Cooking Under Pressure

In the first installment of Kitchen Alchemy, the team delves into the science of pressure cookers in the name of sunflower seed "risotto"

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Pressure cookers are among our favorite culinary gadgets. We like them for things as simple as perfectly steamed beets and as playful as caramelized yogurt. And the days of screeching, squealing pressure cookers, shuddering on your range top and conjuring fears of explosions, are on the wane. Today we have quiet, efficient appliances that are used in both professional and home kitchens. Now you can buy electric pressure cookers, which shorten cooking times, are easy to clean and make a minimal amount of noise.

In order to understand how pressure cookers work, we must explore a bit of physics. Water boils at 212°F, and no matter how much you increase the heat being applied to the water it will never rise above that temperature under normal conditions. As water boils, it creates steam, which also stays at 212°F in a ventilated environment. But boiling water in a closed environment causes a buildup of pressure, which forces an increase in the temperature of the steam inside the enclosed space.

The pressure also forces the steam to pass through the food. Steam is a very efficient conductor for the transfer of heat and needs less time to effect changes than dry heat. At sea level, a pressure of about 5 psi (pounds of force per square inch) on the inside of the pressure cooker raises the temperature in the chamber to 220°F. At a higher pressure of 15 psi — the maximum setting on most pressure cookers — the food inside the cooker is being subjected to a temperature of 257°F. When steam condenses on a cooler surface it has six times the heat potential, which allows it to be a very efficient method of cooking food. Cooking times may be reduced by up to 70 percent from more traditional cooking methods such as roasting or braising.

Pressure cookers have locking lids, which must be locked into place before the pressure cooker can be turned on. They are equipped with regulators to release steam when the pressure climbs above safe levels for that particular cooker. These regulators are usually weighted stoppers, which are lifted by excessive amounts of steam, to allow some of the pressure to escape. Modern pressure cookers are also equipped with a backup safety, which is usually in the form of a rubber grommet that distorts and releases pressure at extreme temperatures, or a hole in the lid plugged by an alloy that melts at dangerous heat levels.

The food inside the pressure cooker is not pulverized or distorted because the pressure within the chamber is uniformly applied to the entire surface area of any items contained within. In fact, foods cooked in a pressure cooker keep a more uniform and natural shape than foods cooked in other ways.

There are many benefits to using pressure cookers. They shorten cooking times, which means they are energy-efficient. Shorter cooking also allows food to retain more of its nutrients. They allow you to cook with minimal fat. Many pressure cookers have nonstick interiors for easy cleaning, and by nature they are splatter-free.

Pressure cooking is a low-maintenance method, since you don't need to tend them during the cooking time. It is also an excellent outlet for creativity in the kitchen, allowing cooks to make culinary leaps like a "risotto" made with sunflower seeds instead of rice. Under normal circumstances, the seeds take so long to cook that no one would go to the trouble of tenderizing them. With a pressure cooker it takes just 30 minutes to cook them into succulent, juicy morsels. Fold in a bit of celery root puree, garnish with country ham, and you have a delicious and unusual dish that was practically no trouble at all. That's the true power of cooking under pressure.
Our Smoked Trout and Sunflower Seed "Risotto"

First of all, if you're looking to pick up a pressure cooker, you have many options. As a simple rule, pick the size and features that work for the type of cooking you do most often. For general all-around pressure cooking, we like the Cuisinart CPC-600 ($140, amazon.com), the Fagor Splendid 6-Quart ($60, amazon.com) or the larger Fagor Professional Duo 10-Quart, which also serves as a canner ($100, amazon.com).

2 tablespoons olive oil
1 tablespoon sweet butter
1 small white onion, diced
16 ounces of sunflower seed kernels
1/2 cup dry vermouth
4 cups roast chicken broth
4 scallions, finely sliced
zest of 1 lemon
1 whole smoked trout (about a pound), bones and skin removed
3 tablespoons crème fraiche
3 tablespoons sweet butter
Fresh black pepper
Salt to taste
2 ounces grated Piave Vecchio cheese

Melt the butter and olive oil together in the base of a pressure cooker. Add the diced onion and sweat until tender. Season the onions with a quarter-teaspoon of salt. Add the sunflower seeds and continue to cook until the seeds are lightly toasted.

Deglaze the cooker with the vermouth. Cook until liquid is nearly gone and the seeds are lightly

glazed. Add the roast chicken broth and another quarter-teaspoon of salt, and cover the pressure cooker. Cook under pressure for 30 minutes.

When the time is up, release the pressure, strain the seeds and reserve the liquid separately. Puree a third of the seeds with some of the cooking liquid until a smooth fluid puree is formed. Strain the puree through a fine mesh sieve, and mix with the reserved sunflower seeds. This is the risotto base. This dish can be finished immediately or chilled at this point and reheated.

To serve, heat the risotto base in the base of your pressure cooker. If the texture seems a bit thick, add a little water to thin it out. Once it is warm, flake the trout with a fork, and fold it into the base, along with the lemon zest, sliced scallions, and crème fraiche.

When the mixture is hot, stir in the cold butter and two-thirds of the cheese, and taste to check the seasoning. Spoon the risotto into bowls and top with the remaining cheese and freshly ground black pepper.

Serve immediately.