



CRACKING THE CODE:

On Food Time and Temperature



50K+

The US Department of Agriculture's meat and poultry hotline **receives over 50,000 calls annually from consumers** concerned about the dangers of foodborne illnesses.¹

Introduction

These food hygiene woes mostly revolve around bacterial contaminations that may arise from the soil, air, water, and unsanitary food preparations.

A combination of favorable environmental factors—nutrients, moisture, time, and temperature—create the ideal bacterial growth conditions in certain foods, paving the way for various foodborne diseases.

In particular, the time that food stays at a certain temperature plays a critical role in determining its freshness and safety of consumption. Germs and bacteria responsible for many foodborne illnesses become active in food items cooked, prepped, stored, and served at unsafe temperatures. Since bacteria may not immediately affect the appearance, taste, or scent of food, contaminated dishes could cause harm while remaining undetected.



This eBook serves as a **go-to guide for maintaining the ideal time and temperature control** for handling various foods in different environments so you and your staff can keep foodborne illnesses at bay with greater confidence.

¹ USDA. (2022, March 11). USDA Meat and Poultry Hotline.



Common Food Time and Temperature Myths

Have you ever left a large cut of meat out overnight to thaw and wondered whether it was safe to eat the next day? Or cautiously scooped potato salad on your plate after it had been sitting out in the sun at a family cookout?

There have been many food safety myths perpetuated through the years, whether it's using the 'smell check' to test if something is spoiled or relying on firmness alone to see if a piece of meat is cooked through.

Let's look at some common food time and temperature myths to see if they hold true, or if they fall flat:

IS IT OKAY TO LEAVE FOOD OUT OVERNIGHT TO THAW?

Thawing food (especially meat) at room temperature is dangerous because it results in an uneven thawing process. Specifically, the external layer thaws faster than the inside. In such instances, certain opportunistic bacterial strains like staphylococcus may grow on the outside layer of your food. These bacteria contain toxins that stay intact on food even after cooking, making it unsafe for consumption.

IS IT SAFE TO CONSUME MAYONNAISE-BASED DISHES THAT HAVE BEEN SITTING OUT?

While foods sitting out at room temperature for an extended period of time can lead to food poisoning if ingested, mayonnaise is often not to blame. The acid content in commercially prepared mayonnaises prevents most harmful bacterial growth.² The foods mixed with mayonnaise, such as potatoes, eggs, or lobster meat, are typically the culprits behind "picnic" food poisoning. Remember to dispose of refrigerated foods after two or more hours of sitting at room temperature.

IS IT SAFE TO STORE EGGS AT ROOM TEMPERATURE?

Leaving chemically sanitized eggs at room temperature exposes them to bacterial infections such as salmonella. As such, you should avoid consuming eggs that have been stored at room temperature for more than two hours. Although the FDA requires farmers to clean, dry, sanitize, and eggs before distribution, the process wears out the shell's natural barrier against salmonella infection.³ Therefore, it is important to keep supplies refrigerated (much cooler than the ideal temperature for salmonella growth, between 41 °F-135 °F).

IN A RESTAURANT SETTING, FOLLOWING THESE FOOD MYTHS/UNSAFE PRACTICES COULD POSE SOME SERIOUS HEALTH RISKS TO YOUR CUSTOMERS. IT IS CRITICAL TO KEEP YOUR SERVICE TEAM PROPERLY TRAINED AND WELL-INFORMED OF THESE MISCONCEPTIONS TO MAINTAIN THE BEST PRACTICES.

²USDA. (2023, March 6). Does mayonnaise cause foodborne illness?

³FDA. (2022, August 10). Egg Safety Final Rule.



How Time and Temperature Affect Food

While time and temperature affect all food differently, some foods are more prone to unsafe bacteria growth when exposed to certain temperatures for an extended amount of time. In the foodservice industry, these are known as TCS foods.

Training is the foundation on which food safety culture is built, but strong and effective culture is achieved by developing and maintaining a set of values. Preserving food safety culture is an everyday job that requires the attention of every member of the food establishment.

The temperature range of 41 °F-135 °F is known as the **temperature danger zone**. Because bacteria in food tend to grow most rapidly in this range, food handlers must limit the amount of time TCS food is kept in the temperature danger zone. Within these temperatures, the number of bacteria in food can double within 20 minutes.⁴

⁴ USDA. (2020, October 19). How Temperatures Affect Food.

Proper time and temperature control are essential for keeping TCS food safe.

Here are some common TCS foods that should be kept out of the temperature danger zone:



MILK AND DAIRY

Safety guidelines:

Milk and dairy should be stored below 41 °F.

Why it matters:

Milk and dairy products that have exceeded 41 °F for more than two hours can contain harmful bacteria. Raw milk and products made with raw milk, such as queso fresco and brie, can lead to contain dangerous pathogens including Campylobacter, Cryptosporidium, E. coli, Listeria, and Salmonella.



SHELL EGGS

Safety guidelines:

Shell eggs should be stored below 41 °F. Eggs should be cooked to an internal temperature of 145 °F for at least 15 seconds.

Why it matters:

Raw eggs may contain Salmonella. Most commercial eggs are washed and sanitized to minimize the risk of Salmonella, however, this sanitization also makes the shell more porous and susceptible to bacteria proliferation, which is why refrigeration is advised.



POULTRY

Safety guidelines:

Store poultry below 41 °F. Cook all poultry to a safe minimum internal temperature of 165 °F.

Why it matters:

Raw chicken is often contaminated with Campylobacter bacteria and sometimes with Salmonella and Clostridium perfringens bacteria.



BEEF, PORK, & LAMB

Safety guidelines:

Store meat below 41 °F. Cook all raw ground beef, pork, and lamb to an internal temperature of 160 °F for at least 17 seconds. Cook all steaks, chops, and other meat cuts to a minimum internal temperature of 145 °F for 15 seconds. For meat roasts, cook to a minimum temp of 145 °F for at least 4 minutes.

Why it matters:

Raw meats can contain harmful pathogens including E. coli and Trichinosis. Ground meats must be cooked at a higher temperature than steaks or roasts because pathogens typically grow on the outside of meats, and the process of grinding redistributes these pathogens throughout the meat.



Proper time and temperature control are essential for keeping TCS food safe.

Here are some common TCS foods that should be kept out of the temperature danger zone:



FISH, SHELLFISH, & CRUSTACEANS

Safety guidelines:

Store below 41 °F. Cook all seafood to an internal temperature of 145 °F for at least 15 seconds.

Why it matters:

Raw or undercooked seafood can contain Salmonella, norovirus, or Vibrio vulnificus bacteria.



BAKED POTATOES

Safety guidelines:

Keep baked potatoes below 41 °F or above 135 °F.

Why it matters:

Baked potatoes, specifically foil-wrapped baked potatoes, can remain warm for hours after cooking. This warm, oxygen-deprived environment can become a breeding ground for the extremely dangerous botulism toxin.



HEAT-TREATED PLANT FOOD

Safety guidelines:

Heat-treated plant food, such as baked beans, cooked rice, or steamed veggies, that will be held for hot service should be kept at or above 135 °F.

Why it matters:

Heat-treated veggies that have fallen into the temperature danger zone for an extended period can grow harmful bacteria.



Additional Measures

TCS foods meet the conditions of five qualifying factors:

1. Acidity
2. Moisture Content
3. Acidity & Moisture Interaction
4. Heat Treatment
5. Packaging

Other food items that fall under the TCS category and need to be monitored include tofu, cut leafy greens, sliced fruits, peeled garlic, and oil mixtures. A food handling certification course provides a comprehensive understanding of each food item's required temperature and time measurement needs to optimize your food preparation methods.

Safe Food Temperature Control Practices

Your food service staff can apply the following set of TCS control measures to avoid time-temperature errors that may compromise the hygiene and safety of your kitchen operations.



Conduct Proper Cooking Practices

The most important factor in cooking TCS foods is monitoring and recording food temperatures. To do this, your kitchen staff will need well-calibrated thermometers.

From the moment food arrives in a delivery, right up until the time it is served, thermometers should be used. Keeping well-calibrated thermometers and a timer on hand allows your team to accurately test for internal food temperatures. Doing so ensures that food gets thoroughly cooked based on TCS control requirements. It is important to calibrate your thermometer often for optimal food safety practices. Digital food thermometers may prove more efficient, as they usually come with a reset button for quick recalibrations.

Also, it is important to follow the best practices for thermometer usage. For instance, you should always insert the thermometer into the thickest part of the meat for accurate temperature readings. Similarly, stick the thermometer into different spots for solid food and in the middle (and stir) for soft food. Remember to always **clean and sanitize your thermometers after each use.**



Practice Safe Cooling

While it might seem like a good idea to put hot food into the refrigerator immediately after cooking, doing so can render your food unsafe. Large containers or pots of hot food can retain heat long after the cooking process has stopped, even in the refrigerator, and can turn into breeding grounds for harmful bacteria.

The two-stage cooling method can help deter bacterial growth and preserve the freshness of TCS food.⁵ Two-stage cooling works by dividing large portions of food, such as soups or casseroles, into shallow containers before placing them inside the refrigerator. You can also apply the two-stage method to meat items by slicing them into smaller portions and storing them inside shallow containers. The goal is to cool hot food from 140 °F to 70 °F within two hours and to 41 °F or lower within four hours.⁵

Applying the two-stage method also prevents large containers of hot food from raising the overall temperature in the fridge (and compromising the quality of other stored food items). Use a thermometer throughout the cooling process to ensure accurate measurement of food temperatures.

⁵ USDA. (2023, March 4). What is a two-stage cooling method?

Safe Food Temperature Control Practices (cont.)

Reheat the Right Way

Certain foods are reheated and served immediately, such as roast beef for a hot sandwich. This kind of food can be reheated to any temperature. However, other TCS foods are reheated and then held for later service, such as soup. This kind of food must be heated to an internal temperature of 165 °F (74 °C) for 15 seconds. The food must reach this temperature within two hours.

Closely Manage Food Supplies

Keep leftovers in the refrigerator for a maximum of 7 days. You should dispose of any leftovers that exceed that time frame to avoid the risks of food poisoning caused by bacterial contamination. Immediately freeze leftovers to keep them safe for an extended period. However, keep in mind that food quality usually degrades within two to four months of freezer storage. When reheating leftovers, ensure that their internal temperature reaches 165 °F and stir thoroughly for even heat distribution.

Safely Hot-Hold Food

Proper hot-holding practices stifle bacterial and germ growth, which prevents foodborne illnesses that may occur when offering cooked food in a self-serve setting. As a rule of thumb, it is important to always keep food in hot-holding containers at or above 135 °F and dispose of any food items exposed to the temperature danger zone.



Certifying Food Safety in Your Operation

As you can see, time and temperature have a lot to do with the safety of the food you serve—which makes managing TCS foods a big responsibility. Fortunately, ServSafe's training and certification programs equip you and your staff with the skills needed to serve safe, enjoyable meals every day.

With ServSafe's Food Handler certification, your staff will understand why time and temperature are so important for food safety and how to keep TCS foods out of the temperature danger zone. ServSafe Food Handler gives your employees valuable training on proper cooking, cooling, storing, and reheating techniques as well as training on other essential food safety best practices like good personal hygiene and preventing cross-contamination.



**DON'T LEAVE FOOD SAFETY UP TO CHANCE.
CERTIFY YOUR STAFF WITH THE NUMBER ONE
FOOD SAFETY TRAINING PROGRAM IN THE NATION.**

Learn more at [ServSafe.com/ServSafe-Food-Handler](https://www.servsafe.com/servsafe-food-handler).