

# BELGIAN'S REFERENCE CENTER OF SALMONELLA & SHIGELLA : ORGANISATION AND COVERAGE

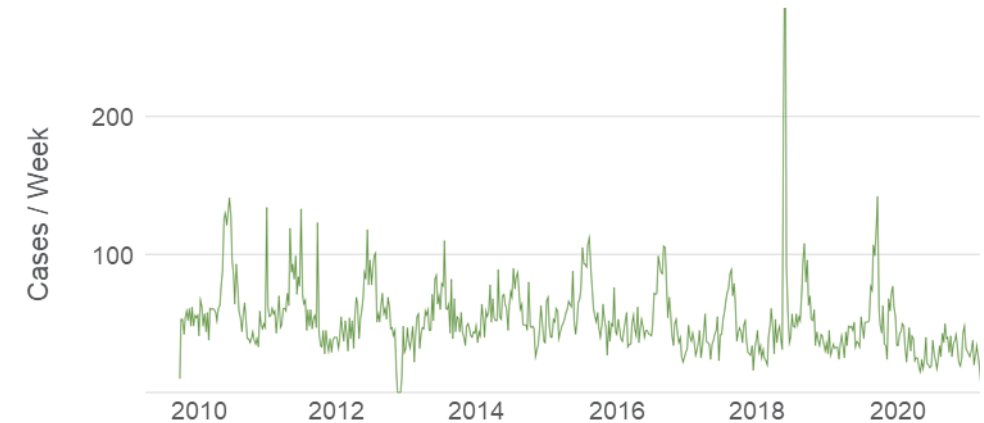
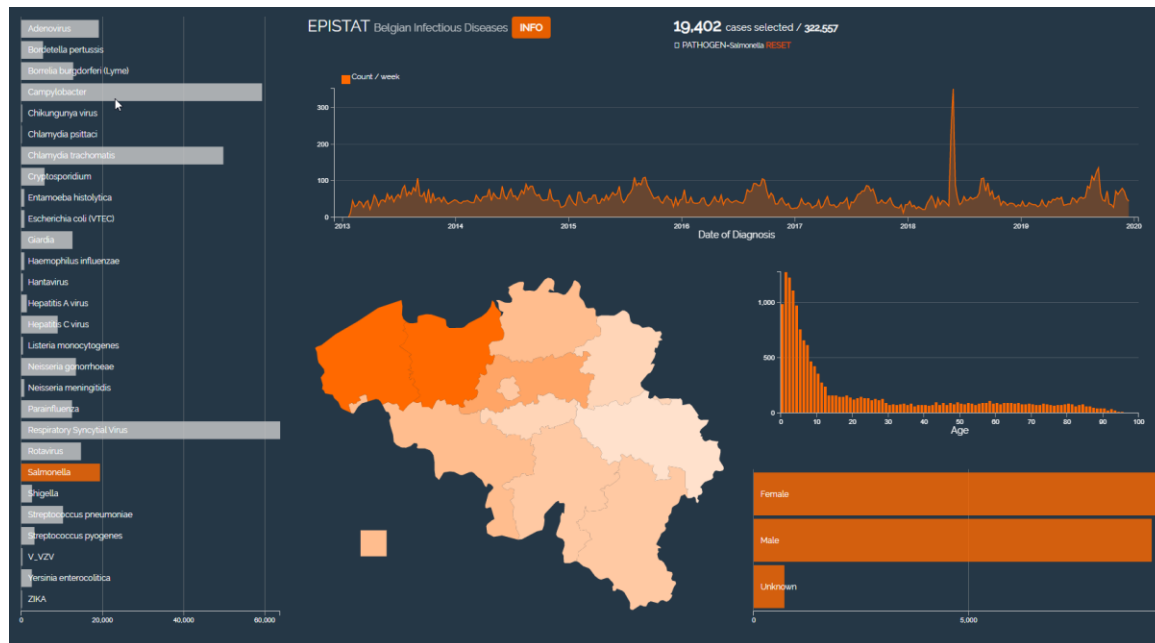
# Surveillance of human Salmonellosis in Belgium

## SENTINEL SYSTEM

- 38 Sentinel labs who weekly report the number of isolated *Salmonella* spp.
- Basic metadata
- No AST/serotype/subtyping information

## NATIONAL REFERENCE LAB

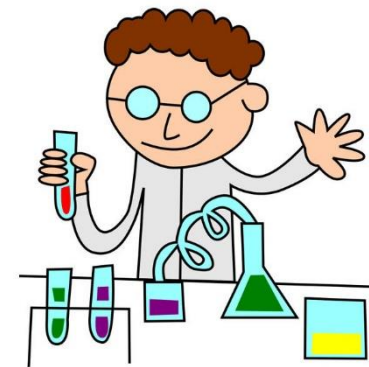
- Voluntary submission of human *Salmonella* isolates from 121 peripheral clinical microbiology labs
- Microbiological subtyping
- Monthly data uploads to Epistat (incl. metadata)



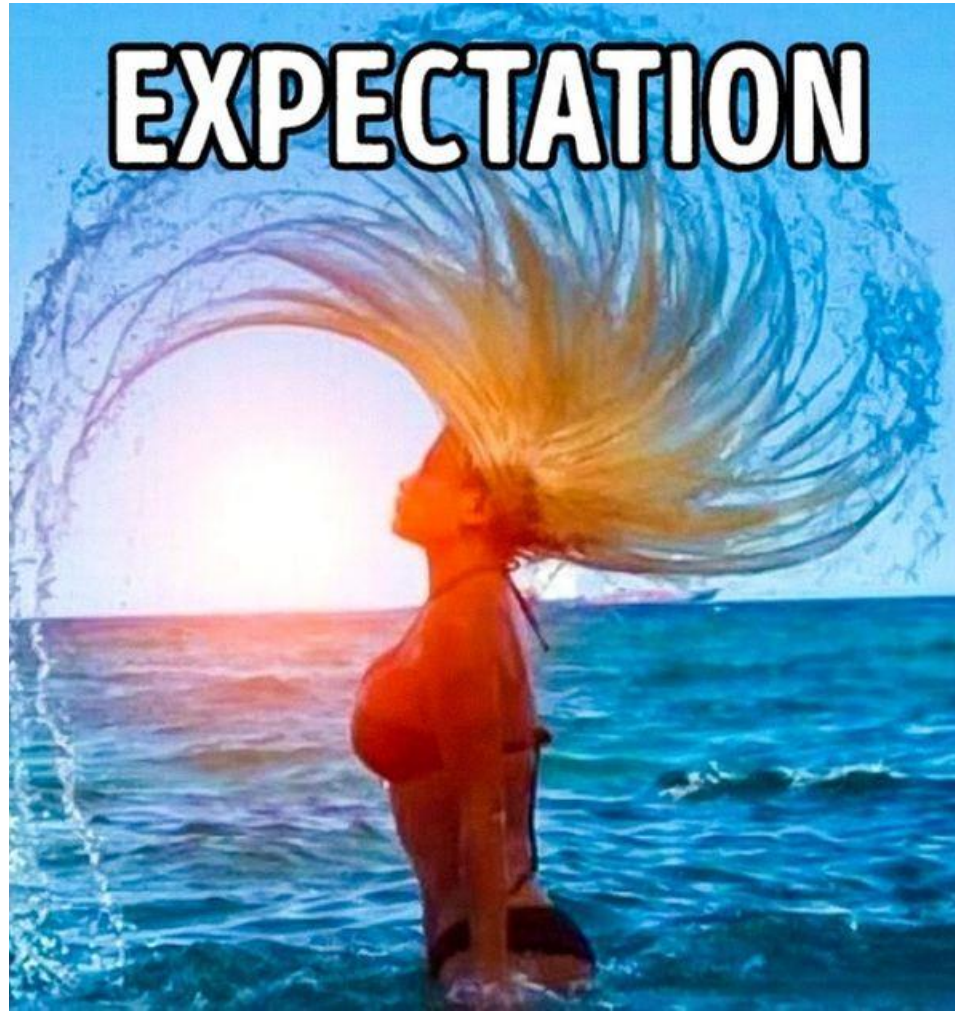
TOPIC OF TODAY

## About being a Reference Center in Belgium

- Belgium has 41 National Reference Labs, 5 year mandates
- Official tasks of NRC Salmonella & Shigella :
  - Confirmation of diagnosis
  - Technical support to peripheral labs (sampling/transport/test results communication)
  - Tracking, developing and implementation of new diagnostic tests and typing methods
  - ISO accreditation
  - Contribute to scientific/epidemiological research
  - Publish annual report
  - Technical advice to government
- Sample number : 3,000 (Salmonella) / 400 (Shigella) per year
- Total budget:
  - 100,000€ for sample analysis / year – OVERHEAD
  - 45,000€ for personnel / year - OVERHEAD

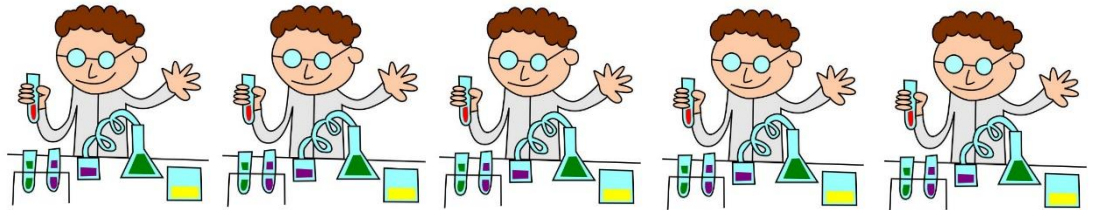


1 lab technician + €27 per sample



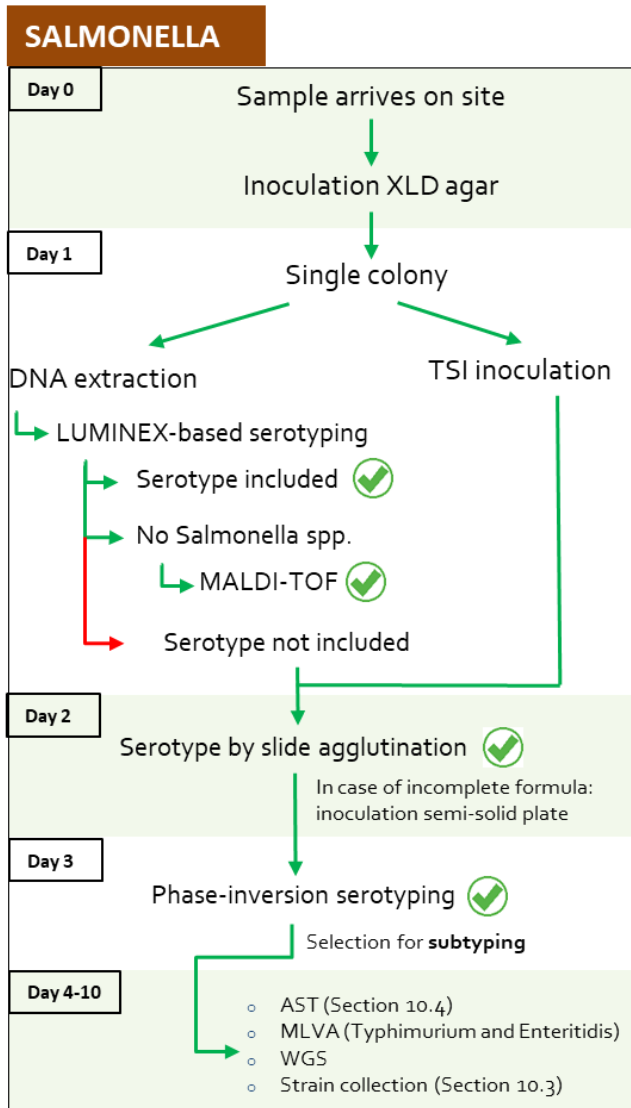
## Looking for a workable solution

- Embed in group with permanent scientists
  - Wesley Mattheus
  - An Van den Bossche
  - Pieter-Jan Ceysens
- Expand reference activities & create transversal platforms
  - NRC Listeria
  - NRC Neisseria
  - NRC Yersinia
  - NRC Mycobacteria
- Serotyping of veterinary samples
- Research grants
- Optimizing lab flow





# Current lab flow

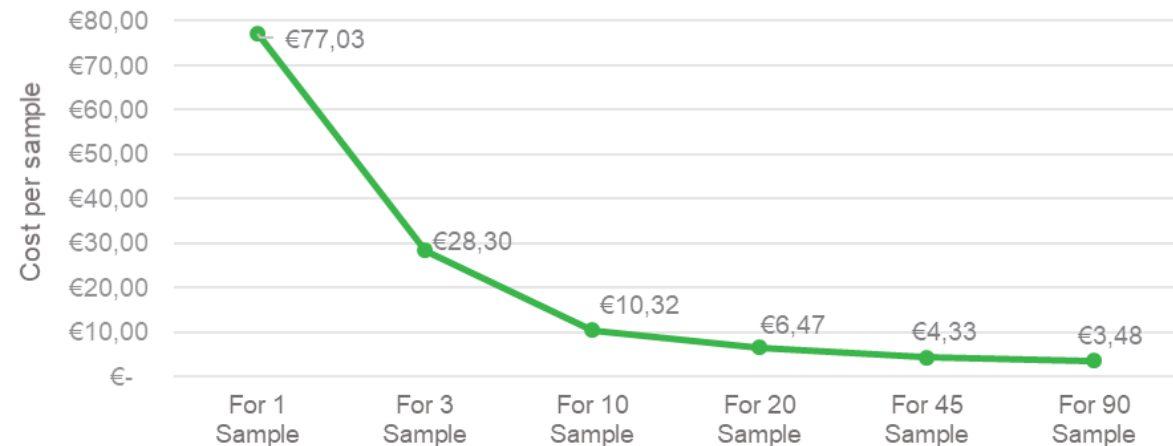


## A multiplex oligonucleotide ligation-PCR method for the genoserotyping of common *Salmonella* using a liquid bead suspension assay

Mathieu Gand<sup>a, b</sup>, Wesley Mattheus<sup>a, c, d</sup>, Nancy H.C. Roosens<sup>e</sup>, Katrijne Dierick<sup>d</sup>, Kathleen Marchal<sup>b, e</sup>, Sigrid C.J. De Keersmaecker<sup>e, 1</sup>, Sophie Bertrand<sup>e, 1</sup>



- 80% of human isolates
- Cost declines with increasing samples numbers



- MLVA : 6€ per sample

# Antibiotic Susceptibility Testing



- Approx. 1,000 tests per year
- Certain serotypes are not monitored (e.g. Braenderup)
- **EU help needed in defining priorities !**

Sérovar	Fréquence d'échantillonnage (par semaine)				
	Semaines				
	1-24	25-29	30-41	42-47	48-53
<i>S. Typhimurium</i>	5	8	10	8	5
<i>S. Enteritidis</i>	3	5	5	5	3
<i>S. Brandenburg</i>	(tout)				
<i>S. Derby</i>	(tout)				
<i>S. Virchow</i>	(tout)				
<i>S. Hadar</i>	(tout)				
<i>S. Dublin</i>	(tout)				
<i>S. Newport</i>	(tout)				
<i>S. Infantis</i>	(tout)				
<i>S. Kentucky</i>	(tout)				
<i>S. Heidelberg</i>	(tout)				
<i>S. Panama</i>	(tout)				
<i>S. Agona</i>	(tout)				
<i>S. Stanley</i>	(tout)				
<i>S. Livingstone</i>	(tout)				
<i>S. Corvalis</i>	(tout)				
<i>Isolates from abroad</i>	(tout)				
<i>S. Typhi</i>	(tout)				
<i>S. Paratyphi A, B et C</i>	(tout)				
<i>S. Chester</i>	(tout)				
<i>Invasive isolates</i>	(tout)				

optimal?

## PLOS ONE

RESEARCH ARTICLE

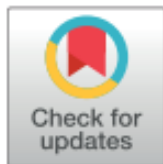
# Coverage of the national surveillance system for human *Salmonella* infections, Belgium, 2016-2020

Nina Van Goethem<sup>1,2\*</sup>, An Van Den Bossche<sup>3</sup>, Pieter-Jan Ceyskens<sup>3</sup>, Adrien Lajot<sup>1</sup>, Wim Coucke<sup>4</sup>, Kris Vernelen<sup>4</sup>, Nancy H. C. Roosens<sup>5</sup>, Sigrid C. J. De Keersmaecker<sup>5</sup>, Dieter Van Cauteren<sup>1‡</sup>, Wesley Mattheus<sup>3‡</sup>

**1** Scientific Directorate of Epidemiology and Public Health, Sciensano, Brussels, Belgium, **2** Department of Epidemiology and Biostatistics, Institut de Recherche Expérimentale et Clinique, Faculty of Public Health, Université Catholique de Louvain, Woluwe-Saint-Lambert, Belgium, **3** National Reference Centre for Salmonella and Shigella, Sciensano, Brussels, Belgium, **4** Quality of laboratories, Sciensano, Brussels, Belgium, **5** Transversal Activities in Applied Genomics, Sciensano, Brussels, Belgium

‡ These authors contributed equally to this work (Joint Senior Authors).

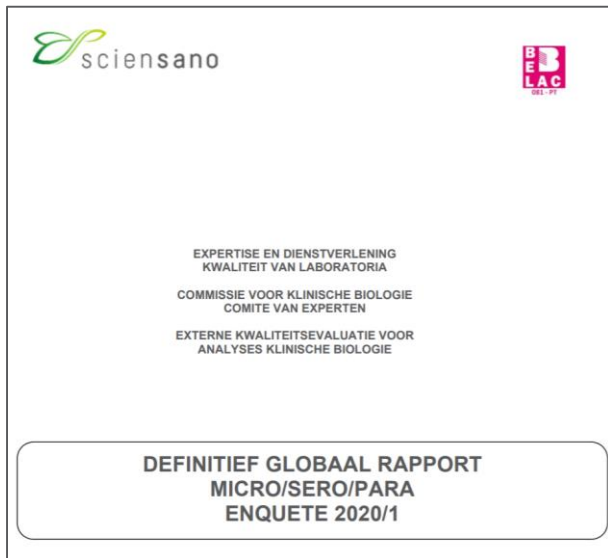
\* [nina.vangoethem@sciensano.be](mailto:nina.vangoethem@sciensano.be)





# Coverage of surveillance system

Which proportion of all isolates from diagnosed cases with a laboratory confirmation are sent to the NRC ?



## Data on no. reimbursed stool cultures

- calculate the Salmonella positivity rate
- estimate the total number of cases in Belgium in 2019

## Capture – recapture<sup>1</sup>

= Comparing two independent data sources (NRC/Sentinel) that provide surveillance information on the same disease

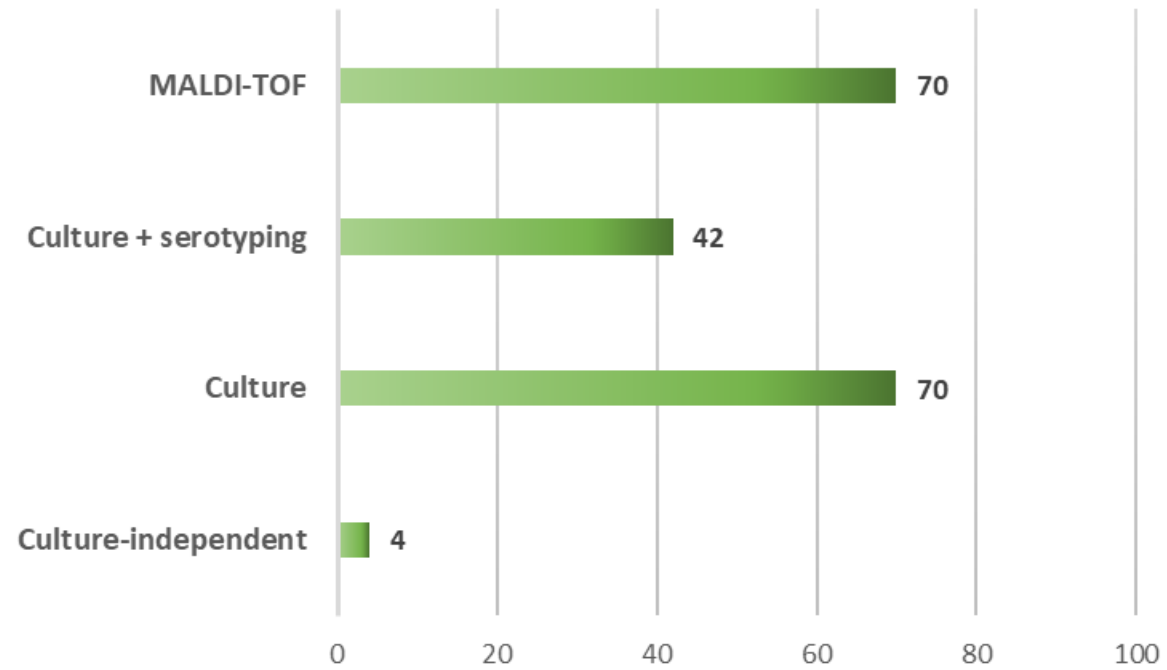
- estimate extent of incomplete ascertainment
- Identify true and missed cases

Mandatory Quality control for all 121 labs

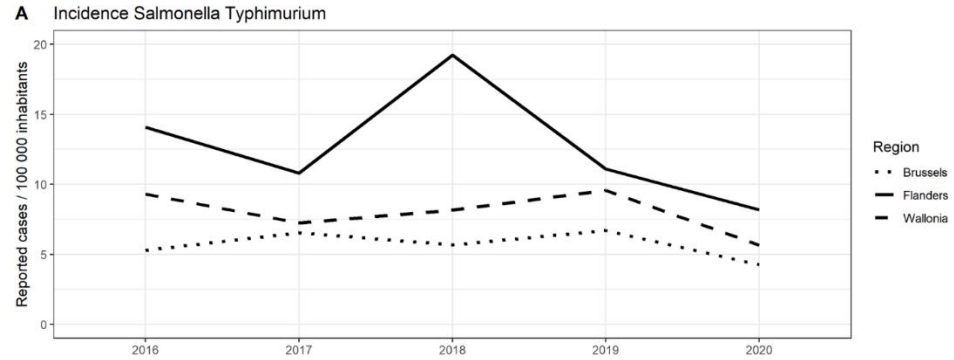
=> Questionnaire:

- How many Salmonella samples in 2019 ?
- Which culture-independent diagnostics ?

## Diagnosis of Salmonella in Clinical Labs (2019 data)

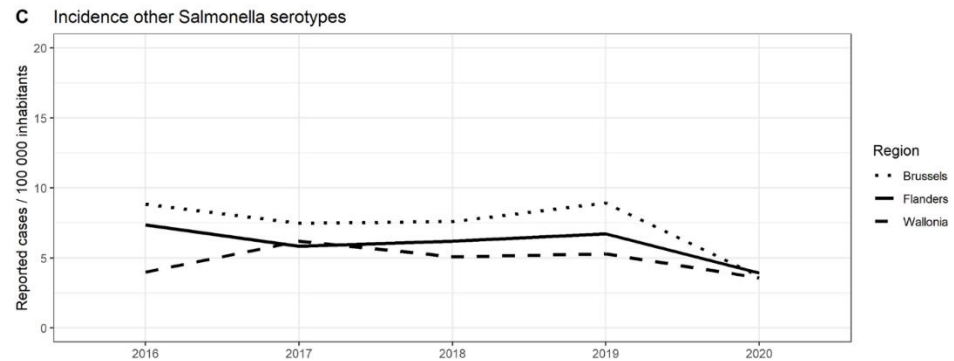
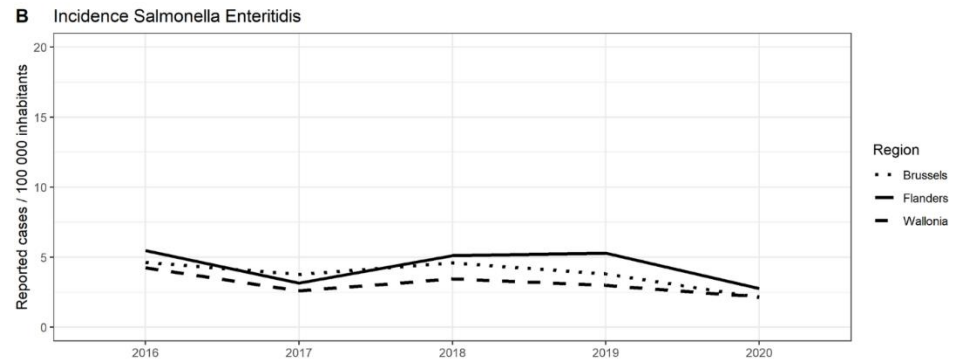


# Salmonella epidemiology

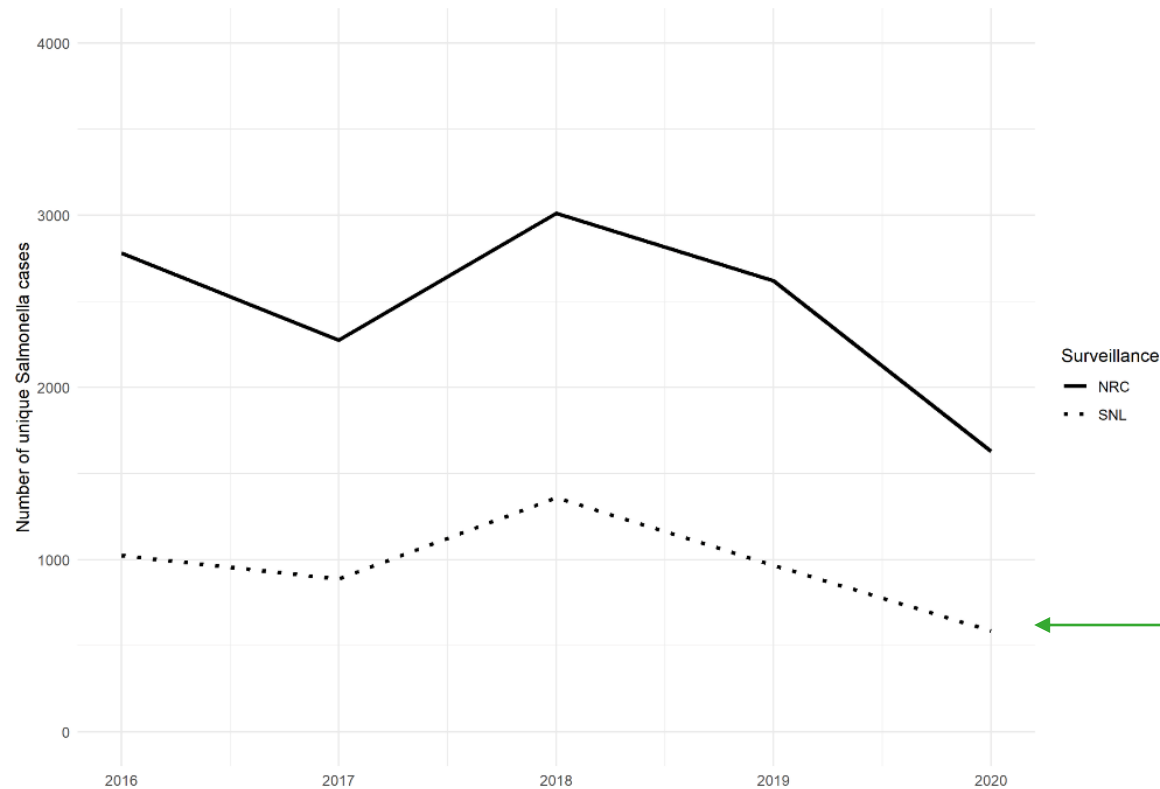


**Number of *Salmonella* cases per 100 000 inhabitants reported by the National Reference Center (NRC) per region, Belgium, 2016–2020.**

- Outbreak in 2018
- Stable (except Covid decline)

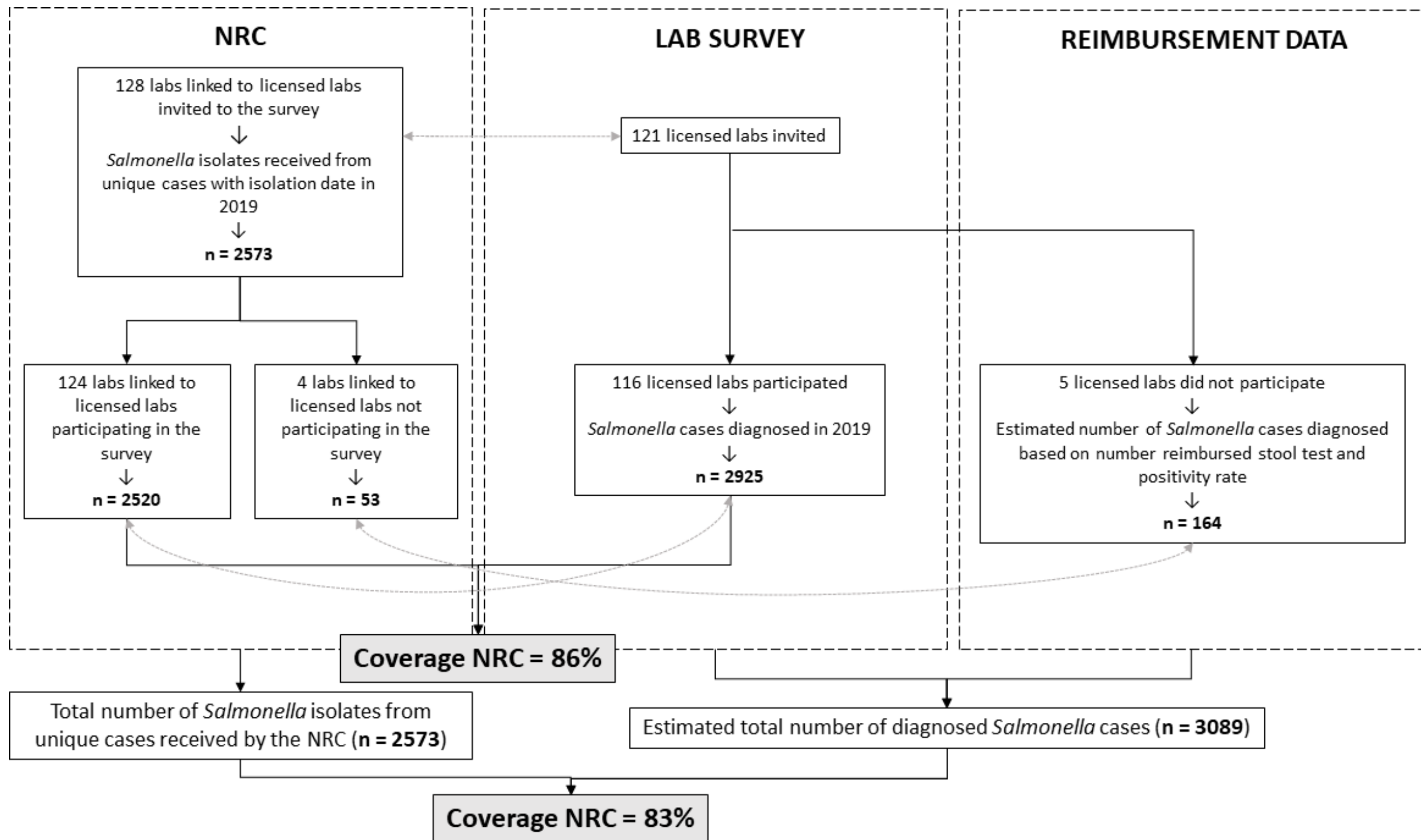


## NRC vs SNL



**The annual trends observed between both surveillance systems are similar.**

← Lower because of less labs reporting

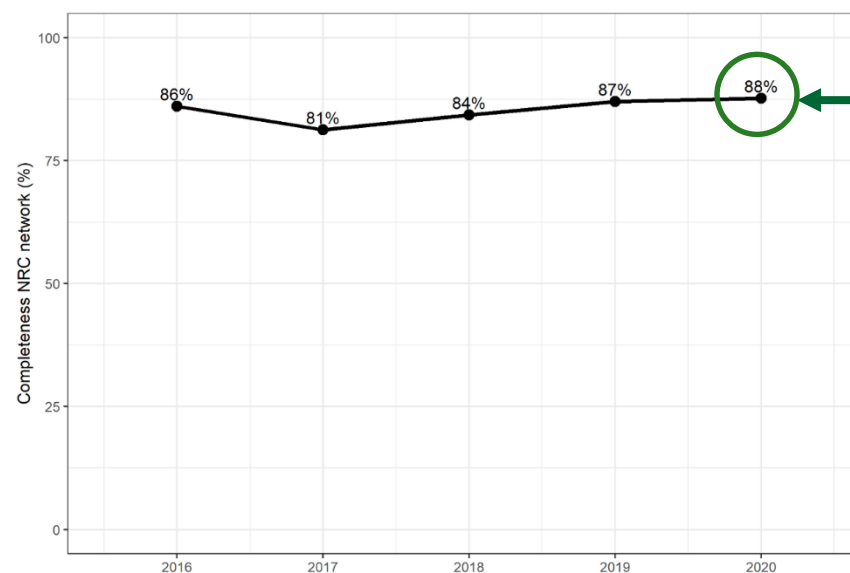


## Capture – recapture (2016-2020), Chapman method

SNL	NRC		
	Identified	Not identified	Total
Identified	3869	679	4548
Not identified	7148	<i>1254</i>	8402
Total	11017	<i>1933</i>	<i>12950</i>

NRC: National Reference Center; SNL: Sentinel Network of Laboratories. In italics: numbers estimated by capture-recapture using Chapman's formula [15].

Coverage NRC : 85% (95% CI: 84–86%)  
Coverage SNL : 35% (95% CI: 34–36%)

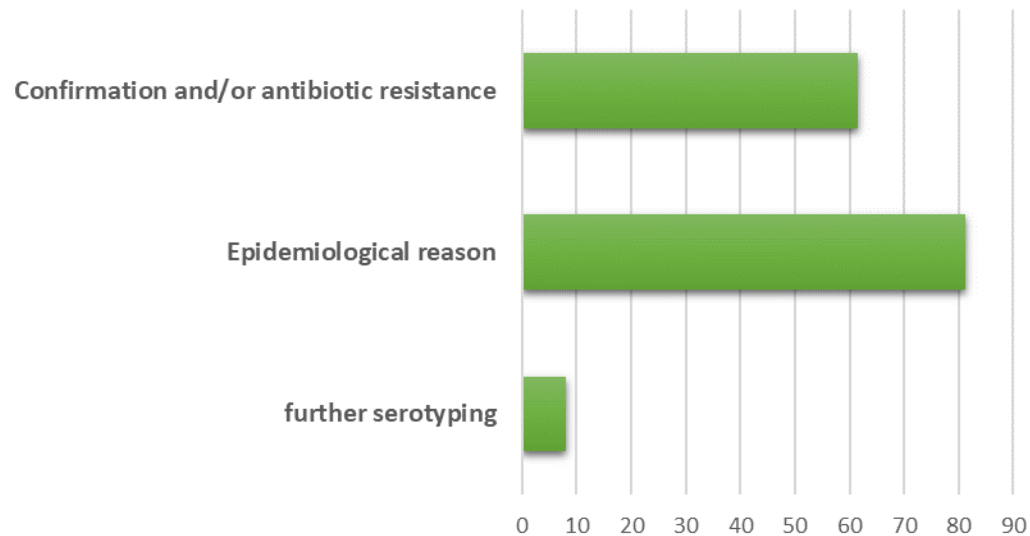


Stable in Covid times !



## Reasons for high coverage (I)

- Higher than reported for France (48%) and The Netherlands (64%)<sup>1</sup>
- Why? Labs are motivated !



- Continuity : NRC Salmonella has been in place for >30 y
- Combined with other NRCs for Gastrointestinal Diseases (some of which are mandatory) – clear for the labs
- Transport tubes, package material and pre-paid sending material is provided to the labs – all that within the €27 per sample!

## Struggles

- **We can't sequence everything**
- **Far from early detection system, as food isolates are routinely not sequenced as well**
- Reduce number of analyses – seems possible given the high coverage
- Prioritize serotypes ?

**EU help needed in defining priorities !**

## Contact

Pieter-Jan Ceysens • [pieter-jan.ceysens@sciensano.be](mailto:pieter-jan.ceysens@sciensano.be) • +32 2 373 31 19