

***Salmonella* Enteritidis Outbreak Associated with Frozen Chicken Entrees  
Minnesota  
2005- 2006**

**Background**

In 1998 and 2005, two outbreaks of salmonellosis associated with eating frozen, pre-browned, single-serving, microwavable stuffed chicken products were identified in Minnesota. Thirty-three cases of *Salmonella* Typhimurium infection associated with consumption of Maple Leaf Farms Chicken Kiev were identified in the 1998 outbreak. Four cases of *S. Heidelberg* infection associated with consumption of Cub Foods Chicken Broccoli and Cheese were identified in the 2005 outbreak. The investigations of these two outbreaks lead to minor label changes of the two specific brands of stuffed chicken products.

Another outbreak of salmonellosis associated with these types of products was identified and investigated in Minnesota in 2005. From August 2005 through February 2006, the Minnesota Department of Health (MDH) Public Health Laboratory identified 13 human-case isolates of *Salmonella* Enteritidis that were indistinguishable by pulsed-field gel electrophoresis (PFGE); the subtype was designated SE43. Routine interviews of the cases revealed that many of the cases reported eating frozen, pre-browned, single-serving, microwavable stuffed chicken products during the week before illness onset. An investigation was initiated.

**Methods**

All *Salmonella* cases reported to MDH are routinely interviewed about food consumption and other exposures as part of enteric disease surveillance in Minnesota. A case-control study was conducted to evaluate the association of illness with stuffed chicken products. All *S. Enteritidis* SE43 identified in surveillance that were interviewed from August, 2005 through February 2006 were included as cases. *Salmonella* cases of serotypes other than Enteritidis identified in the same time frame were used as controls. Three controls were included per case.

The Minnesota Department of Agriculture (MDA), the Centers for Disease Control and Prevention, the United States Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS), and other states were notified of the *S. Enteritidis* outbreak on March 8, 2006.

The MDA Dairy and Food Division collected products for testing that *S. Enteritidis* cases had purchased at the same time as the products consumed in the week before their illness. Intact products from the same stores or chains where the cases shopped were also collected for testing. The MDA Microbiology Laboratory cultured the products for *Salmonella*, and all isolates were sent to the MDH Public Health Laboratory for PFGE subtyping.

## Results

Eleven cases and 33 controls were included in the case-control study. Eating stuffed chicken products was statistically associated with illness (9 of 11 cases vs. 0 of 32 controls; odds ratio, undefined; 95% confidence interval, undefined;  $p < 0.001$ ). No other exposure was statistically associated with illness.

Twenty-seven *S. Enteritidis* cases with isolates of the outbreak subtype ( $n=26$ ) or one band different ( $n=1$ ) from the outbreak subtype that reported eating stuffed chicken products in the week prior to illness were identified. Dates of illness onset ranged from August 21, 2005 through July 27, 2006. The median age of the cases was 31 years (range, 5 to 85 years). All 27 cases had diarrhea, 22 of 25 (88%) had cramps, 21 of 25 (84%) had fever, 17 of 26 (65%) had nausea, 11 of 26 (42%) had vomiting, and 11 of 27 (41%) had bloody stools. The median duration of illness was 7 days (range, 3 to 22 days). Six cases were hospitalized for their infection. Several cases reported eating the stuffed chicken products multiple times during the week prior to onset, and the majority of the cases did not recall the precise meal date and time. Among the three cases for whom a precise meal date and time was known, the median incubation was 4 days (range, 40.5 hours to 7 days).

Unlike the two previous outbreaks, cases reported eating different varieties (Kiev, Cordon Bleu, and Shrimp and Crab) of product representing several different brands and manufacturers. Eight different brands produced by three different manufacturers were reportedly consumed by cases. Products produced by Serenade Foods (USDA plant 2375) were reported by at least 11 cases, Aspen (USDA plant 1358) by at least five cases, and Barber Foods (USDA plant 273) by at least one case.

*S. Enteritidis* was isolated from stuffed chicken products from three cases' households. All three were Maple Leaf Farms (USDA plant 2375; *i.e.*, Serenade Foods) products, with production codes of S5307, S5308, and C6047 which represent production dates of November 3 and 4, 2005, and February 16, 2006. No other brands were available for testing from cases' households.

Cooking methods were ascertained for all 27 cases; of these, 70% cooked the products in the microwave, and one case cooked the product in a toaster oven. None of the cases took the internal temperature after cooking.

Fourteen additional *S. Enteritidis* cases associated with these products were identified in nine other states.

### Public Health Interventions:

Responding to the isolation of *S. Enteritidis* of the outbreak subtype, Maple Leaf Farms issued a recall on March 10, 2006. Only Chicken Broccoli and Cheese and Shrimp and Crab sold under the Maple Leaf Farms and Kirkwood labels with production codes 5307 and 5308 were recalled. In addition to the recall, on March, 2006, USDA FSIS sent a letter to all processing plants that make these or similar products to those recalled, instructing them to re-evaluate the adequacy of the package labels to ensure that the

consumer is aware that these products are “uncooked”. Also in response to the outbreak, the National Advisory Committee for the Microbiological Criteria for Foods (NACMCF) issued new guidelines for labeling this type of product; these guidelines included: advising consumers that microwaving raw poultry from a frozen state is not advisable unless the manufacture instructions ensures that they achieve the recommended (165°F) endpoint temperature; the principal display panel of the label should have a warning declaration explicitly stating that the product contains raw poultry; and reminding consumers to fully cook the product when the product is raw, but gives the appearance of being fully cooked. The processing plants were required to submit the new labels for USDA approval within 8 months.

Due to the ongoing nature of the outbreak after the recall, USDA FSIS issued a consumer alert on July 3, 2006. The consumer alert included instructions to consumers on needing to “take multiple temperature readings using a food thermometer at different locations throughout the product due to the non-uniformity of the heating process and the creation of “cold spots”” when cooking these products in the microwave. This alert was not run in local newspapers, and did not appear to have an effect on the outbreak. On July 20, MDA and MDH issued a joint press release notifying Minnesota consumers about the outbreak, and strongly advising against cooking these types of products in the microwave.

### **Discussion**

This was the third outbreak of *Salmonella* infections in Minnesota associated with eating frozen, pre-browned, single-serving, microwavable stuffed chicken products. Even though these products are raw, the products’ cooked appearance, and the label’s microwave instructions, has lead to consumers undercooking the products. Most cases cooked the products in the microwave without thawing it first (as per instructions on the labels). Despite instruction on the label to take an internal temperature to assure that these products were cooked thoroughly, none of the cases took the internal temperature. Under the new label requirements, consumers will more easily identify the product as raw. The producers were required to verify that the cooking instructions (time and temperature) on the label are sufficient to reach the appropriate internal temperature. However, microwave cooking instructions will still be allowed on the new labels. In order to prevent future outbreaks, we recommend that microwave instructions should be removed entirely from the label, that these products are fully cooked prior to sale, or that these products are irradiated prior to sale.