

Proficiency testing Drinking water Microbiology

September 2025

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Contents

Abbreviations	4
Analyses in this PT round	5
Method.....	6
Results	9
Coliform bacteria.....	10
Suspected thermotolerant coliform bacteria.....	13
<i>Escherichia coli</i>	15
Intestinal enterococci.....	18
<i>Pseudomonas aeruginosa</i>	20
Culturable microorganisms, 22 ± 2 °C for 68 ± 4 hours.....	22
Culturable microorganisms, 36 ± 2 °C for 44 ± 4 hours.....	24
Outcome of the results of individual participants - assessment.....	26
Test material and quality control	29
References.....	31

Abbreviations

Media

BEAA	Bile Esculin Azide Agar (EN ISO 7899-2:2000)
CCA	Chromogenic Coliform Agar (EN ISO 9308-1:2014)
Colilert	Colilert® Quanti-Tray® (IDEXX Inc.; EN ISO 9308-2:2014)
Enterolert	Enterolert® Quanti-Tray® (IDEXX Inc.)
LES	m-Endo Agar LES (SS 028167)
LTLSB	Lactose tryptone lauryl sulphate broth (SS 028167)
m-Ent	m-Enterococcus Agar (EN ISO 7899-2:2000)
m-FC	m-FC Agar (SS 028167)
PACN	Pseudomonas Agar base/CN agar (EN ISO 16266:2008)
PCA	Plate count agar
Pseudalert	Pseudalert® Quanti-Tray® (IDEXX Inc.; ISO 16266-2:2018)
YEA	Yeast extract Agar (EN ISO 6222:1999)

Other abbreviations

MF	Membrane filter (method)
MPN	Most Probable Number (quantification based on statistical distributions)
ISO	International Organization for Standardization
EN	European standard from "Comité Européen de Normalisation" (CEN)
DS, NS, SFS, SS	National standards from Denmark, Norway, Finland and Sweden
SLV	Livsmedelsverket/Swedish Food Agency, Sweden

Analyses in this PT round

Quantitative analyses

Coliform bacteria

Suspected thermotolerant coliform bacteria (not assessed)

Escherichia coli

Intestinal enterococci

Pseudomonas aeruginosa

Culturable microorganisms, 22 ± 2 °C for 68 ± 4 hours

Culturable microorganisms, 36 ± 2 °C for 44 ± 4 hours

Method

Reporting of results and method information

It is the responsibility of the individual participants to correctly report results according to the instructions. Incorrectly reported results, for example results reported for the wrong sample, cannot be correctly processed. Incorrectly reported results are as a general rule excluded but may – after manual assessment by the Swedish Food Agency in each individual case – still be included and processed.

It is also mandatory for the participants to report method information for all analyses. This method information is sometimes contradictory or difficult to interpret. For example when manual comments by the participant contradict the reported method information. In such cases, the reported method information provided by the participants is generally used in method comparisons “as it is”. Alternatively, method data that are difficult to interpret may be excluded or added to the group “Other”, together with results from methods and media that are only used by 1–2 participants.

Standard deviation and assigned value

Evaluation of the participants’ results and statistical calculations are carried out on square root transformed results. Results reported by participants as “> value” or “< value” are not evaluated.

A robust statistical approach is used to determine the mean value and standard deviation. Algorithm A with iterated scale as described in ISO 13528:2022 [1] is used to determine the robust mean (m_{PT}) and robust standard deviation (s_{PT}) of the participants’ results. Results that are obviously erroneous are excluded prior to determining m_{PT} and s_{PT} (blunder removal). For evaluated parameters, the assigned value consists of m_{PT} . It is regarded as the true, normative value.

For small datasets, there is an increased uncertainty associated with determining the robust mean (m_{PT}) and robust standard deviation (s_{PT}) of the participants’ results. Therefore, when fewer than 12 participants have reported evaluated results, the statistical measures for performance evaluation will be provided *only as an information* to the participants.

Outliers

Outliers are results that deviate from the other results in a way that cannot be explained by normal variation. Results within $m_{PT} \pm 3s_{PT}$ are considered acceptable, whereas results outside this interval are considered as outliers. When fewer than 12 participants have reported results, as well as in some individual cases, subjective adjustments are made to set acceptance limits based on prior knowledge of the samples contents.

Results from different methods

Non-robust median values (*Med*) and coefficient of variation (*CV*) are calculated to assist in the evaluation of the results from different methods. These are shown in tables in the report, in connection with the respective analyses. In these instances, *Med* and *CV* are calculated from the respective method groups' results, with outliers and false results excluded. For method groups with fewer than 5 results, only the number of false results and outliers are provided.

Coefficient of variation

The coefficient of variation (*CV*) is a relative measure and is calculated as:

$$CV = 100 \times \frac{s_{PT}}{m_{PT}}$$

The *CV* for square root transformed results is given as a measure of dispersion. When the dispersion is <10 % it is regarded as very small, 10–20 % as small, 20–30 % as medium, 30–40 % as large and >40 % as very large.

Measurement uncertainty for the assigned value

The standard uncertainty (u_{PT}) of the assigned value (m_{PT}) is estimated from the standard deviation (s_{PT}) and the number of evaluated results (n):

$$u_{PT} = 1.25 \times \frac{s_{PT}}{\sqrt{n}}$$

The measurement uncertainty is considered negligible compared to the standard deviation (which is used for evaluating the participants' results) when:

$$u_{PT} < 0.3s_{PT}$$

In appendix 1 the relative standard uncertainty (u_{rel}) of m_{PT} is also provided.

$$u_{rel,mPT}(\%) = 100 \times \frac{s_{PT}}{\sqrt{n} \cdot m_{PT}}$$

Z-scores

To allow comparison of the results from different analyses and samples, results are transformed into standard values (*z*-scores). *Z*-scores are calculated as:

$$z = \frac{x_{lab} - m_{PT}}{s_{PT}}$$

where x_{lab} is the square root transformed result of the individual participant.

Z-scores for individual analyses are shown in Appendix 2 and can be used as a tool by participants when following up on the results. For quantitative analyses, a *z*-score is either positive or negative, depending on whether the participants result is higher or lower than m_{PT} .

In evaluations of the analytical results, the following guidelines can be used:

$ z \leq 2$	indicates that the result is acceptable
$2 < z < 3$	indicates a warning that the result may be deviating, and might motivate an action in the follow-up process
$ z \geq 3$	indicates that the result is regarded as deviating and should lead to an action in the follow-up process

Table legends

N	number of participants that reported results for the analysis
n	number of participants with acceptable result (false results and outliers excluded)
m_{PT}	assigned value, robust mean value in cfu / MPN 100 ml ⁻¹ or cfu ml ⁻¹ , re-transformed to the cfu / MPN scale
Med	median in cfu /MPN100 ml ⁻¹
CV	coefficient of variation in percent
F	number of false positive or false negative results
$<$	number of low outliers
$>$	number of high outliers

Figure legends

■	results within the interval of acceptance
■	outlier
□	false-negative result
*	value outside the x-axis scale

Results

General outcome

Samples were sent to 82 participants: 32 in Sweden, 46 in other European countries, and four outside of Europe. In total, 79 participants (96 %) reported results, of which 43 (54 %) provided at least one result with a remark.

Individual results are listed in Appendix 1. Z-scores for individual results are listed in Appendix 2.

Table 1. Composition of the test material and proportion of deviating results (N: number of reported results, F: false-positive or false-negative results, X: outliers)

	Sample A				Sample B				Sample C			
% participants with												
Microorganisms	<i>Escherichia coli</i> <i>Serratia marcescens</i> <i>Enterococcus hirae</i> <i>Pseudomonas aeruginosa</i> <i>Staphylococcus saprophyticus</i>				<i>Escherichia coli</i> <i>Klebsiella aerogenes</i> <i>Enterococcus durans</i> <i>Burkholderia cepacia</i>				<i>Klebsiella pneumoniae</i> <i>Enterobacter hormaechei</i> <i>Lactiplantibacillus plantarum</i> <i>Pseudomonas aeruginosa</i> <i>Pseudomonas brenneri</i>			
Analysis	Target organism	N	F	X	Target organism	N	F	X	Target organism	N	F	X
Coliform bacteria	<i>E. coli</i> <i>S. marcescens</i>	113	2	1	<i>E. coli</i> <i>K. aerogenes</i>	114	0	9	<i>K. pneumoniae</i> <i>E. hormaechei</i>	115	1	8
Suspected thermotolerant coliform bacteria	<i>E. coli</i>	21	0	0	<i>E. coli</i> <i>K. aerogenes</i>	22	0	0	<i>K. pneumoniae</i> <i>E. hormaechei</i>	21	0	0
<i>E. coli</i>	<i>E. coli</i>	118	4	2	<i>E. coli</i>	121	3	4	-	112	2	0
Intestinal enterococci	<i>E. hirae</i> (<i>S. saprophyticus</i>)	90	0	4	<i>E. durans</i>	91	0	7	(<i>L. plantarum</i>)	85	10	0
<i>P. aeruginosa</i>	<i>P. aeruginosa</i>	65	0	0	(<i>B. cepacia</i>)	63	3	0	<i>P. aeruginosa</i>	65	3	0
Culturable microorganisms, 22°C for 3 days	<i>All</i>	84	0	2	<i>All</i>	83	0	4	<i>All except P. brenneri</i>	83	0	3
Culturable microorganisms, 36°C for 2 days	<i>All</i>	71	0	1	<i>All</i>	70	0	4	<i>P. brenneri</i>	68	0	6

- no target organism or no value

microorganism = main target organism

microorganism = The microorganism may give different results depending on method or definition used

(*microorganism*) = false-positive before confirmation

The results are not evaluated

Coliform bacteria

Sample A

The strains of *E. coli* and *S. marcescens* were target organisms. The strain of *E. coli* forms typical colonies with a metallic sheen on m-Endo Agar LES (LES) and blue colonies on Chromocult Coliform Agar (CCA). In contrast, the strain of *S. marcescens* diverges phenotypically from the typical colony morphology of coliform bacteria. On LES, the strain forms small red colonies without metallic sheen and apricot-coloured colonies with a subtle pink undertone on CCA. Both strains possess the enzyme β -galactosidase and are detected as coliform bacteria with most probable number (MPN) methods according to ISO 9308-2.

On CCA, *S. saprophyticus* may form small atypical pink colonies that should not be included in the result.

In total, 113 results were evaluated. Two false-negative results, both from the same participant, were reported. One high outlier was identified.

The results indicate that some participants have excluded *S. marcescens*, while others have not. Z-scores below -2 should be interpreted with caution, as they may vary depending on the method used and the definition of coliform bacteria applied.

Sample B

The strains of *E. coli* and *K. aerogenes* were target organisms. *E. coli* forms typical colonies on most MF media at 35/36/37 °C. The strain of *K. aerogenes* forms pink colonies on CCA. However, the colonies of *K. aerogenes* do not exhibit a distinct metallic sheen on LES. Both strains possess the enzyme β -galactosidase and are detected as coliform bacteria with MPN-methods.

On CCA, *E. durans* may form small atypical pink colonies that should not be included in the result.

In total, 114 results were evaluated. Two high and seven low outliers were identified.

Sample C

The strains of *K. pneumoniae* and *E. hormaechei* were target organisms. Both strains possess the enzyme β -galactosidase and form typical colonies on most MF media at 35/36/37 °C.

In total, 115 results were evaluated. One false-negative result, as well as three low and five high outliers were identified.

General remarks

Most participants followed (EN) ISO 9308-2:2012 using MPN (most probable number) method. This was last reviewed by ISO in 2023 and remains current. With this method, coliform bacteria are defined as members of the Enterobacteriaceae family that produce the enzyme β -D-galactosidase. The sample and culture medium are incubated in designated trays at 36 ± 2 °C for 18 to 22 hours. The enzyme β -D-

galactosidase cleaves ortho-nitrophenol galactoside (ONPG), resulting in a yellow coloration of the wells, which indicates a positive reaction for coliform bacteria. Using statistical tables or a computer program, the most probable number (MPN) of coliform bacteria in 100 ml of the sample can then be determined.

For MF methods, most participants followed (EN) ISO 9308-1:2014 using the enzyme-based chromogenic medium CCA. Due to the low selectivity of the medium, CCA is suitable for waters with a low bacterial background flora. On CCA, β -D-galactosidase positive (pink to red) colonies are counted as presumptive coliform bacteria. β -D-galactosidase and β -D-glucuronidase positive (dark blue to violet) colonies are counted as *E. coli*. Total coliform bacteria are the sum of oxidase-negative presumptive coliform bacteria and *E. coli*. ISO 9308-1:2014 was last reviewed and confirmed by ISO in 2019 and remains current. An amendment of the incubation time and performance testing of CCA is available (ISO 9308-1:2014/Amd 1:2016).

SS 028167 and SFS 3016 are Nordic national standards that are based on incubation on LES. On LES, coliform bacteria form red colonies with a metallic sheen due to the production of aldehyde from the fermentation of lactose. The presumptive coliform bacteria are confirmed by a negative oxidase test.

A somewhat higher median was observed for participants that used MPN methods according to (EN) ISO 9308-2:2012, most notably in sample B.

Note: One participant reported the same set of result twice, together with the same method. Only one of these sets was evaluated. The other, marked in blue in Appendix 1 and 2, was excluded from the evaluation. It appears that one participant may have mixed up samples B and C. These results were therefore excluded from calculations of m_{PT} and s_{PT} , but were otherwise included in the evaluation. This information is highlighted in blue text in Appendix 1.

Table 2. Results from analysis of coliform bacteria.

Method	Sample A							Sample B							Sample C						
	N	n	m_{PT}	CV	F	<	>	N	n	m_{PT}	CV	F	<	>	N	n	m_{PT}	CV	F	<	>
All results	113	110	31	22	2	0	1	114	105	2727	18	0	7	2	115	106	40	13	1	3	5
ISO 9308-2 (Colilert-18)	38	38	35	10	0	0	0	36	34	3230	13	0	1	1	37	35	44	10	0	0	2
ISO 9308-1 (CCA)	27	26	37	24	0	0	1	26	25	2500	15	0	0	1	26	25	34	11	0	1	0
Colilert-18	8	8	30	9	0	0	0	10	10	2437	14	0	0	0	11	10	41	11	0	1	0
m-Endo Agar LES (LES)	8	7	21	36	1	0	0	9	7	2500	21	0	2	0	8	8	34	15	0	0	0
SFS 3016 (LES)	8	8	16	32	0	0	0	8	8	2545	9	0	0	0	8	8	41	13	0	0	0
SS 028167 (LES)	8	8	20	25	0	0	0	7	6	2176	28	0	1	0	8	7	44	10	0	0	1
CCA	7	7	30	31	0	0	0	9	7	2500	19	0	2	0	7	6	33	11	0	1	0
Other	3	2	-	-	1	0	0	4	3	-	-	0	1	0	4	1	-	-	1	0	2
ISO 9308-1:1990 (old edition, LES)	3	3	-	-	0	0	0	3	3	-	-	0	0	0	3	3	-	-	0	0	0
Colilert	3	3	-	-	0	0	0	2	2	-	-	0	0	0	3	3	-	-	0	0	0

For "All results", m_{PT} = assigned value, robust mean value in cfu / MPN 100 ml⁻¹, re-transformed to the cfu / MPN scale

For individual methods, m_{PT} = median value in cfu / MPN 100 ml⁻¹

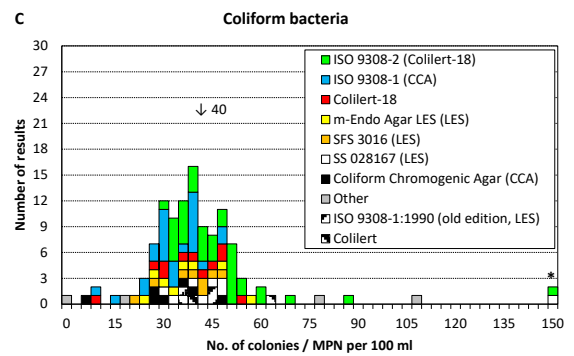
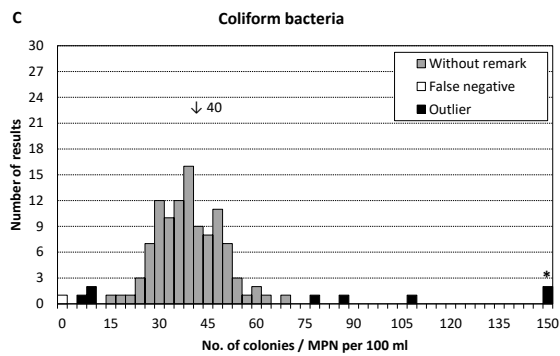
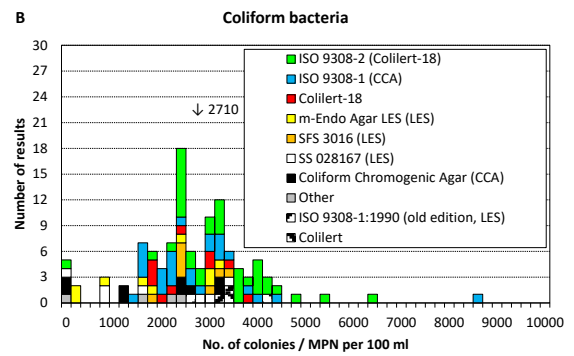
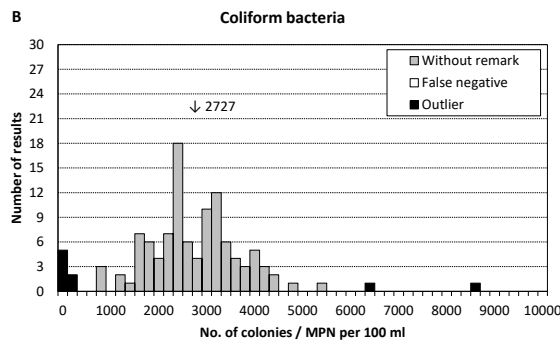
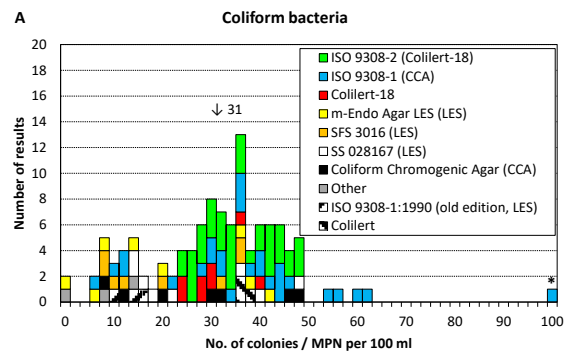
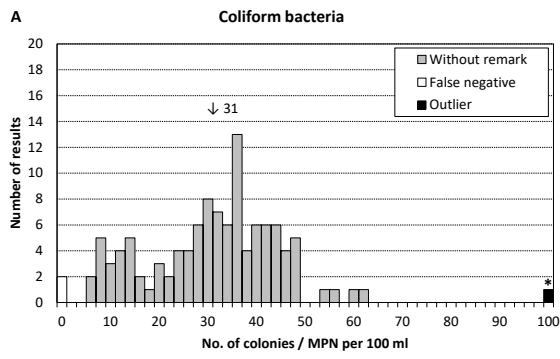


Figure 1. Results from analysis of coliform bacteria

Suspected thermotolerant coliform bacteria

Sample A

The strain of *E. coli* was target organism. On m-FC agar, it forms typical blue colonies at 44/44.5 °C. The strain of *E. coli* is gas-negative. Gas production at 44/44.5 °C is, according to some standards, a criterion for classifying a strain as thermotolerant coliform bacteria. If this criterion has been applied also when reporting suspected thermotolerant coliform bacteria – despite not being part of the formal parameter definition – it is plausible that *E. coli* colonies may have gone unreported.

In total, 21 results were reported. Five of these were zero results.

Sample B

The strain of *E. coli* was target organism. On m-FC agar, it forms typical blue colonies at 44/44.5 °C.

The strain of *K. aerogenes* may also grow as a suspected thermotolerant coliform bacterium, forming small, blue to grey colonies on m-FC agar.

In total, 22 results were reported. One of these was a zero result.

Sample C

The strain of *K. pneumoniae* was target organism. On m-FC Agar, it forms grey-blue colonies at 44 °C.

E. hormaechei may also grow as suspected thermotolerant coliform bacterium with small blue colonies on m-FC.

In total, 21 results were reported. Seven of these were zero results.

General remarks

The parameter suspected thermotolerant coliform bacteria is not evaluated and the median value for performance evaluation is provided only as an information.

In total, 22 results were reported. Most participants used m-FC. The elevated incubation temperature (44/44.5 °C) and the addition of rosolic acid makes m-FC selective for thermotolerant coliform bacteria. Different standards specify varying incubation temperatures, for example 44.0 ± 0.5 °C and 44.5 ± 0.2 °C, which may result in differences in the detection of suspected thermotolerant coliform bacteria between methods.

ISO is currently developing a draft standard for membrane filtration method of *E. coli* in water with high levels of background bacteria.

Table 3. Results from analysis of suspected thermotolerant coliform bacteria.

Method	Sample A							Sample B							Sample C						
	N	n	Med	CV	F	<	>	N	n	Med	CV	F	<	>	N	n	Med	CV	F	<	>
All results	21	21	11	-	-	-	-	22	22	495	-	-	-	-	21	21	10	-	-	-	-
SS 028167 (m-FC)	5	5	11	-	-	-	-	6	6	495	-	-	-	-	6	6	18	-	-	-	-
Other	5	5	14	-	-	-	-	6	6	425	-	-	-	-	5	5	0	-	-	-	-
SFS 4088 (m-FC)	4	4	-	-	-	-	-	4	4	-	-	-	-	-	4	4	-	-	-	-	-
ISO 9308-1:1990 (old edition, m-FC)	2	2	-	-	-	-	-	2	2	-	-	-	-	-	2	2	-	-	-	-	-
m-FC Agar (m-FC)	2	2	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	-
MacConkey Agar	1	1	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	-
ISO 9308-1:2000 (old edition, LTTC)	1	1	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	-
NS 4792 (m-FC)	1	1	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	-

Med= Median value in cfu 100 ml⁻¹. The parameter suspected thermotolerant coliform bacteria is not evaluated and the median value for performance evaluation is provided only as an information.

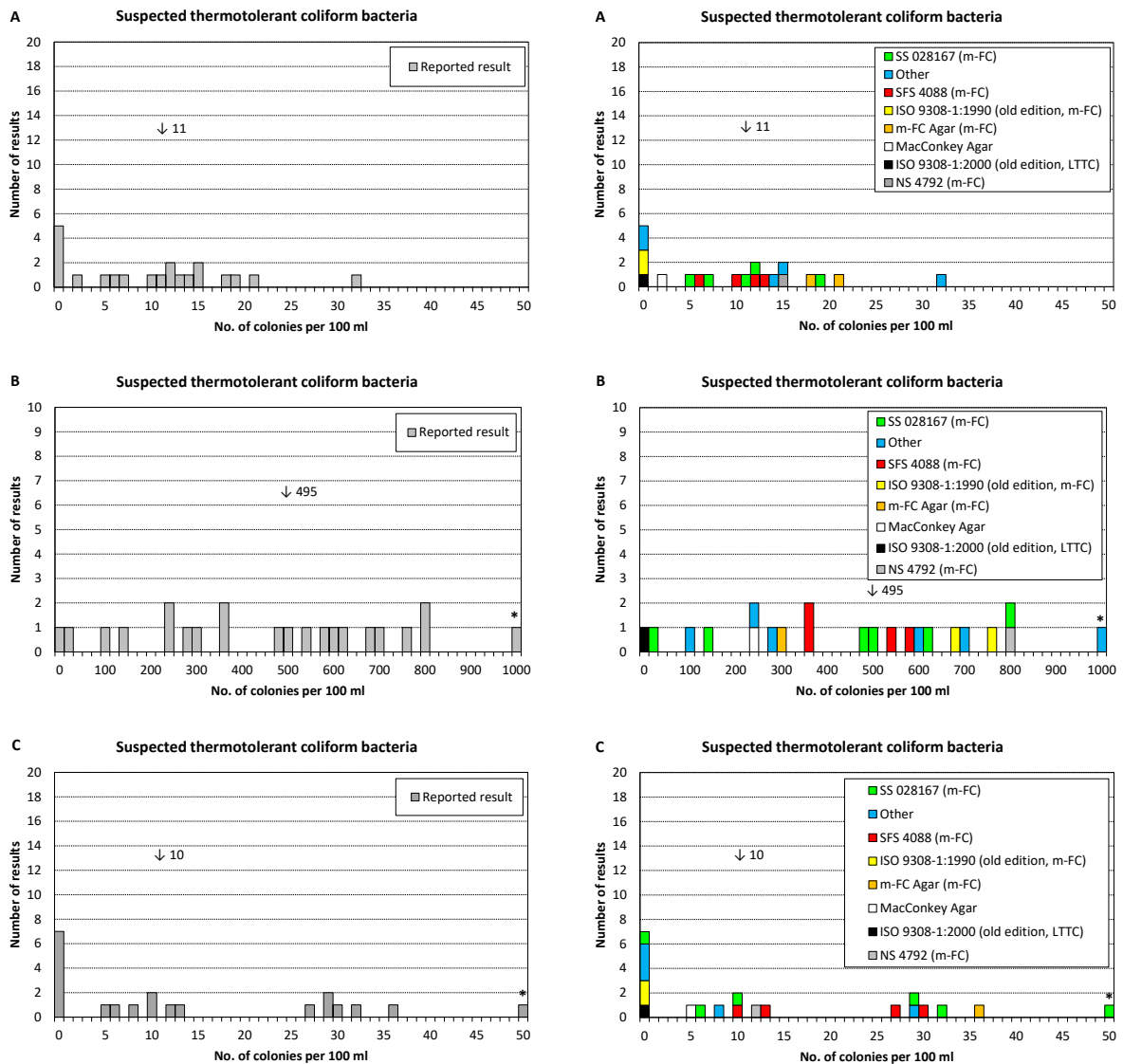


Figure 2. Results from analysis of suspected thermotolerant coliform bacteria

Escherichia coli

Sample A

The strain of *E. coli* was target organism. It forms typical colonies with a metallic sheen on LES and blue colonies on CCA. It possesses the enzyme β -glucuronidase and is detected as *E. coli* with MPN-methods according to ISO 9308-2. The strain is positive for indole production in Lactose-Tryptone-Lauryl Sulphate Broth (LTLSB). However, the strain does not produce gas in LTLSB at 44 °C.

In total, 118 results were evaluated. Four false-negative results, as well as two high outliers were identified. If gas production is a decisive criterion for a laboratory in the detection of *E. coli*, results should be reported as negative in its absence. This may explain some of the false-negative results that occurred.

Sample B

The strain of *E. coli* (not identical to that in sample A) was target organism. It has a typical appearance on most MF media, as well as with MPN methods at 35/36/37 °C. The strain is positive for indole production and produces gas in LTLSB.

In total, 121 results were evaluated. Three false-negative results, as well as one high and three low outliers were identified.

Sample C

No target organism was present in the sample.

In total, 112 results were evaluated. Two false-positive results were reported. Both of these were from the same participant, and are believed to be due to having mixed up samples B and C.

General remarks

Most participants followed (EN) ISO 9308-2:2012, (EN) ISO 9308-1:2014 and/or Nordic national standards (see table 4). (EN) ISO 9308 defines *E. coli* as a member of the Enterobacteriaceae that possesses both β -D-galactosidase and β -D-glucuronidase enzymes. On CCA, β -D-galactosidase and β -D-glucuronidase-positive strains appear as dark blue to violet colonies. On Colilert, yellow wells that also exhibit any degree of fluorescence are regarded as positive for *E. coli*. No further confirmation is needed.

When colonies are isolated from LES or m-FC, confirmation is required. Since EN ISO 9308-1:2014 only requires expression of β -D-glucuronidase, some participants have modified their standard accordingly. Depending on the method, tests for gas production, indole production and/or β -glucuronidase activity are usually performed from oxidase-negative presumptive colonies.

The primary MF growth media CCA and LES are incubated at 35/36/37 °C and m-FC at 44/44.5 °C.

Note: One participant reported the same set of result twice, together with the same method. Only one of these sets was evaluated. The other, marked in blue in Appendix 1 and 2, was excluded from the evaluation.

Table 4. Results from analysis of *Escherichia coli*.

Method	Sample A							Sample B							Sample C						
	N	n	m _{PT}	CV	F	<	>	N	n	m _{PT}	CV	F	<	>	N	n	m _{PT}	CV	F	<	>
All results	118	112	13	20	4	0	2	121	114	698	20	3	3	1	112	110	-	-	2	-	-
ISO 9308-2 (Colilert-18)	37	37	14	17	0	0	0	36	35	820	16	1	0	0	36	35	-	-	1	-	-
ISO 9308-1 (CCA)	27	26	13	23	0	0	1	27	26	720	15	0	1	0	26	26	-	-	0	-	-
Colilert-18	9	9	11	16	0	0	0	11	11	649	23	0	0	0	9	9	-	-	0	-	-
Chromocult Coliform Agar	8	7	9	18	1	0	0	9	7	580	26	1	1	0	5	5	-	-	0	-	-
m-Endo Agar LES (LES)	7	7	10	24	0	0	0	7	7	660	22	0	0	0	7	7	-	-	0	-	-
SS 028167 (LES)	7	7	15	10	0	0	0	7	4	-	-	1	1	1	6	5	-	-	1	-	-
SFS 3016 (LES)	6	6	11	20	0	0	0	6	6	725	22	0	0	0	6	6	-	-	0	-	-
SS 028167 (m-FC)	5	5	13	24	0	0	0	5	5	500	11	0	0	0	5	5	-	-	0	-	-
Other	3	1	-	-	2	0	0	4	4	-	-	0	0	0	3	3	-	-	0	-	-
Colilert	3	2	-	-	0	0	1	3	3	-	-	0	0	0	3	3	-	-	0	-	-
ISO 9308-1:1990 (old edition, LES)	2	2	-	-	0	0	0	2	2	-	-	0	0	0	2	2	-	-	0	-	-
SFS 4088 (m-FC)	1	1	-	-	0	0	0	1	1	-	-	0	0	0	1	1	-	-	0	-	-
NS 4792 (m-FC)	1	0	-	-	1	0	0	1	1	-	-	0	0	0	1	1	-	-	0	-	-
m-FC Agar (m-FC)	1	1	-	-	0	0	0	1	1	-	-	0	0	0	1	1	-	-	0	-	-
ISO 9308-1:1990 (old edition, m-FC)	1	1	-	-	0	0	0	1	1	-	-	0	0	0	1	1	-	-	0	-	-

For "All results", m_{PT} = assigned value, robust mean value in cfu / MPN 100 ml⁻¹, re-transformed to the cfu / MPN scale

For individual methods, m_{PT} = median value in cfu / MPN 100 ml⁻¹

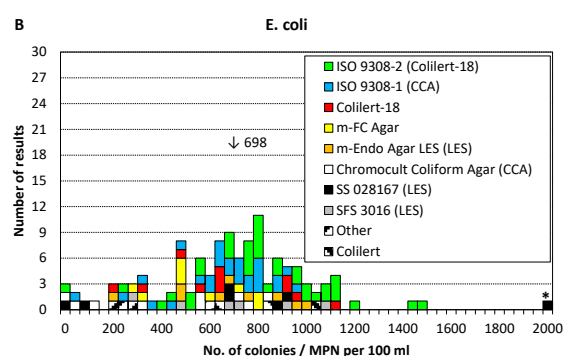
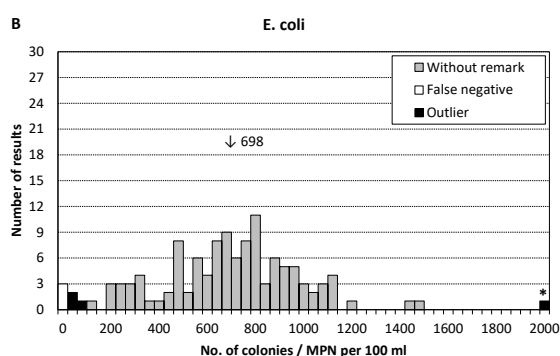
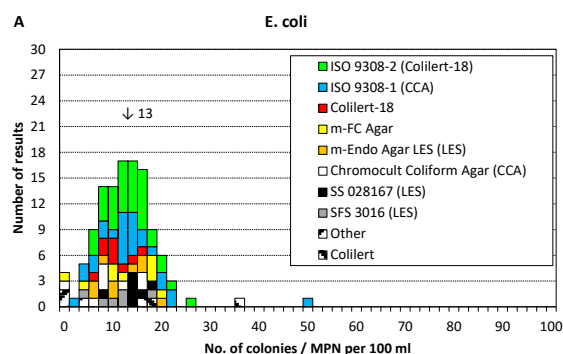
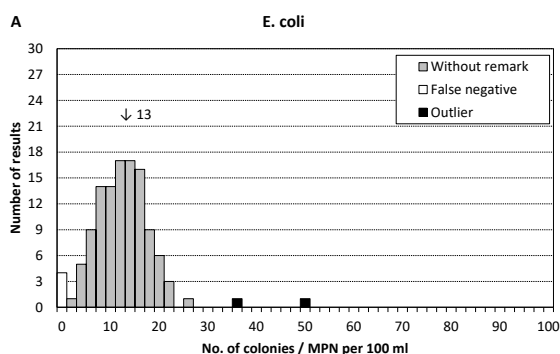


Figure 3. Results from analysis of *Escherichia coli*. m-FC Agar includes the reporting of SS 028167 (m-FC), SFS 4088 (m-FC), NS 4792 (m-FC), ISO 9308-1:1990 (old edition, m-FC) and m-FC Agar (unknown method). m-Endo Agar LES (LES) includes the reporting of ISO 9308-1:1990 (old edition, LES) and m-Endo Agar LES (unknown method).

Intestinal enterococci

Sample A

The strain of *E. hirae* was target organism. On m-Enterococcus Agar (m-Ent), it forms raised, red to maroon colonies. Upon confirmation on Bile Esculin Azide Agar (BEAA), a distinct black colour is typically seen.

In total, 90 results were evaluated. One low and three high outliers were identified.

Sample B

The strain of *E. durans* was target organism. On m-Ent, it forms small red to maroon colonies. Upon confirmation on BEAA, a distinct black colour is typically seen.

In total, 91 results were evaluated. Seven low outliers were identified.

Sample C

No target organism was present in the sample. The strain of *L. plantarum* was present as false-positive organism for the analysis. The strain of *L. plantarum* forms atypical colonies after two days on m-Ent and may show a weak reaction on BEAA. The intensity of the reaction may vary depending on the manufacturer of confirmation media used.

In total, 85 results were evaluated. Ten false-positive result were identified.

General remarks

Most participants followed (EN) ISO 7899-2:2000 using m-Ent (Slanetz & Bartley). With this standard, intestinal enterococci are defined as bacteria that reduce 2,3,5-triphenyltetrazolium chloride to formazan and hydrolyse aesculin at 44 °C on m-Ent and BEAA, respectively. ISO 7899-2:2000 was last reviewed and confirmed by ISO in 2021 and remains current.

For MPN methods, 16 results were reported using Enterolert-E and ten results were reported using Enterolert-DW. (EN) ISO 7899-3:2025, using Enterolert-DW, was published 2025 by ISO. The Enterolert-DW test defines intestinal enterococci as bacteria that are capable of growth in the defined substrate medium, and that produce a green colour through cleavage of ortho-nitrophenyl- β -D-glucoside by the enzyme β -D-glucosidase.

The primary MF growth media m-Ent is incubated at 36 ± 2 °C and Enterolert-E/-DW at 41 ± 0.5 °C.

Note: One participant reported the same set of result twice, together with the same method. Only one of these sets was evaluated. The other, marked in blue in Appendix 1 and 2, was excluded from the evaluation. It appears that one participant may have mixed up samples B and C. These results were therefore excluded from calculations of m_{PT} and s_{PT} , but was otherwise included in the evaluation. This information is highlighted in blue text in Appendix 1.

Table 5. Results from analysis of intestinal enterococci.

Method	Sample A							Sample B							Sample C						
	<i>N</i>	<i>n</i>	<i>m</i> _{PT}	<i>CV</i>	<i>F</i>	<	>	<i>N</i>	<i>n</i>	<i>m</i> _{PT}	<i>CV</i>	<i>F</i>	<	>	<i>N</i>	<i>n</i>	<i>m</i> _{PT}	<i>CV</i>	<i>F</i>	<	>
All results	90	86	303	11	0	1	3	91	84	6244	11	0	7	0	85	75	-	-	10	-	-
ISO 7899-2 (m-Ent)	54	54	315	9	0	0	0	57	51	7000	11	0	6	0	53	43	-	-	10	-	-
Enterolert-E	16	15	273	10	0	0	1	16	16	5487	8	0	0	0	16	16	-	-	0	-	-
Enterolert-DW	10	10	282	10	0	0	0	10	10	6042	10	0	0	0	10	10	-	-	0	-	-
Other	6	5	300	6	0	0	1	6	5	5400	13	0	1	0	3	3	-	-	0	-	-
m-Enterococcus Agar (m-Ent)	4	2	-	-	0	1	1	2	2	-	-	0	0	3	3	-	-	-	0	-	-

For “All results”, *m*_{PT} = assigned value, robust mean value in cfu / MPN 100 ml⁻¹, re-transformed to the cfu / MPN scale

For individual methods, *m*_{PT} = median value in cfu /MPN 100 ml⁻¹

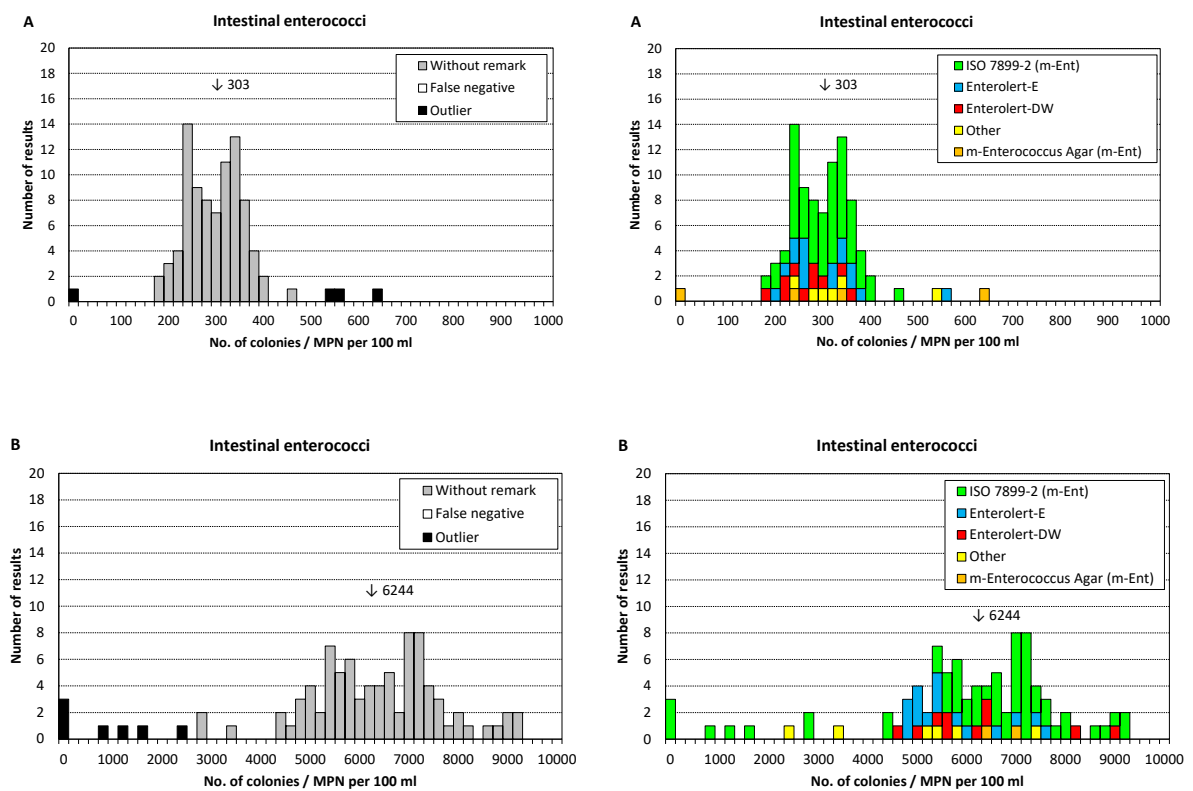


Figure 4. Results from analysis of intestinal enterococci.

Pseudomonas aeruginosa

Sample A

The strain of *P. aeruginosa* was target organism. On Pseudomonas Agar base/CN agar (PACN), it forms typical blue-green colonies that fluoresce under UV light. Due to the presence of blue-green pigmentation and fluorescence observed on PACN, no further confirmation of the colonies is required according to EN ISO 16266:2006.

In total, 65 results were evaluated. No outliers or false-negative results were identified.

Sample B

No target organism was present in the sample. On PACN, *B. cepacia* may form transparent colonies.

In total, 63 results were evaluated. Three false-positive results were identified.

Sample C

The strain of *P. aeruginosa* was target organism. On PACN, it forms light green colonies that fluoresce under UV light.

In total, 65 results were evaluated. Three false-negative results were identified.

General remarks

Most participants followed the standard (EN) ISO 16266:2006. In this, *P. aeruginosa* are defined as microorganisms that grow on selective media containing cetrimide and produce pyocyanin, or as microorganisms that grow on such media, are oxidase-positive, fluoresce under UV light, and can produce ammonia from acetamide. ISO 16266:2006 was last reviewed and confirmed by ISO in 2021 and remains current.

Because some reagents used in the confirmation test are considered hazardous, some laboratories have modified the standard by substituting the confirmation tests with alternative methods. However, when only typical blue-green (pyocyanin-producing) colonies are observed, no confirmation is required.

Fifteen participants reported results obtained using Pseudalert according to (EN) ISO 16266-2:2018. This method is based on the growth of target organisms in a liquid medium, with enumeration carried out by reference to MPN tables. The *P. aeruginosa* enzyme aminopeptidase hydrolyses the substrate 7-amino-4-methylcoumarin, and positive wells exhibit blue fluorescence under UV light. ISO 16266-2:2018 was last reviewed and confirmed by ISO in 2024 and remains current.

Note: One participant reported the same set of result twice, together with the same method. Only one of these sets was evaluated. The other, marked in blue in Appendix 1 and 2, was excluded from the evaluation.

Table 6. Results from analysis of *P. aeruginosa*.

Method	Sample A							Sample B							Sample C						
	<i>N</i>	<i>n</i>	<i>m</i> _{PT}	<i>CV</i>	<i>F</i>	<	>	<i>N</i>	<i>n</i>	<i>m</i> _{PT}	<i>CV</i>	<i>F</i>	<	>	<i>N</i>	<i>n</i>	<i>m</i> _{PT}	<i>CV</i>	<i>F</i>	<	>
All results	65	65	9	30	0	0	0	63	60	-	-	3	-	-	65	62	9	21	3	0	0
ISO 16266 (PACN)	33	33	9	30	0	0	0	33	31	-	-	2	-	-	34	33	8	22	1	0	0
ISO 16266-2 (Pseudalert)	14	14	8	31	0	0	0	15	15	-	-	0	-	-	13	13	6	24	0	0	0
PACN	8	8	9	28	0	0	0	6	5	-	-	1	-	-	9	9	11	8	0	0	0
Other	6	6	10	12	0	0	0	6	6	-	-	0	-	-	4	2	-	-	2	0	0
Pseudalert	4	4	-	-	0	0	0	3	3	-	-	0	-	-	5	5	6	27	0	0	0

For "All results", *m*_{PT} = assigned value, robust mean value in cfu / MPN 100 ml⁻¹, re-transformed to the cfu / MPN scale

For individual methods, *m*_{PT} = median value in cfu / MPN 100 ml⁻¹

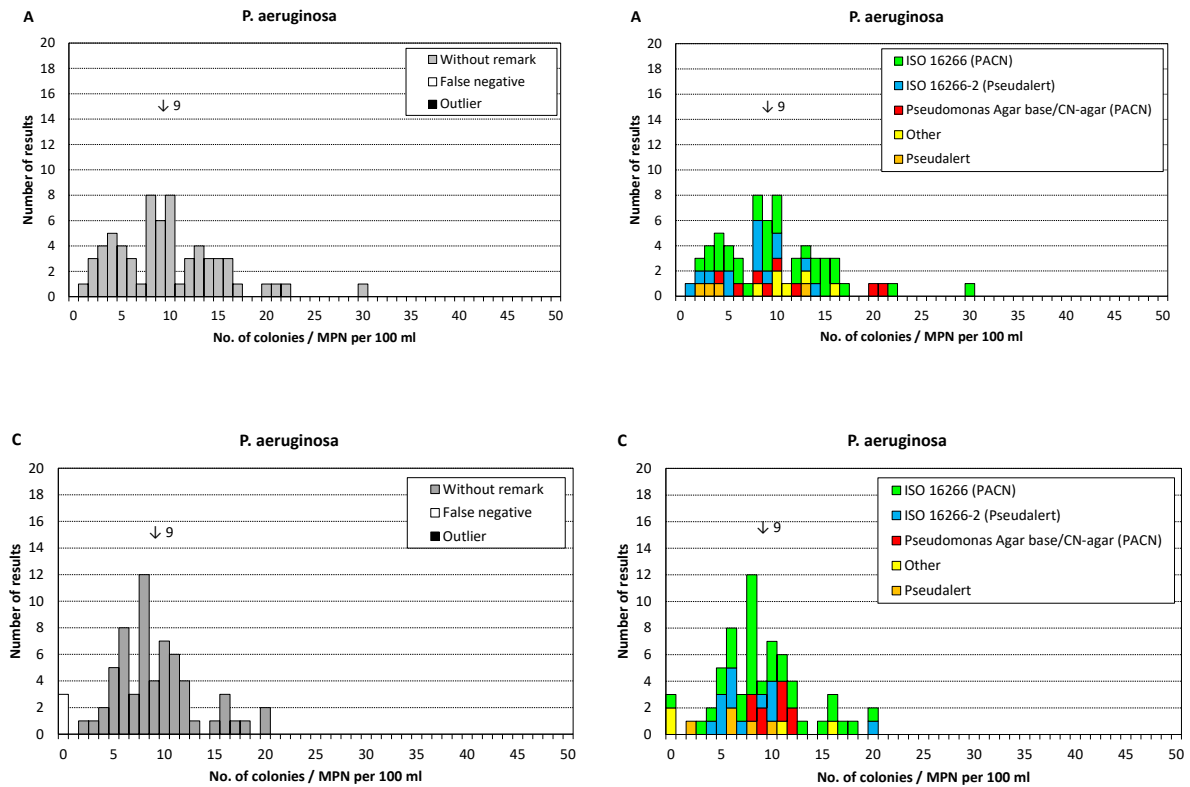


Figure 5. Results from analysis of *P. aeruginosa*.

Culturable microorganisms, 22 ± 2 °C for 68 ± 4 hours

Sample A

All of the strains included in the sample grow at 22 ± 2 °C as culturable microorganisms. The concentration of culturable microorganisms was low; m_{PT} was only 3 cfu ml⁻¹. A reported result of <1 cfu ml⁻¹ was included in the expected results range and is considered acceptable. Z-scores down to -3 are also considered acceptable.

In total, 84 results were evaluated. Two high outliers were identified.

Sample B

All of the strains included in the sample grow at 22 ± 2 °C as culturable microorganisms.

In total, 83 results were evaluated. One low and three high outliers were identified.

Sample C

The strain of *P. brenneri* was the main target organism.

In total, 83 results were evaluated. One high and two low outliers were identified.

General remarks

Most participants followed the standard (EN) ISO 6222:1999, which specifies a pour-plate method using Yeast Extract Agar (YeA). With this standard, culturable microorganisms are defined as all aerobic bacteria, yeasts, and moulds that form colonies on the medium. ISO 6222:1999 was last reviewed and confirmed by ISO in 2021 and remains current.

Some laboratories have modified the standard by using Plate Count Agar (PCA) instead of YeA. No difference between the two media was observed for samples A and B, but for sample C, the median value obtained with PCA was slightly lower than that obtained with YeA.

Note: One participant reported the same set of result twice, together with the same method. Only one of these sets was evaluated. The other, marked in blue in Appendix 1 and 2, was excluded from the evaluation. One result was excluded from calculations of m_{PT} and s_{PT} (blunder removal) but included in the evaluation. This information is highlighted in blue text in Appendix 1.

Table 7. Results from analysis of culturable microorganisms, 22 ± 2 °C for 68 ± 4 hours.

Method	Sample A							Sample B							Sample C						
	N	n	m _{PT}	CV	F	<	>	N	n	m _{PT}	CV	F	<	>	N	n	m _{PT}	CV	F	<	>
All results	84	82	3	24	0	0	2	83	79	100	6	0	1	3	83	80	31	26	0	2	1
ISO 6222 (YeA, pour plate)	49	48	3	26	0	0	1	48	47	98	7	0	1	0	49	49	34	27	0	0	0
ISO 6222 modified (PCA, pour plate)	21	21	4	26	0	0	0	20	18	100	6	0	0	2	19	18	25	38	0	1	0
Other	5	4	-	-	0	0	1	5	5	106	11	0	0	0	5	4	-	-	0	0	1
Yeast extract Agar (YeA, pour plate)	5	5	3	33	0	0	0	5	4	-	-	0	0	1	4	4	-	-	0	0	0
3M™ Petrifilm™ Aerobic Count Plate	3	3	-	-	0	0	0	3	3	-	-	0	0	0	3	3	-	-	0	0	0
Plate Count Agar (PCA, pour plate)	1	1	-	-	0	0	0	2	2	-	-	0	0	0	3	2	-	-	0	1	0

For “All results”, m_{PT} = assigned value, robust mean value in cfu ml⁻¹, re-transformed to the cfu scale

For individual methods, m_{PT} = median value in cfu ml⁻¹

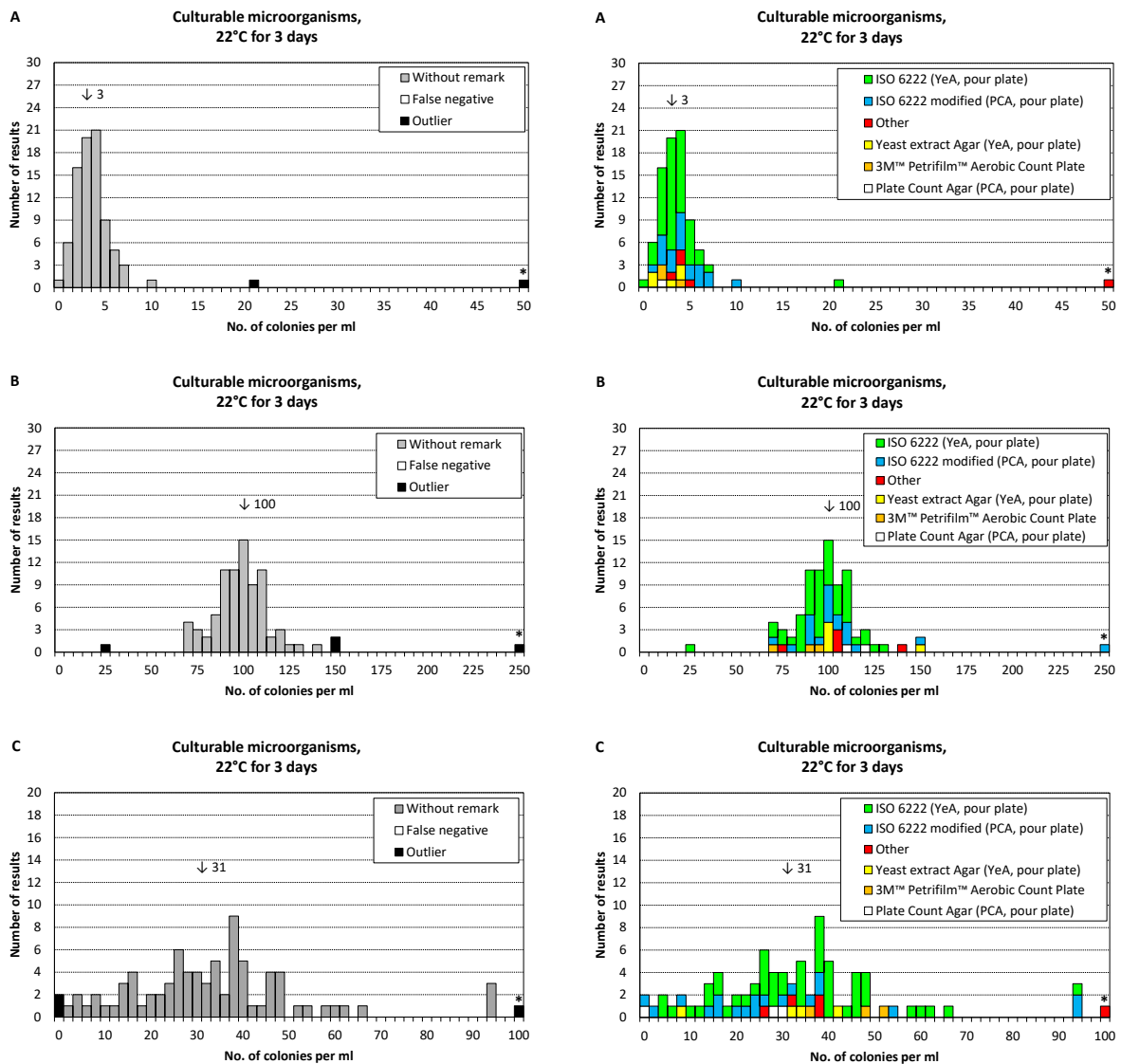


Figure 6. Results from analysis of culturable microorganisms, 22 ± 2 °C for 68 ± 4 hours.

Culturable microorganisms, 36 ± 2 °C for 44 ± 4 hours

Sample A

All of the strains included in the sample grow at 36 ± 2 °C as culturable microorganisms. The concentration of culturable microorganisms was low; m_{PT} was only 3 cfu ml⁻¹. A reported result of <1 cfu ml⁻¹ was included in the expected results range and is considered acceptable. Z-scores down to -3 are also considered acceptable.

In total, 71 results were evaluated. One high outlier was identified.

Sample B

All of the strains included in the sample grow at 36 ± 2 °C as culturable microorganisms.

In total, 70 results were evaluated. One low and three high outliers were identified.

Sample C

The included strain of *P. brenneri* does not grow at 36 ± 2 °C. Due to the low concentrations of the remaining strains, their presence is expected to be minimal. Consequently, total counts of less than 1 cfu/ml are included in the acceptable results range.

In total, 68 results were evaluated. Six high outliers were identified.

General remarks

Most participants followed the standard (EN) ISO 6222:1999, with certain laboratories applying a modification in which PCA was used instead of YeA. Sample C contained the strain *P. brenneri*, which does not grow at 36 ± 2 °C; consequently, zero results were both anticipated and acceptable.

Note: One participant communicated that there was an error in their data submission. These results were therefore excluded from calculations of m_{PT} and s_{PT} , but were otherwise included in the evaluation. This information is highlighted in blue text in Appendix 1.

Table 8. Results from analysis of culturable microorganisms, 36 ± 2 °C for 44 ± 4 hours.

Method	Sample A							Sample B							Sample C							
	N	n	m _{PT}	CV	F	<	>	N	n	m _{PT}	CV	F	<	>	N	n	m _{PT}	CV	F	<	>	
All results	71	70	3	33	0	0	1	70	66	97	9	0	1	3	68	62	1	115	0	0	0	6
ISO 6222 (YeA, pour plate)	39	39	2	40	0	0	0	38	36	95	7	0	1	1	38	36	0	132	0	0	0	2
ISO 6222 modified (PCA, pour plate)	20	20	4	28	0	0	0	17	16	98	9	0	0	1	17	14	2	72	0	0	0	3
Yeast extract Agar (YeA, pour plate)	4	4	-	-	0	0	0	4	4	-	-	0	0	0	4	4	-	-	0	0	0	0
Plate Count Agar (PCA, pour plate)	2	1	-	-	0	0	1	5	4	-	-	0	0	1	4	3	-	-	0	0	0	1
3M™ Petrifilm™ Aerobic Count Plate	3	3	-	-	0	0	0	3	3	-	-	0	0	0	3	3	-	-	0	0	0	0
Other	3	3	-	-	0	0	0	3	3	-	-	0	0	0	2	2	-	-	0	0	0	0

For “All results”, m_{PT} = assigned value, robust mean value in cfu ml⁻¹, re-transformed to the cfu scale

For individual methods, m_{PT} = median value in cfu ml⁻¹

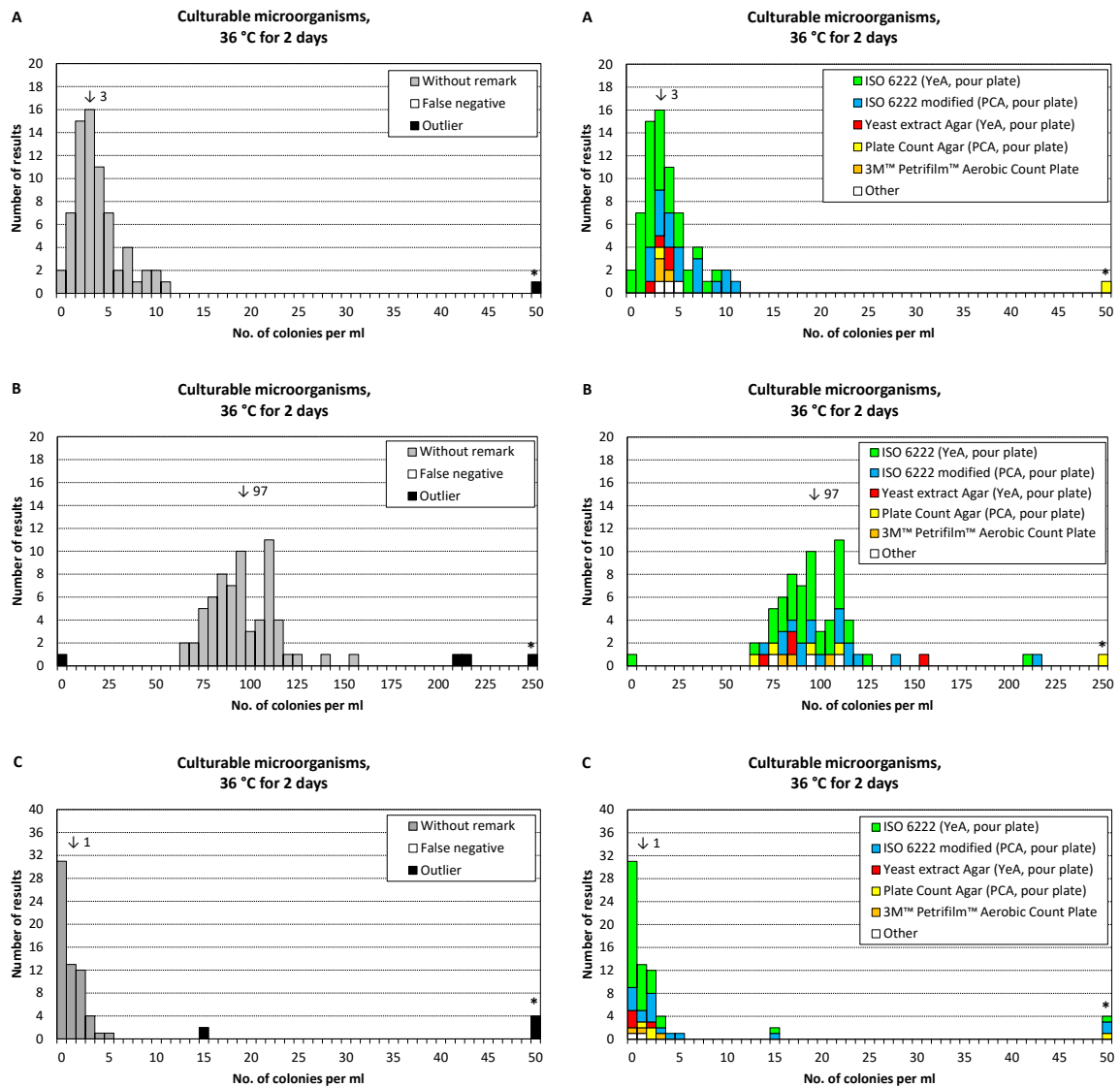


Figure 7. Results from analysis of culturable microorganisms, 36 ± 2 °C for 44 ± 4 hours.

Outcome of the results of individual participants - assessment

Reporting and evaluation of results

The results of all participants are listed in Appendix 1, together with the minimum and maximum accepted values for each analytical parameter. Outliers and false results are highlighted in yellow and red, respectively, with bold font.

Participants are not grouped or ranked based on their results. The performance of an individual participant can be broadly assessed by the numbers of outliers and false results, and by the z -scores.

Information on the results processing and recommendations for follow-up work are given in the Scheme Protocol [2].

Samples for follow-up analyses can be ordered at: <https://laboratory.livsmedelsverket.se>

Box plots and numbers of deviating results for each participant

Box plots are based on the z -scores listed in Appendix 2 and give a comprehensive view of the performance of each participant. The range of z -scores is indicated by the size of the box and, for most participants, by lines and/or circles above and beneath the box. A small range of values, centred around zero, indicates that the results of the individual participant are in general close to m_{PT} for the different analyses.

The different parts of a box plot are shown in figure 8.

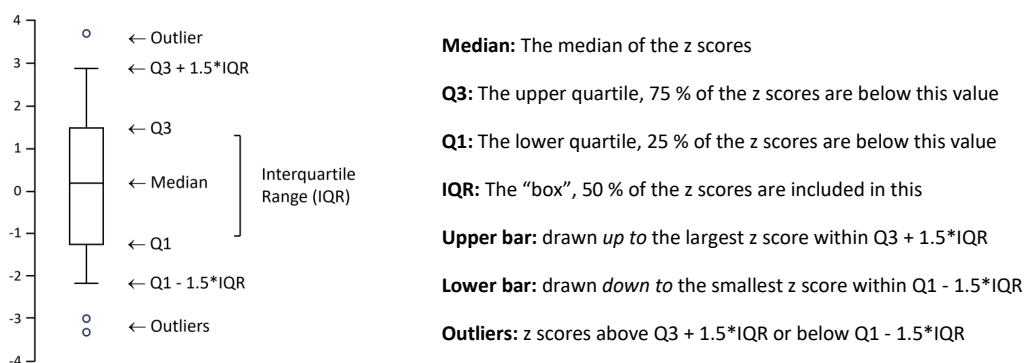
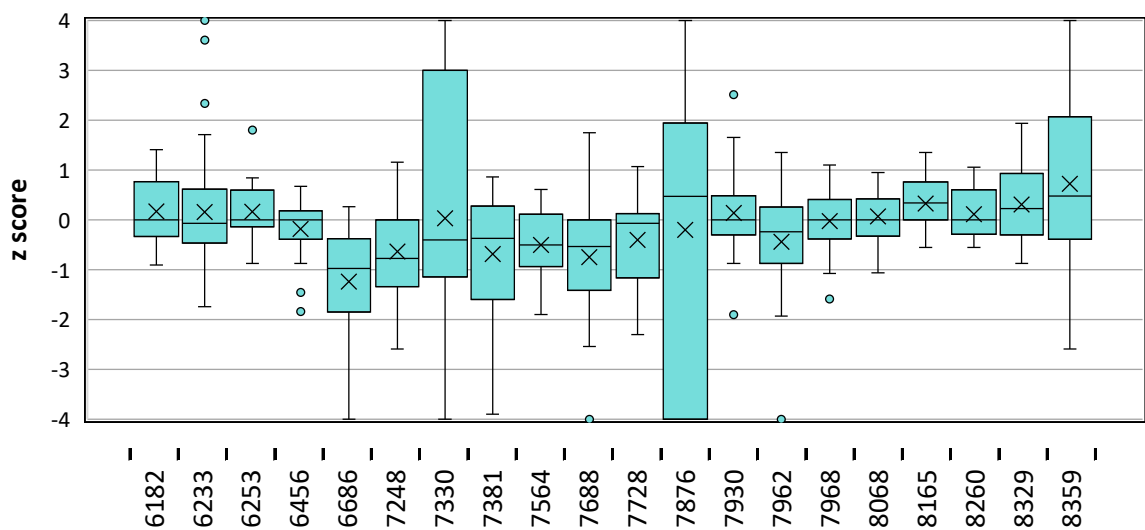
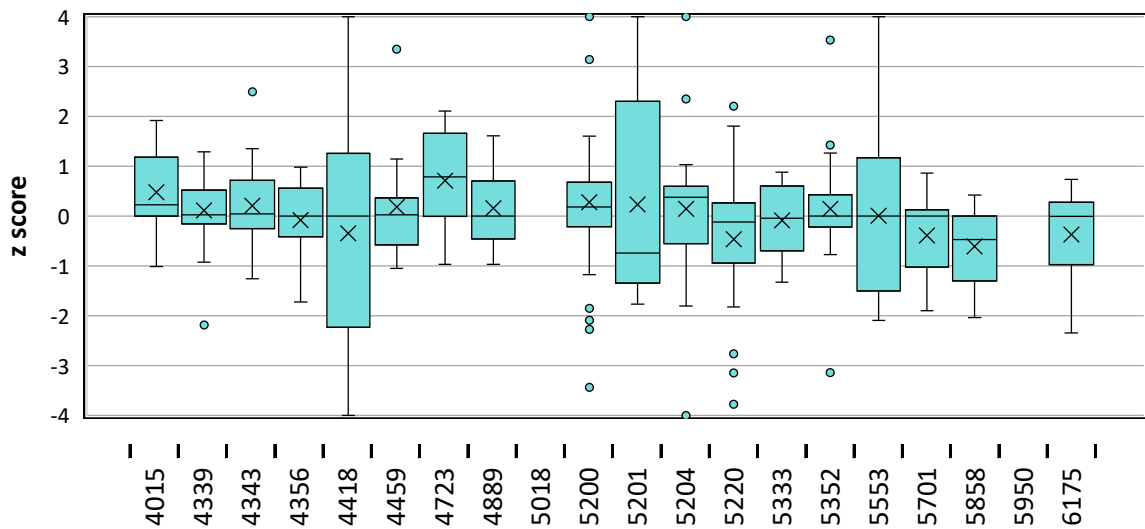
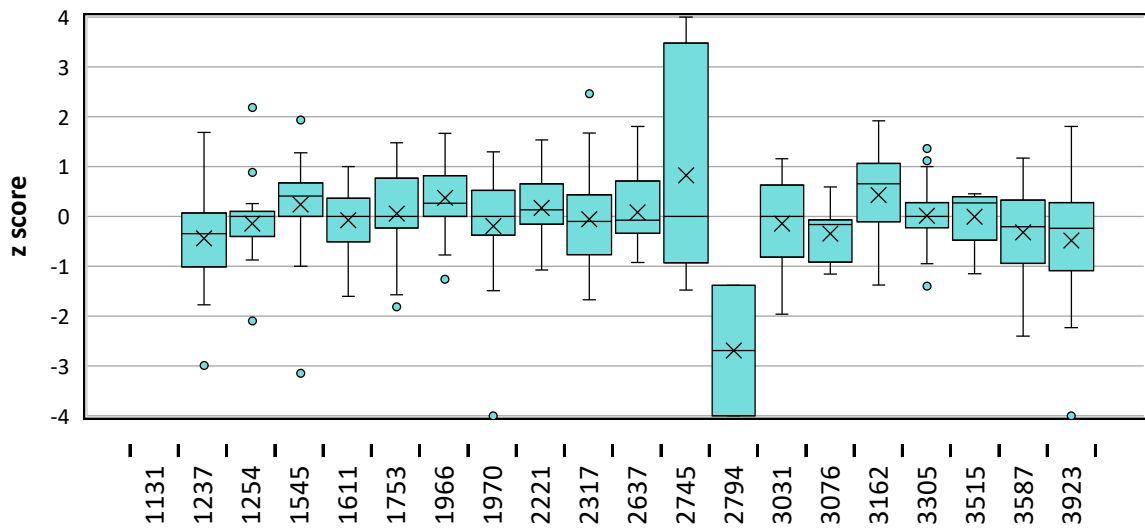
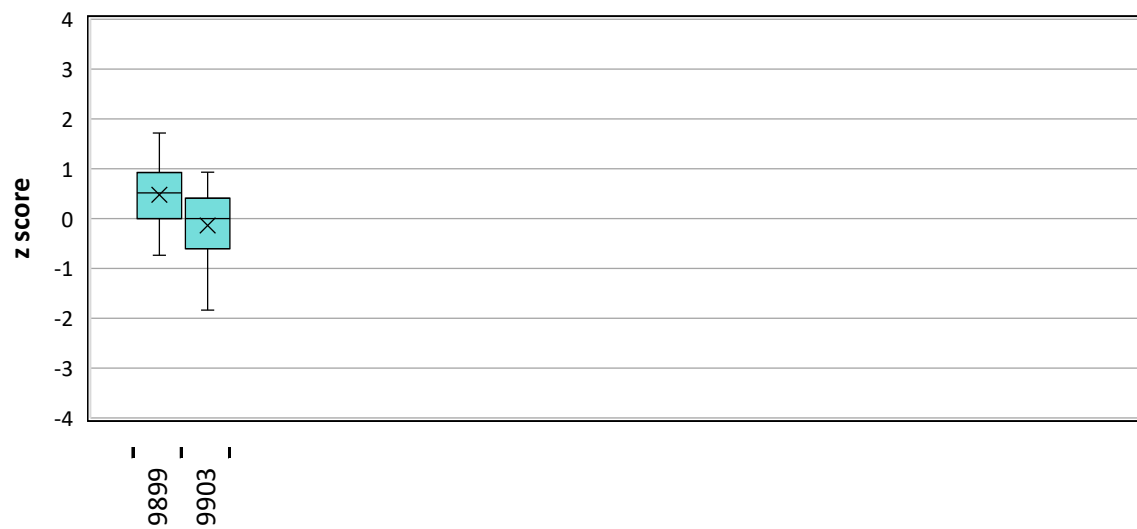
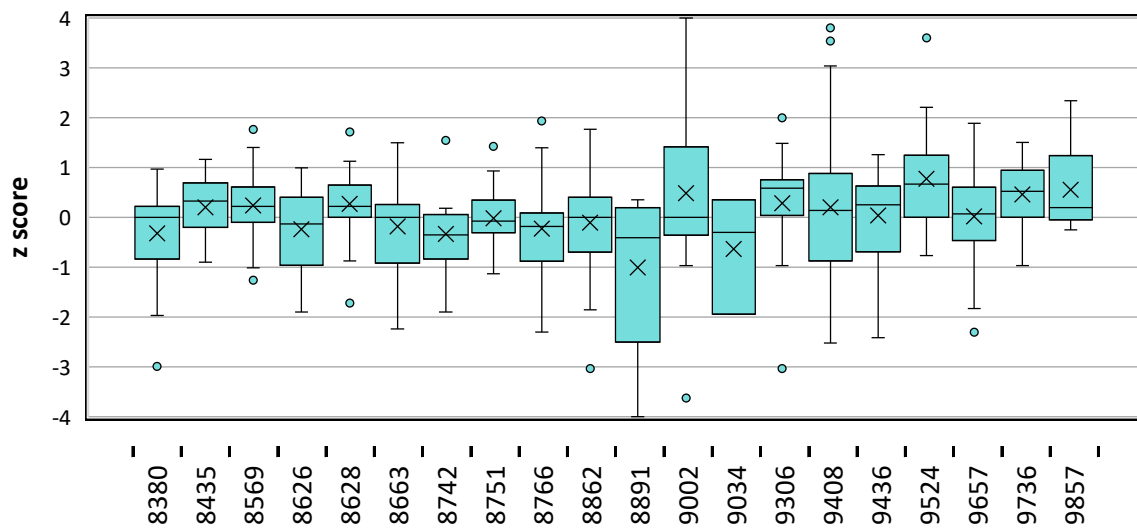


Figure 8. Schematic explanation of a box plot.





Test material and quality control

Test material

Each participant received three samples with freeze-dried microorganisms, designated A–C. The test material was freeze-dried in 0.5 ml portions in glass vials, as described by Peterz and Steneryd [3]. Before analysing the samples, the contents of each vial should be reconstituted in 800 ml of sterile diluent. The microorganism content of the samples and the concentrations determined at the Swedish Food Agency are listed in the table below.

Table 9. Microorganisms and approximate concentrations in the samples.

Sample	Microorganism	Strain			
		SLV no. ¹	Origin	Reference ²	cfu / 100 ml ³
A	<i>Escherichia coli</i>	532	Water	CCUG 48891	12
	<i>Serratia marcescens</i>	040	Water	ATCC 13880	36
	<i>Enterococcus hirae</i>	536	Water	CCUG 46536	271
	<i>Pseudomonas aeruginosa</i>	453	Water	CCUG 551	16
	<i>Staphylococcus saprophyticus</i>	013	-	CCUG 45100	1*
B	<i>Escherichia coli</i>	082	Water	CCUG 45097	882
	<i>Klebsiella aerogenes</i>	099	Sputum	ATCC 13 048	2705
	<i>Enterococcus durans</i>	078	Meat	CCUG 44816	7062
	<i>Burkholderia cepacia</i>	042	-	-	138
C	<i>Klebsiella pneumoniae</i>	537	-	-	31
	<i>Enterobacter hormaechei</i>	187	Vegetarian kebab	CCUG 43599	10
	<i>Lactiplantibacillus plantarum</i>	475	Cabbage, pickled	CCUG 30503	1
	<i>Pseudomonas aeruginosa</i>	569	-	-	13
	<i>Pseudomonas brenneri</i>	535	Water	CCUG 45106	55

¹ Internal strain identification no. at the Swedish Food Agency

² Culture collection. ATCC: American Type Culture Collection, CCUG: Culture Collection University of Gothenburg, Sweden

³ cfu = colony forming units

* indicates cfu per ml

Quality control of the samples

Quality control and evaluation of sample homogeneity is performed on minimum 10 randomly chosen vials in conjunction with manufacture, or on 5 vials if the batch is previously approved for homogeneity. Homogeneity of a test material is approved if, for each analysis, the p value of a one-way analysis of variance (ANOVA) fulfils the criterion $p \geq 0.05$. If the ANOVA yields $p < 0.05$, the PT test item batch is still considered homogenous, if $s_{bb} < s_R/3$, where:

s_{bb} : the between-vial standard deviation from the ANOVA

s_R : the expected laboratory variation, generally assumed to be 1.25 for the Drinking water scheme.

See the Scheme protocol [2] for more information regarding the evaluation of homogeneity.

Table 10. Concentration mean (m), between-vial variation (s_{bb}) and p values from the quality control of the samples; m is expressed in square root cfu (colony forming units) per 100 ml of sample for MF methods and per 1 ml for pour plate methods.

Analysis and method	A ¹			B ¹			C ¹		
	m	s_{bb}	p	m	s_{bb}	p	m	s_{bb}	p
Coliform bacteria (MF) SS-EN ISO 9308-1:2014	6.91	0.24	0.14	6.01 ^a	0.00	0.99	6.38	0.45	0.17
Suspected thermotolerant colif. bact. (MF) m-FC Agar, 44 °C according to SS 028167	3.41	0.04	0.48	2.07 ^a	0.00	0.59	5.15	0.51	0.18
Escherichia coli (MF) SS-EN ISO 9308-1:2014	3.45	0.21	0.24	2.97 ^a	0.00	0.60	-	-	-
Intestinal enterococci (MF) SS-EN ISO 7899-2:2000	5.21 ^b	0.38	0.14	8.40 ^a	0.00	0.77	-	-	-
Pseudomonas aeruginosa (MF) SS-EN ISO 16288:2008	4.02	0.00	0.93	-	-	-	3.60	0.00	0.73
Culturable microorg., 48 h 37 °C (pour plate) SS-EN ISO 6222:1999	2.01	0.20	0.30	10.35	0.33	0.30	0.64	0.34	0.22
Culturable microorg., 72 h 22 °C (pour plate) SS-EN ISO 6222:1999	1.76	0.37	0.11	10.41	0.31	0.32	7.43	0.55	0.11

– No target organism or no value

¹ n = 5 vials analysed in duplicate

^a cfu per 1 ml of sample

^b cfu per 10 ml of sample

References

1. ISO 13528:2022 Statistical methods for use in proficiency testing by interlaboratory comparison.
2. Ilbäck J and Blom L. 2025. Protocol – Microbiological Proficiency Testing, Swedish Food Agency.
3. Peterz, M., Steneryd. A.C. 1993. Freeze-dried mixed cultures as reference samples in quantitative and qualitative microbiological examinations of food. *Journal of Applied Bacteriology*. 74:143–148

Appendix 1. Results of the participating laboratories

Lab no.	Coliform bacteria			Suspected thermotolerant coliform bacteria			E. coli			Intestinal enterococci			P. aeruginosa			Culturable microorganisms, 22°C for 3 days			Culturable microorganisms, 36°C for 2 days			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
1131-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1131-1
1131-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1131-2
1131-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1131-3
1237-1	30	1700	36	2	240	5	8	820	0	250	2800	1	20	0	11	-	90	9	4	110	2	1237-1
1237-2	30	1700	30	-	-	-	8	360	0	-	-	-	-	-	-	2	-	-	-	-	-	1237-2
1237-3	26	2400	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1237-3
1254-1	33	2400	37	-	-	-	9	770	0	460	5700	0	8	0	9	5	97	26	2	99	0	1254-1
1254-2	9	2500	42	-	-	-	9	750	0	-	-	-	9	0	6	-	-	-	-	-	-	1254-2
1254-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1254-3
1545-1	41	3400	33	15	700	8	15	695	0	330	6800	0	12	0	6	5	108	17	9	115	-	1545-1
1545-2	44	4110	45	18	800	10	18	800	0	-	-	-	-	-	-	-	-	-	-	-	-	1545-2
1545-3	-	-	-	-	-	-	15	788	0	-	-	-	-	-	-	-	1	-	-	-	-	1545-3
1611-1	38	3100	36	-	-	-	10	660	0	340	6300	0	8	0	6	4	92	25	2	71	2	1611-1
1611-2	34	3200	34	-	-	-	12	1000	0	-	-	-	-	-	-	-	-	-	-	-	-	1611-2
1611-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1611-3
1753-1	25	3922	49	-	-	-	13	920	0	310	7200	0	8	0	4	3	111	45	3	125	0	1753-1
1753-2	-	-	-	-	-	-	-	-	-	198	6295	0	-	-	-	-	-	-	-	-	-	1753-2
1753-3	-	-	-	-	-	-	-	-	-	360	5167	0	-	-	-	-	-	-	-	-	-	1753-3
1966-1	48	3063	46	-	-	-	9	694	0	333	6577	0	10	0	12	4	110	62	5	96	1	1966-1
1966-2	43	4310	56	-	-	-	18	702	0	344	5305	0	-	-	-	-	-	-	-	-	-	1966-2
1966-3	44	4595	40	-	-	-	7	658	0	-	-	-	-	-	-	-	-	-	-	-	-	1966-3
1970-1	14	3300	45	0	680	0	14	910	0	350	26	0	17	0	9	3	91	31	3	95	0	1970-1
1970-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1970-2
1970-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1970-3
2221-1	-	-	-	-	-	-	16	500	0	410	7300	0	4	0	8	-	-	-	5	103	1	2221-1
2221-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2221-2
2221-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2221-3
2317-1	35	2010	32	-	-	-	12	680	0	340	7000	0	4	0	7	4	106	16	11	92	5	2317-1
2317-2	32	2190	24	-	-	-	8	700	-	-	7500	-	-	-	8	2	84	15	3	82	4	2317-2
2317-3	37	-	39	-	-	-	15	660	-	-	7250	-	-	-	6	3	95	-	7	87	3	2317-3
2637-1	29	2000	38	-	-	-	11	660	-	330	5800	-	-	-	7	100	20	7	100	2	2637-1	
2637-2	31	1900	48	-	-	-	11	500	-	290	5200	-	-	-	4	110	36	3	110	2	2637-2	
2637-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2637-3
2745-1	32	2500	29	32	2500	29	9	350	0	-	-	-	-	-	-	50	141	800	-	-	-	2745-1
2745-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2745-2
2745-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2745-3
2794-1	15	70	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2794-1
2794-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2794-2
2794-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2794-3
3031-1	10	2500	32	-	-	-	5	810	0	250	7500	0	16	0	0	4	94	49	3	80	3	3031-1
3031-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3031-2
3031-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3031-3
3076-1	-	-	-	-	-	-	-	-	-	-	-	-	8	0	11	3	86	29	3	81	0	3076-1
3076-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3076-2
3076-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3076-3
3162-1	40	3076	51	-	-	-	20	583	0	350	7300	0	16	0	17	5	-	58	1	116	0	3162-1
3162-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	92	-	-	-	-	-	3162-2
3162-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3162-3
3305-1	37	3000	49	-	-	-	12	700	0	290	5800	0	9	0	8	6	95	41	2	97	0	3305-1
3305-2	28	2600	52	-	-	-	14	460	0	220	7700	0	-	-	-	-	-	-	-	-	-	3305-2
3305-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3305-3
3515-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	105	39	4	78	1	3515-1
3515-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3515-2
3515-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3515-3
3587-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	97	53	3	105	0	3587-1
3587-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	72	37	4	85	1	3587-2
3587-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3587-3
3923-1	8	2500	20	-	-	-	5	225	0	18	6400	0	21	61	11	5	95	16	3	110	3	3923-1
3923-2	35	2500	35	-	-	-	8	550	0	-	-	-	-	-	-	-	-	-	-	-	-	3923-2
3923-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3923-3
4015-1	31	4000	53	-	-	-	8	984	0	318	9164	0	-	-	-	2	114	47	-	-	-	4015-1
4015-2	-	-	-	-	-	-	-	-	-	306	8864	0	-	-	-	-	-	-	-	-	-	4015-2
4015-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4015-3
4339-1	31	3300	40	13	370	10	15	960	0	390	5500	0	1	0	10	3	90	27	4	95	2	4339-1
4339-2	36	1900	45	-	-	-	10	1100	0	320	7400	0	10	0	13	-	-	-	-	-	-	4339-2
4339-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4339-3
4343-1	33	3654	40	-	-	-	13	909	0	292	5555	1	14	0	20	3	109	47	7	105	1	4343-1
4343-2	-	-	-	-	-	-	-	-	-	260	5475	0	-	-	-	-	-	-	-	-	-	4343-2
4343-3	-	-	-	-	-	-	-	-	-	228	5475	0	-	-	-	-	-	-	-	-	-	4343-3
4356-1	46	3700	37	12	590	27	15	820	0	360	5900	0	2	0	6	3	98	13	1	90	0	4356-1
4356-2	33	3500	28	-	-	-	18	930	0	-	-	-	12	0	8	-	-	-	-	-	-	4356-2
4356-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4356-3
4418-1	8	95	7	0	0	0	0	0	0	260	8100	0	10	2100	3	10	296000	2	5	65	15	4418-1
4418-2	8	95	7	0	0	0	0	0	0	260	8100	0	10	2100	3	10	296000	2	5	65	15	4418-2
4418-3	8	95	7	0	0	0	0	0	0	260	8100	0	10	2100	3	10	296000	2	5	65	15	4418-3
4459-1	36	>2420	40	-	-	-	36	1050	0	243	4880	0	-	-	-	4	100	38	4	89	0	4459-1
4459-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4459-2
4459-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4459-3
4723-1	43	3654	60	-	-	-	26	1120	0	355	9200	0	-	-	-	2	100	30	-	-	-	4723-1
4723-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4723-2
4723-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4723-3
4889-1	57	2300	34	-	-	-	20	800	0	380	7200	0	6	0	10	2	100</					

Appendix 1. Results of the participating laboratories

Lab no.	Coliform bacteria			Suspected thermotolerant coliform bacteria			E. coli			Intestinal enterococci			P. aeruginosa			Culturable microorganisms, 22 °C for 3 days			Culturable microorganisms, 36 °C for 2 days			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
5201-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5201-3
5204-1	16	3300	50	-	-	-	16	2640	0	330	7300	0	15	0	11	0	92	39	2	68	0	5204-1
5204-2	27	3104	51	-	-	-	10	1497	0	334	7027	0	-	-	-	-	-	-	-	-	-	5204-2
5204-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5204-3
5220-1	42	2200	16	-	-	-	14	630	0	330	6100	0	5	0	10	7	111	1	10	75	2	5220-1
5220-2	40	2170	10	-	-	-	5	320	0	350	5500	0	2	0	10	-	-	-	-	-	-	5220-2
5220-3	24	1986	10	-	-	-	12	649	0	225	5170	0	2	0	8	-	-	-	-	-	-	5220-3
5333-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	84	40	-	-	-	5333-1
5333-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	94	34	-	-	-	5333-2
5333-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5333-3
5352-1	36	4100	39	14	100	0	13	900	0	300	5400	0	9	0	8	3	119	46	5	92	15	5352-1
5352-2	36	2800	39	11	500	0	14	100	-	-	-	-	-	-	-	-	-	-	-	-	-	5352-2
5352-3	-	-	-	-	-	-	11	500	0	-	-	-	-	-	-	-	-	-	-	-	-	5352-3
5553-1	55	1690	25	-	-	-	50	240	0	360	4400	0	-	-	-	-	-	-	-	-	-	5553-1
5553-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5553-2
5553-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5553-3
5701-1	22	1630	49	-	-	-	13	500	0	-	-	-	-	-	-	1	102	33	-	-	-	5701-1
5701-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5701-2
5701-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5701-3
5858-1	37	1560	39	-	-	-	15	460	0	248	5900	0	3	0	8	2	76	7	2	76	1	5858-1
5858-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5858-2
5858-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5858-3
5950-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5950-1
5950-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5950-2
5950-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5950-3
6175-1	31	>201	30	-	-	-	6	201	0	-	-	-	-	-	-	3	101	42	4	86	2	6175-1
6175-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6175-2
6175-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6175-3
6182-1	48	3563	43	-	-	-	17	1140	0	252	6766	0	-	-	-	4	89	29	-	-	-	6182-1
6182-2	-	-	-	-	-	-	-	-	-	277	5794	0	-	-	-	-	-	-	-	-	-	6182-2
6182-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6182-3
6233-1	41	5475	46	-	-	-	17	1022	0	579	5172	0	5	0	5	3	123	41	3	211	0	6233-1
6233-2	12	2500	36	-	-	-	12	300	0	218	5800	0	7	0	8	-	-	-	-	-	-	6233-2
6233-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6233-3
6253-1	35	2400	45	-	-	-	16	880	0	360	-	0	-	-	-	7	100	29	2	96	0	6253-1
6253-2	-	-	-	-	-	-	-	-	-	-	6100	-	-	-	-	-	-	-	-	-	-	6253-2
6253-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6253-3
6456-1	-	2500	40	-	-	-	15	582	0	273	6600	0	-	-	-	4	101	33	4	92	0	6456-1
6456-2	41	2591	40	-	-	-	11	354	0	-	-	-	-	-	-	-	-	-	-	-	-	6456-2
6456-3	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6456-3
6686-1	20	1300	30	-	-	-	7	140	-	190	100	-	-	-	-	2	88	31	3	87	1	6686-1
6686-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6686-2
6686-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6686-3
7248-1	8	860	27	19	620	32	6	774	0	230	4400	0	16	0	9	3	70	15	1	75	0	7248-1
7248-2	36	1800	29	-	-	-	9	960	0	-	-	-	-	-	-	-	-	-	-	-	-	7248-2
7248-3	-	-	-	-	-	-	19	620	0	-	-	-	-	-	-	-	-	-	-	-	-	7248-3
7330-1	-	-	-	-	-	-	8	56	0	244	1680	0	5	0	5	-	-	-	325	407	251	7330-1
7330-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7330-2
7330-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7330-3
7381-1	15	250	49	-	-	-	-	-	-	-	-	-	6	0	12	4	101	9	3	70	0	7381-1
7381-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7381-2
7381-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7381-3
7564-1	40	2300	34	-	-	-	14	740	0	-	-	-	-	-	-	1	95	15	2	81	0	7564-1
7564-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7564-2
7564-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7564-3
7688-1	25	3100	54	-	-	-	10	920	0	260	4900	0	3	0	2	3	120	66	1	94	0	7688-1
7688-2	6	210	32	-	-	-	6	210	0	200	1200	0	3	0	7	-	-	-	-	-	-	7688-2
7688-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7688-3
7728-1	12	2500	29	-	-	-	12	750	0	310	7800	0	9	0	12	3	74	5	1	110	0	7728-1
7728-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7728-2
7728-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7728-3
7876-1	18	35	3200	12	31	290	18	0	1100	240	2	6000	15	12	0	3	25	95	6	1	84	7876-1
7876-2	37.9	27.8	3651	-	-	-	16	0	845	-	-	-	-	-	-	-	-	-	-	-	-	7876-2
7876-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7876-3
7930-1	46	3100	34	-	-	-	13	670	0	290	5700	0	9	0	6	1	96	34	8	96	0	7930-1
7930-2	43	4500	70	-	-	-	12	850	0	-	-	-	-	-	-	-	-	-	-	-	-	7930-2
7930-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7930-3
7962-1	21	2500	22	6	360	13	5	500	0	320	880	1	3	0	7	4	102	19	3	79	0	7962-1
7962-2	45	3650	35	-	-	-	17	1120	0	-	-	-	-	-	-	-	-	-	-	-	-	7962-2
7962-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7962-3
7968-1	42	2500	40	-	-	-	11	495	0	350	7300	0	4	0	8	5	100	38	2	110	1	7968-1
7968-2	48	2550	41	-	-	-	15	565	0	210	5500	0	4	0	10	-	-	-	-	-	-	7968-2
7968-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7968-3
8068-1	26	2613	50	-	-	-	15	435	0	345	5172	0	14	0	11	4	96	47	4	95	1	8068-1
8068-2	29	2420	43	-	-	-	11	548	0	340	6200	0	-	-	-	-	-	-	-	-	-	8068-2
8068-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8068-3
8165-1	36	2488	51	-	-	-	10	1121	0	364	5600	0	13	0	10	-	-	-	-	-	-	8165-1
8165-2	38	3300	40	-	-	-	15	981	0	-	-	-	-	-	-	-	-	-	-	-	-	8165-2
8165-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8165-3
8260-1	29	2750	49	-	-	-	10	615	0	-	-	-	-	-	-	4	114	27	-	-	-	8260-1
8260-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8260-2
8260-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8260-3
8329-1	46	3990	42	-	-	-	17	1203	0	260	9200	0										

Appendix 1. Results of the participating laboratories

Lab no.	Coliform bacteria			Suspected thermotolerant coliform bacteria			E. coli			Intestinal enterococci			P. aeruginosa			Culturable microorganisms, 22°C for 3 days			Culturable microorganisms, 36°C for 2 days			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
8435-2	46	3380	-	-	-	-	17	580	-	310	7300	-	8	0	-	5	106	-	5	82	-	8435-2
8435-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8435-3
8569-1	30	3300	50	-	-	-	8	770	0	400	7000	0	-	-	-	3	110	38	-	-	-	8569-1
8569-2	29	2908	60	-	-	-	7	784	0	-	-	-	-	-	-	-	-	-	-	-	-	8569-2
8569-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8569-3
8626-1	17	2600	37	0	760	0	17	1000	0	240	7000	0	-	-	-	1	103	-	3	81	0	8626-1
8626-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38	-	-	-	-	8626-2
8626-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8626-3
8628-1	12	3100	41	15	800	12	12	800	0	380	7600	2	10	0	16	3	125	34	4	109	0	8628-1
8628-2	-	-	-	-	-	-	0	800	0	-	-	-	-	-	-	-	-	-	-	-	-	8628-2
8628-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8628-3
8663-1	8	3200	42	10	540	30	8	960	0	380	6000	3	4	0	4	2	120	28	3	110	1	8663-1
8663-2	32	2800	38	-	-	-	16	770	0	250	4900	-	5	0	5	-	-	-	-	-	-	8663-2
8663-3	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	8663-3
8742-1	22	2800	30	-	-	-	22	750	0	-	-	-	-	-	-	-	100	22	3	88	0	8742-1
8742-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	8742-2
8742-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8742-3
8751-1	38	3060	31	-	-	-	18	640	0	288	4780	0	-	-	-	4	92	26	-	-	-	8751-1
8751-2	-	4290	38	-	-	-	-	640	0	-	-	-	-	-	-	-	-	-	-	-	-	8751-2
8751-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8751-3
8766-1	21	1945	33	21	309	36	21	509	0	248	6727	2	8	0	8	2	100	5	9	92	3	8766-1
8766-2	29	2375	46	-	-	-	8	343	0	-	-	-	-	-	-	-	-	-	-	-	-	8766-2
8766-3	-	-	-	-	-	-	21	309	0	-	-	-	-	-	-	-	-	-	-	-	-	8766-3
8862-1	60	2745	39	-	-	-	22	745	0	245	6300	0	8	0	5	2	78	38	0	86	0	8862-1
8862-2	37	4030	51	-	-	-	20	692	0	260	5845	0	-	-	-	-	-	-	-	-	-	8862-2
8862-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8862-3
8891-1	-	29	40	-	-	-	-	-	-	-	-	-	-	-	-	4	95	17	-	-	-	8891-1
8891-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8891-2
8891-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8891-3
9002-1	190	8600	50	-	-	-	12	56	0	280	8600	0	-	-	-	2	110	26	-	-	-	9002-1
9002-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9002-2
9002-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9002-3
9034-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	77	26.5	-	-	-	9034-1
9034-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9034-2
9034-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9034-3
9306-1	37	3448	63	-	-	-	16	866	0	-	-	-	-	-	-	2	110	60	0	100	2	9306-1
9306-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9306-2
9306-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9306-3
9408-1	45	3500	29	-	-	-	16	780	0	350	9000	0	10	-	12	2	113	11	1	87	0	9408-1
9408-2	45	6488	89	-	-	-	6	1467	0	240	7600	1	12	-	8	4	98	35	1	92	0	9408-2
9408-3	33	3900	31	-	-	-	3	940	0	-	-	-	-	-	-	1	150	34	2	156	0	9408-3
9436-1	15	882	30	7	155	6	15	882	0	250	6600	1	15	0	8	4	89	48	2	119	1	9436-1
9436-2	38	3260	42	-	-	-	17	1088	0	-	-	-	-	-	-	-	-	-	-	-	-	9436-2
9436-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9436-3
9524-1	62	3200	42	-	-	-	20	825	0	256	6488	0	-	-	-	6	151	54	5	140	2	9524-1
9524-2	26	4049	54	-	-	-	10	1068	0	375	7000	2	-	-	-	-	-	-	-	-	-	9524-2
9524-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9524-3
9657-1	14	945	44	5	491	29	14	945	0	364	7100	0	14	0	16	4	101	38	2	113	1	9657-1
9657-2	25	4880	35	-	-	-	7	804	0	-	-	-	-	-	-	-	-	-	-	-	-	9657-2
9657-3	-	-	-	-	-	-	5	491	0	-	-	-	-	-	-	-	-	-	-	-	-	9657-3
9736-1	31	3328	44	-	-	-	18	703	0	298	8091	0	-	0	15	2	106	49	6	111	2	9736-1
9736-2	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	9736-2
9736-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9736-3
9857-1	34	4352	51	-	-	-	12	1106	0	299	6488	0	-	-	-	3	132	41	-	-	-	9857-1
9857-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9857-2
9857-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9857-3
9899-1	45	3300	38	-	-	-	18	918	0	300	7000	0	8	0	16	6	108	48	4	111	1	9899-1
9899-2	48	2586	48	-	-	-	22	824	0	336	7582	0	13	0	6.3	-	-	-	-	-	-	9899-2
9899-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9899-3
9903-1	11	3409	46	-	-	-	18	736	0	267	5700	0	6	0	5	4	92	31	2	98	2	9903-1
9903-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9903-2
9903-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9903-3

N	113	114	115	21	22	21	118	121	112	90	91	85	65	63	65	84	83	83	71	70	68	N
n	110	105	106	21	22	21	112	114	110	86	84	75	65	60	62	82	79	80	70	66	62	n
m_{PT}	5.57	52.22	6.29	-	-	-	3.56	26.42	-	17.42	79.02	-	2.96	-	2.96	1.84	10.01	5.58	1.83	9.86	0.77	m_{PT}
s_{PT}	1.23	9.34	0.83	-	-	-	0.73	5.23	-	1.84	8.73	-	0.90	-	0.61	0.44	0.63	1.46	0.60	0.89	0.88	s_{PT}
u_{PT}	0.146	1.103	0.098	-	-	-	0.085	0.601	-	0.243	1.150	-	0.139	-	0.097	0.061	0.088	0.201	0.090	0.135	0.134	u_{PT}
CV (%)	22	18	13	-	-	-	20	20	-	11	11	-	30	-	21	24	6	26	33	9	115	CV (%)
u_{rel,mPT} (%)	2.1	1.7	1.2	-	-	-	1.9	1.8	-	1.1	1.2	-	3.8	-	2.6	2.6	0.7	2.9	3.9	1.1	14.0	u_{rel,mPT} (%)
F+	0	0	0	-	-	-	0	0	2	0	0	10	0	3	0	0	0	0	0	0	0	F+
F-	2	0	1	-	-	-	4	3	0	0	0	0	0	0	3	0	0	0	0	0	0	F-
<	0	7	3	-	-	-	0	3	0	1	7	0	0	0	0	0	1	2	0	1	0	<
>	1	2	5	-	-	-	2	1	0	3	0	0	0	0	0	2	3	1	1	3	6	>
Min	0	28	0	0	0	0	0	0	0	18	2	0	1	0	0	0	25	1	0	1	0	Min
Max	190	8 600	3 651	32	2 500	290	50	2 640	1 100	657	9 200	6 000	30	2 100	20	50	296 000	800	325	407	251	Max
Med	33	2 750	40	11	495	10	13	742	0	308	6 488	0	9	0	8	3	100	34	3	95	0	Med
m_{PT}	31	2 727	40	-	-	-	13	69														

Appendix 2. Z-scores of all participants

Lab no.	Coliform bacteria			Suspected thermotolerant coliform bacteria			E. coli			Intestinal enterococci			P. aeruginosa			Culturable microorganisms, 22°C for 3 days			Culturable microorganisms, 36 °C for 2 days			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
1131-1																						1131-1
1131-2																						1131-2
1131-3																						1131-3
1237-1	-0.079	-1.177	-0.346				-1.012	0.425	0	-0.870	-2.990	1.682	0	0.591		-0.821	-1.775	0.279	0.702	0.736	1237-1	
1237-2	-0.079	-1.177	-0.977				-1.012	-1.425	0						-0.968						1237-2	
1237-3	-0.386	-0.346	-0.346																		1237-3	
1254-1	0.139	-0.346	-0.246				-0.776	0.255	0	2.186	-0.403	0	-0.150	0	0.071	0.881	-0.250	-0.332	-0.692	0.100	-0.873	1254-1
1254-2	-2.095	-0.238	0.235				-0.776	0.185	0						0.041	0	-0.834					1254-2
1254-3																						1254-3
1545-1	0.675	0.652	-0.654				0.423	-0.010	0	0.407	0.395	0	0.558	0	-0.834	0.881	0.608	-1.003	1.936	0.966		1545-1
1545-2	0.862	1.273	0.509				0.931	0.357	0													1545-2
1545-3							0.423	0.317	0									-3.149				1545-3
1611-1	0.481	0.370	-0.346				-0.553	-0.139	0	0.555	0.041	0	-0.150	0	-0.834	0.349	-0.656	-0.400	-0.692	-1.604	0.736	1611-1
1611-2	0.209	0.466	-0.550				-0.139	0.996	0													1611-2
1611-3																						1611-3
1753-1	-0.467	1.115	0.862				0.056	0.749	0	0.104	0.669	0	-0.150	0	-1.573	-0.253	0.834	0.773	-0.165	1.476	-0.873	1753-1
1753-2										-1.813	0.037	0										1753-2
1753-3										0.845	-0.817	0										1753-3
1966-1	1.102	0.335	0.599				-0.776	-0.014	0	0.451	0.238	0	0.222	0	0.833	0.349	0.759	1.575	0.670	-0.070	0.264	1966-1
1966-2	0.800	1.439	1.445				0.931	0.015	0	0.614	-0.708	0										1966-2
1966-3	0.862	1.667	0.046				-1.263	-0.147	0													1966-3
1970-1	-1.491	0.560	0.509				0.243	0.717	0	0.701	-4.000	0	1.293	0	0.071	-0.253	-0.738	-0.010	-0.165	-0.127	-0.873	1970-1
1970-2																						1970-2
1970-3																			0.670	0.323	0.264	1970-3
2221-1							0.598	-0.776	0	1.536	0.736	0	-1.073	0	-0.211							2221-1
2221-2																						2221-2
2221-3																						2221-3
2317-1	0.278	-0.791	-0.760				-0.139	-0.065	0	0.555	0.533	0	-1.073	0	-0.512	0.349	0.455	-1.088	2.460	-0.300	1.670	2317-1
2317-2	0.068	-0.581	-1.676				-1.012	0.008			0.869				-0.211	-0.968	-1.329	-1.175	-0.165	-0.900	1.402	2317-2
2317-3	0.414		-0.050				0.423	-0.139			0.702				-0.834	-0.253	-0.411		1.349	-0.596	1.097	2317-3
2637-1	-0.154	-0.803	-0.147				-0.341	-0.139		0.407	-0.327					1.802	-0.011	-0.763	1.349	0.156	0.736	2637-1
2637-2	-0.005	-0.925	0.775				-0.341	-0.776		-0.209	-0.791					0.349	0.759	0.287	-0.165	0.702	0.736	2637-2
2637-3																						2637-3
2745-1	0.068	-0.238	-1.088				-0.776	-1.475	0							4.000	2.947	4.000				2745-1
2745-2																						2745-2
2745-3																						2745-3
2794-1	-1.384	-4.000																				2794-1
2794-2																						2794-2
2794-3																						2794-3
3031-1	-1.963	-0.238	-0.760				-1.826	0.391	0	-0.870	0.869	0	1.155	0		0.349	-0.492	0.974	-0.165	-1.024	1.097	3031-1
3031-2																						3031-2
3031-3																						3031-3
3076-1													-0.150	0	0.591	-0.253	-1.158	-0.136	-0.165	-0.962	-0.873	3076-1
3076-2																						3076-2
3076-3																						3076-3
3162-1	0.611	0.347	1.032				1.246	-0.435	0	0.701	0.736	0	1.155	0	1.916	0.881		1.397	-1.378	1.018	-0.873	3162-1
3162-2																	-0.656					3162-2
3162-3																						3162-3
3305-1	0.414	0.273	0.862				-0.139	0.008	0	-0.209	-0.327	0	0.041	0	-0.211	1.361	-0.411	0.564	-0.692	-0.013	-0.873	3305-1
3305-2	-0.230	-0.132	1.117				0.243	-0.951	0	-1.401	1.000	0										3305-2
3305-3																						3305-3
3515-1																-0.253	0.379	0.455	0.279	-1.150	0.264	3515-1
3515-2																						3515-2
3515-3																						3515-3
3587-1																-0.968	-0.250	1.166	-0.165	0.432	-0.873	3587-1
3587-2																-0.968	-2.402	0.344	0.279	-0.716	0.264	3587-2
3587-3																						3587-3
3923-1	-2.234	-0.238	-2.191				-1.826	-2.185	0	-4.000	0.113	0	1.805		0.591	0.881	-0.411	-1.088	-0.165	0.702	1.097	3923-1
3923-2	0.278	-0.238	-0.447				-1.012	-0.568	0													3923-2
3923-3																						3923-3
4015-1	-0.005	1.181	1.200				-1.012	0.948	0	0.226	1.914	0				-0.968	1.057	0.875				4015-1
4015-2										0.042	1.733	0										4015-2
4015-3																						4015-3
4339-1	-0.005	0.560	0.046				0.423	0.874	0	1.265	-0.556	0	-2.187	0	0.337	-0.253	-0.821	-0.266	0.279	-0.127	0.736	4339-1
4339-2	0.347	-0.925	0.509				-0.553	1.292	0	0.256	0.803	0	0.222	0	1.066							4339-2
4339-3																						4339-3
4343-1	0.139	0.881	0.046				0.056	0.714	0	-0.178	-0.514		0.868	0	2.490	-0.253	0.684	0.875	1.349	0.432	0.264	4343-1
4343-2										-0.700	-0.575	0										4343-2
4343-3										-1.256	-0.575	0										4343-3
4356-1	0.983	0.922	-0.246				0.423	0.425	0	0.845	-0.253	0	-1.726	0	-0.834	-0.253	-0.170	-1.359	-1.378	-0.418	-0.873	4356-1
4356-2	0.139	0.743	-1.202				0.931	0.781	0				0.558	0	-0.211							4356-2
4356-3																						4356-3
4418-1	-2.234	-4.000	-4.000						0	-0.700	1.258	0	0.222		-2.013	2.964	4.000	-2.865	0.670	-2.010	3.532	4418-1
4418-2																						4418-2
4418-3																						4418-3
4459-1	0.347		0.046				3.345	1.146	0	-0.991	-1.049	0				0.349	-0.011	0.400	0.279	-0.477	-0.873	4459-1
4459-2																						4459-2
4459-3																						4459-3
4723-1	0.800	0.881	1.762				2.108	1.349	0	0.773	1.936	0				-0.968	-0.011	-0.073				4723-1
4723-2																						4723-2
4723-3																						4723-3
4889-1	1.608	-0.457	-0.550				1.246	0.357	0	1.127	0.669	0	-0.572	0	0.337	-0.968	-0.011	-0.613	-0.692	0.702	0.736	4889-1
4889-2	0.278																					

Appendix 2. Z-scores of all participants

Lab no.	Coliform bacteria			Suspected thermotolerant coliform bacteria			E. coli			Intestinal enterococci			P. aeruginosa			Culturable microorganisms, 22°C for 3 days			Culturable microorganisms, 36 °C for 2 days			Lab no.
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
5201-3																						5201-3
5204-1	-1.281	0.560	0.947				0.598	4.000	0	0.407	0.736	0	1.014	0	0.591	-4.000	-0.656	0.455	-0.692	-1.805	-0.873	5204-1
5204-2	-0.307	0.374	1.032				-0.553	2.349	0	0.466	0.551	0										5204-2
5204-3																						5204-3
5220-1	0.738	-0.570	-2.761				0.243	-0.252	0	0.407	-0.105	0	-0.810	0	0.337	1.802	0.834	-3.149	2.204	-1.342	0.736	5220-1
5220-2	0.611	-0.604	-3.773				-1.826	-1.632	0	0.701	-0.556	0	-1.726	0	0.337							5220-2
5220-3	-0.549	-0.820	-3.773				-0.139	-0.180	0	-1.310	-0.815	0	-1.726	0	-0.211							5220-3
5333-1																-0.253	-1.329	0.510				5333-1
5333-2																0.881	-0.492	0.171				5333-2
5333-3																						5333-3
5352-1	0.347	1.265	-0.050				0.056	0.686	0	-0.052	-0.634	0	0.041	0	-0.211	-0.253	1.423	0.824	0.670	-0.300	3.532	5352-1
5352-2	0.347	0.074	-0.050				0.243	-3.142														5352-2
5352-3							-0.341	-0.776	0													5352-3
5553-1	1.499	-1.190	-1.554				4.000	-2.091	0	0.845	-1.453	0										5553-1
5553-2																						5553-2
5553-3																						5553-3
5701-1	-0.719	-1.269	0.862				0.056	-0.776	0							-1.900	0.146	0.111				5701-1
5701-2																						5701-2
5701-3																						5701-3
5858-1	0.414	-1.363	-0.050				0.423	-0.951	0	-0.904	-0.253	0	-1.372	0	-0.211	-0.968	-2.035	-2.018	-0.692	-1.277	0.264	5858-1
5858-2																						5858-2
5858-3																						5858-3
5950-1																						5950-1
5950-2																						5950-2
5950-3																						5950-3
6175-1	-0.005		-0.977				-1.533	-2.342	0							-0.253	0.067	0.617	0.279	-0.656	0.736	6175-1
6175-2																						6175-2
6175-3																						6175-3
6182-1	1.102	0.800	0.327				0.767	1.406	0	-0.836	0.371	0				0.349	-0.905	-0.136				6182-1
6182-2										-0.419	-0.332	0										6182-2
6182-3																						6182-3
6233-1	0.675	2.332	0.599				0.767	1.062	0	3.604	-0.813	0	-0.810	0	-1.185	-0.253	1.710	0.564	-0.165	4.000	-0.873	6233-1
6233-2	-1.717	-0.238	-0.346				-0.139	-1.741	0	-1.437	-0.327	0	-0.354	0	-0.211							6233-2
6233-3																						6233-3
6253-1	0.278	-0.346	0.509				0.598	0.621	0	0.845		0				1.802	-0.011	-0.136	-0.692	-0.070	-0.873	6253-1
6253-2										-0.105												6253-2
6253-3																						6253-3
6456-1		-0.238	0.046				0.423	-0.439	0	-0.484	0.255	0				0.349	0.067	0.111	0.279	-0.300	-0.873	6456-1
6456-2	0.675	-0.141	0.046				-0.341	-1.455	0													6456-2
6456-3	-1.837																					6456-3
6686-1	-0.897	-1.732	-0.977				-1.263	-2.791		-1.969	-4.000					-0.968	-0.989	-0.010	-0.165	-0.596	0.264	6686-1
6686-2																						6686-2
6686-3																						6686-3
7248-1	-2.234	-2.453	-1.317				-1.533	0.269	0	-1.220	-1.453	0	1.155	0	0.071	-0.253	-2.590	-1.175	-1.378	-1.342	-0.873	7248-1
7248-2	0.347	-1.049	-1.088				-0.776	0.874	0													7248-2
7248-3							1.091	-0.290	0													7248-3
7330-1							-1.012	-3.624	0	-0.973	-4.000	0	-0.810	0	-1.185				4.000	4.000	4.000	7330-1
7330-2																						7330-2
7330-3																						7330-3
7381-1	-1.384	-3.900	0.862										-0.572	0	0.833	0.349	0.067	-1.775	-0.165	-1.670	-0.873	7381-1
7381-2																						7381-2
7381-3																						7381-3
7564-1	0.611	-0.457	-0.550				0.243	0.150	0							-1.900	-0.411	-1.175	-0.692	-0.962	-0.873	7564-1
7564-2																						7564-2
7564-3																						7564-3
7688-1	-0.467	0.370	1.282				-0.553	0.749	0	-0.700	-1.033	0	-1.372	0	-2.535	-0.253	1.495	1.746	-1.378	-0.184	-0.873	7688-1
7688-2	-2.543	-4.000	-0.760				-1.533	-2.282	0	-1.775	-4.000	0	-1.372	0	-0.512							7688-2
7688-3																						7688-3
7728-1	-1.717	-0.238	-1.088				-0.139	0.185	0	0.104	1.065	0	0.041	0	0.833	-0.253	-2.218	-2.300	-1.378	0.702	-0.873	7728-1
7728-2																						7728-2
7728-3																						7728-3
7876-1	-1.083	-4.000	4.000				0.931			-1.043	-4.000		1.014			-0.253	-4.000	2.861	1.023	-4.000	4.000	7876-1
7876-2	0.474	-4.000	4.000				0.598															7876-2
7876-3																						7876-3
7930-1	0.983	0.370	-0.550				0.056	-0.102	0	-0.209	-0.403	0	0.041	0	-0.834	-1.900	-0.330	0.171	1.651	-0.070	-0.873	7930-1
7930-2	0.800	1.592	2.512				-0.139	0.524	0													7930-2
7930-3																						7930-3
7962-1	-0.807	-0.238	-1.927				-1.826	-0.776	0	0.256	-4.000		-1.372	0	-0.512	0.349	0.146	-0.841	-0.165	-1.087	-0.873	7962-1
7962-2	0.923	0.878	-0.447				0.767	1.349	0													7962-2
7962-3																						7962-3
7968-1	0.738	-0.238	0.046				-0.341	-0.798	0	0.701	0.736	0	-1.073	0	-0.211	0.881	-0.011	0.400	-0.692	0.702	0.264	7968-1
7968-2	1.102	-0.185	0.141				0.423	-0.507	0	-1.586	-0.556	0	-1.073	0	0.337							7968-2
7968-3																						7968-3
8068-1	-0.386	-0.118	0.947				0.423	-1.064	0	0.628	-0.813	0	0.868	0	0.591	0.349	-0.330	0.875	0.279	-0.127	0.264	8068-1
8068-2	-0.154	-0.324	0.327				-0.341	-0.576	0	0.555	-0.032	0										8068-2
8068-3																						8068-3
8165-1	0.347	-0.251	1.032				-0.553	1.352	0	0.902	-0.479	0	0.716	0	0.337							8165-1
8165-2	0.481	0.560	0.046				0.423	0.938	0													8165-2
8165-3																						8165-3
8260-1	-0.154	0.024	0.862				-0.553	-0.310	0							0.349	1.057	-0.266				8260-1
8260-2																						8260-2
8260-3																						8260-3
8329-1	0.983	1.172	0.2																			

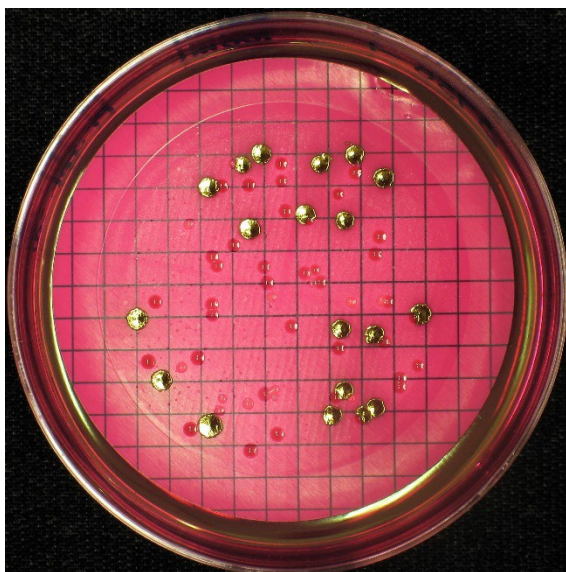
Appendix 2. Z-scores of all participants

Lab no.	Coliform bacteria			Suspected thermotolerant coliform bacteria			E. coli			Intestinal enterococci			P. aeruginosa			Culturable microorganisms, 22°C for 3 days			Culturable microorganisms, 36 °C for 2 days			Lab no.		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C			
8435-2	0.983	0.634					0.767	-0.447		0.104	0.736		-0.150	0		0.881	0.455		0.670	-0.900		8435-2		
8435-3																						8435-3		
8569-1	-0.079	0.560	0.947				-1.012	0.255	0	1.401	0.533	0				-0.253	0.759	0.400				8569-1		
8569-2	-0.154	0.183	1.762				-1.263	0.303	0													8569-2		
8569-3																						8569-3		
8626-1	-1.181	-0.132	-0.246				0.767	0.996	0	-1.043	0.533	0				-1.900	0.224		-0.165	-0.962	-0.873	8626-1		
8626-2																	0.400					8626-2		
8626-3																						8626-3		
8628-1	-1.717	0.370	0.141				-0.139	0.357	0	1.127	0.935		0.222	0	1.714	-0.253	1.852	0.171	0.279	0.649	-0.873	8628-1		
8628-2								0.357	0													8628-2		
8628-3																						8628-3		
8663-1	-2.234	0.466	0.235				-1.012	0.874	0	1.127	-0.178		-1.073	0	-1.573	-0.968	1.495	-0.200	-0.165	0.702	0.264	8663-1		
8663-2	0.068	0.074	-0.147				0.598	0.255	0	-0.870	-1.033		-0.810	0	-1.185							8663-2		
8663-3												0										8663-3		
8742-1	-0.719	0.074	-0.977				1.546	0.185	0										-0.011	-0.613	-0.165	-0.536	-0.873	8742-1
8742-2																			-1.900				8742-2	
8742-3																							8742-3	
8751-1	0.481	0.332	-0.868				0.931	-0.214	0	-0.241	-1.132	0				0.349	-0.656	-0.332					8751-1	
8751-2		1.422	-0.147					-0.214	0														8751-2	
8751-3																							8751-3	
8766-1	-0.807	-0.870	-0.654				1.398	-0.738	0	-0.904	0.344		-0.150	0	-0.211	-0.968	-0.011	-2.300	1.936	-0.300	1.097		8766-1	
8766-2	-0.154	-0.374	0.599				-1.012	-1.511	0														8766-2	
8766-3							1.398	-1.692	0														8766-3	
8862-1	1.768	0.018	-0.050				1.546	0.168	0	-0.956	0.041	0	-0.150	0	-1.185	-0.968	-1.855	0.400	-3.035	-0.656	-0.873		8862-1	
8862-2	0.414	1.206	1.032				1.246	-0.021	0	-0.700	-0.294	0											8862-2	
8862-3																							8862-3	
8891-1		-4.000	0.046													0.349	-0.411	-1.003					8891-1	
8891-2																							8891-2	
8891-3																							8891-3	
9002-1	4.000	4.000	0.947				-0.139	-3.624	0	-0.370	1.572	0				-0.968	0.759	-0.332					9002-1	
9002-2																							9002-2	
9002-3																							9002-3	
9034-1																0.349	-1.945	-0.299					9034-1	
9034-2																							9034-2	
9034-3																							9034-3	
9306-1	0.414	0.696	1.993				0.598	0.576	0							-0.968	0.759	1.487	-3.035	0.156	0.736		9306-1	
9306-2																							9306-2	
9306-3																							9306-3	
9408-1	0.923	0.743	-1.088				0.598	0.289	0	0.701	1.816	0	0.222		0.833	-0.968	0.983	-1.557	-1.378	-0.596	-0.873		9408-1	
9408-2	0.923	3.034	3.801				-1.533	2.274	0	-1.043	0.935		0.558		-0.211	0.349	-0.170	0.229	-1.378	-0.300	-0.873		9408-2	
9408-3	0.139	1.096	-0.868				-2.518	0.812	0							-1.900	3.536	0.171	-0.692	2.940	-0.873		9408-3	
9436-1	-1.384	-2.413	-0.977				0.423	0.628	0	-0.870	0.255		1.014	0	-0.211	0.349	-0.905	0.925	-0.692	1.172	0.264		9436-1	
9436-2	0.481	0.522	0.235				0.767	1.257	0														9436-2	
9436-3																							9436-3	
9524-1	1.872	0.466	0.235				1.246	0.441	0	-0.768	0.175	0				1.361	3.601	1.213	0.670	2.205	0.736		9524-1	
9524-2	-0.386	1.222	1.282				-0.553	1.199	0	1.057	0.533												9524-2	
9524-3																							9524-3	
9657-1	-1.491	-2.301	0.419				0.243	0.827	0	0.902	0.601	0	0.868	0	1.714	0.349	0.067	0.400	-0.692	0.861	0.264		9657-1	
9657-2	-0.467	1.889	-0.447				-1.263	0.371	0														9657-2	
9657-3							-1.826	-0.815	0														9657-3	
9736-1	-0.005	0.586	0.419				0.931	0.019	0	-0.083	1.252	0		0	1.505	-0.968	0.455	0.974	1.023	0.755	0.736		9736-1	
9736-2													0.716										9736-2	
9736-3																							9736-3	
9857-1	0.209	1.473	1.032				-0.139	1.309	0	-0.067	0.175	0				-0.253	2.339	0.564					9857-1	
9857-2																							9857-2	
9857-3																							9857-3	
9899-1	0.923	0.560	-0.147				0.931	0.743	0	-0.052	0.533	0	-0.150	0	1.714	1.361	0.608	0.925	0.279	0.755	0.264		9899-1	
9899-2	1.102	-0.147	0.775				1.546	0.438	0	0.496	0.923	0	0.716	0	-0.735								9899-2	
9899-3																							9899-3	
9903-1	-1.837	0.660	0.599				0.931	0.136	0	-0.583	-0.403	0	-0.572	0	-1.185	0.349	-0.656	-0.010	-0.692	0.044	0.736		9903-1	
9903-2																							9903-2	
9903-3																							9903-3	

- |z| ≥ 3,0 ("Unacceptable" or "Action")
- 2,0 < |z| < 3,0 ("Warning")
- The parameter is not evaluated
- The result is not evaluated

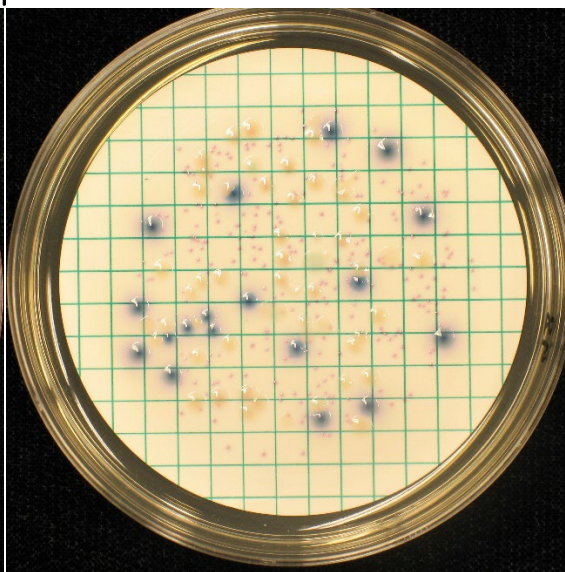
Sample A

m-Endo Agar LES, 37 °C



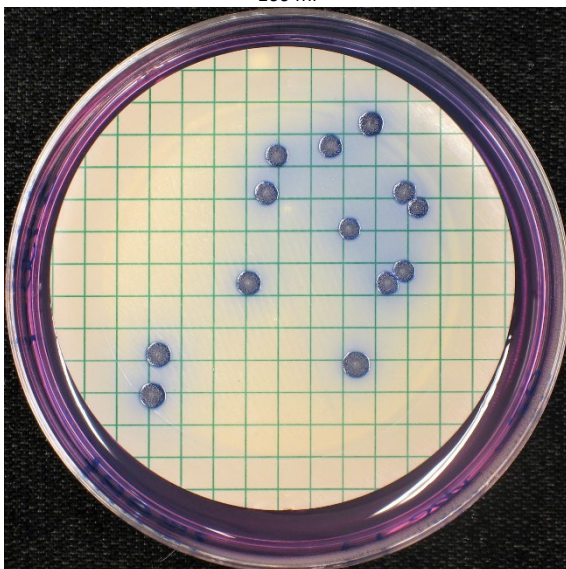
100 ml

Chromocult Coliform Agar, 37 °C



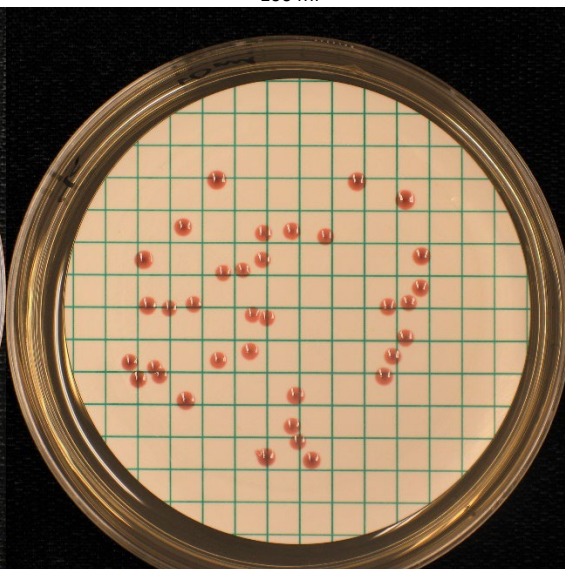
100 ml

m-FC Agar, 44 °C



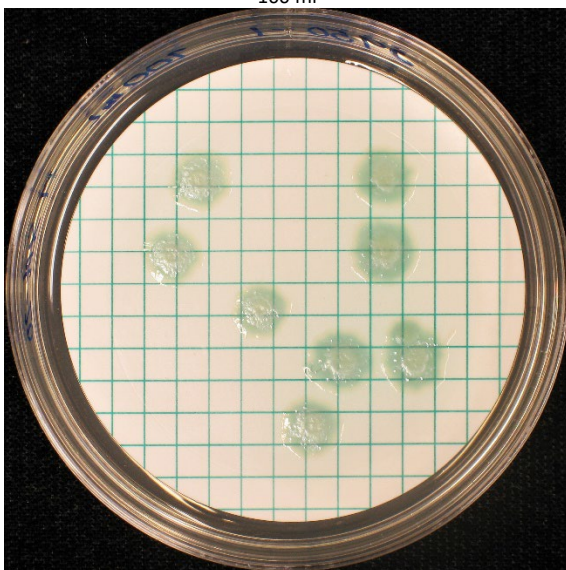
100 ml

m-Enterococcus Agar, 37 °C



10 ml, 2 days

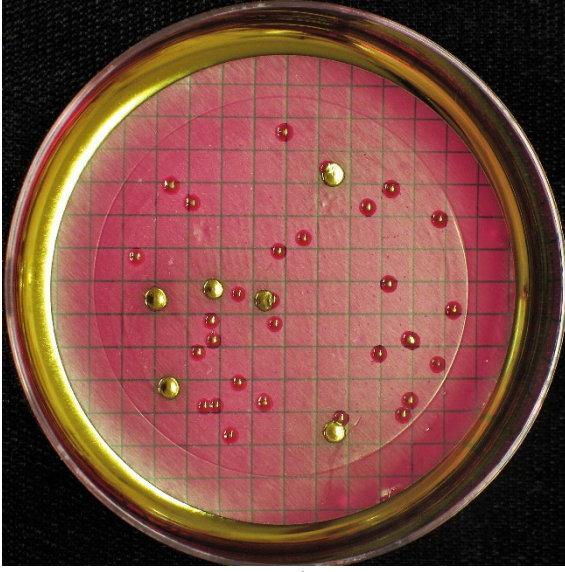
m-Pseudomonas CN Agar, 37 °C



100 ml, 2 days

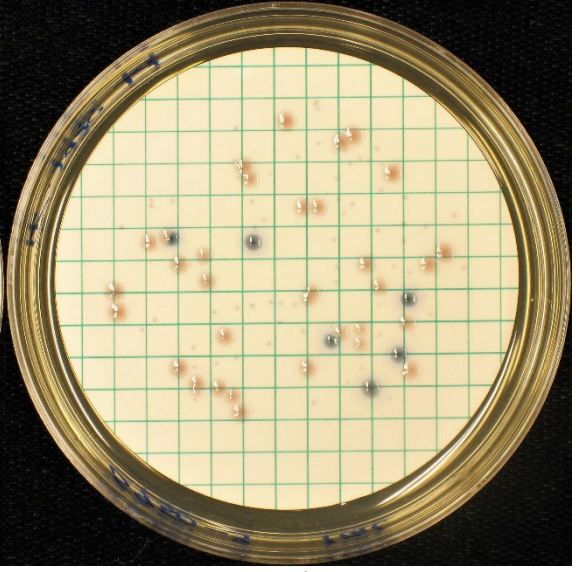
Sample B

m-Endo Agar LES, 37 °C



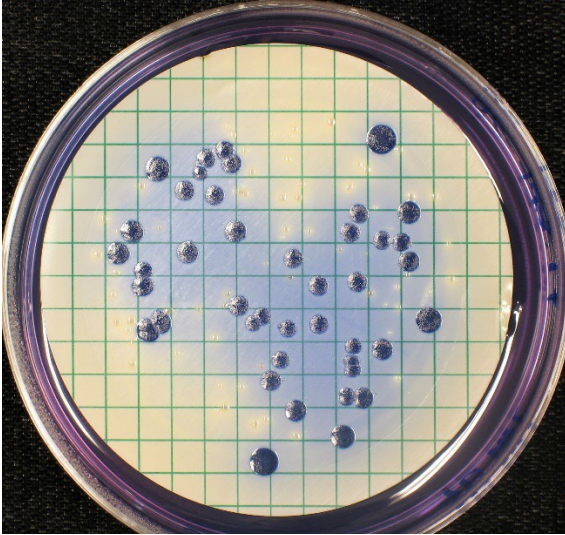
1 ml

Chromocult Coliform Agar, 37 °C



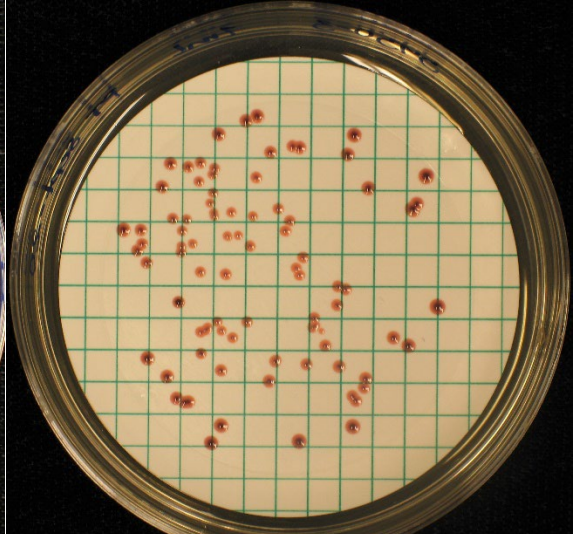
1 ml

m-FC Agar, 44 °C



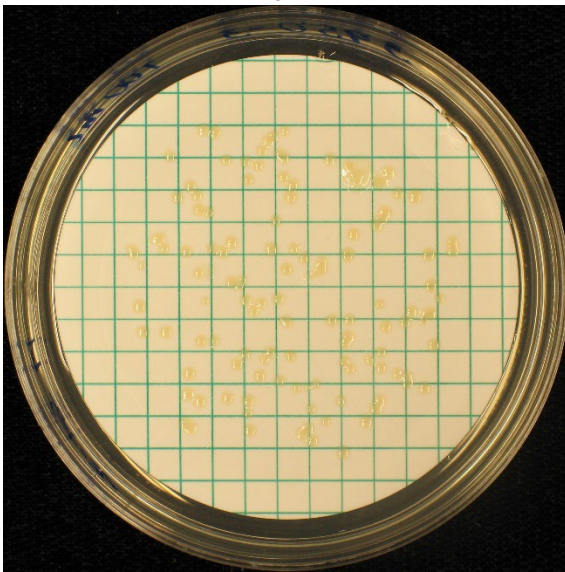
10 ml

m-Enterococcus Agar, 37 °C



1 ml, 2 days

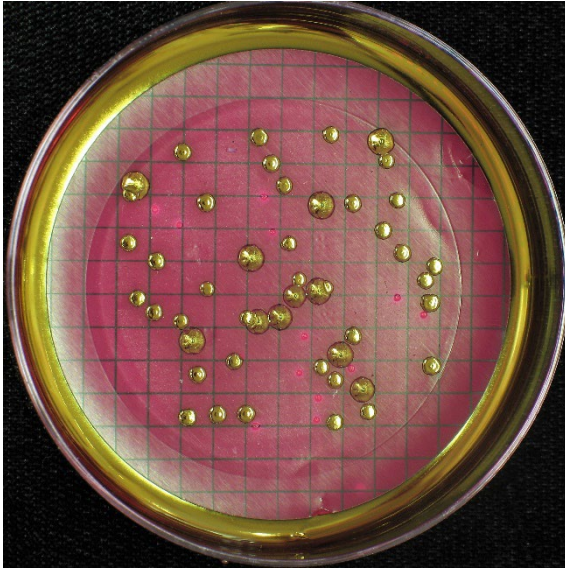
m-Pseudomonas CN Agar, 37 °C



100 ml, 2 days

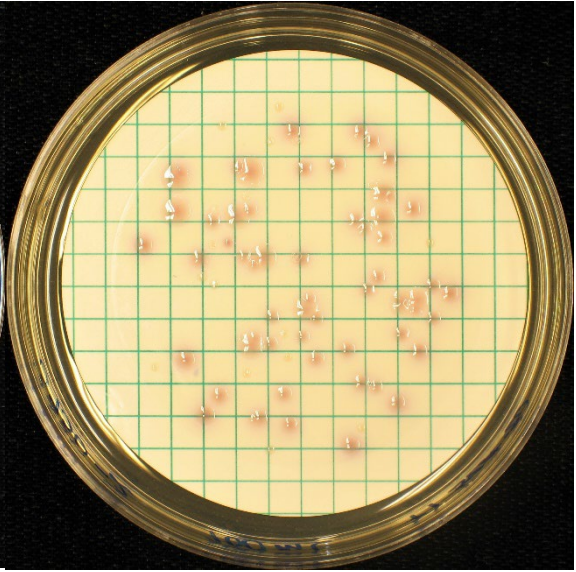
Sample C

m-Endo Agar LES, 37 °C



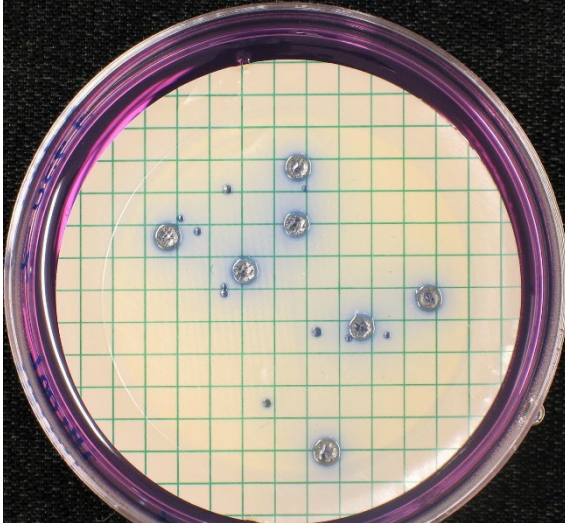
100 ml

Chromocult Coliform Agar, 37 °C



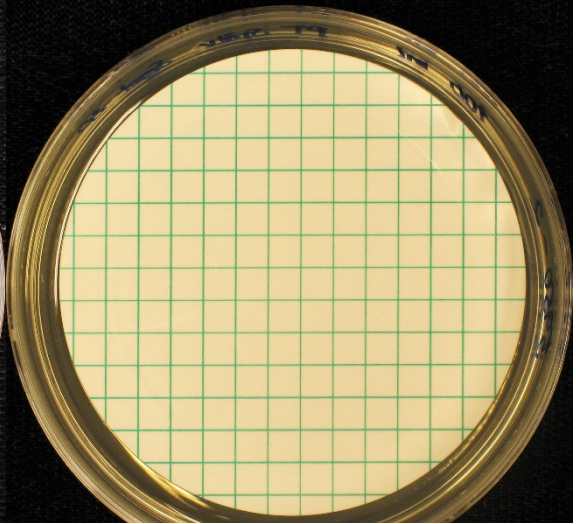
100 ml

m-FC Agar, 44 °C



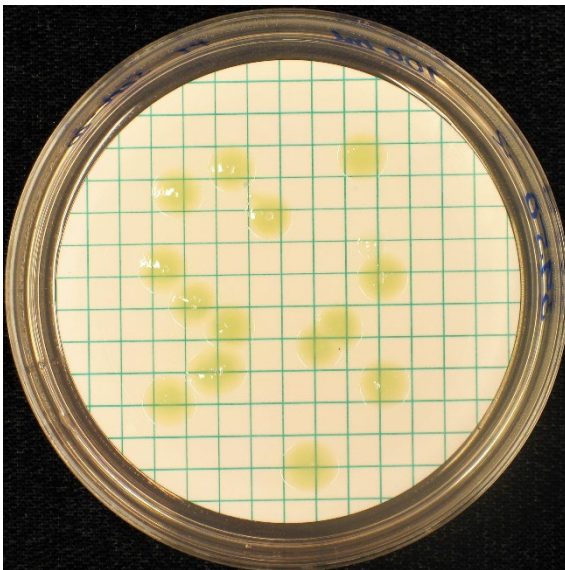
100 ml

m-Enterococcus Agar, 37 °C



100 ml

m-Pseudomonas CN Agar, 37



100 ml, 2 days

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 participants carry out some form of internal quality assurance, but the analytical work also needs 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 PT, identical test material is analysed by a number of participants. After reporting of results by the participants, the organiser evaluates the results and compiles them in a report.

The Swedish Food Agency's PT program offers

- External and independent evaluation of participants analytical competence.
- Improved knowledge of analytical methods with respect to various types of organisms.
- Expert support.
- Tool for inspections regarding accreditation.

For more information, visit our website: www.livsmedelsverket.se/en/PT-micro

The Swedish Food Agency's reference material

As a complement to the proficiency testing, but without specific accreditation, the Swedish Food Agency also manufactures a number of reference materials (RM) for internal quality control of food and drinking water microbiological analyses, including pathogens.

For more information, visit our website: www.livsmedelsverket.se/en/RM-micro