



Why the Chicken Comes Before the Lemon

Or the science behind making a meal taste better. BY BRIAN J. GEIGER

I'VE ALWAYS LOVED EXPERIMENTING. In my day job, I mess around at a robotics firm. When I get home, I do my experimenting in the kitchen. And because I'm a geek (I admit it), when I get interested in something, I tend to go into it a bit further than a normal person. The good news is that my all-consuming focus doesn't just lead to interesting discoveries—it also results in better-tasting food.

Take, for example, a recent trip to the grocery store, where I saw lemons on sale. My first thought on seeing a whole bag of lemons was one you've probably had as well: "Wow, I could make a lot of chicken piccata." No? Well, to me, the sight of all those lemons made me want to play around with my standard recipe, to see if I could improve on a weeknight staple. Here's what I found out.

Chicken piccata is a fast, easy recipe—you flatten chicken cutlets, dredge them in flour, sauté until brown, and then make a pan sauce with some lemon juice added for tang. I thought to myself, Wouldn't it be an awfully good idea to use lemon earlier in the cooking, to infuse the chicken with lemony goodness? Might not even need a sauce at that point. Crazy thinking, I know.

So I added an extra bowl at the beginning of my dredging station and put lemon juice in it. I dipped the flattened chicken breast into the lemon juice, then in flour, then into a hot skillet. The odd thing was that the chicken didn't cook quite right. It was mostly fine, but the browning was uneven.

I wondered if the problem was that the chicken was too wet (because of the added

amp up the flavor

As our Food Geek learns, browning chicken and other foods creates intense flavors. His conclusions point to two good tips:

- For meat to brown, it must be heated hotter than 230°F.
- Too much acid (like lemon juice) will result in less browning.

lemon juice), so I made two cutlets side by side, dipping one in lemon juice at the beginning and one in water. Strangely, the lemony chicken browned unevenly and didn't have as complex a flavor as the one dipped in water.

What was going on? I concluded that the results had something to do with the Maillard reactions. These are a series of chemical reactions that cause browning and amp up the flavor when you cook meat, vegetables, or anything that isn't mostly sugar. A French scientist named Louis-Camille Maillard discovered these reactions in 1913 when researching cell biochemistry, and most of the research

browning occurs at 230°F. Water normally boils at 212°F. Therefore, if you have too much water, you'll be steaming whatever you're cooking, and it will never have the chance to brown.

PH The environment should not be acidic. Aha! This is when I realized that too much lemon juice was throwing off the pH balance of my chicken piccata. That's why it wasn't browning. You know how if you put sliced apples in water with lemon juice, they won't turn brown? That's because the browning of fruit is a Maillard reaction as well, albeit one

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had to do with diabetes, not cooking. But that doesn't mean we can't use what scientists have learned in order to make better food.

Here's what we know about Maillard reactions: Heat + amino acids + sugar + water in a pH-neutral to somewhat alkaline environment will make food taste better. Too much to take in at once? Let's break it down.

HEAT This is the easy one. Not all that much heat is necessary for the golden-brown deliciousness of the Maillard reactions—generally, about 230°F. This is significantly lower than is needed to caramelize sugar, which is good because otherwise, meat would dry out while you're trying to bring out the flavor. Another way to encourage browning is to cook at a lower heat for a longer time.

AMINO ACIDS Proteins, like the ones found in meat and gluten, are composed of building blocks of about 20 amino acids. In addition, there are hundreds of other amino acids running around doing things that are unrelated to making protein. The important thing is that some of them are on the surface of the food you're cooking; otherwise, it won't brown. Usually, you get these amino acids from proteins that start to break down when you cook them.

SUGAR You don't need much, and it doesn't have to be table sugar. Starches are made of sugar molecules, and when you heat the starches, some of them break down into sugars and fuel the tasty chemical reactions.

WATER Again, not a lot of water. You may recall from the heat discussion that

that happens without heat. The acid in the lemon juice prevents browning there, and it will prevent browning in other circumstances as well.

So the key to tasty chicken piccata is not the lemon (although that adds a nice sharpness) but the fact that the whole recipe is geared towards maximizing the Maillard reactions (which translates into maximum flavor).

Here's why:

- **First, you flatten the chicken.** This creates more surface area, so there's more browning. More browning means more flavor.
- **Second, you dredge in flour.** The flour soaks up moisture from the surface and imparts a bunch of handy proteins that are ready to be broken apart and turned into amino acids.
- **Third, you make a pan sauce.** Scrape up the bits of whatever you were cooking that were changed by the Maillard reactions but were left in the pan, dissolve those bits in liquid, and get a delectable sauce.

By adding lemon juice at the beginning, I was interfering with the Maillard reactions. Even though the resulting chicken was infused with lemony flavor, I don't think I'll make this modification permanent for my standard chicken piccata. It's not worth losing the tasty browning. Instead, the next time lemons go on sale at my local store, I'll just get out my juicer and make lemonade.

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