## To Market to Market

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Do you remember when fat was the villain and reduced-fat food became the rage? Food companies scrambled to reduce the fat content of almost every food that contained fat, especially saturated fat that was linked to increased levels of cholesterol in the blood and heart disease. This occurred in the mid-to-late 1980's and continued to grow through the 1990's. Jumping on the bandwagon the National Pork Board launched an advertising campaign to promote "Pork. The Other White Meat" in 1987. The campaign presented the image that pork was more like healthier lower-fat chicken than red meat like beef, because beef was higher in saturated fat than chicken. Well before the start of the advertising campaign pork breeders were taking steps to produce leaner pigs. The meat-eating public was well aware of the concerns about eating red meat resulting in chicken consumption overtaking beef in 1992. The pork producers wanted pork to be perceived to be more like chicken.

The United States Department of Agriculture has always classified pork as a red meat because of the similarity in fat content and composition. Newer generations of leaner pork may have less fat than older generations, but the composition of the fat is still about the same largely due to the cereal grain based diet fed to pigs and cattle since the 1970's. The development of pigs with less fat might have produced a healthier form of red meat, yet unlike chicken the per capita consumption of pork has remained almost constant since 1970, approaching 50 pounds per person per year in the United States. Could it be that leaner, paler pork is less appealing to the consumer?

Leaner pork is less flavorful, less moist, and requires careful attention to cooking conditions to produce meat that is not as tough and dry as shoe leather. Is it any wonder sales have not kept pace with chicken? Until just a few years ago the USDA recommendation was to cook whole cuts of pork to 160F to avoid any illness due to trichinosis parasites. But moving hogs indoors and feeding them a well-controlled safe diet has lowered the incidence of trichinosis to about two cases per year in the entire US population. In 2011 the USDA changed its recommendation to cook whole cuts of pork to 145F followed by a 3-minute rest. Ground pork must still be cooked to 160F like ground beef. But whole cuts of pork can be cooked so it is slightly pink inside and much more tender. Although moving in the right direction this step does not result in more flavorful meat.

Buying pork in the supermarket is a guessing game. How does one know if a cut of pork will be flavorful, moist, and tender? Is it even possible to buy pork with these attributes, and if so how does one tell? With a little knowledge of the science of pork it is actually quite easy. It is based on the color of the fresh meat. To understand the science let's step back and look at how the quality of pork is categorized and how it is produced. The quality of pork is divided into three main categories: The ideal standard, RFN (stands for reddish-pink, firm, nonexudative, or no exuded water in the package), and the lower standards, PSE (pale, soft, and exudate), and DFD (dark, firm, and dry). PSE is inferior in texture (mushy), flavor, and moistness. DFD is actually of exceptional quality with excellent water-holding capacity and tenderness. But because of its dark red color consumers wrongly believe it is meat from older animals, lacking freshness. About 25% of all pork falls into the less desirable PSE and DFD categories.

There are three critical stages in pork production that affect the quality of the meat. These stages occur before, during and following slaughter of the animal. Nowadays slaughtering animals and birds for food consumption is referred as "harvesting". Not surprisingly, the amount of stress experienced by the pig before and during slaughter has a profound effect on the quality of the meat. When animals are stressed they produce higher levels of lactic acid, which lowers the pH of the meat. The pH of muscle in live animals is neutral, or pH 7. When excessive lactic acid is produced during stress the pH drops significantly, to as low as 5.5-5.2 (moderately acidic). The pH of the muscle tissue determines if the meat will be tender and juicy or tough and dry. It also has a direct bearing on the flavor of the meat. The pH of pork is measured 45 minutes after slaughter and typically should be close to pH 6.2, and preferably closer to pH 6.5. If the pH is lower, for example pH 5.7, the muscle fibers will tighten and hold less moisture when it cooks. But most importantly, the enzymes called calpains, that break down the muscle proteins and make the meat tender and flavorful are most active close to pH 7. These enzymes continue to tenderize meat after the animal has been slaughtered. So meat that has a pH of 6.5 will be much more tender and flavorful than meat that has a pH of 5.7 or lower.

But of course we can't bring a pH meter to the market when we buy pork. Fortunately, there is a simple way to tell the pH of the meat, and that is by its color. The pigment that colors all red meat is a protein called myoglobin. It is found in all muscle cells and is there to store the oxygen that muscles need for action. Hemoglobin is another protein that is colored red and is found in the blood where it transports oxygen from the lungs to the muscle cells. Hemoglobin is actually composed of four myoglobin molecules linked together. But hemoglobin is too large to enter muscle cells. In order to transport the oxygen into the cells each hemoglobin molecule must dissociate into four myoglobin molecules, which then ferry the oxygen into the muscle cells. The intensity of the red color of myoglobin is dependent on the pH. The higher the pH the redder the color of myoglobin. Thus we can simply look at the pork and gauge its pH. Darker red colored meat means higher pH. Darker red color means the pork will be more tender, moist, and flavorful. Unfortunately, consumers who shun dry, firm, dark (DFD) pork because they think it is not fresh are rejecting the best cuts of pork. So next time you are in the supermarket look for cuts of pork that are dark, well marbled with fat, and contain no free water in the package. Pass up those pale, mushy looking cuts because they will be tough, flavorless, and dry.

Some of the top breeders of pigs are now taking great care to raise and slaughter their animals with the minimum of stress, producing meat that is dark, flavorful, and tender. Pork from these pedigreed pigs is expensive, but worth it, not only because of the quality of the meat, but because the animals have been treated more humanly. Next time you are in the supermarket notice how dark the pork has gotten. Perhaps the National Pork Board will change its slogan to "Pork. The Other Red Meat"!



Which would you prefer?

