

TAIRA TIMES



This Month's Theme : Time Temperature Management

Dear Friends and Taira Times Fans,

Every month the Taira Times brings you great information on food safety and sanitation as well as notes on emerging trends in food poisoning. It's rare for me to go into depth about one individual topic, but I think readers of the Taira Times are interested in meaty lectures about the fundamentals of food sanitation. And this is a real treat. In fact, I think this the best Taira Times ever.

This time we will look at time temperature management; TT as we call it in the business. TT is essential to the safe management of food in the kitchen from storage to cooking to serving. Without this fundamental knowledge, you might as well feed your customers garbage.

■ TT Management

Time and Temperature Management is a system of food quality management that is fundamental to the safety of food with the goal of serving food before it can become unfit for consumption through the proliferation of bacteria.

Bacteria will multiply when they have three things

1. Time
2. Temperature
3. Moisture



When you remove one of these three elements, bacteria cannot multiply enough to cause harm. However, most foods contain moisture that cannot be removed without changing the foods into a cracker. So we need to focus on time and temperature to prevent spoilage.

One very important step in TT Management is refrigerating foods after cooking to prevent bacteria growth. Foods stored at normal room temperature will be ideal environments for bacterial growth. In addition, August is picnic season in the northern hemisphere where foods can get plenty of warmth and time to amass a dangerous pile of bacteria before getting eaten.





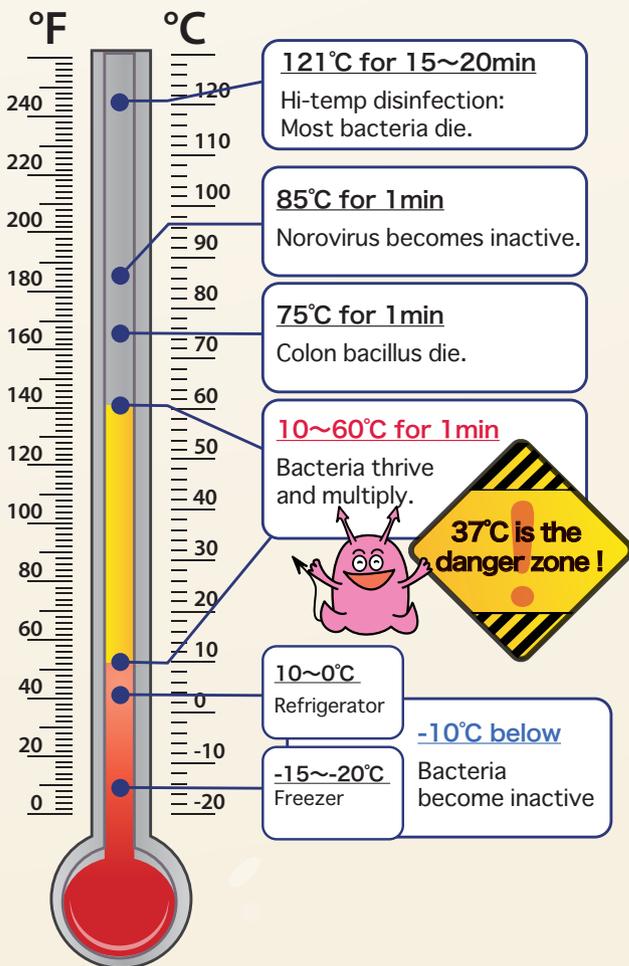
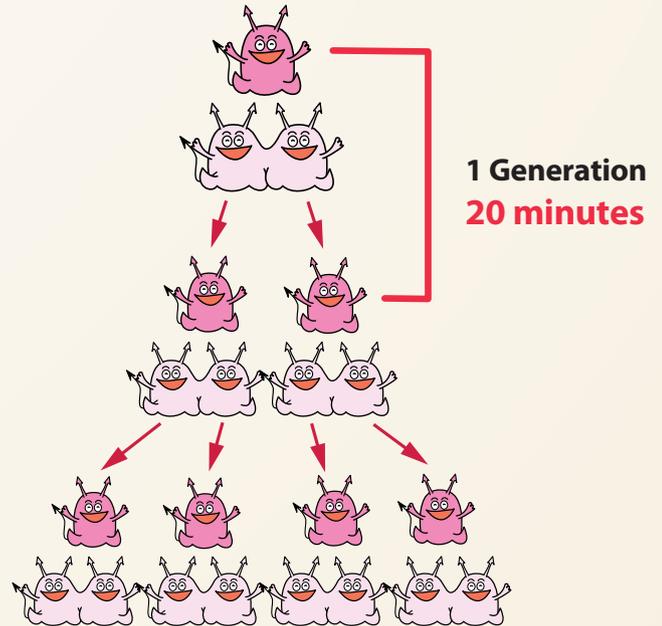
Facts for TT Management

Bacteria cells reproduce by dividing into two cells. The time it takes for one bacteria to divide into two cells can be thought of as a generation.

The length of a generation may be different for each type of bacteria, but in general 20 minutes is common. This means that every twenty minutes a population of bacteria is doubling, from a single cell.

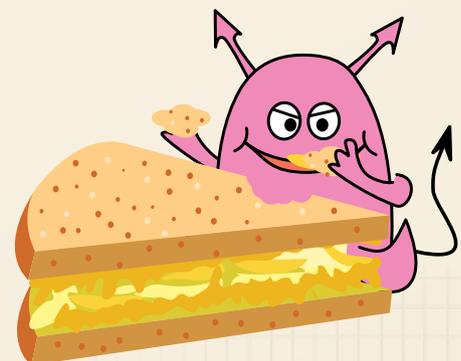
While critics of the Taira Times may think you have ample time to wait before the bacteria on their egg salad sandwich can cause food poisoning. But at that rate of reproduction, one bacteria in your warm egg salad can become 262,144 in just 6 hours. Many bacteria only need a force 10,000 strong to cause food poisoning symptoms. Perhaps that makes you feel helpless. To put this into perspective, at optimal conditions e. coli can reach 4,700,000,000,000,000,000 (4.7 sextillion) bacteria in 24 hours from one parent. The family would weigh as much as an African Elephant.

Bacteria division and time



On the left you can see the relationship between temperature and bacteria. Between the temperatures 10 ~ 60°C we find bacteria thriving and multiplying steadily, with 37 degrees (98F) being the optimal temperature for reproduction. In the summer, a room without an air conditioner can reach dangerously ideal levels for cultivating a healthy batch of bacteria on a shrimp cocktail in lightning speed.

One of the most important parts of TT Management is making sure food is out of the danger zone as much as possible to prevent bacteria growth. This covers both Time and Temperature.





Experiment for TT Management

I did an experiment.



A large 28L cylindrical pot was used to cook curry to 93°C. Once the temperature reached 93°C, the pot was immediately put into the refrigerator. Do you know how long it took the entire pot of curry to get below 10°C???



ANSWER: **25 HOURS**

In this experiment, the surface temperature reached 38°C in one hour, but the center of the curry was still 70°C. For places such as restaurants, cafeterias and factories that make large portions of food this can be a great risk for food borne illness. Because food cooling for consumption on a later day can spend a very long time in the danger zone between 10~60°C, the risk of bacterial contamination is high. Foods prepared a day before consumption should be divided into small portions and cooled quickly.



Clostridium perfringens and TT Management

Food poisoning from Clostridium perfringens is often identified in catering incidents for large groups of people. When looking at the statistics for food poisoning outbreaks in 2012, Clostridium perfringens ranks as the 3rd most common culprit.

As an anaerobic bacteria, it can multiply long periods of time in simmering pots where there is no oxygen. It is very heat resistant and can create spores to protect itself at very high temperatures. Once the food temperature returns to 45°C, Clostridium perfringens sheds its spore wall and returns to multiplying. These features make C. perfringens difficult to avoid without proper TT Management.

Found naturally in many places such as soil, water and healthy human's stool. Commonly found on beef, poultry and fish.

Clostridium perfringens (From the Food Safety Committee Documents)



Habitat

Found naturally in many places such as soil, water and healthy human's stool. Commonly found on beef, poultry and fish.

Contaminated Foods

- Dishes that contain dirty meat and fish.
- Soup, curry, stew and other dishes cooked in large quantities that allows the bacteria time to multiply.

Characteristics

- Anaerobic (Can multiply without the presence of oxygen)
- Creates disinfectant and heat resistant spores.

Incubation Period

About 12 hours.

Symptoms

Watery diarrhea, stomach pain. Sometimes vomiting. Symptoms last 1 to 2 days.





■ Outbreak Incident

An incident where 412 people came down with diarrhea and nausea occurred last August. After a investigation, it was found that a creamy spaghetti teaming with *C. perfringens* had caused the food poisoning. The spaghetti was cooked that same day, but the cream sauce was prepared the day before. The pasta sauce was simmered for an extended time, then left to sit for 2 hours in the 32°C kitchen before being placed for storage in an 18°C refrigerator for 15 hours. The bacteria were given more than enough time to multiply in perfect conditions. Needless to say this kitchen should be closed down forever.

When cooking, many type of bacteria will die because of their low resistance to heat. However, *Clostridium perfringens* can create heat-resistant spores to protect itself when cooking. A pot of liquid or tightly packed food may be very low on oxygen, with the least amount near the bottom.



When the sauce was done cooking and let to cool, the bacteria shed their spores and once again began to multiply. With such a large source of nutrients, the bacteria were able to multiply and infect a large number of people.

■ The Propagation of *C. perfringens*.

C. perfringens is often found in meat where the oxygen level is quite low and ideal for the bacteria.



■ Infection Prevention Points

1) When storing cooked foods, quickly chill below 10°C

Try to keep the time spent in the danger zone as short as possible. Do this by dividing food into small portions and cooling individually. Make sure the center is cool too.

2) Make sure to stir well when cooking and cooling!

Stirring allows oxygen to mix through the dish, discouraging *C. Perfringens* from multiplying. cool too.

3) Avoid cooking the day before !

The more time in between cooking and eating means more time for bacteria to grow.

Source : 2008.6 Food and Health p10-19 「Know to Defend! ! Clostridiumperfringens」

Practice smart TT Management and keep foods out of the danger zone!

