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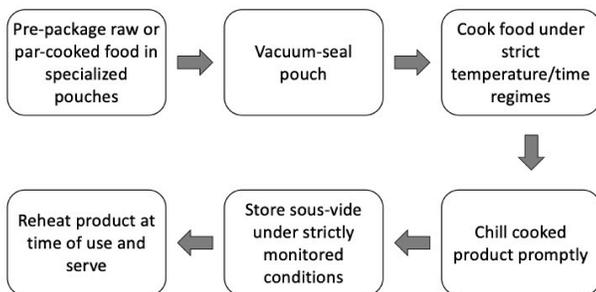
Sous-Vide Cooking

Sous-vide is a French term literally meaning “under vacuum” and uses a water bath or “bain-marie” heated to the required temperature with a water circulator. Placing the packaged food in a water bath prevents overcooking with the temperature set at the desired final cooking temperature of the food because the food cannot get hotter than the water bath that it is in. It is also known as low temperature long time (LTLT) cooking.

The temperature for sou-vide cooking is much lower than usually used for cooking, typically around 55 to 60 °C (130 to 140 °F) for red meat, 66 to 71 °C (150 to 160 °F) for poultry, and higher for vegetables. The intent is to cook the item evenly, ensuring that the inside is properly cooked without overcooking the outside, and to retain moisture.

This type of cooking is especially useful for food consisting of partially cooked ingredients alone or combined with raw foods that require low-temperature storage until the food is thoroughly heated immediately prior to serving.

The generic flow diagram for a sous-vide processing is as follows.



In general, the organoleptic attributes of sous-vide cooked food characterized by fresh-like textures and vivid flavor make sous-vide cooking increasingly more appealing to consumers. But there are a few concerns with sous-vide cooking. First, only top-quality ingredients should be used, and preparation should be accomplished in a clean environment to minimize initial contamination. Second, the time-temperature regime of the cooking step as well as the storage conditions need to be strictly monitored as they would affect the type of microorganisms that may survive and grow in the cooked food.

Food safety is a function of both time and temperature. A temperature usually considered insufficient to render food safe may be perfectly safe if maintained for long enough. For example, some sous vide fish recipes can be cooked

below 55 °C (131 °F). However, it should be aware that people with compromised immunity should never eat food that has not been properly pasteurized. Pregnant women eating food cooked sous-vide expose themselves and their fetus to risk and thus may choose to avoid unpasteurized recipes. In addition, sous-vide could provide a condition for *Clostridium botulinum* bacteria to grow unless sous-vide cooking is performed under carefully controlled conditions and proper time-temperature conditions to kill *C. botulinum* cells and maintained under cold temperature to prevent botulinum spore germination.

Fate of *E. coli* in Nonintact Beef Steaks Cooked by Sous-Vide at Different Conditions

Sous-vide cooking has increased in popularity due to ease of use and unique flavor and texture. Sous-vide cooking of meat commonly involves a final high-heat finishing step such as searing or broiling to develop color and flavor on the product surface, and this step is typically sufficient for destroying pathogens on the surface of intact meat products. However, this process may be insufficient for the safe cooking of nonintact products in the home because the final searing or broiling step may not result in a sufficient or even appreciable increase in the internal temperature of the product. Some popular chefs and manufacturers of sous-vide cooking equipment may not adequately distinguish between intact and nonintact products and may recommend cooking nonintact meat products to final temperatures that are potentially not safe for consumption. Some published on-line sources recommend cooking ground beef to internal temperatures as low as 46°C.

One popular chef that works in partnership with a sous-vide equipment manufacturer recommends that consumers purchase whole muscle cuts of beef and grind those cuts at home to decrease the risk associated with sous-vide cooking ground beef at low temperatures. A food safety risk similar to this example could occur in a domestic setting with products that are blade tenderized or marinated for an extended period of time. Recommendations such as this may lead to consumption of potentially unsafe beef products due to the use of in-home cooking methods that are not adequately validated for microbial safety. For cooking nonintact beef products in the home, use of proper internal cooking temperatures for enough time during the sous-vide step is the safest and most practical method for destroying any vegetative pathogens that may exist in the product.

Since few research has been studied on the safety of sous-

vide cooked meat products, a research team at the University of Nebraska-Lincoln evaluated the safety of individual sous-vide thermal procedures with different cooking temperatures and cooking times that are recommended by the US Department of Agriculture-Food Safety Inspection Services (USDA-FSIS) in Appendix A.

E. coli Inoculation on Steaks and Sous-Vide Cooking

In the study, semitendinosus beef carcasses were received from a local meat packaging facility, steaks of 2.4 cm thickness were cut perpendicular to the long axis of the entire muscle and vacuum packaged. After 15 min exposure of UV light in order to reduce any surface contamination, steaks were internally inoculated with *E. coli* bacterial solution (8.5 log CFU/ml by pressing with a pin pad inserted five times into each side of a steak to ensure adequate migration of bacteria to the interior of the steak. After inoculation, steaks were air dried (30 min, 23°C) and individually vacuumed sealed.

Sous-Vide Cooking Conditions

Using a commercial sous-vide cooker, the inoculated steak samples were cooked at different time and temperature conditions as shown in TABLE 1.

FIGURE 1. Sous-vide cooker at different settings

TABLE 1. Time and cooking temperature combinations

46°C	51°C	54°C	62°C
150 min	150 min	64.5 min	2.25 min
420 min	193.5 min	86 min	3 min
	258 min	107.5 min	3.75 min
	322.5 min		

Results

Temperatures of 51, 54, and 62°C all achieved 5-log reductions of *E. coli* during sous-vide cooking of the nonintact steaks, with reductions of 5.80, 6.62, and 6.83 log CFU/g achieved at 258, 64.5, and 2.25 min, respectively (Table 2). Reductions at the longest cook times for 51, 54, and 62°C treatments were all >6 log CFU/g. In the samples cooked at 46°C, *E. coli* levels after 150 min of holding were not significantly different from the levels in the raw inoculated samples, and even after 420 min of holding, only a 1.07-log reduction was achieved.

At 46°C, cooking achieved a final 1.07-log reduction (P < 0.01) after 420 min. These results confirm the utility of

USDA-FSIS guidelines (Appendix A) and raise concerns about the safety of sous-vide meat cooked at < 46°C.

The safety of Time and Temperature Control (TCS) foods cooked using sous vide has become a concern as the popularity of sous-vide cooking has grown in both foodservice and domestic settings.

TABLE 2. Levels of *E. coli* after cooking

Cooking Time	Bacterial Number (Reduction) log CFU/g
46°C Cooking Temp.	
0 min (Raw steak)	7.41 + 0.13 (n/a)
150 min	7.37 + 0.07 (0.04)
420 min	6.33 + 0.28 (1.07)
51°C Cooking Temp.	
0 min (Raw steak)	7.02 + 0.15 (n/a)
150 min	3.88 + 0.28 (3.14)
193.5 min	2.21 + 0.31 (4.81)
258 min	1.22 + 0.20 (5.80)
322.5 min	0.39 + 0.0 (6.63)
54°C Cooking Temp.	
0 min (Raw steak)	7.13 + 0.12 (n/a)
64.5 min	0.51 + 0.07 (6.62)
86 min	0.47 + 0.05 (6.66)
107.5 min	1.01 + 0.42 (6.12)
62°C Cooking Temp.	
0 min (Raw steak)	7.25 + 0.10 (n/a)
2.25 min	0.42 + 0.03 (6.83)
3 min	0.42 + 0.03 (6.83)
3.75 min	0.58 + 0.19 (6.67)

The finding of the study indicated that the time and temperature combinations recommended by some sous-vide equipment manufacturers and popular chefs for nonintact products may not be safe and the consumer should be cautious sous-vide cooking of TCS foods such as meat and seafood.

Source: H.B. Hunt, S.C. Watson, B. D. Chaves, G.A. Cavender, and G.A. Sullivan. Fate of *Escherichia coli* in Nonintact Beef Steaks during Sous-Vide Cooking at Different Holding Time and Temperature Combinations. Food Prot. Trend. 41(6): 569-573.

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Personal Finance

A Few Financial Lessons from Alexander Hamilton

Historian Richard B. Morris identified seven key Founding Fathers of the United States: George Washington, John Adams, Thomas Jefferson, James Madison, Benjamin Franklin, John Jay, and Alexander Hamilton.

Most of these founding fathers were presidents. Franklin, though never president, is also well known as the man who discovered electricity, invented bifocals, and told lots of jokes to lighten the moods of the other founding fathers. His face can even be found on the \$100 bill. John Jay and Alexander Hamilton are perhaps not quite as well known. Unfortunately for John Jay, there has not, to date, been a hit Broadway musical written about him, so he might have to remain relatively unknown for a while longer.

As for Hamilton, he once was lost and now is found due to the efforts of noted songwriter/performer Lin-Manuel Miranda. Thank you, Broadway, for resurrecting one of the most important figures in early American history and making him the subject of one of the biggest stage shows of the last decade.

Alexander was the first U.S. Secretary of the Treasury and was instrumental in laying the foundation of what would eventually become the greatest economy the world has ever seen. So maybe it's not too crazy to think that we could learn a few financial lessons from him.

In an article by popular finance bloggers Camilo and Francisco Maldonado (twins, with interesting stories of their own) entitled "10 Lessons About Money from Alexander Hamilton," we see that the first U.S. Secretary of the Treasury had a few good life lessons we can learn from that could help us in our own financial journeys. I'll call them the 10 "Dollar Commandments":

- #1 Get an education
- #2 Set financial goals
- #3 Question conventional wisdom
- #4 Don't try to do it all by yourself
- #5 Don't let money define you.
- #6 Learn from your mistakes
- #7 Make the most of what you have
- #8 Take care of those around you
- #9 Balance your life
- #10 Keep records of your finances

First, Hamilton was orphaned at a young age, but through a combination of friends, hard work, and persistence he was able to secure a solid education, first by reading on his own, and then through formal schooling.

Second, Hamilton knew his values and stuck to them. Similarly, our personal values should dictate everything about our financial plan including career paths, financial goals, and lifestyle pursuits.

Third, the founding fathers questioned the British government's actions. Similarly, we should question conventional financial wisdom and habits that include large amounts of debt for school, cars, homes, life goals and timelines. Instead let your values and goals dictate what you spend your money on, and thus, how you live your life.

Fourth, Alexander Hamilton was George Washington's "right-hand man" both during the revolution and during Washington's presidency. They didn't always get along perfectly but were nearly unstoppable together. Similarly, we are not on our financial journeys by ourselves. Get help from experts, friends, and family in your goals, and work together to achieve common dreams.

Fifth, money is not an end, it is a means to an end. Hamilton wasn't in pursuit of money during his life, that was a byproduct of the meaningful life he sought to live. Similarly, money can't be your goal if you really want to be happy, it should be a byproduct of other life goals you pursue based on your values.

Sixth, as a child there was no blueprint for someone who wanted to be an orphan turned influential revolutionary. It is key to learn from others, but use that knowledge to blaze your own path, don't try to replicate anyone's success because ultimately that person's goals and values will be different from yours. In doing this you'll make mistakes, but that's OK, it should even be expected. Simply learn from them and persist.

Seventh, Hamilton had few possessions, friends, or family when he came to the colonies from the West Indies. He didn't let that stop him. He acted like he belonged everywhere he went, though inwardly he knew that wasn't the case. But one thing he realized quickly is that few people are as grand, rich, successful or as flawless as they often try to appear. In today's social media driven society, develop your skill at looking past the apparent wealth and staged happiness of your friends and acquaintances and realize that we're all pretending to some degree. We've all got flaws, debt, challenges of some sort. You belong. You deserve success and happiness as much as anyone else. Indeed, that is the America that Hamilton helped forge.

Eighth, Hamilton's legacy is in what he left for future generations. Promoting success and happiness for others is perhaps one of the noblest life pursuits one can have. Financial tools such as life insurance and savings accounts can help set up your children for financial success. Trusts, donations, giving of time and energy to a cause bigger than yourself also inspires others. This is likely to bring more happiness and satisfaction to you than most other financial goals.

Ninth, some of Hamilton's deepest regrets came from times he worked too much and didn't enjoy life balance between work and family. Work is necessary, and leaving a legacy is noble, but it shouldn't come too often at the expense of your immediate family and friends.

Tenth, Hamilton took meticulous notes on his reading, his speeches, and even his finances. Keeping records facilitates a master plan that will propel us toward our most important goals for life and finances.

Hamilton made a lasting legacy though he came from very little. His financial life wasn't flawless, but maybe that's the point. We don't have to get it perfect either. If we can learn anything from Alexander Hamilton it's that if we spend our lives focused on working towards values and goals, the necessary resources will follow.

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Eat Smart Idaho

Cooking at Home

The COVID-19 pandemic has forever changed our world. It seems every conference or regional meeting over the last year has included a discussion of how COVID-19 has changed programming, challenged research efforts, or created new research questions. It has certainly increased our use of technology and set the stage for more cooking at home. Idaho's Office of Drug Policy's Eat Together Idaho project partnered with The Family Dinner Project to provide resources for Idaho families to encourage cooking at home and eating as a family.



In this issue of the Communicator, let's take a closer look at cooking at home. What is home cooking? What are the benefits? What skills or resources are needed to cook at home? How has COVID-19 shaped the landscape for outreach efforts to facilitate cooking at home?

Mills et al. (2020) conducted a qualitative study in the US and UK to better understand peoples' perceptions and definitions of home cooking. This involved secondary analysis of interview (UK) and focus group (US) data. Researchers analyzed transcripts using Framework Analysis to identify themes related to the definition, values, and importance of home cooking. Themes that emerged related to the definition of home cooking included cooking from scratch, demonstration of love and care, and nostalgia. People recalled happy memories from childhood related home cooking. The perceived benefits of home cooking were more focused on the potential social and emotional benefits rather than diet quality and physical health. time is tied.



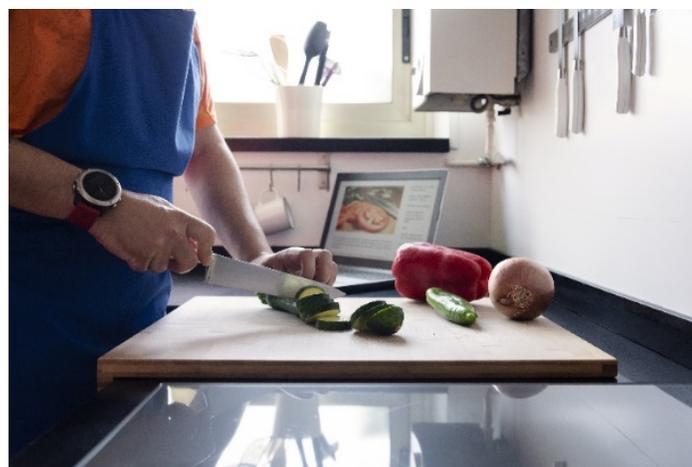
While the nutritional benefits of home cooking were not highlighted in this study, there is evidence to support a relationship between cooking at home and healthy eating.

Wolfson et al. (2020) sought to examine how the relationship between frequency of cooking at home and diet quality varied by income bracket in the US. To answer this question, the researchers looked at data from the National Health and Nutrition Examination Survey (NHANES) from 2007 to 2010. During these years, a question about frequency of cooking dinner was included in the survey, along with collection of two 24-hour dietary recalls, income status, and other socio-economic and demographic variables. The 24-hour dietary recall data was used to generate a score of diet quality called the Healthy Eating Index (2015), which assesses how well one's diet aligns with the 2015-2020 Dietary Guidelines for Americans. More frequent cooking at home was associated with higher Healthy Eating Index scores. When stratified by income, the magnitude of the association was lower among lower-income (<300% of federal poverty level) individuals compared to higher-income. Researchers also looked at the food components of the Healthy Eating Index and how these differed by frequency of cooking at home and by income category. The relationship between frequency of cooking at home and intake of fruits and vegetables differed by income category, indicating a need to further explore access or other factors that may contribute to this difference.

In a subsequent study, Wolfson and colleagues explored the concept of food agency, or a person's ability to acquire and prepare food within the context of their own social, physical, and economic environment. They discuss food agency as more than a person's competency but rather their self-efficacy to achieve food related goals. They explored relationships between food agency and cooking at home using an online survey delivered through TurkPrime. Food agency was associated with more frequent cooking and specifically cooking from scratch. Researchers suggest

that the Cooking and Food Provisioning Action Scale may be a useful tool to include in future studies or interventions seeking to better understand or improve cooking behaviors and diet quality.

Silver et al. (2021) tested the efficacy of a home cooking and telemedicine intervention to improve nutrition and resiliency during the COVID-19 pandemic through use of a randomized controlled trial. Overweight adults who were the primary food provider of their household and did not currently cook most lunches and dinners at home were recruited from the US and Israel to participate in the study. Both groups received nutritional counseling at the beginning and end of the study. The treatment group (n=14) participated in a 3-month culinary coaching telemedicine program via Zoom® while the control group (n=14) received access to nutrition education websites. Both quantitative and qualitative survey questions were used to assess the impact of the program on participants' home cooking and coping strategies during the COVID-19 pandemic. Those who received culinary coaching used self-care as a coping strategy more often than those in the control group. While both groups reported increasing cooking from home during the pandemic, only those in the intervention group reported improved emotional wellbeing and improved resiliency and hope as a self-perceived benefit. At a time when prevalence of depressive symptoms in the US are 3-fold higher than before the COVID-19 pandemic, this finding may be very applicable when developing new or modified strategies for providing nutrition and wellness education.



Source:

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