SOUS VIDE

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The next step in home cooking is Sous Vide - "Cooking under Vacuum"

Simply stated cooking Sous Vide is to:

1. Season the food
2. Seal the food in a vacuum bag
3. Drop the sealed bag into a heated water bath and cook for a specified length of time at a specific temperature
4. Remove and brown item if browning is needed

The origin of the term Sous Vide (pronounced sue-vee), is French, meaning “under vacuum”, also widely known as low temperature cooking. Sous Vide is the process of cooking food that has been packaged in a vacuum sealed bag, at a low and consistent temperature, in a heated and circulating water bath. An immersion circulator heats the water and keeps the water in motion ensuring the heat is distributed evenly. This allows the temperature of the water be kept very precise. The water is held at the temperature you wish the food to reach and the food is cooked at that temperature for a specific time.

This cooking method creates new taste and texture sensations by preserving the aroma, flavors and vitamins of meat, poultry, fish, vegetables and desserts.

Sous Vide style precision, low temperature, cooking is another way to cook and just like all cooking techniques, it involves trade-offs. It does takes longer and that it does requires more equipment.

To truly cook Sous Vide the food must be “under vacuum” and this step should not be overlooked. Use a quality vacuum sealer to suction out the air and get a good tight seal. If you do not vacuum seal the bag, the air left in the bag can cause it to float on top of the water, which will cause it to be heated unevenly. Also, pulling a good vacuum intensifies the flavors of the food by infusing any added seasonings through the food evenly, rather than cooking them away. In other words, the air removed from the food opens the pores and allows seasonings and liquids to infuse into the open pores of the food. You will need less seasoning because the vacuum sealed package preserves flavor by protecting the juices, the nutrients and aroma of the food. Without the vacuum seal the juice will evaporate and some nutrients will be lost during cooking and the aroma will be gone. Also, the removal of air draws the bag tight to the food and ensures a very efficient transfer of heat from the water bath as water is many more times more thermal conductive than air. This efficient transfer of heat allows for lower cooking temperatures.

Why Sous Vide? - Cooking sous vide produces results unattainable through traditional cooking methods. The secret is low and precise temperature control along with time. (Time and temperature charts are readily available to guide you as time will vary for different types of food). If there's one dish that most dramatically shows the differences between Sous Vide and traditional cooking methods, its chicken breast so we will use chicken breast as an example of how to Sous Vide. However, beef, lamb, seafood, vegetables and game, may all be cooked Sous Vide.

When food, such as a chicken breast, is cooked on a stove top, a grill or in an oven, it is cooked at a higher temperature than the internal temperature you want the food to reach. For instance, to cook a chicken breast using an oven, you might cook at 300-350 degrees until it reaches the USDA recommended 165 degree internal temperature.

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On a grill the temperature may be even higher. These higher temperatures will overcook the outer layers, to ensure that the center of the chicken is cooked through and safe to eat. This can lead to a dry, bland & stringy texture.

But when cooking a chicken breast sous vide you can cook at temperatures around 140 -150 degrees but at a longer cook time. This combo of time and temperature (pasteurization) will safety cook the chicken breast. The results are a savory and moist piece of chicken cooked perfectly from edge to center.

It does takes longer to get the food to the necessary internal temperature when the cooking temperature is the same, (in our example our water bath temperature would be 140-150 degrees) but the food cooked sous vide will always be more nutritional, juicier and have a better aroma than foods cooked traditional. Chicken will be fork tender, full with juice, with texture and flavor that just aren't attainable via traditional high-heat cooking methods.

Understanding Chicken and Food Safety - There is a misconception about what constitutes a safe cooking temperature for meat, especially poultry. You've probably heard of the 40–140°F "danger zone," the temperature range in which bacteria thrive. You've been warned to avoid eating or serving any food that has remained within this range for a total time of four hours. You've probably also heard that in order for chicken to be safe, it should be cooked to 165° F. internally. These warnings and guidelines are correct so heed them - for traditional cooking methods. However, these guidelines are designed for home stove top cooks and for employees in restaurants to ensure food served is safe to eat. Which means that the food is not the best it could be because two things - modern equipment and a modern approach to food safety, allow us to safely cook chicken at far lower temperatures while achieving more desirable textures and tastes.

Sous vide style cooking uses temperatures as low as 134° F and can take 1 hour to 36 hours to complete. For our example, the temperature recommendation for cooking chicken falls in the 145–150°F range for at least 1 hour. This is well below the 165°F target the USDA wants. What gives? Is it still safe to eat? Yes, because food safety is a function or combination of ***both temperature and time.*** This is called Pasteurization***.***

What the USDA is looking for is a 7.0 $\log_{10}$ relative reduction in salmonella bacteria in chicken. That is, a reduction that ensures that out of every 10,000,000 bacteria living on that piece of chicken to start, only one will survive.

For chicken the bacteria is dead instantly at 165° F but will be just as dead if held at 140° F for about 28 minutes. Take a look at the simplified chart below using data from the USDA's guide "**TIME-TEMPERATURE TABLES FOR COOKING READY-TO-EAT POULTRY PRODUCTS".**

You will see that bacteria can be eliminated with varying amounts of heat paired with different periods of time. A lower temperature over a longer time will reduce bacteria as will the traditional grill and bake temperatures. Study the chart and information below and you will see how safe sous vide cooking is.

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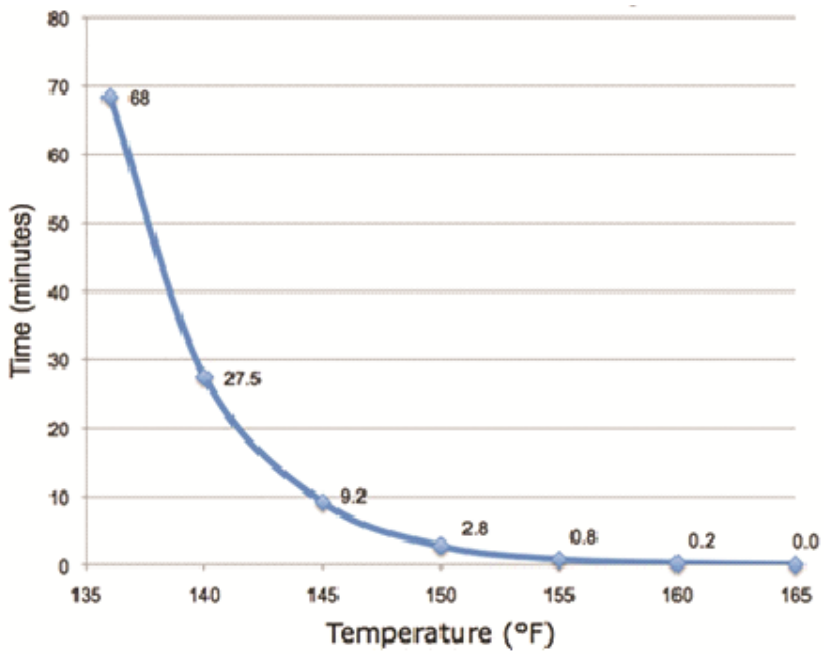
Pasteurization Time for Chicken With 5% Fat Content (7-log10 lethality)	The data above shown in the graph below follows a pretty straightforward logarithmic decay curve: The hotter you get (Temp), the faster bacteria die (Time).
Temperature Time 136°F (58°C) 68.4 minutes 140°F (60°C) 27.5 minutes 145°F (63°C) 9.2 minutes 150°F (66°C) 2.8 minutes 155°F (68°C) 47.7 seconds 160°F (71°C) 14.8 seconds 165°F (74°C) Instant Once the internal temp of the chicken ***has reached*** a temperature (Left column) you can see the time (Right Column) required to kill any bacteria.	

As you can see, at 165°F, you achieve pasteurization nearly instantly. At 136°F, on the other hand, it takes a little over an hour for the bacteria to die.

It's important to note that the times shown indicate the minimum cooking time for chicken ***after it has reached the temperatures internally.***

To be safe you should add an extra hour to the time recommended in the government charts when starting with chicken from the refrigerator or two hours when starting with frozen chicken.

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The Effect of Temperature on Juiciness - The hotter you cook chicken, the more juice it expels. Tests showing how much juice is expelled and how the taste is affected can be conducted by cooking near-identical chicken breasts to temperatures ranging from 135°F to 165°F, measuring the moisture lost to the bag in each sample and tasting the results.

- When the juice expelled is measured, the difference is more than twice as much when cooked at the higher temperature.
- When the chicken is tasted, both temperatures yield relatively juicy meat, though the juiciest were those that were cooked the lowest. Even the chicken cooked, sous vide, at 165°F, comes out juicier than chicken cooked to 165°F internally in a conventional oven at 350. or on the grill at grill temperatures..

The Effect of Temperature on Texture - The texture also changes as you cook chicken at higher temps, and this is a change that's apparent when you eat. Just like any overcooked chicken, once you get to around the 155°F mark, sous-vide chicken starts to take on a chalky, tacky texture (but far less than with conventional cooking methods).

The Effect of Time on Texture - The longer a chicken is cooked the more the amount of gelatin and other proteins are extracted. Overcooked chicken becomes mushy. At two hours, the chicken has a nice, resilient chew to it, while retaining juiciness. At 24 hours, on the other hand, the texture has no resilient left and when pressed on its surface meat will show a depression and not bounce back. For best results, cook chicken for two to three hours – never longer than four hours.

Sous-Vide Chicken Breast Temperature and Timing Guide		
Texture	**Temp**	**Timing Range**
A very tender, extremely juicy, and smooth texture that is firm and completely opaque (no medium-rare chicken here) and shows no signs of stringiness or tackiness	140°F (60°C)	1-1/2 - 4 hours
Moist and tender, but will also show some of its signature stringiness. This is the preferred temperature for chicken that's destined to be served cold as a salad. Can also be served hot.	150°F (66°C)	1 - 4 hours
Well-done sous-vide chicken can be compared of traditional roast chicken. The chicken is stringy, with a tacky texture as you bite into it, except it's also extremely juicy and moist. The temperature range for those who want the texture of roast chicken, but moister.	160°F (71°C)	1 - 4 hours

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How to Cook a Chicken Breast Sous Vide, Step by Step

Step 1: Preheat Cooker - Preheat your immersion circulator to the desired temperature according to the timing chart above. Allow the water bath to come to the right temperature before adding your chicken.

Step 2: Season Chicken - Season boneless chicken breasts generously with salt and pepper or the seasoning of your choice.

Step 3: Bag Chicken - To bag slide the seasoned chicken breasts into the bag, along with any aromatics, such as fresh herbs or lemon slices. Be careful and keep chicken juices from getting on the edges of the bag, which can interfere with the seal or provide for contamination.

Step 4: Seal the Bag – Using with a vacuum-sealer – (Preferred method). If using a zipper-lock bag, (Alternate method) use the displacement method. To do this, slowly lower your bagged meat into a pot of water, letting the pressure of the water press air out through the top of the bag. Once most of the air is out of the bag, carefully seal the bag just above the waterline.

Step 5: Cook the Chicken - Drop the bag in the water bath, making sure not to block the intake or output ports of your cooker's circulating pump. If properly sealed, the chicken should sink. Cook according to the timing chart above.

Step 6: Finish

To Finish the Chicken for Plating - Brown the Chicken - Remove the chicken from the bag, discard any aromatics (if using), and place it on a paper towel–lined plate. Pat it dry very carefully on both sides. Brown the chicken by putting it in a skillet with hot oil or on a hot grill for 2-3 minutes each

To Finish for Chicken Salads - Drop the cooked but still bagged, chicken breasts into an ice bath and until completely chilled, about 10 minutes. Remove the chicken breasts from the bags, discard any aromatics. Remove any membranes that remain over the meat. Split the chicken horizontally lengthwise, then cut it into half-inch-long strips. Cut crosswise to create half-inch dice. Use the diced chicken for your favorite chicken salad recipe.