

Does The Bone Make the Meat Better?



Closest to the bone,

Sweeter is the meat, Last slice of Virginia ham, Is the best that you can eat. Popular song "The Closer To The Bone" by Louis Prima, 1957.

By ***Meathead***

It is a common belief that bones make grilled and barbecued meat taste better. The shibboleth goes that bone-in ribeye is tastier than boneless, that bone-in pork shoulder makes better pulled pork than boneless, that bone-in chicken breasts are more succulent than boneless, etc.

Fact or myth?

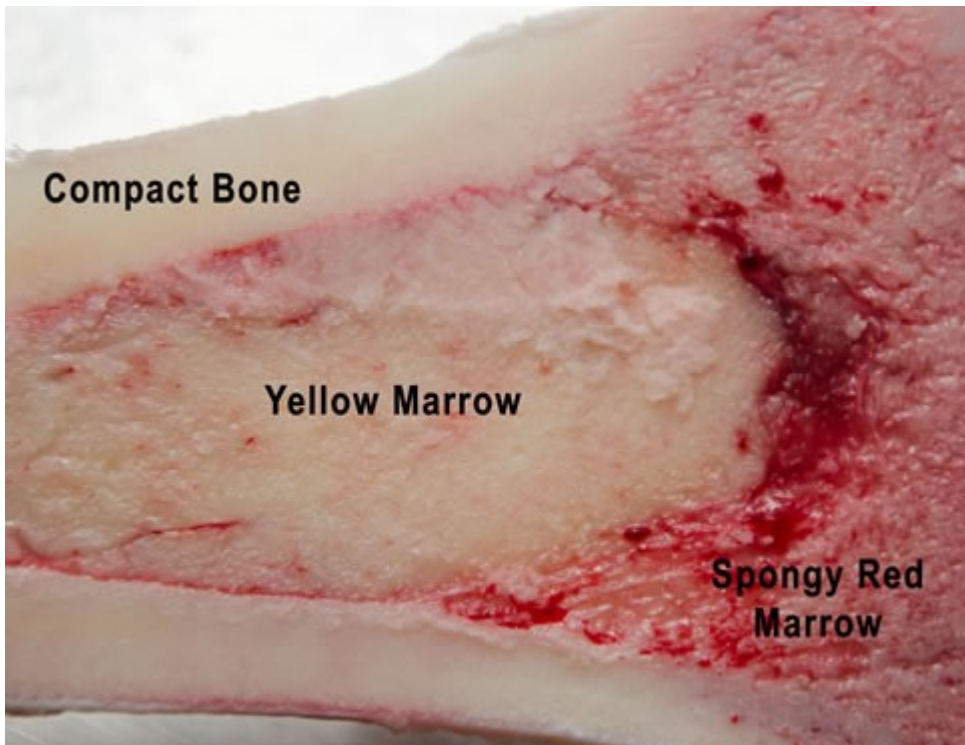
Mostly myth.

On slabs of ribs, there is no question that the intercostal meat, the meat between the bones, is special. It is loaded with **connective tissue that can gelatinize and become sweet and succulent**. There is also a lot of fat marbling in there, and the old saw that "fat is flavor" is no myth. On poultry, the connective tissue between the ribs is often sucked and savored because it is so tasty and because, if you did it right, it has seasoning on it.

But what about other bones? What about bone-in ribeye, shown above, or T-Bones, or pork butts?

Anatomy of bones

Bones are complex structures and they differ from species to species and location to location. In cattle, leg bones are different from neck bones or rib bones, etc. In chickens, leg bones are very different from rib bones. The differences are mostly in the function of the bone. Bones have important architectural functions. They are load bearing and protective. But there are some things that most bones have in common.



Bone exteriors. The

exteriors are walls of calcium and other minerals called "compact bone" designed to bear loads and protect organs. The larger the animal, the thicker the compact bone. Obviously, bovine leg bones have much thicker calcium than chicken breast bones. Bone walls do not dissolve or melt during cooking. There are small channels running through the calcium to carry blood and nerves to and from the marrow, but in general, the calcium is not very porous so very little marrow can leak out during roasting or grilling, even under the pressure of heat.

Marrow. The marrows of bones are complex. **Dr. Antonio Mata**, the AmazingRibs.com meat consultant says that bone marrow can be broadly divided in two categories, red marrow and yellow marrow. "Red marrow is the hard honeycomb marrow that we have all seen in ribeyes, T-bones, and porterhouses because the bones are often cut open by a bandsaw" he says. "It can also be found in the ends of bones." These highly porous marrows, also called spongy marrows, serve as home to stem cells that produce blood cells. That's why the ends of pork rib bones often turn black during cooking. Although almost all blood is drained from muscle tissue during slaughter (the pink liquid is myoglobin, a protein, and water, not blood), some blood can be trapped in bones. Yellow marrow is the type you find in the center of femurs and other leg bones. It is mostly fat. You can eat it and it is orgasmic" says Mata ([click here to see a recipe for grill roasted marrow](#)). Cowboys call it prairie butter. I call it poor man's foie gras.



Connective tissue. Bones

are surrounded by membranes of connective tissue that anchor muscle to them. This sheathing, we call it gristle, is mostly made of a protein called collagen which can partially turn to gelatin when heated to the right temp. Invisible collagen also surrounds muscle groups and fibers ([see my article on meat science](#)) and it is more tender in young animals than old. Gelatinized collagen is a major contributor to the richness and mouthfeel of meat. You've seen it when you chill cooked meat, especially chicken. The juices solidify and form a gel called aspic. It is very different from fat. Taste it. It is pure essence of meat. There is a lot more connective tissue and fat between rib bones than any other muscle groups, which explains why we love ribs so. And the rib cage of a chicken has a tender membrane, the pleura, that encloses the organs. It softens with cooking and is fun to rip off with your front teeth. This membrane on pork ribs can get hard and leathery. Not so much fun. But in a steak or roast or even a chicken breast, there is no way the gelatin can wriggle down through the muscle fibers and impact the flavor of a whole piece of meat. Meat is just not that porous.

The cooking method matters

In wet cooking methods, such as braising and in slow cookers, where the meat is submerged and simmered for hours in liquid, the marrow can dissolve and can have a major impact on the flavor of the liquid and the meat. Braising liquids are often made with wine and/or water, both solvents that help pull out the marrow. Marrow is a major reason ossobuco, braised veal shanks, is such a wonderful treat (although gelatinized collagen is also important). This is where the idea that bones add flavor to meat began.

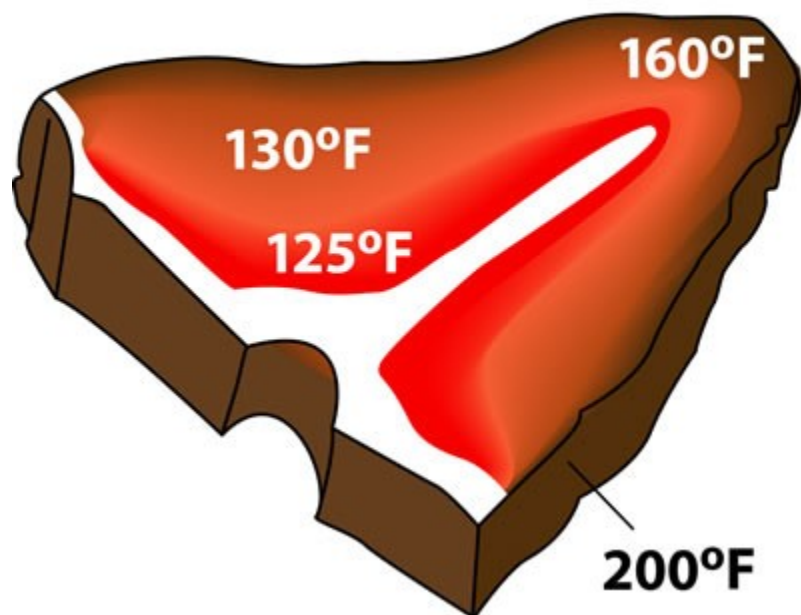
But bones contribute no significant flavor to meats cooked by dry cooking methods such as grilling, low and slow barbecue, oven roasting, or frying (frying is considered a dry method because there is no water). A tiny bit of marrow might escape the ends if they have been cut, and minuscule amount may escape if the bone has been sawed open lengthwise, as it often is for T-bones and ribeyes (see the ribeye photo above). But the small amount of liquid in red marrow does not travel far onto or into the meat. It can influence only the meat immediately adjacent to the bone.

It is possible that some of the fat and collagen inside the marrow can exit through the pores in the bones, but again, this is a very small quantity and there is no way it can travel more than a fraction of an inch into the muscle if it can somehow get beyond the sheath surrounding the bone. Some marrow may drip onto the fire, and when it incinerates the smoke and gases might strike the surface of the

meat. But this is a small amount of the total drippings, most of which is edge fat, intramuscular fat (marbling), and myoglobin (mostly water from within the muscle cells).

Thermal impact of bones

Inside a T-Bone



Bones can have an impact on heat transmission. Some bones, particularly those that have a honeycomb like interior, are slow to heat up because they are a Styrofoam-like insulator filled with air pockets. Then when they get hot, they can retain heat longer than the meat. It's sort of like a pizza stone. If you throw it in the oven, turn on the oven, and then add the pizza, the stone will be cool and the bottom of the pizza undercooked. But if you let the stone heat up for at least 30 minutes, it will crisp the bottom of the dough, and if you serve the pizza on the stone, it will keep it warm for almost an hour.

So, depending on how long you cook, the meat closer to the bone can be slightly more or less cooked than the meat just half an inch away. In the case of a steak, the insulation properties of the bone will leave the meat closest to the bone about 5 to 10°F cooler than the center of the steak. So, if you take the steak off at 130°F, medium rare, it may be rare along the bone. That can make it slightly more tender and juicy closer to the bone. Or it can be undercooked and stringy.

If you leave the bones on a big rib roast, they make an effective base upon which to stand the roast (hence the name standing rib roast), and they act like a heat shield, at first blocking heat from below until they get fully hot and then they conduct heat and continue to cook the meat after you take it out of the cooker. But normally we don't want one part of the meat lagging behind the rest and then continuing to cook when the rest has stopped. We want the meat to cook evenly throughout. No surprises. And since so much of the fun of a large roast is the rich brown crust, hopefully rife with salt, herbs, and spices, leaving the bones in can prevent up to 1/3 of the surface from browning and make carving a pain. That's why I remove the rib rack from standing rib roasts of beef and crown

roasts of port. I cook the ribs separately, savoring the intercostal succulence, and get the roast brown all over (see my article on beef roasts).

On cuts like a **pork shoulder**, which is often cooked low and slow for a long time, the bone is mostly buried in the large roast. It is slow to warm, and it can remain hot after the meat begins to cool when removed from the cooker.

I asked Professor **Jeffrey W. Savell**, Leader of the **Meat Science Section in the Department of Animal Science at Texas A&M University** how bones impact meat. "We do have some national data about the tenderness, juiciness, and flavor of bone-in and boneless ribeye and strip steaks, but the differences were very small. I believe that cooking these steaks with the bone helps to form them so that they are more uniform in thickness when cooked and protects the lean from being overcooked."

Another factor that needs to be mentioned. According to Steven L. Moore, Director of Innovation at **Brand Formula**, a food science consultancy, "Bone, in many cases seals the muscle from losing meat juices as it is cooked. So, when a muscle is de-boned there is usually a large area now that is exposed muscle, no longer sealed to help maintain juices through cooking. Removing a chicken breast from the breast bone for instance drastically increases the surface area of the breast that will be directly exposed to the grill or heat, which will result in more evaporation from the muscle or meat juice loss (drying) in cooking. An associated phenomena is the fact that many boneless products have also be closely trimmed while being boned, therefor the boneless version of a muscle versus the bone in version of the same cut or muscle is significantly different, boneless chicken is usually skinless chicken, boneless boston butt is usually a more highly trimmed boston butt." On the other hand, removing bone exposes more muscle to seasoning and browning, and seasoned brown meat is very tasty stuff. Who doesn't love the crust of a roast?

There is another factor to consider. You buy meat by the pound. You are paying for bone when you get bone in meat. Sometimes it is cheaper because boning chicken breasts is labor intensive, but the price is something to consider.

Finally, there is one major reason to leave bones in. We love chewing on them. The surfaces are often charred, and if the sheathing has softened, it can be very satisfying. Some people even like sucking the marrow out.

So, it seems Mr. Prima was right when it comes to warm air cooking. "Closest to the bone, Sweeter is the meat." But the refrain could easily be "A fraction away, No difference, no way."