



Smoking – an ideal method to preserve mollusc meat

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Foods have been preserved using smoke for millennia and the practice of smoking fish and shellfish has been around ever since people contemplated ways to preserve a portion of their catch. Smoked products in tropical countries have storage properties that enable them to be marketed without the use of sophisticated refrigeration systems.

Fish spoilage can be delayed by many methods, including temperature, pH, and smoke, which eliminate, or at least reduce, microbial growth, enzyme activity, oxidation or insect infestation. Smoking for example helps to preserve fish by reducing moisture content, thereby retarding bacteria growth.

Due to limited facilities and extreme climatic conditions, smoking is carried out as an inexpensive option for preservation in less developed countries to reduce and avoid post-harvest loss. In developed countries, smoking is used to obtain products that are popular for their texture and flavour. In many developing countries, smoked or dried fish is very popular and continues to be a major source of inexpensive dietary protein. The preservative process, which combines smoking with salting, drying and heating, gives the product a characteristic and desirable flavour.

Today, smoked products are often treated as delicacies in many countries. Any species of fish and shellfish can be smoked, and nearly everything that comes out of the smokehouse tastes good. In its simplest form, smoking of meat and fish is similar throughout the world depending on the end product desired.

The long storage life of smoked fish is due more to the drying and cooking process than to the preservative value of the chemical compounds deposited on the fish by the smoke. Smoking methods vary, but all are based on the few common principles below:

- First, the product is treated with salt, either dipped in strong brine (very salty water) or covered with dry salt. The process is called curing.

- During curing, a two-way exchange takes place, with much of the moisture drawn out and some salt absorbed by the product. This process may take up to two days.
- The combination of reduced moisture and increased salt content in the product inhibits the growth of bacteria, a basic principle for all cured meats.
- Secondly, the product is smoked inside a chamber filled with smoke from smouldering hardwood.
- The smoking chamber temperature can be adjusted to obtain a “cold” or “hot” smoking process.
- On completion of smoking, the product is left in the smoking chamber so that the temperature reduces gradually.

The methods of cold and hot smoking and their differences are summarised in Table 1.

Mussels, scallops, and oysters are some of the important mollusc species that are smoked and eaten in different parts of the world.

Whole mussels are usually smoked with oak wood. Smoked mussels are delicious as stews or chowders, or eaten with a splash of lemon. Canned smoked mussel meat is popular on the international market because of its characteristic flavour.

Smoked scallops are an excellent appetizer and often used as an “anytime-snack”. Italians have used smoked scallops as their “secret ingredient” in spaghetis for centuries. Similar to mussels and scallops, smoked oysters with their unique flavour, are highly nutritious shellfish and best enjoyed without further cooking. Other smoked molluscs include the Buccinid gastropods, which usually have a very strong flavour; the product is popularly called “scungilli”. In Japan smoked squid meat is increasingly popular among consumers.

Research on smoke curing of molluscs such as mussels, oysters and gastropod meat has been

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studied in India for a number of years (Muraleedharan et al. 1979; Jeyachandran et al. 1988; Shanthini and Patterson 2001; Patterson, 2001). These studies indicate that the shelf life of smoked mollusc products may be up to eight months.

A simple process for smoking mollusc meat in India is summarised below.

- gastropod shells are washed and then boiled for 20 to 30 minutes.
- the meat is shucked off the shell using a sharp-tipped knife.
- the edible portion, such as foot and adductor muscle, is cut off and the mucus and pigmentation in the foot muscle are scrapped off with a sharp knife.

- for smoke curing, the meat is cut into thin slices to facilitate uniform smoking. Blanching the meat in a 5% brine solution gives it a salty taste and removes substantial moisture.
- the meat is left to dry in the shade for 30 minutes before smoking; this is an important step as drying allows subsequent uniform absorption of the smoke.
- smoking can be done in home-made smoking kilns (Figs. 1–4) or electrical kilns using sawdust. The flavour of the smoked meat will depend on the type of wood used.
- the preservative effect of the smoking process results from drying and the deposition in the flesh of natural wood smoke chemicals. During smoking, the smoke from the burning wood contains a number of compounds that inhibit

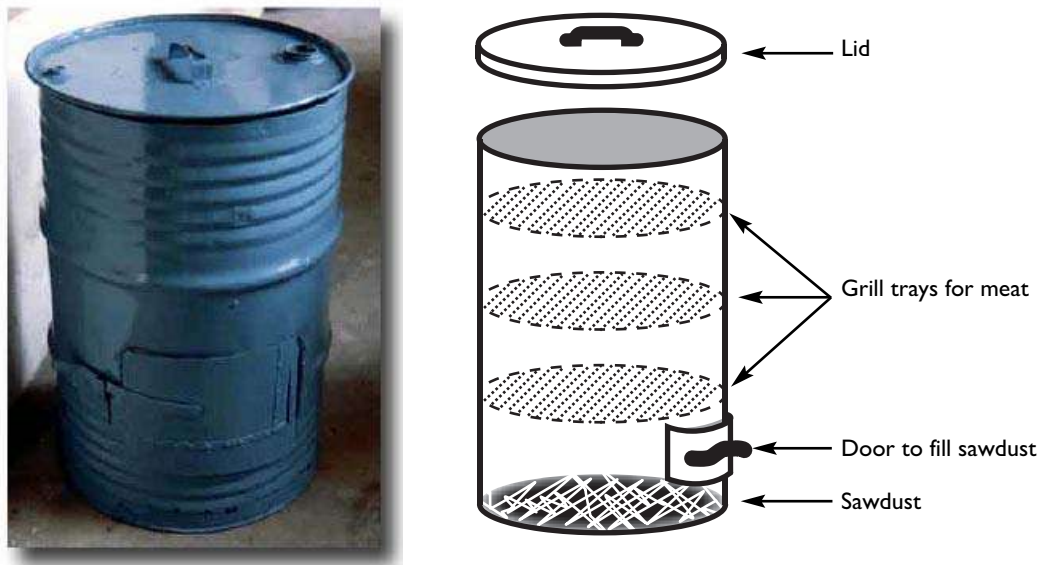


Figure 1. An oil drum modified to be used as a smoking kiln



Figure 2. Inside view of smoking kiln



Figure 3. Freshly salted and dried meat ready for smoking



Figure 4. Smoked meat, ready for consumption or storage

bacterial growth, while the heat dries and cooks the flesh, thereby preventing both bacterial growth and enzyme activity.

- hot smoking is best for gastropod meat. The meat can be smoked until it becomes golden brown. After that, it is once again sun dried and can be preserved for a long time in proper airtight packing.

The above process is summarised in Figure 5.

The shelf life of hot smoked products is generally longer than that of cold smoked products. The method given above is an inexpensive and effective method of preserving mollusc meat.

Table 1. Differences between the cold and hot smoking methods

Smoking method	Characteristics and product
Cold smoking	<ul style="list-style-type: none"> • Temperature never rises to a level that would modify the protein content or cook the flesh (30°C maximum). • Smoking lasts 4–6 weeks. • This method is mainly used for temperate species, because high temperatures easily denature their proteins. This is not the case for tropical water species.
Hot smoking	<ul style="list-style-type: none"> • “Mild temperature” smoking is conducted at 30–50°C, “high temperature” smoking is conducted at temperatures up to 80°C. • Smoking lasts 3–8 hours. • It is essential that the temperature in the smoking chamber be carefully controlled to avoid product charring. • In developing countries, it is the heat, rather than the smoke, that is mostly used as the curing factor. • Hot smoking produces firmer and flakier meat than cold smoking, yet moister than when grilling or barbecuing. • Usually, hot smoked fish is cut into cubes, chunks or flakes rather than slices, which may crumble if they are cut too thin.

References

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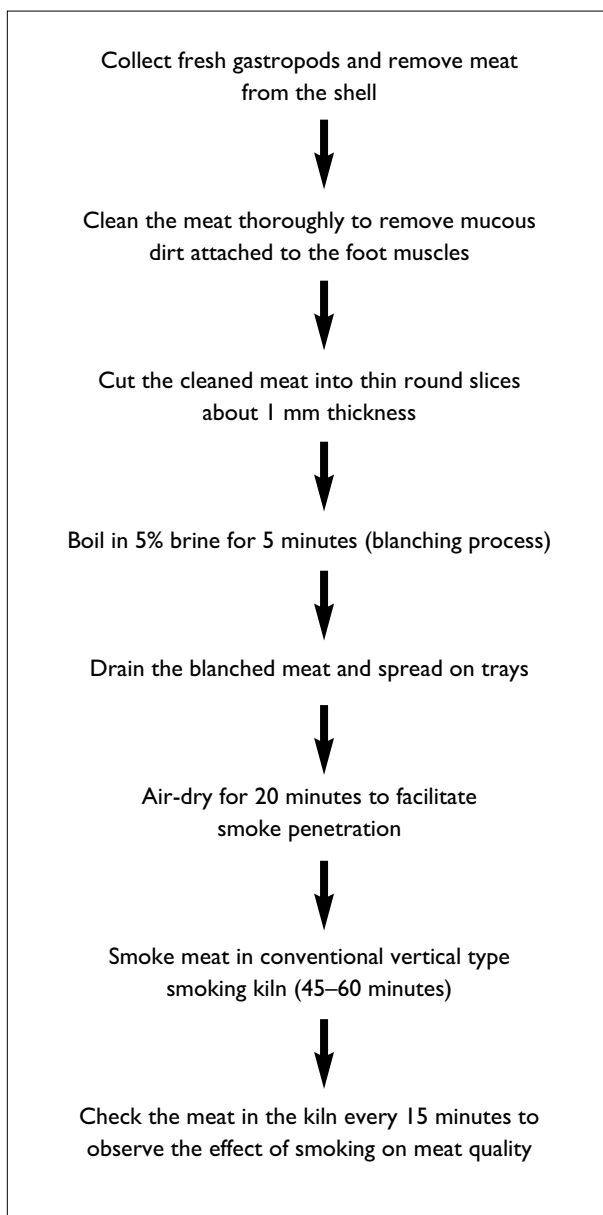


Figure 5. Smoking process