Government of **Western Australia**
Department of **Health**

Salmonella Typhimurium outbreak linked to chickens

Molecular typing has shown that a recent increase in notifications of *Salmonella* Typhimurium infection in humans is linked to particular chicken flocks and contaminated chicken meat.

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Background

Salmonellosis was the second most commonly notified enteric infection in Western Australia in 2011, with 1323 cases. *Salmonella* Typhimurium (STM) was the most commonly notified *Salmonella* serotype, comprising 428 notifications, approximately 30% higher than the mean number for the previous 5 years. There were 5 identified food-borne or suspected food-borne outbreaks caused by STM in 2011, all associated with particular restaurants or caterers. Different subtypes of STM caused each outbreak, as determined by the pulsed field gel electrophoresis (PFGE) pattern of the organism.

STM PFGE 39 infections in humans

From the beginning of 2011 there has been a general increase in the number of notifications of gastroenteritis caused by another STM PFGE type, designated as type 39. There was an average of 2 cases per month of STM PFGE 39 notified from 2008 to 2010, but this increased to 6 per month in 2011, and has continued to be high in 2012 with an average of 8 per month (Figure 1). Other Australian states and territories have not reported an increase in this *Salmonella* type.

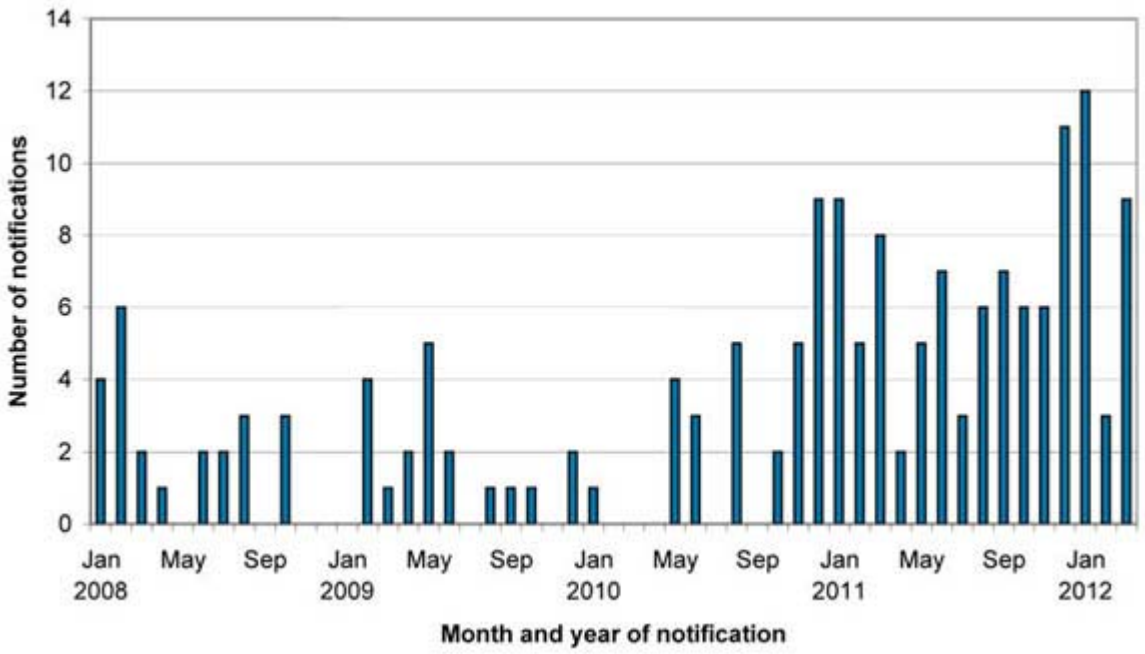

Figure 1 – Number of *Salmonella* Typhimurium PFGE 39 notifications in WA, January 2008–March 2012

STM PFGE type 39 infections notified in WA appear to be more severe than other STM infections, with 26% of STM 39 cases hospitalised, compared to 21% of other STM cases over the same period. In December 2011, 1 case with STM PFGE 39 infection developed rhabdomyolysis, a serious and very rare complication of *Salmonella* infection, which resulted in acute renal failure.

Hypothesis-generating interviews of cases conducted between January and March 2011 found that the most commonly consumed foods were eggs (88% of cases), chicken (82%) and pasteurised milk (82%). Historically, *Salmonella* cases have had a similar frequency of chicken and milk consumption (80% and 83% respectively), but egg consumption has been lower (73%). As pasteurised milk is subject to heat treatment and is an unlikely source, further investigations focused on chicken and egg consumption. Interviews with additional cases in the period January to March 2012 found that within their likely incubation periods, 81% of cases had eaten chicken and 38% had eaten eggs, providing stronger evidence of a link to chicken.

STM PFGE 39 in chickens and chicken meat

In late 2011, STM PFGE 39 was detected in a number of poultry livestock samples that were submitted to PathWest Laboratory Medicine WA through a veterinary laboratory. These samples were submitted in accordance with WA quarantine requirements, as there was a higher than normal mortality rate in some grower flocks. The Department of Health's Food Unit has been investigating possible environmental causes of the STM PFGE 39 contamination, including links with a fertile egg-producing flock.

To assist investigations, the Food Unit implemented a chicken meat sampling program in October 2011 and from March to May 2012. In October 2011, 7 of 8 samples from selected chicken processors collected at retail outlets were positive for STM PFGE 39. In 2012, 1 of 12 samples from the same processors was positive for this type. The October 2011 results showed that there was a significantly higher proportion of samples positive for *Salmonella*, when compared to a poultry survey conducted in 2007 and 2008, which found that only 12.5% of carcasses were positive.

Discussion

Raw chicken products are frequently contaminated with *Salmonella* and other organisms, such as *Campylobacter*, due to environmental factors associated with livestock production and growing. It is thought that a significant proportion of cases of WA-acquired infections with S. Typhimurium are associated with consumption of chicken meat or eggs. While defined outbreaks linked to contaminated food served at specific food premises or functions are identified occasionally, most STM cases appear to be sporadic, representing a range of STM PFGE types, and are generally ascribed to cross-contamination during food preparation or inadequate cooking at home.

The contemporaneous identification of infections due to STM type 39 in humans and livestock chickens, along with detection of the same organism in retail chicken meat samples that were linked to the affected poultry flocks, provides unusually strong evidence that increased levels of contamination of chicken meat by some *Salmonella* sub-species can lead to increased human illness. It is possible that this organism was associated with a higher than usual bacterial load in livestock chickens, that was more difficult to control during processing and/or was able to withstand consumer hygiene practices. The mortality rate in livestock chickens, and the higher hospitalisation rate in humans with STM type 39 infection, also suggests that this organism may have higher virulence than other STM types.

The identification of this outbreak demonstrates the utility of enhanced surveillance of enteric diseases using molecular typing methods, and of linkage of data on human infections with results from food sampling and potential animal sources. The Department of Health will continue to liaise with poultry companies to thoroughly examine all potential sources of contamination, while monitoring whether notifications of STM PFGE 39 infections in humans return to their former lower levels.