

# All About Brining

Brining is a popular method for improving the flavor and moisture content of lean meats like chicken, turkey, pork and seafood. This topic explains how brining works, which cuts of meat benefit most from brining, and concludes with a couple of recipes to get you started.

## Background On Brining

Historically, brining has been used as a method to preserve meat. Meat is soaked for many days in a very strong saltwater solution with the addition of sugar, spices, and other ingredients. This curing process binds the water in the meat or removes it altogether so it's not available for the growth of food-spoiling microorganisms.

With the advent of mechanical refrigeration, traditional brining became less popular for food preservation, but is still used today in the production of some meat products.



## Introducing Flavor Brining

Today there's a surge in popularity of "flavor brining", a term coined by Bruce Aidells and Denis Kelly in the book [The Complete Meat Cookbook](#).



While traditional brining was meant to preserve meat, the purpose of flavor brining is to improve the flavor, texture, and moisture content of lean cuts of meat. This is achieved by soaking the meat in a moderately salty solution for a few hours to a few days. Flavor brining also provides a temperature cushion during cooking--if you happen to overcook the meat a little, it will still be moist.

At a minimum, a flavor brine consists of water and salt. Other ingredients may include sugar, brown sugar, honey, molasses, maple syrup, fruit juices, beer, liquor, bay leaves, pickling spices, cloves, garlic, onion, chilies, citrus fruits, peppercorns, and other herbs and spices. Many recipes call for bringing the ingredients to a boil to dissolve the sugars and bring out the flavor of herbs, then cooling the mixture to below 40°F before use.

Sometimes a small amount of a curing agent like sodium nitrite or Morton Tender Quick (a mixture of salt, sugar, sodium nitrate, sodium nitrite and other ingredients) is added to a flavor brine. These curing agents create a color and taste reminiscent of ham and help prevent the growth of botulism. This is important when cold smoking brined meat at temperatures below 140°F or when smoking a large brined turkey that might not reach 140°F internal temperature within the first 4 hours of cooking. Sodium nitrite and Morton Tender Quick can be purchased at butcher supply stores or from suppliers like [Allied Kenco](#).

It's important to point out that not everyone likes the effects of brining on meat. Some

people don't like the texture that results, while others complain about the flavor, saying that it makes everything taste like ham (especially if sodium nitrite or Morton Tender Quick has been added to the solution) or that the meat tastes too salty. You'll have to judge the results for yourself.

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## How Brining Works

Pick up any book or visit any Web site that describes how brining works and you'll probably see the principles of **diffusion** and **osmosis** mentioned.

The [Merriam-Webster Online Dictionary](#) defines diffusion as "the process whereby particles of liquids, gases, or solids intermingle as the result of their spontaneous movement caused by thermal agitation and in dissolved substances move from a region of higher to one of lower concentration." Merriam-Webster defines osmosis as "movement of a solvent through a semipermeable membrane (as of a living cell) into a solution of higher solute concentration that tends to equalize the concentrations of solute on the two sides of the membrane."

There is general agreement among food scientists and writers that the processes of diffusion and osmosis are involved in achieving equilibrium between the flavor brine solution and the meat--in other words, that these processes attempt to balance the difference between the amount of water, salt, and flavorings in the flavor brine solution and the amount of water and dissolved substances inside the meat cells. However, opinions differ as to the mechanics of this balancing act.

The most commonly offered explanation is that the **flavor brine solution** contains a higher concentration of water and salt than the meat, so the solution passes into the meat cells through their semi-permeable membranes, adding water and flavor to the inside of the meat cells. This explanation is offered by authorities including [Cook's Illustrated](#) magazine and Robert L. Wolke, author of [What Einstein Told His Cook: Kitchen Science Explained](#).

Other experts state the opposite situation, but with the same end result: That **meat cells** contain a higher concentration of water and dissolved solids than the flavor brine solution, so the solution passes into the meat cells through their semi-permeable membranes, again adding water and flavor to the inside of the meat cells. Shirley O. Corriher, author of [CookWise](#), provides this explanation in her book.

Yet another explanation is that the flavor brine solution does not actually penetrate the meat cells at all. Instead, it just flows into the spaces between cells, where it draws out some moisture through the semi-permeable membrane of meat cells, increasing the concentration of naturally occurring sodium inside the cells. Some of the flavor brine solution remains between meat cells where it flavors the meat. The [California BBQ Association Web site](#) provides this explanation in an article written by Joe O'Connell.

Regardless of the explanation, all sources seem to agree that a higher concentration of salt inside meat cells causes protein strands to denature. The tightly wound proteins unwind and get tangled together, and when heated, the proteins form a matrix that traps water molecules and holds onto them tightly during cooking. In the case of the first two explanations, the denatured proteins hold on to some of the water, salt, and flavorings that **flowed into** the meat cells; in the case of the third explanation, the

denatured proteins are holding on to free water that was **already inside** the meat cells and would have been lost had the meat not been brined.

Which of these explanations is correct? I'm not sure, but in the end, it doesn't really matter. The bottom line is that flavor brining results in meat that is more moist and flavorful than unbrined meat, regardless of which explanation you choose to believe.

## Meats That Benefit From Brining

Lean cuts of meat with mild flavor tend to benefit most from flavor brining. The usual suspects include:

- **Chicken:** whole, butterflied, or pieces
- **Cornish Hens:** whole or butterflied
- **Turkey:** whole, butterflied, or pieces
- **Pork:** chops, loin, tenderloin, fresh ham
- **Seafood:** salmon, trout, shrimp

Poultry is probably the most commonly flavor brined meat because it is naturally lean and gets quite dry if overcooked. Lean cuts of pork are also good candidates for the same reasons as poultry, except that in the case of pork, much of the fat (and thus flavor) has been intentionally bred out of the animal by an industry intent on providing meat that appeals to health-conscious consumers.

Beef, lamb, duck, and other meats with high fat content and bold flavors do not benefit from brining--they're naturally moist and flavorful. They also tend to be cooked to lower internal temperatures and thus don't lose as much of their natural moisture.

Pork butt is not a good candidate for brining because of its high fat content. Brisket can be brined to become corned beef or pastrami depending on the seasonings used in the brine.

## Brining Enhanced Meat

Enhanced meat is injected by the producer with a solution of water, salt, and other ingredients to enhance the moisture content and flavor of the meat. Examples include Butterball self-basted turkey and Swift Premium Guaranteed Tender Pork.

Most people prefer to brine meat that's not enhanced so they have total control over the flavor being added to the meat. If you choose to brine enhanced meat, take care not to brine it too long, or the meat may turn out too salty. Having said that, though, there are people who like to brine self-basted turkeys and do not report that they turn out too salty.

See [Enhanced Meat](#) for information on how to identify enhanced meat in the supermarket.

## Which Salt To Use

Kosher salt and table salt are the most common salts used in flavor brining. I use kosher salt most of the time because it dissolves quickly and it's what most professional cooks use in their kitchens, but I also use table salt on occasion.

Sea salt can be used for flavor brining, but it tends to be quite expensive. If you have a cheap supply available, go for it; otherwise, stick to kosher salt or table salt.

Some people say that kosher salt tastes "cleaner" than table salt because it does not contain the anti-caking agents added to table salt. Some people prefer non-iodized table salt over iodized table salt, believing that potassium iodide creates an off-taste. However, these flavor differences melt away when salt is diluted in water.

In an article about salt in the September/October 2002 issue of Cook's Illustrated magazine, taste testers felt that "all nine salts tasted pretty much the same" when dissolved in spring water and chicken stock, whether it was \$0.36/pound iodized table salt, \$0.66/pound kosher salt, or \$36/pound Fleur de Sel de Camargue sea salt from France.

## Salt Equivalent Measures

Table salt and kosher salt do not have the same saltiness in a flavor brine when measured by volume--but they do when measured by weight.

Table salt weighs about 10 ounces per cup, while kosher salt weighs 5-8 ounces per cup, depending on the brand. If using kosher salt in a brine, you must use more than a cup to achieve the same salt flavor you would get from a cup of table salt.

The chart below shows equivalent amounts of table salt and the two most popular brands of kosher salt.

<b>Table Salt</b>	1 cup
<b>Morton Kosher Salt</b>	1-1/2 cups
<b>Diamond Crystal Kosher Salt</b>	2 cups

Morton Kosher Salt weighs about 7.7 ounces per cup, making it three-fourths as strong as table salt. Diamond Crystal Kosher Salt weighs about 5 ounces per cup, making it half as strong as table salt.

What if you're using something other than Morton Kosher or Diamond Crystal Kosher salt? Regardless of the type of salt—sea salt, pickling salt, and any other brand of kosher salt—just measure 10 ounces of it on a kitchen scale, and you will have the equivalent of 1 cup of table salt.

## Low-Salt Brining Doesn't Work

Some people find that flavor brined meat is just too salty for their tastes. Will a flavor brine still work if you cut the amount of salt in half? Not according to the November/December 2002 issue of Cook's Illustrated magazine.

Cook's brined shrimp, pork chops, and whole chicken in a full-strength solution and a half-strength solution for 1 hour per pound. After cooking and tasting, they found that the meats brined at half-strength were a lot less salty than those brined at full-strength, but the improvement in moisture content was marginal, at best. In fact, for shrimp and chicken, Cook's felt that there was no point in flavor brining at half-strength at all.

"If you are very sensitive to salt, we recommend that you skip brining," says Cook's.



### Choosing A Container

You'll need a non-reactive container large enough to hold the meat and the brine. Best bets include:



- **Food Service Containers:** Cambro or Rubbermaid food grade containers from a restaurant supply store (Picture 1)
- **Plastic Buckets:** used bulk food buckets (Picture 2), or non-food buckets lined with a turkey oven roasting bag
- **Coolers:** small, medium or large insulated ice chests (Picture 3)
- **Ziploc Bags:** 1- and 2-gallon sizes (Picture 4) and Big Bags XL
- **Reynolds Turkey Roasting Bag:** nylon bags intended for oven roasting
- **Pots:** stainless steel or anodized (do not use aluminum)
- **Bowls:** large glass, ceramic, or stainless steel mixing bowls (Picture 5)



Avoid garbage bags, used laundry detergent buckets, or other plastic containers not intended for food use. See [Food Grade Plastic Containers For Brining](#) for more information.



Also, keep in mind that the bigger the container, the more brine you'll have to make, so match the size of the container to the meat.

The meat must be completely submerged in the solution during the brining process. Place a heavy ceramic plate or bowl on top of the meat to prevent it from floating in the brine.

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## Refrigeration Is Required

**Flavor brining does not preserve meat.** The meat and brine solution must be kept below 40° at all times.

If storing the meat in the refrigerator during brining, check to make sure that the container will fit in your refrigerator! A container large enough to hold a whole turkey might be too big for your fridge.

If storing the meat in a cooler during brining, you must keep the meat and brine cold without diluting the mixture. Put the meat and brine directly in the cooler, then place Ziploc bags filled with ice or reusable gel packs into the brine solution. Another approach is to put the meat and brine into a turkey

oven roasting bag inside the cooler, then pack ice or gel packs around the bag. Monitor the temp of the cooler to make sure it stays below 40°F at all times.

### **Estimating The Amount of Brine To Make**

Place the meat in the container and cover with plain water. Remove the meat and measure the remaining water to determine the amount of flavor brine you'll need to make.

### **How Long To Brine**

The length of time meat soaks in a flavor brine depends on the type of meat and its size, as well as the amount of salt used in the brine--the saltier the brine mixture, the shorter the soaking time. Here are common brining times found in recipes:

<b>Whole Chicken</b>	3-8 hrs
<b>Chicken Pieces</b>	1-2 hrs
<b>Whole Turkey</b>	12 hrs-2 days
<b>Turkey Breast</b>	4-8 hrs
<b>Cornish Game Hens</b>	1-2 hrs
<b>Pork Chops</b>	2-6 hrs
<b>Pork Tenderloin</b>	2-8 hrs
<b>Whole Pork Loin</b>	1-3 days

It is possible to end up with meat that's too salty for your taste, so you may want to brine on the low end of the time range to see how it turns out. You can always brine longer next time, but there's no way to salvage a piece of meat that's been brined too long.

### **Brine Should Not Be Reused**

Discard the brine solution after use. The brine will contain proteins, blood, and other stuff from the meat that soaked in it. From a food safety standpoint, it is not advisable to reuse brine, even if it is boiled first.

### **To Rinse Or Not To Rinse**

Some recipes suggest that you rinse meat after brining, while others skip this step. Do whatever the recipe calls for. Rinsing is common in recipes with a very high salt concentration or recipes that contain sugar, since sugar can burn on the surface of meat during cooking.

Regardless of whether you rinse or not, make sure to pat the meat dry with paper towels before cooking.

### **Air-Drying Brined Poultry Skin**

Cooking brined poultry at "low & slow" temperatures of 225-250°F can result in soft and rubbery skin.

One solution is to place brined poultry on a rack over a rimmed baking sheet, pat it dry with paper towels, and let it sit uncovered in the refrigerator for several hours. This allows some moisture to evaporate from the skin so it browns better. Try 4-6 hours for chicken and 8-12 hours for turkey.

Probably the best way to get better skin on brined poultry is to cook in the 325-350°F range. The higher temperature gets the fat under the skin hot enough so that it browns the skin.

### **Brined Meat Cooks Faster**

Brined meat tends to cook faster than unbrined meat. Some people believe that the water added to meat through the brining process conducts more heat, resulting in a faster cooking time. The more likely cause, according to Robert L. Wolke in an e-mail to TVWB, is that the denatured meat proteins are partially "cooked" by the brining process, so the heat has less work to do and the meat cooks faster.

So, if you're used to cooking an unbrined chicken or turkey for a certain length of time, start checking the internal temp about 2/3 of the way into the normal cooking time.

### **Recipes To Get You Started**

Here's an all-purpose recipe from Cook's Illustrated magazine that works well with chicken and pork.

#### **All-Purpose Brine**

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1 quart cool water  
1/2 cup Diamond Crystal Kosher Salt  
1/2 cup sugar

Mix in a non-reactive container until dissolved. Substitute 1/4 cup + 2 TBSP Morton Kosher Salt or 1/4 cup table salt for Diamond Crystal.

Make 1 quart of brine for each pound of meat, not to exceed 8 quarts (2 gallons). Soak meat for 1 hour per pound, but not less than 30 minutes or longer than 8 hours. If brining multiple pieces, base the brining time on the weight of an individual piece.

Here's another recipe from Cook's Illustrated for high-temperature roasting, broiling or grilling. The lower sugar content results in less burning during cooking. The salt content has also been reduced.

#### **High-Temp Brine**

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1 quart cool water  
1/4 cup Diamond Crystal Kosher Salt  
2 tablespoons sugar

Mix in a non-reactive container until dissolved. Substitute 3 TBSP Morton Kosher Salt or 2 TBSP table salt for Diamond Crystal.

Make 1 quart of brine for each pound of meat, not to exceed 8 quarts (2 gallons). Soak meat for 1 hour per pound, but not less than 30 minutes or longer than 8 hours. If brining multiple pieces, base the brining time on the weight of an individual piece.

Due to its bland flavor, turkey really benefits from flavor brining. Here's a basic brine that will work well for a turkey in the Weber Bullet or in the oven.

### **Basic Turkey Brine (12-14 Hour Brining Time)**

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2 gallons cool water

2 cup Diamond Crystal Kosher Salt

Mix in a non-reactive container until dissolved. Substitute 1-1/2 cups Morton Kosher Salt or 1 cup table salt for Diamond Crystal.

Optional: 1/2 cup sugar (white or brown) can be added for each gallon of water.

Brine for 12-14 hours. Rinse turkey and pat dry with paper towels before cooking.

Here's a high-strength brine recipe from Cook's Illustrated that cuts brining time to just 4-6 hours.

### **High-Strength Turkey Brine (4-6 Hour Brining Time)**

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2 gallon cool water

4 cups Diamond Crystal Kosher Salt

Mix in a non-reactive container until dissolved. Substitute 3 cups Morton Kosher Salt or 2 cups table salt for Diamond Crystal.

Brine for 4-6 hours. Rinse turkey and pat dry with paper towels before cooking.

Finally, here's a brine recipe from Alton Brown of "Good Eats" on Food Network.

### **Good Eats Turkey Brine**

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1 gallon vegetable broth

1 gallon heavily iced water

1 cup Diamond Crystal Kosher Salt

1/2 cup brown sugar, packed

1 tablespoon peppercorns

1/2 tablespoon allspice berries

1/2 tablespoon candied ginger

Use regular vegetable broth, not low- or no-sodium varieties. Substitute 3/4 cup Morton Kosher Salt or 1/2 cup table salt for Diamond Crystal.

Combine all ingredients except ice water in a large pot. Bring to a boil over high heat, stirring to dissolve. Remove from heat, let mixture come to room temperature, then refrigerate to 40°F.

In a large non-reactive container, combine the mixture with 1 gallon heavily iced water and stir. Place rinsed, drained whole turkey into the brine. Use a heavy weight to keep the bird submerged, if necessary. Refrigerate for 6-8 hours. Turn the bird over once during brining.

Rinse turkey and pat dry with paper towels. Apply a thin coat of canola oil before cooking.