Interim Summary Report

EURL-*Salmonella* Proficiency Test Serotyping 2025

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1. Introduction

This interim summary report describes the overall results of the Proficiency Test (PT) on serotyping of *Salmonella*, organised by the European Union Reference Laboratory for *Salmonella* (EURL-*Salmonella*, Bilthoven, the Netherlands) in August-October 2025. This year's PT did not contain an optional part on cluster analyses.
A total of 33 laboratories participated in the PT 2025. These included 27 National Reference Laboratories for *Salmonella* (NRLs-*Salmonella)* in the 27 EU Member States and 6 NRLs from third countries (EU candidate Member States, members of the European Free Trade Association (EFTA), and the United Kingdom).
The main objective of this PT was to evaluate the performance of the NRLs in serotyping *Salmonella*.

2. Materials and Methods

2.1. *Salmonella* strains for serotyping

A total of 20 *Salmonella* strains (coded S1 - S20) had to be serotyped by the participants. As agreed at the 30th EURL-*Salmonella* Workshop (Mooijman, 2025), a less common strain (S21) was additionally included. Testing this strain was optional and results were not included in the evaluation.
The *Salmonella* strains used for the PT on serotyping originated from the National *Salmonella* Centre collection in the Netherlands. The strains were verified by the Centre before distribution. The complete antigenic formulas of the 21 serovars, in accordance with the most recent White-Kauffmann-Le Minor scheme (Grimont and Weill, 2007) plus published supplements no. 47 (Guibourdenche et al., 2010) and no. 48 (Issenhuth-Jeanjean et al., 2014) are shown in Table 1. However, participants were asked to report only the results as detected and on which the identification of serovar names was based. Three strains (S5 Limete, S6 Belem, and S7 Madelia) represented serovars included in the EURL-*Salmonella* serotyping PTs for the first time.

2.2 Laboratory codes

Each participant was randomly assigned a laboratory code 1 - 33. Labcodes 83 and 86 were additionally assigned to participants 15 and 32 respectively, for reporting a second set of results, based on WGS. Laboratory 5 was participating in the EURL-*Salmonella* PT Serotyping for the second year and was invited to re-submit results using labcode 55 after the hands-on training in their laboratory given by two EURL-*Salmonella* serotyping experts, early October 2025.

Table 1. Antigenic formulas of the 21 Salmonella *strains according to the White-Kauffmann-LeMinor scheme used in the EURL-*Salmonella *PT Serotyping 2025*

Strain code	O-antigens	H-antigens (phase 1)	H-antigens (phase 2)	Serovar
S1	6,7,14	m,t	[z57]	Oranienburg
S2	6,8	z10	e,n,x	Hadar
S3	16	b	1,2	Hull
S4	1,9,12	g,m	-	Enteritidis
S5[a)]	1,4,12,[27]	b	1,5	Limete
S6[a)]	6,8	c	e,n,x	Belem
S7[a)]	1,6,14,25	y	1,7	Madelia
S8	6,7	k	e,n,x	Singapore
S9	6,7,14	r	1,2	Virchow
S10	3,{10}{15}{15,34}	e,h	1,6	Anatum
S11[b)]	1,4,[5],12	i	-	1,4,[5],12:i:-
S12	1,4,[5],12	f,g	[1,2]	Derby
S13[c)]	1,4,[5],12	b	1,2	Paratyphi B var. Java
S14	1,4,[5],12	r	1,2	Heidelberg
S15	6,7,14	g,m,[p],s	[1,2,7]	Montevideo
S16	1,13,22	z	1,6	Poona
S17	1,4,[5],12	i	1,2	Typhimurium
S18	1,9,12[Vi]	g,p	-	Dublin
S19	6,7,14	r	1,5	Infantis
S20	1,4,12	z	1,5	Kiambu
S21[d)]	52	a	1,5	Uithof

[a)] Represented in an EURL-*Salmonella* PT Serotyping for the first time

[b)] Monophasic variant of *S*. Typhimurium based on genomic sequences. Phenotypic result: 4:i:-

[c)] L(+) tartrate (= d-tartrate) positive variant based on genomic sequences, often referred to as var. Java

[d)] Optional strain

2.3 Transport

The parcels containing the strains for typing were sent by the EURL-*Salmonella* on Monday 11 August 2025. All samples were packed and transported as Biological Substance Category B (UN 3373) and transported by a door-to-door courier service.

2.4 Evaluation of the serotyping results

The evaluation of deviating serotyping results is described in Table 2.

Table 2. Evaluation of deviating serotyping results

Results	Evaluation
Auto-agglutination or, Incomplete set of antisera (outside range of antisera)	Not typable
Partly typable due to incomplete set of antisera or, Part of the formula (for the name of the serovar) or, No name serovar	Partly correct
Wrong serovar or, Mixed sera formula	Incorrect

In 2007, the following criteria for 'good performance' in PTs on serotyping were defined (Mooijman, 2007).
Penalty points are given for the incorrect typing of strains, but a distinction is made between the five most important human health-related *Salmonella* serovars (as indicated in EU legislation, also sometimes referred to as 'top-5'), and all other strains:

- 4 penalty points: incorrect typing of *S.* Enteritidis, *S.* Typhimurium (including the monophasic variant), *S.* Hadar, *S.* Infantis or *S.* Virchow, or assigning the name of one of these five serovars to another strain.

- 1 penalty point: incorrect typing of all other *Salmonella* serovars.

The total number of penalty points is calculated for each NRL-*Salmonella*. The criterion for good performance is set at less than 4 penalty points.
All EU Member State NRLs not meeting the criterion of good performance (scoring four penalty points or more) have to participate in a follow-up study, in which 10 additional strains have to be serotyped.

3. Results

3.1 Serotyping results of the NRLs-*Salmonella*

3.1.1. General comments on this year's evaluation

As decided at the 30th EURL-*Salmonella* Workshop (Mooijman, 2025), Strain S21 was an additional strain to the study. Testing of this strain was optional and results were not included in the evaluation.
Non-EU MS Laboratory 5 was participating in the EURL-*Salmonella* PT Serotyping for the second year and re-submitted results under labcode 55 after the hands-on training in their laboratory by the EURL-*Salmonella*. Scope of accreditation of this laboratory is on the 'top-5' strains only, which complicates a proper comparison with the other participants and may lead to a bias in the overall evaluation. Therefore, the results of labcodes 5 and 55 are excluded from the general overview on this PT's evaluation of results (Figures 1-4, Table 4).

3.1.2. Serotyping results per laboratory

The evaluations of the type of errors for O- and H-antigens and for the identification of the strains are shown in Figures 1, 2, and 3.
The percentages of correct results per laboratory are shown in Figure 4.
The number of penalty points was determined for each NRL using the guidelines described in section 2.4. Table 3 shows the number of penalty points for each NRL and indicates whether the level of good performance was achieved (yes or no).

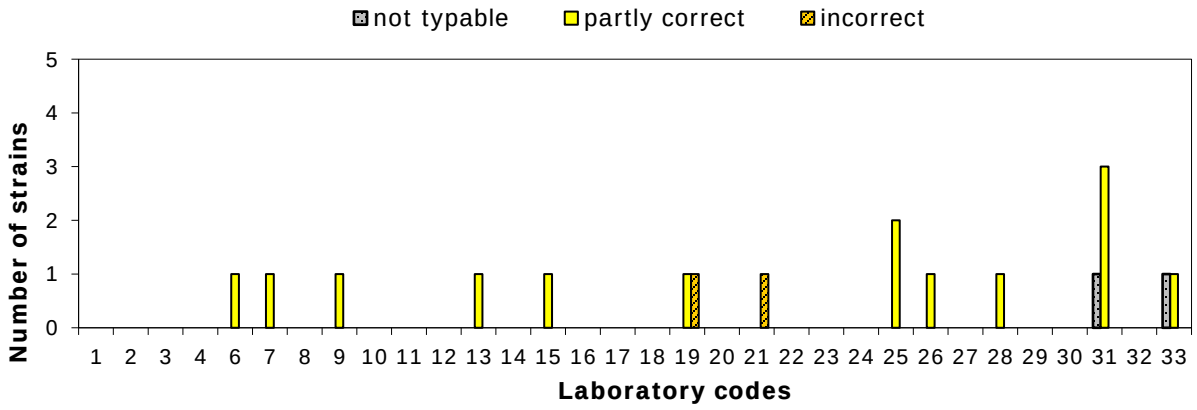

Figure 1. Evaluation of the type of errors for O-antigens, per participant

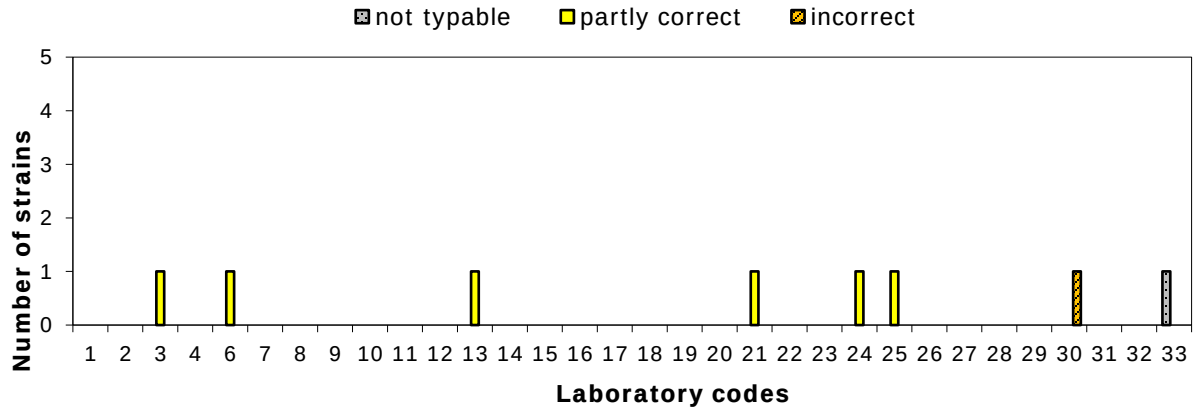

Figure 2. Evaluation of the type of errors for H-antigens, per participant

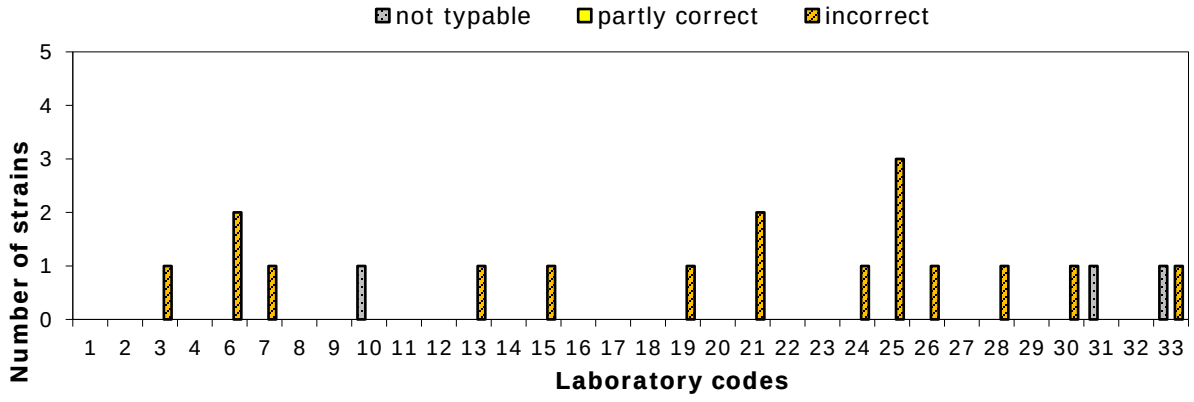

Figure 3. Evaluation of the type of errors in the identification of the serovar names, per participant

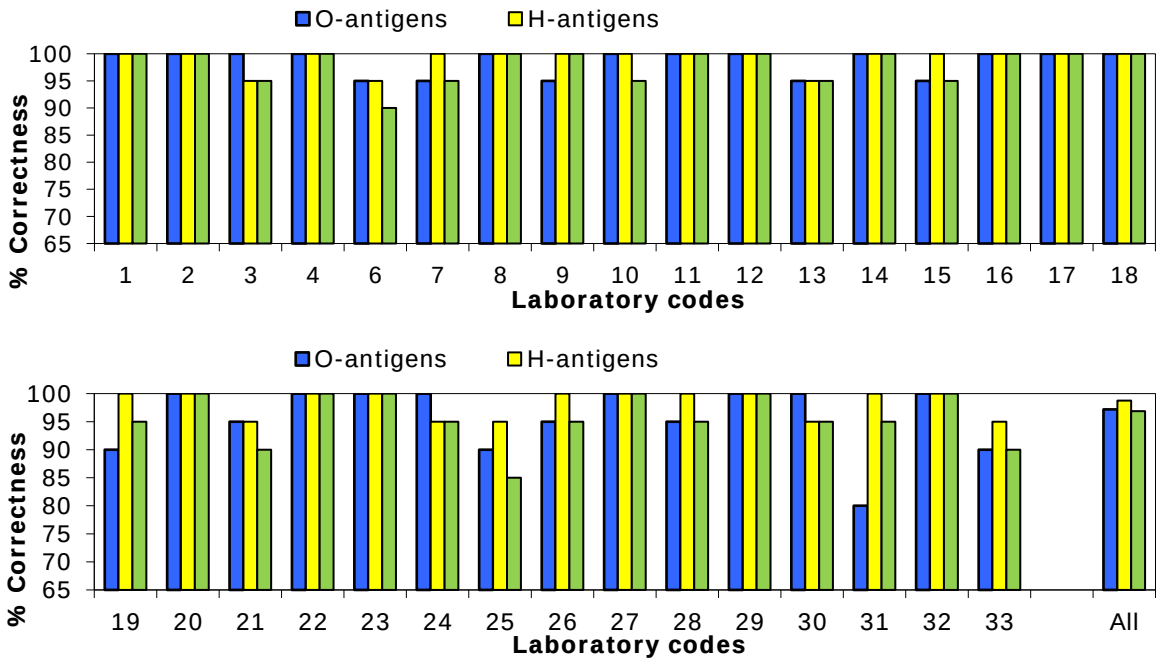

Figure 4. Percentages of correct serotyping results, per participant

Table 3. Evaluation of serotyping results per NRL

Lab code	Penalty points	Good performance	Lab code	Penalty points	Good performance
1	0	yes	18	0	yes
2	0	yes	19	1	yes
3	1	yes	20	0	yes
4	0	yes	21	2	yes
6	2	yes	22	0	yes
7	1	yes	23	0	yes
8	0	yes	24	1	yes
9	0	yes	25	3	yes
10	0	yes	26	1	yes
11	0	yes	27	0	yes
12	0	yes	28	1	yes
13	1	yes	29	0	yes
14	0	yes	30	1	yes
15	1	yes	31	0	yes
16	0	yes	32	0	yes
17	0	yes	33	1	yes
			55*	1	yes

*Limited scope of serotyping ('top-5' only)

Overall, the participants' performance in the PT Serotyping 2025 was good, although one strain (S7, Madelia) resulted in a relatively high number of penalty points (eight participants). Table 4 shows the percentages of correctly typed strains, both for EU-MS

participants only and for all participants. All participants met the level of good performance. This was also the case for Laboratory 55 after the dedicated hands-on training and with a limited scope (Table 3).

Table 4. Correctly typed strains per total number of strains tested and per laboratories participating, separately for EU-MS participants and for all participants.

Results	EU-MS participants	All participants*
N participants	27	32
N strains evaluated per participant	20	20
O-antigens correct/strains tested	524/540 (97,0%)	624/640 (97,5%)
H-antigens correct/strains tested	533/540 (98,7%)	632/640 (98,8%)
Serovar names correct/strains tested	523/540 (96,9%)	620/640 (96,9%)
O-antigens correct/labs participating	18/27 (67%)	21/32 (66%)
H-antigens correct/labs participating	23/27 (85%)	24/32 (75%)
Serovar names correct/labs participating	14/27 (52%)	17/32 (53%)
Total number of Penalty Points	14	17
Total number 'unsatisfactory performance'	0	0

*Excluding Laboratory 55

3.1.3. Serotyping results per strain

Annex A displays the final naming results reported per strain (S1 – S20) and per laboratory (1-33, 55, 83 and 86). A completely correct identification (*Laboratory 55 excluded*) was obtained for 12 *Salmonella* serovars: Hadar (S2), Enteritidis (S4), Virchow (S9), Anatum (S10), 1,4,[5],12:i:- (S11), Derby (S12), Heidelberg (S14), Poona (S16), Typhimurium (S17), Dublin (S18), Infantis (S19), and Kiambu (S20).
Annex A also shows the reported serovar names for strain 1,4,[5],12:i:- (S11). Eighteen participants used a PCR method to confirm this strain to be monophasic Typhimurium. Notably, 18 out of the 33 submissions for strain S13 named this strain Paratyphi B. Nevertheless, d-tartrate was tested by 5/18 participants, but with an unexpected negative result. Paratyphi B var. Tartrate+/var. Java was reported by 15 participants and 14 of them indicated (indirectly) that strain S13 was confirmed on tartrate, either biochemically, by PCR, and/or by WGS.
Annex B includes the details on the strains that caused problems in serotyping. The main problem was seen for strain S7 Madelia (1,6,14,25:y,1,7). Nine participants, including the additional WGS serotyping performed by laboratories 83 and 86, reported Carrau instead of Madelia. Maybe not all the necessary O-antisera were available for those laboratories, but in such a case 'Carrau or Madelia' would have been an appropriate reporting (Lab 31), or the serovar formula as far as detected (Lab 30).
Annex C describes details on the additional and optional strain S21. All participants tried to serotype strain S21, a less common *Salmonella enterica* subsp. *enterica* (I). The completely correct serovar name Uithof (52:a:1,5) in the end was reported by 32 participants, including WGS serotyping performed by laboratories 83 and 86.

List of abbreviations

EFTA	European Free Trade Association
EU	European Union
EURL-*Salmonella*	European Union Reference Laboratory for *Salmonella*
MS	Member State
NRLs-*Salmonella*	National Reference Laboratories for *Salmonella*
PT	Proficiency Test
REF	Reference
RIVM	National Institute for Public Health and the Environment
WGS	Whole Genome Sequencing

References

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https://www.eurlsalmonella.eu/publications/workshop-reports (under preparation).

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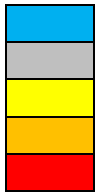
Annex A. Serotyping results per strain (S1 – S20) and laboratory (1 – 33, 5=55, 83, 86)

Lab:	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
REF	**Oranienburg**	**Hadar**	**Hull**	**Enteritidis**	**Limete**	**Belem**	**Madelia**	**Singapore**	**Virchow**	**Anatum**
1	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
2	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
3	Othmarscher	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
4	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
6	Othmarschen	Hadar	Hull	Enteritidis	Limete	Belem	Carrau	Singapore	Virchow	Anatum
7	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Carrau	Singapore	Virchow	Anatum
8	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
9	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
10	6,7:m,t:-	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
11	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
12	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
13	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Carrau	Singapore	Virchow	Anatum
14	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
15	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Carrau	Singapore	Virchow	Anatum
16	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
17	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
18	Oranienburg	Hadar	Hull	Enteritidis	Limete	Santiago	Madelia	Singapore	Virchow	Anatum
19	Oranienburg	Hadar	Skansen	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
20	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
21	Othmarschen	Hadar	Skansen	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
22	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
23	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
24	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
25	Oranienburg	Hadar	Hull	Enteritidis	Limete	Santiago	Gatow	Escanaba	Virchow	Anatum
26	Oranienburg	Hadar	Hull	Enteritidis	Limete	Santiago	Carrau	Singapore	Virchow	Anatum
27	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
28	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Carrau	Singapore	Virchow	Anatum
29	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
30	6,7:m,t:-	hadar	hull	enteritidis	mono	belem	14,25:y:1,7	singapore	virchow	anatum
31	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Carrau or Madelia	Singapore	Virchow	Anatum
32	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Madelia	Singapore	Virchow	Anatum
33	Oranienburg	Hadar	Hull	Enteritidis	Limete	Santiago	Carrau	Singapore	Virchow	Anatum
55	7:m,t	S. Hadar	-	S. Enteritidi	4	8,6	-	7	S. Virchow	3
83	Oranienburg	Hadar	Hull	Enteritidis	Limete	Belem	Carrau	Singapore	Virchow	Anatum
86	Oranienburg	Hadar	Hull	Enteritidis	Limete	Santiago or Belem	Carrau	Singapore	Virchow	Anatum
X	3	0	2	0	1	1	8	1	0	0

S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	Lab:
4,12:i:-	**Derby**	**Paratyphi B var. Java**	**Heidelberg**	**Montevideo**	**Poona**	**Typhimurium**	**Dublin**	**Infantis**	**Kiambu**	**REF**
Typhimurium monophasic variant	Derby	Paratyphi B (Java)	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	1
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	2
Typhimurium monofaza	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	3
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	4
4,5,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	6
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	7
Typhimurium, monophasic	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	8
I 4,[5],12:i:-	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	9
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	10
4:i:- monophasic Typhimurium	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	11
4,12:i:- (mST)	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	12
4,12:i:-	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	13
4,12:i:-	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	14
Monophasic Typhimurium	Derby	Paratyphi B var Tartrate +	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	15
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	16
4,5,12:i:-	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	17
Monophasic variant of Typhimurium (4,12:i:-)	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	18
4,12:i:-	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	19
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	20
4,12; i; -	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	21
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	22
4:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	23
4:i: -	Derby	Paratyphi B	Heidelberg	Menston	Poona	Typhimurium	Dublin	Infantis	Kiambu	24
Monophasic Salmonella Typhimurium	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	25
Typhimurium, monophasic (4,12:i:-)	Derby	Paratyphi B var Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	26
4,12:i:-	Derby	Paratyphi B var. Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	27
4,5,12:i:-	Derby	Paratyphi B dT+	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	28
4,12:i:-	Derby	Paratyphi B	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	29
4,12:i:-	derby	paratypi B2	heidelberg	montevideo	poona	typhimurium	dublin	infantis	kiambu	30
4:i:-	Derby	Paratyphi B**	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	31
4:i:-	Derby	Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	32
4,12:i:-	Derby	Not tested	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	33
S. Typhimurium monophasic	4,8,6:x	4	4	S. Montevideo	-	S. Typhimurium	S. Dublin	S. Infantis	4	55
Monophasic Typhimurium	Derby	Paratyphi B var Tartrate +	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	83
Monophasic Typhimurium	Derby	Java	Heidelberg	Montevideo	Poona	Typhimurium	Dublin	Infantis	Kiambu	86
0	0	0	0	1	0	0	0	0	0	**X**



remark (e.g. spelling error)
not typable (e.g. antisera not available, rough strain)
partly correct; in the naming: no penalty points
incorrect; in the naming: 1 penalty point
incorrect; in the naming: 4 penalty points

X = number of deviating laboratories (by penalty points) per strain, *Laboratories 55, 83, and 86 excluded*.

Results for Strain S21 are given in Annex C.

Annex B. Details per strain that caused problems in serotyping

Strain code	O-antigens	H-antigens		Serovar	Lab code
		(phase 1)	(phase 2)		
S1	**6,7,14**	**m,t**	**[z57]**	**Oranienburg**	**REF**
S1	6,7	g,m,t	-	Othmarscher	3
S1	6,7	g,m	-	Othmarschen	6
S1	6,7	m,t	-	6,7:m,t:-	10[a)]
S1	6,7	g,m,t	-	Othmarschen	21
S1	6,7	m,t	-	6,7:m,t:-	30
S1	7	m,t	-	7:m,t	55
S2	**6,8**	**z10**	**e,n,x**	**Hadar**	**REF**
S2	8	z10	e,n,x	Hadar	19
S2	8	z10	e,n,x	Hadar	31
S2	8	z10	e,n,x	Hadar	86
S3	**16**	**b**	**1,2**	**Hull**	**REF**
S3	16	b	1,2,5	Hull	13
S3	6,8	b	1,2	Skansen	19
S3	6,8	b	1,2	Skansen	21
S3	-	-	-	-	55
S5	**1,4,12,[27]**	**b**	**1,5**	**Limete**	**REF**
S5	4,12	l,w	5	mono	30
S5	4	-	-	4	55
S6	**6,8**	**c**	**e,n,x**	**Belem**	**REF**
S6	8	c	e,n,x	Santiago	18
S6	8,20	c	e,n,x	Santiago	25
S6	8	c	e,n,x	Santiago	26
S6	8	c	x	Belem	28
S6	8	c	e,n,x	Belem	31
S6	8	c	e,n,x	Santiago	33
S6	8,6	-	-	8,6	55
S6	8	c	e,n,x	Belem	83
S6	8	c	e,n,x	Santiago or Belem	86
S7	**1,6,14,25**	**y**	**1,7**	**Madelia**	**REF**
S7	6,14	y	1,7	Carrau	6
S7	14,24	y	1,7	Carrau	7
S7	14	y	1,7	Carrau	13
S7	6,14	y	1,7	Carrau	15
S7	6,7	y	1,7	Gatow	25
S7	6,14	y	1,7	Carrau	26[b)]
S7	14,24	y	1,7	Carrau	28
S7	14,25	y	1,7	14,25:y:1,7	30
S7	6,14	y	1,7	Carrau or Madelia	31[c)]
S7	6,14,24	y	1,7	Carrau	33
S7	-	-	-	-	55
S7	6,14	y	1,7	Carrau	83
S7	6,14	y	1,7	Carrau	86

S8	**6,7**	**k**	**e,n,x**	**Singapore**	**REF**
S8	6,7	k	e,n,z15	Escanaba	25
S8	7	-	-	7	55
S10	**3,{10}{15}{15,34}**	**e,h**	**1,6**	**Anatum**	**REF**
S10	3	-	-	3	55
S12	**1,4,[5],12**	**f,g**	**[1,2]**	**Derby**	**REF**
S12	4,8,6	x	-	4,8,6:x	55
S13	**1,4,[5],12**	**b**	**1,2**	**Paratyphi B var. Java**	**REF**
S13	4,5,12	b	1,2	paratypi B2	30
S13	4	b	1,2	Java	32
S13	-	-	-	Not tested	33
S13	4	-	-	4	55
S13	4	b	1,2	Java	86
S14	**1,4,[5],12**	**r**	**1,2**	**Heidelberg**	**REF**
S14	4	-	-	4	55
S15	**6,7,14**	**g,m,[p],s**	**[1,2,7]**	**Montevideo**	**REF**
S15	7	g,s	-	Menston	24
S15	6,7	g,m,s,t	-	S. Montevideo	55
S16	**1,13,22**	**z**	**1,6**	**Poona**	**REF**
S16	13	z	1,6	Poona	9
S16	13	z	1,6	Poona	31
S16	13	z	1,6	Poona	86
S16	-	-	-	-	55
S20	**1,4,12**	**z**	**1,5**	**Kiambu**	**REF**
S20	4	-	-	4	55

a) S1: strain we can't write serovar name, because we haven't z57 and z64 sera.

b) S7: Not straight forward O-antigen (O25?).

c) S7: we did not have O-25 and O-24,25 or control strains in house. Therefore, we could not distinguish between Carrau and Madelia.

Reference strain
remark (e.g. spelling error)
not typable (e.g. antisera not available, rough strain)
partly correct; in the naming: no penalty points
incorrect; in the naming: 1 penalty point
incorrect; in the naming: 4 penalty points

Annex C. Details on serotyping results optional strain S21

Strain code	O-antigens	H-antigens		Serovar	Lab code
		(phase 1)	(phase 2)		
S-21	52	a	1,5	Uithof	**REF**
S-21	52	a	5	Uithof	1
S-21	52	a	1,5	Uithof	2
S-21	52	a	1,5	Uithof	3
S-21	52	a	1,5	Uithof	4
S-21	52	a	1,5	Uithof	6
S-21	52	a	1,5	Uithof	7
S-21	-	a	5	S. ssp.I (-:a:5)	8[a)]
S-21	52	a	1,5	Uithof	9
S-21	52	a	1,5	Uithof	10
S-21	52	a	1,5	Uithoff	11
S-21	52	a	1,5	Uithof	12
S-21	52	a	1,5	Uithof	13
S-21	52	a	1,5	Uithof	14
S-21	52	a	1,5	Uithof	15
S-21	52	a	5	Uithof	16
S-21	52	a	1,5	Uithof	17
S-21	52	a	1,5	Uithof	18
S-21	52	a	1,5	Uithof	19
S-21	52	a	1,5	Uithof	20
S-21	52	a	1,5	Uithof	21
S-21	52	a	1,5	Uithof	22
S-21	52	a	1,5	Uithof	23
S-21	52	a	5	Uithof	24
S-21	48	a	1,5,7	Hisingen	25
S-21	52	a	1,5	Uithof	26
S-21	52	a	1,5	Uithof	27
S-21	52	a	1,5	Uithof	28
S-21					29
S-21	52	a	1,5	uithof	30
S-21	52	a	1,5	Uithof	31
S-21	52	a	1,5	Uithof	32
S-21	52	a	1,5	Uithof	33
S-21	-	-	-	-	55
S-21	52	a	1,5	Uithof	83
S-21	52	a	1,5	Uithof	86

a) The strain was not reacted by any of our O polyvalent antisera. We made the WGS and sent the sequences to SeqSero and received result Uithof (52 : a : 1,5). We do not have the monovalent O52, so we could not receive the result by classical serology and would use also in routine the WGS and SeqSero if needed.

Reference strain
remark, deviations in the results on optional strain S21
not typable (e.g. antisera not available, rough strain)