

SMOKED FISH

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Interest in various ways to prepare and utilize fishery products is increasing. How to smoke fish at home and on a commercial basis is high on the list of inquiries received by the Texas Agricultural Extension Service.

Production of smoked fish in Texas is inconsequential compared to some other areas, and very little research in this field has been done in the Gulf states. In the U.S., production is centered around the Pacific Northwest, the Great Lakes and, to a lesser extent, in the eastern states and Florida. During 1960, about 28.5 million pounds of smoked fishery products were produced in the U.S. and about 8 million pounds were imported.

Smoking was used by prehistoric man to cure fish. Today, properly smoked fish is a high quality food item. It is considered a delicacy, enjoyed by nearly everyone who is privileged to eat it. It is one of the many ways that fish can be enjoyed as a food. The gourmet can enjoy its piquant flavor at many restaurants and delicatessens and the adventurous chef can test his culinary skill when preparing it in the home smokehouse.

Traditionally, only a few species of fish such as salmon, chub, sturgeon, sablefish and mullet are used in the U.S. for smoking. Information is lacking on the smoked quality of many species of fish native to Texas. In Florida, Alabama and some other areas, smoked mullet is sold in local markets as a delicacy. Mullet is one of the most abundant species along the Texas coast, but only a small number is utilized in the state. Likely, black drum, red fish, mackerel, catfish and other native species are also suitable for producing a smoked product. However, the suitability and marketability of these species have not been determined and are awaiting someone's ingenuity and innovation to do so.

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QUALITY

Handling fish before and during the smoking process requires the same good sanitary practices essential for good quality in any food product.

Fish and other meats spoil as a result of decomposition or breakdown of the flesh by bacteria and enzymes. Therefore, the principal considerations in handling, processing and storing fish or other foods are reduced bacteria and retardation of bacteria growth and the autolytic action of enzymes. This must be considered from the time fish are harvested until the end product is consumed.

After fish die, spoilage bacteria begin to multiply quickly and the autolytic action of enzymes increases. To repress or retard these deteriorations, good sanitary practices and proper refrigeration are necessary through all the processes before, during and following smoking.

Freshly caught fish should be washed thoroughly in cool, clean water, dressed, washed again and then iced or frozen immediately. The initial washing removes most of the mud, debris, slime and surface-growing bacteria from the skin and helps reduce bacteria invasion into the flesh when the fish is butchered. Carefully clean each fish to avoid bruising or tearing the flesh or puncturing the intestines. Intestines, gills, kidneys and blood decompose quickly and should be removed immediately to maintain high quality. The quality and freshness of fish cannot be improved but it can be maintained under proper conditions.

Fillets, steaks or fish in the round may be smoked. Fish size and individual preference will determine what cuts are smoked. The smoking process involves three basic steps: salting, drying and smoking or barbecuing.

SMOKING

The primary reason for smoking fish is to impart a desirable flavor. The salt and heat involved with the smoking process provide little preservative quality. Smoked fish is highly perishable and must be properly refrigerated or frozen if it is not consumed soon after the smoking process is completed.

Salting or Brining

Salt gives flavor and firms the flesh by removing moisture. Fish may be brined lightly or heavily, depending on the desired product. The salt content of smoked fish must be about 2 to 4 percent to be generally acceptable to the consumer. Heavily brined fish may have a salt concentration of up to 10 percent. At this concentration some temporary preservative action is provided, but the salt content must be reduced to 2 to 4 percent by soaking the fish in cold, running water before it is smoked.

Fish are brined in clean, sanitized containers using clean, cold water (38 degrees F. or below) and relatively pure salt. The size of the pieces of fish and the degree of brining desired determine the amount of time that the fish remain in the brine solution. The weaker the solution the longer the immersion time. Coho salmon steaks and fillets are brined in a salt solution having a salinometer reading of 30 degrees (11 ounces of salt per gallon of water) for 16 hours. Whole, eviscerated Coho salmon are brined in a salt solution having a salinometer reading of 25 degrees (9 ounces of salt per gallon of water) for 48 to 72 hours.

Mullet are brined by two methods in Florida. They are soaked in 90 degree salinometer brine (40 ounces of salt per gallon of water) for 2 to 4 hours, or they are soaked about 1/2 hour in 40 degree salinometer brine (15.6 ounces of salt per gallon of water). The fish are then washed, dredged in salt, placed in a container for 1 to 3 hours, rinsed briefly in cool, clean, fresh water and dried.

Drying

Fish can be dried in the smokehouse or in a cool, well ventilated area. An ideal place for drying is a "cool room" equipped with a system for circulating refrigerated air. Fans may be used to hasten drying. Maintain a relative humidity below 75 percent. Approximately 1 to 3 hours are required to dry the fish. The shorter the time the less the bacteria will multiply.

Drying removes excess moisture from the surface of fish and forms a pellicle. The pellicle is a glossy firm "skin" and is important for good quality. It gives the fish a desirable appearance, helps seal in natural juices and aids in the absorption of the smoke flavor. If fish are smoked or barbecued before the pellicle forms, the flesh will erupt, resulting in an unattractive product.

Smoking

A variety of equipment is used to smoke fish. Some people merely hang the fish over an open fire. This method is similar to that used by the cave man.

A number of commercial fish dealers in the Pacific Northwest use a modified version of a smokehouse designed by the Washington State Department of Fisheries. Some smokehouses are equipped with devices that accurately control the air velocity and temperature, smoke quality and volume and humidity. Smokehouses of simpler design but with less quality control features are more commonly used. Most hardwoods are suitable for smoking fish. Oak and hickory are commonly used. Pine and other resinous woods that give off acrid flavor should not be used.

Study applicable health regulations and consult health and other regulatory authorities before building a smokehouse or producing smoked fish. Smokehouse design and sanitary equipment and practices are important and may be regulated by state or federal agencies.

The hot smoked process or barbecuing is recommended for smoked fish. This process gives a smoked flavor and cooks the fish so that no further preparation is required before eating it. Hot smoked fish is cooked at a higher temperature and has a longer shelf life than cold smoked fish.

Hot smoked or barbecued mullet are smoked at a temperature of about 200 degrees F. for 2 to 4 hours or until the flesh is cooked. The U.S. Food and Drug Administration has set standards for hot smoked chub, a fish commonly smoked and marketed in the Great Lakes region. The internal temperature for chub must be at least 160 degrees F. for at least 30 minutes during the smoking process.

The time period for the entire smoking process (salting, drying and smoking) should be kept to a minimum.

AFTER SMOKING

After fish are smoked and cooked, extinguish the fire and cool the fish quickly while still in the smokehouse. Then transfer the smoked product to a refrigerated area (38 degrees F. or colder) and chill. When chilled to 38 degrees F. or below, individual pieces are wrapped in wax paper. If it is to be eaten within 2 or 3 days, it is refrigerated at 38 degrees F. or below. If it is to be kept longer, it should be frozen immediately.

Follow strict sanitary practices while handling or wrapping smoked fish. This helps avoid bac-

teria contamination. Do not handle smoked fish unless it is necessary.

Remember that smoking fish adds flavor but very little, if any, preservative qualities or shelf life. The storage and refrigeration requirements of smoked fish are the same as for uncooked fresh fish.

Information in this publication is based on the work of numerous researchers. A list of references pertaining to production of smoked fish follows.

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