



Cooking Techniques: Brining

Background

Brine, also called “pickle,” is a solution of salt and water. While many people use the terms interchangeably, pickle is used to designate a salt-and-water solution that also contains nitrite or cure. Brine or pickle may also contain other seasonings such as dry spices, herbs, or aromatic vegetables that add appealing background flavors. In Italy brine is also called salamoia and in some Italian salumerie, meats, particularly beef or veal tongue, can be seen floating in large earthenware crocks in a spicy brine that includes juniper, peppercorns, allspice berries, bay leaves, garlic, and thin-sliced carrot, celery, and onion. Brined meats are typically boiled and served either cold as an antipasto or hot as a secondo, following soup or pasta. Apart from the enhancement the meat receives through its absorption of salt and seasonings, brining also has a tenderizing and moistening effect. Brining requires more or less time depending upon the thickness and density of the cut of meat. As long as the meat remains submerged in brine, the brine is absorbed and diffused slowly throughout the meat. I don't recommend brining very thick cuts of meat, as those thicker than 3 inches may spoil at the center before the salt penetrates.

I use straight immersion brines primarily for pickling tongues and ears destined for cold antipasti, and for other trim cuts used in special cooked sausages that benefit from the additional seasonings, cured flavor, and color they pick up. Thin cuts of pork, such as boneless loin and tenderloin, as well as cubed meats from the leg or shoulder require a matter of three to five days to drink up the brine and are delicious skewered and grilled on a wood fire.

If you wish to make your own fresh ham, or brine denser cuts such as shoulders or heavy loins, it is wise to inject them first with brine using a brine pump before immersing them in brine. This is the surest way to introduce salt to the center of a dense cut of meat, where it is most vulnerable to spoilage. Submerging the meat afterwards in the brine allows the brine ingredients to diffuse and equalize throughout the meat.

The basic procedure for brining follows. I include this procedure in the event that the weights of the meat you wish to brine do not correspond to the recipes below. In such a case, it is important when working with percentages of salt or parts per million (ppm) of nitrite to understand the reasoning behind the recipes as the brine elements are based on the weight of the meat and the water it contains.

Procedure

When formulating your brine there are two calculations to make, the first to assure a minimum “brine strength” (or saline concentration) and sugar content, the second for the nitrite addition. Water content varies in raw meat between 60 and 70 percent. When making brine, the amount of salt is measured not only for its concentration in the water of the brine, but also in the water of the meat as well. If the amount of salt added to the brine were based on a percentage by weight of the water in the brine alone, the meat would, in effect, dilute it. In order to season the meat fully and to discourage the growth of bacteria, the brine strength should range between three to five percent salt in water. I use the average of 65 percent when considering the water-in-meat portion and, because I prefer more lightly salted meats, I add the minimum amount of salt to yield equilibrium brine strength of three percent. Sugar is added purely for its flavor-balancing effect on the salt at two percent and is calculated similarly.

For safety purposes it is important to make sure the meat is well chilled. The same applies to the water you use to make your brine, and the conditions of the refrigerator or cold room in which you are storing the meat. Ideally, meat, pickle, and refrigeration temperatures should not exceed 34 to 38°F at any point during the process.

I also observe the standard for nitrite addition, which is calculated in parts per million. The federal guidelines suggest an addition of 200 ppm for “immersion” cured meats. This level is based on the level for nitrite in the brine and in the meat at total equilibrium. This means that the quantity of nitrite is based on the total weight of the meat and the water in the brine.

For the sake of example, let’s say you want to brine-cure five pounds of boneless pork loin. Place the meat in a clean, nonreactive container large enough to hold it entirely submerged. Five-gallon plastic buckets are very handy for brining, as are square food-grade plastic Lexan containers available in restaurant supply stores. Determine how much water you must add to cover the meat by three inches by placing the meat in the container and pouring cold water over it, measuring as you go. For this example, three gallons of brine should be sufficient to fully immerse the meat. You would then calculate the amount of salt to add (the brine strength) as follows:

- 1 gallon of water weighs 8.33 pounds
- Water weight of loins = 5 pounds x .65 = 3.25 pounds water
- 3 gallons water = 25 pounds (rounded)
- Weight of water + water in meat = 25 + 3.25 = 28.25 pounds
- 28.25 pounds x .03 = .84 pound salt
- 28.25 pounds x .02 = .56 pound sugar

Once you know the weight of the meat and the weight of the brine, use this simple formula to arrive at the amount of curing salt needed.

- Raw weight of the meat = 5 pounds
- Weight of the water in the brine =
- 25.00 pounds water
- .84 pound salt
- .56 pound sugar
- Total brine weight = 26.40 pounds

$$\text{Pounds Nitrite} = 200 \text{ ppm} \times (\text{total brine weight} + \text{raw weight of the meat})$$

$$1,000,000$$

$$\text{Pounds Nitrite} = 200 \times (26.4 \text{ pounds} + 5 \text{ pounds})$$

$$1,000,000$$

$$\text{Pounds Nitrite} = 200 \times 31.4$$

$$1,000,000$$

$$\text{Pounds Nitrite} = .006 \text{ pure nitrite}$$

As noted above, sodium nitrite is commonly sold as a curing mix, a blend of common salt and nitrite. The nitrite content must be listed on the package; the curing mix I recommend is 6.25 percent pure nitrite. Because the formula above gives the percent in pure nitrite you will have to divide the amount of pure nitrite by the percentage of nitrite in your curing mix. To do this, express the percentage of nitrite in the cure mix as a decimal (move the decimal two places to the left) and divide the amount of pure nitrite needed by the percentage of the nitrite in the curing mix:

- $.006 / .0625 = .096$ pounds curing mix

With such a small amount, it will be necessary to convert to grams. There are 16

ounces in a pound and 28 grams in an ounce, so:

- .096 pounds curing mix x 16 ounces x 28 grams = 43 grams of curing mix

For the sake of accuracy, I convert the salt and sugar to grams as well:

- .84 pounds salt = .84 x 16 ounces x 28 grams = 376 grams salt
- .56 pounds sugar = .56 x 16 ounces x 28 grams = 251 grams sugar

However, because a significant amount of salt comes along with the nitrite in your curing mix, you must deduct the amount from the total quantity called for. Again, assuming a curing mix that is 6.25 percent nitrite (and therefore 93.75 percent salt), calculate as follows:

- 43 grams of curing mix (6.25 percent nitrite) – 3 grams of pure nitrite (rounded) = 376 grams salt – 40 grams = 336 grams additional salt

You are now ready to assemble the brine:

- 3 gallons ice-cold water
- 336 grams salt
- 251 grams sugar
- 43 grams curing mix
- 5 pounds boneless pork loin

You can make a spicy version of this brine for use in curing tongues, ears, and small cuts of meat. The percentages of salt and sugar are the same.

Source: Cooking by Hand, by Paul Bertolli (Clarkson Potter, 2003)