

# Handling Raw Animal Foods



*In April 2010, an E.coli O157:H7 was traced to a Sidney, Nebraska day care center. The Associated Press reported that at least four children between the ages of nine and 18 months became ill with E.coli infections and three were hospitalized.*

## Public Health Reasons

Raw animal food comes from the muscle tissue of animals and includes beef, pork, and poultry. The muscle tissue of healthy live animals has extremely low, undetectable, or no bacterial populations. However, as the barriers that protect muscle tissue (skins and hides) and the natural antimicrobial defense mechanisms of live animals (lysozymes and antimicrobial peptides) are destroyed during slaughter, the meat becomes exposed to pathogenic microorganisms. The sources of these pathogens include external surfaces of the animal (hide, hair, hooves, and feathers) and the animal's gastrointestinal tract. Some important pathogens in raw animal meats include *Clostridium perfringens*, *Escherichia coli* O157:H7, *Listeria monocytogenes*, *Salmonella* spp., *Yersinia enterocolitica*, and *Campylobacter jejunum*.

Eggs are another raw animal food of concern. Eggs are frequently eaten raw, undercooked, or lightly cooked. The most important pathogen in raw eggs is *Salmonella enterica* serotype Enteritidis. Infections of *Salmonella* Enteritidis began in the late 1970s and spread during the 1980s. The shell egg has been recognized as the most important vehicle for transmitting the pathogen in the United States. Among outbreaks of *Salmonella* Enteritidis with a confirmed food vehicle from 1985-2003, 75% of attributed food sources were either primarily egg-based or contained egg ingredients. There are three ways in which *Salmonella* Enteritidis can contaminate eggs: (1) *Salmonella* Enteritidis can be transmitted directly to the internal contents of the egg prior to laying, (2) external contamination of the shell may occur when the egg passes through the cloaca of the hen during laying, and (3) internal contamination of the egg can occur by penetration of the eggshell via microscopic cracks after the egg has been laid.

If raw animal foods are not stored and handled properly, they can contaminate food-contact surfaces, hands, or other foods. Chen et al. quantified the transfer rate of *Enterobacter aerogenes* from artificially contaminated raw chicken to hands, from hands to a metal water faucet, from a metal water faucet to hands, between hands and lettuce, and between plastic cutting boards and lettuce. They found that the most common transfer rates were 3% and 10% between chicken and hands, 1% from hands to the water faucet, 1% from the water faucet to hands, 0.3% between hands and lettuce, and 10% from cutting boards to lettuce. In a study done by Kusumaningrum et al. in 2004 the mean transfer rates of *Salmonella* spp. were 1.6% from chicken to a stainless steel surface and

34.8% from a stainless steel surface to cucumber slices. The mean transfer rates for *Campylobacter* spp. were 2.4% from chicken to a stainless steel surface and 42.5% from a stainless steel surface to cucumber slices. For raw eggs, Humphrey et al. found that the breaking of contaminated eggs led to contamination of fingers with *Salmonella* Enteritidis, and the mixing of eggs with other ingredients in a bowl created contaminated droplets that could contaminate surfaces around the mixing bowl.

The U.S. Food and Drug Administration (FDA) defines highly susceptible populations as “persons who are more likely than other people in the general population to experience foodborne disease” including preschool age children. The FDA requires that raw animal foods or partially cooked animal foods not be served to highly susceptible populations. Also, pasteurized eggs or egg products must be substituted for the use of raw eggs unless the raw eggs are combined as an ingredient in baked goods, such as cakes, muffins, or bread. Pasteurization is a heat process that will kill or inactivate bacteria and other harmful microorganisms likely to be in these potentially hazardous foods.

Thorough cooking of raw animal products is necessary for eliminating pathogens. Different species of microorganisms have different susceptibilities to heat. Also, microorganisms that are in the growing stage of their development, such as the vegetative cells of bacteria, are more susceptible to heat than the protective stage of development, such as the spore form of bacteria. The thermal killing of a microorganism is determined by its ability to survive at a certain temperature for a certain length of time, and there are different time/temperature combinations that will be equally effective. To kill all the pathogens in raw animal foods, all parts of the food must reach the required temperature for the correct length of time.

## Practices

### Separation

- Keep raw meat, poultry, seafood and their juices away from ready-to-eat food.
- Separate raw meat, poultry, seafood, and eggs from other foods in your shopping cart, grocery bags, and in your refrigerator.
- Store raw meats on the lowest shelf of the refrigerator possible to avoid having juices drip on other foods and contaminate them.
- Use separate plates, utensils, and cutting boards when preparing food to prevent cross-contamination: one set for raw meat, poultry, and seafood and another for other foods.

### Storage

- Refrigerate or freeze raw meat, poultry, and eggs promptly. Do not leave these foods at room temperature.
- Keep raw meat, poultry, and eggs below 41°F (5°C).

*In order to keep foods at 41°F (5°C) or colder, it is recommended to keep the refrigerator set at 39°F (3.8°C).*

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- Keep fresh raw meats and poultry in the refrigerator for one to two days.
- Raw shell eggs can be kept for three to five weeks.
- Keep liquid egg substitutes in the refrigerator for ten days if unopened and three days if opened.
- Keep raw meats and poultry in the freezer for three to four months.
- Egg substitutes can be kept frozen for twelve months if unopened.

### Preparation

- Wash hands with warm water and soap for 10-15 seconds before and after handling raw animal foods (See “Practicing Good Hand Hygiene for Food Workers” fact sheet).
- Do not cross-contaminate cooked or ready-to-eat foods with raw animal foods or their juices.
- Wash and sanitize cutting boards, dishes, utensils, and counter tops after preparing raw animal foods before you go on to the next food (See “Cleaning and Sanitizing Food-Contact Surfaces” fact sheet).
- Use paper towels to clean up kitchen surfaces. If using cloth towels, wash them each day in the hot cycle of your washing machine.

### Cooking

- Foods must be cooked without interruption until the minimum required internal temperature is reached.
- Cook all whole raw meat and eggs to at least 145°F (63°C) as measured with a food thermometer for 15 seconds before removing meat from the heat source. For safety and quality, allow meat to rest for at least three minutes before carving or consuming. For reasons of personal preference, consumers may choose to cook meat to higher temperatures or longer time periods.
- Cook all poultry to an internal temperature of 165°F (74°C) as measured with a food thermometer for 15 seconds. Greater numbers and varieties of pathogens are generally found on poultry than on other raw animal foods. Therefore, a higher internal temperature is needed to cook these products.
- Cook all hamburgers and raw ground meat to an internal temperature of 155°F (71°C) as measured with a food thermometer. In whole muscle meat, the interior meat is sterile, but the grinding process exposes the interior meat in ground beef to bacteria and other microorganisms. Therefore, a higher internal temperature is needed to cook these products.

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