

The Meat Smoking and Curing FAQ

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Meat Curing and Smoking FREQUENTLY ASKED QUESTIONS (FAQ) in the group rec.food.preserving

This file is a compilation of shared knowledge and answers to frequently asked questions of the group rec.food.preserving. As such, this file is updated. *Be a contributor--point out mistakes, write sections and reviews, provide us with new sources. All contributors will be cited in this file.*

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CHARTER

Rec.food.preserving is a newsgroup devoted to the discussion of recipes, equipment, and techniques of food preservation. Current food preservation techniques that rightly should be discussed in this forum include canning, freezing, dehydration, pickling, smoking, salting, distilling, and potting. Foodstuffs are defined as produce (both fruits and vegetables), meat, fish, dairy products, culinary and medicinal herbs. Discussions should be limited to home-grown or home-preserved foods.

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I. Curing

[Why is meat cured?]

For a couple of reasons. One is safety. When meat is cold smoked its temperature often stays in the danger zone for several hours or days. Many environmental factors of this treatment are such that the growth of dangerous bacteria is greatly accelerated. The curing of the meat inhibits this growth.

The other reason is traditional preparation. There are many curing techniques that were developed in the days before refrigeration that are continued today for traditional reasons. A good example is corned beef.

Oldtime butcher shops closed every weekend. Ice, the only refrigerant available, could not dependably hold fresh meat for two days. To keep unsold meat from going to waste, the butcher soaked the meat in a strong brine or covered it with coarse salt to trigger osmosis. The grains of salt were called "corn" in England, and the name "corned beef" stuck with the product. [1]

-- Contribution from rlogan@ianet.net --

Meat is cured for one other reason, color. Using prague powder is what gives meat its pink color.

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[What is osmosis?]

Osmosis is the movement of water across a membrane from weak solutions toward strong solutions. [1]

[What is meant by "the danger zone"?)

The "danger zone" is the temperature range between 40 and 140 degrees F. When uncured meat remains in this range for more than 2 hours the growth of dangerous bacteria increases to a dangerous level.

[What other factors affect the growth of bacteria?]

When meat is smoked, the environment is robbed of most of its oxygen. If this is combined with temperatures in the danger zone, the growth of the bacteria that causes botulism is increased.

[What is botulism?]

Botulism is an intoxication of the bacteria *Clostridium botulinum*. This bacteria is anaerobic meaning that it requires an environment relatively free of oxygen to multiply. It also requires a moist environment and temperatures in the danger zone. The symptoms of botulism are sore throat, vomiting, blurred vision, cramps, diarrhea, difficulty breathing, and central nervous system damage (including paralysis). Symptoms usually occur within 12 to 36 hours. The fatality rate is up to 70%. [2]

[What are the commonly used curing compounds?]

Salt, sugar, sodium nitrite and sodium nitrate. Salt and sugar both cure meat by osmosis. In addition to drawing the water from the food, they dehydrate and kill the bacteria that make food spoil. In general, though, use of the word "cure" refers to processing the meat with either sodium nitrite or sodium nitrate.

Sodium nitrite and sodium nitrate are the basis for two commercially used products: Prague powders #1 and #2. Prague powder #1 is a mixture of 1 part sodium nitrite and 16 parts salt. The chemicals are combined and crystallized to assure even distribution. Even though diluted, only 4 ounces of Prague powder #1 is required to cure 100 lbs of meat. A more typical measurement for home use is 1 tsp per 5 lbs of meat. Prague powder #2 is a mixture of 1 part sodium nitrite, .64 parts sodium nitrate and 16 parts salt. It is primarily used in dry-curing.

One other commonly available curing product is Morton's Tender Quick. It is a mixture of salt, sodium nitrite, sodium nitrate and sugar. Ask your butcher or grocer to stock it for you.

[Why use soy protein concentrate?]

Soy protein concentrate is used to bind together sausages and slow the loss of fat and moisture during smoking. This is extremely important to ensure that the final product is not dry and crumbly inside the casing.

[Where can these compounds be obtained?]

If you are chummy with a local butcher who does curing, maybe (s)he will sell you a small quantity. Otherwise, the Sausage Maker offers all items mentioned here and elsewhere in this FAQ mail order. See the books section for a phone number where you can obtain a catalog.

[What is spray pumping?]

It is the process of injecting the meat with cure using a special purpose needle.

[What's trichinosis?]

It is an infestation of trichinae. The parasites invade the voluntary muscles causing severe pain and edema. It can be avoided by ensuring that cooked pork reaches an internal temperature of 150 degrees F.

[If my cured pork doesn't reach a safe temperature, what about trichinosis?]

Trichinae can also be killed by freezing the pork according to the following chart:

Temperature	Grp1-days	Grp2-days
-----	-----	-----
5 deg F	20	30
-10 deg F	10	20
-20 deg F	6	12

Group 1 comprises product in separate pieces not exceeding 6" in thickness or arranged on separate racks with the layers not exceeding 6" in depth.

Group 2 comprises product in pieces, layers or within containers

the thickness of which exceeds 6" but not 27". [3]

What about dry-curing sausages and meats?]

I'll leave this topic open for someone with real experience. The dry climate in Tucson makes it difficult to maintain the ideal 70% relative humidity required for dry-curing so I've never even tried.

II. Smoking

[What is the difference between smoke cooking and curing?]

Pretty simple; Smoke cooking is done at higher temperatures in order to cook the meat. Smoke curing is really just smoking cured meat or sausage. Although smoking meat does provide some preservative effect, it alone is not sufficient to allow long term storage.

"Smoke is a very complex material, with upward of 200 components that include alcohols, acids, phenolic compounds, and various toxic, sometimes carcinogenic substances. The toxic substances inhibit the growth of microbes, and the phenolics retard fat oxidation, and the whole complex imparts the characteristic flavor of burning wood to the meat." [4]

[What are the proper temperatures for smoke cooking meat?]

I prefer to keep the temperature around 200-220F. This means the temperature *at* the meat. I use a large log burning smoking pit with an offset firebox so it's easy to maintain this. In an upright water smoker you will have trouble keeping the temperature this low, since the heat builds up at the top where the meat is. You can achieve decent results with a water smoker, but the cooking time will be shorter and the depth of smoke penetration will be less. My briskets and pork shoulders smoke for 16-24 hours; pork ribs and pork loin roasts take less time.

[How important is temperature control during smoke curing?]

Very. If you are smoking sausages, excess heat will melt the fat out and leave the final product dry and crumbly. This I know from experience. Here, we're talking about temperatures around 140F, although it varies from recipe to recipe. This is very difficult to maintain in a wood burning smoker. Mine has a slow smoking section farthest away

from the fire. With experience, I've learned to control the temperature in this section without overdamping the air inlet. Some other meats, like bacon and ham, are a little more tolerant of higher heat, but it can affect the quality of the final product.

The best solution is a thermostat controlled gas or electric slow smoker like those sold by the Sausage Maker (see sources). These are not good general purpose smokers, in my opinion. I just don't think they do nearly as well as a log burning pit for smoke cooking.

Unfortunately for the many water smoker owners, they just won't do for slow smoking-- don't even bother trying.

[Is closing down the air inlet dampers a good way to keep the temperature down?]

If you keep the temperature low by closing down the inlet dampers, the smoke gets thick and sooty and produces an unattractive and bitter coating on the surface of the meat. I prefer to keep the fire burning more freely and control the temperature by providing some draft between the fire and the meat.

[What are the various woods used for smoking?]

Alder

The traditional wood for smoking salmon in the Pacific Northwest, alder also works well with other fish. It has a light delicate flavor.

Apple and Cherry

Both woods produce a slightly sweet, fruity smoke that's mild enough for chicken or turkey, but capable of flavoring a ham.

Hickory

Hickory is the king of the woods in the Southern barbeque belt, as basic to the region's cooking as cornbread. The strong, hearty taste is perfect for pork shoulder and ribs, but it also enhances any red meat or poultry.

Maple

Mildly smoky and sweet, maple mates well with poultry, ham, and vegetables.

Mesquite

The mystique wood of the past decade, mesquite is also America's most misunderstood wood. It's great for grilling because it burns very hot, but below average for barbecuing for the same reason. Also, the smoke taste turns from tangy to bitter over an extended cooking time. Few serious pitmasters use mesquite, despite a lot of stories about its prevalence in the Southwest.

Oak

If hickory is the king of barbecue woods, oak is the queen. Assertive but always pleasant, it's the most versatile of hardwoods, blending well with a wide range of flavors. What it does to beef is probably against the law in some states.

Pecan

The choice of many professional chefs, pecan burns cool and offers a subtle richness of character. Some people call it a mellow version of hickory. [5]

[Rick, do you have any politically incorrect views about smoke cooking that you enjoy getting flamed about?]

Don't get me started.

III. Specific Foods

[Can I make a Smithfield Ham at Home?]

These are unique since the hams come from only peanut-fed hogs. They are worked with cure for 30-45 days. Then they are smoked for at least 7 days and left in the smokehouse for another 6 months. "The Smithfield ham or a reasonable facsimile is rather difficult to produce unless you have a steady supply of peanuts and a huge smokehouse 3-4 stories high." [3]

[How do I make my own bacon at home?]

It is my experience that bacon is the easiest slow smoked product to produce at home and the results are as good as, or better than, the best commercially produced bacon.

I use Morton Tender Quick and brown sugar. Rub down a slab of fresh bacon (pork belly) with a liberal quantity of the Tender Quick. You can't really use too much but a cup or so should do. Then follow with a thorough rub of brown sugar (again, start with a cup or so). Then place the meat in heavy plastic and allow to cure for 7 days at 38F. I use a small refrigerator for this. I run a remote temperature probe inside and monitor the temperature, tweaking the thermostat when necessary. The temperature is important; too low (below 36F) and the curing action will cease, too high (above 40F) and the meat will begin to spoil. I also cut the pork belly in two and cure it with the meat surfaces face to face and the skin on the outside. It helps it fit in the fridge and improves the curing action. I then smoke it at 140-150F until the internal temperature of the pork reaches 128F (about 8 to 10 hours). I find it best to remove the skin about 3/4 of the way through the smoking process. This way the fat is protected but still acquires some color. Chill overnight before using. Slice into approximately 3/16" thick and fry as usual.

If you are using Prague Powder #1, mix 2 oz with 1 lb of salt and use like the Tender Quick.

Other sugars can be used instead of brown sugar. Try honey or even some maple syrup.

[How do I make my own corned beef?]

For best results, use trimmed briskets.

Start with a curing brine. This recipe comes from [3] and makes enough for 25 lbs of meat.

5 quarts ice water (about 38-40F)

8 oz. salt

3 oz. Prague Powder #1

3 oz. powdered dextrose

Spray pump the briskets to about 12-15% of their original weight. After pumping, the briskets are packed in a vat, and sprinkled with whole pickling spice. If more than one brisket is done at a time, pack them flesh to flesh with the fat sides out. Add enough brine to cover and allow to cure for 3-4 days at 38-40F. The meat is then ready to use (but still requires cooking).

[What is pastrami and how do I make my own?]

For best results, use trimmed briskets.

Start with a curing brine. This recipe comes from [3] and makes enough for 25 lbs of meat.

5 quarts ice water (about 38-40F)

8 oz. salt

5 oz. Prague Powder #1

5 oz. powdered dextrose

1 Tbl garlic juice

Prepare and cure as for corned beef. After curing, remove from brine and rub liberally with cracked black pepper and coriander seeds. Smoke at 140F until the meat is dry and then increase smoker temperature to 200-220F and hold until internal temperature of meat reaches 170-180F. Chill overnight before using. This meat is fully cooked.

[How do I make my own andouille sausage?]

Andouille is a spicy smoked sausage common in Louisiana cooking. It is easy to make at home. This recipe is based on one from from [6] with minor modifications, most notably the addition of the soy protein concentrate.

2 tsp garlic powder

2 Tbl sugar

2 Tbl kosher salt

1 tsp Prague powder #1

1 Tbl ground black pepper

5 lbs pork, fat and lean separated

1 tsp red pepper flakes	3/4 cup cold water
2 tsp cayenne	1/2 cup soy protein concentrate
3 Tbl paprika	(see sources)
1/2 tsp ground mace	wide hog casings
1 tsp thyme	

Grind the fat through a 1/4 inch plate. Grind lean meat through 1/2 inch plate. Dissolve Prague powder in water to ensure even distribution. Mix all ingredients, except casings, well. Stuff into casings and twist at 12 inch intervals to form links. Hang sausages in front of a fan in a cool place overnight to dry. Smoke at less than 140F for 6 to 8 hours. Refrigerate until firm. Freezes well.

[How do I make beef jerky?]

There are a jillion recipes for jerky--just take a look in the recipe archives. I prefer a teriyaki-based marinade (use 1/2 tsp of Prague Powder #1 or 1 tsp of Tender Quick for safety) with other spices, lightly smoked. Experiment with your own combinations of spices and find something you like. I like to avoid fresh ingredients like garlic preferring to use powder instead. Also try various combinations of black, white and red pepper (cayenne) to suit your tastes.

[How do I make smoked salmon?]

(From [3]) Start with boneless sides (filets) of fresh salmon.

Place the sides in a tub of saturated salt solution and add ice to chill. This removes diffused blood, makes the flesh firmer and helps retain oils. The fish should remain in this brine for 60-90 minutes.

The sides should be drained for 15-20 minutes. A shallow vessel is filled with a salting mixture prepared as follows (for 20 lbs of fish):

- 2 lbs salt
- 1 oz brown sugar
- 1 oz Prague Powder #1
- 1 oz white pepper
- 1 oz ground bay leaves
- 1 oz ground allspice

1 oz ground cloves

1 oz ground mace

Dredge the sides in the mixture and rub it into the flesh lightly. Pack the sides into a tub with as much curing mixture as will cling to them. cover loosely and apply weight. Leave fish for 8 to 12 hours then remove and scrub and rinse to remove excess salting mixture. Fix sides on a hanger and allow to dry in front of a fan for 4 to 6 hours. Hang in smoker and smoke for 8 hours at not more than 100F. Continue to smoke for 24 to 48 hours at 70F. Brush with oil and store in a cool, dry place.

IV. Other Sources (besides this FAQ)

[This FAQ does not tell me what I need to know!]

Please put the question to the group, rec.food.preserving. Or...

BOOKS:

Great Sausage Recipes and Meat Curing (1984). Ryttek Kutas. Self published. Can be obtained from the author at The Sausage Maker Inc./ 26 Military Road/ Buffalo NY 14207. (888)-490-8525.

The bible of sausage making, meat curing and slow smoking. This is the first book I pick up when I need a question answered.

Michael Kankiewicz contributed the following:

A funny anecdote about The Sausage Maker: On the inside cover there's a short humorous biography of each of the brothers. They're a bunch of good 'ol Buffalo Polish guys. The paragraph about Ben Kutas says something like "...and when he's not packing sausage, he spends his spare time as a as a radiologist."

I always thought it was a joke. Then one day, when I was looking through our university's directory, I came across Ben Kutas, Professor Emeritus, Radiology.

MK

Hot Links and Country Flavors (1990). Bruce Aidells and Denis Kelly. Knopf. ISBN: 0-394-57430-3.

This book is great. It contains about 60 recipes for sausages, divided by region. It also contains about 200 recipes using the sausages you make. The andouille hash is one of my favorites.

V. References

- [1] Food Science--Osmosis, Rita Sorci Planey, "Fine Cooking",
Aug/Sep 1994, pp12,13

- [2] The New Professional Chef (1991). The Culinary Institute of
America.

- [3] Great Sausage Recipes and Meat Curing (1984), Ryttek Kutas.

- [4] On Food and Cooking (1984), Harold McGee.

- [5] Smoke and Spice (1994), Jamison and Jamison.

- [6] Hot Links and Country Flavors (1990). Bruce Aidells and Denis
Kelly.