Epidemic *Salmonella* Typhimurium in WA

71st Annual State EH Conference, Sept 2017

Niki Foster, Nevada Pingault, Barry Combs, Gary Dowse
OzFoodNet Epidemiologists
Communicable Disease Control Directorate
OzfoodnetWA@health.wa.gov.au

ozfoodnet

Government of Western Australia
Department of Health

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

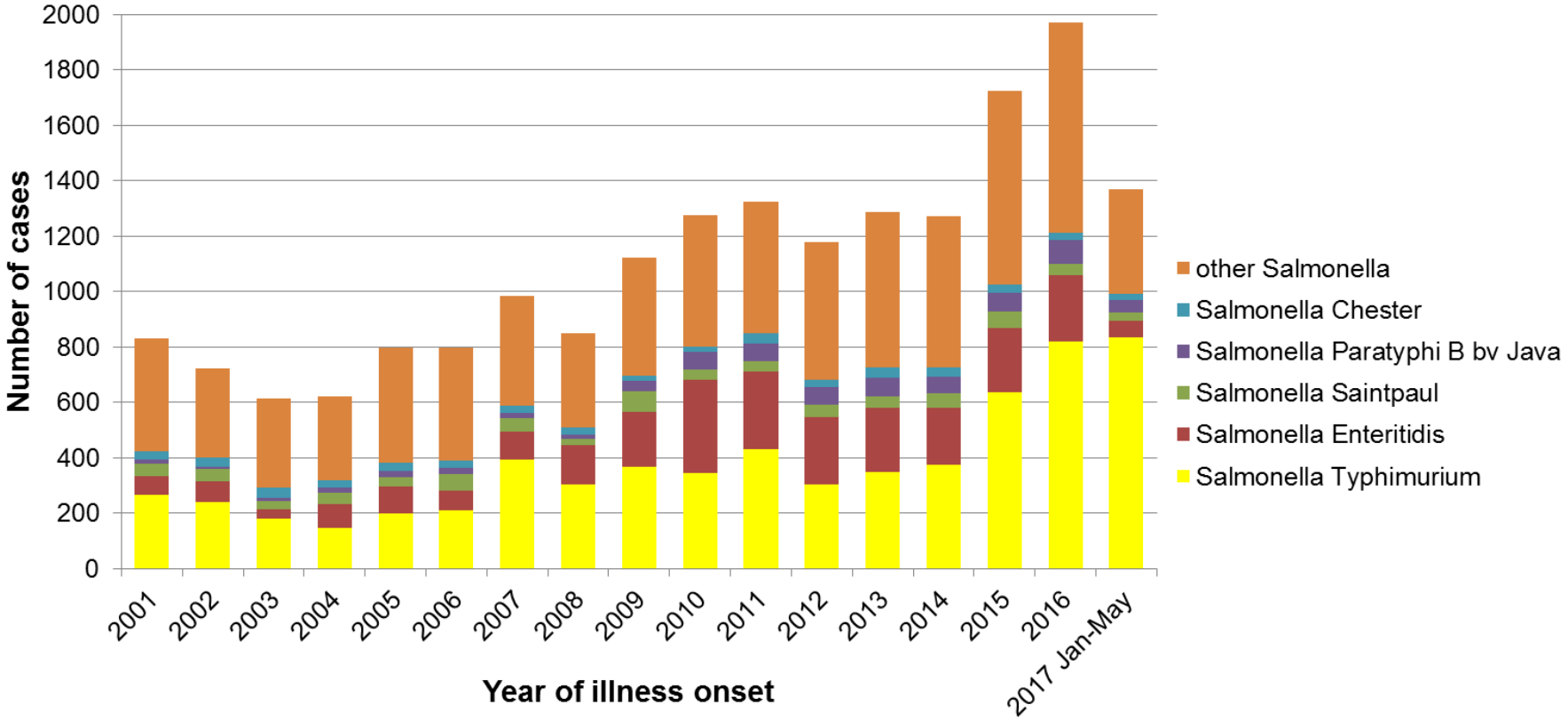
Salmonella and eggs

- 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?

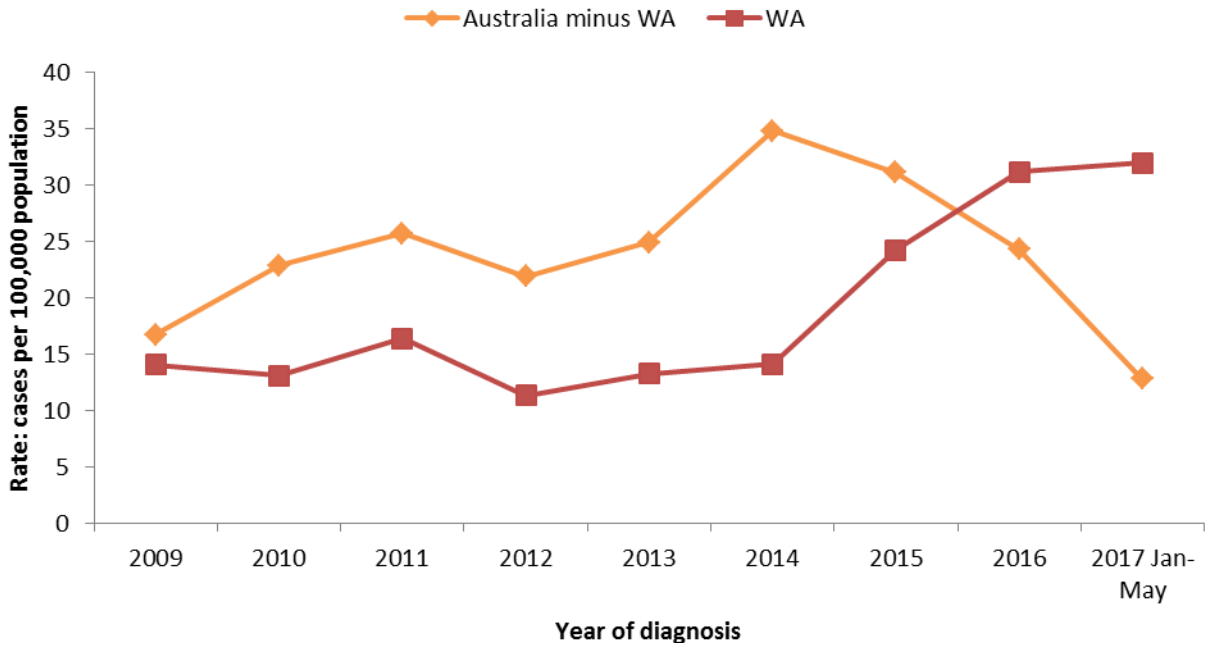
- *Salmonella* is common in chickens
- Eggs can easily be contaminated with chicken poo
- Eggs not always washed by egg producers
- Modern cooking includes many raw egg foods, mousse, tiramisu, mayonnaise
- Poor temperature control can lead to rapid growth of *Salmonella*

Salmonella notifications in WA



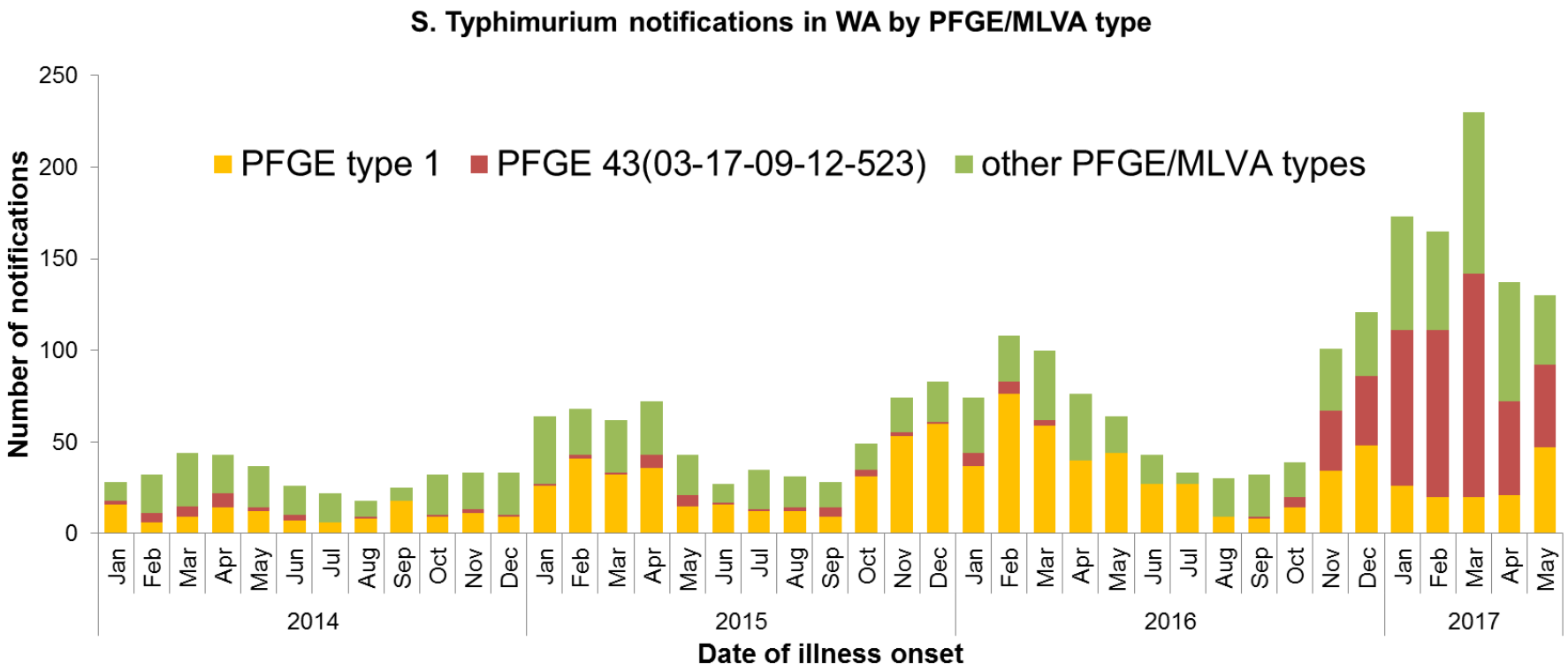
- Large increase in *Salmonella* in 2015-2016
- *S.* Typhimurium was the main cause of the increase
  - 1.8, 2 and 3.8-fold the 5-year average in 2015, 2016 and 2017 (Jan-May)

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

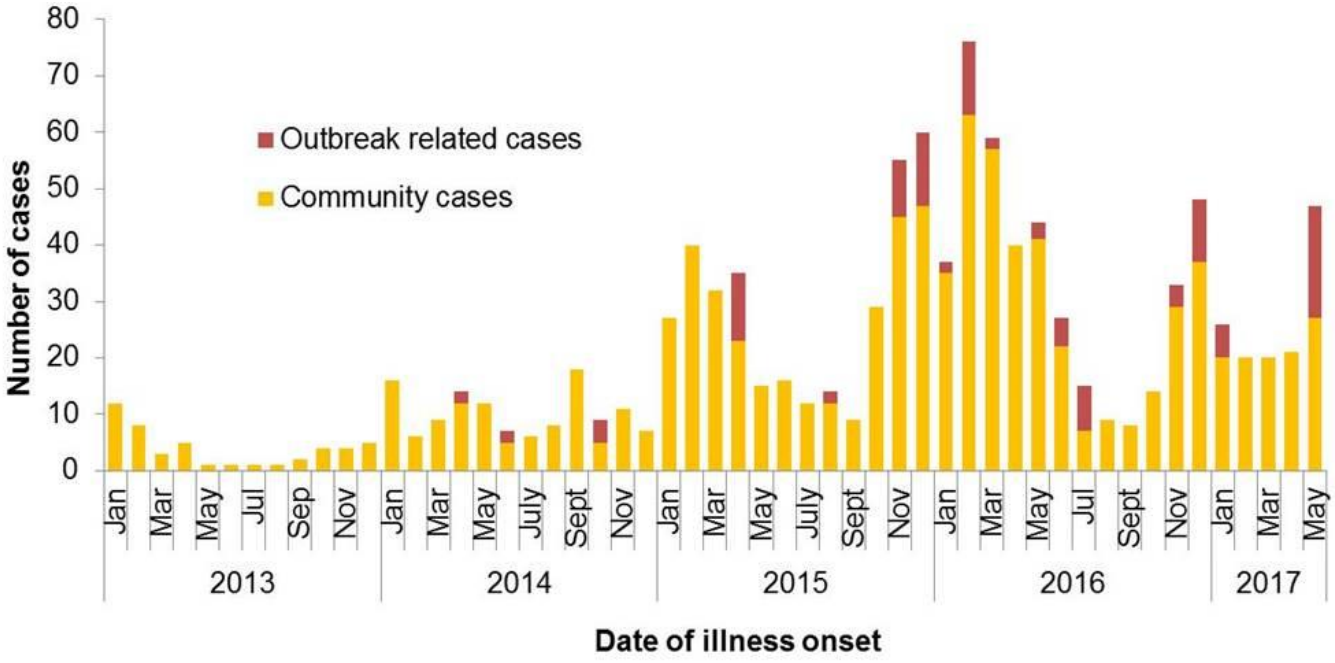


- STM PFGE1 drove the increase in 2015 and most of 2016
- STM PFGE43 emerged in November 2016 and mainly driven the increase late 2016 and 2017 YTD

ozfoodnet

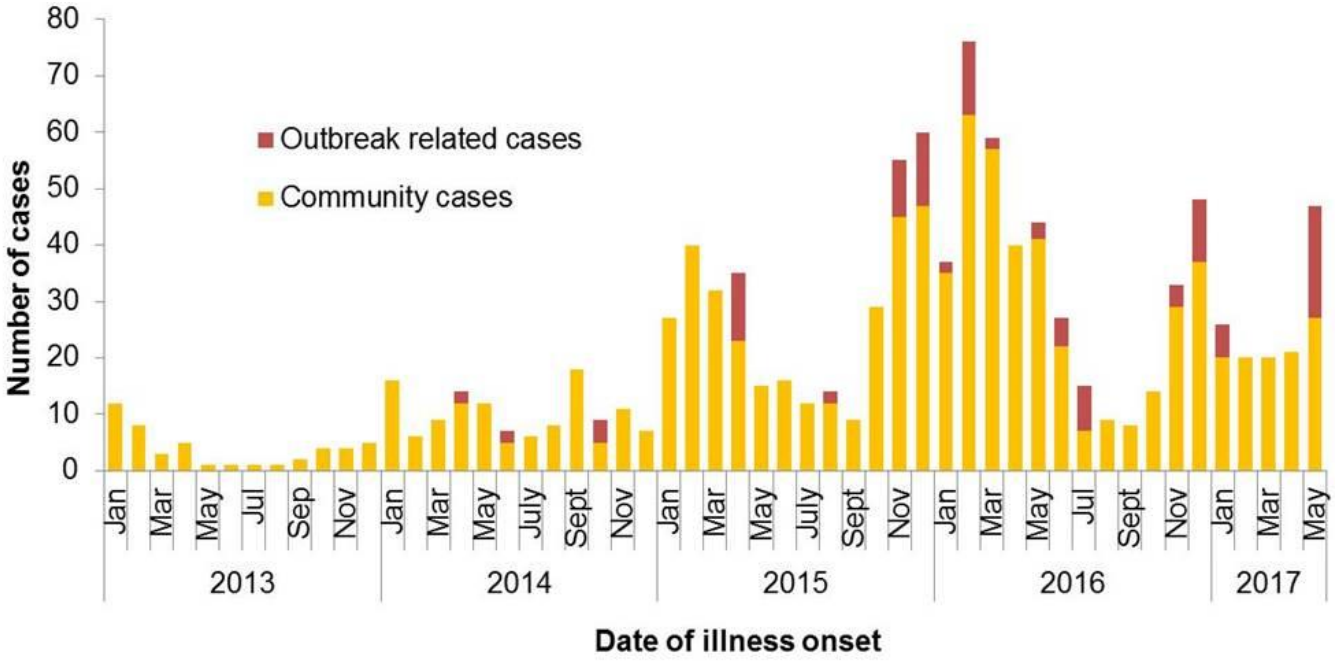
Government of **Western Australia**
Department of **Health**

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



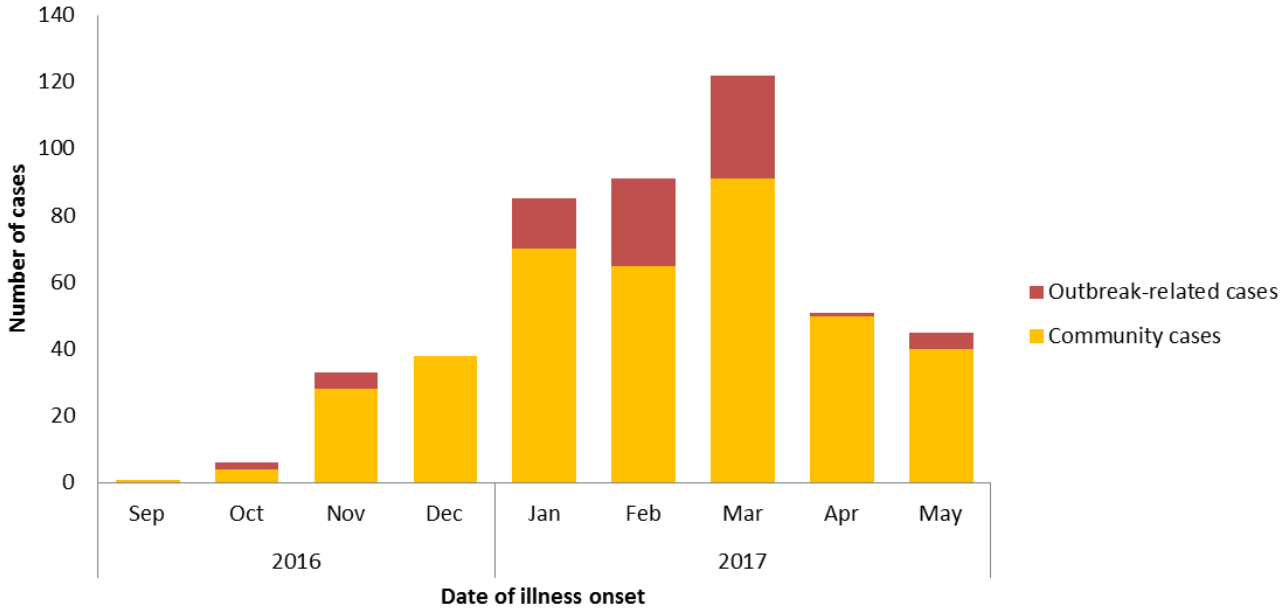
- Jan 2015 – May 2017 = 18 point source outbreaks
  - 155 ill (median 8.5, range 2-28), 17% hospitalised (median 14%, range 0-50%)
  - Cafes/restaurants (n=7), private residences (n=6), after school care or daycare (n=2), church (n=1), community (n=1), mobile food vendor (n=1)
  - 17 due to egg dishes 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

Specimen Date	Specimen type	PFGE type
06/01/2017	AVIAN SHED 1	1
17/11/2016	Egg sample	1
01/06/2016	Egg laying chicken postmortem sample	1
23/03/2016	Egg sample	1
23/03/2016	Egg laying chicken postmortem sample	1
23/03/2016	Egg laying chicken postmortem sample	1
26/10/2015	Egg sample	1
18/05/2015	Egg sample	1
06/10/2014	Free range chicken	1
12/09/2014	chicken meat	1
28/07/2014	chicken meat	1
17/06/2014	Egg laying chicken postmortem sample	1

Salmonella Typhimurium PFGE 43 outbreak

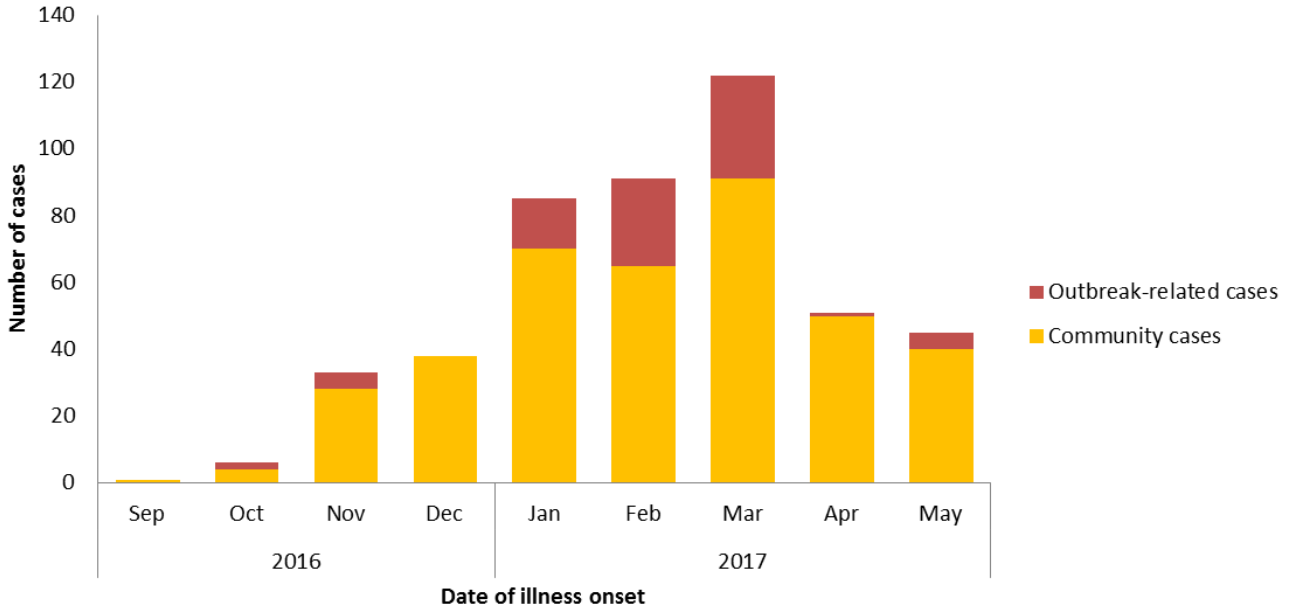


- 2016= 78 cases, 2017= 396 cases, 5 y avg (2011-15)= 20
- Community cases
  - Median age 30 y, 45% M, 86% metro
  - 26% bloody diarrhoea, 25% hospitalised (median 3 d)
  - 71% ate eggs, 10% unsure; 13% ate raw eggs; variety of producers

ozfoodnet

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

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

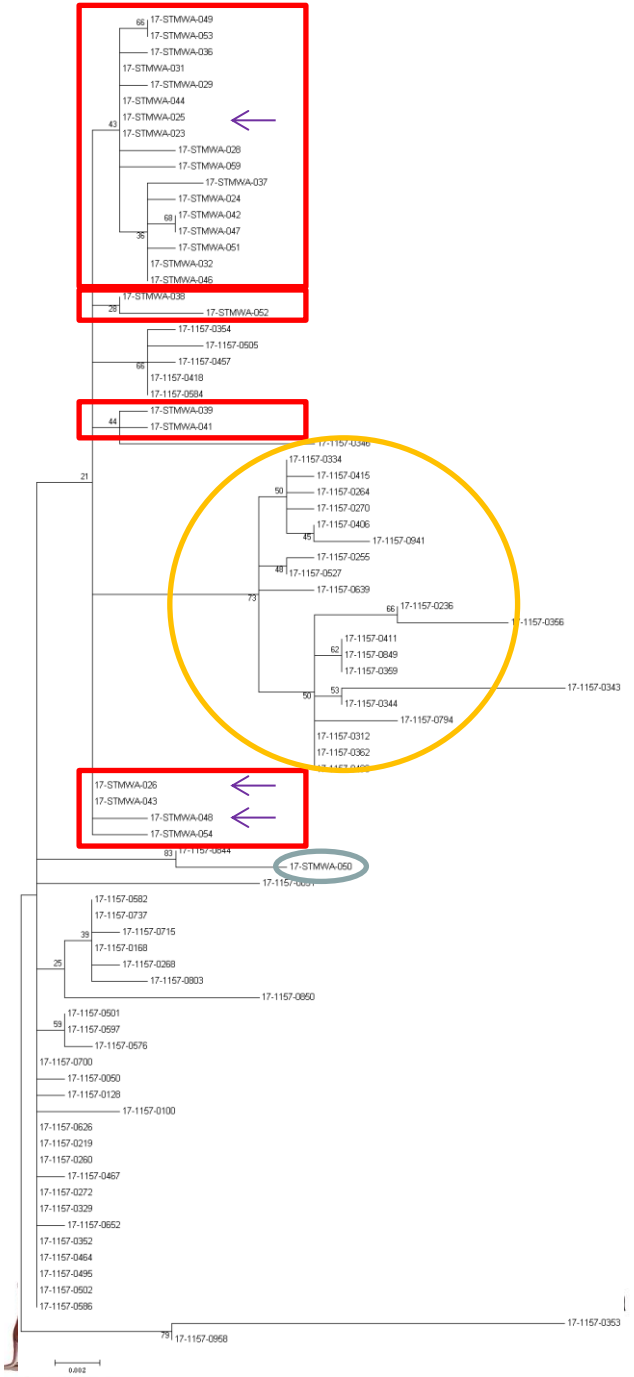
STM PFGE43 non-human isolates

- 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

Specimen date	Specimen type	MLVA
01/04/2017	Egg farm sample	3-17-9-12-523
01/03/2017	Duckling	3-17-9-12-523
18/02/2017	Egg farm sample x 2	3-17-9-12-523
06/01/2017	Egg farm sample x 4	3-17-9-12-523
09/11/2016	Egg farm sample	3-17-9-12-523
09/11/2016	Egg farm sample x 2	3-20-9-12-523

STM PFGE43 WGS

- 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

the lab examining egg shells for salmonella. She said wash hands

(Busselton Mail, June 13th 2017)

ozfoodnet

Government of Western Australia
Department of Health

References

- “Guidelines for the Environmental Health Investigation of a Food-borne Disease Outbreak”, Government of Western Australia, Department of Health.
- “Monitoring the incidence and causes of diseases potentially transmitted by food in Australia: Annual Report of OzFoodNet Network 2011”, Australian Government, Department of Health.
- OzFoodNet WA reports available at http://ww2.health.wa.gov.au/Articles/F_I/Infectious-disease-data/Enteric-infection-reports-and-publications-OzFoodNet
- *“Salmonella* Typhimurium and outbreaks of Egg-Associated disease in Australia 2001-2011”. Moffatt etal. Foodborne Pathog Dis 2016.
- “National Notifiable Diseases Surveillance System” http://www9.health.gov.au/cda/source/cda-index.cfm