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Proficiency Testing

Microbiology – Food

April 2017

Accred. no. 1457
Proficiency testing
ISO/IEC 17043

Quantitative analyses

- Aerobic microorganisms, 30 °C
- Psychrotrophic microorganisms
- Enterobacteriaceae
- *Escherichia coli*
- Presumptive *Bacillus cereus*
- Coagulase-positive staphylococci
- Lactic acid bacteria
- *Clostridium perfringens*
- Anaerobic sulphite-reducing bacteria
- Aerobic microorganisms in fish products, 20-25 ºC
- H_2S-producing bacteria in fish products
- Yeasts
- Moulds

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Abbreviations

Media

BA	Blood agar
BA-P	Blood agar with Polymyxin
BcsA	*Bacillus cereus*-selective Agar
BcsA-P	*Bacillus cereus*-selective Agar with Polymyxin
BP	Baird-Parker agar
BP + RPF	Baird-Parker agar with Rabbit Plasma Fibrinogen
DG18	Dichloran Glycerol agar
DRBC	Dichloran Rose Bengal Chloramphenicol agar
IA	Iron Agar
ISA	Iron Sulphite Agar
LTLSB	Lactose Tryptone Lauryl Sulphate Broth
mCP	Membrane *Clostridium perfringens* agar
MPCA	Milk Plate Count agar
MRS	de Man, Rogosa and Sharpe agar
MRS-aB	de Man, Rogosa and Sharpe agar with amphotericin
MRS-S	de Man, Rogosa and Sharpe-agar with sorbic acid
MYP	Mannitol egg Yolk Polymyxin agar
OGYE	Oxytetracyclin Glucose Yeast Extract agar
PAB	Perfringens Agar Base
PCA	Plate Count Agar
SFP	Shahidi-Ferguson Perfringens agar
TBX	Tryptone Bile X-glucuronide agar
TGE	Tryptone Glucose Extract agar
TSA	Tryptone Soy Agar
TSC	Tryptose Sulphite Cycloserine agar
VRB	Violet Red Bile agar
VRBG	Violet Red Bile Glucose agar
YGC	Yeast extract Glucose Chloramphenicol agar

Organisations

AFNOR	French National Standardization Association
AOAC	AOAC INTERNATIONAL
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 after $\log_{10}$ transformation 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 is accredited, it is mandatory for the participating laboratories to report method information for all their analyses. Method information is sometimes difficult to interpret, since many laboratories report a medium that that is not included in the standard method that they refer to. Results from laboratories that report contradictory data on methods/media have either been excluded from the method analysis, or been added to the group of "Others", together with results from methods and media that are only used by 1-2 laboratories.

Mean values and standard deviations are normally provided for the different analyses. When the total number of reported results for an analysis is fewer than 20, the median is provided instead of the mean value. For method groups with fewer than 5 results, only the number of false results and outliers are provided.

Uncertainty of measurement for the assigned values

The uncertainty of measurement for an assigned value is calculated as the standard deviation divided by the square root of the number of correct results ("standard error"). The assigned value of evaluated parameters is the mean value of the participants results.

Table and figure legends

Tables

N	number of laboratories that performed the analysis
n	number of laboratories with satisfactory result
m	mean value in $\log_{10}$ cfu/ml (false results and outliers excluded)
s	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 the analytical results for each mixture are presented. The mean value of the analysis results is indicated in each histogram.

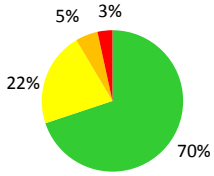
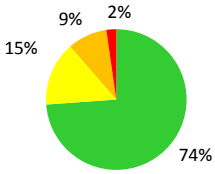
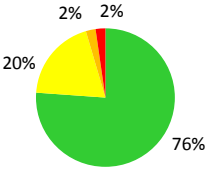
▒	values within the interval of acceptance (Annex 1)
■	outliers
□	false negative results
*	values outside of the x-axis scale

Results of the PT round April 2017

Samples were sent to 186 laboratories, 43 in Sweden, 130 in other European countries, and 13 outside Europe. Of the 176 laboratories that reported results,93 (53 %) provided at least one result that received an annotation. In the previous round with similar analyses (April 2016), the proportion was 81 %.

Individual results for each analysis in the PT round are listed in Annex 1 and are also available on the website after logging in: www2.slv.se/absint.

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

	Mixture A				Mixture B				Mixture C			
% of participants with 0 annotation 1 annotations 2 annotations >2 annotations												
Microorganisms	*Escherichia coli* *Kluyveromyces marxianus* *Lactobacillus plantarum* *Penicillium verrucosum*				*Aspergillus flavus* *Bacillus cereus* group *Brochotrix thermosphacta* *Clostridium perfringens* *Hanseniaspora uvarum* *Shewanella putrefaciens*				*Enterococcus faecium* *Escherichia coli* *Staphylococcus aureus* *Staphylococcus saprophyticus*			
Analysis	**Target organism**	**N**	**F%**	**X%**	**Target organism**	**N**	**F%**	**X%**	**Target organism**	**N**	**F%**	**X%**
Aerobic micro-organisms, 30 °C	All	162	0	6	All	161	0	0	All	162	0	4
Psychrotrophic microorganisms	*P. verrucosum**	10*	0*	0*	*B. thermosphacta*	10	0	0	All*	10*	0*	0*
Enterobacteriaceae	*E. coli*	137	1	4	-	137	3	0	*E. coli*	138	4	4
E. coli	*E. coli*	123	9	7	-	125	3	0	*E. coli*	124	3	4
Presump. *B. cereus*	-	120	1	0	*B. cereus*	121	2	0	-	121	3	0
Coagulase-positive Staphylococci	-	117	4	0	-	117	8	0	*S. aureus*	116	7	1
Lactic acid bacteria	*L. plantarum*	60	2	2	-	60	32	0	*E. faecium*	61	20	0
C. perfringens	-	62	0	0	*C. perfringens*	63	5	8	-	63	2	0
Anaerobic sulphite-reducing bakteria	-	67	3	0	*C. perfringens*	68	6	1	-	68	4	0
Aerobic microorg. in fish products	*All*	29	0	3	*All*	29	0	0	*All*	29	0	3
H_2S-prod. bacteria in fish products	-	29	7	0	*S. putrefaciens*	29	10	3	-	29	3	0
Yeasts	*K. marxianus*	140	6	2	*H. uvarum*	142	2	6	-	141	4	0
Moulds	*P. verrucosum*	140	10	6	*A. flavus*	142	1	5	-	141	3	0

- no target organism or no value; (*microorganism*) false positive before confirmation
* the results are not evaluated

Aerobic microorganisms, 30 °C

Mixture A
Strains of *Escherichia coli* and *Lactobacillus plantarum* were present in the highest concentrations in the mixture, and thus most colonies were from these species. The analyses were without any notable problem for the majority of the laboratories, and the results were distributed around a distinct peak. Two high and 7 low outliers were reported.

Mixture B
Strains of *Bacillus cereus*, *Shewanella putrefaciens* and *Brochothrix thermosphacta* were present in the highest concentrations in the mixture, and thus most colonies were from these species. The results were distributed with a main peak at around $\log_{10}$ 4.0 and a smaller peak around $\log_{10}$ 4.6. The results in the main peak could mainly be attributed to the use of PCA, MPCA and TSA, while the results in the higher peak could be attributed to the use of 3M™ Petrifilm™ Aerobic Count (Petrifilm AC). No false negative results were reported, and no outliers could be identified.

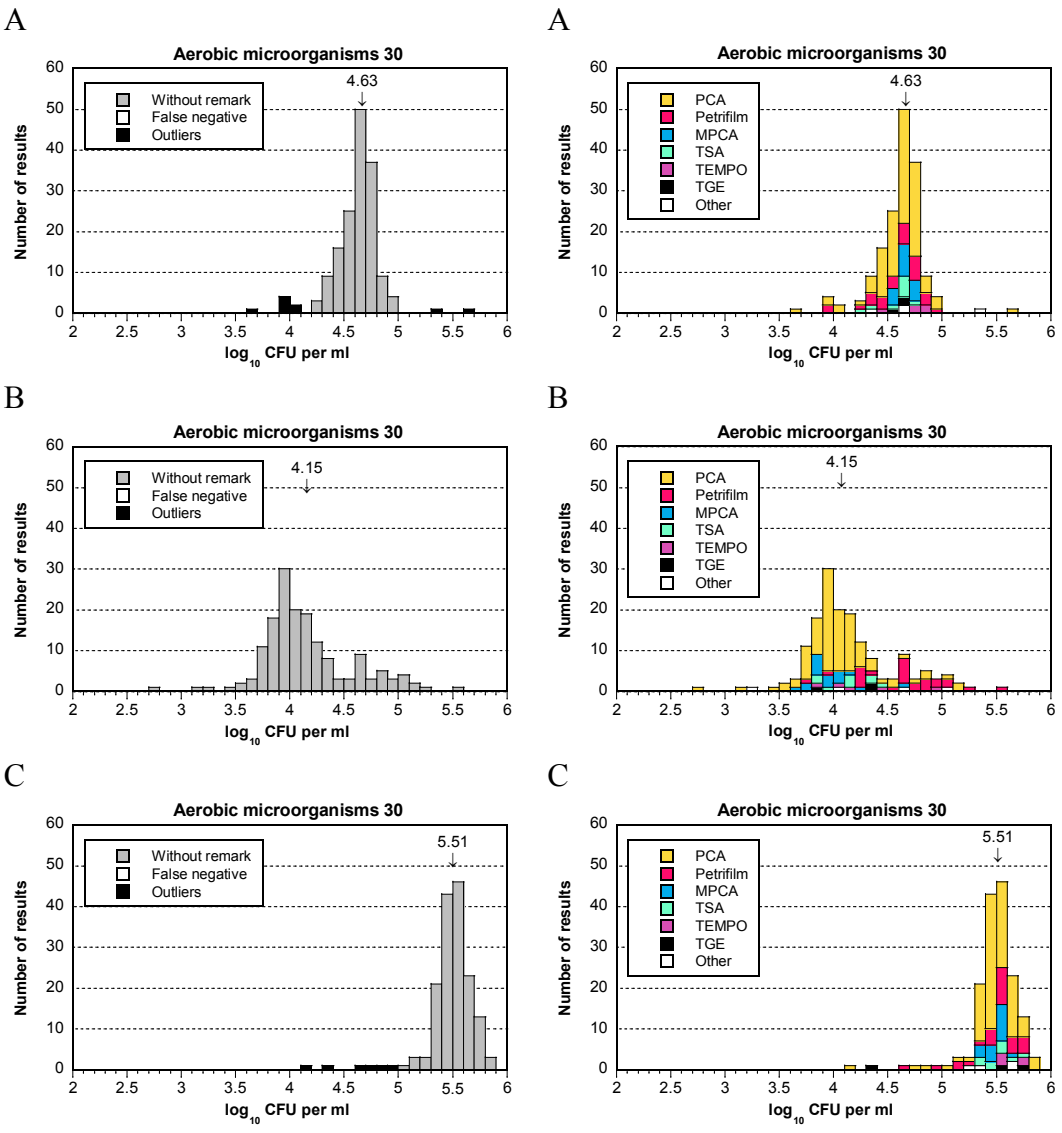
Mixture C
Strain of *Escherichia coli*, *Staphylococcus aureus* and *Enterococcus faecium* were present in the highest concentrations in the mixture, and thus most colonies were from these species. The analyses were without any notable problem for the majority of the laboratories, and the results were distributed around a distinct peak. Six low outliers were reported.

General remarks
As in previous PT rounds, NMKL 86 and ISO 4833 were the most used methods. Consequently, PCA and MPCA were the most used media, but Petrifilm AC was also used. It should be mentioned that many laboratories reported following the older versions NMKL 86:2006 and ISO 4833:2003, which have since been replaced by NMKL 86:2013 and ISO 4833-1:2013 respectively.

The results for mixture B were distributed in two peaks. Analyses at the National Food Agency – on PCA according to NMKL 86:2013 – resulted in a concentration of $\log_{10}$ 4.28, which is in the higher part of the main peak at $\log_{10}$ 4.0. The results in the higher peak around $\log_{10}$ 4.6 were mainly attributed to the use of Petrifilm AC. Such higher results for Petrifilm AC compared to other media have been observed previously, for example in PT January 2017. The cause is currently unclear. Possibly, the surface

Results of aerobic microorganisms analysis

Media	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	162	153	4.63	0.14	0	7	2	161	4.15	0.42	0	0	0	156	5.51	0.14	0	6	0
PCA	97	91	4.63	0.13	0	5	1	97	4.04	0.35	0	0	0	94	5.50	0.13	0	3	0
Petrifilm AC	27	25	4.62	0.19	0	2	0	26	4.62	0.40	0	0	0	25	5.53	0.17	0	2	0
MPCA	17	17	4.66	0.07	0	0	0	17	3.95	0.23	0	0	0	17	5.50	0.08	0	0	0
TSA	9	9	4.57	0.17	0	0	0	9	4.14	0.21	0	0	0	9	5.51	0.11	0	0	0
TEMPO AC	5	5	4.72	0.18	0	0	0	5	4.28	0.44	0	0	0	5	5.63	0.12	0	0	0
TGE	3	3	-	-	0	0	0	3	-	-	0	0	0	2	-	-	0	1	0
Other	4	3	-	-	0	0	1	4	-	-	0	0	0	4	-	-	0	0	0



spreading technique used with Petrifilm AC is more gentle to the bacteria compared to the pour plate method used in NMKL 86 and ISO 4833. The incubation conditions are otherwise similar, both NMKL 86 and ISO 4833 prescribe incubation for 72 h at 30 °C. In contrast, there is some variation for Petrifilm AC, depending on what method that is followed. For example, AOAC® 990.12 prescribes incubation for 48 h at 35 °C while AFNOR 3M 01/1-09/89 prescribes 72 h at 30 °C.

Psychrotrophic microorganisms

Mixture A

A strain of *Penicillium verrucosum* was target organism. Only 10 laboratories performed the analysis, and used incubation conditions that were varied significantly. At the National Food Agency, small colonies were observed on PCA after 10 days incubation at 6.5 °C. These were easily missed without the use of a magnifying lens and ample lighting. Only 2 of the 4 laboratories that incubated at 6.5 °C for 10 days reported

concentrations corresponding to that of *P. verrucosum*; the remaining 2 laboratories reported zero results. All 3 laboratories that incubated at 7 °C for 3 days reported zero results, which is reasonable for that incubation time. At the same time, two laboratories that incubated at 21-22 °C reported higher concentrations, corresponding to those of *Lactobacillus plantarum* and *Escherichia coli* in the mixture. This is correct given the incubation temperature, but it can be discussed if these organisms are to be considered as psychrotrophs.

Mixture B

A strain of *Brochothrix thermosphacta* was target organism. The mixture also contained – in concentrations similar to that of *B. thermosphacta* – strains of *Bacillus cereus* and *Shewanella putrefaciens.* These two however do not grow as well as *B. thermosphacta* at low temperatures. As for mixture A, the incubation conditions varied among the laboratories. Despite this, all laboratories except one reported results between $\log_{10}$ 4.0 and $\log_{10}$ 4.9. These are all considered correct, even though it cannot be determined which of the stains that were identified. One laboratory reported a slightly higher result ($\log_{10}$ 5.3), which given the circumstances cannot be considered incorrect.

Mixture C

The mixture contained strains of *Escherichia coli*, *Staphylococcus aureus, S. saprophyticus* and *Enterococcus faecium*, all in concentrations between $\log_{10}$ 4.0 and $\log_{10}$ 5.0. After repeated analysis at the National Food Agency, small colonies were detected at a concentration of $\log_{10}$ 4.7, after 10 days incubation on PCA at 6,5 °C. These colonies were difficult to detect without the aid of a magnification lens and ample lighting. Four laboratories reported zero results. The remaining laboratories reported results between $\log_{10}$ 3.6 and $\log_{10}$ 5,7. The lower of these results were mainly reported by laboratories that incubated at a low temperature (6,5-7 °C) and the higher results by laboratories that incubated at a higher temperature (21-22 °C).

General remarks

A total of 10 laboratories performed the analysis. The incubation conditions varied largely, which is also reflected in the variation among the methods used by the laboratories. NMKL 86:2013 prescribes 10 days at 6.5 °C, but 20 h at 17 °C followed by 3 days at 7 °C can also be used. ISO 4833-1:2013, here used by some laboratories although it is aimed for analysis of aerobic plate count, stipulates incubation at 30 °C, whereas 6730:2005/IDF 101:2005 states 6,5 °C. Several laboratories simultaneously deviated from the conditions stipulated in the methods, and thus temperatures from 6,5 °C up to 22 °C, and incubation times from 24 h up to 10 days were used.

NMKL 74:2000 and NMKL 86:2006 were used by two laboratories each. Both of these methods have been replaced by NMKL 86:2013.

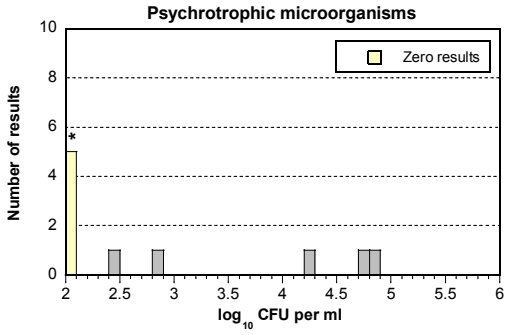
Due to the low number of participating laboratories – and the large variations in incubation conditions – the results for mixtures A and C are not evaluated. As a consequence, no z-scores have been calculated for these results, and they are also excluded from the tables located below the box plots. Due to the low number of participants, median values are also shown instead of mean values in the tables and figures below.

Results of psychrotrophic microorganisms analysis

Temperature	N	Mixture A*						Mixture B						Mixture C*					
		n	Med**	s	F	<	>	n	Med**	s	F	<	>	n	Med**	s	F	<	>
Total	10	5	1.24	-	-	-	-	10	4.47	-	0	0	0	6	4.06	-	-	-	-
6,5 °C	4	2	-	-	-	-	-	4	-	-	0	0	0	1	-	-	-	-	-
17 °C and 7 °C	4	1	-	-	-	-	-	4	-	-	0	0	0	3	-	-	-	-	-
21-22 °C	2	2	-	-	-	-	-	2	-	-	0	0	0	2	-	-	-	-	-
Other	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-	-	-	-

* The results for mixtures A and C are not evaluated.
** Med: median

A



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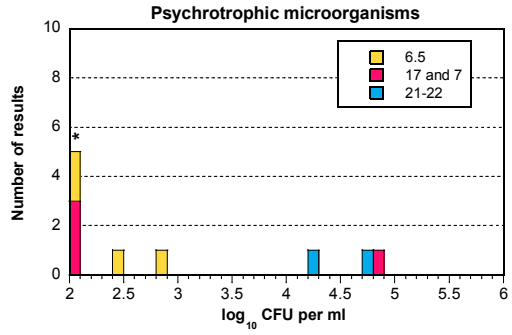

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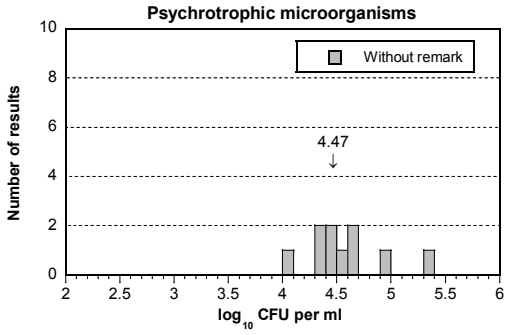

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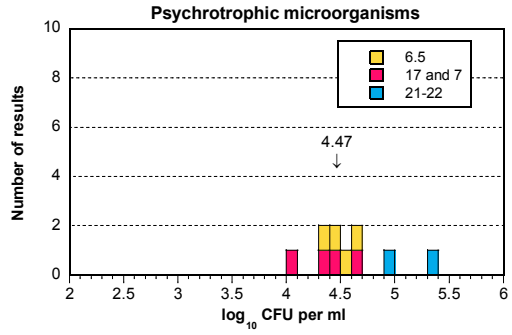

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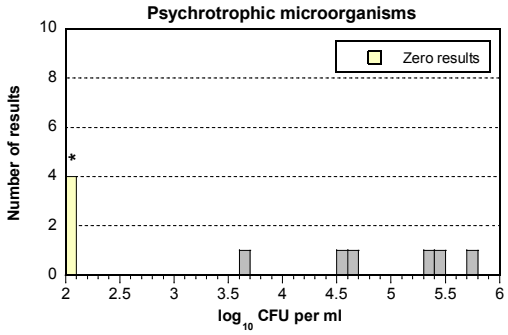

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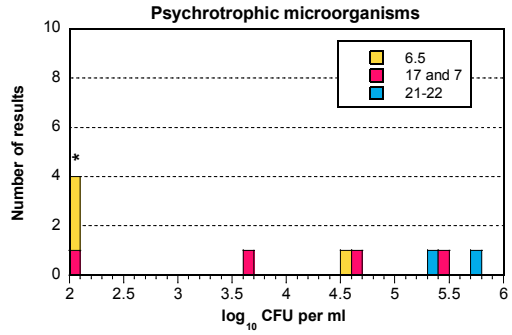


Enterobacteriaceae

Mixture A
A strain of *Escherichia coli* was target organism. The analyses were without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Two false negative results were reported, as well as 3 low and 2 high outliers.

Mixture B
No target organism was present in the mixture. Four false positive results were reported.

Mixture C
A strain of *Escherichia coli* was target organism. The analyses were without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Six false results were reported, as well as 6 low outliers.

General remarks
As in earlier PT rounds, NMKL 144:2005 and ISO 21528-2:2004 were the most used methods. Consequently, the majority of the laboratories (73 %) used violet red bile glucose agar (VRBG). The remaining laboratories mainly used 3M™ Petrifilm™ Enterobacteriaceae (20 %) but TEMPO® Enterobacteriaceae (TEMPO EB) was also used.

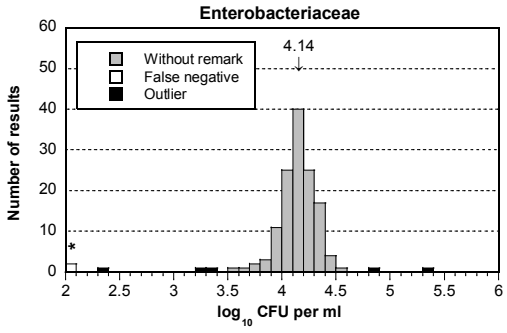
The analyses were for the most part without problem for the laboratories. Equivalent results were also reported, regardless of what method and media that was used. All of the low outliers in mixture C were reported by users of VRBG, but this was at the same time the most commonly used media.

Enterobacteriaceae are Gram-negative and oxidase negative bacteria, that ferment glucose with the production of acid by-products. On VRBG they form pink/red colonies, with or without a bile precipitation zone. The appearance is similar on Petrifilm EB, which also includes a colour indicator that assists in the detection of acid by-products, and a plastic film for detection of gas production. NMKL 144:2005 stipulates that presumptive colonies on VRBG shall be confirmed with an oxidase test. ISO 21528-2:2004 in contrast states that presumptive colonies shall be confirmed with both an oxidase test and with a test for glucose fermentation.

Results of Enterobacteriaceae analysis

Media	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	137	130	4.14	0.16	2	3	2	133	-	-	4	-	-	126	4.66	0.20	6	6	0
VRBG	102	96	4.13	0.16	1	3	1	101	-	-	1	-	-	94	4.64	0.19	2	6	0
Petrifilm EB	28	26	4.16	0.15	1	0	1	24	-	-	3	-	-	25	4.71	0.22	3	0	0
TEMPO EB	4	4	-	-	0	0	0	4	-	-	0	-	-	4	-	-	0	0	0
Other	4	4	-	-	0	0	0	4	-	-	0	-	-	3	-	-	1	0	0

A



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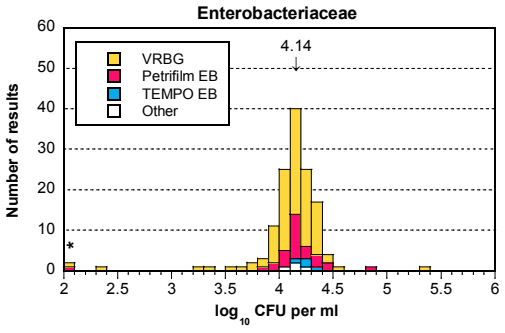

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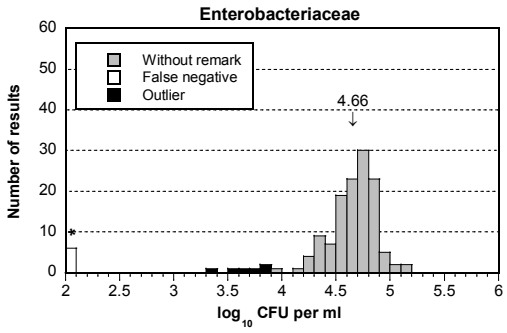

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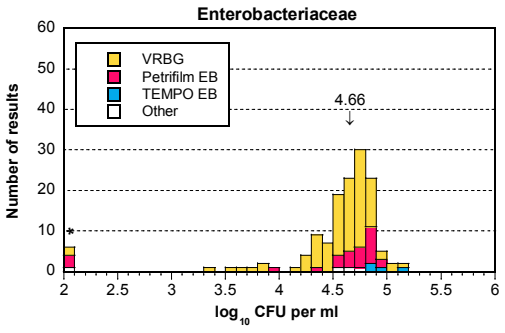

Escherichia coli

Mixture A

A strain of *Escherichia coli* was target organism. The results for the majority of the laboratories were distributed around a distinct peak. Eleven false negative results were however reported, as well as 7 low and 2 high outliers. The cause of the false negative results is unclear. In a previous PT round where the same material was used (April 2015), the results were distributed in a similar way as in the present PT round. However in the earlier PT round, no false results were reported. A small number of false results have however been reported for the same strain in the PT rounds of October 2013 and October 2014, without being attributed to the use of a specific method or media. Also in the current PT round, the false negative results were relatively evenly distributed among the various methods and media.

Mixture B

No target organism was present in the mixture. Four laboratories reported a false positive result.

Mixture C

A strain of *Escherichia coli* was target organism. The analyses were without problem for the majority of the laboratories and the results were distributed around a distinct peak. Four false negative results were reported, as well as 1 high and 4 low outliers.

General remarks

Approximately half of the laboratories (46 %) followed either NMKL 125:2005 or ISO 16649-2:2001. A large proportion of the laboratories (33 %) used 3M™ Petrifilm either as *E. coli*/coliform count (Petrifilm EC/CC) or Select *E. coli* (Petrifilm SEC).

NMKL 125:2005 describes the analysis of both thermotolerant coliform bacteria and *E. coli*. When incubated on violet red bile agar (VRB) at 44 °C, thermotolerant coliform bacteria form typical dark red colonies surrounded by a red precipitation zone. These are for example confirmed by inoculation in lactose tryptone lauryl sulphate broth (LTLSB), in which thermotolerant coliform bacteria form gas, as a consequence of lactose fermentation. *E. coli* are further identified by their production of indole either in LTLSB or in tryptone broth. ISO 16649-2:2001 instead uses tryptone bile X-glucuronide agar (TBX). On this medium, *E coli* β-glucuronidase reacts with an indicator in the medium, resulting in blue colonies. Petrifilm EC/CC and Petrifilm SEC are also based on detection of β-glucuronidase activity in *E. coli* – the plastic film in these media also facilitates the detection of gas produced from lactose fermentation.

In general, equivalent results were reported regardless of what method and media that was used. For mixture C however, a few minor differences in the mean values could be observed, depending on what media that was used. For example, the mean value for TBX was somewhat lower, and the mean value for TSA/VRB somewhat higher, compared to the mean value for all media combined. Similar differences in the results for TBX and TSA/VRB have been seen in previous PT rounds, but no clear cause has been found. Possibly, performing a pre-incubation may have an effect on the result. In NMKL 125:2005 a pre-incubation is routinely carried out prior to the final incubation on VRB. ISO 16649-2:2001 similarly prescribes a pre-incubation prior to the final incubation – this is however only required if the sample is suspected to contain stressed microorganisms.

For mixture A, a relatively large number of false negative results (3 of 4 laboratories) were reported by users of *Brilliance*™ E. coli/coliform Selective Agar (Brilliance EC/CC). The low number of laboratories that used this media however makes it difficult to draw any further conclusions from this observation.

The group "Other" includes a number of media that were used by fewer than 4 laboratories, and includes among others RAPID'E coli 2 Medium, REBECCA™ and Compact Dry™ EC.

Results of E.coli analysis

Media	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	125	103	4.20	0.15	11	7	2	121	-	-	4	-	-	115	4.74	0.22	4	4	1
TSA/VRB	26	25	4.23	0.11	0	1	0	26	-	-	0	-	-	25	4.89	0.15	0	1	0
Petrifilm EC/CC	24	21	4.22	0.14	2	1	0	24	-	-	0	-	-	24	4.77	0.14	0	0	0
Petrifilm SEC	19	15	4.26	0.12	2	1	1	16	-	-	3	-	-	17	4.84	0.12	2	0	0
TBX	20	17	4.11	0.16	1	1	0	20	-	-	0	-	-	18	4.60	0.18	0	2	0
VRB	11	10	4.11	0.15	0	1	0	11	-	-	0	-	-	10	4.74	0.17	0	1	0
TEMPO EC	4	3	-	-	1	0	0	4	-	-	0	-	-	4	-	-	0	0	0
Brilliance EC/CC	4	1	-	-	3	0	0	4	-	-	0	-	-	4	-	-	0	0	0
Other	17	11	4.21	0.20	2	2	1	16	-	-	1	-	-	13	4.50	0.28	2	0	1

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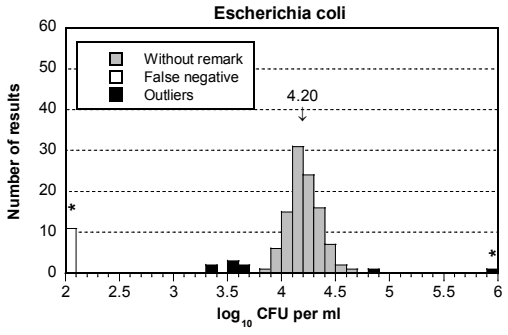

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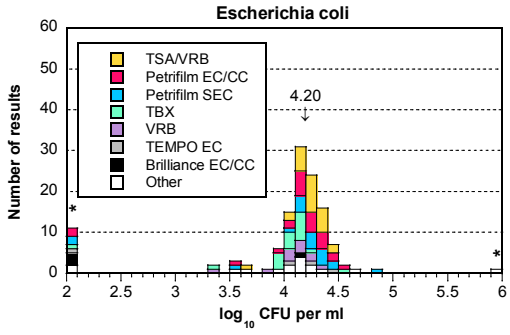

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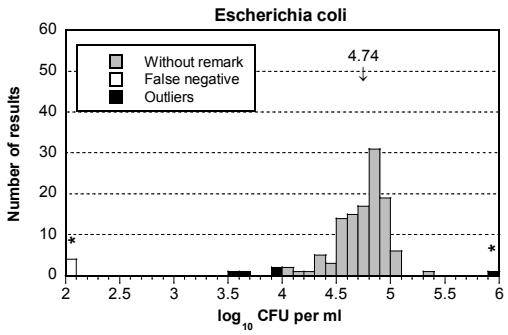

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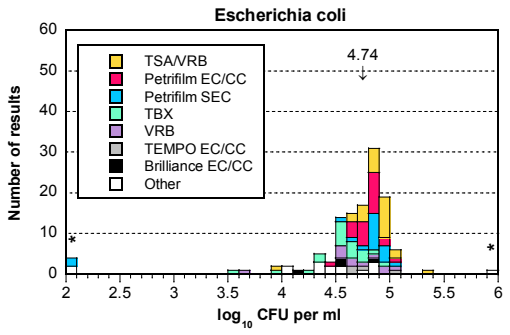

Presumptive *Bacillus cereus*

Mixture A

No target organism was present in the mixture. One false positive result was reported.

Mixture B

A strain of *Bacillus cereus* was target organism. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Three false negative results were reported.

Mixture C

No target organism was present in the mixture. Four false positive results were reported.

General remarks

The majority of laboratories followed either NMKL 67:2010 (58 %) or ISO 7932:2004 (21 %). The remaining laboratories either followed other methods, or did not state which method they used. Two laboratories stated that they followed older versions of the NMKL method (NMKL 67:2003 or NMKL 67:1997). No differences in the results could be attributed to the use of a specific method.

In NMKL 67:2010 samples are incubated on blood agar (BA), and colonies are confirmed by sub culturing onto either *Bacillus cereus*-selective agar with Polymyxin (BcsA-P) or onto Cereus-Ident agar (a chromogenic medium). On BA, *B. cereus* grows with large, irregular and grey colonies, surrounded by a large zone of haemolysis. Upon confirmation on BcsA-P, presumptive *B. cereus* form bluish colonies, that are surrounded by a precipitation zone, due to lecithinase activity on egg yolk present in the medium. On Cereus-Ident agar, presumptive *B. cereus* are blue/turqoise, and possibly surrounded by a blue ring. ISO 7932:2004 prescribes incubation on mannitol egg yolk

polymyxin agar (MYP), on which presumptive *B. cereus* form large pink colonies. On MYP, *B. cereus* are normally surrounded by a large zone of precipitation, due to lecithinase activity. The colonies can be then be confirmed if they display haemolysis on BA.

An in earlier PT rounds, several laboratories reported using combinations of methods and media that are incompatible. Other laboratories reported that the same medium was used in both steps of the analysis. The tables and figures below are based on the methods/media stated by the laboratories, regardless if these are compatible or not. Alternatively, in some cases it has been assumed that the laboratory used the medium that is specified by the method. Laboratories that only stated "chromogenic medium" are included in the group of "Other". Despite these inconsistencies, the mean values for the different method groups are very similar. The only exception is a slightly higher mean value for the group that used MYP.

Results of presumptive Bacillus cereus analysis

Media	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	120	119	-	-	1	-	-	118	4.07	0.27	3	0	0	117	-	-	4	-	-
BA-BcsA	34	33	-	-	1	-	-	33	4.10	0.23	1	0	0	34	-	-	0	-	-
BA	27	27	-	-	0	-	-	27	4.07	0.27	1	0	0	26	-	-	1	-	-
BA-MYP	26	26	-	-	0	-	-	26	4.01	0.31	1	0	0	26	-	-	1	-	-
MYP	12	12	-	-	0	-	-	12	4.23	0.25	0	0	0	12	-	-	0	-	-
BcsA	7	7	-	-	0	-	-	6	3.95	0.27	0	0	0	6	-	-	1	-	-
Other	14	14	-	-	0	-	-	14	4.03	0.29	0	0	0	13	-	-	1	-	-

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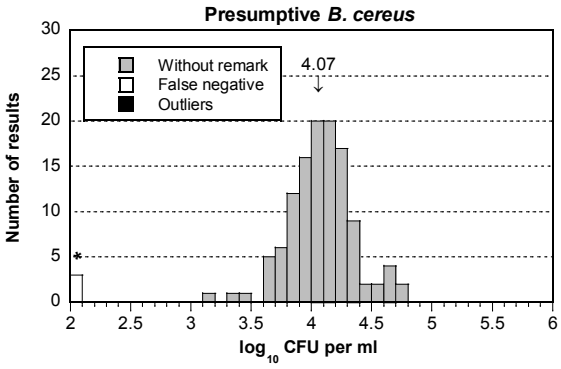

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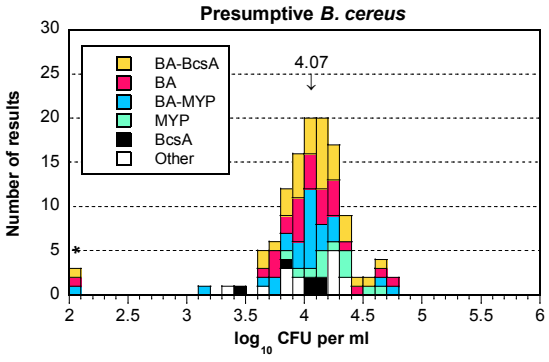

Coagulase-positive *Staphylococci*

Mixture A

No target organism was present in the mixture. Five false positive results were reported.

Mixture B

No target organism was present in the mixture. Nine false positive results were reported.

Mixture C

A strain of *Staphylococcus aureus* was target organism. The analysis was in general without problem for the laboratories, and the results were distributed around a distinct

peak. Eight false negative results were reported, as well as 1 low outlier.

General remarks

Most laboratories (48 %) followed NMKL 66:2009. Other laboratories followed either ISO 6888-1:1999 (16 %), used 3M™ Petrifilm™ Staph Express (14 %) or followed ISO 6888-2:1999 (7 %). The remaining 13 laboratories (15 %) either used other methods or did not state a method. No obvious difference in the results due to the use of a specific method or media could be found, for either of the mixtures. Altogether, only one false result was however reported by users of ISO 6888-1:1999 and ISO 6888-2:1999. This is low compared to other methods, but is likely due to a combination of coincidence, individual laboratories mixing up the samples, and the fact that relatively few laboratories used the ISO methods. The somewhat high number of false results for all three mixtures is otherwise relatively evenly distributed among the methods and media that were used.

NMKL 66:2009 prescribes incubation on Baird-Parker agar (BP) and/or BP with rabbit plasma fibrinogen (BP + RPF). As a complement to these media, blood agar (BA) can also be used. On BP, *S. aureus* forms characteristic convex, shiny colonies, that are grey/black due to reduction of tellurite in the medium. Proteolysis of egg yolk in the medium (due to lecithinase activity) normally causes a clear zone around the colonies. An opaque halo may also form near the colony, due to precipitation caused by lipase activity. The colonies are confirmed by a positive result in a coagulase test. When using BP + RPF, the coagulase activity is instead tested directly in the medium, and no subsequent confirmation is required. Similar to NMKL 66, ISO 6888-1 stipulates surface spreading on BP and confirmation by a coagulase test, whereas ISO 6888-2 instead uses BP + RPF. 3M™ Petrifilm™ Staph Express (Petrifilm Staph) uses a modified Baird-Parker medium, and a chromogenic indicator that stains *S. aureus* red/purple.

The majority of the laboratories (79 %) stated that they used some kind of confirmation test. Confirmation of coagulase-positive *Staphylococci* is traditionally done by detection of extracellular or bound coagulase (tube coagulase test and slide coagulase test respectively). Here, several laboratories instead performed confirmation by a latex agglutination test. This is based on latex particles coated either with fibrinogen or with IgG that binds to protein A on the bacterial cell surface. Antibodies targeted against polysaccharides on the bacterial cell surface are also used in variations of this test. Confirmation can also be carried out with a DNAse test, something which is done with 3M™ Petrifilm™ Staph Express Disk. This test distinguishes

Results of coagulase-positive Staphylococci analysis

Medium	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	117	112	-	-	5	-	-	108	-	-	9	-	-	107	4.79	0.15	8	1	0
BP	69	68	-	-	1	-	-	65	-	-	4	-	-	64	4.79	0.14	3	1	0
BP + RPF	23	22	-	-	1	-	-	23	-	-	0	-	-	22	4.85	0.14	1	0	0
Petrifilm Staph	16	15	-	-	1	-	-	13	-	-	3	-	-	14	4.74	0.14	2	0	0
TEMPO STA	2	2	-	-	0	-	-	1	-	-	1	-	-	2	-	-	0	0	0
OXOID Brilliance Staph 24	2	2	-	-	0	-	-	2	-	-	0	-	-	2	-	-	0	0	0
Other	5	3	-	-	2	-	-	4	-	-	1	-	-	3	-	-	2	0	0

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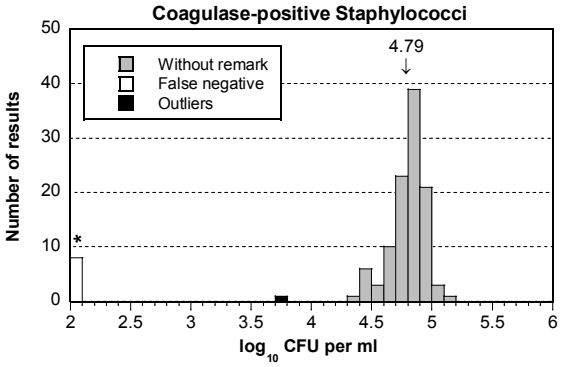

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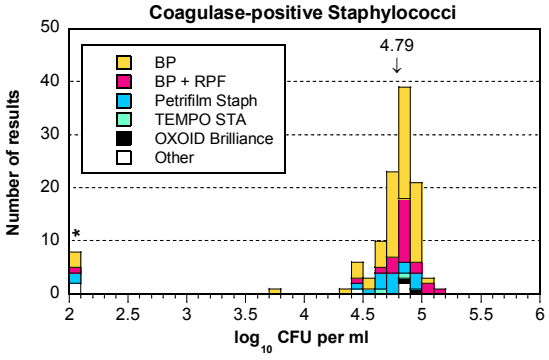

microorganisms that produce extracellular DNAse (including *S. aureus*). In this PT, no differences in the results could be attributed to the use of a specific method for confirmation. Laboratories that did not perform a confirmation were also not over-represented among the false results.

Lactic acid bacteria

Mixture A

A strain of *Lactobacillus plantarum* was target organism. The analyses were without problem for the majority of the laboratories. One false negative result was reported, as well as one low outlier.

Mixture B

No target organism was present in the mixture. Despite this, 19 of the 60 laboratories reported a false positive result. The false results could not be attributed to the use of a specific method or media.

Mixture C

A strain of *Enterococcus faecium* was target organism. The majority of the results were distributed around a distinct peak, but 12 laboratories reported false negative results. All 5 laboratories that used Rogosa agar reported a false negative result.

General remarks

The majority of the laboratories (62 %) followed NMKL 140. Most of these stated they used NMKL 140:2007, but 8 reported following the older NMKL 140:1991. The older method prescribes surface spreading onto de Man, Rogosa and Sharpe-agar with sorbic acid (MRS-S), while the newer method prescribes MRS with amphotericin (MRS-aB). On both media, lactic acid bacteria appear as 1,5-2 mm grey/white colonies. ISO 15214:1998 was used by 13 % of the laboratories. This method instead stipulates a pour plate method with MRS. All methods recommend confirmation by Gram staining and/or a catalase test; lactic acid bacteria are Gram positive and usually catalase negative. It should be mentioned that lactic acid bacteria are a heterogeneous group of microorganisms, that have different optimal medium, pH and incubation conditions. For example MRS-aB (pH 6.2), which is recommended in NMKL 140:2007, allows the growth of a relative wide range of lactic acid bacteria. This may however also result in the appearance of more false positive colonies compared to the more acid MRS-S (pH 5.7). Such differences between media and incubation conditions add to the importance

of performing a confirmation test in uncertain cases. In this PT, 56 % of the laboratories reported performing some type of confirmation.

Many false positive results were reported for mixture B. These however showed no obvious correlation to the use of a specific method or medium. Performing a confirmation test or not, also did not appear to have had an effect on the outcome for this mixture. Among the laboratories that reported a false positive result for mixture B, 63 % reported performing some type of confirmation test (e.g. Gram staining or catalase test), which is higher than the average for the analysis as a whole.

Many false negative results were reported for mixture C, notably by all 5 laboratories that used Rogosa agar. Possibly, the low pH in Rogosa (pH 5.4) may have had an effect, or the fact that only two of these laboratories performed a confirmation test. In contrast, at the National Food Agency, analysis of mixture C revealed typical colonies that grew well on MRS-aB. Also, none of the laboratories that used MRS-aB or MRS-S reported a

Results of lactic acid bacteria analysis

Medium	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	60	58	4.41	0.17	1	1	0	41	-	-	19	-	-	49	4.79	0.31	12	0	0
MRS	30	29	4.40	0.18	1	0	0	19	-	-	11	-	-	26	4.82	0.36	5	0	0
MRS-aB	12	11	4.34	0.20	0	1	0	8	-	-	4	-	-	12	4.71	0.30	0	0	0
MRS-S	7	7	4.48	0.15	0	0	0	5	-	-	2	-	-	7	4.76	0.21	0	0	0
Rogosa	5	5	4.53	0.15	0	0	0	5	-	-	0	-	-	0	-	-	5	0	0
Other	6	6	4.40	0.03	0	0	0	4	-	-	2	-	-	4	-	-	2	0	0

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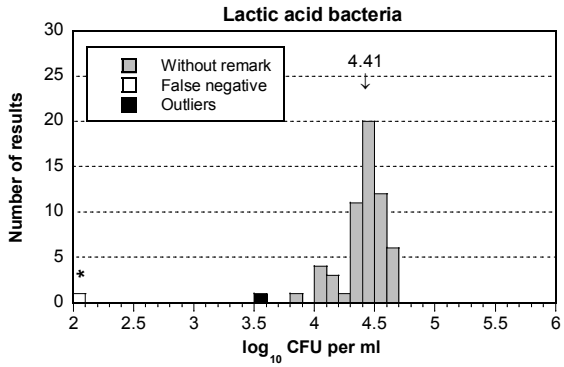

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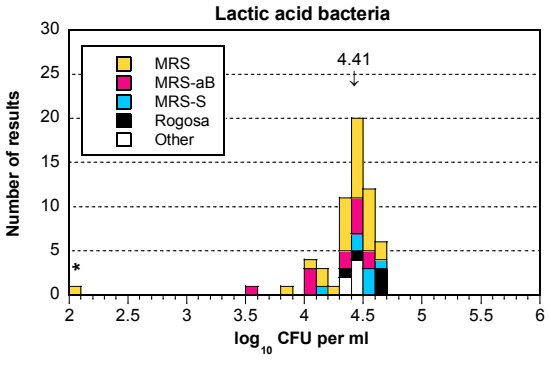

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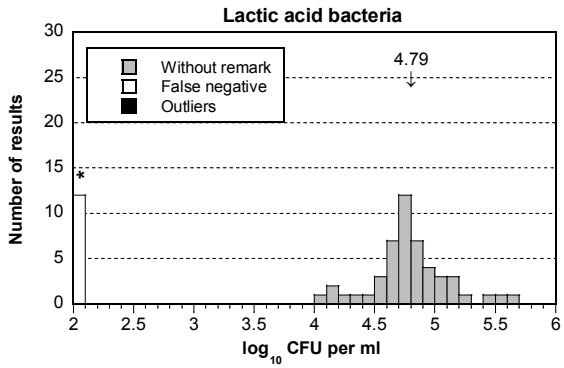

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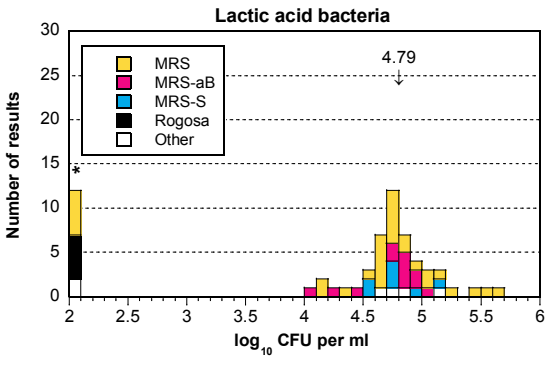

false negative result for mixture C. In total, 6 of the 12 laboratories that reported a false negative result for mixture C reported performing some type of confirmation.

C. perfringens

Mixture A
No target organism was present in the mixture. All laboratories that performed the analysis reported correct negative results.

Mixture B
A strain of *Clostridium perfringens* was target organism. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Three false negative results were reported, as well as 5 low outliers.

Mixture C
No target organism was present in the mixture. The analysis was without problem for the majority of the laboratories, but one laboratory reported a false positive result.

General remarks
The majority of the laboratories followed either NMKL 95:2009 (65 %) or ISO 7937:2004 (27 %). Among media, the use of TSC was predominant (85 %). The false negative results and outliers could not be attributed to the use of a specific method or medium.

The methods in NMKL 95:2009 and ISO 7937:2004 are similar. NMKL 95 prescribes surface spreading on mCP and/or a pour plate method with TSC. With TSC, *C. perfringens* forms black colonies, after anaerobic incubation at 37 °C. Presumptive and typical colonies are subcultured on blood agar (BA), and are confirmed by a motility test and a test of lactose fermentation. *C. perfringens* are non-motile, and form acid and gas as a consequence of lactose fermentation. ISO 7937:2004 also stipulates a pour plate method with TSC, and confirmation is by similar methods as in NMKL 95:2009.

In this PT round, only two laboratories used mCP. This medium is however often used in membrane filter analyses of water, where it sometimes has been found to result in lower recovery of *C. perfringens* compared to TSC (2, 3, 4). Comparative studies on food analyses have also advocated the use of TSC as the preferred medium for detecting *C. perfringens* (5, 6).

Results of C. perfringens analysis

Medium	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	62	62	-	-	0	-	-	55	2.66	0.17	3	5	0	62	-	-	1	-	-
TSC	53	53	-	-	0	-	-	50	2.67	0.17	0	4	0	54	-	-	0	-	-
mCP	2	2	-	-	0	-	-	0	-	-	1	1	0	2	-	-	0	-	-
PFA	2	2	-	-	0	-	-	1	-	-	1	0	0	1	-	-	1	-	-
Other	5	5	-	-	0	-	-	4	-	-	1	0	0	5	-	-	0	-	-

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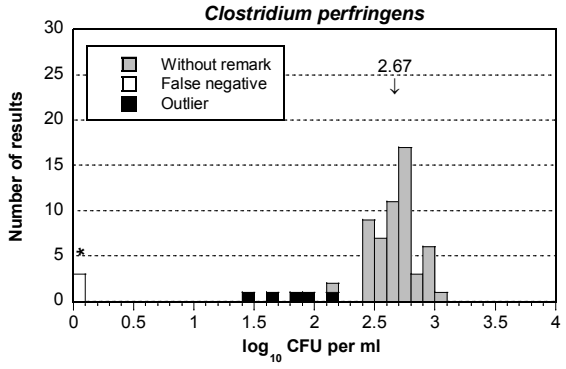

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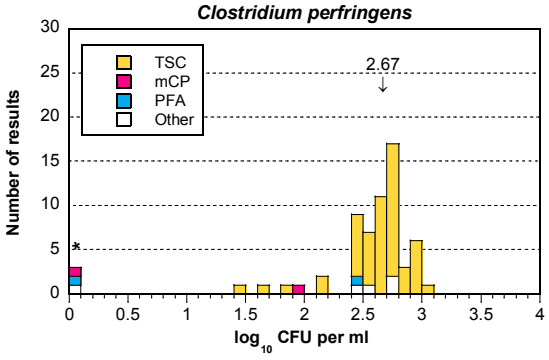

Anaerobic sulphite-reducing bacteria

Mixture A

No target organism was present in the mixture. Two false positive results were reported

Mixture B

A strain of *Clostridium perfringens* was target organism. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Four false negative results were reported, as well as one high outlier

Mixture C

No target organism was present in the mixture. Despite this, three laboratories reported a false positive result.

General remarks

The analyses were in general without problem for the laboratories. The small number of false results and outliers could not be attributed to a specific method or medium.

The majority of the laboratories (64 %) stated that they followed either NMKL 56:2008, or the newer NMKL 56:2015. In comparison, ISO 15213:2003 was used by 13 % of the laboratories. Both NMKL 56:2015 and ISO 15213:2003 stipulate the use of iron sulphite agar (ISA). Black colonies (possibly surrounded by a black zone) are considered as sulphite-reducing. The black colour of the colonies comes from iron sulphide, which is a precipitate of Fe^{3+} in the medium and H_2S that is produced by the reduction of sulphite. Growth of anaerobic bacteria that only produce hydrogen (and not H_2S) may sometimes result in a diffuse an unspecific blackening of the medium.

Results of anaerobic sulphite-reducing bacteria analysis.

Medium	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	67	65	-	-	2	-	-	63	2.52	0.26	4	0	1	65	-	-	3	-	-
ISA	28	27	-	-	1	-	-	27	2.49	0.29	1	0	1	27	-	-	2	-	-
TSC	15	15	-	-	0	-	-	15	2.51	0.25	0	0	0	15	-	-	0	-	-
SFP	13	13	-	-	0	-	-	13	2.61	0.27	0	0	0	13	-	-	0	-	-
PAB	6	6	-	-	0	-	-	4	-	-	2	0	0	5	-	-	1	-	-
Other	5	4	-	-	1	-	-	4	-	-	1	0	0	5	-	-	0	-	-

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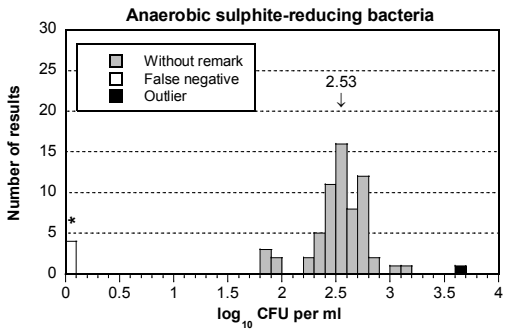

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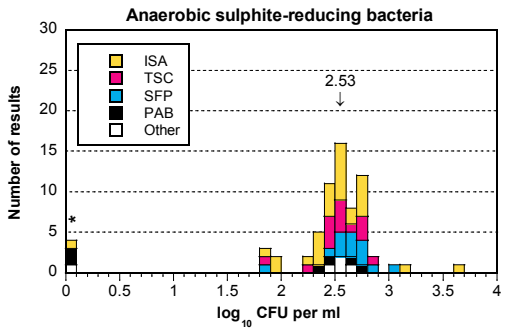


For users of NMKL 56 there was a variation in the use of media among laboratories. In addition to ISA that is stipulated by the method, laboratories reported using Perfingens agar base (PAB), Shahidi-Ferguson Perfringens agar (SFP) and tryptose sulphite cycloserin agar (TSC). These media are used when identifying *C. perfringens*, and colonies should in those cases be confirmed using the methods in NMKL 95.

Aerobic microorganisms in fish products, 20-25 °C

Mixture A

Strains of *Escherichia coli* and *Lactobacillus plantarum* were present in the highest concentrations, and thus most colonies were from these species. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. One low outlier was reported.

Mixture B

Strains of *Bacillus cereus* and *Shewanella putrefaciens* were present in the highest concentrations in the mixture, and thus most colonies were from these species. The analysis was without problem for the majority of the laboratories. The results had a relatively wide distribution, but no outliers could be identified.

Mixture C

Strains of *Escherichia coli*, *Staphylococcus aureus* and *Enterococcus faecium* were present in the highest concentration in the mixture, and thus most colonies were from these species. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. One low outlier was reported.

General remarks

The analyses were in general without problem for the laboratories, and differences in the results due to the use of a specific method or medium could not be identified. The majority of the laboratories (80 %) reported following NMKL 184:2006. The method prescribes the use of iron agar (IA), which was also used by most laboratories (90 %).

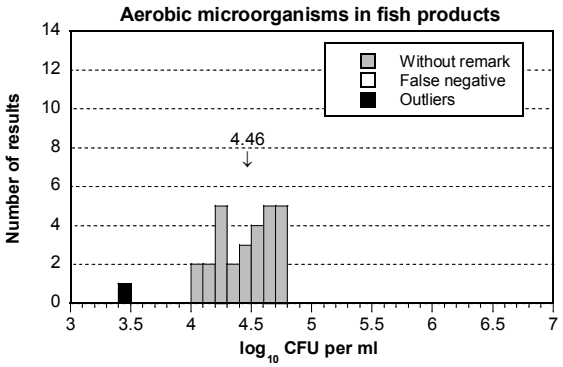
Two laboratories followed NMKL 86 (“Aerobic microorganisms in foods”). Though this method is adapted for use in all types of food samples, it also refers to NMKL 184:2006 for the analysis of fish and fish products. Three laboratories followed NMKL 96:2003, which uses the same method for total aerobic count as NMKL 184:2006. However, NMKL 96:2003 has been replaced by NMKL 96:2009 (”Coliform bacteria, thermotolerant coliform bacteria and *E. coli*”) which refers to NMKL 184:2006 for the analysis of total aerobic count in fish and seafood.

It can be mentioned that NMKL 184:2006 also allows incubation on Long & Hammer agar for the detection of psychrotrophic and heat-sensitive microorganisms. With this medium, incubation is done at 15 °C, which may be advantageous when analysing fresh minced fish meat or lightly preserved fish products.

Results of aerobic microorganisms in fish products analysis.

Method	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	29	28	4.46	0.22	0	1	0	29	4.49	0.43	0	0	0	28	5.45	0.22	0	1	0
NMKL 184	23	23	4.44	0.22	0	0	0	23	4.55	0.44	0	0	0	23	5.42	0.22	0	0	0
NMKL 96	3	3	-	-	0	0	0	3	-	-	0	0	0	3	-	-	0	0	0
NMKL 86	2	2	-	-	0	0	0	2	-	-	0	0	0	2	-	-	0	0	0
Other	1	0	-	-	0	1	0	1	-	-	0	0	0	0	-	-	0	1	0

A



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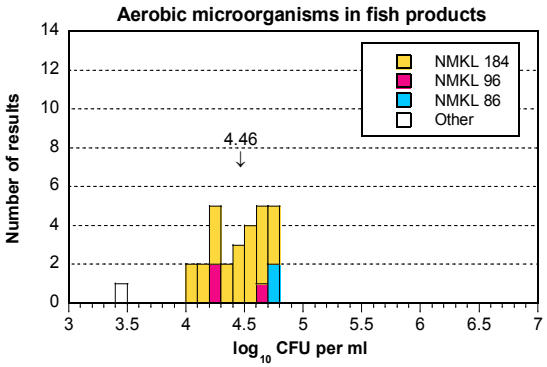

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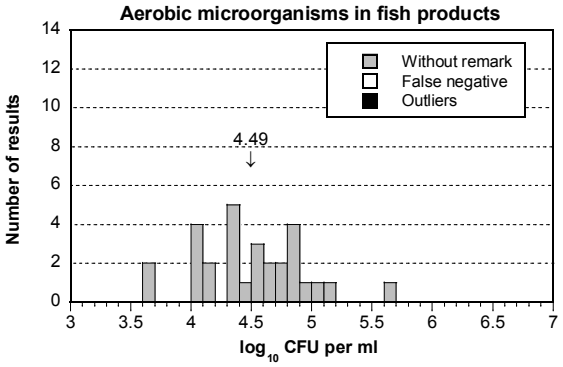

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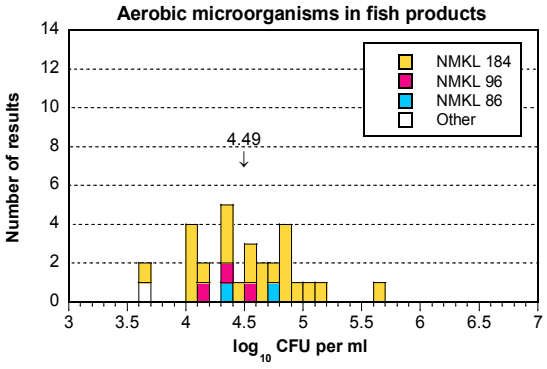

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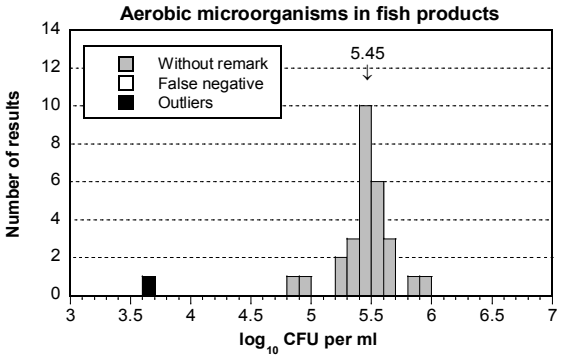

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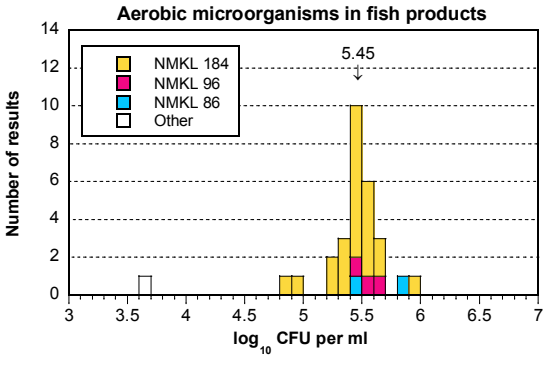


H_2S-producing bacteria in fish products

Mixture A

No target organism was present in the mixture. A total of 29 laboratories performed the analysis. Two false positive results were reported.

Mixture B

A strain of *Shewanella putrefaciens* was target organism. The analysis was without problem for the majority of the laboratories, but the results had a relatively wide distribution. Three false negative results were reported, as well as one low outlier.

Mixture C

No target organism was present in the mixture. One false positive result was reported.

General remarks

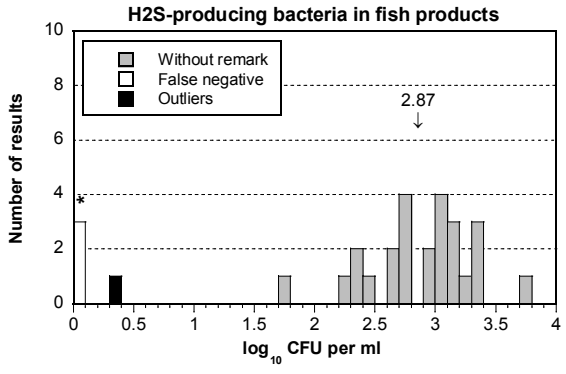
The analyses were in general without problem for the laboratories, and differences in the results due to the use of a specific method or medium could not be identified.

An in the analysis of aerobic microorganisms in fish and fish products (above) the use of NMKL 184:2006 and IA was prevalent. With IA, H_2S-producing bacteria form black colonies. Three laboratories stated the use of NMKL 96:2003. Though this uses the same principal method as NMKL 184:2006, it has been replaced by NMKL 96:2009 which refers to NMKL 184:2006 for the analysis of aerobic microorganisms and H_2S-producing bacteria in fish and seafood.

Results of H_2S producing bacteria in fish products analysis.

Method	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	29	27	-	-	2	-	-	25	2.87	0.43	3	1	0	28	-	-	1	-	-
NMKL 184	25	24	-	-	1	-	-	21	2.83	0.45	3	1	0	25	-	-	0	-	-
NMKL 96	3	3	-	-	0	-	-	3	-	-	0	0	0	3	-	-	0	-	-
Other	1	0	-	-	1	-	-	1	-	-	0	0	0	0	-	-	1	-	-

B



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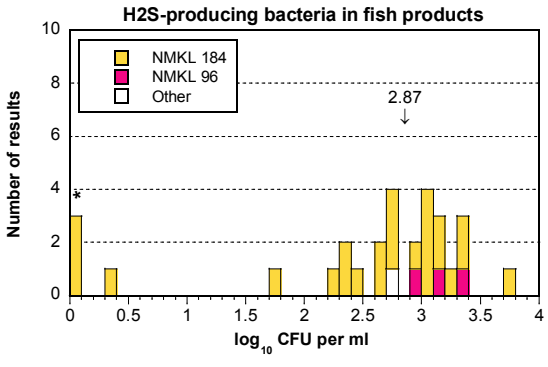


Yeasts and moulds

Mixture A

A strain of *Kluyveromyces marxianus* was target organism in the analysis of yeasts. The majority of the laboratories also reported results that were distributed around a peak

corresponding to that of the concentration of *K. marxianus* in the mixture. A smaller number of laboratories reported results that formed a smaller peak, which rather corresponded to the slightly higher concentration of *Penicillium verrucosum* in the mixture. Statistically, the results in the two peaks could however not be separated. Eight false negative results and 3 high outliers were reported.

A strain of *Penicillium verrucosum* was target organism in the analysis of moulds. The analysis was without problem for the majority of the laboratories and the results were distributed around a distinct peak. However 14 false negative results were reported, as well as 6 low and 2 high outliers. Approximately half of the false negative results are likely due to colonies of *P. verrucosum* being incorrectly identified and reported as yeasts.

Among the values in the higher peak for yeasts, there was a slight over-representation of laboratories that used 3M™ Petrifilm Yeast and Mould (Petrifilm YM) and 3M™ Petrifilm Rapid Yeast and Mould (Petrifilm RYM). This is also reflected in the higher mean value for these media. At the same time, somewhat more false negative results were reported by users of Petrifilm in the analysis of moulds, compared to users of other media. Possibly, the colonies of *P. verrucosum* were more easily mistaken for yeasts by users of Petrifilm.

Mixture B

A strain of *Hanseniaspora uvarum* was target organism in the analysis of yeasts. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Three false negative results were reported, as well as 5 low and 4 high outliers.

A strain of *Aspergillus flavus* was target organism for the analysis of moulds. The analysis was without problem for the majority of the laboratories, and the results were distributed around a distinct peak. Two false negative results were reported, as well as 3 low and 4 high outliers.

Mixture C

No target organism was present in the mixture, for either of the analyses. Despite this, 6 laboratories reported a false positive result for yeasts, and 4 laboratories reported a false positive result for moulds.

General remarks

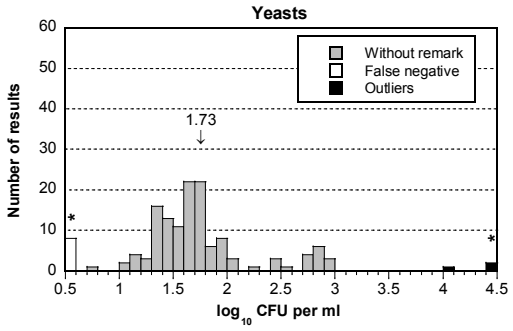
The methods used in the analysis of yeasts and moulds were practically identical, as were the participating laboratories. The methods included (for yeasts) mainly NMKL 98:2005 (43 %), ISO 6611:2004/IDF 94:2004 (19 %) and ISO 21527-1:2008/21527-2:2008 (6 %). Twelve laboratories (9 %) used Petrifilm YM or Petrifilm RYM.

NMKL 98:2005 prescribes the use of either dichloran Rose-Bengal chloramphenicol agar (DRBC), dichloran glycerol agar (DG18) or oxytetracyclin glucose yeast extract agar (OGYE). Incubation is for 5-7 days at 25 °C. Similarly, ISO 21527-1:2008 recommends DRBC while 21527-2:2008 recommends DG18. DRBC is generally recommended for fresh foods with a water activity greater than 0.95 (e.g. fruit, vegetables, meat and milk products) and DG18 for foods with a water activity less than 0.95 (e.g. dried fruits, dried meats, grains, nuts). OGYE is recommended if only yeasts are to be analysed. ISO 6611:2004/IDF 94:2004 describes the determination of yeasts and moulds in milk and milk products and uses OGYE or yeast extract glucose chloramphenicol agar (YGC).

Results of yeasts analysis.

Medium	N	Mixture A						Mixture B						Mixture C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	140	129	1.73	0.47	8	0	3	130	2.28	0.15	3	5	4	135	-	-	6	-	-
YGC	39	38	1.73	0.42	1	0	0	34	2.29	0.14	2	1	2	37	-	-	1	-	-
DG18 + DRBC	21	21	1.68	0.40	0	0	0	23	2.26	0.14	0	0	0	23	-	-	0	-	-
DRBC	21	19	1.64	0.36	1	0	1	20	2.28	0.17	0	1	0	20	-	-	1	-	-
DG18	18	16	1.36	0.32	2	0	0	18	2.28	0.14	0	0	0	18	-	-	0	-	-
Petrifilm	12	10	2.27	0.61	1	0	1	10	2.29	0.11	1	0	1	12	-	-	0	-	-
OGYE	8	7	1.72	0.08	1	0	0	7	2.38	0.12	0	1	0	7	-	-	1	-	-
Sabouraud	5	5	1.96	0.30	0	0	0	3	-	-	0	2	0	4	-	-	1	-	-
Other	16	13	1.92	0.61	2	0	1	15	2.27	0.20	0	0	1	14	-	-	2	-	-

A



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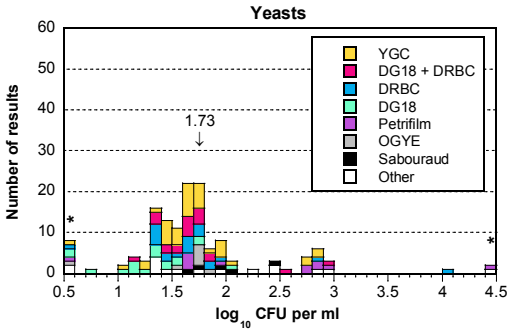

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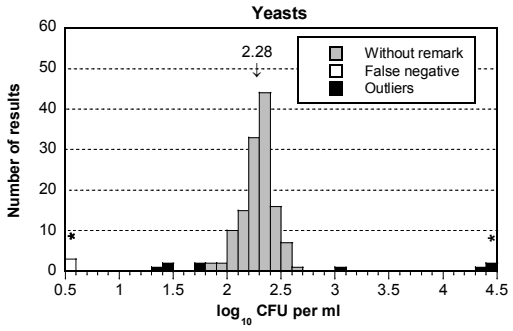

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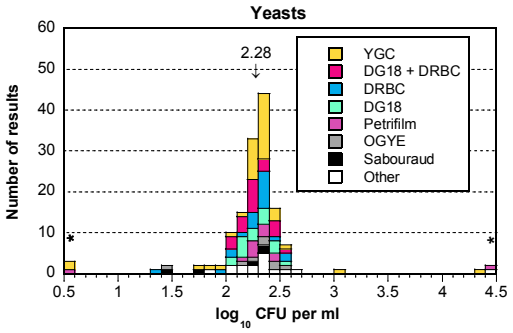
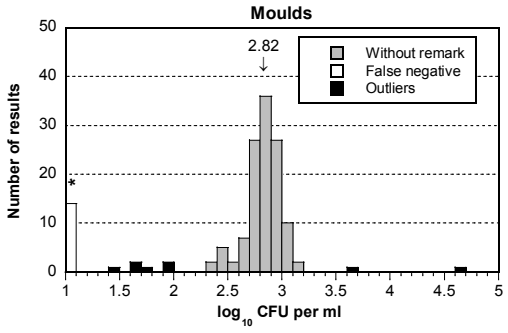


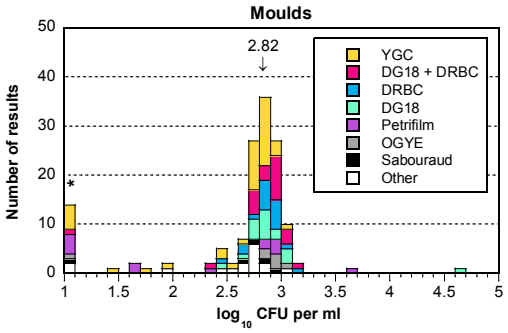
Results of moulds analysis.

Medium	N	Blandning A						Blandning B						Blandning C					
		n	m	s	F	<	>	n	m	s	F	<	>	n	m	s	F	<	>
Total	140	118	2.82	0.16	14	6	2	133	2.13	0.22	2	3	4	137	-	-	4	-	-
YGC	40	32	2.79	0.13	5	3	0	38	2.12	0.23	1	0	1	38	-	-	1	-	-
DG18 + DRBC	23	22	2.87	0.17	1	0	0	22	2.20	0.18	1	1	0	24	-	-	0	-	-
DRBC	18	18	2.85	0.16	0	0	0	18	2.18	0.28	0	1	0	18	-	-	1	-	-
DG18	18	17	2.82	0.14	0	0	1	18	2.08	0.23	0	0	0	18	-	-	0	-	-
Petrifilm YM	13	6	2.81	0.23	4	2	1	12	2.09	0.14	0	0	1	13	-	-	0	-	-
OGYE	7	6	2.91	0.11	1	0	0	6	2.23	0.10	0	0	1	6	-	-	1	-	-
Sabouraud	5	4	-	-	1	0	0	5	2.00	0.16	0	0	0	5	-	-	0	-	-
Other	16	13	2.72	0.16	2	1	0	14	2.13	0.27	0	1	1	15	-	-	1	-	-

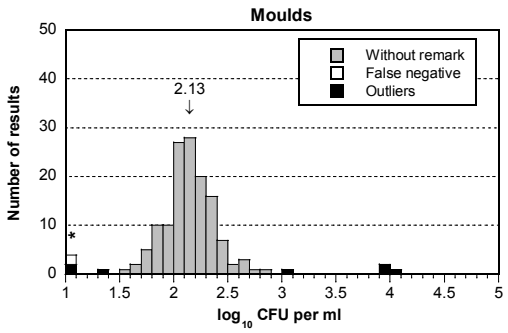
A


Moulds
2.82
Without remark
False negative
Outliers
Number of results
log10 CFU per ml

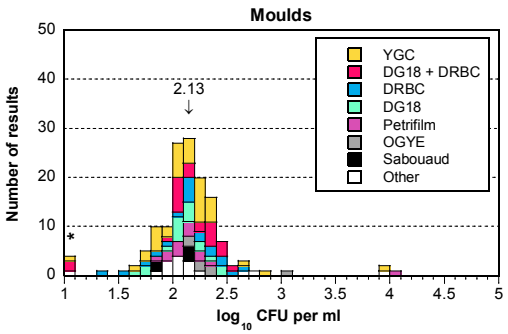
A


Moulds
2.82
YGC
DG18 + DRBC
DRBC
DG18
Petrifilm
OGYE
Sabouraud
Other
Number of results
log10 CFU per ml

B


Moulds
2.13
Without remark
False negative
Outliers
Number of results
log10 CFU per ml

B


Moulds
2.13
YGC
DG18 + DRBC
DRBC
DG18
Petrifilm
OGYE
Sabouaud
Other
Number of results
log10 CFU per ml

Outcome of the results of individual laboratory - assessment

The reported results of all participating laboratories are listed in Annex 1, together with the minimum and maximum accepted values for each analysis. Results that received a remark (false results and outliers) are highlighted in yellow, with bold font.

It is the responsibility of the participating laboratories to correctly report results according to the instructions. When laboratories incorrectly report their results, for example by stating “pos” or “neg” for quantitative analyses, the results cannot be correctly processed. Such incorrectly reported results are normally excluded. Inclusion and further processing of such results may still be done, after manual assessment in each individual case.

Z-scores (see below) for individual analyses are shown in Annex 2 and can be used as a tool by laboratories when following up on the results.

The laboratories are not grouped or ranked based on their results. The performance of a laboratory as a whole can only be evaluated from the number of false results and outliers that are listed in Annex 1 and below the box plots.

Information on the results processing and recommendations for follow-up work are given in the Scheme Protocol (2). Samples for follow-up can be ordered, free of charge via our website: www.livsmedelsverket.se/en/PT-extra**s and deviating results**

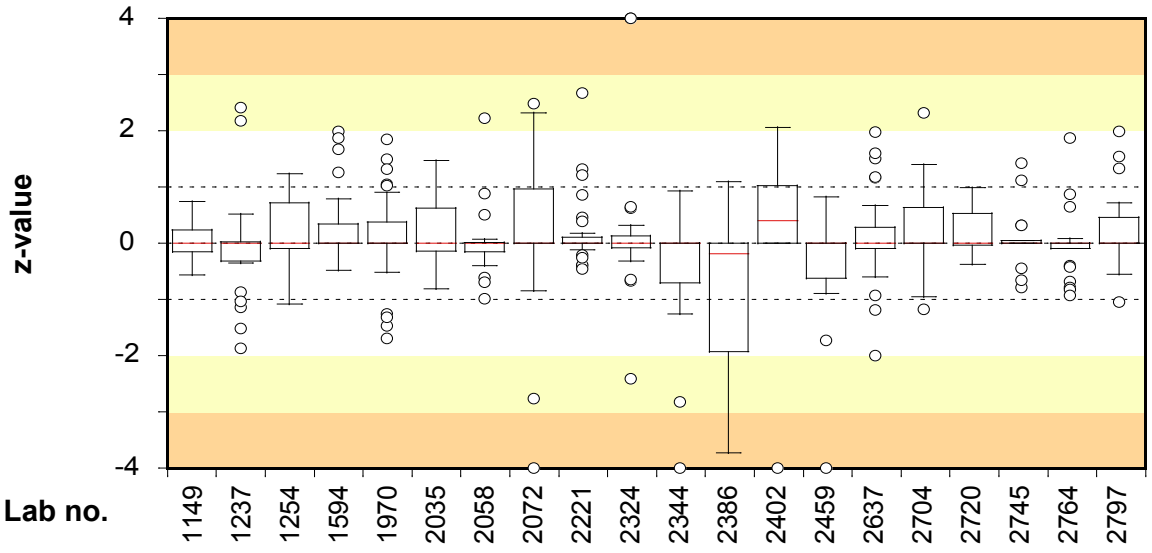
In order to allow comparison of the results from different analyses and mixtures, all results are transformed into standard values (z-scores). For quantitative analyses, a z-score is either positive or negative, depending on whether the individual result is higher or lower than the mean value calculated from all laboratory results for each analysis.

The box plots are based on the z-scores listed in Annex 2, and give a comprehensive view of the achievement of each laboratory. A small box, centred around zero, indicates the results of that individual laboratory, with false results excluded, are close to the general mean values calculated for all laboratory results. The range of z-scores is indicated by the size of the box and, for most laboratories, by lines and/or circles above and beneath the box. For each laboratory, the number of false results and outliers are also listed in the tables below the box plots.

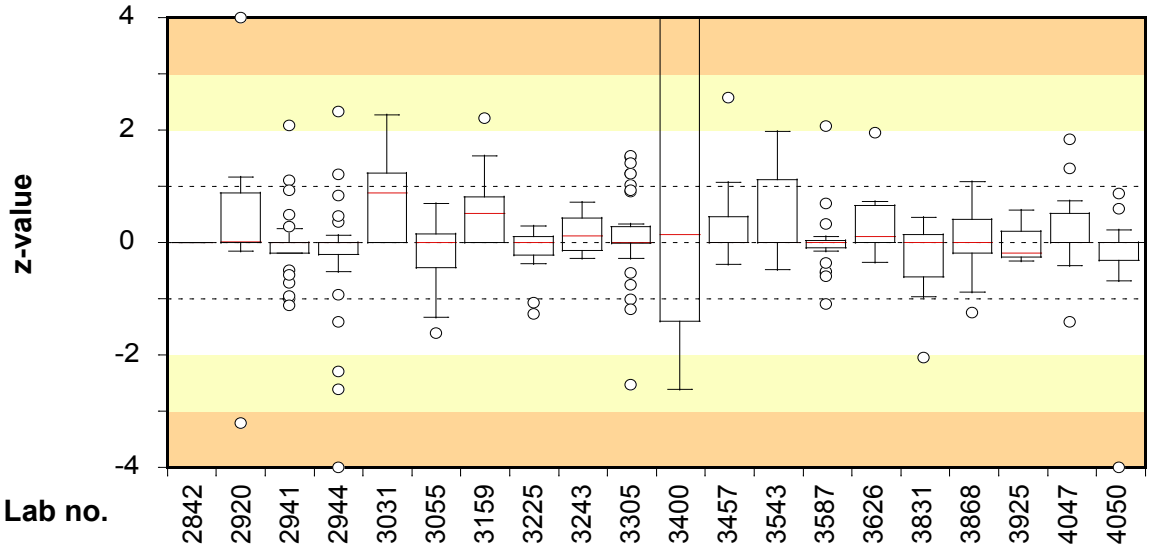
Box plots and numbers of deviating results for each laboratory

- *Z-scores are 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 of the participating laboratories, after removing outliers and false results.*
- *Outliers are included in the figures after being calculated to z-scores in the same way as for other results.*
- *False results do not generate any z-scores, and are not included in "No. of results".*
- *Correct results for qualitative analyses and correct negative results for quantitative analyses without target organism generate a z-score 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.*
- *A circle is for technical reasons shown in the plot when a value deviates to certain degree* from the other values. This does not by itself indicate that the value is an outlier.*
- *z-scores >+4 and <−4 are positioned at +4 and −4, respectively, in the plot.*
- *The background is divided by lines and shaded fields to simplify identifying the range in which the results are located.*

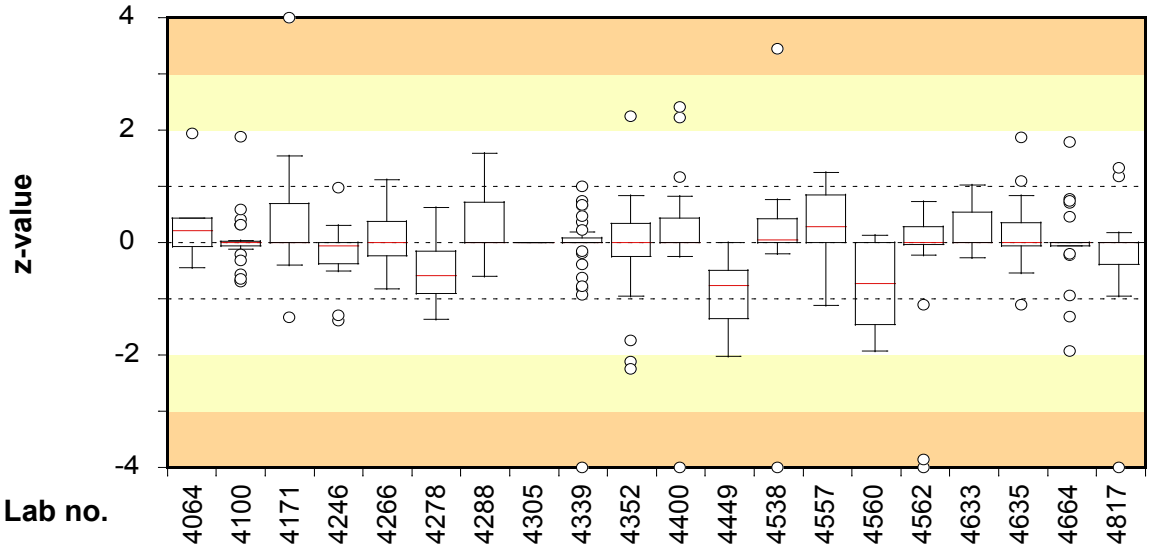
* *< [lowest value in the box −1,5 × (highest value in the box− lowest value in the box)]* *or* *> [highest value in the box + 1,5 × (highest value in the box − lowest value in the box)].*



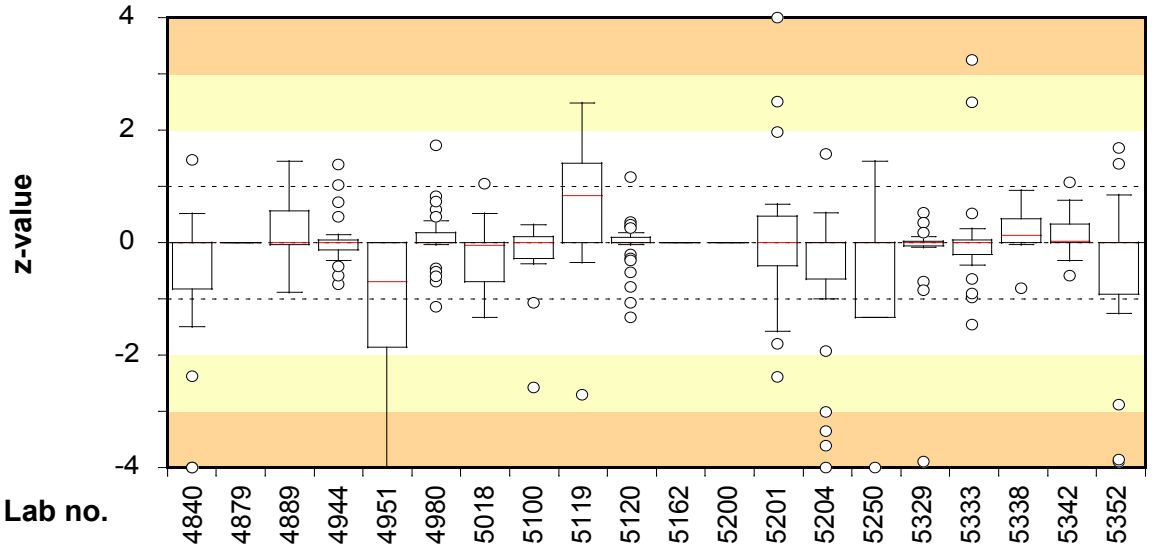
Lab no.	1149	1237	1254	1594	1970	2035	2058	2072	2221	2324	2344	2386	2402	2459	2637	2704	2720	2745	2764	2797
No. of results	21	28	27	27	37	12	20	30	29	23	23	11	14	20	30	24	15	18	25	30
False positive	-	1	-	-	-	-	-	1	-	-	-	2	-	1	-	-	-	-	-	-
False negative	-	1	-	-	-	-	1	-	1	1	-	2	1	-	-	-	-	-	2	-
Low outliers	-	-	-	-	-	-	-	1	-	-	2	1	3	1	-	-	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-



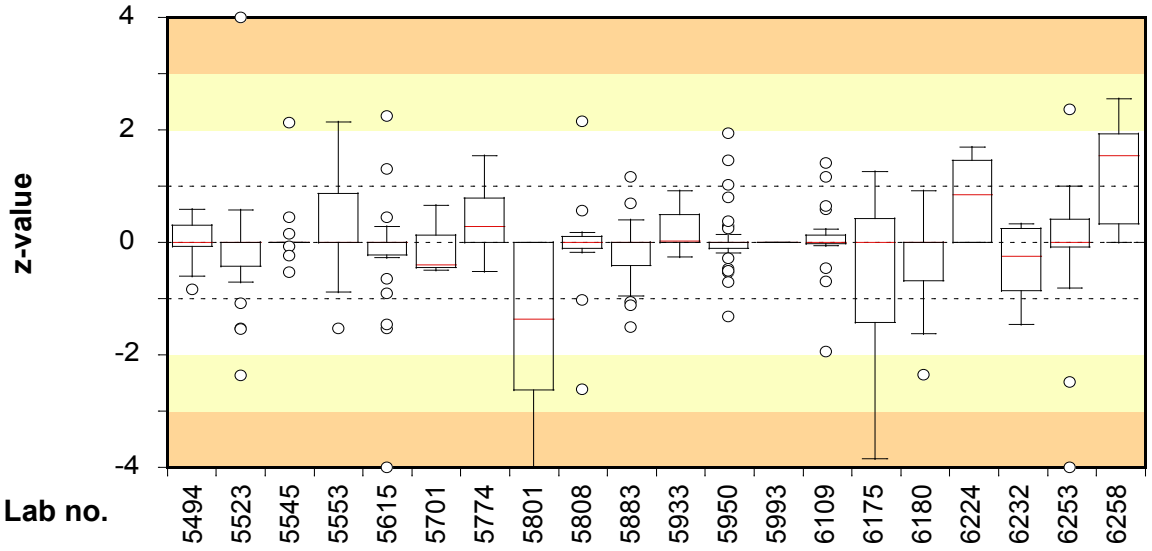
Lab no.	2842	2920	2941	2944	3031	3055	3159	3225	3243	3305	3400	3457	3543	3587	3626	3831	3868	3925	4047	4050
No. of results	-	14	26	29	6	15	15	15	6	36	10	21	18	23	18	14	36	3	21	18
False positive	-	-	-	1	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
False negative	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Low outliers	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
High outliers	-	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-



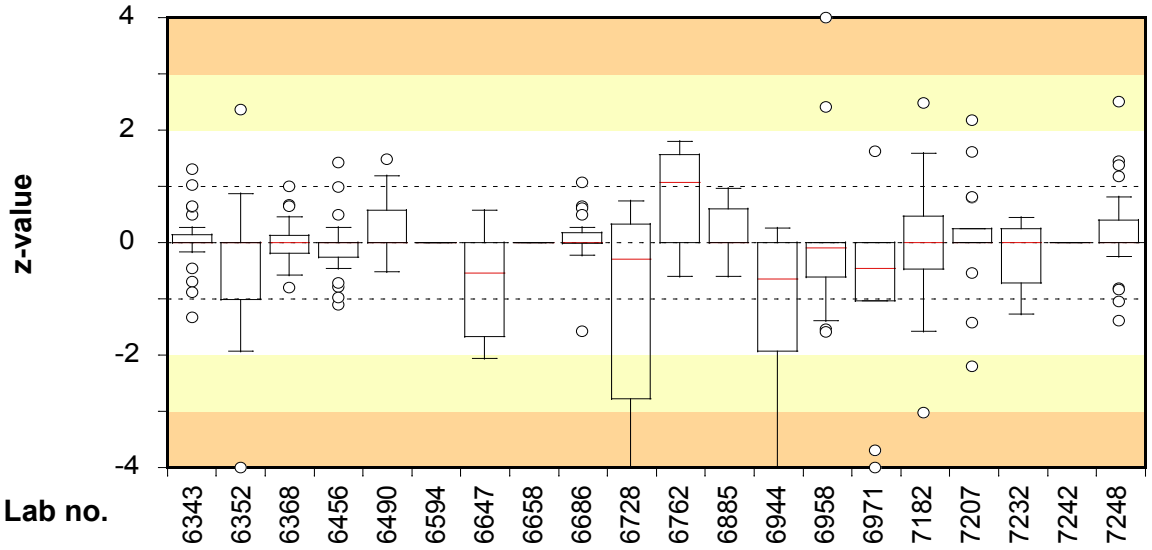
Lab no.	4064	4100	4171	4246	4266	4278	4288	4305	4339	4352	4400	4449	4538	4557	4560	4562	4633	4635	4664	4817
No. of results	6	27	25	14	15	10	26	-	35	35	17	6	9	8	12	25	20	23	21	21
False positive	-	-	-	1	-	1	-	-	1	-	-	-	4	-	-	2	1	1	-	-
False negative	-	-	2	-	-	-	1	-	-	1	1	-	5	1	-	-	-	-	-	-
Low outliers	-	-	-	-	-	-	-	-	1	-	2	-	1	-	-	2	-	-	-	1
High outliers	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



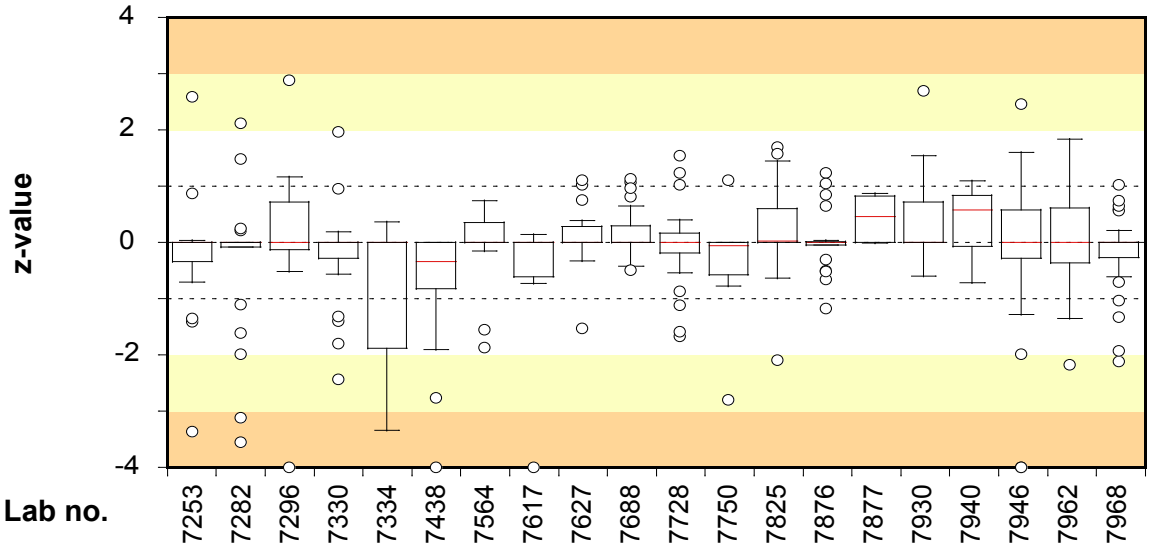
Lab no.	4840	4879	4889	4944	4951	4980	5018	5100	5119	5120	5162	5200	5201	5204	5250	5329	5333	5338	5342	5352
No. of results	21	-	24	23	14	29	27	13	12	36	-	-	21	31	14	20	24	12	18	24
False positive	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
False negative	3	-	-	2	1	1	1	2	-	-	-	-	-	-	1	1	-	-	-	-
Low outliers	2	-	-	-	2	-	-	-	-	-	-	-	-	1	3	1	-	-	-	2
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-



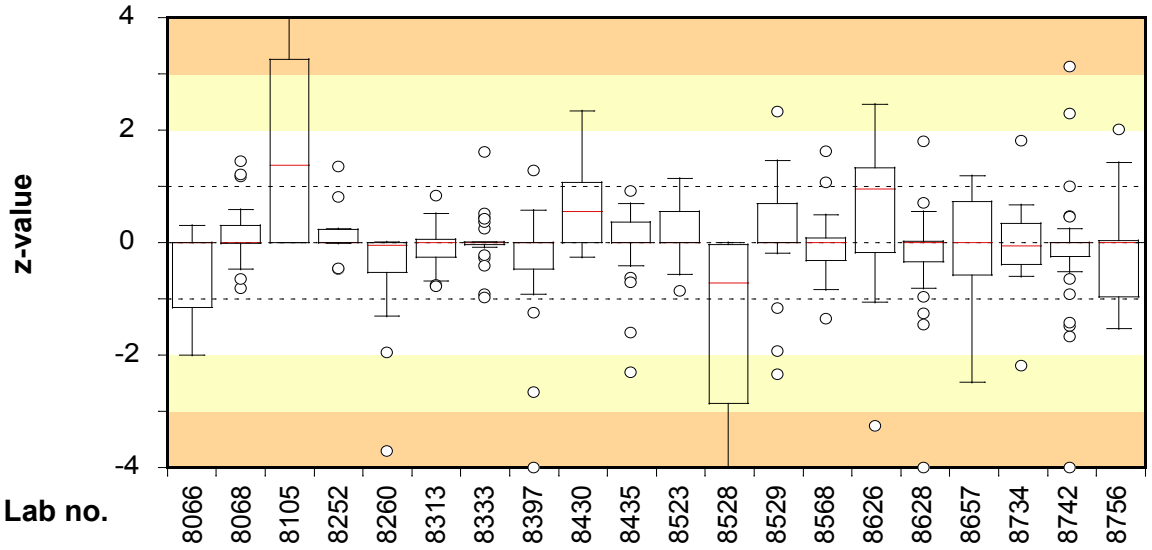
Lab no.	5494	5523	5545	5553	5615	5701	5774	5801	5808	5883	5933	5950	5993	6109	6175	6180	6224	6232	6253	6258
No. of results	12	28	13	18	26	3	6	12	14	24	6	37	-	20	12	24	6	6	24	7
False positive	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
False negative	-	1	2	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Low outliers	-	-	-	-	1	-	-	2	-	-	-	-	-	-	1	-	-	-	1	-
High outliers	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



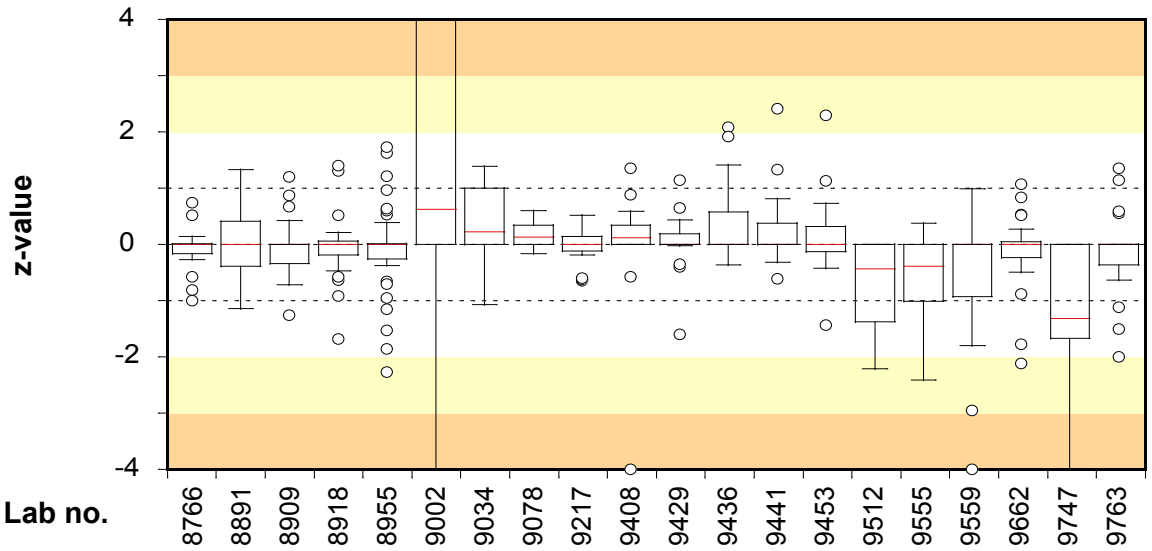
Lab no.	6343	6352	6368	6456	6490	6594	6647	6658	6686	6728	6762	6885	6944	6958	6971	7182	7207	7232	7242	7248
No. of results	27	22	27	27	21	-	10	-	24	8	9	20	17	14	9	17	17	9	-	31
False positive	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	1
False negative	-	1	-	-	-	-	-	-	-	2	-	1	1	1	-	-	1	-	-	1
Low outliers	-	1	-	-	-	-	-	-	-	2	-	-	1	-	1	-	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-



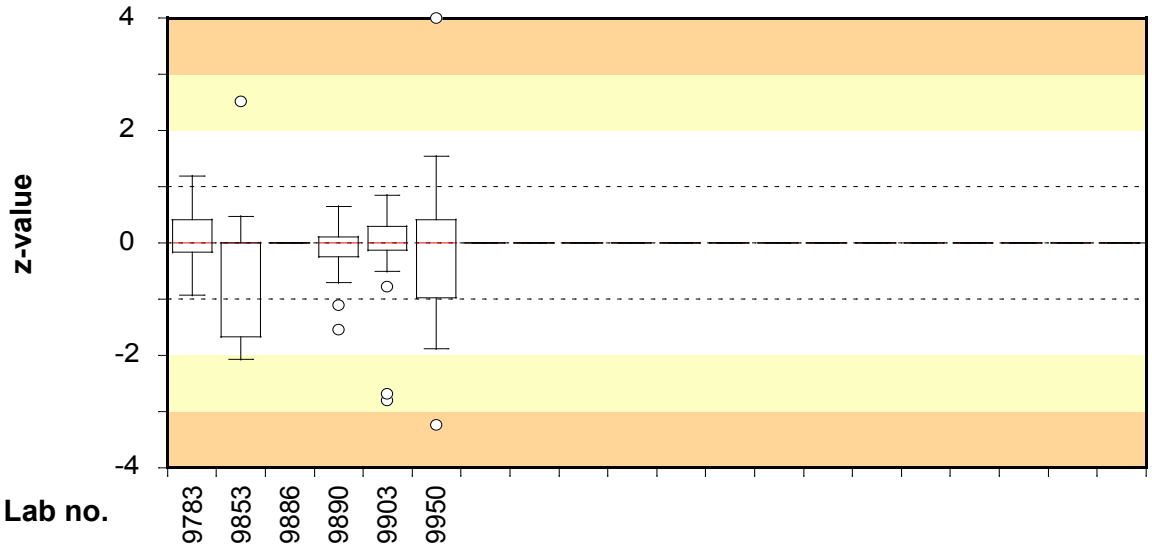
Lab no.	7253	7282	7296	7330	7334	7438	7564	7617	7627	7688	7728	7750	7825	7876	7877	7930	7940	7946	7962	7968
No. of results	23	21	9	21	14	24	27	9	15	31	24	16	20	22	5	24	3	31	21	33
False positive	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	5	2	-
False negative	1	-	-	-	4	-	-	-	-	-	-	2	-	2	-	-	-	1	-	-
Low outliers	1	1	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	2	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Lab no.	8066	8068	8105	8252	8260	8313	8333	8397	8430	8435	8523	8528	8529	8568	8626	8628	8657	8734	8742	8756
No. of results	15	28	15	15	26	24	25	24	18	26	15	12	30	23	12	35	12	8	29	20
False positive	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1
False negative	-	1	-	-	1	-	1	-	-	1	-	-	-	1	-	-	-	-	-	-
Low outliers	-	-	-	-	1	-	-	1	-	-	-	2	-	-	-	1	-	-	1	-
High outliers	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Lab no.	8766	8891	8909	8918	8955	9002	9034	9078	9217	9408	9429	9436	9441	9453	9512	9555	9559	9662	9747	9763
No. of results	24	20	21	27	36	10	10	6	23	14	18	31	23	18	14	21	25	30	15	24
False positive	-	-	-	-	-	8	-	-	1	5	-	-	1	-	-	-	2	-	-	-
False negative	-	1	-	-	-	9	-	-	-	5	-	-	1	-	1	-	-	-	-	-
Low outliers	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	1	-	2	-
High outliers	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Lab no.	9783	9853	9886	9890	9903	9950
No. of results	9	14	-	23	24	16
False positive	-	-	-	1	-	1
False negative	-	1	-	-	-	1
Low outliers	-	-	-	-	-	-
High outliers	-	-	-	-	-	1

Test material and quality control

Test material

Each laboratory received three manufactured freeze-dried microbial mixtures, designated A-C. The test material was freeze-dried in portions of 0.5 ml in vials, as described by Peterz and Steneryd (8). Before analysing the samples, the contents of each vial had to be dissolved in 254 ml of sterile diluent. The organisms present in the mixtures are listed in Table 2.

Table 2. *Microorganisms present in mixtures A-C.*

Mixture[1]	Microorganism	Strain	
		SLV no.[2]	Reference[3]
A	*Kluyveromyces marxianus*	SLV-439	-
	Lactobacillus plantarum	SLV-445	ATCC 8014
	Escherichia coli	SLV-524	CCUG 47554
	Penicillium verrucosum	SLV-526	CBS 111026
B	*Brochotrix thermosphacta*	SLV-220	CCUG 45641
	Clostridium perfringens	SLV-442	CCUG 43593
	Aspergillus flavus	SLV-480	CBS 282.95
	Bacillus cereus group	SLV-518	CCUG 44741
	Shewanella putrefaciens	SLV-520	CCUG 46538
	Hanseniaspora uvarum	SLV-555	-
C	*Staphylococcus saprophyticus*	SLV-013	CCUG 45100
	Escherichia coli	SLV-085	Water
	Staphylococcus aureus	SLV-280	Egg
	Enterococcus faecium	SLV-459	CCUG 35172

[1] The links between the mixtures and the randomised sample numbers are shown in Annex 1.
[2] Internal strain identification no. at the National Food Agency
[3] Origin or culture collection (CCUG: Culture Collection University of Gothenburg, Sweden ; ATCC: American Type Culture Collection, CBS: Westerdijk Fungal Biodiversity Institute, SMI: Public Health Agency of Sweden)

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 is performed on 10 randomly chosen vials in conjunction with manufacturing of the mixtures or on 5 vials if an "old" mixture was used and the last quality control was performed more than 6 months ago. Homogeneity of a mixture is approved if, for each analysis, the values obtained for the test of reproducibility (T) and the test "Index of dispersion" between vials (I_2) do not simultaneously exceed 2.6 and 2.0, respectively. (For definitions of T and I_2, see references 9 and 10 respectively.)

Table 3. *Concentration mean (m), T and I_2 values from the quality control of the mixtures; m is expressed in log_{10} cfu (colony forming units) per ml of sample.*

Analysis and method	A[1]			B[2]			C[1]		
	m	T	I_2	m	T	I_2	m	T	I_2
Aerobic microorganisms, 30 ºC NMKL method no. 86:2013	4.729	1.50	1.93	4.276	1.78	1.99	5.577	1.42	1.04
Psychrotrophic microorganisms NMKL method no. 86:2013	2.912	1.36	1.90	4.684	2.23	7.99	4.701	1.26	0.69
Enterobacteriaceae NMKL method no. 144:2005	4.297	1.30	0.35	-	-	-	4.800	1.63	3.60
Escherichia coli NMKL method no. 125:2005	4.288	1.33	0.37	-	-	-	4.953	1.20	0.72
Presumptive *Bacillus cereus* NMKL method no. 67:2010	-	-	-	4.046	1.87	1.10	-	-	
Coagulase-positive staphylococci NMKL method no. 66:2009	-	-	-	-	-	-	4.878	1.22	0.72
Lactic acid bacteria NMKL method no. 140:2007	4.483	1.73	1.90	-	-	-	4.767	1.59	1.46
Clostridium perfringens NMKL method no. 95:2009	-	-	-	2.587	1.46	1.30	-	-	-
Anaerobic sulphite-reducing bacteria NMKL method no. 56:2008	-	-	-	2.727	2.62	1.41	-	-	-
Aerobic microorganisms in fish products NMKL method no. 184:2006	4.700	1.11	0.15	4.535	2.14	5.41	5.455	1.21	1.23
H_2S-producing bacteria in fish products NMKL method no 184:2006	-	-	-	3.672	2.50	0.92	-	-	-
Yeasts NMKL method no. 98:2005, DRBC	1.727	1.55	0.22	2.471	1.44	1.01	-	-	-
Moulds NMKL method no. 98:2005, DRBC	3.025	1.24	1.18	2.410	1.79	2.22	-	-	-

– No target organism and therefore no value
[1] n = 5 vials analysed in duplicate
[2] n = 10 vials analysed in duplicate

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Annex 1 *Results of the participating laboratories - April 2017*

All results are in log_{10} cfu per ml sample. Results reported as "< value" have been regarded as zero. Results reported as "> value" are exluded from the calculations. A dash indicates 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			Psychrotrophic microorganisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-reducing bacteria			Aerobic m.o. in fish products, 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
1149	1 2 3	4.66	4	5.46	-	-	-	4.18	<2	4.77	4.14	<2	4.73	<2	4.03	<2	<2	<2	4.71	-	-	-	-	-	-	-	-	-	-	-	-	1.64	2.33	<1	2.86	2.3	<1	1149
1237	3 1 2	4.7	5.05	5.46	-	-	-	4.16	<1	4.69	**<1**	<1	4.66	<1	3.66	<1	<1	<1	4.52	4.43	**1**	4.7	<1	2.48	<1	<1	2.3	<1	-	-	-	-	-	-	2.86	2.26	<1	2.83	1.9	<1	1237
1254	1 3 2	4.73	3.88	5.47	-	-	-	4.26	<1	4.49	4.38	<1	4.96	<1	3.78	<1	<1	<1	4.96	-	-	-	-	-	-	-	-	-	4.65	4.07	5.48	<1	3.06	<1	1.65	2.23	<1	3	2.29	<1	1254
1594	1 2 3	4.72	4.08	5.56	-	-	-	4.34	<2	4.61	4.23	<2	4.91	<2	4.61	<2	<2	<2	4.82	-	-	-	-	-	-	0	2.4	0	-	-	-	<1	3	<1	1.76	2.56	0	3.08	2.11	0	1594
1970	3 1 2	4.57	4.34	5.34	<1	4.01	4.68	4.15	<2	4.58	4.18	<2	4.74	<2	4.57	<2	<2	<2	4.79	4.59	<2	5	<1	2.79	<1	<1	2.76	<1	4.08	5.14	5.34	<1	2.3	<1	1.85	2.34	<1	2.98	2.43	<1	1970
2035	1 2 3	-	-	-	-	-	-	4.1	<1	4.5	4.2	<2	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.5	0	2.9	2.4	0	2035
2058	2 1 3	4.54	3.98	5.48	-	-	-	-	-	-	4.05	<2	4.93	<2	4.21	<2	-	-	-	4.42	<2	4.76	0	2.67	0	-	-	-	-	-	-	-	-	-	2.77	2.28	0	**0**	1.98	0	2058
2072	2 1 3	4.75	4.89	5.8	4.78	4.9	5.71	4.36	<1	4.79	4.18	<1	4.58	<1	4.3	<1	<1	<1	4.97	4.56	**2.56**	4.8	<1	**1.81**	<1	<1	1.81	<1	-	-	-	-	-	-	1.34	2.56	<1	3.18	2.69	<1	2072
2221	2 3 1	4.64	3.98	5.69	-	-	-	4.16	<2	4.64	4.14	<2	4.64	<2	4.1	<2	<2	<2	4.86	4.62	<2	5.63	<1	2.63	<1	<0	2.57	<0	-	-	-	-	-	-	**<1**	2.41	<1	2.78	2.22	<1	2221
2324	1 2 3	4.62	3.87	5.47	-	-	-	4.16	<1	4.79	4.15	<1	4.77	<1	4.16	<1	<1	<1	4.44	4.52	<1	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	1.68	**4.32**	<1	2.72	**3.94**	<1	2324
2344	3 2 1	4.52	4.18	5.46	-	-	-	4.04	0	4.41	**3.32**	0	**3.57**	-	4.01	0	0	0	4.38	-	-	5.08	-	2.7	0	-	2.51	0	-	-	-	-	-	-	-	2.14	0	-	2	0	2344
2386	1 3 2	4.6	4.6	5.19	-	-	-	-	-	-	-	-	-	<2	**<2**	**4.75**	<2	**4**	**<2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.04	<1	2.48	**1.3**	<1	2386
2402	3 2 1	4.77	5	5.62	-	-	-	4.41	<1	4.87	4.4	<1	4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**<1**	**1.32**	<1	**1.94**	**1.04**	<1	2402
2459	2 3 1	4.38	4.21	**4.94**	-	-	-	4.27	0	4.76	4.18	0	4.58	0	4.07	0	0	**2.16**	4.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.32	2.34	0	2.77	2.02	0	2459
2637	2 3 1	4.72	3.96	5.57	-	-	-	4.08	<1	4.26	4.2	<1	4.99	<1	4.15	<1	<1	<1	4.78	4.67	<1	5.41	<1	2.93	<1	<1	2.83	<1	-	-	-	-	-	-	1.3	2.11	<1	2.74	2	<1	2637
2704	2 1 3	4.46	5.11	5.6	-	-	-	4.26	<2	4.93	4.24	<2	4.87	<2	4.1	<2	<2	<2	4.79	-	-	-	-	-	-	0	2.28	0	4.77	5.03	5.53	<1	2.76	<1	-	-	-	-	-	-	2704
2720	3 2 1	4.64	4.03	5.59	-	-	-	4.26	<1	4.76	-	-	-	<1	3.97	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	2.43	<1	2.94	2.09	<1	2720
2745	1 3 2	4.67	3.82	5.45	-	-	-	4.04	<2	4.89	4.2	<2	4.75	<2	4.16	<2	<2	<2	4.8	-	-	-	0	2.9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2745
2764	1 3 2	4.53	4.18	5.51	-	-	-	4.08	<2	5.04	4.08	<1,60	4.72	<2	3.85	<2	0	0		4.4	<3	**<3**	-	-	-	<1	2.75	<1	-	-	-	-	-	-	1.3	2.38	<1	2.82	2.04	<1	2764
2797	1 2 3	4.69	3.92	5.46	-	-	-	4.2	<1	4.7	4.28	<1	5.03	<1	4.15	<1	<1	<1	4.9	-	-	-	<1	2.92	<1	-	-	-	4.61	4.37	5.46	<1	2.42	<1	1.48	2.38	<1	2.83	2.58	<1	2797
2842	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2842
2920	3 2 1	4.79	4.16	5.49	-	-	-	4.28	0	4.86	4.28	0	4.93	-	-	-	-	-	-	3.85	0	**0**	-	-	-	0	**3.6**	0	-	-	-	-	-	-	-	-	-	-	-	-	2920
2941	3 2 1	4.66	3.73	5.38	-	-	-	4.22	0	**0**	4.36	0	4.8	0	3.94	0	0	0	4.63	4.57	0	4.73	-	-	-	0	2.5	0	-	-	-	-	-	-	1.4	2.2	0	2.8	2.6	0	2941
2944	1 3 2	4.58	4.2	5.56	-	-	-	4.11	<2	4.38	4.12	<2	4.84	<1	4.7	<1	<1	<1	4.97	4.38	**2.41**	4.72	<0	**1.93**	<0	<0	1.93	<0	-	-	-	-	-	-	1.3	1.9	<1	2.95	2.32	<1	2944
3031	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.73	4.83	5.94	<1	3.3	<1	-	-	-	-	-	-	3031
3055	1 2 3	4.62	4.05	5.33	-	-	-	4.04	0	4.34	-	-	-	0	4.26	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.06	2.33	0	2.71	2.27	0	3055
3159	2 1 3	4.8	4.4	5.72	-	-	-	4.23	<1	5.11	4.3	<1	4.85	<1	4.32	<1	<1	<1	4.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3159
3225	1 3 2	4.64	3.7	5.49	-	-	-	4.16	<1	4.71	-	-	-	<1	3.73	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.56	2.24	<1	2.84	2.2	<1	3225
3243	2 1 3	4.66	4.03	5.57	-	-	-	4.12	<2	4.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3243
3305	2 3 1	4.84	3.92	5.72	-	-	-	4.18	<2	4.91	4.2	<2	4.96	<2	3.8	<2	<2	<2	4.78	4.36	<2	4.85	0	2.72	0	0	2.76	0	4.73	4.9	5.45	<1	1.78	<1	1.38	2.11	0	3.04	2.11	0	3305
3400	3 1 2	**5.36**	4.66	5.32	-	-	-	-	-	-	**8.04**	**6.04**	**7.04**	-	-	-	**5.15**	**4.16**	4.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.95	2.14	**2.6**	2.6	1.92	**2.34**	3400
3457	2 1 3	-	-	-	-	-	-	4.23	<2	4.88	4.17	<2	4.94	-	-	-	<2	<2	4.81	4.34	<2	4.76	0	2.74	0	-	-	-	4.5	5.61	5.47	<1	3.11	<1	-	-	-	-	-	-	3457
3543	3 2 1	4.76	4.15	5.78	-	-	-	4.32	<1	4.89	-	-	-	<2	4.04	<2	<2	<2	4.78	-	-	-	-	-	-	<1	2.4	<1	-	-	-	-	-	-	2.49	2.53	<1	-	-	-	3543
3587	3 1 2	4.55	3.69	5.52	-	-	-	4.16	<2	4.73	4.12	<2	4.89	<2	4.03	<2	<2	<2	4.74	-	-	-	-	-	-	<1	2.55	<1	-	-	-	-	-	-	2.7	2.28	<1	**<1**	2	<1	3587
3626	1 3 2	4.7	4	5.6	-	-	-	4.2	<2	4.8	4.3	<2	4.8	<2	4.6	<2	<2	<2	4.9	-	-	-	<1	2.7	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3626
3831	1 2 3	4.54	3.92	5.43	-	-	-	-	-	-	**0**	0	4.3	-	-	-	-	-	-	4.24	0	4.56	-	-	-	-	-	-	-	-	-	-	-	-	1.8	2.33	0	2.89	2.23	0	3831
3868	1 3 2	4.74	3.9	5.49	-	-	-	4.26	0	4.82	4.29	0	4.85	0	4.01	0	0	0	4.93	4.46	0	4.71	0	2.82	0	0	2.77	0	4.28	4.11	5.52	0	3.33	0	1.15	2.23	0	2.78	1.94	0	3868
3925	1 2 3	4.58	4.07	5.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3925
4047	1 2 3	4.73	4.91	5.69	-	-	-	4.15	<1	4.81	4.23	<1	4.85	<1	4	<1	<1	<1	4.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.54	2.28	<1	2.9	1.82	<1	4047
4050	3 1 2	4.53	4.24	5.43	-	-	-	4.04	<1	**3.56**	-	-	-	<1	4.06	<1	-	-	-	4.56	<1	4.78	-	-	-	-	-	-	-	-	-	-	-	-	1.74	2.24	<1	2.77	2.27	<1	4050
4064	3 2 1	4.9	3.96	5.57	-	-	-	4.21	<1	4.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4064
4100	1 3 2	4.67	3.87	5.51	-	-	-	4.11	<2	4.67	4.15	<2	4.59	<2	4.58	<2	<2	<2	4.84	4.41	<2	4.75	-	-	-	<1	2.63	<1	-	-	-	-	-	-	1.47	2.37	<1	2.87	1.99	<1	4100
4171	2 1 3	4.71	3.98	5.72	-	-	-	4.08	<2	4.89	4	<1,60	4.72	<2	4.26	<2	0	0		4.61	<2	**<2**	-	-	-	0	2.8	0	-	-	-	-	-	-	1.11	2.51	0	**4.68**	2.26	0	4171
4246	3 2 1	4.43	4.55	5.46	-	-	-	4.19	<1	4.64	4.16	<1	4.7	-	-	-	<2	<2	4.83	4.32	**2.3**	4.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4246
4266	1 3 2	4.67	4.61	5.57	-	-	-	-	-	-	4.3	<2	4.64	-	-	-	<2	<2	4.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.95	2.2	0	2.86	1.95	0	4266
4278	1 3 2	4.6	3.77	5.41	-	-	-	4.24	**2.95**	4.73	-	-	-	-	3.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.66	2.2	-	2.63	1.83	-	4278
4288	3 1 2	4.85	3.99	5.64	-	-	-	4.26	<2	4.78	4.41	<2	4.81	<2	4.36	<2	<2	<2	4.9	-	-	-	<1	2.62	<1	<1	2.71	<1	-	-	-	-	-	-	**<1**	2.26	<1	2.91	2	<1	4288
4305	2 3 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4305
4339	2 1 3	4.6	4.3	5.6	-	-	-	4.3	<2	4.5	4.2	<2	4.9	<2	4.2	<2	<2	<2	4.8	**3.5**	**4.7**	4.8	0	2.6	0	0	2.7	0	4.5	4.5	5.5	<1	2.6	<1	1.3	2.3	0	2.7	2.1	0	4339
4352	2 3 1	4.38	5.08	5.59	-	-	-	4	<1	4.81	4.32	<1	4.85	<2	3.94	<2	<1	<1	5	4	<2	4	<1	2.74	<1	<1	2.56	<1	4.30	4.08	5.61	<2	**<2**	<2	1	2	<1	2.90	2	<1	4352
4400	3 2 1	4.94	4.27	5.67	-	-	-	5	<1	4.83	**3.30**	<1	**4**	<1	4.19	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	<1	**<1**	2	<1	4400
4449	1 3 2	4.34	3.94	5.43	-	-	-	3.93	0	4.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4449
4538	1 2 3	4.68	5.58	**4.66**	-	-	-	4.15	<2	**<2**	4.31	**4.88**	**<2**	-	-	-	<2	**4.88**	**<2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.93	**<1**	**2.41**	2.79	**<1**	**2.12**	4538
4557	1 2 3	4.71	4.58	5.68	-	-	-	-	-	-	**<2**	<2	4.88	-	-	-	<2	<2	4.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4557
m		4.63	4.15	5.51		4.55		4.14	0	4.66	4.20	0	4.74	0	4.07	0	0	0	4.79	4.41	0	4.79	0	2.67	0	0	2.53	0	4.46	4.49	5.45	0	2.87	0	1.73	2.28	0	2.82	2.13	0	**m**
s		0.14	0.42	0.14		0.37		0.16	0	0.20	0.15	0	0.22	0	0.27	0	0	0	0.15	0.17	0	0.32	0	0.17	0	0	0.26	0	0.22	0.43	0.22	0	0.43	0	0.47	0.15	0	0.16	0.22	0	**s**

Lab no	Vial	Aerobic microorganisms 30 °C			Psychrotrophic microorganisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-reducing bacteria			Aerobic m.o. in fish products, 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
4560	1 2 3	4.4	4.2	5.4	-	-	-	-	-	-	4.1	<0,5	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3	2	<0,5	2.6	1.8	<0,5	4560
4562	3 2 1	**3.65**	4.15	5.36	-	-	-	4.2	0	4.62	4.18	0	**3.91**	0	4.15	0	0	**2.3**	4.9	4.5	**3.75**	4.75	0	2.77	0	-	-	-	-	-	-	-	-	-	1.72	2.28	0	2.9	2.23	0	4562
4633	2 3 1	-	-	-	-	-	-	-	-	-	4.3	<1	4.96	<2	4.21	**4.66**	<1	<1	4.85	-	-	-	<1	2.76	<1	<1	2.62	<1	-	-	-	-	-	-	1.61	2.41	<1	2.92	2.2	<1	4633
4635	2 3 1	4.61	4.09	5.66	-	-	-	3.97	<1	4.7	-	-	-	<1	4	<1	<1	<1	4.86	4.37	**3.85**	4.99	-	-	-	<1	2.74	<1	-	-	-	-	-	-	1.48	2.56	<1	2.92	2.19	<1	4635
4664	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	4.76	-	-	-	0	2.51	0	0	2.51	0	4.56	4.8	5.41	<2	2.3	<2	2.57	2	0	2.94	2.3	0	4664
4817	3 2 1	4.65	4.2	5.38	-	-	-	-	-	-	**3.52**	<2	4.58	<2	4.39	<2	<2	<2	4.77	-	-	-	<1	2.6	<1	-	-	-	-	-	-	-	-	-	1.3	2.48	<0	2.68	2.08	<0	4817
4840	1 3 2	**4**	3.16	5.43	-	-	-	3.98	<2	4.75	**<2**	<2	4.85	<2	3.85	<2	<2	<2	4.78	-	-	-	<1	**<1**	<1	-	-	-	-	-	-	-	-	-	2.42	**1.44**	<1	**<1**	1.8	<1	4840
4879	1 2 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4879
4889	2 1 3	4.6	4.11	5.71	-	-	-	4.36	0	4.71	4.36	0	5	0	4.28	0	0	0	4.73	-	-	-	-	-	-	0	2.49	0	4.28	4.11	5.53	0	3.34	0	-	-	-	-	-	-	4889
4944	2 1 3	4.64	4.11	5.53	-	-	-	4.36	<2	4.81	4.15	<2	4.58	<2	4	<2	<2	<2	4.86	-	-	-	<1	**<1**	**2.56**	<1	**<1**	**2.56**	-	-	-	-	-	-	1.46	2.26	<1	2.98	2.04	<1	4944
4951	1 2 3	4.53	3.84	**4.38**	-	-	-	**3.23**	<2	4.29	**<2**	<2	4.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.53	2.05	<1	2.53	1.98	<1	4951
4980	2 1 3	4.87	3.86	5.53	-	-	-	4.15	<2	4.83	4.2	<2	4.64	<2	4.23	<2	<2	<2	4.85	-	-	-	-	-	-	<1	2.23	<1	4.56	4.81	5.49	<1	2.98	<1	**<2**	2.28	<1	2.74	2	<1	4980
5018	2 1 3	4.48	3.79	5.41	-	-	-	3.95	<1	4.57	4	<1	4.58	<1	3.9	<1	<1	**2.7**	4.76	4.59	**4.31**	**<1**	<1	2.49	<1	<1	2.43	<1	-	-	-	-	-	-	1.71	2.36	<1	2.77	2.04	<1	5018
5100	2 1 3	4.64	4.09	5.46	-	-	-	4.16	0	**0**	**0**	0	4.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.3	0	2.87	1.56	0	5100
5119	2 3 1	4.78	4	5.59	-	-	-	-	-	-	4.4	<1	5.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4	2.65	<1	2.4	2.65	<1	5119
5120	3 2 1	4.79	4.06	5.51	-	-	-	4.2	<2	4.7	4	<2	4.57	<2	4.15	<2	<2	<2	4.84	4.36	<2	4.45	0	2.66	0	<1	2.54	0	4.34	4.53	5.49	<1	2.73	<1	1.76	2.31	0	2.86	2.16	0	5120
5162	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5162
5200	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5200
5201	3 2 1	4.56	4.09	5.58	-	-	-	4.25	<2	5.06	3.93	<2	4.84	<2	3.96	<2	<2	<2	5.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	**3.03**	<1	2.45	1.9	<1	5201
5204	2 3 1	**3.9**	4.8	5.1	<1	4.4	3.6	4.1	<2	4.5	4.1	<2	4.7	<1	3.1	<1	<2	<2	4.7	4.5	<2	4.7	<1	2.5	<1	<1	2.6	<1	-	-	-	-	-	-	1.7	2	<1	2.3	2.2	<1	5204
5250	1 2 3	-	-	-	-	-	-	**2.4**	<1	**3.3**	4	<1	4.57	<1	4.46	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.95	**<1**	<1	**1.48**	2.3	<1	5250
5329	1 2 3	4.7	4.13	5.5	-	-	-	4.16	<2	**3.88**	-	-	-	<2	4.05	<2	<2	<2	4.8	4.47	<2	4.57	-	-	-	-	-	-	-	-	-	-	-	-	1.34	2.31	<1	**<1**	2.13	<1	5329
5333	2 3 1	4.57	3.74	5.5	-	-	-	4.09	<2	4.67	4.1	<2	4.85	<2	3.68	<2	<2	<2	4.83	-	-	-	-	-	-	0	3.17	0	-	-	-	-	-	-	1.31	2.32	0	2.83	2.86	0	5333
5338	3 2 1	4.65	4.13	5.4	-	-	-	4.17	0	4.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.77	2.42	0	2.93	2.26	0	5338
5342	2 1 3	4.67	4.17	5.59	-	-	-	4.26	<1	4.79	4.24	<1	4.81	-	-	-	<1	<1	4.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.46	2.24	<1	2.77	2.2	<1	5342
5352	2 3 1	4.48	3.79	5.34	-	-	-	4.06	<2	4.72	**3.62**	<2	**3.91**	<2	4.3	<2	<2	<2	4.65	-	-	-	0	2.19	0	-	-	-	-	-	-	-	-	-	1.5	2.49	0	2.76	2.51	0	5352
5494	3 1 2	4.68	3.8	5.55	-	-	-	-	-	-	-	-	-	<1	4.12	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.67	2.37	<1	2.87	2	<1	5494
5523	2 1 3	4.6	3.96	5.59	-	-	-	4.08	<1	4.72	3.97	<1	4.23	<1	3.78	<1	<1	<1	4.69	4.14	<1	4.68	<1	2.41	<1	<1	2.57	<1	-	-	-	-	-	-	**4.57**	**4.92**	**5.34**	**<1**	**3.95**	<1	5523
5545	2 3 1	-	-	-	-	-	-	4.06	<1	4.65	-	-	-	<1	4.01	<1	<1	<1	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.73	2.35	<1	**<1**	2.17	<1	5545
5553	1 2 3	4.78	4.1	5.6	-	-	-	4.32	<1	4.69	3.97	<1	4.55	<1	4.65	<1	<1	<1	4.92	-	-	-	<1	2.96	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5553
5615	2 1 3	4.41	4.69	5.48	-	-	-	4	<1	4.61	**<1**	<1	4.6	<1	4.15	<1	<1	<1	4.58	-	-	-	<1	2.64	<1	<1	2.64	<1	-	-	-	-	-	-	2.78	2.3	<1	**1.61**	2.15	<1	5615
5701	2 3 1	4.57	3.94	5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5701
5774	1 2 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2.4	<1,70	2.74	2.48	<1,70	5774
5801	3 1 2	4.27	3.49	5.14	-	-	-	-	-	-	-	-	-	<2	3.83	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	**1.7**	<1	**1.97**	1.6	<1	5801
5808	2 1 3	4.93	4.22	5.52	-	-	-	-	-	-	4.28	0	4.52	0	3.37	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.65	2.3	0	**0**	2.11	0	5808
5883	2 1 3	4.61	4.07	5.46	-	-	-	4.16	<2	4.36	4.13	<2	4.89	<2	4.18	<2	<2	<2	4.84	-	-	-	0	2.49	0	-	-	-	-	-	-	-	-	-	1.21	2.16	0	3	1.92	0	5883
5933	2 3 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.66	4.38	5.46	<1	3.08	<1	-	-	-	-	-	-	5933
5950	2 1 3	4.44	3.95	5.44	2.48	4.51	<2	4.14	<1	4.68	4.18	<1	4.77	<1	3.93	<1	<1	<1	4.72	4.46	<2	4.73	<1	2.65	<1	<1	2.59	<1	4.45	4.84	5.3	0	3.7	0	1.6	2.34	<1	2.98	2.46	<1	5950
5993	1 2 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5993
6109	3 2 1	4.62	4.15	5.51	-	-	-	-	-	-	3.91	<1,60	4.64	<2	4.23	<2	-	-	-	4.45	<2	**<2**	-	-	-	0	2.51	0	-	-	-	-	-	-	1.41	2.38	0	3	2.45	0	6109
6175	2 3 1	4.41	3.84	5.33	-	-	-	3.58	<2	**3.89**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.78	2.47	<1	2.94	2.3	<1	6175
6180	3 1 2	4.43	3.85	5.29	-	-	-	4.04	<2	4.67	4.08	<2	4.71	<2	3.44	<2	<2	<2	4.76	-	-	-	<1	2.49	<1	-	-	-	-	-	-	-	-	-	1.71	2.37	<2	2.96	2.34	<2	6180
6224	3 1 2	4.82	4.85	5.71	-	-	-	-	-	-	-	-	-	<2	4.16	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6224
6232	1 2 3	4.67	3.94	5.54	-	-	-	3.91	<2	4.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6232
6253	3 1 2	4.69	3.81	5.49	-	-	-	4.3	<1	4.74	3.83	<1	4.64	<1	4.26	<1	<1	<1	4.92	-	-	-	-	-	-	<1	2.36	<1	-	-	-	-	-	-	2.84	2.36	<1	**1.7**	2.2	<1	6253
6258	2 1 3	4.87	5.2	5.72	4.23	5.34	5.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.89	2.18	0	6258
6343	1 3 2	4.66	3.86	5.39	-	-	-	4.22	<2	4.72	4.29	<2	4.88	<2	3.95	<2	<2	<2	4.8	-	-	-	<0	2.88	<0	<0	2.79	<0	-	-	-	-	-	-	1.11	2.26	<0	2.82	2.11	<0	6343
6352	3 1 2	4.48	4.1	5.33	-	-	-	3.84	<2	4.46	4.18	<2	4.62	<2	3.8	<2	<2	**2.39**	4.92	-	-	-	0	2.51	0	-	-	-	-	-	-	-	-	-	2.84	**0**	0	**1.64**	2.33	0	6352
6368	2 1 3	4.54	3.97	5.6	-	-	-	4.11	<2	4.68	4.15	<2	4.95	-	-	-	<2	<2	4.82	4.42	<2	4.86	-	-	-	-	-	-	4.28	4.36	5.45	<1	2.97	<1	1.64	2.38	0	2.89	2.04	0	6368
6456	1 2 3	4.6	3.82	5.36	-	-	-	4.22	0	4.72	4.13	0	4.64	0	3.81	0	0	0	4.82	-	-	-	0	2.9	0	0	2.78	0	-	-	-	-	-	-	1.4	2.26	0	2.85	2.06	0	6456
6490	3 1 2	4.76	3.93	5.59	-	-	-	4.33	<1	4.73	-	-	-	<1	4	<1	<1	<1	4.89	-	-	-	-	-	-	<1	2.45	<1	-	-	-	-	-	-	1.7	2.3	<1	3.05	2.28	<1	6490
6594	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6594
6647	3 2 1	4.39	3.8	5.59	-	-	-	-	-	-		<0,48		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.77	2.1	0	2.78	1.73	0	6647
6658	1 3 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6658
6686	2 3 1	-	-	-	-	-	-	4.15	<1	4.88	4.17	<1	4.88	-	-	-	<1	<1	4.83	-	-	-	<1	2.71	<1	-	-	-	4.45	4.76	5.56	<1	2.77	<1	1	2.3	<1	2.81	2.11	<1	6686
6728	1 3 2	**4**	3.9	5.6	-	-	-	3.9	**2**	**0**	**3.5**	0	4.9	-	-	-	**4.7**	0	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6728
6762	1 3 2	4.88	3.90	5.73	-	-	-	4	<1	4.98	4.34	<1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6762
6885	3 1 2	4.71	4.29	5.58	-	-	-	4	0	4.79	-	-	-	0	3.91	0	0.00	0	5	-	-	-	-	-	-	0.00	2.69	0.00	-	-	-	-	-	-	**0**	2	0.00	2.97	2	0	6885
6944	1 3 2	-	-	-	-	-	-	-	-	-	**<2**	<2	4.14	-	-	-	-	-	-	4.44	<2	4.18	-	-	-	-	-	-	4.19	4.07	4.85	<1	**0.3**	<1	1.3	2.19	0	2.86	1.68	0	6944
6958	2 1 3	4.54	4.02	5.3	-	-	-	**5.3**	<1	4.58	-	-	-	<1	4.02	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.86	2.08	<1	**<1**	1.78	<1	6958
m		4.63	4.15	5.51		4.55		4.14	0	4.66	4.20	0	4.74	0	4.07	0	0	0	4.79	4.41	0	4.79	0	2.67	0	0	2.53	0	4.46	4.49	5.45	0	2.87	0	1.73	2.28	0	2.82	2.13	0	**m**
s		0.14	0.42	0.14		0.37		0.16	0	0.20	0.15	0	0.22	0	0.27	0	0	0	0.15	0.17	0	0.32	0	0.17	0	0	0.26	0	0.22	0.43	0.22	0	0.43	0	0.47	0.15	0	0.16	0.22	0	**s**

Lab no	Vial	Aerobic microorganisms 30 °C			Psychrotrophic microorganisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-reducing bacteria			Aerobic m.o. in fish products, 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
6971	1 2 3	3.93	4.82	5.37	-	-	-	4.07	0	3.92	-	-	-	0	3.88	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6971
7182	2 3 1	4.57	4.66	5.51	-	-	-	4.06	<1	4.57	4.35	<1	4.4	-	-	-	-	-	-	4.49	3.67	5.29	-	-	-	-	-	-	-	-	-	2.89	2.33	<1	2.35	2.03	<1	7182
7207	3 2 1	4.63	5.05	5.62	-	-	-	3.92	<1	4.22	-	-	-	<1	4.29	<1	-	-	-	4.44	<1	<1	-	-	-	-	-	-	-	-	-	1.48	2.32	<1	3.07	2.16	<1	7207
7232	1 2 3	4.66	3.85	5.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.67	2.35	<0	2.87	1.85	<0	7232
7242	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7242
7248	3 2 1	4.74	3.71	5.4	-	-	-	4.37	<1	4.67	4.4	<1	4.81	<1	4.12	<1	<1	<1	4.83	4.55	4.84	4.94	<1	2.65	<1	<1	2.31	<1	4.72	4.72	5.46	-	-	-	2.9	2.08	<1	<1	2.08	<1	7248
7253	1 2 3	4.63	3.56	5.49	-	-	-	<1	<1	4.84	4.58	<1	4.67	<1	3.71	<1	<1	<1	4.74	-	-	-	<1	2.11	<1	-	-	-	-	-	-	-	-	-	1.44	2.18	<1	2.8	2.07	<1	7253
7282	2 3 1	4.47	4.12	5.8	-	-	-	3.83	<1	4.34	3.67	<1	4.07	<1	4.05	<1	<1	<1	5.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.83	2.32	<1	2.82	2.13	<1	7282
7296	3 2 1	4.71	3.93	4.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.28	2.39	<1	2.8	2.78	<1	7296
7330	1 3 2	4.62	4.12	5.64	-	-	-	3.76	<1	4.55	3.93	<1	4.44	<1	4.05	<1	<1	<1	5.08	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.29	<1	2.85	1.84	<1	7330
7334	2 1 3	4.36	2.76	5.56	-	-	-	-	-	-	-	0		-	-	-	0	0	4.83	-	-	-	-	-	-	<1	1.87	<1	-	-	-	-	-	-	<1	1.87	<1	<1	1.87	<1	7334
7438	3 2 1	4.58	4	5.4	-	-	-	4.03	<1	4.32	3.92	<1	4.33	-	-	-	<1	<1	4.68	-	-	-	<1	1.6	<1	<1	1.81	<1	-	-	-	-	-	-	1.34	2.17	<1	2.81	2.04	<1	7438
7564	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	<2	4.18	<2	<2	<2	4.89	4.41	<2	4.85	<0	2.72	<0	<0	2.49	<0	4.04	4.66	5.6	<1	2.2	<1	1.66	2.36	<0	2.9	2.3	<0	7564
7617	2 3 1	4.54	3.85	5.43	-	-	-	-	-	-	4.22	<1	4.77	-	-	-	<1	<1	3.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7617
7627	1 3 2	4.68	4.46	5.65	-	-	-	-	-	-	-	-	-	<2	4.37	<2	-	-	-	-	-	-	-	-	-	<0	2.57	<0	-	-	-	-	-	-	1.58	2.06	<0	2.81	2.16	<0	7627
7688	3 2 1	4.74	3.97	5.53	2.83	4.66	<1	4.19	<1	4.72	4.18	<1	4.88	<1	3.94	<1	<1	<1	4.95	4.41	<1	4.76	<1	2.72	<1	<1	2.53	<1	-	-	-	-	-	-	1.67	2.45	<1	2.97	2.04	<1	7688
7728	2 3 1	4.77	4.15	5.72	-	-	-	-	-	-	4.38	0	4.38	0	4.18	0	0	0	4.84	-	-	-	0	2.48	0	0	2.3	0	-	-	-	-	-	-	1.48	2.23	0	2.88	1.78	0	7728
7750	2 3 1	4.23	4.11	5.45	-	-	-	4.09	<2	4.66	-	-	-	<2	3.89	<2	-	-	-	4.6	<2	<2	-	-	-	-	-	-	-	-	-	-	-	-	0	2.17	0	2.71	2.03	0	7750
7825	1 3 2	4.7	4.39	5.66	-	-	-	4.41	<2	4.59	4.29	<2	5.05	-	-	-	<2	<2	5.02	4.42	2	4.88	-	-	-	-	-	-	-	-	-	-	-	-	1.66	2.19	<1	2.5	2.16	<1	7825
7876	1 2 3	4.8	4.5	5.35	-	-	-	4.04	<2	<2	4.19	<2	<2	<2	3.99	<2	<2	<2	4.72	-	-	-	<1	2.58	<1	-	-	-	-	-	-	-	-	-	1.74	2.29	<1	2.92	2.37	<1	7876
7877	1 3 2	4.69	-	5.63	-	-	-	4.14	-	4.83	-	-	-	0	-	4.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7877
7930	2 1 3	4.76	4.03	5.72	-	-	-	4.3	<2	4.75	4.41	<2	5.32	<2	4.26	<2	<2	<2	4.9	-	-	-	<1	2.72	<1	-	-	-	-	-	-	-	-	-	1.81	2.3	<1	2.82	2	<1	7930
7940	2 3 1	4.78	3.85	5.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7940
7946	1 3 2	4.54	4.81	5.58	4.85	4.32	5.41	4.26	<1	5.16	4.25	<1	4.98	<1	4.25	<1	<1	<1	4.89	4.32	<1	<1	<1	2.7	<1	2.02	2.7	2.24	3.42	3.63	3.6	2.02	2.72	2.24	2.09	2.25	2.91	2.62	2.13	<1	7946
7962	3 2 1	4.66	3.99	5.61	-	-	-	4.43	<2	4.59	4.41	<2	4.97	<2	3.71	<2	<2	<2	4.84	4.03	4	4.98	-	-	-	-	-	-	-	-	-	-	-	-	1.34	2.12	0	-	2.48	1.79	7962
7968	1 3 2	4.48	4.04	5.45	-	-	-	4.15	<2	4.54	4	<2	4.96	<2	4.23	<2	<2	<2	4.69	4.04	<2	4.18	0	2.62	0	0	2.41	0	-	-	-	<1	3.11	<1	1.83	2.38	0	2.8	2.3	0	7968
8066	1 3 2	-	-	-	-	-	-	-	-	-	4.1	0	4.8	0	3.6	0	0	0	4.5	-	-	-	-	-	-	-	-	-	4.2	4	5.2	0	3	0	-	-	-	-	-	-	8066
8068	3 1 2	4.7	4	5.4	-	-	-	4.2	0	4.57	4.37	0	5.05	0	4.15	0	0	0	4.84	4.51	4.87	5.17	0	2.64	0	0	2.46	0	-	-	-	-	-	-	1.43	2.28	0	2.84	0	0	8068
8105	2 3 1	4.77	4.72	5.77	-	-	-	-	-	-	4.57	<1	5.05	-	-	-	<1	<1	4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.93	4.59	<1	3.6	4.04	<1	8105
8252	2 1 3	4.74	4.71	5.51	-	-	-	4.18	<2	4.57	4.23	<2	4.64	<2	4.08	<2	<2	<2	4.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8252
8260	2 3 1	4.35	3.89	5.39	-	-	-	4.06	<1	4.57	4.15	<1	4.72	<1	3.88	<1	<1	<1	<1	-	-	-	<1	2.45	<1	<1	2.45	<1	-	-	-	-	-	-	1.74	1.74	<1	2.79	2.11	<1	8260
8313	3 2 1	4.52	4.34	5.48	-	-	-	4.14	<2	4.51	4.12	<2	4.68	<2	3.89	<2	<2	<2	4.85	-	-	-	0	2.75	0	-	-	-	-	-	-	-	-	-	1.54	2.3	0	2.85	2.32	0	8313
8333	1 3 2	4.62	4.33	5.5	-	-	-	4.1	<1	4.58	4.06	<1,60	4.53	<2	4.14	<2	<1	<1	>1	4.37	<2	<2	-	-	-	<1	2.62	<1	-	-	-	-	-	-	1.74	2.36	<1	3.07	2.23	<1	8333
8397	3 1 2	4.25	4.68	5.59	-	-	-	4.09	<1	4.68	4.06	<1	4.83	<1	4.04	<1	<1	<1	4.61	4.41	<2	4.6	-	-	-	-	-	-	-	-	-	-	-	-	1.7	2.28	<1	2.72	1	<1	8397
8430	1 3 2	4.92	4.45	5.83	-	-	-	4.49	<1	4.88	4.48	<1	4.94	-	-	-	<1	<1	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.78	2.34	<1	2.78	2.3	<1	8430
8435	2 1 3	4.72	3.89	5.41	-	-	-	4.23	<2	4.34	4.25	<2	4.85	<2	3.96	<2	<2	<2	4.81	-	-	-	<1	<1	<1	<1	1.93	<1	4.66	4.54	5.6	<1	3.11	<1	-	-	-	-	-	-	8435
8523	1 2 3	4.68	3.91	5.61	-	-	-	4.31	<1	4.49	-	-	-	-	-	-	<1	<1	4.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.92	2.39	<1	2.83	2.11	<1	8523
8528	3 2 1	3.9	3.7	4.86	-	-	-	3.7	<1	4.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3	1.86	<1	2.75	2.12	<1	8528
8529	1 3 2	4.6	4.3	5.71	-	-	-	4.3	<2	4.85	4.3	<2	4.85	<2	4.7	<2	<2	<2	4.45	4.4	<2	5.18	<0	2.79	<0	<0	2.79	<0	-	-	-	-	-	-	1.7	2	<0	2.64	2.2	<0	8529
8568	3 1 2	4.69	4.35	5.45	-	-	-	4.09	<2	4.88	4.1	<2	4.56	<2	3.96	<2	-	-	-	4.69	<3	<3	-	-	-	0	2.57	0	-	-	-	-	-	-	1.1	2.24	0	2.79	2.17	0	8568
8626	1 3 2	4.75	5.17	5.65	-	-	-	4.36	<1	4.92	4.04	0	4.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.74	4.34	5.86	-	-	-	-	-	-	-	-	-	8626
8628	1 3 2	4.49	3.92	5.4	-	-	-	3.91	<2	3.67	4.23	<2	4.89	<2	4.22	<2	1	<2	4.84	4.36	<2	4.64	0	2.74	0	0	2.62	0	4.18	4.37	5.29	<1	2.7	<1	1.78	2.26	0	3.1	2.15	0	8628
8657	1 2 3	4.74	4.64	5.45	-	-	-	4.03	<1	4.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.63	1.92	<1	2.92	2.32	<1	8657
8734	3 1 2	4.6	4.9	5.5	-	-	-	3.8	0	4.8	-	-	-	-	-	-	-	-	-	4.4	2	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8734
8742	2 3 1	4.65	3.93	5.48	-	-	-	3.91	<1	4.66	4.66	<1	4.38	<1	3.69	<1	<1	<1	4.94	4.49	4.59	5.51	<1	1.48	<1	<1	2.59	<1	-	-	-	-	-	-	1.95	2.15	<1	2.72	2.08	<1	8742
8756	2 3 1	4.41	4.98	5.52	-	-	-	4.22	<1	4.95	4.06	<1	4.71	<1	3.8	<1	<1	2.25	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.95	2.28	<1	2.6	1.86	<1	8756
8766	3 1 2	4.6	4.2	5.5	-	-	-	4.1	<2	4.5	4.2	<2	4.9	<2	4	<2	<2	<2	4.8	-	-	-	0	2.5	0	-	-	-	-	-	-	-	-	-	1.8	2.2	0	2.9	2.1	0	8766
8891	2 1 3	4.67	3.67	5.44	-	-	-	4.3	<1	4.84	<1	<1	4.85	<1	3.93	<1	<1	<1	4.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.44	2.48	<1	2.75	2.06	<1	8891
8909	3 1 2	4.72	3.94	5.46	-	-	-	4.09	<2	4.64	4.01	<2	4.64	<2	3.88	<2	<2	<2	4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	2.46	<1	2.79	2.23	<1	8909
8918	3 1 2	4.56	4.69	5.54	-	-	-	4.16	<2	4.6	4.06	<2	4.71	<2	3.62	<2	<2	<2	4.7	-	-	-	0	2.57	0	0	2.57	0	-	-	-	-	-	-	1.62	2.49	0	2.9	2.18	0	8918
8955	1 3 2	4.41	3.99	5.38	-	-	-	4.04	<1	4.77	4.17	<1	4.87	<1	4.08	<1	<1	<1	4.97	4.69	<1	4.91	<1	2.95	<1	<1	2.69	<1	4.2	3.69	4.96	<1	3.28	<1	1.58	2.18	<1	2.8	2.11	<1	8955
9002	2 3 1	5.6	4.67	4.1	-	-	-	4.82	4.21	0	4.89	4.28	0	0	0	4.02	4.85	0	0	0	4.33	0	-	-	-	0	0	2.63	-	-	-	-	-	-	0	1.43	2.24	0	3.04	2.18	9002
9034	1 3 2	4.8	3.7	5.7	<1	4.3	<1	4.3	<2	4.7	4.3	<2	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9034
9078	3 2 1	4.71	4.29	5.54	-	-	-	4.15	<2	4.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9078
9217	3 2 1	4.6	4.3	5.5	-	-	-	4.2	<2	4.7	4.2	<2	4.6	<2	4.2	<2	2	<2	4.7	4.3	<2	4.6	-	-	-	-	-	-	-	-	-	-	-	-	1.9	2.3	<1	2.9	2.1	<1	9217
9408	3 2 1	3.93	4.71	5.59	-	-	-	<2	4.27	4.73	<2	4.32	4.81	4.14	<2	<2	<2	<2	4.71	-	-	-	-	-	-	2.49	<1	<1	4.65	4.63	5.51	2.6	<1	<1	-	-	-	-	-	-	9408
9429	1 3 2	4.57	4	5.57	-	-	-	-	-	-	-	-	-	<1	4.38	<1	-	-	-	-	-	-	<1	2.4	<1	<1	2.52	<1	-	-	-	-	-	-	1.78	2.38	<1	2.85	2.2	<1	9429
9436	2 1 3	4.73	4.18	5.52	<1	5	<1	4	<2	4.82	4.16	<2	5	<2	4.45	<2	<2	<2	5	5	<2	5	<1	3.01	<1	<1	3.02	<1	-	-	-	-	-	-	2	2	<1	3.04	2	<1	9436
9441	1 3 2	-	-	-	<1	4	4.52	-	-	-	-	-	-	<2	4.11	<2	-	-	-	4	4.64	5	<1	2.80	<1	<1	2.71	<1	4.49	4.43	5.32	<1	<1	<1	3	2	<1	2.90	2	<1	9441
9453	1 2 3	4.67	3.55	5.46	-	-	-	4.14	<1	4.58	-	-	-	<1	4.69	<1	<1	<1	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.91	2.45	<1	2.8	2.04	<1	9453
m		4.63	4.15	5.51		4.55		4.14	0	4.66	4.20	0	4.74	0	4.07	0	0	0	4.79	4.41	0	4.79	0	2.67	0	0	2.53	0	4.46	4.49	5.45	0	2.87	0	1.73	2.28	0	2.82	2.13	0	**m**
s		0.14	0.42	0.14		0.37		0.16	0	0.20	0.15	0	0.22	0	0.27	0	0	0	0.15	0.17	0	0.32	0	0.17	0	0	0.26	0	0.22	0.43	0.22	0	0.43	0	0.47	0.15	0	0.16	0.22	0	**s**

Lab no	Vial	Aerobic microorganisms 30 °C			Psychrotrophic microorganisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-reducing bacteria			Aerobic m.o. in fish products, 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
9512	1 2 3	4.38	3.23	5.25	-	-	-	4	0	4.65	-	-	-	-	-	-	-	-	-	4.17	0	4.65	-	-	-	-	-	-	-	-	-	-	-	-	1.63	2.12	0	**0**	2.04	0	**9512**
9555	3 1 2	4.5	3.91	5.31	-	-	-	3.96	<1	4.46	4.06	<1	4.47	<1	3.95	<1	<1	<1	4.44	-	-	-	-	-	-	-	-	-	-	-	-	1.58	2.34	<1	2.76	1.86	<1	**9555**
9559	1 3 2	4.7	3.76	5.39	-	-	-	3.68	<1	4.33	**3.59**	<2	4.81	<2	4.16	<2	<2	**2**	4.92	4.36	**5.07**	5.1	-	-	-	<2	2.47	<2	-	-	-	-	-	-	1.26	2.21	<1	2.54	1.89	<1	**9559**
9662	2 3 1	4.65	3.94	5.48	-	-	-	4.15	<2	4.72	4.15	<2	4.69	<2	4.36	<2	<2	<2	4.87	4.04	<2	4.23	0	2.52	0	0	2.46	0	-	-	-	-	-	-	1.51	2.36	0	2.95	2.15	0	**9662**
9747	3 1 2	4.43	3.6	5.32	-	-	-	**3.32**	<1	**3.7**	-	-	-	<1	3.95	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.54	2.08	<1	2.48	1.7	<1	**9747**
9763	1 2 3	4.59	3.95	5.44	-	-	-	-	<1	4.36	-	<1	4.31	<1	4.22	<1	<1	<1	4.88	-	-	-	<1	2.48	<1	<1	2.36	<1	-	-	-	-	-	-	-	2.26	<1	3.03	2.39	<1	**9763**
9783	2 3 1	4.79	3.76	5.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.66	2.21	0	2.89	2.2	0	**9783**
9853	3 2 1	4.39	4.26	5.28	-	-	-	3.98	0	4.32	-	-	-	-	-	-	0	0	4.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.91	2.22	0	**0**	2.24	0	**9853**
9886	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**9886**
9890	2 3 1	4.58	4.23	5.36	-	-	-	4.11	0	4.73	4.2	0	4.79	0	4.2	0	0	0	4.71	4.51	**2.78**	4.72	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.38	0	2.71	1.79	0	**9890**
9903	2 1 3	4.7	4	5.5	-	-	-	4.2	<2	4.1	4.3	<2	4.7	<2	4.3	<2	<2	<2	4.4	-	-	-	<0	2.7	<0	-	-	-	-	-	-	-	-	-	1.5	2.4	<0	2.7	2.3	<0	**9903**
9950	2 1 3	4.36	4.14	5.07	-	-	-	-	-	-	-	-	-	0	3.72	0	-	-	-	4.19	0	4.57	-	-	-	0	**0**	0	-	-	-	-	-	-	**4.03**	2.51	**4.05**	2.95	2.32	0	**9950**
N		162	161	162	10	10	10	137	137	138	123	125	124	120	121	121	117	117	116	60	60	61	62	63	63	67	68	68	29	29	29	29	29	29	140	142	141	140	142	141	**N**
Min		3.65	2.76	4.10	0	4.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.42	3.63	3.60	0	0	0	0	0	0	0	0	0	**Min**
Max		5.60	5.58	5.83	4.85	5.34	5.71	5.30	4.27	5.16	8.04	6.04	7.04	4.14	4.70	4.75	5.15	4.88	5.16	4.69	5.07	5.63	0	3.01	2.56	2.49	3.60	2.63	4.77	5.61	5.94	2.60	3.70	2.24	4.93	4.92	5.34	4.68	4.04	2.34	**Max**
Med		4.64	4.05	5.51	1.24	4.47	4.06	4.16	0	4.70	4.18	0	4.79	0	4.06	0	0	0	4.83	4.42	0	4.76	0	2.67	0	0	2.56	0	4.50	4.50	5.48	0	2.98	0	1.66	2.30	0	2.83	2.12	0	**Med**
m		4.63	4.15	5.51		4.55		4.14	0	4.66	4.20	0	4.74	0	4.07	0	0	0	4.79	4.41	0	4.79	0	2.67	0	0	2.53	0	4.46	4.49	5.45	0	2.87	0	1.73	2.28	0	2.82	2.13	0	**m**
s		0.14	0.42	0.14		0.37		0.16	0	0.20	0.15	0	0.22	0	0.27	0	0	0	0.15	0.17	0	0.32	0	0.17	0	0	0.26	0	0.22	0.43	0.22	0	0.43	0	0.47	0.15	0	0.16	0.22	0	**s**
F+		0	0	0		0		0	4	0	0	4	0	1	0	4	5	9	0	0	19	0	0	0	1	2	0	3	0	0	0	2	0	1	0	0	6	0	0	4	**F+**
F-		0	0	0		0		2	0	6	11	0	4	0	3	0	0	0	8	1	0	12	0	3	0	0	4	0	0	0	0	0	3	0	8	3	0	14	2	0	**F-**
<		7	0	6		0		3	0	6	7	0	4	0	0	0	0	0	1	1	0	0	0	5	0	0	0	0	1	0	1	0	1	0	0	5	0	6	3	0	**<**
>		2	0	0		0		2	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	4	0	2	4	0	**>**
< OK		4.23	2.76	5.07	0	4.01	0	3.58	0	3.92	3.83	0	4.04	0	3.10	0	0	0	4.38	3.85	0	4.08	0	2.19	0	0	1.81	0	4.04	3.63	4.85	0	1.78	0	0.77	1.86	0	2.30	1.56	0	**< OK**
> OK		4.94	5.58	5.83	4.85	5.35	5.71	4.52	0	5.16	4.66	0	5.32	0	4.70	0	0	0	5.16	4.69	0	5.63	0	3.01	0	0	3.17	0	4.77	5.61	5.95	0	3.70	0	2.95	2.65	0	3.18	2.86	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

The results are not evaluated

Annex 2 Z-scores of all particpants - April 2017

Z-scores are calculated according to the formula: z = (x-m)/s, where 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 have obtained a z-score of zero. False results do not generate a z-score. Z-score from outliers are not real z-scores, but are a practical means to express the results from outliers. Very low and high z-scores are here limited to -4 and +4 respectively.

□ *2 < |z| ≤ 3,* ■ *|z|>3*

Lab no.	Vial	Aerobic microorganisms 30 °C			Psychrotroph. micro-organisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive Staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-red. bacteria			Aerobic m.o. in fish products 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
1149	1 2 3	0.243	-0.351	-0.371				0.240	0	0.527	-0.380	0	-0.043	0	-0.157	0	0	0	-0.566														-0.199	0.313	0	0.259	0.742	0	1149
1237	3 1 2	0.519	2.176	-0.353				0.140	0	0.131		0	-0.356	0	-1.520	0	0	0	-1.874	0.134		-0.281	0	-1.136	0	0	-0.864	0							2.410	-0.195	0	0.041	-1.033	0	1237
1254	1 3 2	0.739	-0.640	-0.297				0.750	0	-0.862	1.242	0	1.026	0	-1.085	0	0	0	1.141										0.865	-0.978	0.131	0	0.452	0	-0.177	-0.367	0	1.161	0.697	0	1254
1594	1 2 3	0.668	-0.158	0.363				1.260	0	-0.267	0.228	0	0.794	0	1.996	0	0	0	0.185							0	-0.482	0				0	0.312	0	0.059	1.877	0	1.676	-0.108	0	1594
1970	3 1 2	-0.394	0.468	-1.251		-1.466		0.049	0	-0.416	-0.110	0	0.003	0	1.848	0	0	0	-0.020	1.046	0	0.675	0	0.758	0	0	0.909	0	-1.694	1.491	-0.516	0	-1.315	0	0.251	0.381	0	1.032	1.324	0	1970
2035	1 2 3							-0.270	0	-0.813	0.026	0	0.747																						-0.284	1.469	0	0.517	1.190	0	2035
2058	2 1 3	-0.607	-0.399	-0.224							-0.988	0	0.887	0	0.511	0				0.069	0	-0.087	0	0.032	0										2.223	-0.027	0		-0.689	0	2058
2072	2 1 3	0.880	1.792	2.124		0.963		1.388	0	0.626	-0.110	0	-0.741	0	0.845	0	0	0	1.210	0.874		0.040	0	-4.000	0	0	-2.761	0							-0.841	1.877	0	2.320	2.487	0	2072
2221	2 3 1	0.101	-0.399	1.317				0.112	0	-0.118	-0.380	0	-0.462	0	0.103	0	0	0	0.458	1.219	0	2.676	0	-0.211	0	0	0.175	0								0.857	0	-0.256	0.384	0	2221
2324	1 2 3	-0.040	-0.664	-0.297				0.112	0	0.626	-0.312	0	0.143	0	0.326	0	0	0	-2.410	0.644	0													-0.113	4.000	0	-0.643	4.000	0	2324
2344	3 2 1	-0.749	0.083	-0.371				-0.653	0	-1.259	-4.000	0	-4.000		-0.231	0	0	0	-2.820			0.929		0.213	0		-0.057	0								-0.979	0		-0.600	0	2344
2386	1 3 2	-0.182	1.094	-2.351								0		0			0																	-0.284	-1.660	0	-2.189	-3.731	0	2386
2402	3 2 1	1.022	2.057	0.803				1.707	0	1.023	1.377	0	0.840																							-4.000	0	-4.000	-4.000	0	2402
2459	2 3 1	-1.730	0.144	-4.000				0.821	0	0.494	-0.117	0	-0.742	0	-0.015	0	0		-0.889															-0.880	0.397	0	-0.315	-0.505	0	2459
2637	2 3 1	0.668	-0.447	0.436				-0.398	0	-2.003	0.026	0	1.166	0	0.289	0	0	0	-0.088	1.506	0	1.977	0	1.606	0	0	1.180	0							-0.927	-1.183	0	-0.514	-0.600	0	2637
2704	2 1 3	-1.174	2.322	0.656				0.750	0	1.321	0.296	0	0.608	0	0.103	0	0	0	-0.020							0	-0.945	0	1.404	1.237	0.362	0	-0.246	0							2704
2720	3 2 1	0.101	-0.279	0.583				0.750	0	0.477				0	-0.380	0																			-0.070	0.993	0	0.774	-0.197	0	2720
2745	1 3 2	0.314	-0.784	-0.444				-0.653	0	1.122	0.026	0	0.050	0	0.326	0	0	0	0.049					1.424	0																2745
2764	1 3 2	-0.678	0.083	-0.004				-0.398	0	1.866	-0.785	0	-0.090	0	-0.825	0	0	0		-0.046	0					0	0.871	0							-0.927	0.653	0	0.001	-0.421	0	2764
2797	1 2 3	0.456	-0.534	-0.378				0.355	0	0.175	0.573	0	1.328	0	0.274	0	0	0	0.718					1.539	0				0.694	-0.283	0.048	0	-1.047	0	-0.548	0.653	0	0.040	1.995	0	2797
2842	3 2 1																																							2842
2920	3 2 1	1.164	0.034	-0.151				0.878	0	0.973	0.566	0	0.887							-3.208	0					0	4.000	0													2920
2941	3 2 1	0.243	-1.001	-0.957				0.495	0		1.107	0	0.282	0	-0.491	0	0	0	-1.113	0.932	0	-0.183				0	-0.095	0							-0.713	-0.571	0	-0.127	2.084	0	2941
2944	1 3 2	-0.324	0.131	0.363				-0.207	0	-1.408	-0.515	0	0.468	0	2.330	0	0	0	1.210	-0.161		-0.214	0	-4.000	0	0	-2.297	0							-0.927	-2.612	0	0.839	0.832	0	2944
3031	3 1 2																												1.235	0.767	2.278	0	1.012	0							3031
3055	1 2 3	-0.040	-0.231	-1.324				-0.653	0	-1.606				0	0.697	0																			0.701	0.313	0	-0.707	0.608	0	3055
3159	2 1 3	1.235	0.612	1.537				0.559	0	2.214	0.701	0	0.515	0	0.920	0	0	0	0.390																						3159
3225	1 3 2	0.101	-1.073	-0.151				0.112	0	0.229				0	-1.271	0																			-0.370	-0.299	0	0.130	0.295	0	3225
3243	2 1 3	0.243	-0.279	0.436				-0.143	0	0.725																															3243
3305	2 3 1	1.518	-0.544	1.537				0.240	0	1.221	0.026	0	1.026	0	-1.011	0	0	0	-0.088	-0.276	0	0.199	0	0.334	0	0	0.909	0	1.224	0.937	-0.008	0	-2.523	0	-0.756	-1.183	0	1.418	-0.108	0	3305
3400	3 1 2	4.000	1.238	-1.398							4.000		4.000						-2.615																2.608	-0.979		-1.416	-0.958		3400
3457	2 1 3							0.559	0	1.073	-0.177	0	0.933				0	0	0.117	-0.391	0	-0.087	0	0.455	0				0.192	2.576	0.085	0	0.568	0							3457
3543	3 2 1	0.951	0.010	1.977				1.133	0	1.122				0	-0.120	0	0	0	-0.088							0	-0.482	0							1.623	1.673	0				3543
3587	3 1 2	-0.536	-1.098	0.070				0.112	0	0.328	-0.515	0	0.701	0	-0.157	0	0	0	-0.361							0	0.098	0							2.073	-0.027	0		-0.600	0	3587
3626	1 3 2	0.526	-0.351	0.656				0.367	0	0.676	0.701	0	0.282	0	1.959	0	0	0	0.732					0.213	0																3626
3831	1 2 3	-0.607	-0.544	-0.591								0	-2.043							-0.966	0	-0.722													0.144	0.313	0	0.452	0.429	0	3831
3868	1 3 2	0.810	-0.592	-0.151				0.750	0	0.775	0.634	0	0.515	0	-0.231	0	0	0	0.936	0.299	0	-0.246	0	0.940	0	0	0.948	0	-0.796	-0.886	0.316	0	1.079	0	-1.249	-0.367	0	-0.256	-0.868	0	3868
3925	1 2 3	-0.324	-0.182	0.583																																					3925
4047	1 2 3	0.739	1.840	1.317				0.049	0	0.725	0.228	0	0.515	0	-0.268	0	0	0	0.253																-0.413	-0.027	0	0.517	-1.405	0	4047
4050	3 1 2	-0.678	0.227	-0.591				-0.653	0	-4.000				0	-0.046	0				0.874	0	-0.024													0.016	-0.299	0	-0.321	0.608	0	4050
4064	3 2 1	1.943	-0.447	0.436				0.431	0	-0.069																															4064
4100	1 3 2	0.314	-0.664	-0.004				-0.207	0	0.031	-0.312	0	-0.694	0	1.885	0	0	0	0.322	0.012	0	-0.119				0	0.407	0							-0.563	0.585	0	0.323	-0.645	0	4100
4171	2 1 3	0.597	-0.399	1.537				-0.398	0	1.122	-1.326	0	-0.090	0	0.697	0	0	0		1.161	0					0	1.064	0							-1.334	1.537	0	4.000	0.563	0	4171
4246	3 2 1	-1.386	0.974	-0.371				0.304	0	-0.118	-0.245	0	-0.183				0	0	0.253	-0.506		-1.294																			4246
4266	1 3 2	0.314	1.118	0.436							0.701	0	-0.462				0	0	-0.703																0.466	-0.571	0	0.259	-0.824	0	4266
4278	1 3 2	-0.182	-0.905	-0.737				0.623		0.328					-0.602																				-0.156	-0.571		-1.222	-1.360		4278
4288	3 1 2	1.589	-0.375	0.950				0.750	0	0.577	1.445	0	0.329	0	1.068	0	0	0	0.732					-0.271	0	0	0.716	0								-0.163	0	0.581	-0.600	0	4288
4305	2 3 1																																							4305
4339	2 1 3	-0.182	0.372	0.656				1.005	0	-0.813	0.026	0	0.747	0	0.474	0	0	0	0.049	-4.000		0.040	0	-0.392	0	0	0.677	0	0.192	0.014	0.224	0	-0.617	0	-0.927	0.109	0	-0.772	-0.153	0	4339
4352	2 3 1	-1.740	2.250	0.583				0.240	0	0.725	0.837	0	0.515	0	-0.491	0	0	0	-0.635	-2.116	0	-2.247	0	0.455	0	0	0.137	0	-0.707	-0.955	0.732	0		0	-0.925	0.517	0	0.517	-0.824	0	4352
4400	3 2 1	2.226	0.299	1.170				2.408	0	0.825	-4.000	0	-4.000	0	0.437	0																			-0.049	0.245	0		-0.242	0	4400
4449	1 3 2	-2.024	-0.495	-0.591				-1.355	0	-0.927																															4449
4538	1 2 3	0.385	3.454	-4.000				0.049	0		0.769						0																		0.423			-0.192			4538

Lab no.	Vial			Aerobic microorganisms 30 °C			Psychrotroph. micro-organisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive Staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-red. bacteria			Aerobic m.o. in fish products 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
4557	1	2	3	0.576	1.046	1.251								0	0.654				0	0	-1.113																					4557
4560	1	2	3	-1.599	0.131	-0.811							-0.650	0	-0.183																						-0.927	-1.932	0	-1.416	-1.495	0	4560
4562	3	2	1	**-4.000**	0.010	-1.104				0.367	0	-0.217	-0.110	0	**-3.856**	0	0.289	0	0		0.732	0.529		-0.119	0	0.637	0									-0.027	-0.027	0	0.517	0.429	0	4562
4633	2	3	1										0.701	0	1.026	0	0.511		0	0	0.390				0	0.577	0	0	0.368	0					-0.263	0.857	0	0.646	0.295	0	4633
4635	2	3	1	-0.111	-0.134	1.097				-1.100	0	0.180				0	-0.268	0	0	0	0.458	-0.218		0.643				0	0.832	0					-0.541	1.877	0	0.646	0.250	0	4635
4664	3	2	1																0	0	-0.225				0	-0.937	0	0	-0.057	0	0.461	0.707	-0.192	0	-1.315	0	1.794	-1.932	0	0.774	0.742	0	4664
4817	3	2	1	0.172	0.131	-0.957							**-4.000**	0	-0.741	0	1.179	0	0	0	-0.156				0	-0.392	0									-0.927	1.333	0	-0.900	-0.242	0	4817
4840	1	3	2	**-4.000**	**-2.374**	-0.591				-1.036	0	0.428		0	0.515	0	-0.825	0	0	0	-0.088				0		0									1.473	**-4.000**	0		-1.495	0	4840
4879	1	2	3																																								4879
4889	2	1	3	-0.168	-0.076	1.449				1.401	0	0.219	1.120	0	1.212	0	0.767	0	0	0	-0.416							0	-0.130	0	-0.801	-0.876	0.367	0	1.107	0							4889
4944	2	1	3	0.101	-0.086	0.143				1.388	0	0.725	-0.312	0	-0.741	0	-0.268	0	0	0	0.458				0			0									-0.584	-0.163	0	1.032	-0.421	0	4944
4951	1	2	3	-0.678	-0.736	**-4.000**				**-4.000**	0	-1.855		0	-0.694																					-0.434	-1.592	0	-1.867	-0.689	0	4951
4980	2	1	3	1.730	-0.688	0.143				0.049	0	0.825	0.026	0	-0.462	0	0.585	0	0	0	0.390							0	-1.138	0	0.461	0.730	0.177	0	0.266	0		-0.027	0	-0.514	-0.600	0	4980
5018	2	1	3	-1.032	-0.857	-0.737				-1.227	0	-0.465	-1.326	0	-0.741	0	-0.640	0	0		-0.225	1.046			0	-1.058	0	0	-0.366	0							-0.049	0.517	0	-0.321	-0.421	0	5018
5100	2	1	3	0.101	-0.134	-0.371				0.112	0			0	-1.066																					-0.284	0.109	0	0.323	**-2.568**	0	5100
5119	2	3	1	1.093	-0.351	0.583							1.377	0	1.398																					1.430	**2.489**	0	**-2.704**	**2.308**	0	5119
5120	3	2	1	1.164	-0.207	-0.004				0.367	0	0.180	-1.326	0	-0.787	0	0.289	0	0	0	0.322	-0.276	0	-1.072	0	-0.029	0	0	0.059	0	-0.527	0.084	0.177	0	-0.315	0	0.059	0.177	0	0.259	0.116	0	5120
5162	3	2	1																																								5162
5200	3	2	1																																								5200
5201	3	2	1	-0.465	-0.134	0.510				0.686	0	1.966	-1.799	0	0.468	0	-0.417	0	0	0	**2.507**															-1.570	**4.000**	0	**-2.382**	-1.047	0	5201
5204	2	3	1	**-4.000**	1.576	**-3.011**		-0.402		-0.270	0	-0.813	-0.650	0	-0.183	0	**-3.609**	0	0	0	-0.635	0.529	0	-0.278	0	-0.998	0	0	0.291	0							-0.070	-1.932	0	**-3.348**	0.295	0	5204
5250	1	2	3							**-4.000**	0	**-4.000**	-1.326	0	-0.796	0	1.448	0																			0.475		0	**-4.000**	0.747	0	5250
5329	1	2	3	0.526	-0.038	-0.077				0.112	0	**-3.889**				0	-0.083	0	0	0	0.049	0.357	0	-0.691													-0.841	0.177	0		-0.018	0	5329
5333	2	3	1	-0.394	-0.977	-0.077				-0.334	0	0.031	-0.650	0	0.515	0	-1.456	0	0	0	0.253							0	**2.493**	0							-0.906	0.245	0	0.066	**3.247**	0	5333
5338	3	2	1	0.172	-0.038	-0.811				0.176	0	0.279																									0.080	0.925	0	0.710	0.563	0	5338
5342	2	1	3	0.314	0.058	0.583				0.750	0	0.626	0.296	0	0.329				0	0	1.073															-0.584	-0.299	0	-0.321	0.295	0	5342
5352	2	3	1	-1.032	-0.857	-1.251				-0.526	0	0.279	**-3.894**	0	**-3.856**	0	0.845	0	0	0	-0.976				0	**-2.875**	0									-0.499	1.401	0	-0.385	1.682	0	5352
5494	3	1	2	0.385	-0.833	0.290										0	0.177	0																		-0.134	0.585	0	0.323	-0.600	0	5494
5523	2	1	3	-0.182	-0.447	0.583				-0.398	0	0.279	-1.529	0	**-2.368**	0	-1.085	0	0	0	-0.703	-1.541	0	-0.341	0	-1.543	0	0	0.175	0							**4.000**	**4.000**			**4.000**	0	5523
5545	2	3	1							-0.526	0	-0.069				0	-0.231	0	0	0																**2.137**	0.449	0		0.161	0	5545
5553	1	2	3	1.093	-0.110	0.656				1.133	0	0.130	-1.529	0	-0.880	0	**2.145**	0	0	0	0.868				0	1.788	0															5553
5615	2	1	3	-1.528	1.311	-0.224				-0.908	0	-0.267		0	-0.648	0	0.289	0	0	0	-1.454				0	-0.150	0	0	0.446	0							**2.244**	0.109	0	**-4.000**	0.071	0	5615
5701	2	3	1	-0.394	-0.495	0.656																																				5701
5774	1	2	3																																	0.573	0.789	0	-0.514	1.547	0	5774
5801	3	1	2	**-2.519**	-1.579	**-2.718**										0	-0.899	0																		-1.141	**-3.972**	0	**-4.000**	**-2.389**	0	5801
5808	2	1	3	**2.155**	0.179	0.070							0.566	0	-1.020	0	**-2.607**	0																			-0.177	0.109	0		-0.108	0	5808
5883	2	1	3	-0.111	-0.182	-0.371				0.112	0	-1.507	-0.448	0	0.701	0	0.400	0	0	0	0.322				0	-1.058	0									-1.120	-0.843	0	1.161	-0.958	0	5883
5933	2	3	1																																	0.922	-0.262	0.043	0	0.496	0				5933
5950	2	1	3	-1.315	-0.471	-0.517		-0.101		-0.015	0	0.080	-0.110	0	0.143	0	-0.528	0	0	0	-0.498	0.299	0	-0.183	0	-0.090	0	0	0.252	0	-0.033	0.799	-0.701	0	1.939	0	-0.284	0.381	0	1.032	1.458	0	5950
5993	1	2	3																																								5993
6109	3	2	1	-0.040	0.010	-0.004							-1.934	0	-0.462	0	0.585	0				0.242	0					0	-0.057	0							-0.691	0.653	0	1.161	1.413	0	6109
6175	2	3	1	-1.528	-0.736	-1.324				**-3.587**	0	**-3.839**																									0.101	1.265	0	0.774	0.742	0	6175
6180	3	1	2	-1.386	-0.712	-1.618				-0.653	0	0.031	-0.785	0	-0.136	0	**-2.347**	0	0	0	-0.225				0	-1.058	0									-0.049	0.585	0	0.903	0.921	0	6180
6224	3	1	2	1.376	1.696	1.463										0	0.326	0																								6224
6232	1	2	3	0.328	-0.486	0.246				-1.457	0	-0.857																																6232
6253	3	1	2	0.456	-0.809	-0.151				1.005	0	0.378	**-2.475**	0	-0.462	0	0.697	0	0	0	0.868							0	-0.636	0							**2.373**	0.517	0	**-4.000**	0.295	0	6253
6258	2	1	3	1.704	**2.549**	1.538		**2.167**																																0.484	0.188	0	6258
6343	1	3	2	0.243	-0.688	-0.884				0.495	0	0.279	0.634	0	0.654	0	-0.454	0	0	0	0.049				0	1.303	0	0	1.025	0					-1.334	-0.163	0	0.001	-0.108	0	6343
6352	3	1	2	-1.032	-0.110	-1.324				-1.929	0	-1.011	-0.110	0	-0.555	0	-1.011	0	0		0.868				0	-0.937	0									**2.373**		0	**-4.000**	0.876	0	6352
6368	2	1	3	-0.579	-0.428	0.671				-0.181	0	0.085	-0.339	0	0.998				0	0	0.185	0.040	0	0.221							-0.801	-0.304	-0.021	0	0.238	0	-0.192	0.653	0	0.465	-0.416	0	6368
6456	1	2	3	-0.182	-0.784	-1.104				0.495	0	0.279	-0.448	0	-0.462	0	-0.974	0	0	0	0.185				0	1.424	0	0	0.986	0					-0.713	-0.163	0	0.195	-0.332	0	6456
6490	3	1	2	0.951	-0.520	0.583				1.197	0	0.328				0	-0.268	0	0	0	0.663							0	-0.289	0							-0.070	0.109	0	1.483	0.653	0	6490
6594	2	1	3																																								6594
6647	3	2	1	-1.669	-0.833	0.583								0																						**-2.063**	-1.251	0	-0.256	-1.808	0	6647
6658	1	3	2																																								6658
6686	2	3	1							0.049	0	1.073	-0.177	0	0.654				0	0	0.253					0.274	0				-0.033	0.614	0.501	0	-0.222	0	-1.570	0.109	0	-0.063	-0.108	0	6686
6728	1	3	2	**-4.000**	-0.592	0.656				-1.546			**-4.000**	0	0.747					0																								6728
6762	1	3	2	1.801	-0.592	1.610				1.069	0	1.569	0.972	0	1.166																												6762
6885	3	1	2	0.597	0.347	0.510				-0.015	0	0.626				0	-0.602	0	0	0	0.595							0	0.639	0								0.789	0	0.968	-0.466	0	6885
6944	1	3	2											0	**-2.786**							0.184	0	-1.929							-1.201	-0.978	**-2.780**	0	**-4.000**	0	-0.927	-0.639	0	0.259	**-2.031**	0	6944
6958	2	1	3	-0.607	-0.303	-1.544				**4.000**	0	-0.416				0	-0.194	0																			**2.415**	-1.387	0		-1.584	0	6958

Lab no.	Vial	Aerobic microorganisms 30 °C			Psychrotroph. micro-organisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive Staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-red. bacteria			Aerobic m.o. in fish products 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
6971	1 2 3	-4.000	1.624	-1.031				-0.462	0	-3.690				0	-0.714	0																								6971
7182	2 3 1	-0.394	1.238	-0.004				-0.526	0	-0.465	1.039	0	-1.578							0.472		1.596													2.480	0.313	0	-3.026	-0.466	0	7182
7207	3 2 1	0.031	2.178	0.803				-1.418	0	-2.202				0	0.808	0				0.184	0														-0.541	0.245	0	1.612	0.116	0	7207
7232	1 2 3	0.243	-0.712	-0.957																														-0.134	0.449	0	0.323	-1.271	0	7232
7242	3 1 2																																						7242
7248	3 2 1	0.810	-1.049	-0.811				1.452	0	0.031	1.377	0	0.329	0	0.177	0	0	0	0.253	0.817		0.485	0	-0.090	0	0	-0.829	0	1.179	0.522	0.039				2.501	-1.387	0		-0.242	0	7248
7253	1 2 3	0.031	-1.411	-0.151					0	0.874	2.594	0	-0.322	0	-1.345	0	0	0	-0.361				0	-3.359	0									-0.627	-0.707	0	-0.127	-0.287	0	7253
7282	2 3 1	-1.103	-0.062	2.124				-1.992	0	-1.606	-3.556	0	-3.112	0	-0.083	0	0	0	1.483															0.209	0.245	0	0.001	-0.018	0	7282
7296	3 2 1	0.597	-0.520	-4.000																														1.173	0.721	0	-0.127	2.889	0	7296
7330	1 3 2	-0.040	-0.062	0.950				-2.439	0	-0.565	-1.799	0	-1.392	0	-0.083	0	0	0	1.961															-0.284	0.041	0	0.195	-1.316	0	7330
7334	2 1 3	-1.882	-3.337	0.363								0					0	0	0.253							0	-2.529	0								-2.816	0		-1.181	0	7334
7438	3 2 1	-0.324	-0.351	-0.811				-0.717	0	-1.706	-1.867	0	-1.903				0	0	-0.771				0	-4.000	0	0	-2.761	0							-0.841	-0.775	0	-0.063	-0.421	0	7438
7564	3 2 1													0	0.400	0	0	0	0.663	0.012	0	0.199	0	0.334	0	0	-0.134	0	-1.874	0.384	0.686	0	-1.547	0	-0.156	0.517	0	0.517	0.742	0	7564
7617	2 3 1	-0.614	-0.724	-0.581							0.143	0	0.146				0	0	-4.000																					7617
7627	1 3 2	0.385	0.757	1.023										0	1.105	0										0	0.175	0							-0.327	-1.524	0	-0.063	0.116	0	7627
7688	3 2 1	0.810	-0.423	0.143		0.308		0.304	0	0.279	-0.110	0	0.654	0	-0.491	0	0	0	1.073	0.012	0	-0.087	0	0.334	0	0	0.021	0							-0.134	1.129	0	0.968	-0.421	0	7688
7728	2 3 1	1.022	0.010	1.537							1.242	0	-1.671	0	0.400	0	0	0	0.322				0	-1.119	0	0	-0.868	0							-0.541	-0.367	0	0.388	-1.584	0	7728
7750	2 3 1	-2.803	-0.086	-0.444				-0.334	0	-0.019				0	-0.677	0				1.104	0															-0.775	0	-0.707	-0.466	0	7750
7825	1 3 2	0.526	0.598	1.111				1.700	0	-0.376	0.614	0	1.454				0	0	1.578	0.052		0.281													-0.149	-0.633	0	-2.092	0.134	0	7825
7876	1 2 3	1.235	0.853	-1.177				-0.653	0		-0.042	0		0	-0.306	0	0	0	-0.498				0	-0.513	0										0.016	0.041	0	0.646	1.055	0	7876
7877	1 3 2	0.456		0.877				-0.015		0.825				0																									7877
7930	2 1 3	0.951	-0.279	1.537				1.005	0	0.428	1.445	0	2.700	0	0.697	0	0	0	0.732					0.334	0										0.166	0.109	0	0.001	-0.600	0	7930
7940	2 3 1	1.093	-0.712	0.583																																			7940
7946	1 3 2	-0.607	1.600	0.510		-0.620		0.750	0	2.462	0.364	0	1.119	0	0.660	0	0	0	0.663	-0.506	0		0	0.213	0		0.677		-4.000	-1.993	-4.000		-0.339		0.766	-0.231		-1.287	-0.018	0	7946
7962	3 2 1	0.243	-0.375	0.730				1.834	0	-0.366	1.445	0	1.073	0	-1.345	0	0	0	0.322	-2.173		0.612													-0.841	-1.115	0		1.547		7962
7968	1 3 2	-1.032	-0.255	-0.444				0.049	0	-0.614	-1.326	0	1.026	0	0.585	0	0	0	-0.703	-2.116	0	-1.929	0	-0.271	0	0	-0.443	0					0	0.568	0	0.209	0.653	0	-0.127	0.742	0	7968
8066	1 3 2										-0.650	0	0.282	0	-1.753	0	0	0	-2.001										-1.156	-1.139	-1.163	0	0.312	0							8066
8068	3 1 2	0.526	-0.351	-0.811				0.367	0	-0.465	1.175	0	1.445	0	0.289	0	0	0	0.322	0.587		1.215	0	-0.150	0	0	-0.250	0							-0.649	-0.027	0	0.130		0	8068
8105	2 3 1	1.022	1.383	1.904							2.526	0	1.445				0	0	0.868																4.000	4.000	0	4.000	4.000	0	8105
8252	2 1 3	0.810	1.359	-0.004				0.240	0	-0.465	0.228	0	-0.462	0	0.029	0	0	0	0.253																					8252
8260	2 3 1	-1.953	-0.616	-0.884				-0.526	0	-0.465	-0.312	0	-0.090	0	-0.714	0	0	0					0	-1.301	0	0	-0.289	0							0.016	-3.700	0	-0.192	-0.108	0	8260
8313	3 2 1	-0.756	0.465	-0.209				-0.047	0	-0.778	-0.495	0	-0.299	0	-0.684	0	0	0	0.404				0	0.522	0										-0.404	0.116	0	0.162	0.832	0	8313
8333	1 3 2	-0.040	0.444	-0.077				-0.270	0	-0.416	-0.921	0	-0.973	0	0.251	0	0	0		-0.218	0					0	0.368	0							0.016	0.517	0	1.612	0.429	0	8333
8397	3 1 2	-2.661	1.287	0.583				-0.334	0	0.080	-0.921	0	0.422	0	-0.120	0	0	0	-1.249	0.012	0	-0.595													-0.070	-0.027	0	-0.643	-4.000	0	8397
8430	1 3 2	2.085	0.733	2.344				2.217	0	1.073	1.918	0	0.933				0	0	0.732																0.101	0.381	0	-0.256	0.742	0	8430
8435	2 1 3	0.640	-0.626	-0.708				0.559	0	-1.597	0.364	0	0.491	0	-0.406	0	0	0	0.090				0		0	0	-2.301	0	0.919	0.116	0.695	0	0.561	0							8435
8523	1 2 3	0.385	-0.568	0.730				1.069	0	-0.862							0	0	1.141																0.401	0.721	0	0.066	-0.108	0	8523
8528	3 2 1	-4.000	-1.073	-4.000				-2.821	0	-0.515																									-0.927	-2.884	0	-0.450	-0.063	0	8528
8529	1 3 2	-0.182	0.372	1.463				1.005	0	0.924	0.701	0	0.515	0	2.330	0	0	0	-2.342	-0.046	0	1.247	0	0.758	0	0	1.025	0							-0.070	-1.932	0	-1.158	0.295	0	8529
8568	3 1 2	0.456	0.492	-0.444				-0.334	0	1.073	-0.650	0	-0.834	0	-0.417	0				1.621	0					0	0.175	0							-1.356	-0.299	0	-0.192	0.161	0	8568
8626	1 3 2	0.880	2.467	1.023				1.388	0	1.271	-1.056	0	-3.251																1.269	-0.355	1.887										8626
8628	1 3 2	-0.961	-0.539	-0.811				-1.457	0	-4.000	0.195	0	0.710	0	0.552	0		0	0.315	-0.276	0	-0.459	0	0.431	0	0	0.380	0	-1.263	-0.286	-0.733	0	-0.387	0	0.097	-0.197	0	1.805	0.053	0	8628
8657	1 2 3	0.810	1.190	-0.444				-0.717	0	-1.904																									-0.220	-2.476	0	0.646	0.832	0	8657
8734	3 1 2	-0.182	1.816	-0.077				-2.184	0	0.676										-0.046		-0.595																		8734
8742	2 3 1	0.172	-0.520	-0.224				-1.482	0	-0.019	3.134	0	-1.671	0	-1.419	0	0	0	1.005	0.472		2.295	0	-4.000	0	0	0.252	0							0.466	-0.911	0	-0.643	-0.242	0	8742
8756	2 3 1	-1.528	2.009	0.070				0.495	0	1.420	-0.921	0	-0.136	0	-1.011	0	0		-1.318															0.466	-0.027	0	-1.416	-1.226	0	8756
8766	3 1 2	-0.182	0.131	-0.077				-0.270	0	-0.813	0.026	0	0.747	0	-0.268	0	0	0	0.049				0	-0.998	0										0.144	-0.571	0	0.517	-0.153	0	8766
8891	2 1 3	0.314	-1.146	-0.517				1.005	0	0.874		0	0.515	0	-0.528	0	0	0	0.663																-0.627	1.333	0	-0.450	-0.332	0	8891
8909	3 1 2	0.668	-0.495	-0.371				-0.334	0	-0.118	-1.259	0	-0.462	0	-0.714	0	0	0	0.868																-0.070	1.197	0	-0.192	0.429	0	8909
8918	3 1 2	-0.465	1.311	0.216				0.112	0	-0.317	-0.921	0	-0.136	0	-1.679	0	0	0	-0.635				0	-0.574	0	0	0.175	0							-0.242	1.401	0	0.517	0.205	0	8918
8955	1 3 2	-1.528	-0.375	-0.957				-0.653	0	0.527	-0.177	0	0.608	0	0.029	0	0	0	1.210	1.621	0	0.389	0	1.727	0	0	0.639	0	-1.156	-1.855	-2.272	0	0.963	0	-0.327	-0.707	0	-0.127	-0.108	0	8955
9002	2 3 1	4.000	1.263	-4.000				4.000			4.000			0				0								0										-4.000			4.000			9002
9034	1 3 2	1.235	-1.073	1.390		-0.674		1.005	0	0.180	0.701	0	0.282																											9034
9078	3 2 1	0.597	0.347	0.216				0.049	0	-0.168																														9078
9217	3 2 1	-0.182	0.372	-0.077				0.367	0	0.180	0.026	0	-0.648	0	0.474	0		0	-0.635	-0.621	0	-0.595													0.359	0.109	0	0.517	-0.153	0	9217
9408	3 2 1	-4.000	1.354	0.590						0.338			0.310			0	0	0	-0.580									0	0.879	0.321	0.247			0							9408
9429	1 3 2	-0.394	-0.351	0.436										0	1.142	0							0	-1.603	0	0	-0.018	0							0.101	0.653	0	0.195	0.295	0	9429
9436	2 1 3	0.739	0.083	0.070		0.144		0.112	0	0.775	-0.245	0	0.422	0	1.402	0	0	0	-0.361	0.932	0	0.103	0	2.090	0	0	1.914	0							0.016	-0.299	0	1.418	1.279	0	9436
9441	1 3 2					-0.320								0	0.140	0				0.242		0.675	0	0.819	0	0	0.716	0	0.147	-0.147	-0.608	0		0	2.415	1.333	0	0.517	0.071	0	9441
9453	1 2 3	0.314	-1.435	-0.371				-0.015	0	-0.416				0	2.293	0	0	0	0.732																0.380	1.129	0	-0.127	-0.421	0	9453
9512	1 2 3	-1.740	-2.205	-1.911				-0.908	0	-0.069										-1.368	0	-0.437													-0.220	-1.115	0		-0.421	0	9512

Lab no.	Vial	Aerobic microorganisms 30 °C			Psychrotroph. micro-organisms			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase-positive Staphylococci			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite-red. bacteria			Aerobic m.o. in fish products 20-25 °C			H_2S-prod. bacteria in fish products			Yeasts			Moulds			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	A	B	C	A	B	C	A	B	C	
9555	3 1 2	-0.890	-0.568	-1.471				-1.163	0	-1.011	-0.921	0	-1.252	0	-0.454	0	0	0	**-2.410**																	-0.327	0.381	0	-0.385	-1.226	0	**9555**
9559	1 3 2	0.526	-0.929	-0.884				**-2.949**	0	-1.656	**-4.000**	0	0.329	0	0.326	0	0		0.868	-0.276		0.993				0	-0.211	0							-1.013	-0.503	0	-1.802	-1.092	0	**9559**
9662	2 3 1	0.172	-0.495	-0.224				0.049	0	0.279	-0.312	0	-0.229	0	1.068	0	0	0	0.527	**-2.116**	0	-1.770	0	-0.877	0	0	-0.250	0							-0.477	0.517	0	0.839	0.071	0	**9662**
9747	3 1 2	-1.386	-1.314	-1.398				**-4.000**	0	**-4.000**				0	-0.454	0																			-0.413	-1.387	0	**-2.189**	-1.942	0	**9747**
9763	1 2 3	-0.253	-0.471	-0.517					0	-1.507		0	-1.996	0	0.548	0	0	0	0.595				0	-1.119	0	0	-0.636	0								-0.163	0	1.354	1.145	0	**9763**
9783	2 3 1	1.128	-0.927	1.192																															-0.160	-0.476	0	0.420	0.304	0	**9783**
9853	3 2 1	-1.669	0.275	-1.691				-1.036	0	-1.706							0	0	**-2.069**																**2.523**	-0.435	0		0.474	0	**9853**
9886	3 2 1																																							**9886**
9890	2 3 1	-0.324	0.203	-1.104				-0.207	0	0.328	0.026	0	0.236	0	0.474	0	0	0	-0.566	0.587		-0.214													-0.284	0.653	0	-0.707	-1.539	0	**9890**
9903	2 1 3	0.526	-0.351	-0.077				0.367	0	**-2.797**	0.701	0	-0.183	0	0.845	0	0	0	**-2.683**				0	0.213	0										-0.499	0.789	0	-0.772	0.742	0	**9903**
9950	2 1 3	-1.882	-0.014	**-3.231**										0	-1.308	0				-1.253	0	-0.691				0		0							**4.000**	1.537		0.839	0.832	0	**9950**

The results are not evaluated

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 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: www2.slv.se/absint

The National Food Agency's reference material

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

More information is available on our website: www.livsmedelsverket.se/en/RM-micro