

NRL for *Salmonella* Germany

23.05.2023, 28th EURL-Salmonella Workshop 2023

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German Federal Institute for Risk Assessment (BfR)

BfR, Berlin

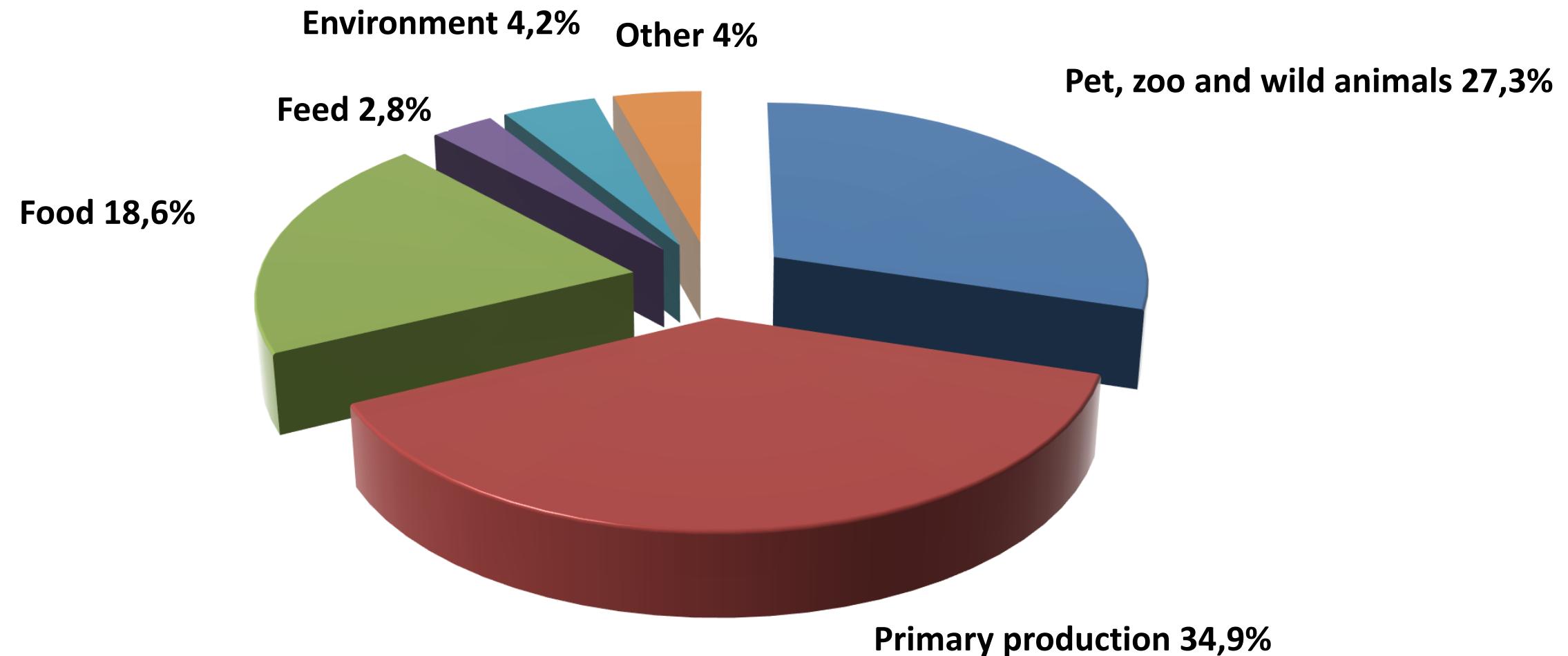


Routine diagnostic

- Approx. 4000 isolates per year sent to the NRL
- Approx. 150 senders: regional public food and veterinary laboratories, animal health laboratories, universities and private laboratories
- Serotyping and vaccine strain diagnostics
- Antibiotic resistance tests against 14 antimicrobial substances (NRL-AR)
- Analysis of outbreaks and chains of infections



Origin of Isolates in the NRL for *Salmonella*



Monitoring and control programs

Strong involvement in the National and European monitoring studies and control measure programs

Monitoring and control measure programs:
approx. 400 isolates/year

Supporting the National Monitoring Sample Design



Advisory service for the ministry and non-governmental organisations



1. Statements for the Ministry

- Suitability of treating table eggs using UV-C LED radiation as additional measure to prevent food contamination by *Salmonella* or *Campylobacter*
- Application and interpretation of Next Generation Sequencing (NGS) - resp Whole genome sequencing (WGS) methods for the tackling of foodborne outbreaks
- Assessment of a *Salmonella Enteritidis* CT1734 disease outbreak

2. Daily enquiries from labs, institutions, private persons, abroad mainly regarding methods and epidemiology of *Salmonella*

Ring trials

Regular Participation on all EURL proficiency tests

Participation depending on the occasion:

- "Validation of a new alternative method for the detection of *Salmonella*..." DTU
- DTU Genomic Proficiency Test 2020
- NGS typing and cluster analysis, organized by National Study Centre for Sequencing in Risk Assessment at the BfR
- "2020 GenoSalmSurv Real-Time Validation Proficiency Test"
- Interlaboratory Study (ILS) of draft ISO/DTS 6579-4: Identification of monophasic *Salmonella* Typhimurium (1,4,[5],12,i:-) by polymerase chain reaction (PCR).

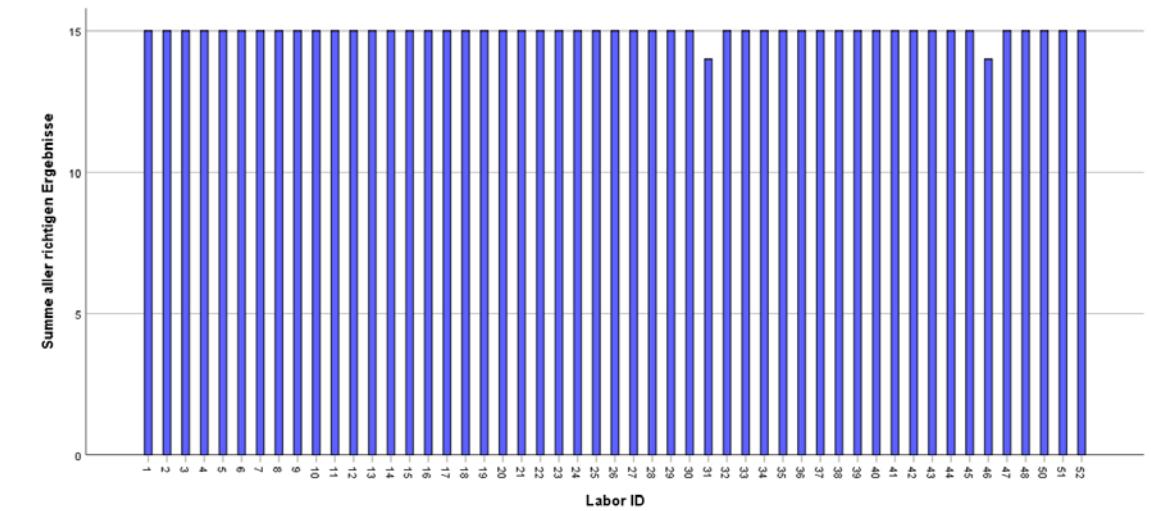
Ring trials

- Annual organisation of a ring trial in frame of the *Salmonella* control programs in poultry
- ISO 6579-1:2017 + Amd.1:2020
- ca. 55 participants
- 15 test samples/participant, 25g spiked faeces/sample



Tabelle 1: Probenkodierung des Ringversuchs „*Salmonella*-Nachweis im Geflügelkot“

Proben ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	K1	K2
Dosierung	0	0	++	+	++	+	+	0	+	++	0	+	++	0	++	0	+/-



Development and validation of rapid detection methods and discriminative typing methods

- Multiplex Real-time PCR for of STM vaccine strain AviPro VacT
- cgMLST-based genome comparison of bacterial isolates using whole genome sequencing data

Workshops

Close contact with Official Laboratories of the Federal States (Länder)

1. Annual/biannual meetings (troubleshooting, standardization issues, new diagnostic methods)

- Scientific Symposium of Microbiological National Reference Laboratories and Consultancy Laboratories at the BfR (biannual, next June 2023)
- Meeting with the federal laboratories in frame of the national and european monitoring studies and control measure programs (annual. Last in May 2023)
- German Veterinary Society, working group for veterinary infection diagnostics: working and advanced training conference "Bacteriology,, (biannual, next 2014)

2. If required: hands on workshops in the NRL about *Salmonella* typing (ca. 2 workshops/year)

Activities in boards and bodies

- DIN Standards Committee Food and Agricultural Products, Microbiology in the food chain
- ISO/TC 34/SC 9/WG 9 'Detection of *Salmonella*'
- ISO/TC 34/SC 9/WG 10 'Typing of *Salmonella*'
- § 64 LFGB-Working Group "Drylab"
- AFFL-Projektgruppe "Verringerung des Salmonelleneintrages durch Schlachtschweine in die Lebensmittelkette,,
- AFFL-Projektgruppe zur Bearbeitung von Fragestellungen im Zusammenhang mit dem Nachweis von Salmonellen bei Geflügel und Eiern

WOAH reference laboratory for Salmonellosis

Salmonellosis

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World Organisation for Animal Health
Founded as OIE

Organisation mondiale de la santé animale
Fondée en tant qu'OIE

Organización Mundial de Sanidad Animal
Fundada como OIE

Research

Funded projects:

GenoSalmSurv - Integrated genome-based surveillance of *Salmonella* (BMG - since 2019, end 08/31/2022)

Uvegg - Use of UV/UV-LED radiation for reduction of microorganisms on eggs (BMEL – 2019 - 2022)

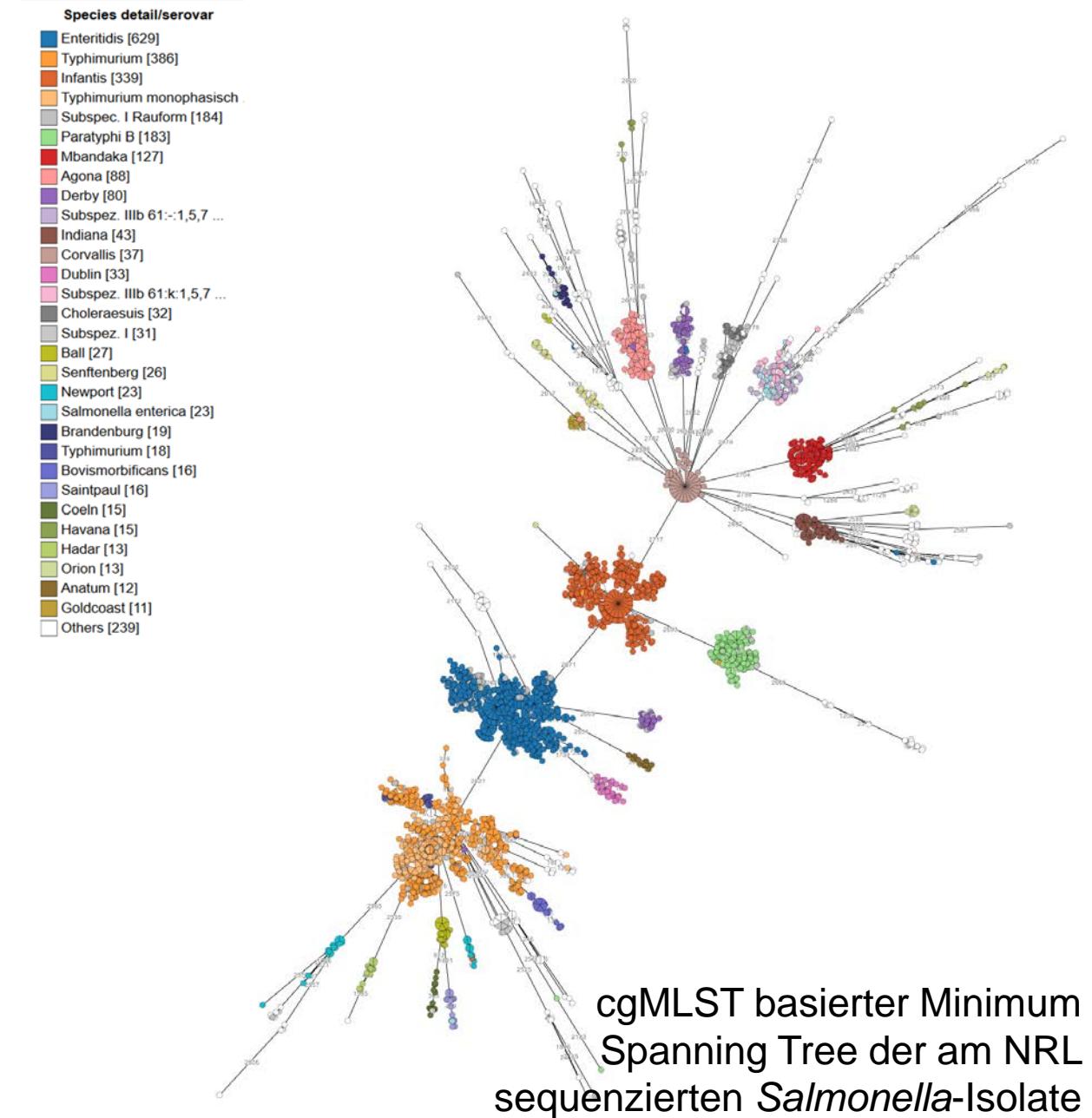
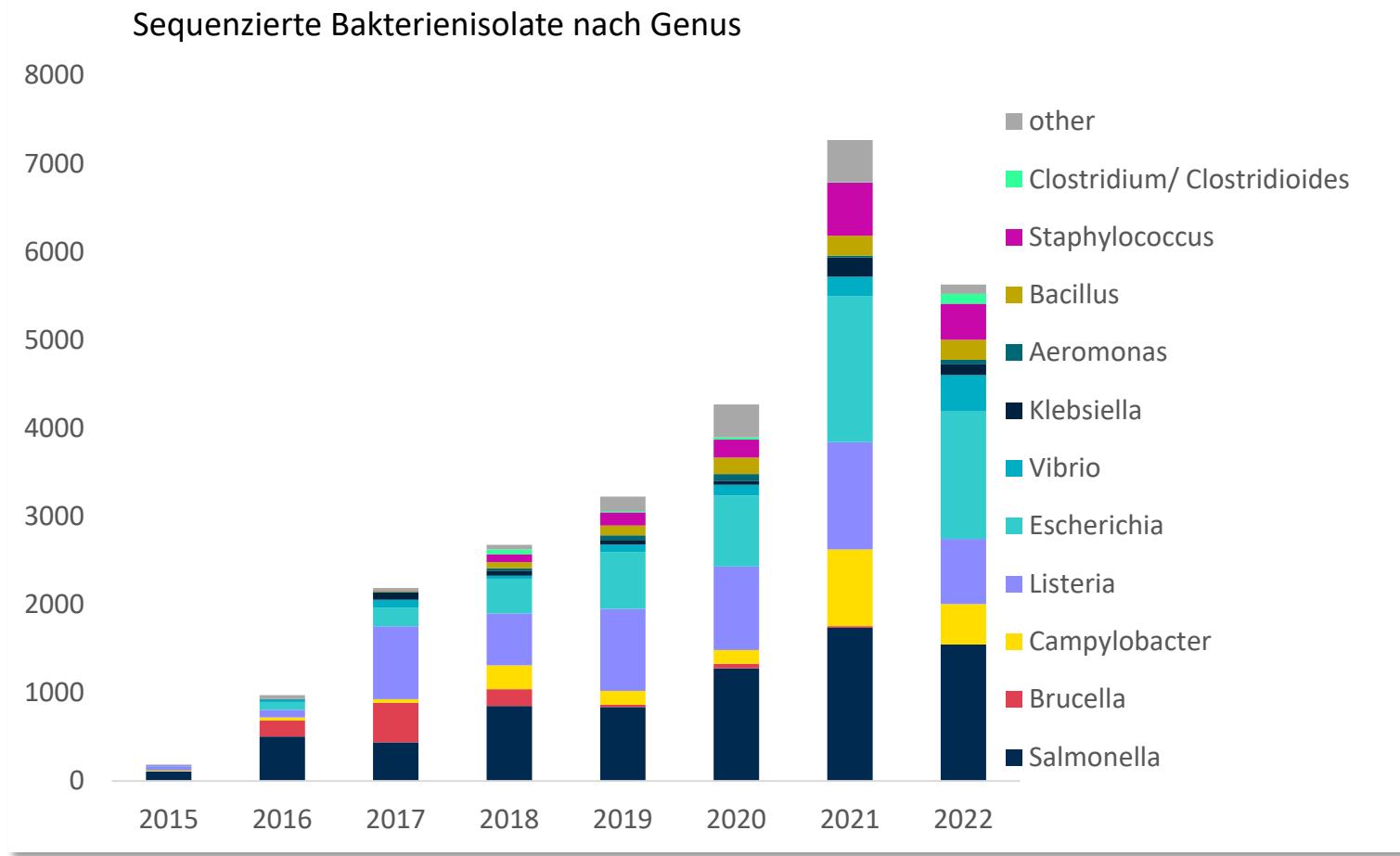
FARMED - Fast Antimicrobial Resistance and Mobile-Element Detection using metagenomics for animal and human on-site tests (EU – Horizon 2020, end June 2023)

Cooperation project with the FDA (USA) on the "Loss of immuno-reactive O-chain in *Salmonella enterica*", project plan

Other projects with European and African countries, PhD and Scientist exchange

In House projects - wildlife, squirrels project, ST183 project with New Zealand (hedgehogs), S. Ball, carbapenemase producing Salm (PCR and WGS-monitoring), ESBL producing Salmonella Incl1 plasmids.....

WGS in NRL for *Salmonella*

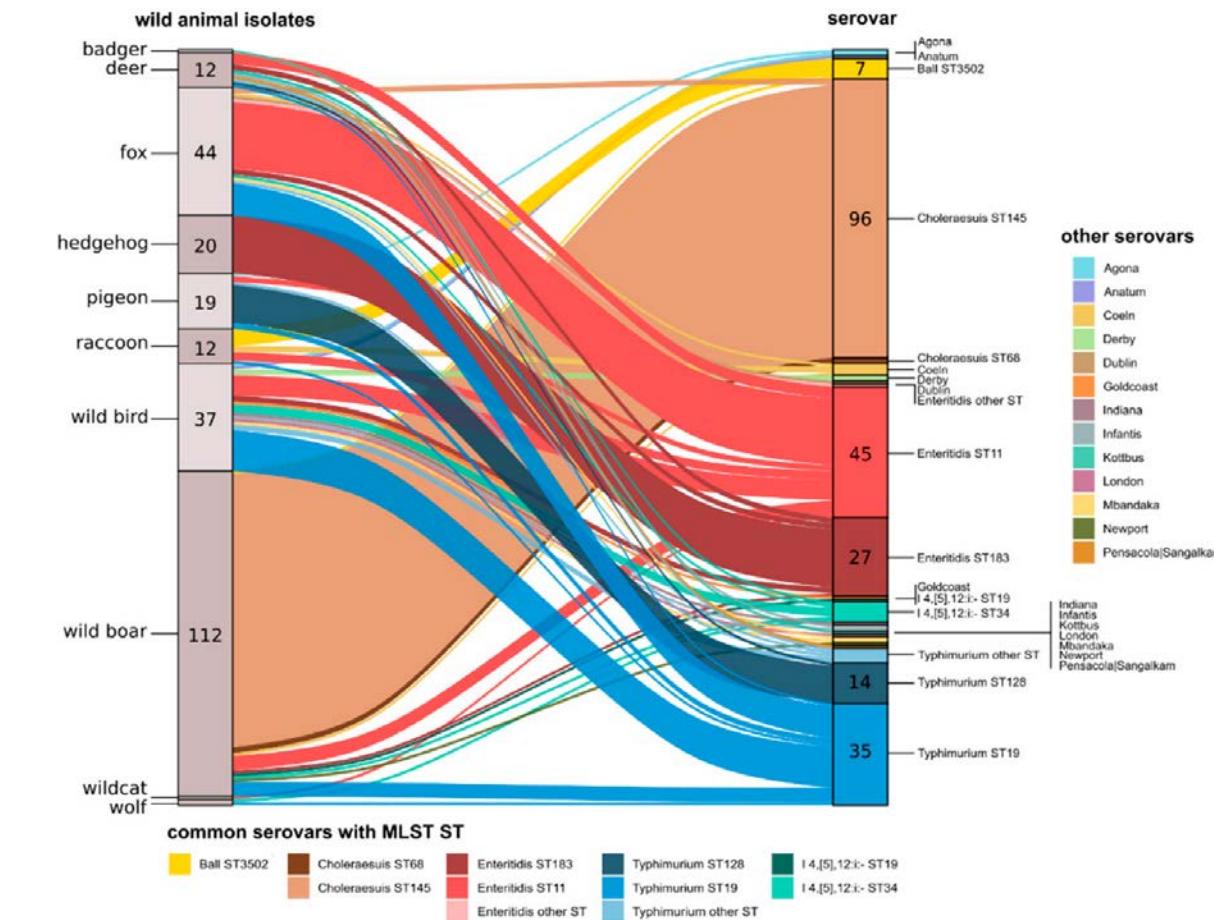


WGS - new possibilities

- Optimised method development:

→ Vaccine strain differentiation: target identification & in silico validation of an rtPCR

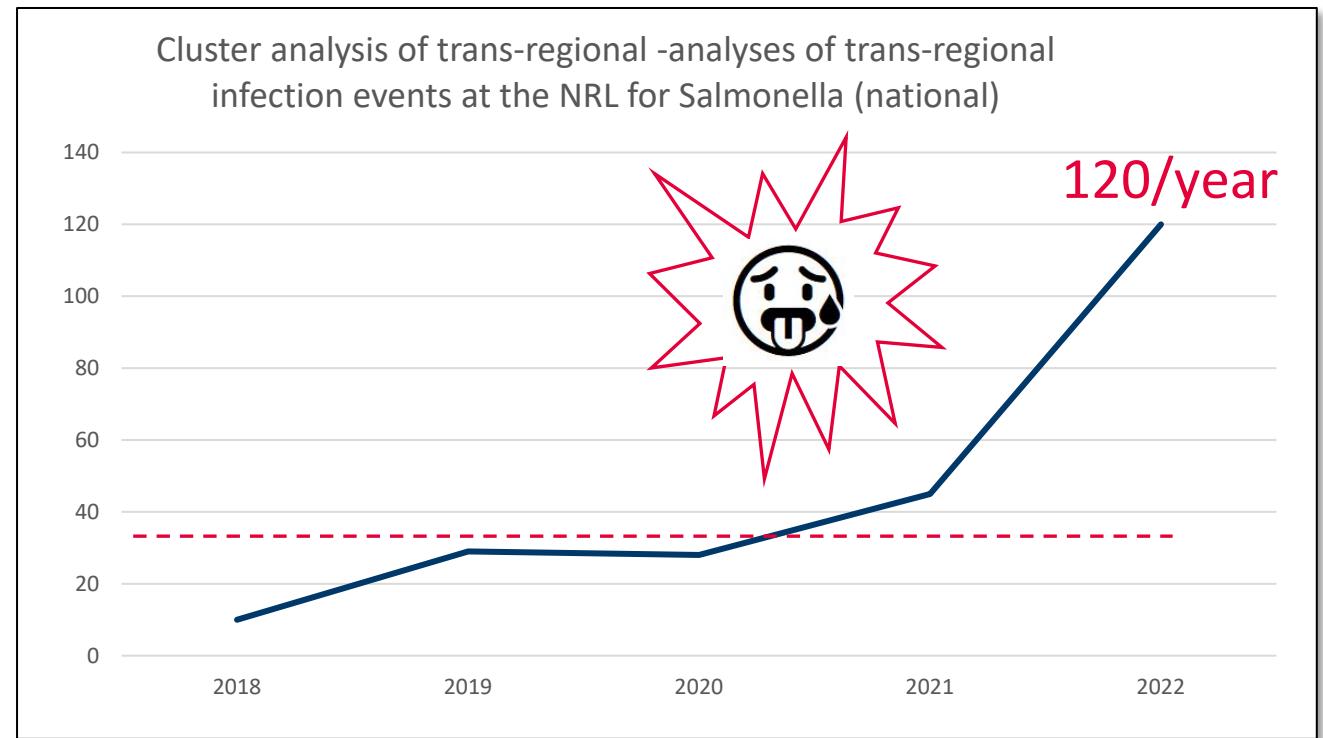
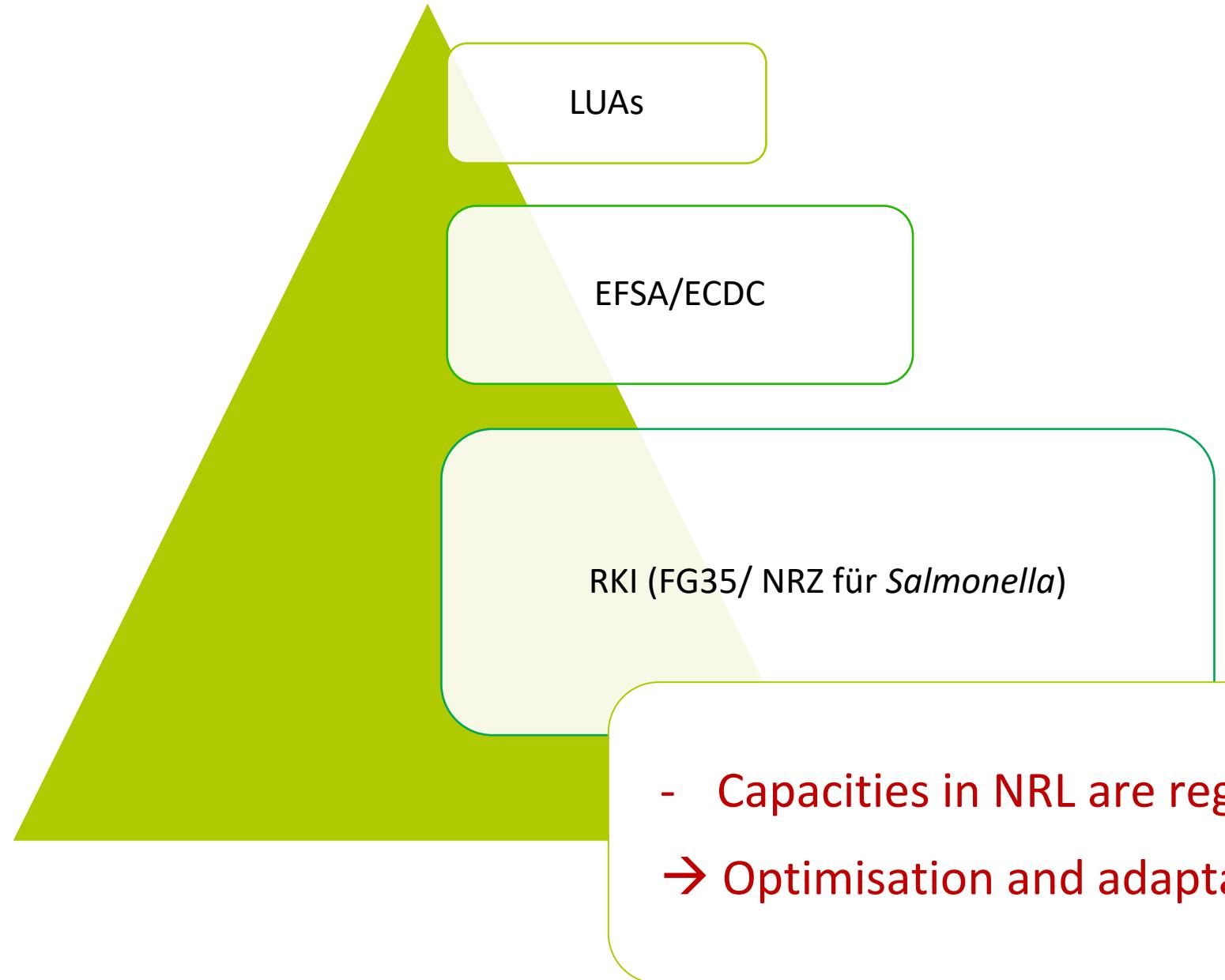
- High-throughput isolate characterisation - BakCharak: resistance genes, plasmids, virulence genes, MLST, serovar prediction, ... →



Assoziation von *Salmonella* Sequenztypen mit bestimmten Wildtier-Spezies in Deutschland
(Uelze et al. 2021 *Microorganisms*)

- High-resolution strain comparisons (SNP and cgMLST).
- Supporting outbreak analyses!

Outbreak analysis



Further collaborations

Technical University of Denmark



AARHUS UNIVERSITY



Universität
Zürich^{UZH}



Brandenburg
University of Technology
Cottbus



ROBERT KOCH INSTITUT



and several institutions of German federal states, universities and private laboratories

Dr. Istvan Szabo

Bundesinstitut für Risikobewertung
bfr.bund.de

BfR | Risiken erkennen –
Gesundheit schützen

Verbraucherschutz zum Mitnehmen

BfR2GO – das Wissenschaftsmagazin des BfR

bfr.bund.de/de/wissenschaftsmagazin_bfr2go.html

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