World Organisation for Animal Health

Francesca Martelli - -

WOAH Reference Laboratory Reports Activities 2024

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LABORATORY INFORMATION

***Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:**	Salmonellosis
***Address of laboratory:**	Woodham Lane, New Haw, Addestone, Surrey, KT15 3NB, United Kingdom
***Tel:**	0044 020 8225 7611
***E-mail address:**	Francesca.martelli@apha.gov.uk
Website:	www.apha.gov.uk
***Name (including Title) of Head of Laboratory (Responsible Official):**	Dr Jenny Stewart
***Name (including Title and Position) of WOAH Reference Expert:**	Dr Francesca Martelli
***Which of the following defines your laboratory? Check all that apply:**	Governmental

TOR1: DIAGNOSTIC METHODS

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training)

Yes

Diagnostic Test	Indicated in WOAH Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
SAT (S. Pullorum/Gallinarum)	Yes	0	9
SAT (S. Typhimurium)	Yes	15	0
RSA (S. Pullorum/Gallinarum)	Yes	0	15

SAT (S. Abortusequi)	Yes	0	281
SAT (S. Dublin)	Yes	9	0
Direct diagnostic tests		Nationally	Internationally
Serotyping	Yes	2212	0
Phagetyping	Yes	812	0
Antimicrobial susceptibility testing		5567	0
Tests for live Salmonella vaccines		767	0
Monophasic STm PCR tests		32	0
Salmonella isolation culture		2949	30
Whole Genome Sequencing	Yes	6526	305
Minimum inhibitory concentration testing	Yes	100	0

TOR2: REFERENCE MATERIAL

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by WOAH?

No

3. Did your laboratory supply standard reference reagents (nonWOAH-approved) and/or other diagnostic reagents to WOAH Members?

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient WOAH Member Countries	Country of recipients
Salmonella typing sera	Serotyping	12,910ml	17,679ml	NK	1	UNITED KINGDOM,
S. Pullorum control serum	SAT	0ml	15.25ml	NK	1	UNITED KINGDOM,
S. Pullorum antigen	SAT and RS	11,196ml	2,425ml	2,125ml	5	DENMARK, GERMANY, ISRAEL, PHILIPPINES, SPAIN,

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAH Members?

No

TOR3: NEW PROCEDURES

6. Did your laboratory develop new diagnostic methods for the designated pathogen or disease?

No

7. Did your laboratory validate diagnostic methods according to WOAH Standards for the designated pathogen or disease?

No

8. Did your laboratory develop new vaccines for the designated pathogen or disease?

No

9. Did your laboratory validate vaccines according to WOAH Standards for the designated pathogen or disease?

No

TOR4: DIAGNOSTIC TESTING FACILITIES

10. Did your laboratory carry out diagnostic testing for other WOAH Members?

Yes

Name of WOAH Member Country seeking assistance	Date	Which diagnostic test used	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
SAUDI ARABIA	2024-01-01	WGS typing	10	10
UZBEKISTAN	2024-01-01	WGS typing	5	5
SOUTH AFRICA	2024-09-01	Isolation	30	0
PHILIPPINES	2024-01-01	WGS	92	0
VIETNAM	2024-04-01	WGS and AST	200	0

11. Did your laboratory provide expert advice in technical consultancies on the request of an WOAH Member?

Yes

Name of the WOAH Member Country receiving a technical consultancy	Purpose	How the advice was provided
SENEGAL	Visited APHA Weybridge and met the WOAH reference laboratory for Salmonellosis team for insight into the UK National Control Programme for Salmonella, APHA Salmonella surveillance programmes, and the Salmonella WGS serotyping pipeline	Face to face meetings in UK.
UZBEKISTAN	Additional advice given on in-country laboratory Salmonella isolation and serotyping.	Email
GHANA	Serotyping, isolation methods, whole genome sequencing	In loco laboratory training
ZAMBIA	Salmonella sampling in broiler flocks, Salmonella national control programmes, surveillance	On-line consultation, e-mail, in-country visit

TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

12. Did your laboratory participate in international scientific studies in collaboration with WOAH Members other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	WOAH Member Countries involved other than your country
Collaboration with the Department of Agriculture - National Meat Inspection Service (DA-NMIS) of the Philippines	12 months	Research on antibiotic resistance and serotypes of non-typhoidal Salmonella (NTS) isolated from slaughtered animals in the Philippines	National Meat Inspection Service (DA-NMIS) of the Philippines	PHILIPPINES
Collaboration with the Vietnam's National Centre for Veterinary Hygiene Inspection	12 months	Investigating the genomic and AMR diversity of non-typhoidal Salmonella (NTS) in Vietnamese chickens collected from 2017 to 2023	Vietnam's National Centre for Veterinary Hygiene Inspection No. 1 (NCVHI-1), under the Department of Animal Health (DAH)	VIETNAM
Biosecurity measures to prevent and control animal infectious diseases on farm and during transport, taking into account effects on animal Welfare	3 years	Investigating biosecurity and methods of control of Salmonella in pig farms	Several European national reference laboratories	FRANCE GERMANY ITALY
Reinforcement of animal resilience	3 years	Investigating how to improve resilience to Salmonella infection in pigs reared outdoors	Several European national reference laboratories	FRANCE GERMANY ITALY

13. In exercising your activities, have you identified any regulatory research needs* relevant for WOAH?

No

TOR6: EPIZOOLOGICAL DATA

14. Did your Laboratory collect epidemiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:
Sati NM, Card RM, Barco L, Muhammad M, Luka PD, Chisnall T, Fagbamila IO, Cento G, Nnadi NE, Kankya C, et al. Antimicrobial Resistance and Phylogenetic Relatedness of Salmonella Serovars in Indigenous Poultry and Their Drinking Water Sources in North Central Nigeria. Microorganisms. 2024; 12(8):1529. https://doi.org/10.3390/microorganisms12081529 Rheman S, Hossain S, Sarker MS, Akter F, Khor L, Gan HM, Powell A, Card RM, Hounmanou YMG, Dalsgaard A, Mohan CV, Bupasha ZB, Samad MA, Verner-Jeffreys DW and Delamare-Deboutteville J (2024) Nanopore sequencing for identification and characterization of antimicrobial-resistant Escherichia coli and Salmonella spp. from tilapia and shrimp sold at wet markets in Dhaka, Bangladesh. Front. Microbiol. 15:1329620. doi: 10.3389/fmicb.2024.1329620 Guzinski J; Potter J; Tang Y; Davies R; Teale C; Petrovska L (2024) Geographical and temporal distribution of multidrug-resistant

Salmonella Infantis in Europe and the Americas. Frontiers in Microbiology 14, February 2024. https://doi.org/10.3389/fmicb.2023.1244533

Galipo, E., Zoche-Golob, V., Sassu, E.L., Prigge, C., Sjölund, M., Tobias, T., Rzeżutka, A., Smith, R.P., Burow, E. (2023) Prioritization of pig farm biosecurity for control of Salmonella and hepatitis E virus infections; results of a European Expert Opinion Elicitation. Porcine Health Management, 9(1):8.

Guzinski, J., Arnold, M., Whiteley, T., Tang, Y., Patel, V., Trew. J., Litrup, E., Hald, T., Smith, R.P. and Petrovska, L., 2024. Comparison of three source attribution methods applied to whole genome sequencing data of monophasic and biphasic Salmonella Typhimurium isolates from the British Isles and Denmark. Frontiers in Microbiology, 15:1393824. (https://doi.org/10.3389/fmicb.2024.1393824)

15. Did your laboratory disseminate epidemiological data that had been processed and analysed?

Yes

If the answer is yes, please provide details of the data collected:

Salmonella in animals and feed in Great Britain 2023

Salmonella species infections in dogs: building the epidemiological picture

FS900284 Survey of the Microbiological Contamination of Cull Ewes and Prime Lamb at Slaughter in England and Wales | Published in FSA Research and Evidence

16. What method of dissemination of information is most often used by your laboratory? (Indicate in the appropriate box the number by category and list the details in the box)

a) Articles published in peer-reviewed journals:

14

Arnold M; Smith RP; Martelli F; Davies R (2024) Bayesian evaluation of meat juice ELISA for detecting Salmonella in slaughtered pigs without specifying a cut-off. Zoonoses and Public Health https://doi.org/10.1111/zph.13109

Guzinski J; Potter J; Tang Y; Davies R; Teale C; Petrovska L (2024) Geographical and temporal distribution of multidrug-resistant Salmonella Infantis in Europe and the Americas. Frontiers in Microbiology 14, February 2024. https://doi.org/10.3389/fmicb.2023.1244533

Cawthraw SA; Goddard A; Huby T; Ring I; Chiverton L; Mueller-Doblies D (2023) Early vaccination of laying hens with the live bivalent Salmonella vaccine AviPro™ Salmonella DUO results in successful vaccine uptake and increased gut colonization. Frontiers in Microbiology 14 https://doi.org/10.3389/fmicb.2023.1327739

Shafiq Rheman, Sabrina Hossain, Md Samun Sarker, Farhana Akter, Laura Khor, Han Ming Gan, Andy Powell, Roderick M. Card, Yaovi Mahuton Gildas Hounmanou, Anders Dalsgaard, Chadag Vishnumurthy Mohan, Zamila Bueaza Bupasha, Mohammed A. Samad, David W. Verner-jeffreys, Jérôme Delamare-deboutteville Nanopore sequencing for identification and characterization of antimicrobial-resistant Escherichia coli and Salmonella spp. from tilapia and shrimp sold at wet markets in Dhaka, Bangladesh Frontiers in Microbiology,07 March 2024, Sec. Food Microbiology, Volume 15 - 2024 https://doi.org/10.3389/fmicb.2024.1329620

Guzinski J; Tang Y; Chattaway Ma; Dallman Tj; Petrovska L (2024) Development and validation of a random forest algorithm for source attribution of animal and human Salmonella Typhimurium and monophasic variants of S. Typhimurium isolates in England and Wales utilising whole genome sequencing data. Frontiers in Microbiology 14, March 2024 https://doi.org/10.3389/fmicb.2023.1254860

Galipo, E., Zoche-Golob, V., Sassu, E.L., Prigge, C., Sjölund, M., Tobias, T., Rzeżutka, A., Smith, R.P., Burow, E. (2023) Prioritization of pig farm biosecurity for control of Salmonella and hepatitis E virus infections; results of a European Expert Opinion Elicitation. Porcine Health Management, 9(1):8.

Jennifer Mattock , Marie Anne Chattaway, Hassan Hartman, Timothy J. Dallman, Anthony M. Smith, Karen Keddy, Liljana Petrovska,

Emma J. Manners, Sanelisiwe T. Duze, Shannon Smouse, Nomsa Tau, Ruth Timme, Dave J. Baker, Alison E. Mather, John Wain, And Gemma C. Langridge A One Health Perspective on Salmonella enterica Serovar Infantis, an Emerging Human Multidrug-Resistant Pathogen Emerging Infectious Diseases Journal. Volume 30, Number 4—April 2024 https://wwwnc.cdc.gov/eid/article/30/4/23-1031_article

Merrick R; Pulford C; Rubeshkumar P; Seyan P; Fina L; Sawyer C; Pacchiarini N; Pollock C; Lighthill J; Potter T; Harvey N; Thomas K; Lloyd D; Gherman I; Mackintosh A; Lawes J; Snow L; Waldram A; Larkin L; Balasegaram S; Painset A; Mccormick J; Elson R; Browning L; Williams C; Andrew R; Mably S; Thomas D (2024) A genetically related cluster of Salmonella Typhimurium cases in humans associated with ruminant livestock and related food chains, United Kingdom, August 2021-December 2022. Epidemiology and Infection https://doi.org/10.1017/S095026882400030X

Navickaite I; Holmes H; Dondi L; Randall L; Fearnley C; Taylor E; Fullick E; Horton R; Williamson S; Abuoun M; Teale C; Anjum MF (2024) Occurrence and characterization of rmtB-harbouring Salmonella and Escherichia coli isolates from a pig farm in the UK. Journal of Antimicrobial Chemotherapy 79 (6) 1329-1336 https://doi.org/10.1093/jac/dkae102

Davies AR; Chisnall T; Akter S; Afrad MMH; Sadekuzzaman M; Badhy SC; Hasan MZ; Rahman MT; Smith RP; Card RM; Brum E; Chowdhury MGA (2024) Genomic characterisation of Escherichia coli isolated from poultry at retail through Sink Surveillance in Dhaka, Bangladesh reveals high levels of multi-drug resistance. Frontiers in Microbiology 15 https://doi.org/10.3389/fmicb.2024.141847

Willis C; Jørgensen F; Cawthraw S; Aird H; Lai S; Kesby M; Chattaway M; Lock I; Quill E; Raykova G (2023) A survey of Salmonella, Escherichia coli, and antimicrobial resistance in frozen, part-cooked, breaded, or battered chicken products on retail sale in the UK. Journal of Applied Microbiology 134 (5) https://doi.org/10.1093/jambio/lxad093

Ivanova M; Ovsepian A; Leekitcharoenphon P; Seyfarth AM; Mordhorst H; Otani S; Koeberl-Jelovcan S; Milanov M; Kompes G; Liapi M; Černý T; Vester CT; Perrin-Guyomard A; Hammerl JA; Grobbel M; Valkanou E; Jánosi S; Slowey R; Alba P; Carfora V; Avsejenko J; Pereckiene A; Claude D; Zerafa R; Veldman KT; Boland C; Garcia-Graells C; Wattiau P; Butaye P; Zając M; Amaro A; Clemente L; Vaduva AM; Romascu LM; Milita NM; Mojžišová A; Zdovc I; Escribano MJZ; De Frutos Escobar C; Overesch G; Teale C; Loneragan GH; Guerra B; Beloeil PA; Brown AMV; Hendriksen RS; Bortolaia V; Kjeldgaard JS (2024) Azithromycin resistance in Escherichia coli and Salmonella from food-producing animals and meat in Europe. Journal of Antimicrobial Chemotherapy 79 (7) 1657-1667

Guzinski, J., Arnold, M., Whiteley, T., Tang, Y., Patel, V., Trew. J., Litrup, E., Hald, T., Smith, R.P. and Petrovska, L., 2024. Comparison of three source attribution methods applied to whole genome sequencing data of monophasic and biphasic Salmonella Typhimurium isolates from the British Isles and Denmark. Frontiers in Microbiology, 15:1393824. (https://doi.org/10.3389/fmicb.2024.1393824)

Salmonella species infections in dogs: building the epidemiological picture
Elizabeth Bruno-McClung, Megan Rawlins, Adrienne Mackintosh
Veterinary record December 2024.

b) International conferences:

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Ramon P. Maluping. Assessing AMR in Animals at Slaughter in the Philippines. National Meat Inspection Service (NMIS) Training and Research Symposium held in Manila, Philippines. July 2024

Ramon P. Maluping, Alistair Davies. Remedios Micu, Thomas Chisnall, Evelyn E. Embestro, Alyssa Mae R. Portes, Rosette G. Dela Cruz, Mary Ann Escoto, Jaromir Guzinski and Roderick Card. Whole-Genome Sequencing Analysis of Non-Typhoidal Salmonella spp. Isolated from Animals at Slaughter in the Philippines Provides Insights into Circulating Serovars and Antimicrobial Resistance Genotypes of One Health Significance. 8th World One Health Congress Cape Town, South Africa, 2024

Shaun Cawthraw and Doris Mueller Doblies Successful vaccination of layer pullets during the first days of life using a bivalent live vaccine against Salmonella Enteritidis and Salmonella Typhimurium. World Vet. Poultry Association Congress, Italy.

F Martelli – Good production practices reduce the need for antimicrobial use – the UK experience with Salmonella. FAO Global conference on Animal Health Innovation, Reference Centres and Vaccines, Rome September 2024.

Arslan Hussaini, Jaromir Guzinski, Lucy Snow, Liljana Petrovska. Phylogenetic and comparative genomics analyses of established and recently emerged determinative phage types of Salmonella Typhimurium in livestock and companion animals from the United Kingdom. E-poster presentation at the IUMS 2024, Florence, Italy

Jahcub Trew, Jaromir Guzinski, Shaun Cawthraw, Arslan Hussaini, Liljana Petrovska. Diversity of pESI like plasmid (IncFIB(pN55391)) in UK Salmonella enterica Infantis isolates and evidence of 2021 2022 lineage based integration. Poster presentation at the IUMS 2024, Florence, Italy
Jaromir Guzinski, Arslan Hussaini, Liljana Petrovska. Application of machine learning models applied to genomic data as a replacement for traditional phage typing of Salmonella Typhimurium isolates. E-poster presentation at the IUMS 2024, Florence, Italy

c) National conferences:

2
Rawlins M., Whole Genome Sequencing (WGS) for Salmonella serotyping and epidemiological investigations. Animal Health and Welfare conference UK, 2024.
Rawlins M., Salmonella in GB poultry - current status and trends. UK Poultry conference, September 2024.

d) Other (Provide website address or link to appropriate information):

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

17. Did your laboratory provide scientific and technical training to laboratory personnel from other WOAH Members?

Yes

a) Technical visit : 3

b) Seminars : 0

c) Hands-on training courses: 0

d) Internships (>1 month) 0

Type of technical training provided (a, b, c or d)	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
A	GHANA	10
A	ZAMBIA	10
A	GHANA	15

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO 9001:2015	Certificate	ANIMAL PLANT HEALTH AGENCY - Certificate UK013916 - ISO 9001 - exp. 25-07-2026.pdf
ISO 17025:2017	Certificate	APHA UKAS cert to 25 Nov 25.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Various Salmonella surveillance and diagnostic tests	UKAS
Various serological and AMR tests	UKAS
Various research methodologies	Bureau Veritas

20. Does your laboratory maintain a "biorisk management system" for the pathogen and the disease concerned?

Yes

APHA complies with HSE working standards (https://www.hse.gov.uk/) and all staff are committed to promote health and safety and comply with current regulations and internal procedures.

TOR9: SCIENTIFIC MEETINGS

21. Did your laboratory organise scientific meetings related to the pathogen in question on behalf of WOAH?

No

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOAH?

No

TOR10: NETWORK WITH WOAH REFERENCE LABORATORIES

23. Did your laboratory exchange information with other WOAH Reference Laboratories designated for the same pathogen or disease?

Yes

24. Do you network (collaborate or share information) with other WOAH Reference Laboratories designated for the same pathogen?

No

25. Did you organise or participate in inter-laboratory proficiency tests with WOAH Reference Laboratories designated for the same pathogen during the past 2 years?

No

N/A

26. Did your laboratory collaborate with other WOAH Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

Yes

Title of the project or contract	Scope	Name(s) of relevant WOAH Reference Laboratories
Discontools	Identifying data gaps in Salmonella knowledge	Salmonella reference laboratory at the Istituto Zooprofilattico delle Venezie (Italy) and Federal Institute for Risk Assessment, Berlin (Germany)

TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

27. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than WOAH Reference Laboratories for the same pathogen during the past 2 years?

Yes

Purpose for inter-laboratory test comparisons1	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries
Assess laboratory capability to conduct isolation and identification of Salmonella species to help maintain accreditation. Animal and Plant Health Agency Vetqas PT scheme PT0087 Salmonella in Animal Feed	participant	24		UNITED KINGDOM,
Assess laboratory capability to conduct isolation and identification of Salmonella species to help maintain accreditation. Animal and Plant Health Agency Vetqas PT scheme PT0088 Salmonella in Poultry	participant	159		CANADA,
Assess laboratory capability to conduct isolation and identification of Salmonella species to help maintain accreditation. Animal and Plant Health Agency Vetqas PT scheme PT0090 Control of Salmonella in Poultry Order (run for Defra for UK labs only)	participant	17		UNITED KINGDOM,
Assess laboratory capability to conduct isolation and identification of Salmonella species to help maintain accreditation. Animal and Plant Health Agency Vetqas PT scheme PT0084 Salmonella serotyping and culture	participant	35		UNITED KINGDOM,

TOR12: EXPERT CONSULTANTS

28. Did your laboratory place expert consultants at the disposal of WOAH?

No

29. Additional comments regarding your report:

No