

The Thrill of the Grill



Grilling the perfect steak just got easier with these new tips based on research from South Dakota State University.

by **Kindra Gordon**

Most people who grill steaks often have a special “art” to their technique. Some say to season the steak “just so,” while others claim the secret is in flipping the meat just once during cooking; and still others swear by keeping the grill lid open — or closed.

New research from South Dakota State University (SDSU) is taking some of the guesswork out of grilling. University researchers say there is some science to grilling the perfect steak on a gas grill.

To come up with the new grilling guidelines, SDSU meat scientists Duane Wulf and Robert Maddock, as well as graduate student Brock Streff, grilled more than 1,400 steaks and presented them to a taste panel of 12 people who evaluated the steaks for tenderness, juiciness and beef flavor intensity. Salt and pepper flavor and presence of any off-flavors were also evaluated. (Steaks were also evaluated for tenderness using Warner-Bratzler shear force.)

Wulf says the research was initiated because more than 60% of the population own gas grills, but current cooking instructions are for charcoal grills. Based on their research using USDA Choice strip loins, here’s what the scientists learned:

- ▶ Steaks that were flipped every two to three minutes were juicier than steaks that were flipped once during cooking.
- ▶ Steaks that were cooked on high heat first and finished on low heat cooked in a shorter time than steaks cooked on

medium heat, but there were no differences in tenderness, juiciness, flavor intensity or overall desirability between the two.

- ▶ There were no differences between steaks grilled with the lid open or closed. However, grilling with the lid closed greatly reduced grilling time.
- ▶ Steaks were more tender and flavorful if thawed completely before grilling, compared to steaks that were frozen when put on the grill.
- ▶ Some cookbooks suggest that steaks should not be seasoned before grilling, because it will draw out moisture. But the SDSU research showed that salt can be added either before or after grilling with no difference in results. However, pepper and herbs should be applied after grilling, because some flavor is burned off during cooking.

Which cut is best?

A second phase of the SDSU research evaluated seven different cuts at two degrees of doneness to determine differences in cooking time, tenderness, shear force, juiciness, flavor and overall desirability. Three conventional types of steak (ribeye, tenderloin and sirloin) and four innovative steaks (flat-iron, round tip center, boneless short rib and ranch cut) were evaluated. The cuts were tested at three grades [top Choice, USDA Select and enhanced (deep-marinated) Select] and two degrees of

doneness (medium rare and medium well).

Although many of the muscles that make up the innovative cuts currently go into roasts or ground beef, Wulf reports that the innovative cuts rated on par with traditional steak cuts in their research. He says, “There is no reason not to market them as steaks” — which would add value to beef carcasses.

However, the researchers found that as cooking time and degree of doneness increased, palatability declined, especially for some cuts more than others. Wulf reports that palatability of all seven cuts was acceptable when cooked to medium rare but, he says, “If you prefer to cook your steak medium well, the best choices are tenderloin, flat-iron or ranch cut.”

Enhancing steaks with a deep marinade also appears to improve palatability. USDA Select steaks that were deep-marinated or “pumped” with a solution of water, salt and tripolyphosphate scored best in palatability ratings compared to Choice and regular Select cuts in this research.

Evaluating eye appeal

In a separate SDSU study, consumer buying preferences were evaluated at a grocery store to determine if a certain ribeye size is preferred. Wulf and graduate student Kurtis Sweeter packaged 700 USDA Choice ribeye steaks into five different ribeye sizes [10.3, 11.8, 13.5, 15.3 and 17.0 ounces (oz.)] and monitored consumer buying habits at the meatcase of a Brookings, S.D., Hy-Vee grocery store throughout a 20-day period. The steaks were all priced at \$6.99 per pound (lb.), resulting in different prices per package due to size differences.

The researchers found there were no significant differences in the buying preferences of consumers based on steak size. All steak packages sold at equal speed.

Another study looking at steak size had 73 consumer volunteers bid on three different types of Choice steaks at an auction used by economists to evaluate price differences. Each participant was given \$15 and had the opportunity to bid on average-size ribeyes, very large ribeyes, and very large ribeyes cut in half.

Results of this study showed that consumers were willing to pay a higher price per pound (+68¢) for the very large ribeyes, while they would pay much less (-46¢) per pound for the very large ribeyes cut in half.


From these two studies, the SDSU researchers concluded that consumers do not care about ribeye size, and, Wulf says, it is unnecessary for producers to limit ribeye size through genetic selection.

Currently, the beef industry recommends that the ribeye muscle be 12 to 15 square

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inches (sq. in.). But Wulf says limiting ribeye size to those parameters is unnecessary. It can even be counterproductive, since the ribeye is an indicator of the amount of muscling on a carcass, and a larger ribeye means more pounds of roasts, ground beef and other steaks. 

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Grilling guidelines

Steps for grilling a perfect steak on a gas grill, based on SDSU research, include the following.

Step 1. Thaw steak completely before grilling.

Step 2. Start grill, set control(s) to medium, and close lid.

Step 3. Allow grill to warm for 5-10 minutes (min.), with lid closed.

Step 4. Before grilling, pat the steak with paper to remove surface water.

Step 5. Seasoning can be done before or after grilling (some spices, such as pepper and herbs, may burn off during grilling).

Step 6. Grill steak on medium heat with lid closed, turning every 2-3 min. until desired internal temperature is reached.

Step 7. Let steak stand for 5 to 15 min. before serving to redistribute juices.

A brochure titled "Great Steaks From Your Grill," which includes grilling tips and advice, is available from SDSU's Animal and Range Sciences Department by calling (605) 688-5165.