



**An Roinn Talmhaíochta,  
Bia agus Mara**  
Department of Agriculture,  
Food and the Marine

# National Reference Laboratory for Salmonella, Ireland

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Presentation to EURL Salmonella workshop  
28th May 2021



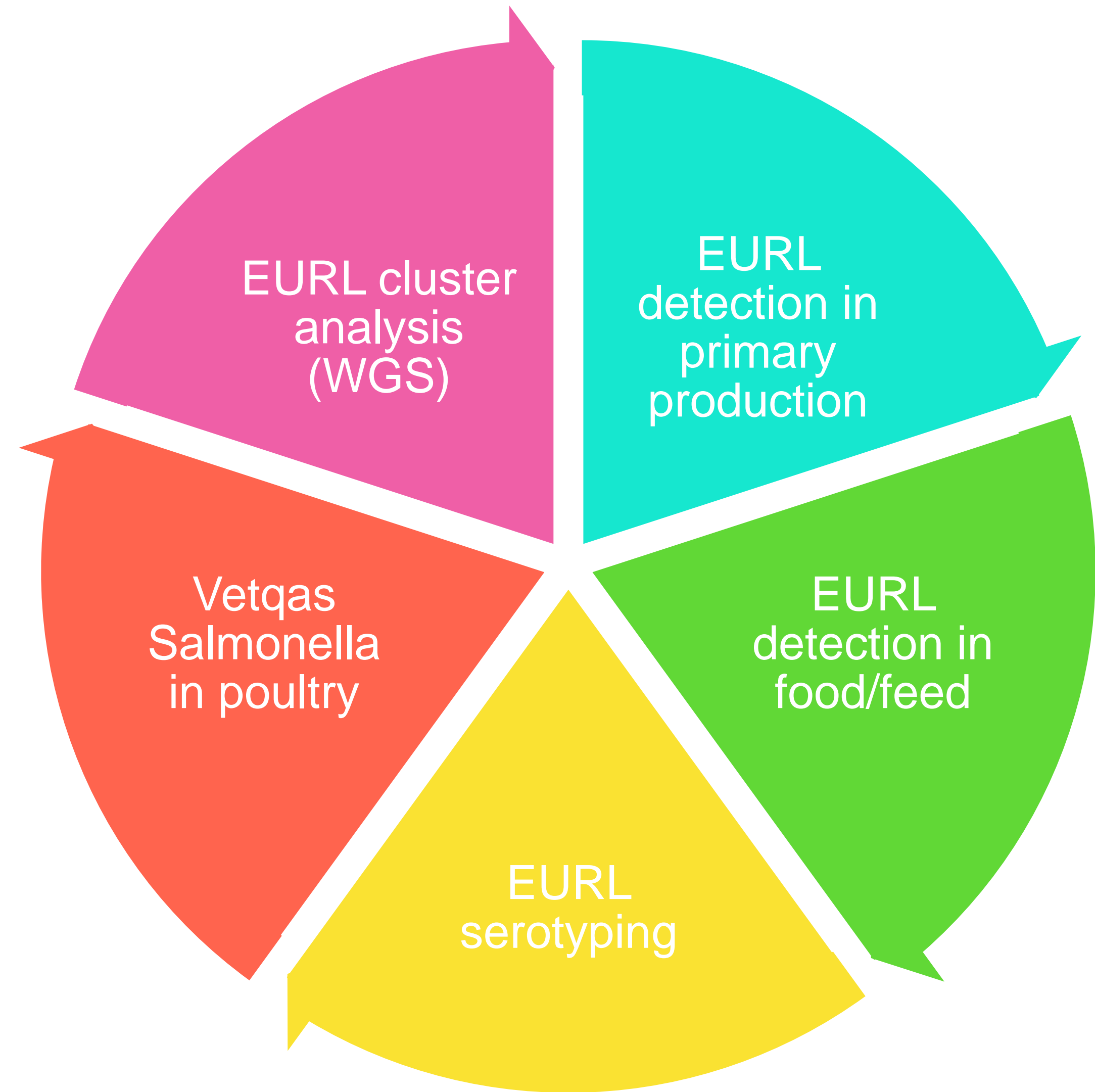
Photo: Peter Barrow, 28th November 2005, Tel: 0872-559638



# DAFM Laboratory Backweston NRL Salmonella

- ISO 17025:2017 accreditation for
  - Detection method for the range of tested matrices
  - Maldi-ToF Salmonella and others
  - Serotyping by slide agglutination
  - PCR for ST and mST
  - Whole Genome Sequencing Salmonella and others
- ISO and Vidas methods for detection of Salmonella
- Planned validation/accreditation of ELISA for Salmonella in pigs (PrioCheck)

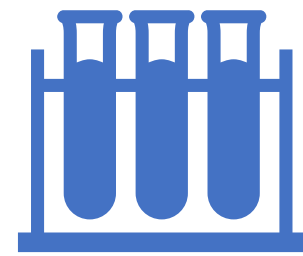
# Proficiency Testing



# Network of laboratories in Ireland

- Department of Agriculture, Food and the Marine Laboratories (DAFM ), Backweston
  - National Reference Laboratory for *Salmonella*, Food, feed and animals in Ireland
  - Official testing laboratory: primary production, feed, hygiene processing samples from factories, animal by-products, food from DAFM supervised FBOs (meat, dairy, horticulture), imports of food of animal origin.
- Other DAFM Laboratories
  - Regional Veterinary Laboratories specialised on animal health
  - Dairy Sciences Laboratories Limerick and Cork testing dairy food samples
- National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory in Galway - reference laboratory for typing of human isolates and food isolates obtained by Health Service Executive and Department of Health (DoH) Official laboratories
- DoH Official testing laboratories – Environmental Health Officer samples from retail and FBOs under DoH supervision and Food of non-animal origin imports
- Authorised Private laboratories
  - Poultry primary production (Poultry Regulations)
  - Animal by-products
  - Other testing programmes

# Supervision of laboratories by the NRL



## **Official laboratories**

Annual questionnaire

Common PT in food matrix

Those under DoH – Isolates sent to NSSLRL



## **Private laboratories**

Approval (documented procedure)

Submission of isolates to DAFM NRL

Annual questionnaire

Common PT

Lead on Investigations if necessary (one incident of revoking of approval)

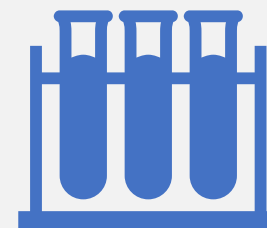
# Annual questionnaire official laboratories



Contact Details



Methods of analysis, types of samples and reference strains and accreditation status



Proficiency testing details including results



Training/support needs

# Common PT

We are not accredited for ISO 7043  
Off the shelf PT's not always  
suitable for all laboratories  
Custom made PT's - cost is  
prohibitive and the small number  
of laboratories made it statistically  
unsound  
2021 first time to join the French  
laboratories participation in the  
BIPEA scheme



**Guidance Document**  
**for the organisation of Proficiency Tests by NRLs for national**  
**networks, including partial outsourcing**

Drafted by EURLs *Campylobacter*, Coagulase Positive Staphylococci, *Listeria*  
*monocytogenes*, *Salmonella*, STEC

**Version 2, 12/07/2019**

	Test parameter	Matrix	Samples received by labs
Salmonella	Detection	minced meat	2 negative samples 6 samples with low-level contamination 1 sample with high-level contamination +1 sample either negative or with high-level contamination
LM	Detection	smoked salmon	2 negative samples 6 samples with low-level contamination 1 sample with high-level contamination +1 sample either negative or with high-level contamination
CPS	Enumeration	not determined yet (minced meat, shrimps or else.)	1 negative sample 1 sample with low-level contamination 1 sample with high-level contamination +1 sample either negative or with high-level contamination



# NRL for DEARA, Northern Ireland

- From 01/01/2021
- For the field of Animal health
- Agrifood and Biosciences Institute (AFBI, former NRL) and private laboratories



# NRL testing of official samples for *Salmonella* control programmes

- To detect *Salmonella* spp. in **broilers, broiler breeders, layers, turkeys** and **turkey breeders**
- Testing to assess **Process Hygiene Criteria** re *Salmonella* in primary processing plants, poultry and pigs
- *Salmonella* testing for controls on; **Tallow and greaves, animal feed, animal by-products, compost, pet food**

# Typing of FBO own check *Salmonella* spp. isolates

FBO and official samples

Approved laboratories & NRL  
culture

NRL typing & culture collection

Feed

Primary production

Process Hygiene Criteria

Food

Pet food

Animal by-products

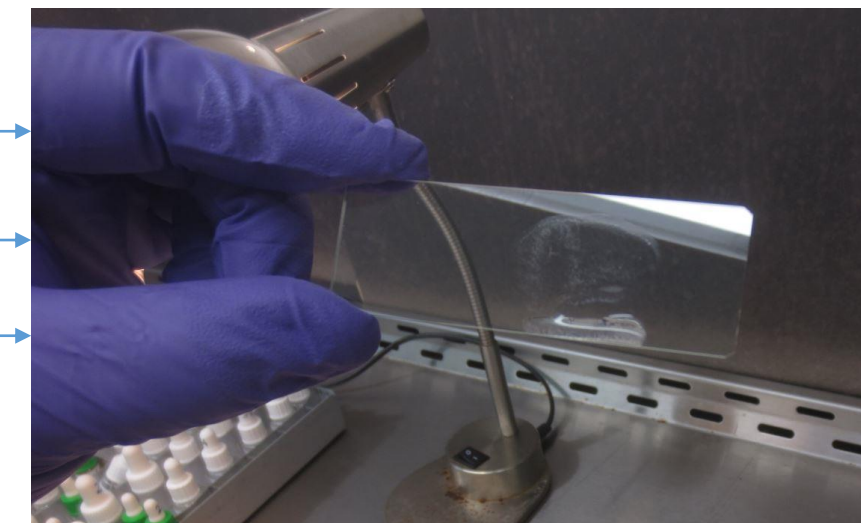
Compost

Maldi-ToF

Serotyping

PCR

Next  
Generation  
Sequencing



# Salmonella spp. detection results of official on-farm poultry flock samples

Category of poultry	EU legislation	Official sampling & testing
Broiler Breeders (Parents & Grandparents)	Commission Regulation (EU) No 200/2010	100% flocks (>250 birds) x 3 times per year
Commercial broiler chickens	Commission Regulation (EU) No 200/2012	10% holdings (> 5,000 birds)
Turkey breeders	Commission Regulation (EU) No 1190/2012	100% flocks (>250 birds) once per year
Turkey fatteners	Commission Regulation (EU) No 1190/2012	10% holdings (> 500 birds)
Table egg layers	Commission Regulation (EU) No 517/2011	100% holdings (>1,000 birds)

Official sampling and testing programme for flocks of *Gallus gallus* and turkeys

Flock type	Detected	Not Detected	Total
Broiler		110	110
Broiler Breeder		806	806
Layer	1*	422	423
Layer breeder		24	24
Turkey		56	56
Turkey Breeder		8	8
Total	1	1426	1427

*Salmonella* spp. detection results for official on-farm *Gallus gallus* and turkey samples in 2020

\*S. Kentucky in one layer flock

All official on-farm flock sample cultures were negative for “target” serovars in 2020



# NRL collates results of *Salmonella* spp. isolates and their serotypes arising from FBO own checks & official testing

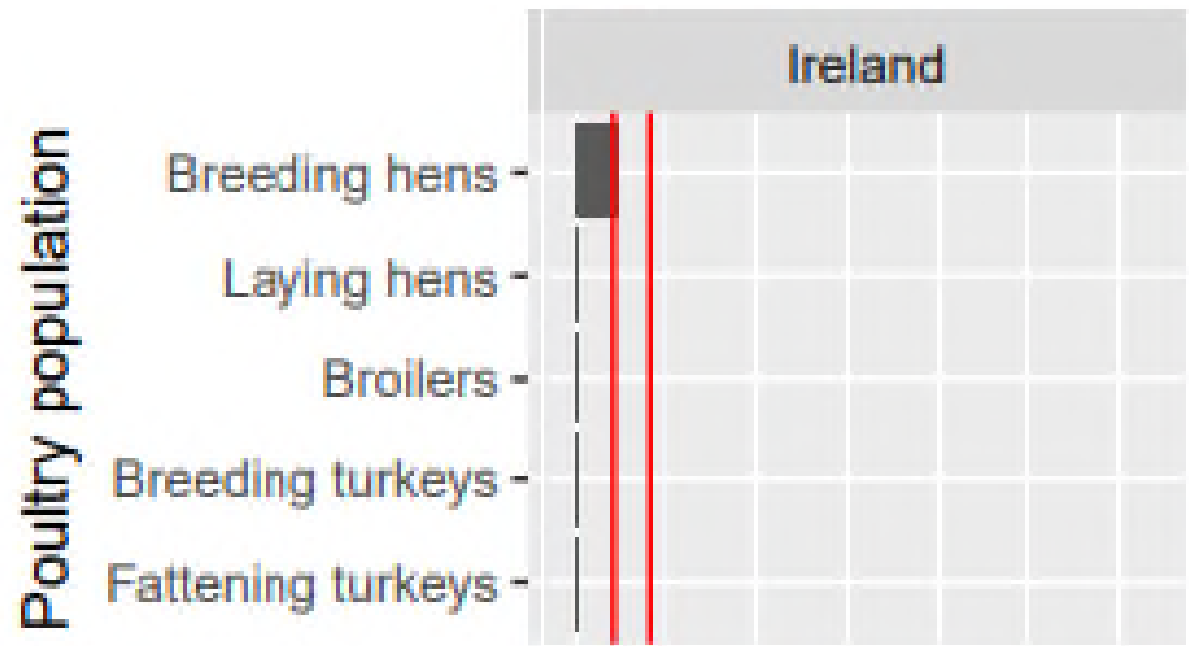
Flock type & isolate serotype	Number of isolates
<b>Breeder</b>	<b>1</b>
Salmonella Llandoff	1
<b>Broiler</b>	<b>7</b>
Salmonella Braenderup	3
Salmonella Llandoff	2
Salmonella Livingstone	1
Salmonella Newport	1
<b>Broiler Breeder</b>	<b>2</b>
Salmonella Agama	2
<b>Layer</b>	<b>5</b>
Salmonella Bardo	1
Salmonella Kentucky	1
Salmonella Llandoff	3
<b>Turkey</b>	<b>12</b>
Salmonella Bardo	2
Salmonella Derby	2
Salmonella Senftenberg	8
<b>Total</b>	<b>27</b>

Salmonella isolates by serotype from chicken (*Gallus gallus*) or turkey flocks from on-farm samples collected by DAFM or FBOs in 2020

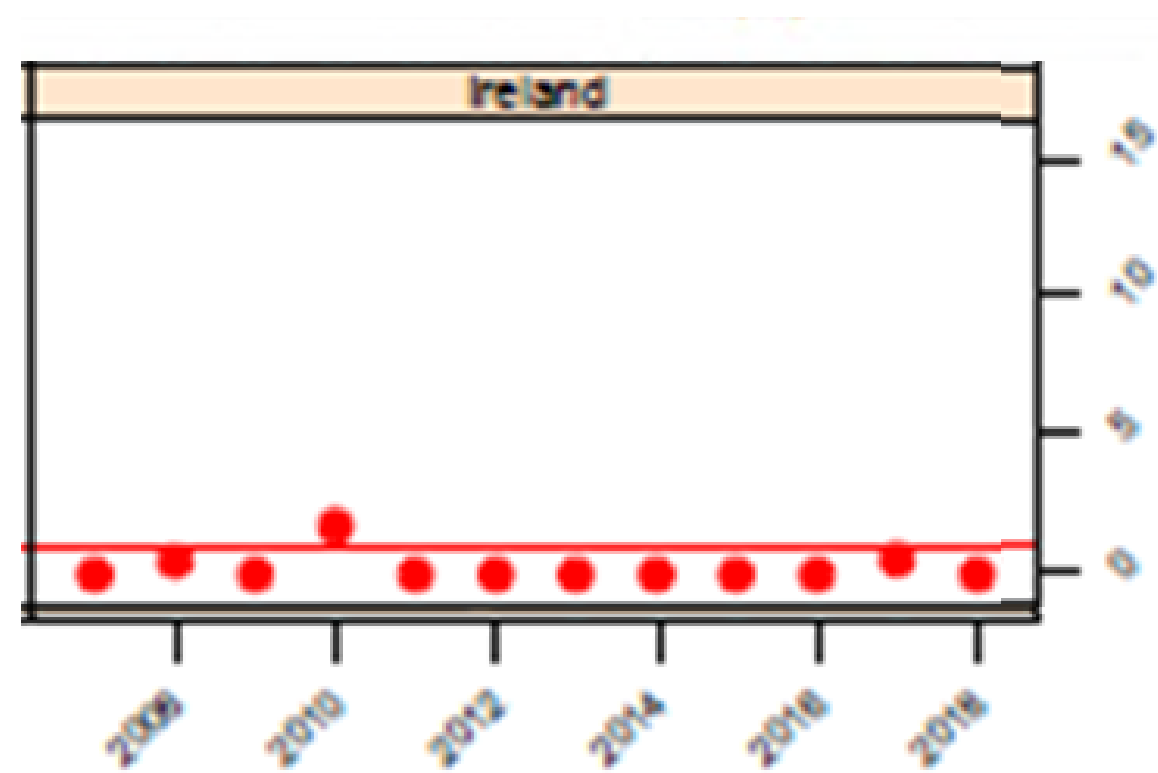
- All FBO and official poultry flock sample isolates were negative for target serovars in 2020
- All poultry PHC samples were negative for SE and ST in 2020

Poultry Meat type and Salmonella serotype	Number of isolates
<b>Chicken</b>	<b>3</b>
Salmonella Braenderup	1
Salmonella Livingstone	2

Number of Salmonella isolates from FBO and official, *Gallus gallus* and turkey, PHC neck skin samples in 2020



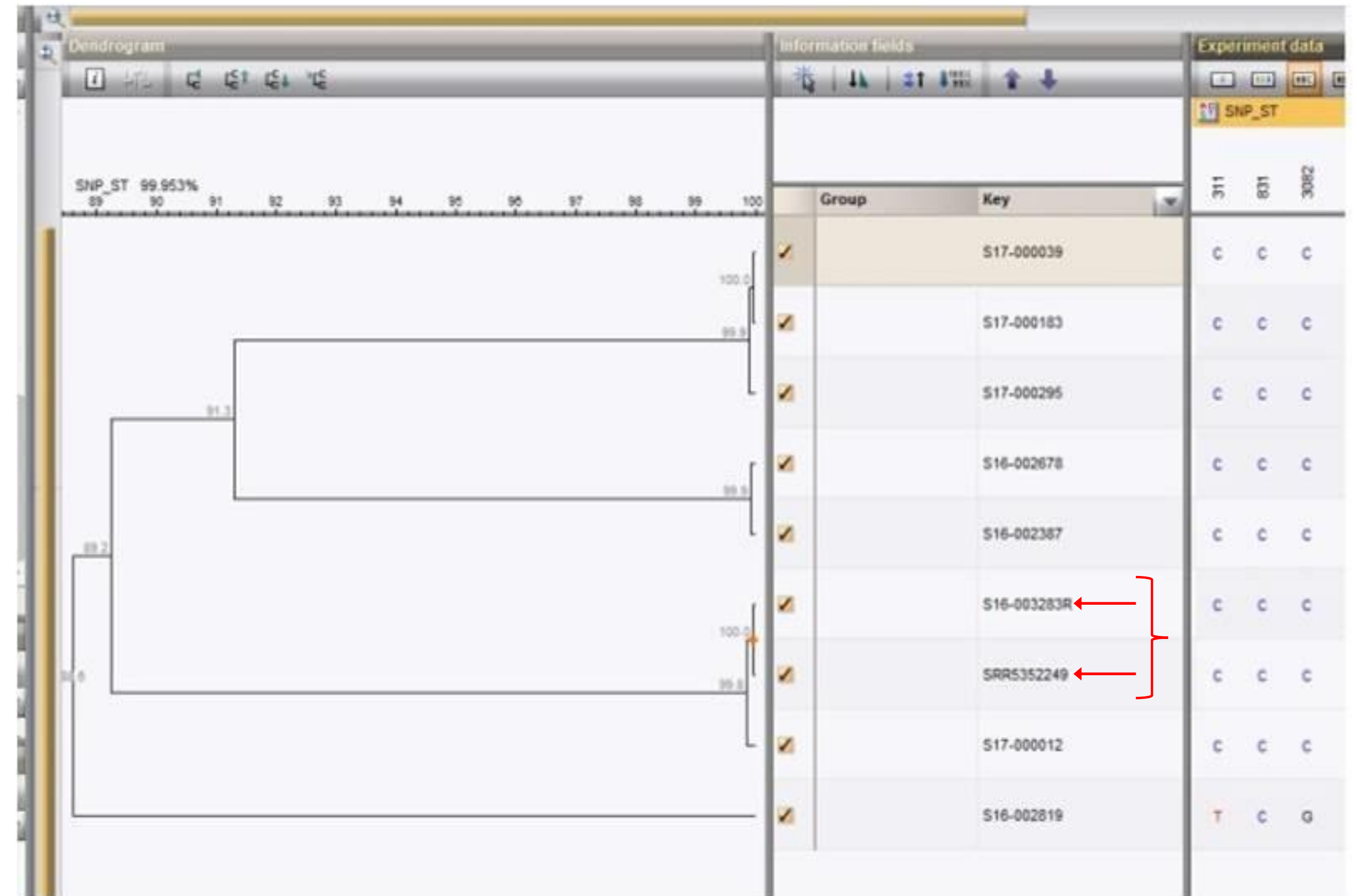
Prevalence of target Salmonella serovars in poultry flocks in 2019, Ireland



Prevalence of target Salmonella serovars in Broiler breeder flocks 2007 – 2018, Ireland

# NRL assists Competent Authority in investigation of outbreaks – Example 1

- Nov 2016 - *Salmonella* Typhimurium isolated from duck egg laying flock in Wexford.
- Irish visitor to Cardiff - hospitalised with enteritis - *Salmonella* Typhimurium isolated
- Questionnaire - Duck eggs consumed before departure from Wexford
- Public Health England - WGS of human isolate – uploaded to NCBI database
- NRL *Salmonella* - WGS of duck flock isolates – SNP cluster analysis



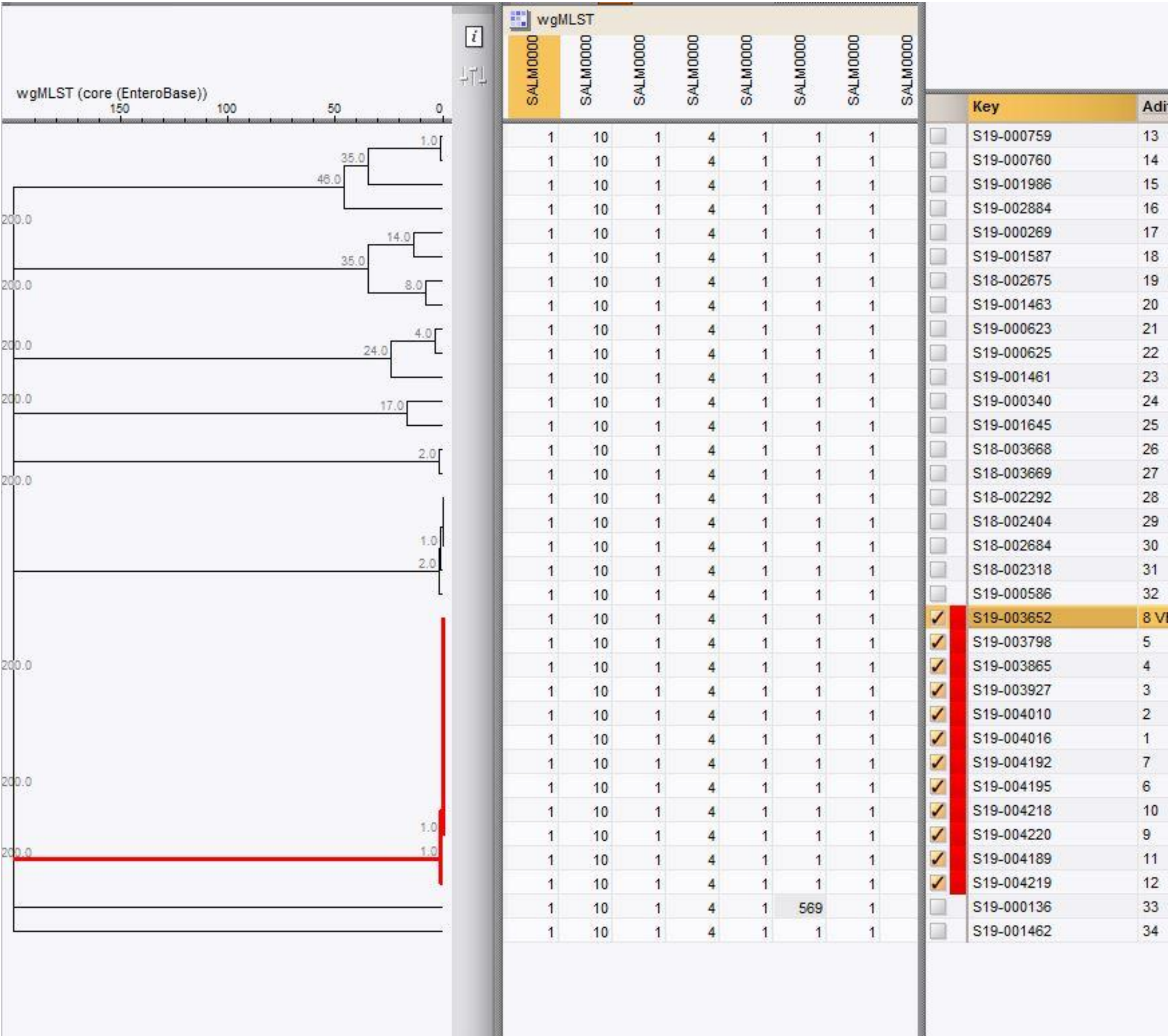
# Investigation of suspected *Salmonella* Typhimurium outbreak, 2019

## Example 2

- November 2019 – NRL received series of *Salmonella spp.* isolates for serotyping - attributed to *Gallus gallus* flocks from one approved laboratory
- Serotyped – *Salmonella* Typhimurium
- Flocks restricted
- Isolates sequenced – compared cgMLST of ST strain with recent ST isolates



# Dendrogram of cgMLST of S. Typhimurium isolates from private laboratory and from PT distribution and from database of sequenced isolates



PT strain ST

Private laboratory isolates

# Investigation of suspected *Salmonella* Typhimurium outbreak, 2019

## Example 2

- November 2019 – NRL received series of *Salmonella spp.* isolates for serotyping - attributed to *Gallus gallus* flocks from one approved laboratory
- Serotyped – *Salmonella* Typhimurium
- Flocks restricted
- Isolates sequenced – compared cgMLST of ST strain with recent ST isolates –
- Clonally related strain of recent PT strain
- Flocks re-sampled, all negative for *Salmonella* -> restrictions withdrawn
- All remaining suspected flocks re-sampled again – all negative (except for 2 broiler breeder pullet flocks – restricted and culled)
- Audit of laboratory and revoking of laboratory approval
- All poultry flocks in Ireland negative for *S. Typhimurium* throughout 2020
- All poultry PHC samples negative for *S. Typhimurium* throughout 2020



# Acknowledgments



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## Questions ?