carefully cut any remaining rib bones away from both fillets (fig. 10D) and finally trim off all uneven edges (fig. 10E).
5. If you desire, you may remove the skin from the fillet. To do this, place the fillet (skin side down) on a level cutting surface. Enter the edge of the knife between the skin and flesh at the tail end, and slide the knife toward the head end. The knife should be held firmly, and the cutting edge should be tilted slightly away from the flesh and toward the skin (fig. 10F).

As was previously mentioned, you may want to trim excess fatty tissue from the fish. After removing the

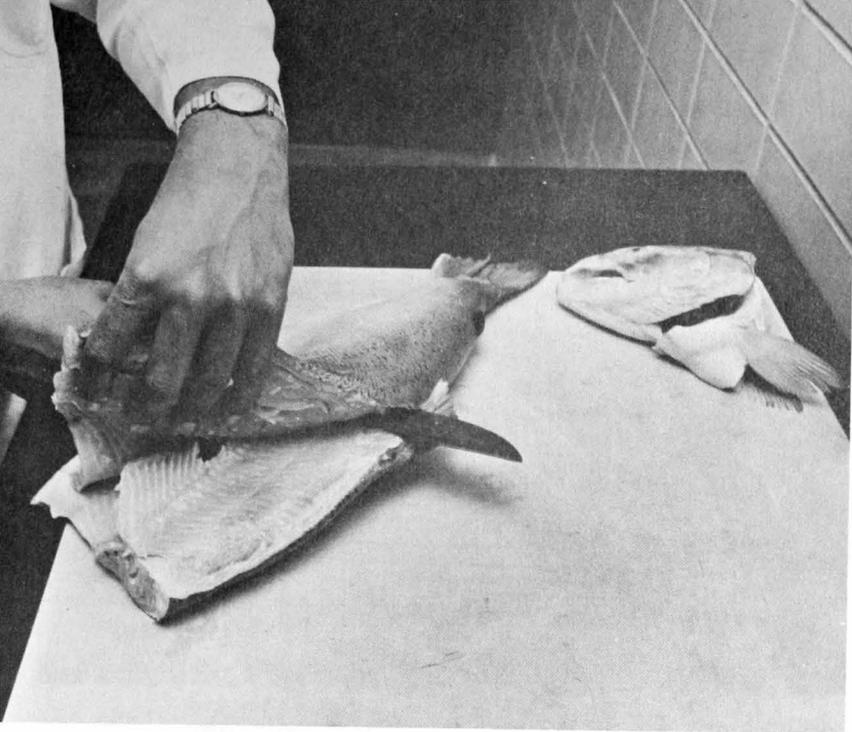


Figure 10A.—Filleting a coho.

Figure 10B.—Follow the bone structure.

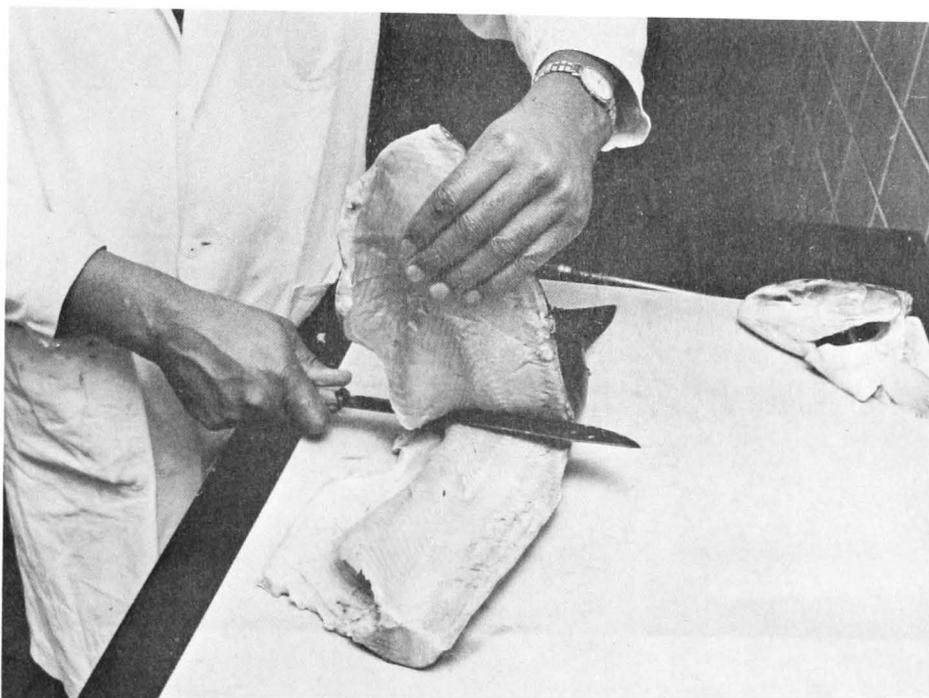
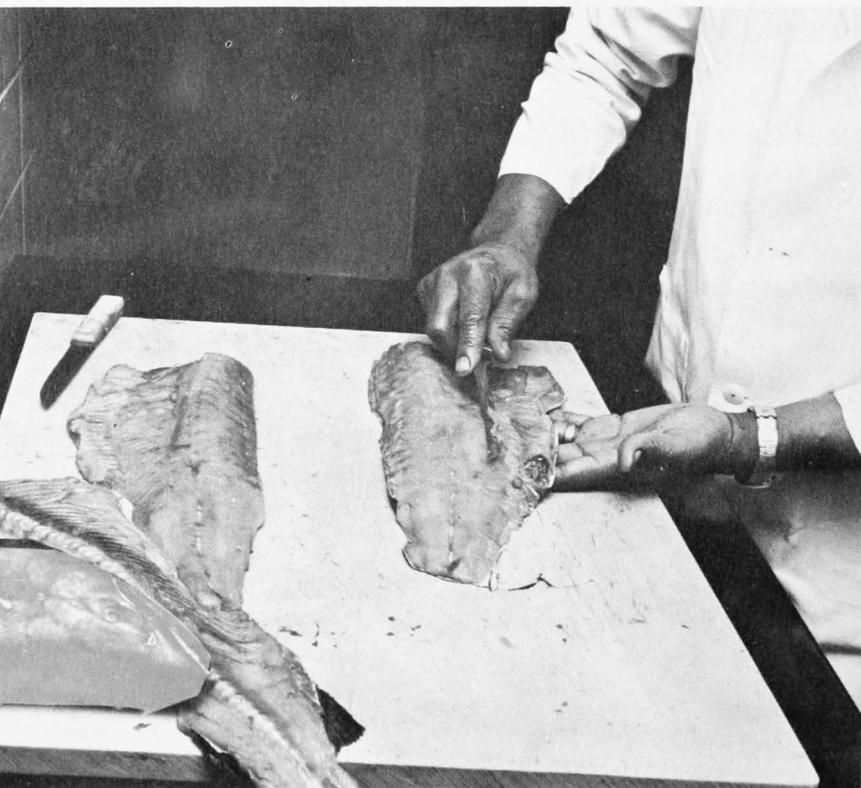




Figure 10C.—Remove the bone from the opposite side.

Figure 10D.—Cut any remaining rib bones away from the fillets.



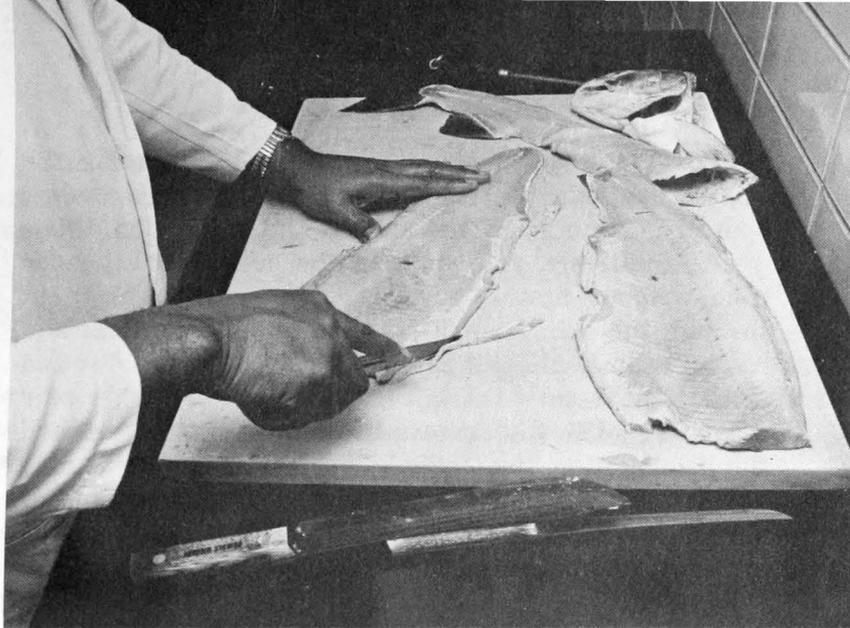


Figure 10E.—Trim the edges.

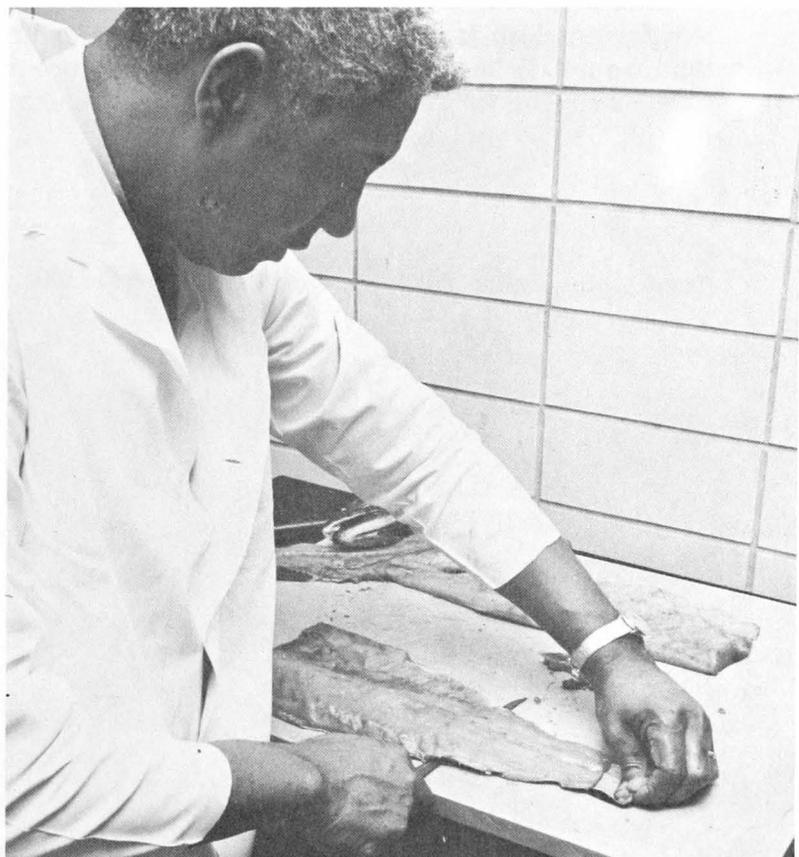


Figure 10F.—
Skinning the
fillet.

skin from the fillet, the dark, fatty tissue along the lateral line can be removed by cutting out a wedge-shaped portion from the side of the coho (fig. 10G).

Alternatively, you can skin the eviscerated, headed coho without first filleting it. To do this, first cut through the skin from head to tail down the back and up the belly to the gut cavity. Cut around the fins and tail. Next, secure the tail end of the skin with a pair of pliers and slowly remove the skin by pulling toward the head section (fig. 10H). You will notice that much of the dark fatty tissue is removed by this method of skinning. Be particularly careful if the flesh is soft, however, as it may tear and adhere to the skin. A coho skinned in this manner can be further prepared by steaking or filleting as previously described. If the coho is to be frozen or smoked, however, it is preferable to leave the skin intact.

Cooking and serving.—You can cook freshly caught coho by pan frying, deep-fat frying, baking, steaming, or broiling. Coho that are not to be used immediately after capture may be stored temporarily under refrigeration at the temperature of melting ice (32° F.) for 3 to 4 days.

Figure 10G.—Cutting the fatty, dark tissue from the fillet.



The appendix supplies recipes for cooking coho. Other recipes are available through the U.S. Government Printing Office, Washington, D.C.⁴

Smoked Coho

The method of smoking described in the following section has proved satisfactory for Great Lakes coho. This procedure may be followed for the preparation of a table-ready, smoked product intended solely for immediate personal use.⁵

The various steps in smoking and the subjects considered here are: (a) brining, (b) coloring, (c) drying (removing excess moisture), (d) smoking, and (e) serving or storing.

⁴ "How to Cook Salmon" is available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price per copy is 20¢.

⁵ Coho smoked for commercial distribution must be processed in accordance with applicable State and Federal regulations (Bratzler and Robinson, 1967).

Figure 10H.—Skinning the coho without filleting.



Brining.—Start with either fresh or frozen coho.

If you start with fresh coho, properly clean, butcher, and trim them as was described earlier. Weigh the fish to determine the amount of brine (salt) to use, and place them in a container for brining.

If you start with frozen coho, thaw them in your refrigerator before brining them. Alternatively, you can hasten the rate of thawing by placing the coho in running, cool tap water. Do not thaw the coho with warm water, because this method will cause the flesh to become mushy and to lose its natural juices.

Clean and sanitize the equipment used in the preparation of the brine by scrubbing it in hot soapy water and rinsing it with chlorinated water. Although salt is an excellent preservative, you must use good sanitary practices (Dougherty and Seagran, 1967) while preparing and using the brine, to keep it fully effective.

Because brining steaks and fillets differs somewhat from the brining of whole coho, we shall consider each kind of brining separately.

Brining steaks and fillets.—Portions such as fillets and steaks brined in a 30° salometer salt solution for 16 hours have an acceptable flavor. To prepare such a solution (fig. 11), use the following procedure:⁶

1. Add salt to clean, potable water in the ratio of 1 cup of salt to 1 gallon of water, and mix the salt until all of the salt is dissolved. If a salometer is available, use it to check the strength of the brine. The salometer should read about 30°. If the strength is greater than you desire, add water; if it is less, add salt. If a salometer is not available, a large, fresh egg may be used to indicate the concentration of salt in the brine solution. In a 30° brine solution, the fresh egg should float with about one-half inch of its surface above the brine.
2. Place the coho in the cool brine solution in the ratio of 1 pound of coho to 2 pounds of brine, and allow the coho and brine to stand in a cool place for 16 hours.

⁶ Further information on brining may be obtained from Research Report 24, July 1966, College of Agriculture, University of Wisconsin, Madison, Wisconsin 53706 (Weckel and Wosje, 1966).

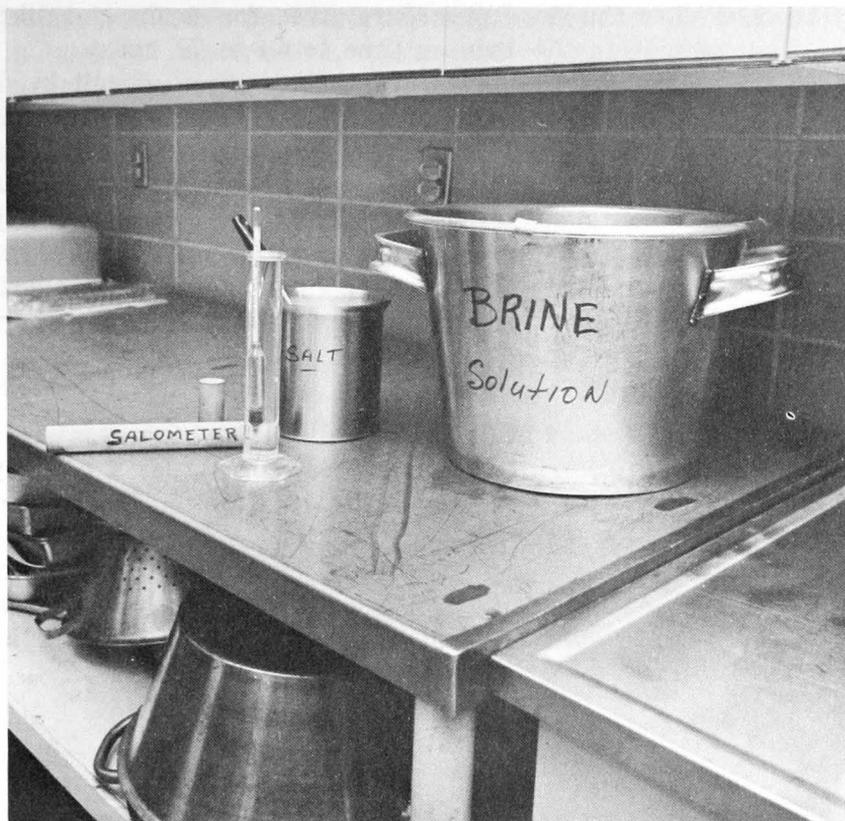


Figure 11.—Brining equipment.

Gently agitate the brine occasionally to distribute the salt evenly throughout the flesh of the coho.

3. Remove the coho from the brine and rinse them in cool, clean water. Allow them to drain a few minutes before placing them in a smokehouse.⁷

Brining whole coho.—For best results, brine whole, eviscerated coho in a 25° salometer brine solution for 48 to 72 hours. To prepare such a solution, use the following procedure:

1. Add five-sixths of a cup of salt to 1 gallon of water and mix well.

⁷ Information on the construction of a smokehouse for home use may be obtained from "Smokehouses and the Smoke Curing of Fish," by Iola I. Berg, Washington State Department of Fisheries, Olympia, Washington 98501. Price is 50¢.

2. Follow the same procedure given for steaks and fillets, increasing the brining time to 48 to 72 hours.

You can measure the concentration of salt in the flesh of the coho in several ways. The more accurate of these ways, however, requires laboratory facilities. One satisfactory test you can make in the home uses a simple indicator device (Greig and Seagran, 1965).⁸ This indicator is self-acting and is used for quality-control purposes in the preparation of other food products. Each kit contains simple instructions on how to perform the test.

Coloring.—If you wish, you can use food coloring to intensify the natural pink color of the coho. Be sure to use a food dye approved by the Food and Drug Administration. The coloring does not penetrate deeply into the flesh. Rather, it accentuates the color of the outer surface, producing a richer appearance. Various red, yellow, and orange dyes, when properly mixed, can produce “salmon” colors that are pleasing. The following are suggested guidelines for preparing the coloring solution:

1. At the start, use about 1 tablespoon of dye⁹ to 4 gallons of water. Alter this ratio to suit your individual preference as to the amount of color you like.
2. Dissolve the dye in a small quantity of water; strain the solution through cheesecloth before adding it to the total volume of solution being prepared.
3. After the coho have been brined, dip them in the coloring solution and allow them to drain on racks a few minutes before placing them in a smokehouse. The coho absorb the coloring rapidly, so dip them quickly.

Drying (removal of excess moisture).—Before the coho are smoked, dry them briefly on racks. This drying step removes moisture from the surface and forms a pellicle or “skin” on it. The pellicle is important because it helps seal in the natural juices and flavors of the flesh and forms a smooth, attractive surface upon which the smoke will deposit evenly. If the coho are smoked

⁸ Quantab type #1176, Ames Company, Elkhart, Indiana.

⁹ Such as Reddish Orange Shade #D, Stang Company, Chicago, Illinois.

before a suitable pellicle is formed, the flesh will erupt, resulting in pools of unattractive, white curd (Fig. 12). A well-formed pellicle gives a glossy sheen to the coho, and it is dry and smooth to the touch. Accordingly, examine the "skin" by feeling it to determine the adequacy of the pellicle before attempting to smoke the coho.

The drying time will vary, depending on the method you use. Place racks of coho in an area where a steady current of clean, cool air flows over the surface of the coho. An ideal system is a "cooler" with a built-in blower system circulating refrigerated air. You can effectively use a common fan, however, or a series of fans in hastening the formation of the desired pellicle (fig. 13). If you dry the coho inside the smokehouse, you do not need to transfer them to other racks.

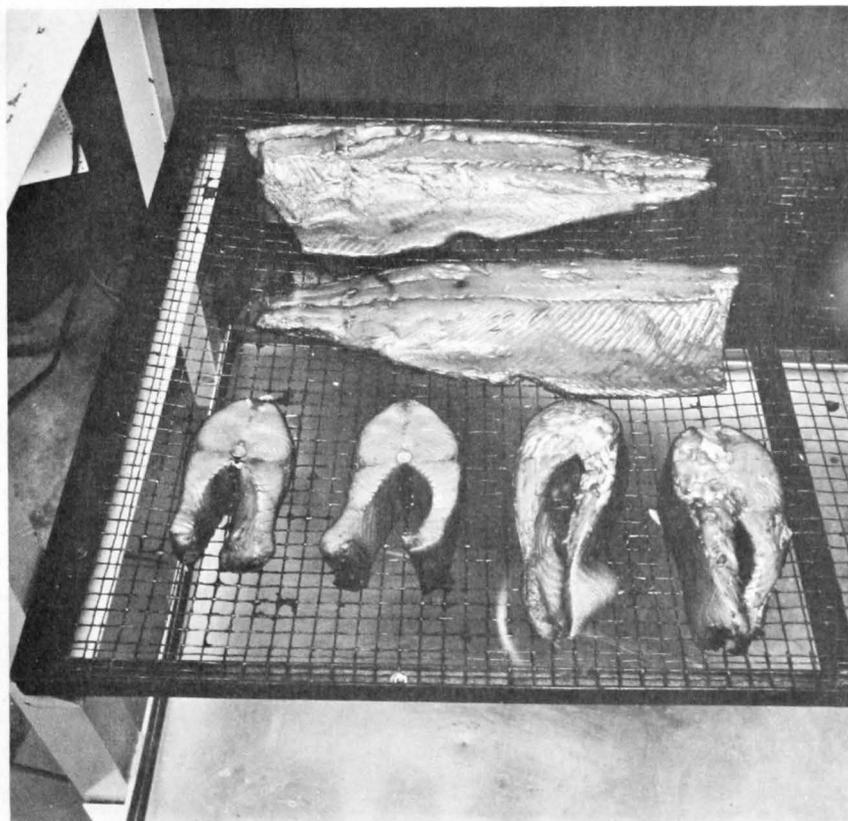


Figure 12.—Note the two distorted steaks on the right as compared with those on the left. This distortion is due to a lack of an adequate pellicle.



Figure 13.—Predrying by use of a fan.

Smoking.—The racks used in smoking should be well greased with cooking oil or should be pretreated with a release agent such as Teflon to prevent the coho from sticking to them. (To spray the racks with Teflon, follow the directions printed on the can.)

The method of smoking differs somewhat depending upon whether you are smoking pieces, such as steaks or fillets, or whole fish.

Smoking pieces.—Described here are (a) the steps in arranging the fish in the smokehouse, (b) the drying and cooking cycle in the smokehouse, and (c) the cooling of the pieces after they are smoked.

Handling the pieces in the smokehouse.—Handle the pieces of coho as follows:

1. Arrange the pieces on racks in the smokehouse in such a way that they will not drip onto each other.
2. To obtain consistent results, probe the coho with a thermometer and check their internal temperature during heat processing (fig. 14).

The thermometer should be inserted into the thickest part of the flesh and fixed in position in such a way that the seat-sensitive portion of the thermometer is completely imbedded in the flesh. Use a thermometer especially designed for cooking (a dial type is suitable).



Figure 14.—Checking fish portions for internal temperature.

Drying and cooking in the smokehouse.—First, adjust the heat input in the smokehouse so that the internal temperature of the pieces of coho will not exceed 85° F. Hold this temperature for 1½ hours. At the same time, introduce smoke from smoldering hardwood sawdust. Do not use sawdust from a resinous softwood, such as a pine, because it may give an undesirable flavor to the pieces. After you have smoked the pieces for 2 hours at this temperature, they should be a glossy brown. Gradually raise the internal temperature of the pieces to the desired level, depending upon (1) your taste preference, (2) the type of end-product you want, and (3) the subsequent method of processing or storage (for example, canning or freezing) you plan to use. You may discontinue the smoke during this final heating period, because the heat will bring out the coloring from the smoke already deposited on the pieces. You can complete the entire procedure for hot-smoking the pieces within 3½ to 4 hours after you have finished the initial curing cycle.¹⁰

Cooling the pieces after smoking.—After completing the smoking process, allow the pieces of coho to cool for a short time while they are in the smokehouse. Then promptly chill them in a refrigerator. You can temporarily store the finished product in the refrigerator at 32° to 38° F. (preferable 32°); but for longer storage, freeze them to prevent the growth of mold and other microorganisms that would make the product unfit to eat. Remember that smoking does not preserve fish, so keep the smoked coho cold in the same way that you would unsmoked coho.

Smoking whole coho.—After you have properly dried the coho, place them on a well-greased rack with one side up. Prop open the belly cavity with wooden pegs to allow heat and smoke to penetrate the coho evenly. Insert a thermometer in the loin (the thickest portion of the fish) to check the processing temperature. Initially, the internal flesh temperature of the fish should not exceed 90° F. Hold the coho at this temperature for about 2 hours. Introduce smoke at the beginning of the operation and continue for 4 hours. After 2 hours of smoking time, raise the internal temperature rapidly to 130° F., and hold it at this level for one-half hour. Continue to raise the temperature gradually

¹⁰ More information on "hot-smoking" can be obtained from Fishery Leaflet 18, by Jarvis (1945).

until the coho reach the desired internal temperature. After you have smoked the coho, cool them and handle them as was described earlier.

Serving or storing.—As was suggested earlier, allow the coho to cool in the smokehouse before moving them to a refrigerator (32°-38° F., preferably 32°). After you have cooled the coho at least 3 hours in the refrigerator, you may prepare them for storage.

To eliminate the problem of storage, smoke only the quantity of coho that will be consumed in a short time. If, for some reason, you need to store the smoked coho in excess of 3 days, freeze it. For shorter periods of storage, keep the product under refrigeration (below 38° and near 32° F., if possible). As we have seen, smoked fish are highly perishable. Therefore, use extreme care to prevent the freshly processed coho from becoming contaminated with bacteria and other undesirable microorganisms.

For the ultimate in flavor and wholesomeness, consume the coho immediately after you smoke them. If you cannot consume them at once and you wish to keep them longer than 3 days, freeze them.

Frozen Coho

As was previously mentioned, you should leave the heads on coho that are to be frozen whole. The reason is to minimize the amount of flesh exposed to air.

For best results, quick-freeze the coho (for example, in a commercial plate freezer or in a blast freezer). However, if you only have access to a small home freezer, it is best to steak or fillet the fish before freezing to increase the contact surface area. Thus, lay the flat surface of the portion on the coldest, flat surface of the freezer. To minimize the increased effects of flesh exposure to air, the use of moisture-vapor-proof films for packaging is particularly important, as described in a following paragraph. Then coat them with an ice glaze before packaging them and placing them in storage.

Glazing significantly retards rancidity (caused by oxidation) and freezer-burn (caused by dehydration). Apply the ice glaze by quickly submerging the prefrozen coho in a container of chilled water (figs. 15A, 15B). Drain off the excess water and return



Figure 15A.—Dip the frozen coho in cold water to glaze.

the coho to the freezer. If you want a thick glaze, repeat the operation several times. This glazing treatment can be applied either to the relatively large, eviscerated fish or to the prefrozen steaks or fillets.

To protect the glazed coho or any prepared portions additionally, you may wrap each of them in Saran-wrap or similar type of moisture-vapor-proof film (Heerdt, Bucher, and Stansby, 1949), or you may place each one in a plastic bag before returning it to the storage freezer.

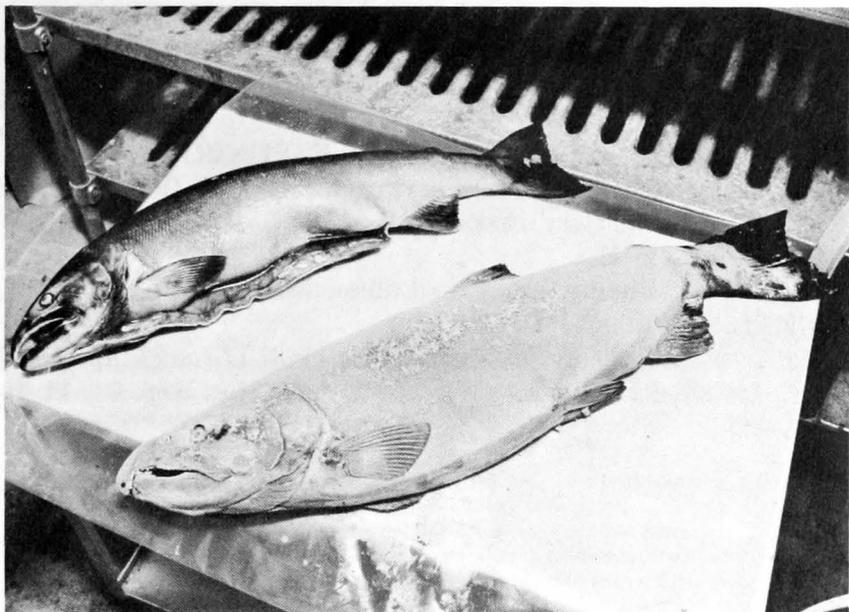


Figure 15B.—Fish before glaze (left) and after glaze (right).

LITERATURE CITED

BERG, IOLA I.

1968. Smokehouses and the smoke curing of fish. Washington State Department of Fisheries, Olympia, Wash., 42 pp.

BRATZLER, L. J., and M. O. ROBINSON.

1967. Processing Great Lakes chub (*Leucichthys hoyi*). Mich. State Univ., Agr. Exp. Sta., Quar. Bull. 49: 440-444.

DOUGHERTY, JACK B., and HARRY L. SEAGRAN.

1967. Steps to effective sanitation in smoked-fish plants. U.S. Fish Wildl. Serv., Circ. 259, iii + 12 pp.

GREIG, R. A., and H. L. SEAGRAN.

1965. Technical note No. 1—A rapid field method for determining the salt concentration in fresh and smoked chub. Commer. Fish. Rev. 27(12): 18-21.

HEERDT, MARTIN, JR., DORRIS L. BUCHER, and MAURICE E. STANSBY

1949. Refrigerated locker storage of fish and shellfish. U.S. Fish Wildl. Serv., Fish. Leafl. 128, 19 pp.

JARVIS, NORMAN D.

1945. Salting, smoking, and other methods of curing fish at home. U.S. Dept. Interior, Fish Wildl. Serv., Fish Leaflet 18, 22 pp.

JARVIS, NORMAN D., and JOSEPH F. PUNCOCHAR.

1957. Home canning of fishery products. U.S. Dept. Interior, Fish Wildl. Serv., Cons. Bull. 28, 31 pp.

TODY, WAYNE H.

1968. Introducing the coho. *Limnos* 1(1): 17-21.

WECKEL, K. G., and D. WOSJE.

1966. Brine salting of Great Lakes chub (*Leucichthys hoyi*) for smoking. Univ. Wis., Coll. Agr., Res. Rep. 24, 11 pp.

APPENDIX: Recipes for coho salmon

COHO SALMON

HEARTY COHO SALMON

- | | |
|---|----------------------------------|
| 2 pounds coho salmon steaks or other fish steaks, fresh or frozen | 3 tablespoons chopped pimiento |
| $\frac{2}{3}$ cup thinly sliced onion | $\frac{1}{2}$ cup dry white wine |
| $1\frac{1}{2}$ cups chopped fresh mushrooms* | 2 tablespoons lemon juice |
| $\frac{1}{3}$ cup chopped tomato | 1 teaspoon salt |
| $\frac{1}{4}$ cup chopped green pepper | $\frac{1}{4}$ teaspoon dill weed |
| $\frac{1}{4}$ cup chopped parsley | $\frac{1}{8}$ teaspoon pepper |
| | Lemon wedges |

Thaw frozen steaks. Cut into serving-size portions. Arrange onion in bottom of a greased baking dish, 12 by 8 by 2 inches. Place fish on top of onion. Combine remaining vegetables and spread over top of fish. Combine wine, lemon juice, and seasonings. Pour over vegetables. Bake in a moderate oven, 350^oF., for 25 to 30 minutes or until fish flakes easily when tested with a fork. Serve with lemon wedges. Serves 6.

*Canned mushrooms may be substituted for fresh mushrooms. Drain canned mushrooms.

—Source: U. S. Department of the Interior, Bureau of Commercial Fisheries.

COHO SALMON

BAKED COHO SALMON WITH SOUR CREAM STUFFING

- | | |
|--|---------------------------------|
| 3 or 4 pounds dressed coho salmon or other dressed fish, fresh or frozen | Sour cream stuffing |
| $1\frac{1}{2}$ teaspoons salt | 2 tablespoons melted fat or oil |

Thaw frozen fish. Clean, wash, and dry fish. Sprinkle inside with salt. Place fish on a well-greased bake and serve platter. Stuff fish loosely. Brush fish with fat. Bake in a moderate oven, 350^oF., for 45 to 60 minutes or until fish flakes easily when tested with a fork. Baste occasionally with fat. Serves 6.

SOUR CREAM STUFFING

- | | |
|-------------------------------------|--------------------------------------|
| $\frac{3}{4}$ cup chopped celery | $\frac{1}{2}$ cup sour cream |
| $\frac{1}{2}$ cup chopped onion | $\frac{1}{4}$ cup diced peeled lemon |
| $\frac{1}{4}$ cup melted fat or oil | 2 tablespoons grated lemon rind |
| 1 quart toasted bread cubes* | 1 teaspoon salt |
| | 1 teaspoon paprika |

Cook celery and onion in fat until tender. Combine all ingredients and mix thoroughly. Makes approximately 1 quart stuffing.

*Commercial herb seasoned croutons may be substituted for bread cubes.

—Source: U. S. Department of the Interior, Bureau of Commercial Fisheries.

OVEN-FRIED COHO SALMON STEAKS

2 pounds coho salmon steaks or other fish steaks, fresh or frozen
 ½ cup salad oil
 2 tablespoons lemon juice
 1 clove garlic, peeled and quartered

1 cup crushed herb-seasoned stuffing mix
 ½ cup grated Parmesan cheese
 ¼ cup chopped parsley
 1 clove garlic, finely chopped

Thaw frozen steaks. Cut into serving-size portions and place in a shallow baking dish. Combine oil, lemon juice, and garlic. Pour sauce over fish and let stand for 30 minutes, turning once. Remove fish, reserving sauce for basting. Combine stuffing, cheese, parsley, and garlic. Roll fish in crumb mixture. Place on a well-greased baking pan, 15 by 10 by 1 inch. Drizzle 2 tablespoons sauce over fish. Bake in an extremely hot oven, 500°F., for 15 to 20 minutes or until fish flakes easily when tested with a fork. Serves 6.

COOKING SUGGESTIONS

The full flavor of fish is retained by this quick-oven treatment. This method minimizes cooking odors, uses less fat, and eliminates standing over a hot frying pan. This method gives a juicy, tender, nicely browned product and is especially good for serving fish to large groups.

—Source: U. S. Department of the interior, Bureau of Commercial Fisheries.

BAKED COHO SALMON SURPRISE

2 pounds coho salmon fillets or other fish fillets, fresh or frozen
 ½ cup thick French dressing
 2 tablespoons lemon juice

¼ teaspoon salt
 1 can (3½ ounces) French fried onions
 ¼ cup grated Parmesan cheese

Thaw frozen fillets. Cut into serving-size portions. Place fish in a shallow baking dish. Combine dressing, lemon juice, and salt. Pour sauce over fish and let stand for 30 minutes, turning once. Remove fish from sauce and place in a well-greased baking dish, 12 by 8 by 2 inches. Crush onions. Add cheese and mix thoroughly. Sprinkle onion mixture over fish. Bake in a moderate oven, 350°F., for 25 to 30 minutes or until fish flakes easily when tested with a fork. Serves 6.

BAKING TIP

The most important principle to remember in fish cookery is not to OVERCOOK. Fish should be cooked only until it flakes easily when tested with a fork.

Remember -- length of cooking time will depend on thickness of the fish.

—Source: U. S. Department of the Interior, Bureau of Commercial Fisheries.



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