



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

WA Health *Salmonella* Taskforce

FINAL REPORT

Communicable Disease Control Directorate
Environmental Health Directorate
PathWest Laboratory Medicine WA



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Disclaimer:

Every endeavour has been made to ensure that the information provided in this document was accurate at the time of writing. However, infectious disease notification data are continuously updated and subject to change.

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Executive summary

Infection with *Salmonella* bacteria is often caused by ingestion of contaminated food or water. Symptoms of *Salmonella* infection (or salmonellosis) include diarrhoea, vomiting, fever, abdominal pain, nausea and lethargy from 1 to 7 days after ingestion.

Between 2015 and 2017, there was a significant and persistent increase in *Salmonella* Typhimurium (STM) infections reported to WA Health (from 373 cases in 2014 to 1,456 cases in 2017). Notably, more than half of all cases were caused by a group of genetically related strains of STM (MLVA type 03-17-09-12-523 and eleven closely related types¹). From January 2015 to June 2022, there was a total of 2,832 reported illnesses caused by this group of STM strains (referred to as the outbreak STM group) and 687 (24%) cases were hospitalised. Most cases occurred in the metropolitan region (87.4%) and a quarter of infections occurred in children <10 years of age.

Investigations by OzFoodNet from Communicable Disease Control Directorate identified 76 individual point-source STM outbreaks due to the outbreak STM group. Of the 76 outbreaks, the most (39%) commonly implicated food dish was raw egg-containing foods such as tiramisu, deep fried ice cream, mousse and raw egg sauces.

Several point-source investigations identified a *Salmonella*-contaminated food item which was tested and confirmed at the PathWest laboratory. The *Salmonella* bacteria found in these food items were analysed using whole genome sequencing and was found to be the same as those causing illness in people. This evidence strongly suggested that *Salmonella*-contaminated egg dishes were the cause of human cases of illness.

In response to the ongoing *Salmonella* outbreak and strong evidence showing eggs were the food source, a “*Salmonella* Taskforce” was established by WA Health. The aims of the Taskforce were to; locate the farm sources of the STM strains causing the outbreak and assist those farms in implementing control measures to reduce *Salmonella* carriage on farms. These measures would hopefully reduce the level of contaminated food products in the WA community. The Taskforce entailed the collaboration of four investigative teams: OzFoodNet, Environmental Health – Food Unit (FU), Local Government and PathWest – Microbiology Laboratory.

The Taskforce investigated the presence of *Salmonella* contamination among retail eggs purchased from all major retailers in WA in October 2019. Only 2/396 (0.5%) egg samples tested were positive for STM, albeit not the strains in the STM outbreak group. In addition, the FU initiated on-farm environmental testing with the aims to pinpoint the primary source of

¹ STM multi-locus variable-number tandem repeat analysis (MLVA) types 03-17-10-12-523, 03-18-09-12-523, 03-18-08-12-523, 03-17-09-11-523, 03-17-08-12-523, 03-16-09-12-523, 03-17-09-13-523, 03-17-07-12-523, 03-17-11-12-523, 03-17-09-12-496 and 03-16-09-11-523.

the outbreak strains and better profile the risk of *Salmonella* contamination at the production level. From February 2020, farm samples were collected from the environment, feed, water, and eggs with the dominant *Salmonella* outbreak strain detected on four farms.

The Taskforce worked closely with egg producers to implement several interventions to reduce the *Salmonella* risks on farms. These included improvements in shed biosecurity, pest control methods, and shed cleaning and fumigation. These biosecurity interventions aimed to minimise the transmission of *Salmonella* between flocks on the farm.

The Taskforce collaborated with three farms to assess the effectiveness of *Salmonella* vaccination of layer hens in June 2020. The efficacy of the vaccine was assessed by comparing the microbial testing results of cloacal swabs and environmental samples (surfaces, manure, litter, dust and boots) between vaccinated flocks with unvaccinated flocks. In all three farms, *Salmonella* detection in chicken flocks and the environment decreased substantially following vaccination, suggesting that the vaccine was effective at reducing in-flock *Salmonella* carriage and contamination on-farm. A reduction in community cases with *Salmonella* strains that were previously detected in the three farms was also observed. It was estimated that by September 2021 the number of egg producing flocks vaccinated against *Salmonella* in WA had increased from 51% to 93%. The cost of vaccination averaged across the production life span of a chicken is estimated at less than \$0.01 per carton of eggs (one dozen).

Following the increased uptake of *Salmonella* vaccination by egg producers, there were significant reductions in reported *Salmonella* illness caused by the dominant outbreak strain type, and in *Salmonella* infections overall. Compared to the total number of reported salmonellosis at the peak of the outbreak in 2017, there was 64% reduction in 2021. While some of the reductions seen in 2020 and 2021 were associated with travel restrictions and WA border closure, the trend continued in 2022 after border reopening. The decrease in salmonellosis in WA has been estimated to have saved the WA community and health system \$23.8 million. The decrease was most likely due to a reduction in *Salmonella* contamination of eggs owing to the increased uptake and implementation of the on-farm vaccination program.

In summary, WA Health identified an outbreak of *Salmonella* in WA linked to consumption of egg dishes. This led to a coordinated and effective response to reduce the health burden of *Salmonella* gastroenteritis by targeting the primary production (egg producer) level using a 'One Health' approach. Although vaccination of chickens is a small upfront cost for producers, this intervention has been shown to greatly increase food safety for the commodity and has resulted in a large decrease in *Salmonella* illness in the community.

Salmonella Outbreak Response Taskforce Achievements

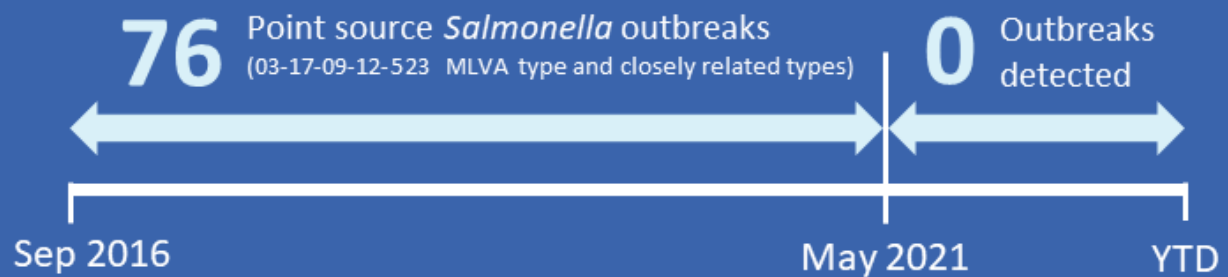
The Taskforce was established in May 2019 to investigate and control a large and ongoing Salmonellosis outbreak predominantly linked to *Salmonella* Typhimurium 03-17-09-12-523 MLVA type in Western Australia.



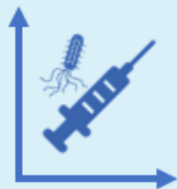
64%
Reduction in WA
Salmonellosis
cases



Control & reduction
of primary outbreak strain
Notified cases in 2017: 610
Cases in 2022: 12



Investigation and interventions



Increase of *Salmonella*
vaccination rates of
local production flock
from ≈51% to ≈ 93%



Use of whole
genome sequencing
to identify and
confirm source



On-farm investigations
Environmental sampling
Salmonella risk assessment
Regulatory compliance



ONE HEALTH
approach to reduce
foodborne illnesses

On-farm studies to investigate the effectiveness of *Salmonella* vaccination



Single aged
flock



Mixed aged
flock



Free range
flock

**Reduction in WA's total burden
of disease for salmonellosis**

-\$23.8 million

Reduction in 2021
(when compared to 2017)



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