

Interim Summary Report

on the 21st EURL-*Salmonella* interlaboratory comparison study (2016) on typing of *Salmonella* spp.

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1. Introduction

This interim summary report describes the overall results on the serotyping part of the 21st interlaboratory comparison study on typing of *Salmonella* spp. organised by the European Union Reference Laboratory for *Salmonella* (EURL-*Salmonella*, Bilthoven, the Netherlands). Results of the study on PFGE typing will be reported separately.

A total of 34 laboratories participated in this study. These included 29 National Reference Laboratories for *Salmonella* (NRLs-*Salmonella*) in the 28 EU Member States, 2 NRLs of an EU-candidate country and 3 NRLs of EFTA countries. The main objective of this study was to check the performance of the NRLs for typing of *Salmonella* spp. and to compare the results of typing of *Salmonella* spp. among the NRLs-*Salmonella*. All NRLs performed serotyping of the strains. NRLs of the EU member states which do not achieve the level of good performance for serotyping have to participate in a follow-up study.

2. Materials and Methods

2.1. *Salmonella* strains for serotyping

A total number of 20 *Salmonella* strains (coded S1 - S20) had to be serotyped by the participants. As discussed at the 21st EURL-*Salmonella* Workshop in St. Malo (Mooijman, 2016), one additional strain (S21), being a less common strain, was included in the study and serotyping of this strain was optional.

The *Salmonella* strains used for the study on serotyping originated from the collection of the National *Salmonella* Centre in the Netherlands. The strains were typed once again by this Centre before mailing. The complete antigenic formulas, according to the most recent White-Kauffmann-Le Minor scheme (Grimont and Weill, 2007), of the 21 serovars are shown in Table 1. However, participants were asked to report only those results, on which the identification of serovar names was based.

2.2 Laboratory codes

The NRLs-*Salmonella* were assigned a random laboratory code 1-34, which differed from the previous typing studies.

Table 1. Antigenic formulas of the 21 *Salmonella* strains according to the White-Kauffmann-LeMinor scheme used in the 21st EURL- *Salmonella* typing study

Strain code	O-antigens	H-antigens (phase 1)	H-antigens (phase 2)	Serovar
S1 ^{a)}	<u>1</u> ,4,[5],12	i	-	<u>1</u> ,4,[5],12:i:-
S2	6,8, <u>20</u>	e,h	1,2	Newport
S3	28	z ₁₀	e,n,x	Umbilo
S4	16	k	1,2	Szentés
S5	6,7, <u>14</u>	r	1,5	Infantis
S6	<u>1</u> ,4,12, <u>27</u>	d	e,n,z ₁₅	Duisburg
S7	3,{10}{ <u>15</u> }{ <u>15</u> ,34}	y	1,5	Orion
S8	<u>1</u> ,4,[5],12	e,h	1,2	Saintpaul
S9	6,7, <u>14</u>	i	1,2	Augustenborg
S10	<u>1</u> ,4,[5],12	e,h	e,n,x	Chester
S11	6,7, <u>14</u>	b	l,w	Ohio
S12	<u>1</u> ,4,[5],12	a	e,n,x	Bispebjerg
S13	<u>1</u> ,4,[5],12	i	1,2	Typhimurium
S14	<u>1</u> ,9,12	g,m	-	Enteritidis
S15	<u>1</u> ,4,[5],12	e,h	1,5	Reading
S16	6,8	z ₁₀	e,n,x	Hadar
S17	6,7, <u>14</u>	f,g	-	Rissen
S18	<u>1</u> ,4,[5],12	z ₁₀	1,2	Haifa
S19	6,7, <u>14</u>	y	e,n,z ₁₅	Mikawasima
S20	6,7, <u>14</u>	r	1,2	Virchow
S21 ^{b)}	60	r	z	60:r:z

a) Typhimurium, monophasic variant as determined by PCR.

b) *Salmonella enterica* subspecies *diarizonae*.

2.3 Transport

All samples were packed and transported as Biological Substance Category B (UN 3373) and transported by door-to-door courier service. The parcels containing the strains for typing were sent by the EURL-*Salmonella* on 7 November 2016.

2.4 Evaluation of the serotyping results

The evaluation of the various serotyping results as mentioned in this report is described in Table 2.

Table 2. Evaluation of 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, criteria for 'good performance' have been defined (Mooijman, 2007). Penalty points are given for strains that are typed incorrectly. A distinction is made between the five most important human health related *Salmonella* serovars (as indicated in EU legislation) 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 5 serotypes to another strain.
- **1 penalty point:** Incorrect typing of all other *Salmonella* serovars.

For each NRL-*Salmonella* the total number of penalty points is determined. The NRL meets the criterion of 'good performance' if it has less than 4 penalty points.

A follow-up study will be organised for NRLs with 4 penalty points or more. All NRLs of the EU Member states not meeting the criterion of 'good performance' have to participate in this follow-up study.

3. Results

3.1 Serotyping results of the NRLs-*Salmonella*

3.1.1. General comments on this year's evaluation

As decided at the 21st EURL-*Salmonella* Workshop (Mooijman, 2016), Strain S21 was an additional strain to the study. Testing of this strain was optional and results were not included in the evaluation.

3.1.2. Serotyping results per laboratory

The evaluation of the detection of O- and H-antigens and identification of the strains per laboratory are shown in Figures 1, 2 and 3 and the percentages of correct results in Figure 4.

The O-antigens were typed correctly by 30 of the 34 participants (88%). This corresponds to nearly 100% of the total number of strains. The H-antigens were typed correctly by 28 of the 34 participants (82%), corresponding to 99% of the total number of strains. A total of 24 participants (71%) gave the correct serovar names, corresponding to 99% of all strains evaluated.

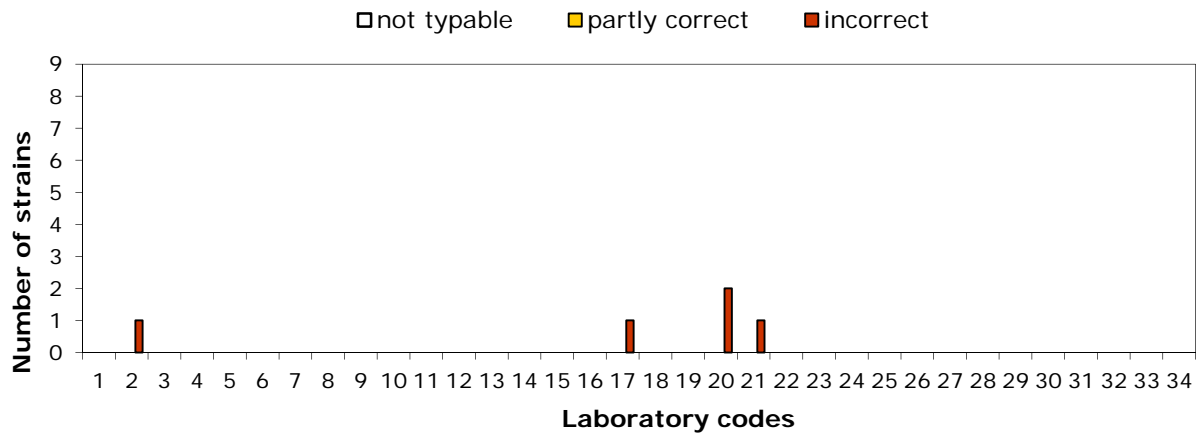


Figure 1. Evaluation of serotyping of O-antigens per NRL

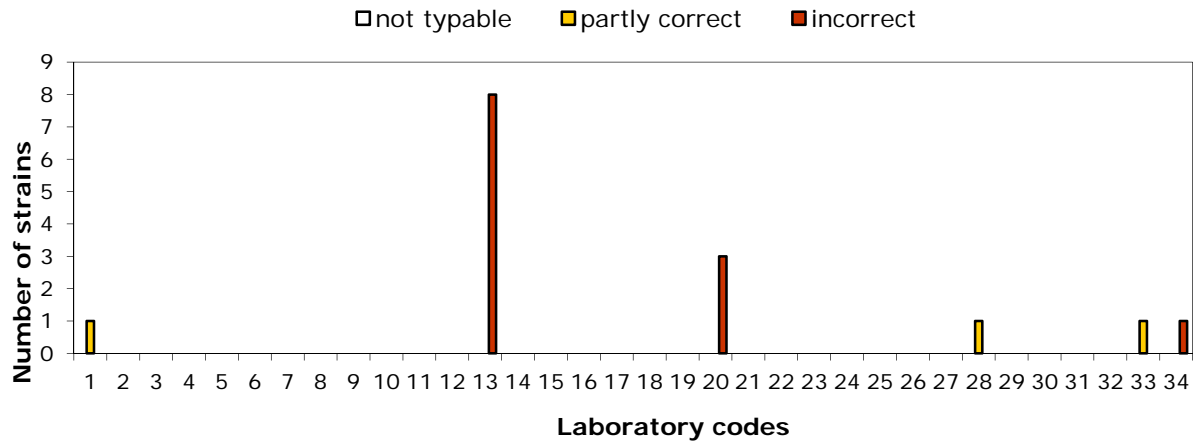


Figure 2. Evaluation of serotyping of H-antigens per NRL

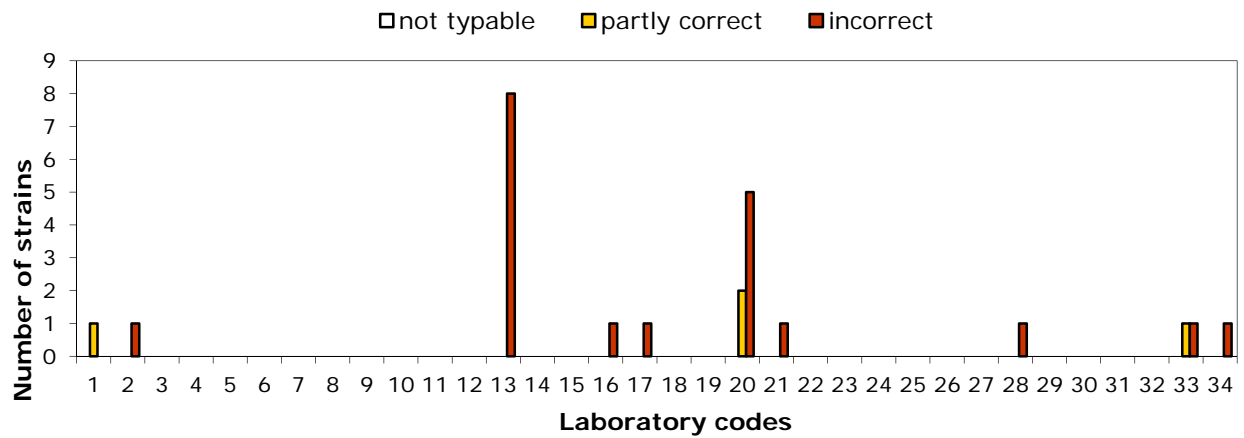


Figure 3. Evaluation of the correct serovar names per NRL

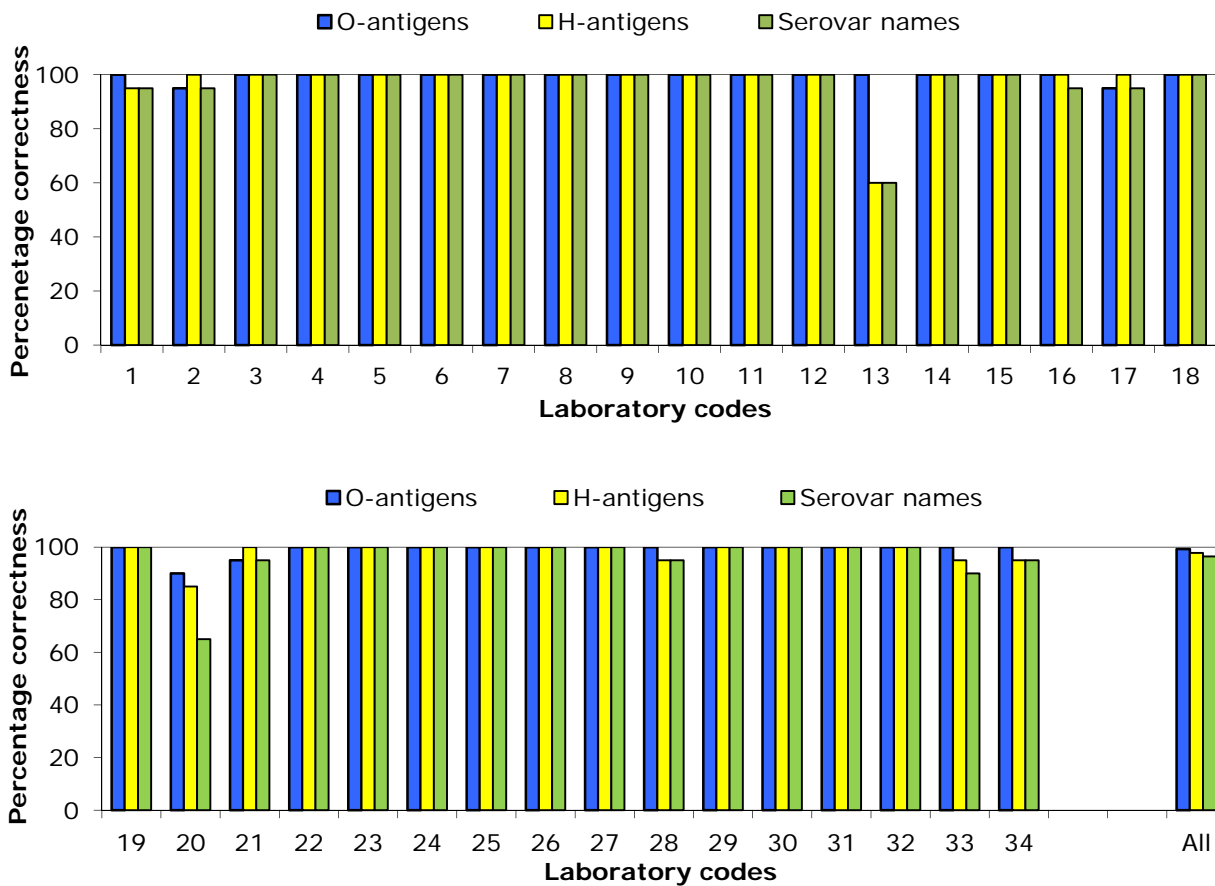


Figure 4. Achievements of the serotyping in percentages that were correct

For each NRL the number of penalty points was determined using the guidelines in section 2.4. Table 2 shows the number of penalty points for each NRL, the next column reports whether the level of good performance was achieved or not. Two participants, both non-EU NRLs, did not meet the level of good performance at this stage of the study and a follow-up study may be organised.

Table 3. Evaluation of serotyping results per NRL

Lab code	Penalty points	Good performance	Lab code	Penalty points	Good performance
1	1	yes	19	0	yes
2	1	yes	20	5	no
3	0	yes	21	1	yes
4	0	yes	22	0	yes
5	0	yes	23	0	yes
6	0	yes	24	0	yes
7	0	yes	25	0	yes
8	0	yes	26	0	yes
9	0	yes	27	0	yes
10	0	yes	28	1	yes
11	0	yes	29	0	yes
12	0	yes	30	0	yes
13	8	no	31	0	yes
14	0	yes	32	0	yes
15	0	yes	33	1	yes
16	1	yes	34	1	yes
17	1	yes			
18	0	yes			

3.1.3. Serotyping results per strain

Overall results found per strain and per laboratory are given in Annex A, except for the more complicated strains S1 and S21, which are separately reported in Annex B.

A completely correct identification was obtained for ten *Salmonella* serovars: Infantis (S5), Duisburg (S6), Bispebjerg (S12), Typhimurium (S13), Enteritidis (S14), Reading (S15), Hadar (S16), Rissen (S17), Mikawasima (S19), and Virchow (S20). Most problems occurred with the serovar Umbilo (S3). Six laboratories had difficulties assigning the correct serovar name to this strain, mostly due to problems with the O-antigens. Details on the strains that caused problems in serotyping are shown in Annex C.

The reported serovar names for strain 1,4,[5],12:i:- (S1) are shown in Annex B. Nineteen participants used a PCR method to confirm this strain to be a monophasic Typhimurium strain. Details on the additional and optional strain S21 are given in Annex B as well. All but four participants actually tried to serotype this strain S21, being a *Salmonella enterica* subsp. *diarizonae* (IIIb). However, not all laboratories did have access to the required antisera to finalise this (60:r:z).

References

Grimont, P.A.D. and Weill, F-X., 2007. Antigenic formulae of the *Salmonella* serovars, 9th ed. WHO Collaborating Centre for Reference and Research on *Salmonella*. Institute Pasteur, Paris, France.

Mooijman K.A., 2007. The twelfth EURL-*Salmonella* workshop; 7 and 8 May 2007, Bilthoven, the Netherlands. National Institute for Public Health and the Environment, Bilthoven, the Netherlands. Report no.: 330604006 (http://www.eurlsalmonella.eu/Publications/Workshop_Reports).

Mooijman K.A., 2016. The 21th EURL-*Salmonella* workshop; 9 June 2016, St. Malo, France. National Institute for Public Health and the Environment, Bilthoven, the Netherlands. RIVM Report no.: 2016-0045 (http://www.eurlsalmonella.eu/Publications/Workshop_Reports).


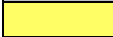


List of abbreviations

EFTA	European Free Trade Association
EU	European Union
EURL- <i>Salmonella</i>	European Union Reference Laboratory for <i>Salmonella</i>
NRLs- <i>Salmonella</i>	National Reference Laboratories for <i>Salmonella</i>
REF	Reference
RIVM	National Institute for Public Health and the Environment

Annex A. Serotyping results per strain and laboratory

Lab:	S2	S3	S4	S5	S6	S7	S8	S9	S10
REF	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
1	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
2	Newport	Djibouti	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
3	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
4	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
5	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
6	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
7	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
8	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
9	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
10	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
11	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
12	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
13	Cremieu	Moroto	Maumee	Infantis	Duisburg	Langensalza	Chester	Stuttgart	Chartres
14	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saint Paul	Augustenborg	Chester
15	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
16	Newport	Lucenwalde	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
17	Newport	Djibouti	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
18	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
19	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
20	8: e, h: 2	Albert	OMC: k: 2	Infantis	Duisburg	Muenster	Sandiego	Aberden	Chester
21	Newport	Telhashomer	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
22	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
23	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
24	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
25	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
26	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
27	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
28	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Oritamerin	Chester
29	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
30	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
31	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
32	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Chester
33	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Augustenborg	Sandiego
34	Newport	Umbilo	Szentes	Infantis	Duisburg	Orion	Saintpaul	Norton	Chester
X	1	6	1	0	0	2	2	4	2

S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	Lab:
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	REF
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	1
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	2
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	3
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	4
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	5
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	6
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	7
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	8
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	9
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	10
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	11
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	12
Adime	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	13
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	14
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	15
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	16
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	17
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	18
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	19
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Istanbul	Rissen	Shubra	Mikawasima	Virchow	20
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	21
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	22
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	23
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	24
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	25
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	26
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	27
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	28
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	29
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	30
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	31
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	32
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	33
Ohio	Bispebjerg	Typhimurium	Enteritidis	Reading	Hadar	Rissen	Haifa	Mikawasima	Virchow	34
1	0	0	0	0	0	0	1	0	0	X

	remark	X = number of deviating laboratories per strain
	partly correct (no penalty points)	
	incorrect (1 penalty point)	
	incorrect (4 penalty points)	Results for Strains S1 and S21 are given in Annex B

Annex B. Details on serotyping results strains S1 and S21

Strain code	O-antigens	H-antigens (phase 1)	H-antigens (phase 2)	Serovar	PCR-confirmed	Lab code
S-1	1,4,[5],12	i	-	1,4,[5],12:i:-	yes	REF
S-1	4,5	i	2	Typhimurium	no	1
S-1	4,5,12	i	-	1,4,5,12:i:-	no	2
S-1	4,5,12	i	-	4,5,12:i:-	no	3
S-1	4,5,12	i	-	4,5,12: i : - . Typhimurium monophasic variant.	no	4
S-1	4,5,12	i	-	4,5,12:i:-	yes	5
S-1	4, 5, 12	i	-	4,5,12:i:-	no	6
S-1	4,12	i	-	4,12 : i : -	yes	7
S-1	4,5,12	i	-	4,5,12:i:-	yes	8
S-1	1,4,5,12	i	-	1,4,5,12:i:-	yes	9
S-1	4,5,12	i	-	4,5,12 : i : -	yes	10
S-1	4,5,12	i	-	4,5,12:i:-	yes	11
S-1	4,5,12	i	-	Typhimurium, monophasic (4,5,12: i : -)	yes	12
S-1	4,5,12	i	-	4,5,12:i:-	no	13
S-1	4,5,12	i	-	4,5,12:i:-	no	14
S-1	4,5	i	-	4,5:i:-	no	15
S-1	4	i	-	Typhimurium monophasic variant	yes	16
S-1	4,5,12	i	-	4,5,12:i:-	no	17
S-1	4,5,12	i	-	4,5,12:i:- (Typhimurium-like monophasic variant)	no	18
S-1	4,5,12	i	-	4,5,12:i:-	no	19
S-1	4,5	i	-	4,5:i:- S. Typhimurium monophasic	yes	20
S-1	1,4,5,12	i	-	1,4,5,12:i:-	yes	21
S-1	1,4,5,12	i	-	1,4,5,12:i:-	yes	22
S-1	1, 4, 5	i	-	Monophasic S. Typhimurium	yes	23
S-1	4,5,12	i	-	1,4,[5],12:i:-	yes	24
S-1	4,5,12	i	-	4,5,12:i:-	no	25
S-1	4,5,12	i	-	4,5,12:i:-	yes	26
S-1	4,5	i	-	4,5,12:i:-	yes	27
S-1	4,5,12	i	-	4,5,12:i:-	yes	28
S-1	1,4,5,12	i	-	Monophasic variant S.Typhimurium	yes	29
S-1	1,4,5,12	i	-	1,4,5,12:i:-	no	30
S-1	4,5,12	i	-	monofasisk subspI=4,5:i:-	yes	31
S-1	4,5,12	i	-	4,5,12:i:-	no	32
S-1	4,5,12	i	-	monophasic Typhimurium	yes	33
S-1	4,5,12	i	-	4,5,12:i:-	no	34

Strain code	O-antigens	H-antigens (phase 1)	H-antigens (phase 2)	Serovar	Lab code
S-21	60	r	z	60:r:z	REF
S-21	60	r	z	S. IIIb 60 : r : z	1
S-21	-	-	-		2
S-21	60	r	z	Salmonella enterica subsp. diarizonae (III b) 60:r:z	3
S-21	60	r	z	S. enterica subsp. diarizonae 60:r:z	4
S-21	60	r	z	III b diarizonae	5
S-21					6
S-21	60	r	-	60 : r : - IIIb	7
S-21	60	r	z	60:r:z	8
S-21	60	r	z	S. IIIb 60:r:z	9
S-21				Salmonella Subspecies II (salamae)	10
S-21	60	r	z	60:r:z	11
S-21	60	r	z	Salmonella enterica subsp.diarizonae ser. 60 : r : z	12
S-21					13
S-21	60	r	-	60:r:-	14
S-21	?	r	z	?:r:z	15
S-21	60	r	-	60 : r : - (enterica subsp. diarizonae)	16
S-21	60	r	z	S. enterica subsp. diarizonae /IIIb/	17
S-21	60	r	z	SGIIIb 60:r:z	18
S-21	60	r	z	60:r:z	19
S-21	OMG	r	-	OMG:r:-	20
S-21	60	r	z53	60:r:z53	21
S-21	60	r	z	60:r:z	22
S-21	60	r	z	S. enterica subsp. diarizonae 60:r:z	23
S-21	60	r	z	IIIb 60:r:z	24
S-21	60	r	z	60:r:z	25
S-21	60	r	z	IIIb 60:r:z	26
S-21	60	r	z	SIII 60:r:z	27
S-21	-	r	-	-:r:-	28
S-21	60	r	z	subsp. Diarizonae	29
S-21	60	r	z	60:r:z	30
S-21	60	r	z	S.SubspIIIb=60:r:z	31
S-21	60	r	z	60:r:z	32
S-21					33
S-21	60	r	z	III b	34

Annex C. Details per strain that caused problems in serotyping

Strain code	O-antigens	H-antigens (phase 1)	H-antigens (phase 2)	Serovar	Lab code
S-2	6,8,20	e,h	1	Newport	REF
S-2	6,8	h	6	Cremieu	13
S-2	8	e,h	2	8:e,h:2	20
S-3	28	z10	e,n,x	Umbilo	REF
S-3	17	z10	e,n,x	S. Djibouti	2
S-3	28	z10	w	Moroto	13
S-3	28	z10	e,n,x	Luckenwalde	16
S-3	17	z10	e,n,x	S. Djibouti	17
S-3	4	z10	e,n,x	S. Albert	20
S-3	11	z10	e,n,x	S. Telhashomer	21
S-4	16	k	1,2	Szentes	REF
S-4	16	k	6	Maumee	13
S-4	OMC	k	2	OMC:k:2	20
S-5	6,7,14	r	1,5	Infantis	REF
S-6	1,4,12,27	d	e,n,z15	Duisburg	REF
S-7	3,{10}{15}{15,34}	y	1,5	Orion	REF
S-7	10	y	w	Langensalza	13
S-7	3,10	e,h	5	S. Muenster	20
S-8	1,4,[5],12	e,h	1,2	Saintpaul	REF
S-8	4,5,12	e	x	Chester	13
S-8	4,5	e,h	e,n,z15	S. San Diego	20
S-9	6,7,14	i	1,2	Augustenborg	REF
S-9	7	i	z6	Stuttgart	13
S-9	11	i	2	S. Aberden	20
S-9	6,7	i	1,5	Oritamerin	28
S-9	6,7	i	l,w	Norton	34
S-10	1,4,[5],12	e,h	e,n,x	Chester	REF
S-10	4,12	h	w	Chartres	13
S-10	4,12	e,h	e,n,z15	Sandiego	33
S-11	6,7,14	b	l,w	Ohio	REF
S-11	6,7	b	6	Adime	13
S-12	1,4,[5],12	a	e,n,x	Bispebjerg	REF
S-13	1,4,[5],12	i	1,2	Typhimurium	REF
S-14	1,9,12	g,m	-	Enteritidis	REF
S-15	1,4,[5],12	e,h	1,5	Reading	REF
S-16	6,8	z10	e,n,x	Hadar	REF
S-16	8	z10	e,n,x	S. Istanbul	20
S-17	6,7,14	f,g	-	Rissen	REF
S-18	1,4,[5],12	z10	1,2	Haifa	REF
S-18	4,5	z	2	S. Shubra	20
S-19	6,7,14	y	e,n,z15	Mikawasima	REF
S-19	6,7	y	-		33
S-20	6,7,14	r	1,2	Virchow	REF

	remark
	partly correct, in the naming: no penalty points
	incorrect, in the naming: 1 penalty point
	incorrect, in the naming: 4 penalty points