Rapport 5 – 2013

Proficiency testing

Food Microbiology

– January 2013

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LIVSMEDELS VERKET
NATIONAL FOOD AGENCY, Sweden

Internal and external control for microbiological analyses of food and drinking water

All analytical activities require work of a high standard that is accurately documented. For this purpose, most laboratories carry out some form of internal quality assurance, but their analytical work also has to be evaluated by an independent party. Such external quality control of laboratory competence is commonly required by accreditation bodies and can be done by taking part in proficiency testing (PT).
In a proficiency test, identical test material is analysed by a number of laboratories using their routine methods. The organiser evaluates the results and compiles them in a report.

The National Food Agency's PT program offers

- External and independent evaluation of laboratories analytical competence.
- Improved knowledge of analytical methods used by laboratories with respect to various types of organisms.
- Expert support
- Tool for inspections regarding accreditation.
- Free extra material for follow-up analyses

For more information visit our website: www.slv.se/absint/index.aspx

The National Food Agency's reference material

As a complement to the proficiency testing, National Food Agency produces also reference material (RM) for internal quality control: a total of 7 RM for food and drinking water microbiological analyses, including pathogens, are available.
Information available on our website: www.slv.se/RM-micro

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Proficiency Testing

Microbiology – Food

January 2013

1457
ISO/IEC 17043

- Quantitative analyses

- Aerobic microorganisms, 30 °C
- Enterobacteriaceae
- Thermotolerant campylobacter
- *Listeria monocytogenes*

- Qualitative analyses

- Thermotolerant campylobacter
- *Listeria monocytogenes*
- *Salmonella*
- *Escherichia coli* O157
- Pathogenic *Vibrio* spp.
- *Yersinia enterocolitica*

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Abbreviations

Media

ALOA	Agar Listeria Ottaviani & Agosti
APW 2%	Alcaline peptone water, 2 % NaCl
BriS	Brilliance Salmonella-agar
BPW	Buffered peptone water
CIN	Cefsulodin-irgasan-novobiocin-agar
CT-SMAC	Cefixime-tellurite-sorbitol-MacConkey-agar
LMBA	Listeria monocytogenes Blood-agar
MPCA	Milk Plate Count Agar
PSB	Phosphate-sorbitol-broth
PCA	Plate Count Agar
RVS	Rappaport-Vassiliadis-soya peptone-broth
SMAC	Sorbitol MacConkey Agar
SPB	Salt-polymyxin-broth
TCBS	Thiosulfate citrate salt sucrose Agar
XLD	Xylose lysine deoxycholate agar
VRBG	Violet Red Bile Glucose agar

Organisations

ISO	International Organization for Standardization
NMKL	Nordic Committee for Food Analyses
SLV/NFA	Livsmedelsverket/National Food Agency, Sweden

Contents

General information on results evaluation

Statistical evaluation of the results

Highly deviating values that did not belong to a strictly normal distribution were identified as statistical outliers (Grubbs' test modified by Kelly (1). In some cases, subjective adjustments were made to set limits, based on knowledge of the mixture's contents. Outliers and false results were not included in the calculations of means and standard deviations. Results reported as ">value" were excluded from the evaluation. Results reported as "<value" were interpreted as being zero (negative result). All reported results are presented in Annex 1.

According to EN ISO/IEC 17043, for which the proficiency testing programme organised by the National Food Agency is accredited since early 2012, it is mandatory for the participating laboratories to give method information for all analyses for which they report results. For this PT round, between 52 and 98 % of the participants reported which method and/or medium they used for the different analyses. Method information is sometimes difficult to interpret, e.g. many laboratories choose a medium that differs from that in the reported standard methods. Therefore, in the following section, results have been grouped according to the method or the medium used to perform the analysis.

Tables and figures legend

Tables

n	number of laboratory that performed the analysis
m	results mean value in $\log_{10}$ cfu/ml (false results and outliers excluded)
s	results standard deviation
F	number of false positive or false negative results
<	number of low outliers
>	number of high outliers
	global results for the analysis
	values discussed in the text

Figures

Histograms of all analytical results obtained for each mixture are presented. The mean value of the analysis results is indicated in each histogram.

▒	values within the interval of acceptance (Annex 1)
■	outliers
□	false negative results
*	values outside of the x-axis scale

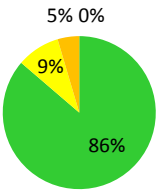
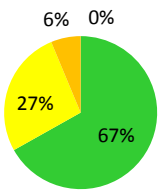
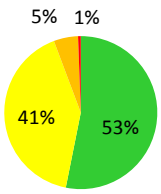
Results of the PT round January 2013

General outcome

Samples were sent to 180 laboratories, 34 in Sweden, 126 in other European countries, and 20 outside Europe. 175 laboratories reported results, 114 (65 %) provided at least one result that received an annotation. In the previous round (January 2011) with similar analyses, the proportion was 38 %.

Individual results for each analysis of the PT round are listed in annex 1 and are also available on the website after logging in: www.slv.se/absint/index.aspx .

Table 1 *Microorganisms in each mixture and % of deviating results (F%: false positive or false negative, Out: outliers).*

		Mixture A			**Mixture B**			**Mixture C**		
% participants with 0 annotation 1 annotation 2 annotations >2 annotations										
Organisms		*Staphylococcus saprophyticus* *Hafnia alvei* *Listeria seeligeri* *Listeria ivanovii* *Salmonella* Enteritidis *Vibrio cholera*			*Micrococcus sp.* *Aeromonas caviae* *Campylobacter lari* *Listeria monocytogenes* *Vibrio parahaemolyticus*			*Micrococcus sp.* *Yersinia enterocolitica* *Campylobacter jejuni* *Salmonella* Dublin *Escherichia coli O157*		
Analysis		**Target**	**F%**	**Out**	**Target**	**F%**	**Out**	**Target**	**F%**	**Out**
Aerob. microorg, 30 °C		***S. saprophyticus*** ***H. alvei***	0	4	***Micrococcus*** ***A. caviae***	0	3	***Micrococcus***	1	7
Enterobacteriaceae		***H. alvei***	1	3	(*A. caviae*)	28	-	***Y. enterocolitica***	40	16
Thermo. camp.	Quant.	-	1	-	***C. lari***	45	0	***C. jejuni***	10	0
	Qual.		2	-		17	-		7	-
L. mono-cytogenes	Quant.	(*L. ivanovii*) (*L. seeligeri*)	6	-	***L. monocytogenes***	0	5	-	0	-
	Qual.		11	-		1	-		3	-
Salmonella		***S.* Enteritidis**	0	-	-	2	-	***S.* Dublin**	5	-
E. coli O157		-	3	-	-	3	-	***E. coli* O157**	3	-
Path. *Vibrio* spp.		***V. cholera***	11	-	***V. parahaemoly-ticus***	33	-	-	6	-
Y. enterocolitica		-	0	-	-	0	-	***Y. enterocolitica***	0	-

- : no target organism or no value; (*microorganism*): false positive

Aerobic microorganisms, 30 °C

Mixture A

The colonies counted for this analysis were mainly from the strains of *Staphylococcus saprophyticus* and *Hafnia alvei* present at the highest concentration in mixture A.

Mixture B

The colonies counted for this analysis were mainly from the strains of *Micrococcus sp.* and *Aeromonas caviae* present at the highest concentration in mixture B.

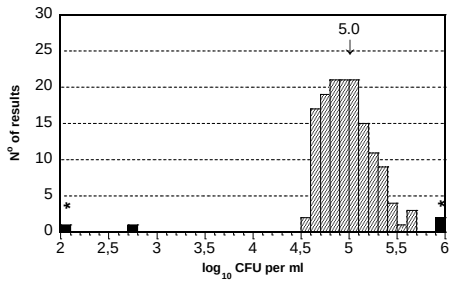
Mixture C

The colonies counted for this analysis were mainly from the strain of *Micrococcus sp.* present at the highest concentration in mixture C.

Results of aerobic microorganisms analysis

Medium	Mixture A						Mixture B						Mixture C					
	n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	150	4.98	0.25	0	2	4	151	4.67	0.27	0	2	3	151	4.46	0.14	1	4	6
PCA	68	4.95	0.26	0	1	2	68	4.61	0.24	0	1	2	68	4.46	0.12	1	2	2
Petrifilm™	19	5.10	0.21	0	0	1	19	4.77	0.33	0	0	0	19	4.39	0.16	0	1	1
MPCA	6	4.85	0.12	0	0	0	6	4.63	0.19	0	0	0	6	4.46	0.10	0	0	0

A



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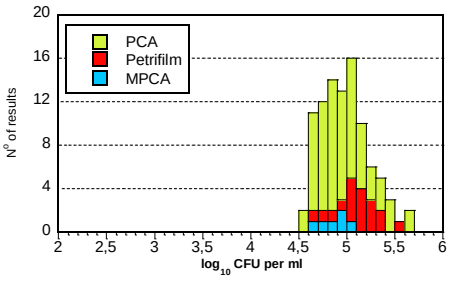

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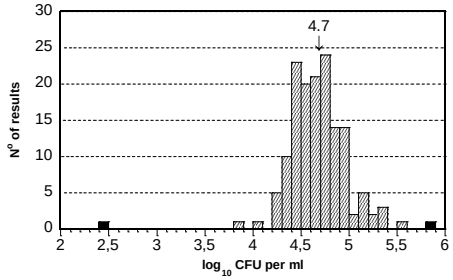

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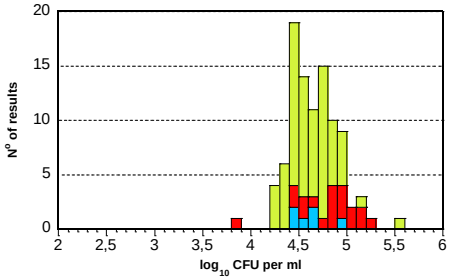

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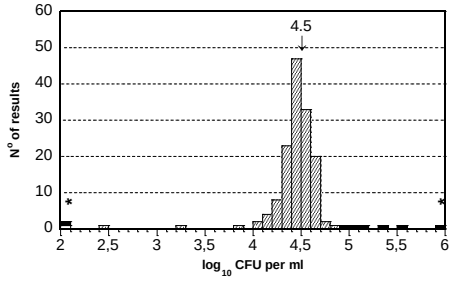

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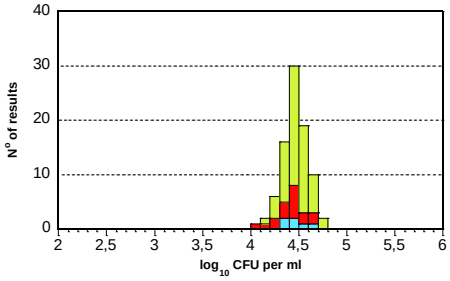


No obvious differences in the results can be seen depending on the medium used for this analysis. However, the results are noticeably more spread for the mixture A and B than for mixture C. In the two first mixtures, counted colonies are from two different microorganisms while only from one in mixture C. It is not obvious that this is the reason for the differences in results but it can be speculated that a bigger variability in colonies appearance can lead to a higher variation in colonies enumeration.

Enterobacteriaceae

Mixture A

Hafnia avei was the target organism for this analysis which did not reveal special difficulty.

Mixture B

Mixture B contained a strain of *Aeromonas caviae* which forms small red colonies on VRBG but is oxidase positive and therefore differentiates from enterobacteriaceae. The 34 laboratories that reported a false positive result have failed or not performed the confirmation test.

Mixture C

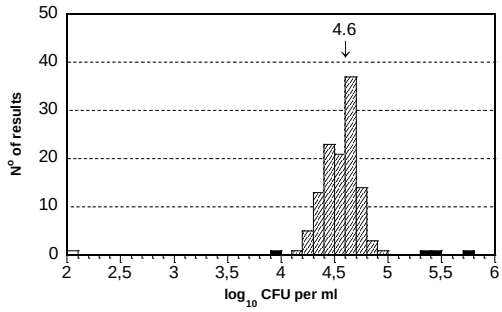
Yersinia enterocolitica was the main target organism for the analysis but single colonies of *Salmonella* Dublin could appear as well if non- or low-diluted sample was analysed. Even though the concentration of *Y. enterocolitica* in mixture C was 3.5 $\log_{10}$ cfu/ml, 40% of the laboratories reported a false negative result. Moreover, many laboratories reported results considered as low outliers, which probably accounted for the enumeration of *S.* Dublin colonies only.

At NFA, *Y. enterolitica* formed typical but small colonies on VRBG and their enumeration did not cause difficulty after 24±2 hours incubation at 37 °C. However the small size of the colonies could explain the very high dispersion of the results as well as the high amount of false results if plates were incubated for a shorter period.

Results of enterobacteriaceae analysis

Medium	Mixture A						Mixture B						Mixture C					
	n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	123	4.55	0.15	1	1	3	121	-	-	34	-	-	121	3.26	0.14	48	19	1
VRBG	62	4.53	0.13	0	1	1	60	-	-	11	-	-	60	3.25	0.16	22	7	1
Petrifilm™	17	4.65	0.12	0	0	1	17	-	-	7	-	-	16	3.14	0.12	7	6	0
Other	6	-	-	0	0	0	6	-	-	1	-	-	6	-	-	4	0	0

A



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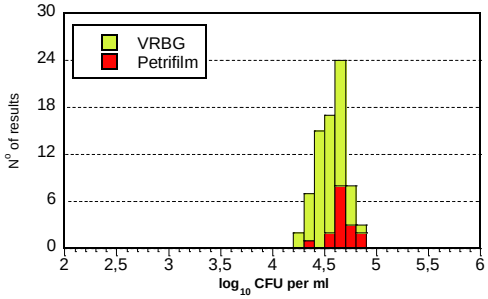

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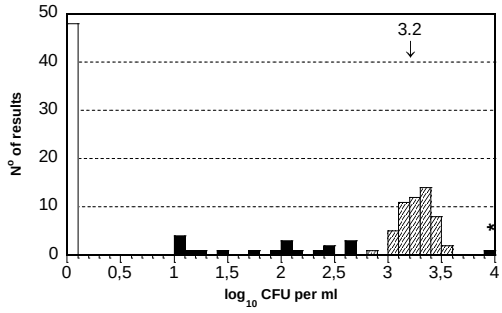

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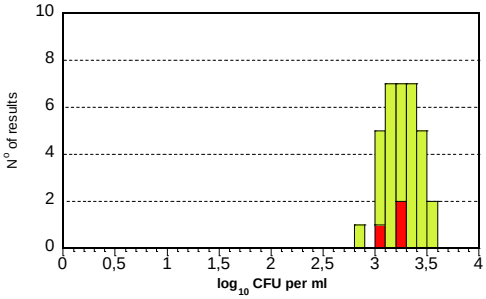


Most of the laboratories used VRBG plate or Petrifilm™ for the analysis of enterobacteriaceae which did not lead to significant results differences when analysing mixture A. On the other hand, the use of Petrifilm™ is almost exclusively linked to false negative results or low outliers for the analysis of mixture C. The reason for this correlation is difficult to assess, but it might be possible that the strain of *Y. enterocolitica* present in mixture C grew slower or formed colonies difficult to see on Petrifilm™.

Thermotolerant campylobacter

Mixture A
Mixture A did not contain any strain of thermotolerant campylobacter

Mixture B
A strain of *Campylobacter lari* was target organism for this analysis but was present at low concentration in mixture B (1.4 $\log_{10}$ cfu/ml). It was the first time this strain was used in the PT program. At NFA, we noticed that it grew slower than other Campylobacter strains. This, together with the low concentration, can explain the big dispersion of the results and the false negative results obtained for both the quantitative and qualitative analysis.

Mixture C
Mixture C contained a strain of *Campylobacter jejuni* at a concentration of 1.5 $\log_{10}$ cfu/ml. The analysis did not cause special difficulties but the results distribution is big.

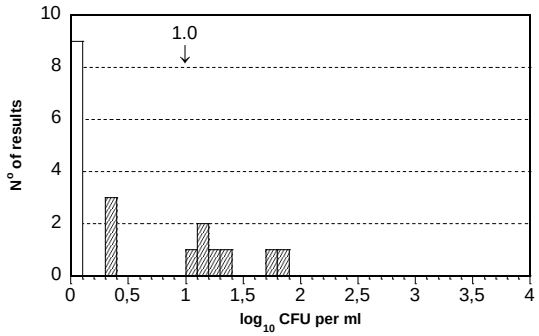
Results of thermotolerant campylobacter quantitative analysis

Quantitative	Mixture A						Mixture B						Mixture C					
	n	**m**	**s**	**F**	**<**	**>**	**n**	**m**	**s**	**F**	**<**	**>**	**n**	**m**	**s**	**F**	**<**	**>**
Total	19	-	-	1	-	-	19	1.03	0.57	9	0	0	19	0.92	0.36	1	0	0
ISO	5	-	-	0	-	-	5	0.90	0.53	2	0	0	5	0.98	0.15	0	0	0
NMKL	5	-	-	1	-	-	5	0.85	0.49	2	0	0	5	0.75	0.53	0	0	0

Results of thermotolerant campylobacter qualitative analysis

Qualitative	**n**	**F**	**n**	**F**	**n**	**F**
Total	39	1	39	7	39	2
ISO	3	0	3	0	3	1
NMKL	9	0	9	1	9	0

B



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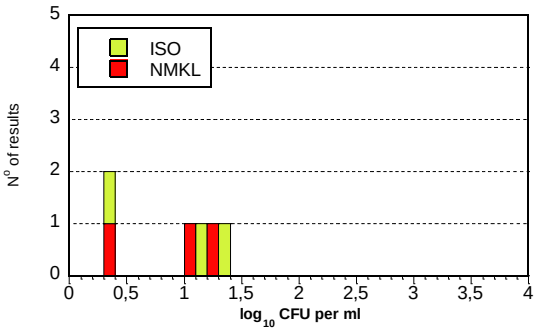

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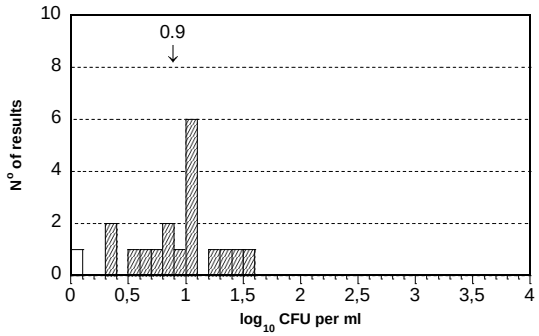

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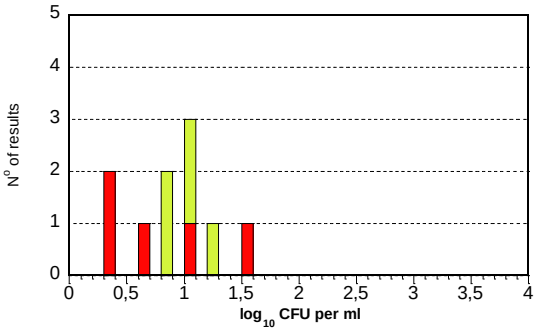


Few laboratories participate in the analysis of thermotolerant campylobacter, it is therefore quite difficult to draw any conclusion regarding the use of different methods. As a general comment, for both mixture B and C, quantitative results obtained by NFA are higher than the average results of the participants: 1.36 versus 1.03 and 1.52 versus 0.92, respectively.

The moisture of the medium can have an influence on the result: campylobacter cells are sensitive to dry plates; therefore, it is preferable to use moist plates and let the sample dry on the plate before incubation. However, if the plates are too moist, colonies tend to flow together which makes the reading more difficult. Moreover, the surface spreading on plates should be done carefully. Studies at NFA have shown that strong surface spreading gives fewer colonies on the plates than careful spreading. At NFA, a spiral spreader is used, which eliminates the variation caused by manual spreading, and can explain the higher results obtained.

Listeria monocytogenes

Mixture A

A strain of *Listeria seeligeri* and of *Listeria ivanovii* were included in mixture A. On ALOA medium and other chromogenic medium, colonies of *L. ivanovii* can be misjudged as *L. monocytogenes*. On blood-based medium (LMBA), and medium revealing esculine hydrolysis (PALCAM and Oxford) both *L. seeligeri* and *L. ivanovii* form colonies similar to *L. monocytogenes*.
However, upon confirmation, these strains can be differentiated: *L. seeligeri* and *L. ivanovii* ferment xylose while *L. monocytogenes* does not.

Mixture B

A strain of *L. monocytogenes* was present in mixture B.

Mixture C

No target organism was present in mixture C for this analysis.

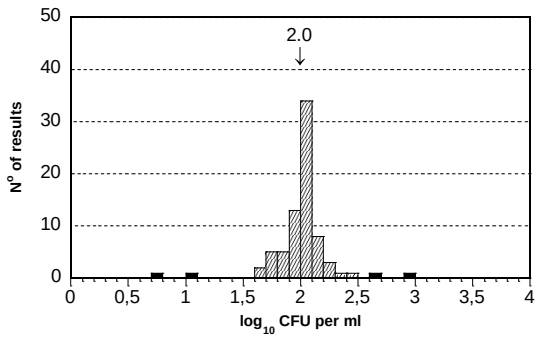
Results of L. monocytogenes quantitative analysis

Method	Mixture A						Mixture B						Mixture C					
	n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	73	-	-	4	-	-	76	2.00	0.14	0	2	2	74	-	-	0	-	-
ISO	17			1			18	2.03	0.11	0	1	0	17			0		
NMKL	12			2			13	1.98	0.12	0	1	1	12			0		
Rapid L.m	16			2			15	2.00	0.12	0	0	1	15			0		

Results of L. monocytogenes qualitative analysis

Method	n	F	n	F	n	F
Total	108	11	109	0	109	2
ISO	19	2	19	0	19	0
NMKL	12	2	12	0	12	0
Rapid L.m	14	2	14	0	14	0
PCR	7	0	7	0	7	0

B



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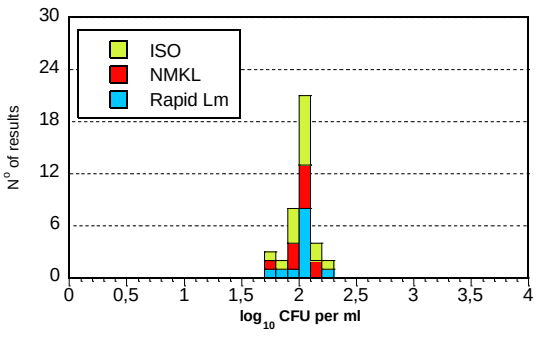


Most of the laboratories used a chromogenic medium for isolation. No correlation between method used and false results or outliers can be concluded.

Salmonella

Mixture A
Mixture A contained a strain of *Salmonella* Enteritidis.

Mixture B
Mixture B did not contain any *Salmonella* strain. Few atypical colonies could appear on XLD medium.

Mixture C
A strain of *Salmonella* Dublin, at a concentration of 13 cfu/ml, was target organism for this analysis. At NFA, this strain formed typical colonies on XLD medium but atypical white colonies on BriS chromogenic medium, after enrichment in BPW and RVS. Moreover, this strain is sensitive to temperature above 42 °C and to high concentration of $MgCl_2$ in RVS medium (2). According to NMKL method this concentration should not be higher than 29 g/l. These characteristics might explain the report of 7 false negative results.

Results of Salmonella qualitative analysis

Method	Mixture A		Mixture B		Mixture C	
	n	F	n	F	n	F
Total	141	0	142	3	141	7
ISO	26	0	25	0	25	0
NMKL	32	0	32	0	32	3
VIDAS	16	0	16	0	16	1
PCR	11	0	11	0	11	0

Most of the laboratories used XLD agar together with another medium for the isolation step. No correlation between the method used and false negative result can be concluded.

Escherichia coli O157

Mixture A
Mixture A did not contain any *E. coli* O157 strain but a strain of *Hafnia alvei* which, as *E. coli* O157, does not ferment sorbitol and can form beige colonies on SMAC or CT-SMAC. However, *H. alvei* differentiates from *E. coli* O157 upon confirmation.

Mixture B
Mixture B did not contain any *E. coli* O157 strain but a strain of *Aeromonas caviae* which, as *E. coli* O157, does not ferment sorbitol. Although it can form beige colonies on SMAC or CT-SMAC upon direct isolation after enrichment, *A. caviae* differentiates from *E. coli* O157 in the confirmation steps of the analysis. However, at NFA, no such colonies were observed if an immuno-separation step was performed between enrichment and isolation. Only atypical pink colonies grew on SMAC plates.

Mixture C
Mixture C contained an *E. coli* O157 strain at a concentration of 16 cfu/ml.

Results of E. coli O157 qualitative analysis

Method	Mixture A		Mixture B		Mixture C	
	n	F	n	F	n	F
Total	33	1	33	1	33	1
ISO	5	0	5	0	5	0
NMKL	5	0	5	1	5	0

Almost all laboratories that reported method information for this analysis used CT-SMAC together with another medium for the isolation step. No link between method/medium used and false results can be concluded.

Pathogenic *Vibrio spp*.

Mixture A

A strain of *Vibrio cholera* was target organism for this analysis and was present at a concentration of 5.0 $\log_{10}$ cfu/ml in mixture A. At NFA, the strain formed typical yellow colonies on TCBS plate after enrichment in APW 2 % or SPB.

Mixture B

A strain of *Vibrio parahaemolyticus* was target organism for this analysis. Although the strain was present at a concentration of 4.3 $\log_{10}$ cfu/ml in mixture B, one third of the laboratories that performed the analysis reported a false negative result. Upon the quality control performed at NFA, the strain formed typical blue-green colonies on TCBS plate after enrichment in APW 2 % or SPB.

Mixture C

No target organism was present in mixture C for this analysis.

Results of pathogenic Vibrio spp. qualitative analysis

Method	Mixture A		Mixture B		Mixture C	
	n	F	n	F	n	F
Total	18	2	18	6	18	1
ISO	6	1	6	1	6	0
NMKL	6	1	6	2	6	0

Almost all laboratories that performed the analysis used APW 2% for enrichment and TCBS agar for isolation. No correlation between method used and false results can be concluded.

Yersinia enterocolitica

Mixture A
No target organism was present in mixture A.

Mixture B
No target organism was present in mixture B.

Mixture C
Mixture C contained a *Yersinia enterocolitica* strain at a concentration of 3.5 $\log_{10}$ cfu/ml, which was also target organism for the analysis of enterobacteriaceae.

Results of Y. enterocolitica qualitative analysis

Method	Mixture A		Mixture B		Mixture C	
	n	F	n	F	n	F
Total	15	0	15	0	15	0
ISO	5	0	5	0	5	0
NMKL	4	0	4	0	4	0

Most laboratories used PSB for enrichment and CIN as isolation medium.

Outcome of the results of individual laboratory - assessment

In order to allow comparison of the results from different analyses and mixtures, all the results of the analyses were transformed into standard values (z-scores). For quantitative analyses, a z-score is either positive or negative, depending on whether the individual result is higher or lower than the mean value calculated from all laboratory results for each analysis. For qualitative analyses, a z-score of zero is attributed for a correct answer. The z-scores obtained, which are listed in Annex 2, can be used as a tool by laboratories when following up on the results.

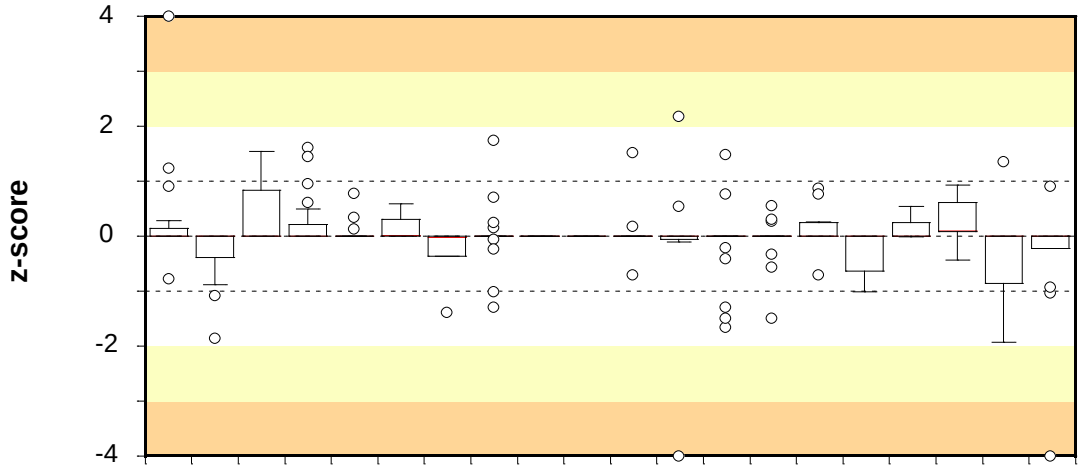
All the results from each laboratory – outliers included and false results excluded – were compiled into a box plot (Figure 1) based on their z-scores. The smaller and more centred round zero the box of a laboratory is, the closer its results are to the general mean values calculated for all laboratory results.

The laboratories were not grouped or ranked based on their results. However, for each laboratory, the numbers of false results and outliers are presented below the box plots. These results are also highlighted in Annex 1, where all the reported results are listed, and the minimum and maximum accepted values for each analysis are stated.

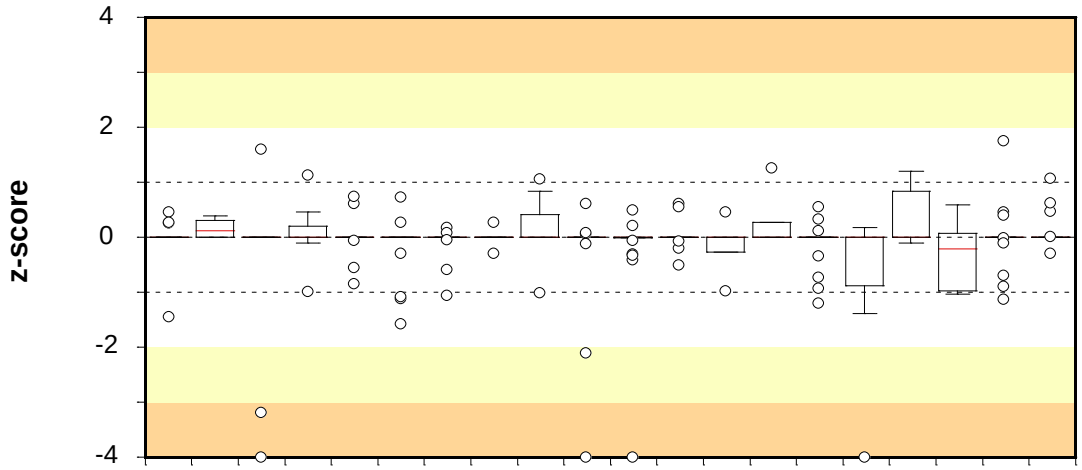
Information on the results processing and recommendations for follow-up work are given in the Scheme Protocol (3). Samples for follow-up can be ordered, free of charge via our website:www.slv.se/pt_extra

Box plots and numbers of deviating results for each laboratory

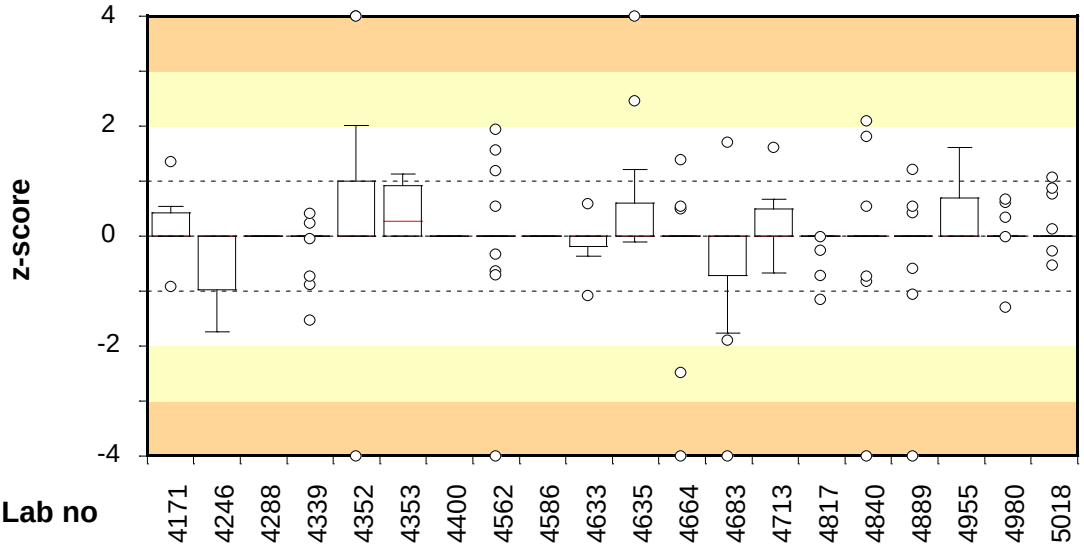
- *The plots are based on the laboratory results from all analyses transformed into z-scores calculated according to the formula: $z = (x-m)/s$, where x is the result of the individual laboratory, m is the mean of the results of all participating laboratories, and s is the standard deviation.*
- *Correct results for quantitative analyses without target organism and for qualitative analyses generate a z-value of 0.*
- *The laboratory median value is illustrated by a horizontal red line in the box.*
- *The box includes 50 % of a laboratory's results (25 % of the results above the median and 25 % of the results below the median). The remaining 50 % are illustrated by lines and circles outside the box.*
- *Very deviating results are represented by circles and are calculated as follow: the lowest result in the box − 1.5 × (the highest result in the box − the lowest result in the box) or the highest result in the box + 1.5 × (the highest result in the box − the lowest result in the box). z-scores higher than +4 and less than −4 are positioned at +4 and −4, respectively, in the plot.*
- *The background is divided by lines and shaded fields to indicate ranges in order to simplify location of laboratory results.*



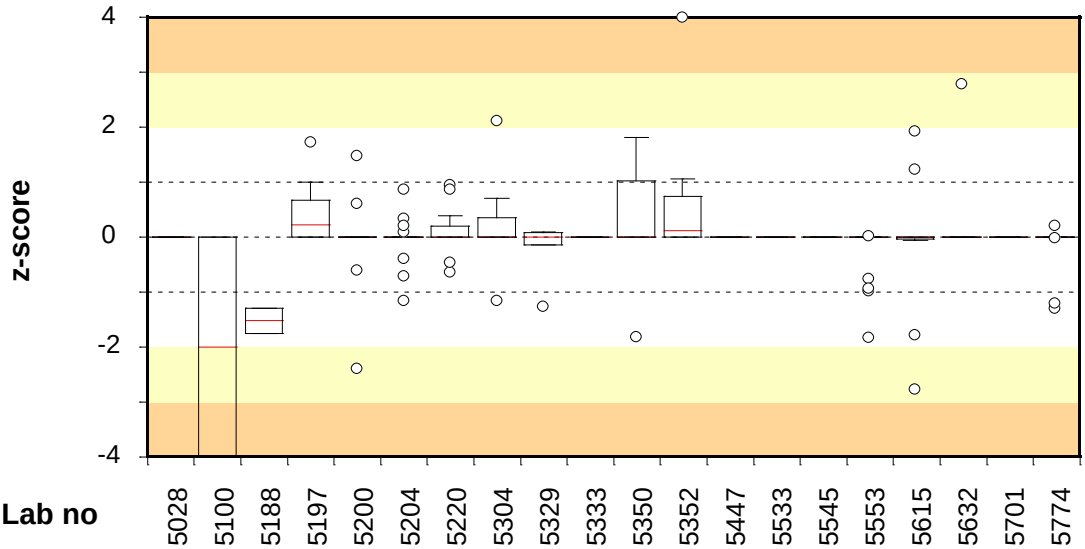
Lab no	1081	1254	1594	1970	2035	2050	2058	2072	2151	2324	2386	2402	2458	2553	2637	2670	2704	2720	2745	2764
No. of results	15	18	12	23	14	9	6	21	6	8	9	9	29	27	14	6	14	5	15	14
False positive	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	1	-	1
False negative	-	-	-	1	1	-	1	-	-	-	-	-	1	-	1	3	1	-	-	-
Low outliers	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
High outliers	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



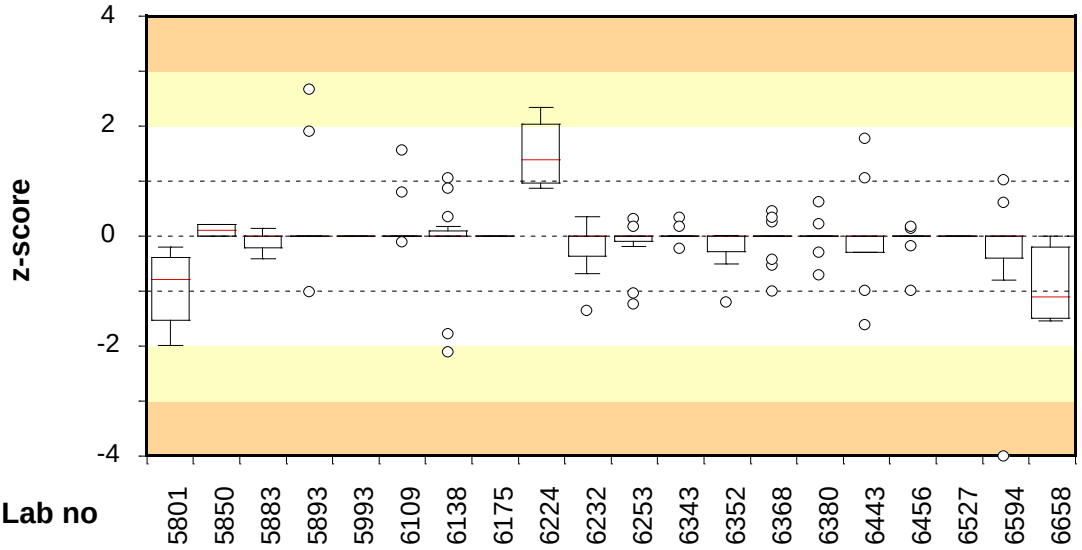
Lab no	2842	2920	3126	3159	3305	3346	3457	3511	3533	3588	3626	3803	3825	3829	3868	3923	3925	4064	4100	4153
No. of results	17	8	10	11	15	23	17	8	8	15	21	17	6	6	19	12	6	6	21	20
False positive	2	-	1	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
False negative	5	1	1	1	1	-	1	1	1	-	-	1	-	-	2	-	-	-	-	1
Low outliers	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



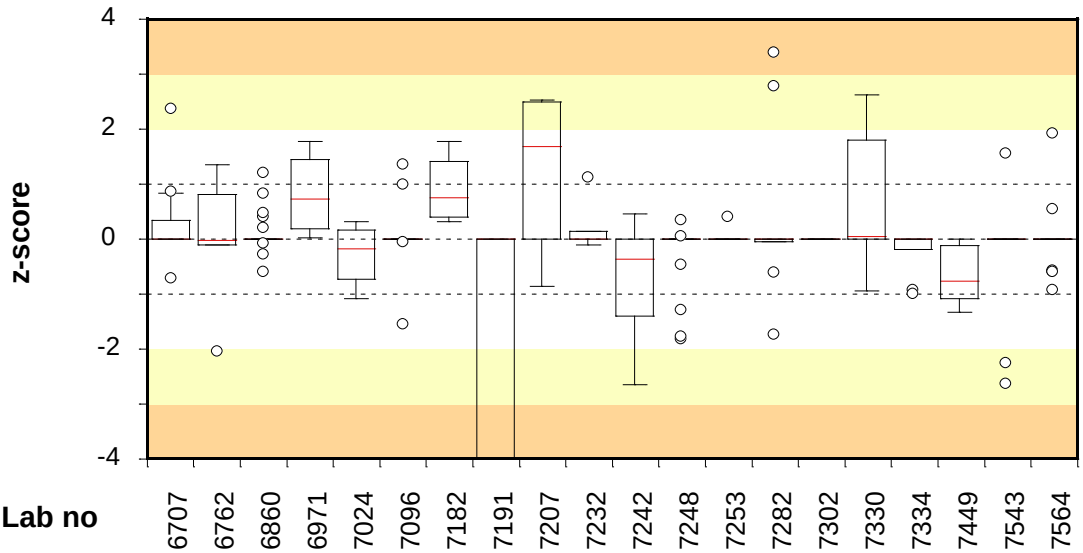
Lab no	4171	4246	4288	4339	4352	4353	4400	4562	4586	4633	4635	4664	4683	4713	4817	4840	4889	4955	4980	5018
No. of results	10	10	-	21	20	6	-	30	3	9	11	17	13	15	23	17	14	14	14	24
False positive	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
False negative	1	1	-	-	-	-	-	-	-	-	1	1	2	-	1	1	1	1	1	-
Low outliers	-	-	-	-	1	-	-	1	-	-	-	1	1	-	-	1	1	-	-	-
High outliers	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-



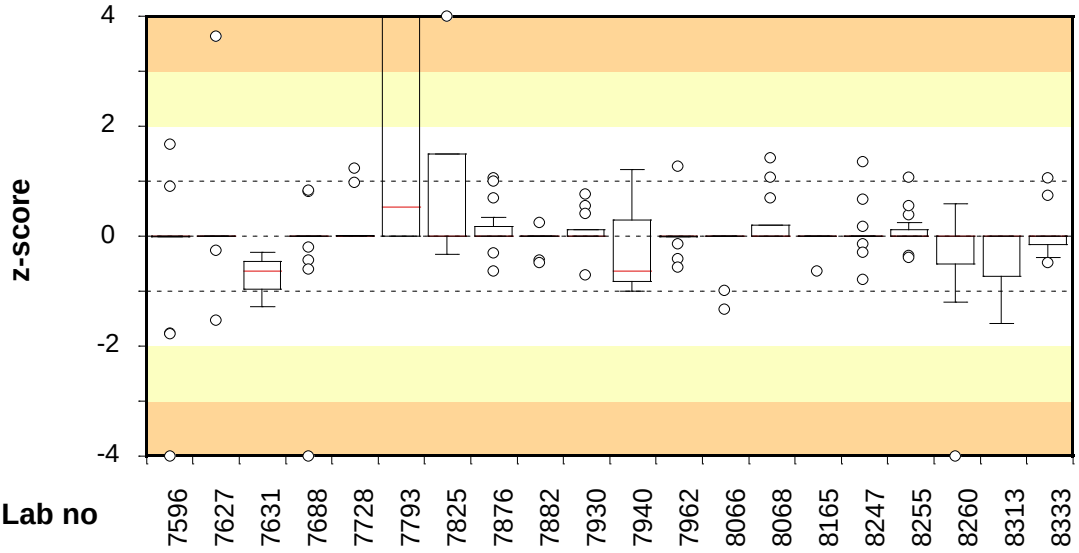
Lab no	5028	5100	5188	5197	5200	5204	5220	5304	5329	5333	5350	5352	5447	5533	5545	5553	5615	5632	5701	5774
No. of results	3	6	2	8	12	22	12	8	5	6	10	7	2	6	5	19	12	8	3	17
False positive	-	-	1	1	-	1	-	1	-	-	1	-	-	-	1	-	-	-	-	-
False negative	-	-	-	-	-	1	-	-	1	-	1	2	1	-	-	1	-	-	-	1
Low outliers	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-



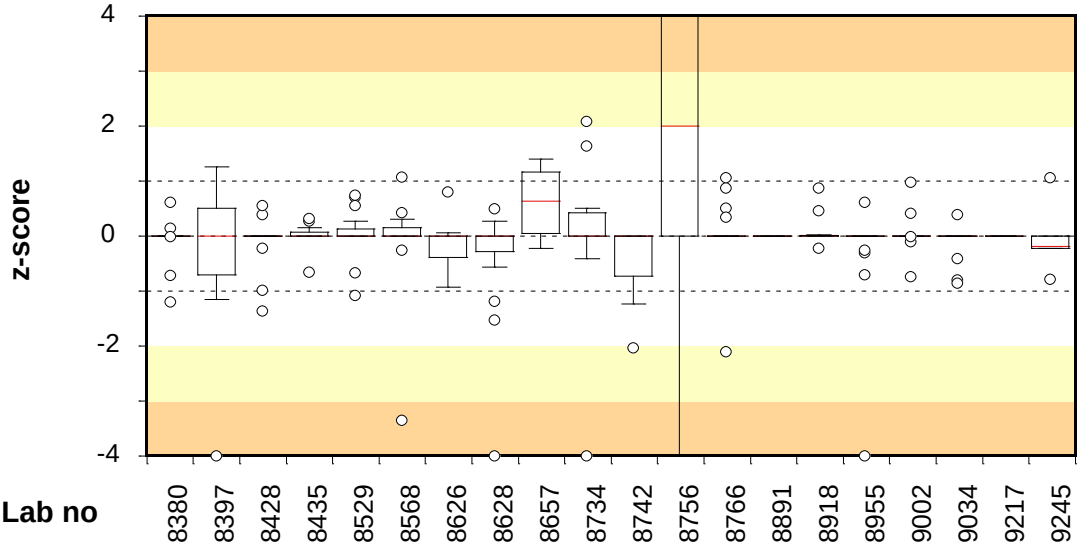
Lab no	5801	5850	5883	5893	5993	6109	6138	6175	6224	6232	6253	6343	6352	6368	6380	6443	6456	6527	6594	6658
No. of results	5	2	15	10	3	9	15	3	4	7	12	9	7	18	10	9	10	6	11	6
False positive	1	-	-	1	-	-	-	-	1	1	-	-	1	-	2	-	1	-	1	-
False negative	-	1	-	1	-	-	-	-	1	1	-	-	1	-	-	-	1	-	-	-
Low outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



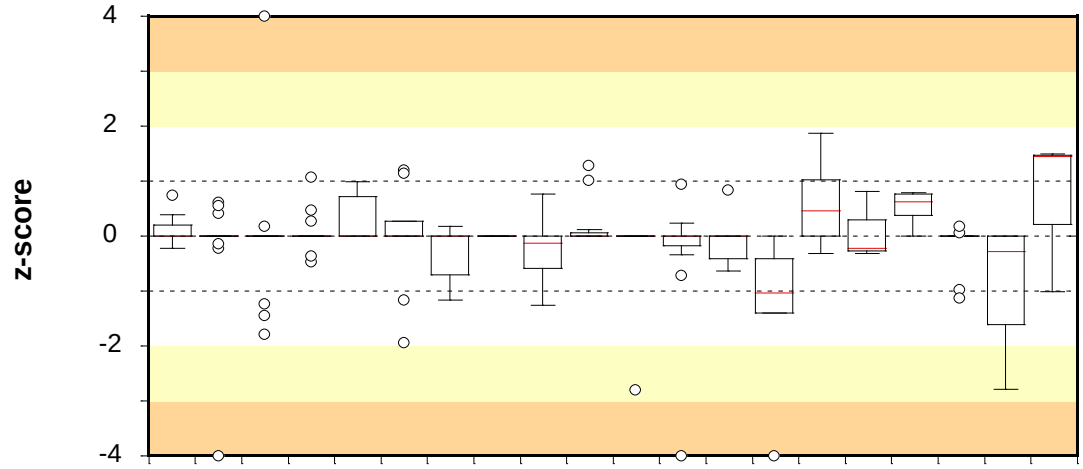
Lab no	6707	6762	6860	6971	7024	7096	7182	7191	7207	7232	7242	7248	7253	7282	7302	7330	7334	7449	7543	7564
No. of results	14	5	29	4	4	11	4	7	5	6	8	18	12	10	6	8	9	6	12	26
False positive	-	1	1	1	1	1	1	-	-	-	1	-	-	1	-	1	-	-	-	2
False negative	-	-	-	1	1	-	1	2	1	-	-	3	-	-	-	-	-	-	-	2
Low outliers	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Lab no	7596	7627	7631	7688	7728	7793	7825	7876	7882	7930	7940	7962	8066	8068	8165	8247	8255	8260	8313	8333
No. of results	15	9	3	24	10	8	14	15	9	13	3	14	9	14	14	18	15	15	11	11
False positive	-	-	-	-	1	-	1	-	-	1	-	-	1	-	-	-	-	-	-	1
False negative	-	-	-	-	1	-	-	-	-	1	-	1	2	1	1	-	-	-	1	-
Low outliers	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
High outliers	-	1	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-



Lab no	8380	8397	8428	8435	8529	8568	8626	8628	8657	8734	8742	8756	8766	8891	8918	8955	9002	9034	9217	9245
No. of results	17	10	17	11	15	12	13	15	4	11	14	8	17	-	12	19	14	13	-	5
False positive	-	2	-	-	-	3	-	-	1	1	-	1	-	-	-	2	-	1	-	-
False negative	1	-	1	1	-	-	-	-	1	-	1	-	1	-	-	-	1	1	-	1
Low outliers	-	1	-	-	-	-	-	1	-	1	-	1	-	-	-	1	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-



Lab no	9420	9429	9436	9441	9451	9453	9465	9512	9555	9569	9589	9662	9716	9747	9753	9783	9890	9903	9923	9950
No. of results	8	15	17	14	15	10	9	-	8	17	12	12	6	6	8	3	6	11	8	3
False positive	-	-	-	-	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	-
False negative	1	-	1	1	-	1	-	-	-	1	-	-	-	-	-	-	-	1	1	-
Low outliers	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
High outliers	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Test material and quality control

Test material

Each laboratory received three freeze-dried microbial mixtures designated A-C. The manufactured test material was freeze-dried in portions of 0.5 ml in vials, as described by Peterz and Steneryd (4). Before analysing the samples, the contents of each vial had to be dissolved in 254 ml of diluent. The organisms present in the mixtures are listed in Table 2.

Table 2. *Microorganisms present in mixture A-C supplied to participants*

Mixture [1]	Microorganism	Strain no.
A	*Staphylococcus saprophyticus*	SLV-013
	Hafnia alvei	SLV-015
	Listeria seeligeri	SLV-347
	Listeria ivanovii	SLV-348
	Salmonella Enteritidis	SLV-436
	Vibrio cholera	SLV-530
B	*Micrococcus sp.*	SLV-055
	Aeromonas caviae	SLV-206
	Campylobacter lari	SLV-559
	Listeria monocytogenes	SLV-361
	Vibrio parahaemolyticus	SLV-529
C	*Micrococcus sp.*	SLV-055
	Yersinia enterocolitica	SLV-408
	Campylobacter jejuni	SLV-540
	Salmonella Dublin	SLV-242
	Escherichia coli O157	SLV-479

[1]The links between the mixtures and the randomised sample numbers are shown in annex 1

Quality control of the mixtures

It is essential to have aliquots of homogeneous mixture and equal volume in all vials in order to allow comparison of all freeze-dried samples from one mixture. Quality control was performed in conjunction with manufacturing of the mixtures according to Scheme Protocol (3). The results are presented in Table 3. Homogeneity requires that the standard deviation and the difference between the highest and lowest value of results from 10 samples analysed do not exceed 0.15 $\log_{10}$ units and 0.5 $\log_{10}$ units, respectively.

Table 3. *Concentration mean (m) and standard deviation (s) from analyses of 10 randomly selected vials per mixture, expressed in log_{10} cfu (colony forming units) per ml of sample.*

Analysis and method	A		B		C	
	m	**s**	**m**	**s**	**m**	**s**
Aerobic microorganisms 30 ˚C NMKL-method no. 86	5.17	0.04	4.89	0.10	4.48	0.05
Enterobacteriaceae NMKL-method no. 144	4.36	0.05	–	–	3.50	0.06
Thermotolerant campylobacter, quant. NMKL method no. 119	–	–	1.36	0.14	1.52	0.15
Thermotolerant campylobacter, qual. NMKL method no. 119	–	–	pos	–	pos	–
Listeria monocytogenes, quant. NMKL method no. 136	–	–	2.02	0.12	–	–
Listeria monocytogenes, qual. NMKL method no. 136	–	–	pos	–	–	–
Salmonella NMKL method no. 71	1.22*	0.15*	–	–	1.12*	0.04*
Escherichia coli O157 NMKL method no. 164	–	–	–	–	1.22**	0.03**
Pathogenic *Vibrio* spp. NMKL-method no. 156	5.01*	0.08*	4.27*	0.19*	–	–
Yersinia enterocolitica NMKL-method no. 117	–	–	–	–	3.50	0.06

– No target organism

* Internal values based on the analyses results of parallel mixtures

** Values based on the analyses results of themotolerant coliform bacteria and *E. coli* (NMKL method no 125)

References

1. Kelly, K. 1990. Outlier detection in collaborative studies. J. Assoc. Off. Anal. Chem. 73:58-64.
2. Peterz, Mats et al. 1989. The effect of incubation temperature and magnesium chloride concentration on growth of salmonella in home-made and in commercially available dehydrated Rappaport-Vassiliadis broths. J. of Applied Bacteriology. 523-528.
3. Anonymous, 2012. Protocol. Microbiology. Drinking Water & Food. The National Food Agency.
4. Peterz. M. Steneryd. A.C. 1993. Freeze-dried mixed cultures as reference samples in quantitative and qualitative microbiological examinations of food. J. Appl. Bacteriol. 74:143-148.

Annex 1 ***Results from the participating laboratories - January 2013***

All results are expressed in log_{10} cfu per ml sample.
Results reported as "<value" were regarded as zero (negative).
Results reported as " > value" were exluded of the calculations.
A dash in the table indicates that the analysis was not performed.
Outliers and false results are highlighted and summarized for each analysis at the end of the table.

Lab no.	vial	Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A B C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
1081	1 3 2	5.28	4.46	4.58	4.59	<1	**4**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**1081**
1254	1 2 3	4.76	4.38	4.38	4.27	<2	3.2	-	-	-	<1	2	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**1254**
1594	1 3 2	5.3	4.76	4.65	4.78	<2	3.26	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**1594**
1970	1 3 2	5.21	4.8	4.54	4.79	<2	**<2**	<1	1.85	1	<1	2.03	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**1970**
2035	2 3 1	-	-	-	4.6	<2	**<2**	<0.5	1.1	1.2	-	-	-	Neg	Pos	Pos	Neg	Pos	Neg	-	-	-	-	-	-	-	-	-	Neg	Neg	Pos	**2035**
2050	2 3 1	5.03	4.75	4.51	4.55	<2	3.34	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2050**
2058	2 1 3	-	4.3	4.45	-	-	-	-	-	-	-	1.95	0	-	-	-	-	Pos	Neg	-	**Pos**	**Neg**	-	-	-	-	-	-	-	-	-	**2058**
2072	2 1 3	5.15	4.71	4.49	4.54	<1	3.11	<1	0.3	0.84	<1	2.25	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2072**
2151	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Pos	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2151**
2324	1 2 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**2324**
2386	1 3 2	5.35	4.48	4.48	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2386**
2402	3 2 1	5.51	4.64	4.53	4.54	<1	**1.26**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2402**
2458	2 1 3	5.34	4.56	4.28	4.3	0	3.04	0	**0**	0.85	0	2.11	0	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	Pos	Pos	Neg	Neg	Neg	Pos	**2458**
2553	3 1 2	4.61	4.74	4.38	4.5	<2	3.3	-	-	-	0	2.08	0	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	Pos	Pos	Neg	Neg	Neg	Pos	**2553**
2637	3 2 1	5.04	4.48	4.49	4.68	<1	**<1**	-	-	-	<1	2.11	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2637**
2670	3 2 1	4.82	4.4	**<2.40**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	**Neg**	-	-	-	Pos	**Neg**	Neg	-	-	-	**2670**
2704	1 2 3	5.05	4.81	4.49	4.63	<2	**<2**	-	-	-	<1	2	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2704**
2720	1 3 2	4.87	4.69	4.47	4.64	**3.38**	3.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2720**
2745	3 1 2	4.67	4.4	4.36	4.26	<2	3.45	-	-	-	<0	1.83	<0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2745**
2764	3 1 2	4.72	4.61	4.58	4.41	**2.04**	**1**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**2764**
2842	1 2 3	5.04	4.79	4.26	-	-	-	<1	**<1**	**<1**	<1	2.04	<1	Neg	**Neg**	**Neg**	Neg	Pos	**Pos**	Pos	Neg	Pos	Neg	Neg	**Neg**	Pos	Pos	**Pos**	-	-	-	**2842**
2920	3 2 1	5.04	4.77	4.49	4.6	0	**0**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**2920**
3126	2 1 3	5.37	3.82	**3.24**	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	**Pos**	Pos	-	-	-	Pos	**Neg**	Neg	-	-	-	**3126**
3159	3 2 1	4.95	4.79	4.61	4.4	<1	**<1**	-	-	-	<1	2.06	<1	-	-	-	Neg	Pos	Neg	-	-	-	-	-	-	-	-	-	-	-	-	**3159**
3305	1 3 2	4.96	4.52	4.54	4.66	<2	**<2**	-	-	-	-	1.88	-	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3305**
3346	3 2 1	4.7	4.25	4.31	4.59	**1.78**	3.36	-	-	-	<1	1.96	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	Neg	Neg	Pos	**3346**
3457	3 1 2	5.02	4.69	4.45	4.46	0	**0**	-	-	-	0	1.85	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	Pos	Pos	Neg	-	-	-	**3457**
3511	1 3 2	-	-	-	4.59	**3.76**	**<1**	-	-	-	**2.54**	1.96	<1	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3511**
3533	1 3 2	5.18	4.4	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	Pos	**Neg**	Neg	-	-	-	**3533**
3588	2 3 1	4.99	4.69	4.44	4.64	<2	**2**	-	-	-	<1	1.7	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3588**
3626	3 2 1	4.9	4.8	4.4	4.5	<2	**2.3**	<1	1	1	<1	2	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3626**
3803	1 2 3	4.85	4.83	4.43	-	-	-	<0	**<0**	0.9	<0	2.08	<0	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3803**
3825	3 1 2	5.09	4.41	4.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3825**
3829	1 3 2	-	-	-	-	-	-	0	1.18	1.37	-	-	-	Neg	Pos	Pos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**3829**
3868	2 3 1	4.68	4.7	4.41	4.41	<2	3.15	0	**0**	1.04	0	2.08	0	Neg	**Neg**	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3868**
3923	1 3 2	4.78	4.41	4.48	4.34	0	**2.11**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	Pos	Pos	Neg	-	-	-	**3923**
3925	3 2 1	5.27	4.64	4.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**3925**
4064	1 3 2	4.72	4.41	4.4	4.56	<1	3.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**4064**
4100	3 1 2	4.7	4.66	4.36	4.41	<2	3.32	<1	1.26	1.54	<1	1.99	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**4100**
4153	2 1 3	4.98	4.59	4.52	4.71	<2	**<2**	-	-	-	<1	2.09	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**4153**
4171	3 1 2	4.75	4.78	4.64	4.63	**4.08**	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**4171**
4246	3 2 1	4.77	4.41	4.22	4.35	**4.22**	**<2**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**4246**
4288	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**4288**
4339	1 3 2	4.76	4.73	4.45	4.32	<2	3.15	-	-	-	<1	2.06	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	Neg	Neg	Pos	**4339**
4352	1 2 3	**6.08**	5.2	**5.18**	**5.41**	**3.89**	**1.7**	-	-	-	<1	**2.94**	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**4352**
4353	2 1 3	5.11	4.91	4.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**4353**
4400	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**4400**
4562	2 1 3	4.82	4.58	4.36	4.63	0	**1.48**	0	1.7	1.48	0	2.28	0	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	Pos	Pos	Neg	Neg	Neg	Pos	**4562**
m		4.98	4.67	4.46	4.55	0	3.26	0	1.03	0.92	0	2.00	0	neg	pos	pos	neg	pos	neg	pos	neg	pos	neg	neg	pos	pos	pos	neg	neg	neg	pos	**m**
s		0.25	0.27	0.14	0.15	0	0.14	0	0.57	0.36	0	0.14	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**s**

Lab no.	vial	Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A B C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
4586	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4586
4633	2 1 3	4.71	4.57	4.45	4.52	<1	3.34	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4633
4635	2 3 1	4.95	5.32	**5.3**	4.73	<2	**<2**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4635
4664	1 2 3	5.1	4.8	4.12	4.63	<2	**2**	-	-	-	<1	2.2	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	**Neg**	Pos	Neg	-	-	-	4664
4683	3 1 2	4.8	4.2	4.2	**3.9**	<1	3.5	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	**Neg**	**Neg**	Neg	-	-	-	4683
4713	1 3 2	5.14	4.49	4.53	4.79	<1	3.32	-	-	-	<1	2.08	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4713
4817	3 2 1	4.8	4.6	4.3	-	-	-	-	-	-	<1	2	<1	Neg	**Neg**	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	Pos	Pos	Neg	Neg	Neg	Pos	4817
4840	1 3 2	5.49	4.45	4.53	4.82	<1	3.15	-	-	-	<1	**0.7**	<1	Neg	**Neg**	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4840
4889	3 1 2	5.08	4.99	4.53	4.46	<1	**1**	-	-	-	<1	1.85	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	**Neg**	-	-	-	-	-	-	-	-	-	4889
4955	1 3 2	5.18	4.82	4.58	4.79	<2	**<2**	-	-	-	<0	2.1	<0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4955
4980	3 2 1	5.06	4.83	4.28	4.65	<2	**<2**	-	-	-	<1	2	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	4980
5018	1 2 3	4.91	4.95	4.56	4.47	<1	3.38	-	-	-	<1	2.02	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	Neg	Neg	Pos	5018
5028	1 2 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Neg	Pos	5028
5100	2 3 1	**2.75**	**2.45**	**2.46**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5100
5188	2 1 3	-	-	-	-	-	-	**0.6**	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5188
5197	3 1 2	5.4	4.7	4.5	4.6	**3.4**	3.4	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5197
5200	2 3 1	5.34	4.51	4.54	-	-	-	-	-	-	<3	1.66	<3	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5200
5204	2 1 3	5	4.9	4.3	4.6	**4.3**	3.2	<1	**<1**	1	<1	1.9	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	5204
5220	3 1 2	5.21	4.5	4.51	4.68	0	3.19	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5220
5304	3 1 2	5.15	5.23	4.3	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	**Pos**	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5304
5329	1 2 3	4.94	4.69	4.47	4.36	<1	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5329
5333	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5333
5350	3 2 1	5.42	4.94	4.21	4.75	**4.58**	**<2**	-	-	-	<1	2.08	<1	-	-	-	Neg	Pos	Neg	-	-	-	-	-	-	-	-	-	-	-	-	-	5350
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5447	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	**Neg**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5447
5533	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5533
5545	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5545
5553	3 2 1	4.79	4.41	4.46	4.41	<1	-	-	-	-	<1	1.74	<1	Neg	**Neg**	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	5553
5615	3 1 2	5.28	5.18	4.08	4.54	<2	3	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5615
5632	3 2 1	-	-	-	-	-	-	-	-	-	<1	2.4	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	-	-	-	-	-	-	-	-	-	-	5632
5701	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5701
5774	3 2 1	-	-	-	4.58	<2	**<2**	<0	0.3	0.5	<1	2	<0	Neg	Pos	Pos	Neg	Pos	Neg	-	-	-	Neg	Neg	Pos	-	-	-	-	-	-	5774
5801	1 3 2	4.6	4.46	4.43	4.25	**2.6**	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5801
5850	3 2 1	-	-	-	-	-	-	0	**0**	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5850
5883	3 2 1	4.88	4.62	4.4	4.57	<2	3.22	-	-	-	0	1.95	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5883
5893	3 2 1	5.63	4.4	4.72	-	-	-	-	-	-	-	-	-	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	-	-	-	Pos	**Neg**	Neg	-	-	-	5893
5993	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	5993
6109	1 3 2	4.95	4.88	4.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	6109
6138	3 1 2	5.02	4.76	4.6	4.68	<2	3	-	-	-	<1	1.7	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6138
6175	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6175
6224	3 2 1	5.4	4.9	4.6	4.9	**3.8**	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6224
6232	2 1 3	4.64	4.65	4.51	4.45	**2.9**	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6232
6253	2 3 1	4.72	4.34	4.5	4.52	<1	3.28	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6253
6343	2 3 1	5.06	4.61	4.48	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6343
6352	1 3 2	4.85	4.35	4.45	4.55	<2	**<2**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	**Pos**	Pos	-	-	-	-	-	-	-	-	-	6352
6368	3 2 1	5.04	4.79	4.32	4.6	<2	3.18	-	-	-	<0	1.94	<0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	Pos	Pos	Neg	-	-	-	6368
6380	2 3 1	5.03	4.59	4.36	-	-	-	-	-	-	**3.03**	2.09	0	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6380
6443	2 3 1	4.58	4.59	4.6	4.4	<2	3.51	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6443
6456	3 1 2	5.01	4.62	4.48	4.4	**3.11**	**<1**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6456
6527	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Pos	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6527
6594	3 2 1	4.78	4.94	4.54	4.43	**2**	**2.6**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	6594
6658	2 3 1	4.76	4.26	4.43	4.35	<1	3.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6658
6707	3 2 1	5.18	4.9	4.78	4.6	<2	-	-	-	-	<2	1.9	<2	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	6707
6762	1 3 2	4.97	4.64	4.18	4.67	**4.36**	3.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6762
6860	2 3 1	4.83	4.65	4.42	4.61	**3.39**	3.43	<1	1.3	1	<1	2.12	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	Pos	Pos	Neg	Neg	Neg	Pos	6860
6971	2 1 3	5.25	5.14	4.46	4.6	**3.76**	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6971
m		4.98	4.67	4.46	4.55	0	3.26	0	1.03	0.92	0	2.00	0	neg	pos	pos	neg	pos	neg	pos	neg	pos	neg	neg	pos	pos	pos	neg	neg	neg	pos	**m**
s		0.25	0.27	0.14	0.15	0	0.14	0	0.57	0.36	0	0.14	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**s**

Lab no.	vial	Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A B C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
7024	3 2 1	4.71	4.57	4.5	4.55	**3.51**	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7024
7096	3 2 1	5.22	5.03	4.45	-	-	-	-	-	-	<1	1.78	<1	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7096
7182	2 3 1	5.23	5.14	4.5	4.62	**3.15**	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7182
7191	3 2 1	**1.99**	**1.98**	**2.04**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	**Neg**	-	-	-	Pos	**Neg**	Neg	-	-	-	7191
7207	2 1 3	5.39	5.33	4.8	4.42	<1	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7207
7232	2 3 1	5.01	4.64	4.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7232
7242	2 1 3	4.69	4.23	4.52	4.44	0	2.88	-	-	-	-	-	-	-	-	-	**Pos**	Pos	Neg	-	-	-	-	-	-	-	-	-	-	-	-	7242
7248	2 3 1	4.66	4.76	4.21	4.48	<2	**<2**	0	**0**	0.3	0	2.01	0	Neg	**Neg**	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7248
7253	2 1 3	-	-	-	-	-	-	-	-	-	<1	2.06	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7253
7282	1 2 3	5.66	5.57	4.45	4.29	-	3.17	-	-	-	-	-	-	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7282
7302	2 3 1	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Pos	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7302
7330	3 1 2	5.62	5.3	4.47	4.73	**4.13**	3.12	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7330
7334	3 1 2	4.93	4.42	4.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	7334
7449	3 1 2	4.78	4.47	4.44	4.35	<2	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7449
7543	3 1 2	5.36	4.07	4.1	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	7543
7564	3 2 1	4.83	5.18	4.38	4.46	<2	**<2**	0	**0**	0.6	**2.99**	2.08	0	Neg	Pos	Pos	**Pos**	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	Pos	Pos	Neg	Neg	Neg	Pos	7564
7596	1 2 3	5.2	4.2	**3.8**	4.8	<2	3	-	-	-	0	2	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7596
7627	3 1 2	4.6	4.6	**4.95**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	7627
7631	3 2 1	4.66	4.59	4.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7631
7688	1 3 2	4.87	4.51	4.43	4.67	<1	**2.48**	-	-	-	<1	2.12	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	Neg	Neg	Pos	7688
7728	2 3 1	5.28	4.67	4.59	-	-	-	-	-	-	-	-	-	**Pos**	**Neg**	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7728
7793	3 2 1	**5.99**	**5.86**	**5.02**	4.67	-	3.29	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7793
7825	1 3 2	**5.99**	**6.6**	**6.26**	4.5	**3.87**	3.47	-	-	-	<1	2.06	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7825
7876	2 1 3	4.9	4.5	4.6	4.6	<1	3.4	-	-	-	<1	2.1	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7876
7882	3 2 1	4.87	4.54	4.49	-	-	-	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7882
7930	1 2 3	5.11	4.7	4.56	4.61	**3**	**<1**	-	-	-	<1	1.9	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7930
7940	3 2 1	4.82	4.99	4.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7940
7962	2 3 1	4.94	4.56	4.38	4.74	<2	**<2**	-	-	-	<1	2	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	7962
8066	2 3 1	-	-	-	4.35	**2.18**	**<2**	-	-	-	<1	1.86	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	**Neg**	-	-	-	-	-	-	-	-	-	8066
8068	2 1 3	5	4.72	4.65	4.71	<2	**<2**	-	-	-	0	2.1	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8068
8165	2 3 1	-	-	-	-	-	-	<1	**<1**	0.7	-	-	-	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	8165
8247	2 3 1	4.94	4.46	4.48	4.65	<1	3.45	-	-	-	<0	1.96	<0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	8247
8255	2 1 3	4.89	4.77	4.49	4.71	<2	3.2	-	-	-	<1	2.08	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8255
8260	3 1 2	4.68	4.49	4.4	4.46	<1	3.34	-	-	-	<1	**1.08**	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8260
8313	2 3 1	4.66	4.51	4.34	4.31	<2	**<2**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8313
8333	2 1 3	4.88	4.54	4.6	4.66	**3**	3.21	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	8333
8380	3 1 2	4.8	4.35	4.54	4.57	<2	**<2**	-	-	-	<1	2	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8380
8397	3 2 1	5.1	5	4.3	4.7	<1	**2.4**	-	-	-	**3**	1.9	<1	-	-	-	**Pos**	Pos	Neg	-	-	-	-	-	-	-	-	-	-	-	-	8397
8428	1 3 2	4.64	4.61	4.51	4.4	<4.18	**<4.18**	-	-	-	<1	2.08	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	8428
8435	1 2 3	4.81	4.74	4.48	**<2**	<2	3.3	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8435
8529	3 1 2	5.15	4.74	4.31	4.66	<2	3.16	-	-	-	<0	2.08	<0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8529
8568	2 3 1	5.08	4.95	4	4.51	**4**	3.3	-	-	-	-	-	-	-	-	-	**Pos**	Pos	Neg	Pos	Neg	Pos	**Pos**	Neg	Pos	-	-	-	-	-	-	8568
8626	1 2 3	4.76	4.88	4.38	4.41	<1	3.2	-	-	-	-	2.01	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8626
8628	3 2 1	4.6	4.8	4.38	4.37	<2	**2.6**	-	-	-	0	2.04	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8628
8657	2 3 1	5.32	4.61	4.5	4.69	**3.14**	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8657
8734	3 1 2	5.1	5.1	4.4	4.6	**1.4**	**1.1**	-	-	-	0	2.3	0	-	-	-	Neg	Pos	Neg	-	-	-	-	-	-	-	-	-	-	-	-	8734
8742	1 3 2	4.7	4.34	4.18	4.44	<1	**<1**	-	-	-	<1	1.93	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8742
8756	3 1 2	**6.04**	**6.08**	**5.51**	**5.32**	**2.94**	**1.99**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8756
8766	1 2 3	5.1	4.9	4.6	4.6	<1.3	**<1.3**	-	-	-	<1	1.7	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	Neg	Neg	Pos	8766
8891	2 3 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8891
8918	1 2 3	5.09	4.9	4.46	-	-	-	-	-	-	<0	1.97	<0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	8918
8955	1 3 2	4.9	4.83	4.36	4.51	**2.7**	**2.65**	-	-	-	-	-	-	Neg	Pos	Pos	-	-	-	Pos	Neg	Pos	Neg	**Pos**	Pos	Pos	Pos	Neg	Neg	Neg	Pos	8955
9002	1 2 3	4.95	4.47	4.59	4.61	<2	**<2**	-	-	-	0	2	0	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	9002
9034	3 1 2	4.78	4.77	4.4	4.42	**2.93**	**<1**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	Neg	Neg	Pos	9034
9217	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9217
9245	1 3 2	4.92	4.46	4.6	4.52	<2	**<2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9245
m		4.98	4.67	4.46	4.55	0	3.26	0	1.03	0.92	0	2.00	0	neg	pos	pos	neg	pos	neg	pos	neg	pos	neg	neg	pos	pos	pos	neg	neg	neg	pos	**m**
s		0.25	0.27	0.14	0.15	0	0.14	0	0.57	0.36	0	0.14	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**s**

Lab no.	vial	Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A B C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
9420	1 2 3	4.92	4.77	4.46	4.66	<2	**<2**	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9420**
9429	1 2 3	4.92	4.63	4.54	4.61	<1	**1**	-	-	-	<1	2.08	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9429**
9436	1 2 3	4.62	4.34	4.48	4.28	<1	**<1**	-	-	-	<1	**2.61**	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Neg	Pos	-	-	-	-	-	-	**9436**
9441	2 1 3	4.86	4.57	4.52	4.71	<2	**<2**	-	-	-	<1	2.04	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9441**
9451	2 3 1	5.15	4.93	4.52	4.69	<1	3.36	-	-	-	<1	2.11	<1	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9451**
9453	3 2 1	4.5	4.36	4.62	4.59	**3.01**	3.42	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	**Neg**	-	-	-	-	-	-	-	-	-	**9453**
9465	3 2 1	4.76	4.36	4.36	4.48	<1	3.28	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9465**
9512	1 3 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**9512**
9555	2 1 3	4.85	4.87	4.42	4.36	**2.74**	3.16	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9555**
9569	3 1 2	5	4.7	4.63	4.7	<1	**<1**	-	-	-	<1	2.01	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9569**
9589	3 2 1	-	-	-	-	-	-	-	-	-	<1	1.6	<1	Neg	Pos	Pos	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9589**
9662	2 3 1	4.8	4.73	4.41	4.69	<1	**1.04**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9662**
9716	1 3 2	4.82	4.56	4.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9716**
9747	1 3 2	4.63	4.49	4.4	4.34	<1	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**9747**
9753	2 3 1	5.2	4.93	4.6	4.83	**4.28**	3.21	-	-	-	-	-	-	-	-	-	-	-	-	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9753**
9783	3 1 2	4.92	4.88	4.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**9783**
9890	2 3 1	5.17	4.82	4.56	4.65	0	3.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**9890**
9903	1 3 2	4.99	4.41	4.48	4.38	0	**0**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	Pos	Neg	Pos	-	-	-	-	-	-	-	-	-	**9903**
9923	2 3 1	4.65	4.52	4.2	4.13	<2	**<2**	-	-	-	-	-	-	-	-	-	Neg	Pos	Neg	-	-	-	-	-	-	-	-	-	-	-	-	**9923**
9950	2 3 1	5.33	4.4	4.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**9950**
n		150	151	151	123	121	121	19	19	19	73	76	74	39	39	39	108	109	109	141	142	141	33	33	33	18	18	18	15	15	15	**n**
Min		1.99	1.98	0	0	0	0	0	0	0	0	0.70	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**Min**
Max		6.08	6.60	6.26	5.73	4.58	4.00	0.60	1.85	1.54	3.03	2.94	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**Max**
median		4.95	4.65	4.47	4.59	0	3.28	0	1.14	1.00	0	2.01	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**median**
m		4.98	4.67	4.46	4.55	0	3.26	0	1.03	0.92	0	2.00	0	neg	pos	pos	neg	pos	neg	pos	neg	pos	neg	neg	pos	pos	pos	neg	neg	neg	pos	**m**
s		0.25	0.27	0.14	0.15	0	0.14	0	0.57	0.36	0	0.14	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**s**
F+		0	0	0	0	34	0	1	0	0	4	0	0	1	0	0	11	0	2	0	3	0	1	1	0	0	0	1	0	0	0	**F+**
F-		0	0	1	1	0	48	0	9	1	0	0	0	0	7	2	0	0	0	0	0	7	0	0	1	2	6	0	0	0	0	**F-**
<		2	2	4	1	0	19	0	0	0	0	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**<**
>		4	3	6	3	0	1	0	0	0	0	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**>**
< OK		4.50	3.82	4.00	4.13	0	2.88	0	0.30	0.30	0	1.60	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**< OK**
>OK		5.66	5.57	4.80	4.90	0	3.51	0	1.85	1.55	0	2.40	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**>OK**

n = number of analyses performed
Min = lowest reported result
Max= highest reported result
median = median value
m = mean value
s = standard deviation

F+ = false positive
F- = false negative
< = low outlier
> = high outlier
< OK = lowest accepted value
> OK = highest accepted value

Annex 2. ***z-scores of all participants - January 2013***

z-scores were calculated according the formula : z = (x-m)/s.

x = result of the individual laboratory, m = mean of the results of all participating laboratories , s = standard deviation of the results of all participating laboratories .

Correct negative results in quantitative analyses and correct results in qualitative analyses obtained a z-score of zero.

False results did not generate a z-score.

2 < |z| ≤ 3, |z|>3

Lab no.	sample	Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A B C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
1081	1 3 2	1.236	-0.773	0.910	0.283	0	4.000										0	0	0	0	0	0	0	0	0							1081
1254	1 2 3	-0.876	-1.082	-0.562	-1.857	0	-0.384				0	-0.007	0	0	0	0	0	0	0	0	0	0						*				1254
1594	1 3 2	1.321	0.350	1.425	1.543	0	0.033													0	0	0	0	0	0							1594
1970	1 3 2	0.955	0.500	0.616	1.610	0		0	1.454	0.216	0	0.202	0	0	0	0	0	0	0	0	0	0	0	0	0							1970
2035	2 3 1				0.343	0		0	0.126	0.780				0	0	0	0	0	0										0	0	0	2035
2050	2 3 1	0.223	0.312	0.395	0.010	0	0.590													0	0	0										2050
2058	2 1 3		-1.384	-0.046								-0.356	0					0	0													2058
2072	2 1 3	0.711	0.161	0.248	-0.057	0	-1.011	0	-1.290	-0.236	0	1.739	0	0	0	0	0	0	0	0	0	0										2072
2151	2 1 3													0	0	0				0	0	0										2151
2324	1 2 3																	0	0	0	0	0	0	0	0							2324
2386	1 3 2	1.524	-0.706	0.174													0	0	0	0	0	0										2386
2402	3 2 1	2.175	-0.103	0.542	-0.057	0	-4.000													0	0	0										2402
2458	2 1 3	1.484	-0.404	-1.297	-1.657	0	-1.498	0		-0.208	0	0.761	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2458
2553	3 1 2	-1.486	0.274	-0.562	-0.324	0	0.311				0	0.552	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2553
2637	3 2 1	0.263	-0.706	0.248	0.876	0					0	0.761	0				0	0	0	0	0	0										2637
2670	3 2 1	-0.632	-1.007																	0	0					0		0				2670
2704	1 2 3	0.304	0.538	0.248	0.543	0					0	-0.007	0				0	0	0	0	0	0										2704
2720	1 3 2	-0.428	0.086	0.101	0.610		0.938																									2720
2745	3 1 2	-1.242	-1.007	-0.709	-1.924	0	1.355				0	-1.195	0				0	0	0	0	0	0										2745
2764	3 1 2	-1.039	-0.216	0.910	-0.924		-4.000										0	0	0	0	0	0	0	0	0							2764
2842	1 2 3	0.263	0.463	-1.445				0			0	0.272	0	0			0	0		0	0	0	0	0		0	0					2842
2920	3 2 1	0.263	0.387	0.248	0.343	0														0	0	0										2920
3126	2 1 3	1.606	-3.193	-4.000													0	0	0	0		0				0		0				3126
3159	3 2 1	-0.103	0.463	1.131	-0.991	0					0	0.412	0				0	0	0													3159
3305	1 3 2	-0.062	-0.555	0.616	0.743	0						-0.845		0	0	0	0	0	0	0	0	0										3305
3346	3 2 1	-1.120	-1.572	-1.077	0.276		0.729				0	-0.287	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	3346
3457	3 1 2	0.182	0.086	-0.046	-0.591	0					0	-1.055	0				0	0	0	0	0	0				0	0	0				3457
3511	1 3 2				0.276							-0.287	0					0	0	0	0	0										3511
3533	1 3 2	0.833	-1.007	1.057																0	0	0				0		0				3533
3588	2 3 1	0.060	0.086	-0.120	0.610	0	-4.000				0	-2.103	0				0	0	0	0	0	0										3588
3626	3 2 1	-0.306	0.500	-0.414	-0.324	0	-4.000	0	-0.051	0.216	0	-0.007	0	0	0	0	0	0	0	0	0	0										3626
3803	1 2 3	-0.510	0.614	-0.194				0		-0.067	0	0.552	0	0	0	0	0	0	0	0	0	0										3803
3825	3 1 2	0.467	-0.969	-0.267																0	0	0										3825
3829	1 3 2							0	0.268	1.259				0	0	0																3829
3868	2 3 1	-1.201	0.124	-0.341	-0.924	0	-0.732	0		0.328	0	0.552	0	0		0	0	0	0	0	0	0										3868
3923	1 3 2	-0.794	-0.969	0.174	-1.391	0	-4.000													0	0	0				0	0	0				3923
3925	3 2 1	1.199	-0.103	0.837																0	0	0										3925
4064	1 3 2	-1.039	-0.969	-0.414	0.076	0	0.590																									4064
4100	3 1 2	-1.124	-0.017	-0.696	-0.891	0	0.466	0	0.401	1.750	0	-0.100	0	0	0	0	0	0	0	0	0	0										4100
4153	2 1 3	0.019	-0.291	0.469	1.076	0					0	0.621	0	0	0	0	0	0	0	0	0	0	0	0	0							4153
4171	3 1 2	-0.916	0.425	1.352	0.543															0	0	0	0	0	0							4171
4246	3 2 1	-0.835	-0.969	-1.739	-1.324												0	0	0	0	0	0										4246
4288	2 1 3																															4288
4339	1 3 2	-0.876	0.237	-0.046	-1.524	0	-0.732				0	0.412	0	0	0	0	0	0	0	0	0	0							0	0	0	4339
4352	1 2 3	4.000	2.008	4.000	4.000		-4.000				0	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0							4352

Lab no.	sample			Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
4353	2	1	3	0.548	0.915	1.131																0	0	0										4353
4400	3	1	2																															4400
4562	2	1	3	-0.632	-0.329	-0.709	0.543	0	**-4.000**	0	1.189	1.569	0	1.949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4562
4586	2	1	3																			0	0	0										4586
4633	2	1	3	-1.079	-0.366	-0.046	-0.191	0	0.590													0	0	0										4633
4635	2	3	1	-0.103	**2.460**	**4.000**	1.210	0											0	0	0	0	0	0										4635
4664	1	2	3	0.507	0.500	**-2.475**	0.543	0	**-4.000**				0	1.390	0				0	0	0	0	0	0					0	0					4664
4683	3	1	2	-0.713	-1.761	-1.886	**-4.000**	0	1.703										0	0	0	0	0	0						0				4683
4713	1	3	2	0.670	-0.668	0.542	1.610	0	0.451				0	0.552	0				0	0	0	0	0	0										4713
4817	3	2	1	-0.713	-0.253	-1.150							0	-0.007	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4817
4840	1	3	2	**2.094**	-0.819	0.542	1.810	0	-0.732				0	**-4.000**	0	0		0	0	0	0	0	0	0										4840
4889	3	1	2	0.426	1.216	0.542	-0.591	0	**-4.000**				0	-1.055	0				0	0	0	0	0												4889
4955	1	3	2	0.833	0.576	0.910	1.610	0					0	0.691	0				0	0	0	0	0	0											4955
4980	3	2	1	0.345	0.614	-1.297	0.676	0					0	-0.007	0				0	0	0	0	0	0											4980
5018	1	2	3	-0.266	1.066	0.763	-0.524	0	0.868				0	0.133	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	5018
5028	1	2	3																													0	0	0	5028
5100	2	3	1	**-4.000**	**-4.000**	**-4.000**																0	0	0										5100
5188	2	1	3								-1.288	-1.756																						5188
5197	3	1	2	1.728	0.124	0.322	0.343		1.007													0	0	0										5197
5200	2	3	1	1.484	-0.592	0.616							0	**-2.382**	0				0	0	0	0	0	0										5200
5204	2	1	3	0.101	0.877	-1.150	0.343		-0.384	0		0.216	0	-0.706	0	0	0	0	0	0	0	0	0	0	0	0	0							5204
5220	3	1	2	0.955	-0.630	0.395	0.876	0	-0.454										0	0	0	0	0	0										5220
5304	3	1	2	0.711	**2.121**	-1.150													0	0		0	0	0										5304
5329	1	2	3	-0.144	0.086	0.101	-1.257	0																										5329
5333	3	2	1																0	0	0	0	0	0										5333
5350	3	2	1	1.809	1.028	-1.812	1.343						0	0.552	0				0	0	0													5350
5352	1	2	3	0.426	0.124	1.057	**4.000**	0														0	0										5352
5447	3	2	1													0	0																	5447
5533	3	1	2																0	0	0	0	0	0										5533
5545	2	1	3																	0	0	0	0	0										5545
5553	3	2	1	-0.754	-0.969	0.027	-0.924	0					0	-1.823	0	0		0	0	0	0	0	0	0	0	0	0							5553
5615	3	1	2	1.240	1.933	**-2.769**	-0.057	0	-1.776										0	0	0	0	0	0										5615
5632	3	2	1										0	**2.787**	0				0	0	0	0	0											5632
5701	2	1	3																			0	0	0										5701
5774	3	2	1				0.210	0		0	-1.290	-1.195	0	-0.007	0	0	0	0	0	0	0				0	0	0							5774
5801	1	3	2	-1.527	-0.781	-0.194	-1.991		-0.384																									5801
5850	3	2	1							0		0.216																						5850
5883	3	2	1	-0.388	-0.178	-0.414	0.143	0	-0.245				0	-0.356	0				0	0	0	0	0	0										5883
5893	3	2	1	**2.676**	-1.015	1.911														0	0	0	0	0					0		0			5893
5993	3	1	2																			0	0	0										5993
6109	1	3	2	-0.103	0.802	1.572																0	0	0	0	0	0							6109
6138	3	1	2	0.182	0.350	1.057	0.876	0	-1.776				0	**-2.103**	0				0	0	0	0	0	0										6138
6175	2	1	3																			0	0	0										6175
6224	3	2	1	1.728	0.877	1.057	**2.343**																											6224
6232	2	1	3	-1.352	-0.054	0.358	-0.677															0	0	0										6232
6253	2	3	1	-1.039	-1.233	0.322	-0.191	0	0.172										0	0	0	0	0	0										6253
6343	2	3	1	0.345	-0.216	0.174													0	0	0	0	0	0										6343
6352	1	3	2	-0.510	-1.195	-0.046	0.010	0														0		0										6352
6368	3	2	1	0.263	0.463	-1.003	0.343	0	-0.524				0	-0.426	0				0	0	0	0	0	0					0	0	0				6368
6380	2	3	1	0.223	-0.291	-0.709								0.621	0					0	0	0	0	0										6380
6443	2	3	1	-1.608	-0.291	1.057	-0.991	0	1.772													0	0	0										6443
6456	3	1	2	0.141	-0.178	0.174	-0.991												0	0	0	0	0	0										6456
6527	2	1	3													0	0	0				0	0	0										6527
6594	3	2	1	-0.794	1.028	0.616	-0.791		**-4.000**													0	0	0	0	0	0							6594

Lab no.	sample			Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
6658	2	3	1	-0.876	-1.535	-0.194	-1.324	0	-1.498																									6658
6707	3	2	1	0.833	0.877	**2.382**	0.343	0					0	-0.706	0				0	0	0	0	0	0										6707
6762	1	3	2	-0.021	-0.103	**-2.033**	0.810		1.355																									6762
6860	2	3	1	-0.591	-0.065	-0.267	0.410		1.216	0	0.481	0.216	0	0.831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6860
6971	2	1	3	1.118	1.782	0.027	0.343																											6971
7024	3	2	1	-1.079	-0.366	0.322	0.010																											7024
7096	3	2	1	0.996	1.367	-0.046							0	-1.544	0					0	0	0	0	0										7096
7182	2	3	1	1.036	1.782	0.322	0.476																											7182
7191	3	2	1	**-4.000**	**-4.000**	**-4.000**																	0	0					0		0			7191
7207	2	1	3	1.687	**2.498**	**2.529**	-0.857	0																										7207
7232	2	3	1	0.141	-0.103	1.131																	0	0	0									7232
7242	2	1	3	-1.161	-1.648	0.461	-0.731	0	**-2.646**											0	0													7242
7248	2	3	1	-1.283	0.350	-1.812	-0.457	0		0		-1.759	0	0.063	0	0		0	0	0	0	0	0	0	0									7248
7253	2	1	3										0	0.412	0	0	0	0	0	0	0	0	0	0	0									7253
7282	1	2	3	**2.786**	**3.402**	-0.046	-1.724		-0.593											0	0	0	0	0										7282
7302	2	3	1													0	0	0				0	0	0										7302
7330	3	1	2	**2.623**	**2.385**	0.101	1.210		-0.941														0	0	0										7330
7334	3	1	2	-0.184	-0.920	-0.988																	0	0	0	0	0	0						7334
7449	3	1	2	-0.794	-0.743	-0.120	-1.324	0	-1.080																									7449
7543	3	1	2	1.565	**-2.251**	**-2.622**													0	0	0	0	0	0	0	0	0							7543
7564	3	2	1	-0.591	1.933	-0.562	-0.591	0		0		-0.913		0.552	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7564
7596	1	2	3	0.914	-1.761	**-4.000**	1.676	0	-1.776				0	-0.007	0				0	0	0	0	0	0										7596
7627	3	1	2	-1.527	-0.253	**3.633**																	0	0	0	0	0	0						7627
7631	3	2	1	-1.283	-0.291	-0.635																												7631
7688	1	3	2	-0.428	-0.592	-0.194	0.810	0	**-4.000**				0	0.831	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	7688
7728	2	3	1	1.240	0.011	0.984												0	0	0	0	0	0	0	0									7728
7793	3	2	1	**4.000**	**4.000**	**4.000**	0.810		0.242														0	0	0									7793
7825	1	3	2	**4.000**	**4.000**	**4.000**	-0.331		1.494				0	0.391	0				0	0	0	0	0	0										7825
7876	2	1	3	-0.306	-0.630	1.057	0.343	0	1.007				0	0.691	0				0	0	0	0	0	0										7876
7882	3	2	1	-0.428	-0.479	0.248													0	0	0	0	0	0										7882
7930	1	2	3	0.548	0.124	0.763	0.410						0	-0.706	0				0	0	0	0	0	0										7930
7940	3	2	1	-0.632	1.216	-1.003																												7940
7962	2	3	1	-0.144	-0.404	-0.562	1.276	0					0	-0.007	0				0	0	0	0	0	0										7962
8066	2	3	1				-1.324						0	-0.985	0				0	0	0	0	0											8066
8068	2	1	3	0.101	0.199	1.425	1.076	0					0	0.691	0				0	0	0	0	0	0										8068
8165	2	3	1							0		-0.631				0	0	0	0	0	0	0	0	0	0	0	0							8165
8247	2	3	1	-0.144	-0.781	0.174	0.676	0	1.355				0	-0.287	0				0	0	0	0	0	0	0	0	0							8247
8255	2	1	3	-0.347	0.387	0.248	1.076	0	-0.384				0	0.552	0				0	0	0	0	0	0										8255
8260	3	1	2	-1.201	-0.668	-0.414	-0.591	0	0.590				0	**-4.000**	0				0	0	0	0	0	0										8260
8313	2	3	1	-1.283	-0.592	-0.856	-1.591	0											0	0	0	0	0	0										8313
8333	2	1	3	-0.388	-0.479	1.057	0.743		-0.315														0	0	0	0	0	0						8333
8380	3	1	2	-0.713	-1.195	0.616	0.143	0					0	-0.007	0	0	0	0	0	0	0	0	0	0	0										8380
8397	3	2	1	0.507	1.254	-1.150	1.010	0	**-4.000**					-0.706	0					0	0													8397
8428	1	3	2	-1.364	-0.216	0.395	-0.991	0					0	0.552	0				0	0	0	0	0	0	0	0	0							8428
8435	1	2	3	-0.660	0.274	0.152		0	0.318										0	0	0	0	0	0										8435
8529	3	1	2	0.711	0.274	-1.077	0.743	0	-0.663				0	0.552	0				0	0	0	0	0	0										8529
8568	2	3	1	0.426	1.066	**-3.358**	-0.257		0.311											0	0	0	0	0	0		0	0						8568
8626	1	2	3	-0.876	0.802	-0.562	-0.924	0	-0.384					0.063					0	0	0	0	0	0										8626
8628	3	2	1	-1.527	0.500	-0.562	-1.191	0	**-4.000**				0	0.272	0				0	0	0	0	0	0										8628
8657	2	3	1	1.402	-0.216	0.322	0.943																											8657
8734	3	1	2	0.507	1.631	-0.414	0.343		**-4.000**				0	**2.088**	0				0	0	0														8734
8742	1	3	2	-1.120	-1.233	**-2.033**	-0.724	0					0	-0.496	0				0	0	0	0	0	0										8742
8756	3	1	2	**4.000**	**4.000**	**4.000**	**4.000**		**-4.000**													0	0	0										8756
8766	1	2	3	0.507	0.877	1.057	0.343	0					0	**-2.103**	0				0	0	0	0	0	0								0	0	0	8766

Lab no.	sample			Aerobic microorganisms 30 °C			Enterobacteriaceae			Thermotolerant campylobacter			Listeria monocytogenes			Thermotolerant campylobacter			Listeria monocytogenes			Salmonella			Escherichia coli O157 (VT-neg)			Pathogenic Vibrio spp			Yersinia enterocolitica			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
8891	2	3	1																														**8891**
8918	1	2	3	0.467	0.877	0.027							0	-0.217	0				0	0	0	0	0	0									**8918**
8955	1	3	2	-0.306	0.614	-0.709	-0.257		**-4.000**							0	0	0				0	0	0	0		0	0	0	0	0	0	0	**8955**
9002	1	2	3	-0.103	-0.743	0.984	0.410	0					0	-0.007	0				0	0	0	0	0	0									**9002**
9034	3	1	2	-0.794	0.387	-0.414	-0.857												0	0	0	0	0	0							0	0	0	**9034**
9217	3	1	2																														**9217**
9245	1	3	2	-0.225	-0.781	1.057	-0.191	0																									**9245**
9420	1	2	3	-0.225	0.387	0.027	0.743	0														0	0	0									**9420**
9429	1	2	3	-0.225	-0.140	0.616	0.410	0	**-4.000**				0	0.552	0				0	0	0	0	0	0									**9429**
9436	1	2	3	-1.445	-1.233	0.174	-1.791	0					0	**4.000**	0				0	0	0	0	0	0	0	0	0							**9436**
9441	2	1	3	-0.469	-0.366	0.469	1.076	0					0	0.272	0				0	0	0	0	0	0									**9441**
9451	2	3	1	0.711	0.990	0.469	0.943	0	0.729				0	0.761	0				0	0	0	0	0	0									**9451**
9453	3	2	1	-1.933	-1.158	1.205	0.276		1.146										0	0	0	0	0										**9453**
9465	3	2	1	-0.876	-1.158	-0.709	-0.457	0	0.172													0	0	0									**9465**
9512	1	3	2																														**9512**
9555	2	1	3	-0.510	0.764	-0.267	-1.257		-0.663													0	0	0									**9555**
9569	3	1	2	0.101	0.124	1.278	1.010	0					0	0.063	0	0	0	0	0	0	0	0	0	0									**9569**
9589	3	2	1										0	**-2.801**	0	0	0	0	0	0	0	0	0	0									**9589**
9662	2	3	1	-0.713	0.237	-0.341	0.943	0	**-4.000**										0	0	0	0	0	0									**9662**
9716	1	3	2	-0.632	-0.404	0.837																0	0	0									**9716**
9747	1	3	2	-1.405	-0.668	-0.414	-1.391	0	**-4.000**																								**9747**
9753	2	3	1	0.914	0.990	1.057	1.876		-0.315													0	0	0									**9753**
9783	3	1	2	-0.217	0.813	-0.319																											**9783**
9890	2	3	1	0.792	0.576	0.763	0.676	0	0.381																								**9890**
9903	1	3	2	0.060	-0.969	0.174	-1.124	0											0	0	0	0	0	0									**9903**
9923	2	3	1	-1.323	-0.555	-1.886	**-2.791**	0											0	0	0												**9923**
9950	2	3	1	1.443	-1.007	1.499																											**9950**

Rapporter som utgivits 2012

1. Fisk, skaldjur och fiskprodukter – analys av näringsämnen av V Öhrvik, A von Malmborg, I Mattisson, S Wretling och C Åstrand.
2. Normerande kontroll av dricksvattenanläggningar 2007-2010 av T Lindberg.
3. Tidstrender av tungmetaller och organiska klorerade miljöföroreningar i baslivsmedel av J Ålander, I Nilsson, B Sundström, L Jorhem, I Nordlander, M Aune, L Larsson, J Kuivinen, A Bergh, M Isaksson och A Glynn.
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5. Mögel och mögelgifter i torkad frukt av E Fredlund och J Spång.
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20. Proficiency Testing – Food Microbiology, October 2012 by L Nachin ,C Normark and I Boriak
21. Dioxin- och PCB-halter i fisk och andra livsmedel 2000-2011 av T Cantillana och M Aune.
22. Not publiced.
23. Kontroll av kontaminanter i livsmedel 2011 – Resultat från kontrollprogrammen för dioxiner och dioxinlika PCB, PAH, nitrat, mykotoxiner och tungmetaller av A Wannberg, F Broman och H Omberg.
24. Proficiency Testing – Drinking Water Microbiology, 2012:2, September by T Šlapokas and K Mykkänen.

Rapporter som utgivits 2013

1. Contaminants and minerals in foods for infants and young children – analytical results, Part 1, by V Öhrvik, J Engman, B Kollander and B Sundström.

   Contaminants and minerals in foods for infants and young children – risk and benefit assessment, Part 2 by G Concha, H Eneroth, H Hallström and S Sand.

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