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Salmonellosis

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Salmonella, a bacteria found throughout nature, is the cause of an intestinal disorder known as salmonellosis. There are more than 2,000 sero-types of salmonella; but only 8 to 12 types are important in poultry. Many years of cooperation between government and industry have almost eradicated some strains of salmonella that cause poultry disease, but have not eliminated all salmonella from every carcass that reaches the slaughter plant. The two most important types in poultry are *S. pullorum* and *S. gallinarum*.

The organism, widely prevalent in the environment, is carried by dust, dirt, insects, rodents, reptiles, animals, free-flying birds, dogs, cats, raccoons and man. However, the amount of salmonella you normally come in contact with is not great enough to cause illness. Human salmonellosis caused by *S. pullorum* occasionally has been produced by massive exposure following ingestion of contaminated foods. *S. gallinarum* is rarely isolated from humans and has little public health significance.

Recent media stories about salmonella in raw chickens have caused consumers to want to know more about the illness it can cause.

The infection is characterized by rapid onset of severe signs of acute enteric infection, usually followed by recovery without treatment. Persons with undeveloped or weakened immune systems are most at risk of serious

health effects from salmonellosis. Salmonella in the small intestine causes stomach pain and diarrhea. Other symptoms include nausea, vomiting, chills and fever. The symptoms usually last from 2 to 5 days. Most human infections are related to animal reservoirs but some persons can be persistent carriers of some strains such as *Salmonella typhi*.

Although many people associate salmonella with poultry, improper handling can lead to salmonella poisoning from many foods. Good food handling in the kitchen before, during and after cooking is the key factor in the prevention of most foodborne infections, including salmonella. Usually, food poisoning is directly related to careless handling of food in the kitchen. Salmonella can be found in a number of foods including red meats, fish, raw milk, raw vegetables and eggs.

Factors (with comments on prevention) that contribute to outbreaks of foodborne disease are (in order of frequency of occurrence):

1) Inadequate cooling of foods. Place food in freezer to cool rapidly. Make sure the food remains under 40 degrees F. in the refrigerator.

2) Lapse of a day or more between preparing and serving. Foods which are to be stored cold should be refrigerated within 1 ½ hours of cooking so that surviving organisms will not have the opportunity to multiply.

3) Infected persons having touched foods which are not subsequently heat-processed. Any person suffering from acute salmonellosis (looseness of the stool) is likely to be excreting large numbers of organisms. It is difficult in these cases to completely wash the bacteria off the ends of the fingers. Hands should always be washed with soap and hot water before and after handling raw meat and fish and before working with other foods.

4) Inadequate time or temperature, or both, during heat processing of foods (canning, cooking, processing). Cook meat to an internal temperature of 185 degrees F. Never partially cook meat and finish cooking it later. Bacteria, some of which produce toxins not destroyed by cooking, can survive in partially cooked foods.

5) Insufficiently high temperature during hot storage of foods. Place hot cooked foods in holding equipment which is already at a temperature of at least 140 degrees F. Always keep hot foods above 140 degrees F. and cold foods below 40 degrees F.

6) Inadequate time or temperature, or both, during reheating of previously cooked food. It has been generally accepted that cooking poultry to an internal temperature

of 185 degrees F. produces optimum doneness and reduces normal microbial contamination to a safe level for consumption.

7) Ingesting contaminated raw foods or raw ingredients. Food poisoning from consumption of raw food invariably follows the use of untreated food such as raw milk, raw steaks and uncooked or lightly cooked eggs.

8) Cross-contamination from raw foods, raw meat, poultry, eggshells or unpasteurized egg product to cooked foods. Do not let raw meat juices drip on other foods. Utensils, such as cutting boards, should be washed in hot soapy water before using them for other foods. Use acrylic cutting boards for meat because salmonella may survive in the crevices in a wooden board. Acrylic boards can be put in a dishwasher.

9) Inadequate cleaning of equipment. Thoroughly wash equipment with hot soapy water and rinse. Chlorine bleach can be applied as directed on the label.

10) Obtaining foods from unsafe sources. Select perishable foods with care. Make sure frozen foods are solid and that refrigerated foods feel cold. Many products are dated. Make sure the date has not expired.

11) Using leftovers. Divide meat, dressing and potato salad into smaller portions before freezing. This allows the food to cool quickly to temperatures at which bacteria quit growing.

The factors that most often contribute to outbreaks of foodborne disease vary, depending on the type of establishment in which foods are handled.

Annual foodborne disease surveillance data show that foods implicated in outbreaks are frequently mishandled in food service establishments and homes. For instance from 1973 to 1976, 67.4 percent of the outbreaks involved foods that were mishandled in food service establishments and 26.6 percent involved foods mishandled in homes.

Current epidemiologic evidence indicates that meat source animals are major reservoirs of salmonella. Animals become infected either from feed, which frequently contains salmonella, or from their environment, which has been contaminated by previous flocks or herds.

The infection rate increases when swine or cattle are transferred to slaughter and held in pens. A few infected (or superficially contaminated) animals are the source of salmonella spread from fecal matter to many of the carcasses.

Considerable contamination occurs early in processing, during defeathering of fowl or dehairing of swine. Washing reduces the level of contamination, but subsequent handling enhances the possibility of cross-contamination, which increases the number of contaminated carcasses. The primary sources of salmonella in retail stores, food processing establishments and homes are poultry carcasses, cuts of meat and unwashed eggshells. Consequently, poultry, meat and eggs have been more commonly associated with salmonella outbreaks than have other foods.

Foods implicated in outbreaks of salmonellosis usually become contaminated by salmonella in one of the following ways:

Animal and fowl carcasses are contaminated with fecal matter during processing.

Foods that receive no further heat treatment or that are inadequately heated are contaminated by the addition of raw ingredients, such as checked or cracked raw eggs that already contain salmonella or have them on their shells.

Cooked foods become contaminated by touching unwashed or inadequately cleaned equipment that has been used to process contaminated raw foods of animal origin, or by persons who have previously handled such contaminated foods (cross-contaminated).

To a lesser extent, human carriers who practice poor personal hygiene can contaminate foods.

It has been difficult to determine, during outbreak investigations, whether infected food workers were carriers and the source of contamination or whether they had eaten the same foods as did the other persons who had become ill or had handled the contaminated food.

To become dangerous, foods contaminated by salmonella usually must be held long enough at suitable temperatures for salmonella to multiply to sufficient numbers to cause infection. In most episodes of salmonellosis, the ill have ingested millions of salmonella. But smaller numbers of some sero-types apparently can cause illness in susceptible persons.

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