Economics of Food Safety: Cantaloupe and Salmonella—A Harmful Combination?

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Where Salmonella Has Been Spotted

On the picnic table sits an array of comfort foods ideal for summer. The light aroma of fresh fruit and garden salads fills the air, bringing back pleasant memories. With each taste, one focuses on the sweet and refreshing flavors of the food, but forgets the potential dangers associated with the flavorful bite. Without warning, one spoonful of the fruit salad could leave one feeling sick for days. Currently, foodborne illnesses prove to be a common occurrence, impacting the health of many individuals around the world. Lately, the United States has seen numerous outbreaks from cantaloupes tainted with salmonella.

Recently, the United States has seen numerous health cases involving salmonella and cantaloupes—it seems the United States has heard of an outbreak every year. Just last year, Chamberlain Farms Produce Incorporated, located in Owensville, Indiana, suffered from salmonella outbreak, leaving twenty-four states (see figure 1)—a total of 261 people—infected with the Salmonella Typhimurium or Salmonella Newport (“Multistate”). Besides American-grown cantaloupes being tainted with salmonella, the contaminated fruit has arrived on the United States’ grocery shelves through means of importation. For instance, the United States Food and Drug Administration (FDA) suspected Guatemalan cantaloupes to be the source for the 2011 Salmonella Parama outbreak (Quester). Moreover, in 2008, the Centers for Disease and Prevention (CDC) believed Honduras cantaloupes possessed Salmonella Litchfield, affecting 51 American citizens and 9 Canadian citizens (“Investigation”). With a recent surge in cantaloupe-salmonella outbreaks, one may wonder if we will ever see a time where the relationship between salmonella and cantaloupe will be nonexistent.
So, What is the Harm in Salmonella?

According to CDC, Salmonella proves to be a “group of bacteria” which can be found transferred through animal and human feces. Being recognized for initiating infections for more than one hundred years, salmonella has been known to affect people of all ages ("Salmonellosis"). After all, in the Chamberlain Farms epidemic, people—ranging from under 1 year of age to 100 years of age—were affected by the bacteria ("Multistate"). After coming into contact with salmonella, the bacteria enter the intestinal tract (see Figure 2), later, causing intestinal mucous membrane inflammation and

![Figure 1](image1)

See CDC's "Multistate Outbreak of *Salmonella Typhimurium* and *Salmonella Newport* Infections Linked to Cantaloupe (Final Update)"

![Figure 2](image2)

"Bleeding in the Digestive Tract" by National Digestive Diseases Information Clearinghouse (NDDIC).
lesions (Moon). Typically, salmonella will show symptoms, like abdominal cramps, fever, and diarrhea, as soon as 12 to 72 hours after ingestion. The bacteria tend to harbor in one’s intestinal tract, but in severe cases, it may leave the intestines to travel through blood stream (“General”). Since the bacteria interferes with the immune system’s productivity (“What are Salmonella”) severe salmonella often targets babies, elderly, and ones who have poor immune system (“General”). As a result, death may occur if one does not treat from the severe infection. Antibiotics and other treatments, like intravenous fluids for rehydration, can be used to treat the infected patient (“General”). However, individuals may continue to feel salmonella’s effects even after it seemed to have gone away. With time, the salmonella bacteria can develop into other health problem, such as Reiter’s syndrome—which can later lead to chronic arthritis (Moon).

Since cantaloupes typically grow in warm sunny areas (Foord) and salmonella favors the summer climate (“General”), Cantaloupes and Salmonella are bound to come into contact. After all, when developing, cantaloupes live directly on the ground surface—in constant contact with the soil. Thus, as Liz Szabo of USA Today reports, nearby livestock manure can flow into the cantaloupes growing area, contaminating the cantaloupes with salmonella that is found in the feces. Not to mention, cantaloupe’s “rough” and “porous” skin can accumulate bacteria, making it a key spot for the bacteria to settle (Szabo). As one may suspect, exposure when growing and handling the cantaloupes can lead to salmonella contamination. For instance, workers who fail to wash their hands after using the restrooms can spread salmonella when handling the cantaloupes (Zorn). Szabo suggests if improper levels of chlorine are present when bathing the cantaloupes, salmonella may spread through the water, contaminating the harvest of cantaloupes. Thus, after cleaning, the bacteria may remain on the cantaloupes even when at the supermarket. As a result,
since the salmonella does not affect food’s appearance, one may unknowingly consume a tainted cantaloupe ("General").

Relative Economic Costs

With a typical case of salmonella, one can expect to recover in about a 4 to 7 days after being infected. Yet, because of the uncomfortable side effects—like diarrhea or abdominal cramps—associated with the illness, one may be unable to perform daily tasks, such as attending work. Thus, as a consequence, one may lose their number of sick leave days or even portions of their paychecks—depending on their work status and how long the person is absent. However, if one’s condition worsens, one may need hospitalization, ultimately initiating other costs. For instance, if one suffers from severe diarrhea, antibiotics and intravenous hydration treatments may prove necessary to treat the infection ("General"). Consequently, the cost to be admitted into the hospital and the additional costs for the treatments may cost the average American …, depending if the person carries insurance or not.

On the other hand, farmers benefit from producing great amounts of cantaloupes in an unsanitary manner. For instance, lower concentrations of chlorine when cleaning the cantaloupes may save the farmer in amount of chlorine purchased. However, as mentioned earlier, the insufficient chlorine amounts may lead to salmonella-related illnesses. Furthermore, farms that utilize manure instead of commercially-produced fertilizer, can increase their chances of salmonella. Thus, through cutting costs of sanitation and using cheaper fertilizers, such as manure, farmers are able to produce cantaloupes at a lower price.

Not to mention, if manure is utilized when growing cantaloupes, run-off could affect nearby water bodies. As the University of Minnesota’s Karl Foord and Jill MacKenzie point out, using great amounts of manure can significantly raise the soil’s phosphorus level. If the manure
. leaches into nearby water bodies, the elevated phosphorus level may encourage algae growth (Foord). While algae serves as food aquatic organisms, too much of it can lower dissolved oxygen levels in the water; after all, oxygen is required to decompose the excess algae ("Algae"). Consequently, without sufficient oxygen many organisms, like fish, will die.

Some farmers raise their animals on antibiotics to enhance their development, making some types of salmonella no longer influenced by antibiotic medication (since the salmonella harbors in the intestinal tract). Yet, some individuals can try antibiotics, like ampicillin and ciprofloxacin, in efforts to treat salmonella, especially when salmonella reaches the bloodstream. Yet, because the salmonella may be already immune to the medication, it may not prove as effective when used in treatment. As the FDA suggests—in cases of severe salmonella—without antibiotics, one may die ("General").

Not only does the individual who consumes the tainted cantaloupe economically suffer, but so do the farms producing the fruit. After all, after tracing the contaminated cantaloupes, government agencies, like the FDA, often encourage the ones with access to the cantaloupes—such as grocery stores—to discard the tainted fruit ("Investigation"). Through the process, often the responsible farm is pressured to shut down production for the season, such as what happen to the Chamberlain Farms outbreak. This loss in production ultimately impacts the farmers’ and related workers’—like packinghouse employees or delivery truck drivers—income. Farmers are especially impacted; after all, commodity farmers’ median incomes run fairly low as seen in Figure 3. Furthermore, farms that play a significant role in the United States cantaloupe market, such as the Asunción Mita farm which provides the Del Monte Fresh Produce with 27% of its cantaloupes, will not distribute as many cantaloupes (Quester). As a result, the country’s cantaloupe supply will be limited, reducing the quantity and raising prices of the cantaloupes
sold in the United States. Thus, when summer comes—and demand for cantaloupe continues to be high—without as much cantaloupe, people will have to look for close substitutes, such as watermelons, to satisfy their appetites.

![Farm operator household income varies by commodity specialization, 2011](chart)

*Includes fruit, nuts, vegetables, greenhouse and nursery.
*Source: Agricultural Resource Management Survey, ERS and NASS, USDA.

**Figure 3**
See USDA’s "Farm Household Income"

**Government Intervention**

Often government-related agencies, along with other qualified individuals, often investigate to determine the source of the salmonella outbreak. For instance, the CDC, FDA, and public health officials worked together to inspect the Chamberlain Farms’ outbreak. According to the CDC, DNA Analysis proved as a technique used by investigators to trace the form of salmonella associated with the Chamberlain Farms’ tainted cantaloupes. First, the method of pulse-field gel electrophoresis (PFGE) was used to obtain DNA “fingerprints” that can help
determine the salmonella strain associated with the reported illnesses. Further, investigators used Multiple-Locus Variable-number tandem repeat Analysis (MLVA) to confirm the salmonella strand. After identifying the strain investigators can use “traceback investigations” to locate the bacteria’s origination. Then, additional testing—at the suspected farm—can confirm if the farm possesses salmonella; the DNA can confirm if the farm’s cantaloupes are infected with the same salmonella strain associated with the outbreak (“Multistate”).

While investigators can build up evidence against farms, and issue warnings to produce markets and consumers, because cantaloupes are distributed over vast regions, the government proves unable to withdraw all tainted cantaloupe from the market. National standards provide farms and packinghouses with the safety expectations for growing and handling cantaloupes to prevent salmonella outbreaks. Furthermore, some farmers, like the Eastern Cantaloupe Growers Association (ECGA) farmers, can expect an “unannounced audit” to ensure they are meeting standards (“FDA Announces”). However, it is impossible to prevent any violation of the standards. As the David Acheson, who previously served as the FDA’s Associate Commissioner of Foods, points out, the FDA fails to have the resources for effective regulation. According to Acheson, the FDA accounts for about 80 percent of the food utilized in United States, but it “physically” examines no more than one percent of imported foods (Quester). Yet, because of the recent outbreaks, the FDA plans to investigate United States packinghouses through sampling in 2013 (“FDA Announces”). Since government agencies cannot inspect all crops, independent organizations may become established to ensure consumer safety. For instance, the California Cantaloupe Advisory Board requires central California’s cantaloupes to be examined before being sold. Also, Californian cantaloupe growers are expected to follow the “standardized principles of ‘Good Agricultural Practices’” (“Consumer Tips”). Cautionary practices, like the
California Cantaloupe Advisory Board can help avoid contributing more cases of salmonella illnesses in America; currently, an estimated 40,000 salmonellosis cases a year in the United States ("General").

![Reported cases Salmonellosis excluding typhoid fever, United States 1988-1995](image)

Summary of Notifiable Diseases, United States MMWR 44(53): 1996 October 25

**Figure 4**
See FDA's "BBB-Salmonella spp."

Overall, throughout the years, salmonella served as an ever-present force in America. With numerous cases being reported on the news each year, one may wonder if a time will come where cantaloupe will undoubtedly prove safe to eat. Although the United States cannot prevent all cases of salmonella-related illnesses, more cautionary measures on behalf of the producers, transporters, and consumers, can significantly lower the chances of ingesting the bacteria and becoming ill. Perhaps through investing in safety precautions, we can preserve our tradition of the juicy cantaloupe found on our picnic tables.
Works Cited


