Epidemic *Salmonella* Typhimurium in WA

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OzFoodNet

• Federally funded enhanced foodborne disease surveillance system
  • Epidemiologists, PHLN, FSANZ, Dept Ag, National Centre for Epi and Pop Health (ANU)
  • Est 2000, national surveillance and applied research
• Work with Food Unit, PHUs and local government to investigate and prevent food-borne disease
• Key roles (foodborne disease outbreaks)
  • Identify possible outbreaks of food-borne disease through notifiable disease surveillance
  • Conduct epidemiological investigations to help identify which food is the source of illness
Overview

- Increase of *Salmonella* in WA
- Evidence linking the increase to consumption of raw or runny eggs
  - Point-source outbreaks
  - Community cases
  - Microbiological evidence
- Public Health response
Salmonella

- Colonises intestinal tract of many animals including chickens, pigs, cows, young dogs/cats, reptiles, frogs
- Can cause severe illness in humans and are a leading cause of gastroenteritis in Australia and worldwide
- Transmission – faecal-oral via food, water, animal, person-to-person (between young children)
  - Incubation period 6 h – 7 d
- Meat can become contaminated during slaughtering process
  - 10-15% of chicken meat samples positive
- Foods can be cross-contaminated from raw foods
  - Grows in food and the environment
Salmonella and eggs

- Australia 2011: 48% (29/61) of outbreaks were linked to eating eggs or egg-based dishes
- WA 2010-2014: 29% (9/31) of outbreaks were linked to eating eggs or egg-based dishes

Why are eggs associated with outbreaks?
- *Salmonella* is common in chickens
- Eggs can easily be contaminated with chicken poo
- Eggs not always washed by egg producers
- Modern cooking includes many raw egg foods, mousse, tiramisu, mayonnaise
- Poor temperature control can lead to rapid growth of *Salmonella*
Salmonella notifications in WA

- Large increase in *Salmonella* in 2015-2016
- *S. Typhimurium* was the main cause of the increase
  - 1.8, 2 and 3.8-fold the 5-year average in 2015, 2016 and 2017 (Jan-May)
Salmonella Typhimurium (STM) notifications in Australia

- WA STM rates previously amongst the lowest in Australia
- Most jurisdictions saw a decrease in STM in 2015 and 2016
- In 2017 (Jan-May), WA had the highest monthly STM rate in Australia except for Feb (ACT)
  - 1.9-2.8 fold higher than the average outside WA
Salmonella Typhimurium subtypes in WA

STM PFGE1 drove the increase in 2015 and most of 2016.
STM PFGE43 emerged in November 2016 and mainly driven the increase late 2016 and 2017 YTD.
Salmonella Typhimurium PFGE1 outbreak

- Jan 2015 – May 2017 = 893 cases
- Case control study Feb 2015-Mar 2016 (Johanna Dupps MAE)
  - 152 cases, 295 controls; Median age 26 y, 47% M, 85% metro
  - 42% bloody diarrhoea, 34% hospitalised (median 3 days)
  - Associated with eating raw eggs (OR 3.3, 95%CI 1.2-9.7, p 0.03) and eating chicken prepared outside home (OR 1.8, 95%CI 1.0-3.1, p 0.04)
Salmonella Typhimurium PFGE1 outbreak

- Jan 2015 – May 2017 = 18 point source outbreaks
  - 155 ill (median 8.5, range 2-28), 17% hospitalised (median 14%, range 0-50%)
  - Cafes/restaurants (n=7), private residences (n=6), after school care or daycare (n=2), church (n=1), community (n=1), mobile food vendor (n=1)
  - 17 due to egg dishes and when an egg brand was known (n=12), most were from one producer
Salmonella Typhimurium PFGE1 non-human isolates

- 7/9 outbreaks with samples collected by local government were positive for STM, all PFGE1
- Retail samples and veterinarian samples of egg laying chickens from implicated farms also positive for PFGE1

<table>
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<tr>
<th>Specimen Date</th>
<th>Specimen type</th>
<th>PFGE type</th>
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<td>17/11/2016</td>
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<td>01/06/2016</td>
<td>Egg laying chicken postmortem sample</td>
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<td>23/03/2016</td>
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Salmonella Typhimurium PFGE 43 outbreak

- 2016 = 78 cases, 2017 = 396 cases, 5 y avg (2011-15) = 20
- Community cases
  - Median age 30 y, 45% M, 86% metro
  - 26% bloody diarrhoea, 25% hospitalised (median 3 d)
  - 71% ate eggs, 10% unsure; 13% ate raw eggs; variety of producers
**Salmonella Typhimurium PFGE 43 outbreak**

- Sep 2016 – May 2017 = 12 point-source outbreaks
- Point-source outbreaks (19% of PFGE 43 notifications)
  - 143 ill (med 6.5, range 2-43), 16% hosp (med 11%, range 0-80%)
  - Cafes/restaurants/takeaway (n=6), private residences (n=2), minesite (n=2), after school care or daycare (n=1), cruise ship (n=1)
  - 7 due to egg dishes (others unknown); brand known in 6, eggs were from 4 producers (5th producer in 3 with unknown food vehicle)
  - Issues: inadequate cooking, food handling and/or storage
STM PFGE43 non-human isolates

- 3/8 outbreaks with samples collected by local government were positive for STM, all the same MLVA type
- Isolated from environmental samples from an implicated producer
- Retail egg samples negative for Salmonella

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<th>Specimen date</th>
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<td>Egg farm sample x 2</td>
<td>3-20-9-12-523</td>
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Is PFGE/MLVA discriminatory enough?

26 WA STM PFGE 43 isolates
  - Clinical isolates representing 10 point source outbreaks, and community cases (egg consumption suspected and not)
  - Non-human samples

Same SNP type (10 SNP cut-off) with 56 isolates from cases in NSW, ACT and VIC (n=1) suggesting common ancestor or recent common source exposure

WA isolates (red) highly related except duckling (blue)

Future = + Vic and SA, ACT
Summary

- WA STM rates have increased 2-fold in the period 2015-2016, and over 3 fold in 2017 compared to previous five year averages.
- There is a large and ongoing WA wide outbreak due to STM PFGE1 and PFGE43 that is driving this increase and causing relatively severe illness.
- The majority of cases have occurred in the community.
- For both STM types, egg dishes have been associated with most point source outbreaks and evidence suggests many of the community cases are due to consumption of eggs.
- Samples of eggs, egg laying chickens and the egg farm environment from a number of egg producers have been positive for STM PFGE1 or PFGE 43; the same egg producers were implicated in outbreaks.
Public Health Actions

• EHD is leading the development of the WA Foodborne Illness Reduction Strategy (2017-2020)
  – Aim: Implement a strategic approach to the ongoing management of microbiological food risks in WA that will reduce levels of foodborne illness
  – Developed through review of existing strategies and other relevant data, and consultation within the EHD and CDCD and other key stakeholders
Public Health Actions

- Mail-out to local government regarding safe handling of eggs and products containing eggs
- Preparing key messages for distribution via social media to inform consumers re minimising infection risk when consuming eggs
- Liaising with food industry bodies to review the efficacy of their systems and ensure consistent messaging
- Working with Murdoch University on a proposal to research risks of Salmonella in layer farms locally
- OzFoodNet WA is continuing surveillance efforts to identify new point source outbreaks, inform EHD and local government, and educate the public
Public Health Actions

• Key messages (food businesses):
  – Consider safer alternatives to raw eggs
  – If choose to manufacture products that contain raw eggs, the associated risks must be properly identified and managed and a suitable processing treatment implemented

• Key messages (public):
  – Do not buy or use cracked or dirty eggs
  – Handle eggs safely to avoid contaminating other foods or surfaces eg. Wash and dry hands thoroughly after handling eggs
  – Store raw eggs in the fridge and do not wash them
  – Susceptible people should avoid eating foods containing raw or lightly cooked eggs
  – If raw eggs are used and not cooked, eat immediately or keep refrigerated for a max of 24 h until eaten
Acknowledgements

- PathWest (culture and typing) and ICPMR (WGS) staff
- Staff from the Food Unit, Department of Health.
- Local government environmental health officers
- Public Health Units
- OFN colleagues

(Busselton Mail, June 13th 2017)
References

• “Guidelines for the Environmental Health Investigation of a Food-borne Disease Outbreak”, Government of Western Australia, Department of Health.


