

The Food Spoilers: Bacteria and Viruses

► Foodborne illness (food poisoning) is costly, both in dollars and in lives. The economic cost in the United States alone has topped \$15.6 billion a year. Of course, the cost in lives is far greater.

Although most people who get food poisoning do not die, some do—over 3,000 annually in the United States. And foodborne illnesses are even more commonplace in underdeveloped countries.

A foodborne illness may be caused by a variety of things associated with foods. Bacteria, viruses, parasites, natural plant toxins, and commercial chemicals can all cause foodborne illnesses. This publication deals with foodborne illnesses caused by the microorganisms we think of as germs—bacteria and viruses.

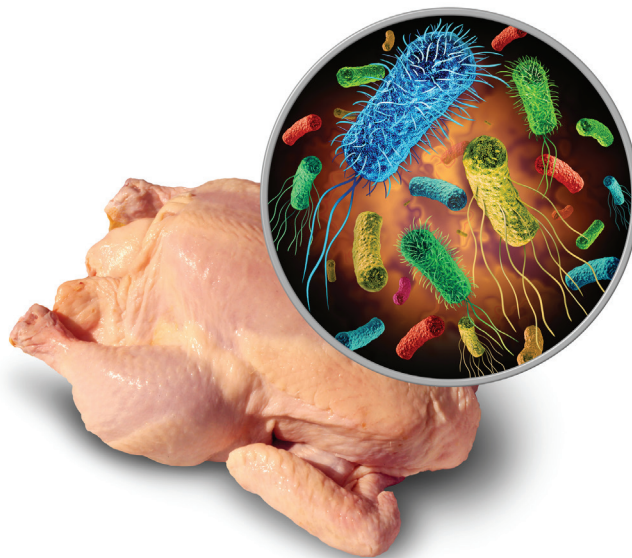
If you contract a foodborne illness you may think you have the flu or a virus that is going around.

This is natural because the symptoms of food poisoning are similar to those of other illnesses. These symptoms often include diarrhea, vomiting, abdominal cramps, fever, chills, and headache.

In contagious diseases, you contract the disease from another human. With foodborne illnesses, the germs are on food or in water. Humans or animals may transfer the germs to the food or water, but you actually contract the illness from what you eat or drink.

Bacteria and viruses are located almost everywhere—in the soil, water, and air. Therefore, it is very difficult to rid a food product of all germs. The necessary conditions for germs to grow include:

- Nourishment—foods are an excellent source.
- Correct temperature—between 40 and 140 degrees Fahrenheit. When foods are not in the refrigerator or being cooked, they will usually be in this range.
- Time to grow.



As the following table shows, very little time is needed for germs to grow. It takes only about 20 minutes for them to double their number if the conditions are right. A single bacterium can reproduce to over 60 in 2 hours, to over 500 in 3 hours, to over 2 million in 7 hours. When you consider that many bacteria may be present in the beginning, you can see how important it is to take precautions, including good personal hygiene and proper food handling.



This publication can help you avoid foodborne illnesses by providing you with:

- Descriptions of the major microorganisms as they relate to foodborne illnesses.
- Habitat—where the germs are found.
- Foods involved—water and foods that are a good place for the germs to live.
- Method of transmission—how you can get the illness.
- Symptoms—signs of sickness.
- Onset—how long it takes for you to get sick.
- Duration—how long the illness may last.
- Prevention—what you can do to keep from getting sick.

The number of germs required to cause illness varies between types of germs and between individuals. Those people most vulnerable to foodborne illnesses include the elderly, infants, and people who are already sick. The people in these groups have one thing in common: their immune systems are not as capable of fighting off germs.

For more detailed information about a certain foodborne illness, contact your county Extension agent or local health department.



Table 1. Bacterial Growth Rate

Time	Bacteria
8:00	1
8:20	2
8:40	4
9:00	8
9:20	16
9:40	32
10:00	64
10:20	128
10:40	256
11:00	512
11:20	1,024
11:40	2,048
12:00	4,096
12:20	8,192
12:40	16,384
1:00	32,768
1:20	65,536
1:40	131,072
2:00	262,144
2:20	524,288
2:40	1,048,576
3:00	2,097,152

Table 2. Bacteria In Foods

Bacteria	Description	Habitat	Method of			Symptoms	Onset	Duration	Prevention
			Foods Involved	Transmission					
<i>Bacillus cereus</i>	Grows well in a normal atmosphere and survives normal cooking	Soil, dust, and spices	Grain products, rice, starchy foods, puddings	Eating contaminated foods not properly cooked		Nausea, abdominal cramps, diarrhea, vomiting	2-16 hours	1 day	Keep cooked food hot (above 140°F) or consume quickly.
<i>Campylobacter jejuni</i>	Widespread in nature; cause of meningitis and urinary infections	Intestinal tracts of humans and animals	Unpasteurized milk, undercooked poultry, raw meat, untreated water	Drinking contaminated water, eating contaminated food, infected handlers, rodents, insects		Nausea, cramps, headache, fever, diarrhea	12-36 hours	2-7 days	Cook properly and reheat to 165°F.
<i>Clostridium botulinum</i>	Causes botulism; produces a deadly toxin under a vacuum; very rare	Soil, plants, fish	Home-canned foods	Improper methods of home canning		Blurred vision, respiratory distress, and possible death	12-48 hours	Varies widely	Toxin is destroyed by boiling for 10 minutes.
<i>Clostridium perfringens</i>	Very common; called the “buffet germ;” grows rapidly in large portions of food, such as beef roast	Dust, soil, intestinal tracts of humans and animals.	Meat and poultry dishes, sauces and gravies	Improper temperature control, handler contamination		Diarrhea, cramps, nausea (no vomiting)	8-15 hours	12-24 hours	Heat foods quickly, then cool
<i>Escherichia coli</i>	Occurs worldwide; known as “tourist diarrhea” or “traveler’s dysentery”	Intestinal tracts of humans and animals	Primarily animal products and water	Foods and water contaminated by handlers and flies		Diarrhea, chills, headache, cramps, fever	1-3 days	2-9 days	Avoid contaminated foods. Cook foods thoroughly. Use proper personal hygiene.
<i>Escherichia coli</i> 0157:H7		Intestinal tracts of humans and some mammals	Water, raw milk, raw or rare ground beef, unpasteurized fruit juices, unwashed fruits and vegetables	Foods contaminated by animal feces		Diarrhea or bloody diarrhea, abdominal cramps, nausea, malaise	2 days to 2 weeks	Usually 8 days but can last months	Cook meat to proper internal temperature. Wash and peel fresh fruits and vegetables. Purchase pasteurized fruit and vegetable juices.

Table 2. Bacteria In Foods (cont.)

Bacteria	Description	Habitat	Method of					Prevention
			Foods Involved	Transmission	Symptoms	Onset	Duration	
<i>Listeria monocytogenes</i>	Cause of Listeriosis; widespread in air, soil, water; attacks those with weak immune systems	Intestinal tracts of humans and animals	Soft cheeses, contaminated milk, raw milk, undercooked meats, vegetables	Contaminated foods	Headache, nausea, fever, vomiting	1-12 days	2-7 days	Cook foods thoroughly. Use pasteurized milk. Chill foods rapidly.
<i>Salmonella</i> (species)	Cause of salmonellosis; over 2,000 species; very common	Intestinal tracts of humans and animals	Poultry, eggs, red meats, dairy products	Contaminated foods, contact with infected person or rodent	Headache, vomiting, diarrhea, cramps, and fever	12-36 hours	2-7 days	Cook foods thoroughly and reheat to at least 165°F.
<i>Yersinia enterocoliticus</i>	Also known as Pasteurella or Yersiniosis	Untreated water: streams, ponds	Pork, meats, raw milk, leftovers	Contaminated water or foods	Cramps, fever, headache, diarrhea, vomiting	24-36 hours	3 days	Properly cook and handle foods
<i>Shigella dysenteriae</i>	Cause of shigellosis or bacillary dysentery; occurs mainly in fall and winter	Intestinal tracts of humans	Most foods and water	Spread of fecal contamination to food handlers and foods	Fever, loss of appetite, vomiting, cramps, massive diarrhea	1-7 days	About one week	Good personal hygiene. Cook foods thoroughly. Chill rapidly.
<i>Staphylococcus aureus</i>	Cause of "staph," increased occurrence during the summer	Nose, throat, and open wounds	Meat and seafood salads, sandwich spreads	Spread by infected food handlers	Nausea, vomiting, diarrhea	30 minutes to 8 hours	1-2 days	Chill foods rapidly. Avoid holding foods between 40° and 140°F. Good personal hygiene.
<i>Streptococcus pyrogenes</i>	Cause of streptococcal infections (scarlet fever and "strep throat")	Respiratory tract and nasal passageway	Milk, ice cream, eggs, potato salad, puddings	Spread to food by coughing or sneezing	Sore throat, tonsillitis, fever, headache, nausea, vomiting, occasional rash	1-3 days	Several weeks	Cook foods rapidly. Chill rapidly.

Table 2. Bacteria In Foods (cont.)

Bacteria	Description	Habitat	Foods Involved	Method of Transmission			Onset	Duration	Prevention
				Symptoms	Transmisson	Symptoms			
<i>Vibrio parahemolyticus</i>	Needs salt to grow. Found in seawater.	Aquatic waters and shellfish	Raw fish and shellfish	Diarrhea, cramps, vomiting, headache, fever	Improperly cooked and recontaminated foods	Diarrhea, cramps, vomiting, headache, fever	12-48 hours	2-5 days	Properly cook and handle seafood.
<i>Vibrio cholera</i>	Found in seawater.	Fish and shellfish, crustaceans	Raw seafood: oysters, shrimp, crabs, and clams	Diarrhea, weakness, chills, nausea	Improper cooking	Diarrhea, weakness, chills, nausea	3-76 hours	1-8 days	Properly cook and handle seafood.
<i>Vibrio vulnificus</i>	Occurs naturally rather than as a result of pollution.	Warm coastal waters	Raw shellfish	Headache, cramps, diarrhea	Improper cooking, eating raw seafood	Headache, cramps, diarrhea	12-24 hours	3-6 days	Properly cook and handle shellfish.

Table 3. Virus In Foods

Bacteria	Description	Habitat	Foods Involved	Method of Transmission			Onset	Duration	Prevention
				Symptoms	Transmisson	Symptoms			
<i>Hepatitis A</i>	Causes about 500,000 illnesses a year; seasonal	Only in humans	Milk, raw shellfish, potato salad	Fever, nausea, abdominal cramps	Foods contaminated by infected workers, contaminated water	Fever, nausea, abdominal cramps	10-50 days	Several months	Properly cook foods. Use good personal hygiene.
<i>Norwalk</i>	Difficult to avoid in undercooked foods and contaminated water	Contaminated water, sewage	Seafood, ice, water	Diarrhea, nausea, vomiting, cramps	Contaminated water	Diarrhea, nausea, vomiting, cramps	1-2 days	2-3 days	Properly cook foods, boil water. Use good personal hygiene.
<i>Polio</i>	Very rare; cause of foodborne polio	Contaminated water	Milk and other beverages	Fever, vomiting, headache, paralysis	Contaminated water	Fever, vomiting, headache, paralysis	5-35 days	Weeks to months	Properly cook foods. Use good personal hygiene.

How to Fight the Food Spoilers

- When shopping for food, pick up perishable foods, meat, poultry, and dairy items last; get them home and into the refrigerator or freezer quickly.
- Never buy food in damaged containers such as leaking, bulging, or severely dented cans, cracked jars, or jars with loose or bulging lids.
- Maintain a refrigerator temperature of 40 degrees F (2 to 4 degrees C) or below, and a freezer temperature of 32 degrees F (0 degrees C) or lower. Check each frequently.
- Thaw meat and poultry in the refrigerator or, for faster results, in a watertight package under cold running water.
- Wash hands thoroughly with soap and warm water before handling foods.
- After handling raw foods such as meat, poultry, vegetables, or fruits, wash your hands before touching other foods or food surfaces.
- Wash utensils, containers, and work surfaces before and after they come into contact with raw foods, especially meat or poultry.
- Always keep hot foods hot (above 140 degrees F) and cold foods cold (below 40 degrees F).
- Refrigerate leftovers promptly in properly covered containers.

If You Think Someone Has a Foodborne Illness:

1. Preserve the evidence. Wrap remaining food securely, mark "DANGER," and freeze it. Save all the packaging material. Write down all available information about the food and symptoms. Save any identical unopened products.
2. Seek treatment as necessary. If the victim is in an at-risk group or if symptoms persist or are severe (bloody diarrhea, excessive nausea and vomiting, high temperature), call your doctor.
3. Call the local health department if the suspect food was served at a large gathering, from a restaurant, or if it is a commercial product.
4. Call the USDA Meat and Poultry Hotline (1-800-535-4555) if the suspect food is a USDA-inspected product and you have all the packaging.



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