# Barbecue 101

## *A Guide to Wicked Good Barbecue*

### *Part III: The Meat*

**By Dan Gill**

**Now that you have your pit and a bag of Wicked Good charcoal, it is time to select and cook some meat. Meat is composed primarily of muscle fibers, organized into bundles held together with connective tissue with a sprinkling of fat deposits. How these muscles develop and are used by the animal determines how they should be cooked. I will talk mostly about commercially available red meat in this article; grass-fed beef, game animals, poultry and fish will be dealt with another time.**

**In selecting meat for your pit, fat is important. Surface fat keeps meat from drying too much during the later stages of cooking, and flavors the surface browning or "Bark" formation. Internal fat bathes muscle fibers, adding flavor and the sensation of juiciness. If you buy packaged meat, check the label for any indication that water has been added. Some major retailers have started engaging in this nefarious practice, even with beef. There is no ethical justification for such mercenary adulteration. Caveat Emptor! (In other words, shop elsewhere.)**

**There is little quality variation in commercial pork, so just look for enough fat covering for it to cook properly and not dry out. Modern pork has been bred and fed to be lean. It is raised in confinement, fed formulated rations and processed at a young age: It is all uniformly mediocre. Selecting beef is more of a challenge. Again, fat is important. Look for a nice covering but not too much. Buy at least USDA choice. If you can see the muscle end, look for fine-grained marbling. Unless you are a good judge of meat, it pays to buy Certified Angus – not that Angus is better than any other breed, but the Angus program does assure the consumer of a certain level of quality. Only upper choice and low prime qualify and it must meet other less obvious criteria. In selecting briskets and ribs, bend or flex them and select the more pliable (tender) ones.**

**Basically, there are only two kinds of meat for a pit: Tough or tender. Tender cuts, such as loin muscles, are used to support and hold the skeleton together but do little strenuous work. There is not much connective tissue, and it is of a finer texture. Tender cuts are usually "smoke-cooked", often at higher temperatures, but only to the desired degree of doneness. Tough cuts are from "working muscles" such as shoulders, briskets and ribs, and are "barbecued", that is, cooked slowly for a long time in order to melt connective tissue and make them tender and moist.**

**Raw meat contains "aging" enzymes and protein complexes, which continue to affect flavor, tenderness and appearance until they are destroyed by heat. These enzymes slowly break down muscle and connective tissue proteins making meat more tender and flavorful. Readers of my articles know that I like to use buttermilk in brines for some meat and poultry. Milk products are high in calcium, and calcium greatly enhances the action of aging enzymes. The meat industry is now working on ways to increase calcium levels in muscle tissue (both pre- and post- mortem). Aging enzymes do their best work on a whole beef carcass when it is hung in a cooler for several weeks to "dry age". Because of the industrialization of meatpacking plants, the days of dry aging are over. Beef can be improved somewhat by "wet aging": storing it in the refrigerator for a week or so while it is still in the "Cryovac" bag. Often the liquid in these bags will have a strong odor because of the lack of oxygen – simply rinse the meat well and then give it the sniff test. Gases in the bag are a sure sign that you have aged your meat too long. Aging enzymes are most active as meat warms. Many cooks will allow meat to come to room temperature before cooking. Slow heating, as in a pit, also hastens the aging process.**

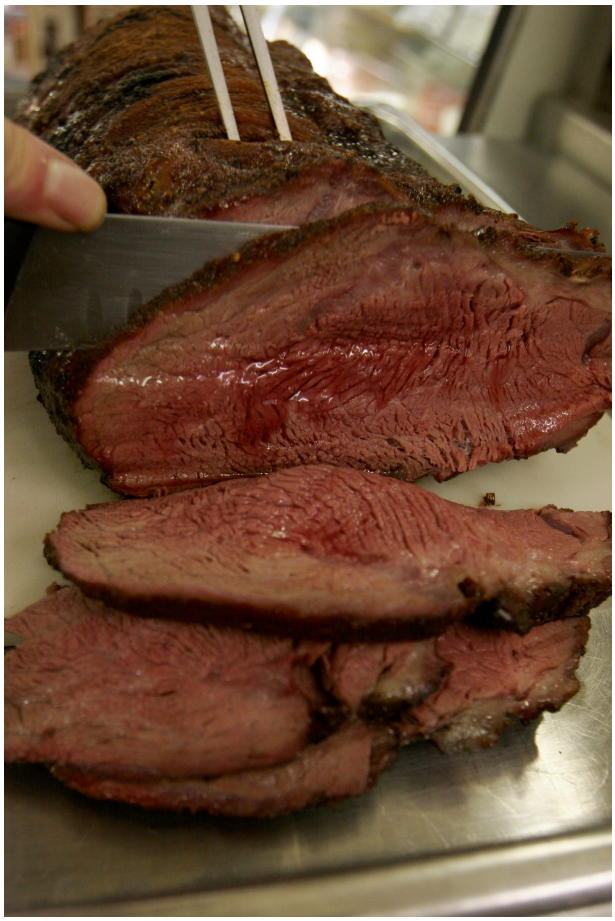
**Myoglobin is the iron-rich protein in meat that makes it red and colors the juices. It denatures as meat cooks, eventually turning brown, indicating "doneness". In a pit, nitrogen compounds in wood smoke can be absorbed by meat and react with myoglobin to form a stable pink zone known as a "smoke ring", an indication of proper barbecue technique. Some unscrupulous practitioners add nitrogen-containing curing salts to their rubs to create an artificial smoke ring.**

**Muscle contains about seventy percent water, incorporated in cells and tissue. The cooking process, regardless of method, releases and expels water. Raw meat, though moist, is not "juicy" and does not have much flavor. If heated only to the "bleu" stage, about 120°, it becomes firmer and juicy as cells begin to rupture and protein starts to coagulate and contract. This process continues through the "rare" stage, about 130°, as more moisture is released and protein begins to break down into flavorful and savory amino acid groups.**

**By now, free water has started migrating to the surface, cooling it and regulating the cooking rate.**

**At around 140° collagen starts to shrink, squeezing out more water and making the meat firmer, drier, and tougher. By now enzymes are destroyed and pigment molecules, such as red myoglobin, are denatured. From about 140° to 150°, so much moisture is squeezed out that cooking progress can actually stop as most of the heat energy is being used to evaporate water. This is known as the first plateau or stall. Tender cuts are now dry, tough, grey and pretty much ruined. Tough cuts are inedible. These moisture losses are inevitable: Boil, foil or steam a tender cut to well done and it will be just as dry and tough as it would be if roasted in an oven or over an open fire.**

**The true art of meat cookery in general and barbecue in particular is dependent upon how these inevitable changes are managed and manipulated. For example, when cooking a roast to "rare" (130° at the center) at barbecue temperatures (250° +/- 25°), meat heats slowly and uniformly as the surface remains moist and therefore below the boiling point of water. This method results in rare meat from the center almost to the surface. At higher temperatures, water is evaporated from the surface faster than it can migrate out from the interior. As the surface dries, it heats beyond the boiling point of water, allowing complex bio-chemical reactions to take place and aiding in the penetration of heat energy. High surface temperatures result in "Maillard browning reactions", which transform carbohydrate and amino acid combinations into intensely flavored compounds and create the "bark". Faster cooking of the outer layers results in a progression from well done to rare. The higher the temperature, the more bark develops and the deeper the well-done zone penetrates relative to the shrinking rare zone.**



**Which way is better? It all depends upon personal preference and who will be eating it.**

**Tough cuts are taken through the first plateau and then on to the second plateau (or stall), when connective tissue starts to dissolve and fat renders. Collagen is the primary component of connective tissue and begins to break down into water and gelatin at about 160°. Greek for "glue producing", collagen is also a major constituent of hides and hoofs, which are rendered into glue and commercial gelatin, and it makes meat stocks gel when chilled. Once collagen starts to melt, much of the cooking energy is used to drive the conversion process, thereby slowing the cooking rate again. This is when "Pit Masters" (artists) are separated from "pit cooks" (practitioners) and when moisture management becomes critical. Artists will use the stall to allow time for collagen to melt slowly and for flavorful "browning" reactions to occur as the surface dries. They may even reduce the pit temperature somewhat, or baste, thereby slowing the cooking rate by additional evaporation. Practitioners, on the other hand, will try to push through the stall: They may increase pit temperature or employ the "Texas Crutch" – aluminum foil. Both approaches speed the process at the expense of the final product. Since there is little moisture left on the surface, high pit temperatures dry the meat and, going beyond "browning", can actually char the surface. Foil definitely speeds up the process as it prevents evaporative cooling and essentially steams the meat, but from a flavor and texture perspective, foiling is only a little better than boiling.**

**Once meat breaks out of the second stall at about 180°, things happen fairly fast and you need to pay attention. Start checking for the proper stage of tenderness. A fork should easily penetrate briskets and pull out without the meat trying to follow. Slabs of ribs become flexible, the surface cracks when bent and it gets a sheen from rendered fat. It should be removed from the pits before it reaches 200°. Beyond this point the structure breaks down, steam pockets form and meat gets mushy. Properly cooked, without taking any shortcuts, the meat will have shrunk considerably and lost about half of its original weight because of moisture and fat losses. If done right, It will have entered the mystical realm of barbecue nirvana. This is why the real thing is expensive and hard to find.**

**Next time, we will talk about seasonings and how to make your barbecue taste like "Something Different". In the meantime, if you want to learn more about the science of food, read Harold McGee: <u>On Food and Cooking</u>.**

**e-mail –** sdcsdeli@yahoo.com

**www.pine3.info**