

# Hot Off the Grill

## Background

About 6 million people get sick every year from eating food that is contaminated. Most food contamination can be prevented by proper food handling. One common way food is contaminated is by cross-contamination. If you pet the dog, then open the refrigerator and pull out a slice of bologna for a sandwich, you may transmit germs from the dog to the food you are about to put in your mouth. If you prepare the sandwich on a bare counter that has not been washed, you are exposing your sandwich to germs from anything that has been on the counter since the last time it was washed thoroughly. If the plate you use to hold your cooked hamburger is the same one you used to carry the raw patty to the grill, you may contaminate your burger with the same kind of bacteria you just killed by cooking it.

It's easy to avoid cross-contamination simply by washing your hands thoroughly before preparing or eating food, by washing counters often with hot, soapy water and clean wiping cloths, by keeping dishes and cooking implements clean and by storing meats and other foods that require cooking separate from fruits, vegetables and other foods that you can eat raw.

Meat, poultry and fish are not safe to eat until they have been cooked. That's because they are particularly attractive to the kind of bacteria that can make us sick. Bacteria growth slows down at temperatures below 40 degrees, so meats can be stored for short periods of time at that temperature, in the refrigerator, until we are ready to use them. Cooking meat at high temperatures kills bacteria, but the meat must be cooked all the way through. The only way to make sure it is done all the way through is to use a meat thermometer. Meat and poultry are not considered safe to eat until they have reached a temperature of 160 degrees or higher, no matter what the meat looks like. Most people are suspicious of meat that is pink, but some turkey, pork, ground beef or veal remains pink even after it has been cooked thoroughly. Meat and poultry grilled or smoked outdoors can also look pink, even when well done.

Hamburgers got their name from a village in Hamburg, Germany. They were named for a style of preparing meat which originally involved slicing the meat very, very thin and eating it raw. That practice may have been safe when the meat was prepared and eaten almost immediately after slaughtering the beef animal, but most of us eat meat that has been transported over many miles and stored in several places before it makes it to our tables, so there are many more opportunities for bacterial growth.

The hamburger meat we buy in the store is usually made from the less tender and less popular cuts of beef. Trimmings from more tender cuts may

## P.A.S.S.

### GRADE 3

**Science Process**—1.1,2;  
3.1,2,3,4; 4.1,3  
**Math Process**—1.2; 3.3;  
4.1,4; 5.1,2  
**Math Content**—4.1bd,2bc;  
5.1abc  
**Health and Safety**—1.3;  
2.4; 3.1,2; 6.2

### GRADE 4

**Science Process**—1.1,2;  
3.1,2,3,4; 4.1,3  
**Math Process**—1.2; 3.3; 4.1,4;  
5.1,2  
**Math Content**—4.1ab,2ab;  
5.1ab,3  
**Health and Safety**—1.3;  
2.4; 3.1,2; 6.2

### GRADE 5

**Science Process**—1.1,2;  
3.1,2,3,4; 4.1,3  
**Physical Science**—1.2  
**Math Process**—1.2; 3.3;  
4.1,4; 5.1,2  
**Math Content**—5.1ab,3  
**Health and Safety**—1.2,3;  
3.10; 7.1

## Materials

2-3 electric skillets

disposable meat thermometers (T-Sticks)

disposable food safety gloves

preformed hamburger patties

spatulas

watch or other timekeeper

hamburger buns

paper plates

condiments, as desired

dish soap and water

hand soap

colored pencils

also be used. Grinding tenderizes the meat, and the fat reduces its dryness and improves flavor. Grinding also exposes more of the meat surface to the bacteria normally occurring in the air, on the meat, on the butcher's hands and on the cutting equipment. For that reason ground beef is more likely to be contaminated than larger cuts of meat.

Most ground beef is ground and packaged in local stores. All meat transported and sold in interstate commerce must be federally inspected. The larger cuts are usually shipped to local stores, where some of it is ground.

All meat will shrink in size and weight during cooking. The amount of shrinkage will depend on its fat and moisture content, the temperature at which the meat is cooked and how long it is cooked. The higher the cooking temperature, the greater the shrinkage.

## Science Process (observe and measure) / Math (measuring, data analysis)

1. Enlist the help of two or three parents or some older teens to set up and assist with this activity. If possible, get permission to use the school cafeteria. Provide wash stations so students can wash their hands frequently through the course of the activity.
2. Hand out copies of the Food Safety Rules, included with this lesson.
  - Discuss the rules as a class. Ask students if they can think of other food safety rules.
3. Read and discuss background material, and hand out student worksheets.
  - Divide students into groups small enough to gather around the available cooking stations.
  - Ask students how much they think a hamburger patty weighs.
  - Provide a variety of objects to use as benchmarks for comparison (deck of cards, calculator, small book, stapler, a handful of erasers, a stack of papers, etc.)
  - Students will each select an object they think is closest to the weight of a hamburger patty, place the object on a paper plate, weigh it, and record the weight on the worksheet.
  - Students will wash their hands thoroughly and put on disposable food safety gloves.
  - Provide each student with a hamburger patty on a paper plate.
  - Students will weigh their hamburger patties and record the weights on the student worksheets.
4. Allow each student to cook his or her hamburger patty under the supervision of an adult or older teenager.
  - Each student will record the starting time on the worksheet before cooking his/her burger
  - When the student thinks the burger is done, he/she will use a T-Stick to check the internal temperature. The burger is not done until it has reached an internal temperature of at least 160 degrees F.
  - When the burger is done, students will remove them from the skillet

and place them on CLEAN paper plates.

—Students will record the end cooking times and record them on their worksheets.

—Students will weigh their burgers again to complete the worksheet.

Discuss why the burgers weigh less. (Cooking draws fat and juices from the meat, especially at high temperatures.)

—Provide hamburger buns and condiments, and invite students to eat their hamburgers.

5. Make a classroom graph of burger weights and cooking times using appropriate graphing method. (See “Graphs,” with the “Additional Resources” on the website.
6. Students will check the temperatures of their refrigerators at home and report back.
  - Students will choose an appropriate method for graphing the temperatures.
  - Students will find the range, mean, median and mode of the temperatures.

### Extra Reading

D'Amico, Joan, and Karen Eich Drummond, *The Science Chef: 100 Fun Food Experiments and Recipes for Kids*. 1994.

Green, Emily K., *Meat and Beans: The New Food Guide Pyramid*, Bellweather, 2006.

Kerr, Daisy, *Keeping Clean: A Very Peculiar History*, Franklin Watts, 1995.

McGinley-Nalley, Sharon, *Pigs in the Pantry: Fun with Math and Cooking*, Simon and Schuster Children's, 1999.

Smith, Linda Wasmer, *Louis Pasteur : Disease Fighter* (Great Minds of Science), Enslow, 1997.

### Vocabulary

**bacteria**—A widely-distributed group of typically one-celled microorganisms, many of which produce diseases. Many are active in processes of fermentation, the conversion of dead organic matter into soluble food for plants and the fixing of atmospheric nitrogen.

**contaminate**—To make impure by contact or mixture with harmful bacteria, fungi, or dangerous chemicals.

**cross-contamination**—Transmitting bacteria from one thing to another.

**ground beef**—Beef that has been ground.

**hamburger**—A sandwich made with a patty of ground meat usually in a roll or bun.

**transmit**—To send from one person, thing, and or plant to another.

Name \_\_\_\_\_

# Safe Food Handling

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## AT THE STORE

- 👉 Don't let juice from raw meat, poultry or fish drip on to your hands or any fresh foods in your grocery cart. Raw juices may contain bacteria.
- 👉 Shop for cold and frozen products last. Use a cooler for the ride home, especially during the summer if you are running other errands.
- 👉 Avoid unpasteurized milk and juice and eggnog or other foods made with raw eggs.

## IN THE KITCHEN

- 👉 Always wash your hands in hot, soapy water before preparing and after handling raw meat, poultry, seafood or eggs.
- 👉 Cook all meat and poultry—or casseroles that contain meat or poultry—at a minimum oven temperature of 325 degrees F.
- 👉 Cook meats thoroughly, but don't overcook them.
- 👉 Keep your refrigerator at no more than 40 degrees F. and your freezer at 0 degrees F.
- 👉 Don't store raw fish in your refrigerator for more than 24 hours. Raw poultry or ground beef will keep for one to two days and raw red meat for three to five.
- 👉 Thaw frozen food in the fridge or in a microwave, not at room temperature.
- 👉 Never put cooked food on the plate used when it was raw.
- 👉 To keep bacteria from growing, put your sponge or scouring pad in the dishwasher every time you run it.

Name \_\_\_\_\_

# Hot Off the Grill



You can't be sure your burger is cooked just by looking at its color. The only way to make sure it is cooked enough to kill harmful bacteria is to use a meat thermometer. Cook your burger to an internal temperature of 160 degrees F. to make sure harmful bacteria has been destroyed.

Use a meat thermometer and kitchen scales to fill in the information below before and after cooking your burger.

My hamburger patty will weigh about \_\_\_\_\_, similar to the weight of a \_\_\_\_\_

BEFORE COOKING

AFTER COOKING

Weight of burger \_\_\_\_\_

Weight of burger \_\_\_\_\_

Difference in weight before and after cooking. \_\_\_\_\_

How long did it take to cook your burger to an internal temperature of 160 degrees F?

Starting time \_\_\_\_\_

Ending time \_\_\_\_\_

Total cooking time \_\_\_\_\_

<u>Food</u>	<u>Cook to</u>
ground beef, pork, veal, lamb	160 degrees F.
ground turkey, chicken	165 degrees F.
medium rare beef, veal, lamb	145 degrees F.
medium beef, veal, lamb	160 degrees F.
well done beef, veal lamb	170 degrees F.
whole chicken or turkey	180 degrees F.
roasted poultry breasts	170 degrees F.
poultry thighs, wings, legs	180 degrees F.
duck and goose	180 degrees F.
stuffing	165 degrees F.
medium pork	160 degrees F.
well done pork	170 degrees F.
fresh (raw) ham	160 degrees F.
precooked ham (to reheat)	140 degrees F.
leftovers and casseroles	165 degrees F.

Use the chart above to answer the following questions:

1. Which food requires the highest internal temperature?
2. Which food requires the lowest internal temperature?
3. Which cut of turkey requires the highest internal temperature?
4. What is the recommended internal temperature for pork cooked medium?
5. What is the recommended internal temperature for leftovers and casseroles?
6. Besides hamburgers, what other foods should be cooked to at least 60 degrees F.?

Oklahoma Ag in the Classroom is a program of the Oklahoma Cooperative Extension Service, the Oklahoma Department of Agriculture, Food and Forestry and the Oklahoma State Department of Education.