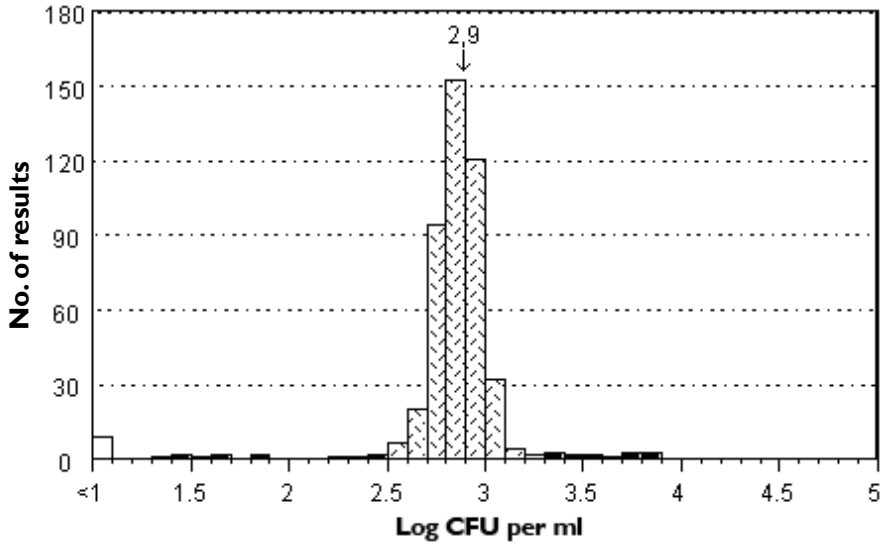
Rapport 8 – 2012

Proficiency testing

Food Microbiology

– April 2012

by Laurence Nachin, Christina Normark, Irina Boriak and Ingela Tillander



LIVSMEDELS VERKET
NATIONAL FOOD AGENCY, Sweden

Proficiency Testing

Microbiology – Food

April 2012

Laurence Nachin, Christina Normark, Irina Boriak and *Ingela Tillander*

Microbiology Division
National Food Agency
Box 622
SE-751 26 UPPSALA
SWEDEN

Uppsala 2012

SWEDAC ACKREDITERING
1457
ISO/IEC 17043

Edition

Version 1 (2012-06-18)

Editor in chief

Annika Rimland, Head of Science Department, National Food Agency

Responsible for the scheme

Christina Normark, Microbiologist, Microbiology Division, National Food Agency

Contents

Abbreviations

Media

DG 18	Dichloran Glycerol agar
DRBC	Dichloran Rose-Bengal Chloramphenicol agar
MPCA	Milk Plate Count Agar
MRS	de Man-Rogosa-Sharpe agar
MRS-aB	de Man-Rogosa-Sharpe agar with amphotericin
PCA	Plate Count Agar
TSA	Trypticase Soy Agar
TGE	Tryptone Glucose Extract agar

Organisations

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

Introduction

All analytical activities require the execution of 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 examined by a number of laboratories. The laboratories must follow instructions, perform analyses on the samples provided and report their results to the organiser. They are also expected to use their routine methods to analyse the samples provided. The organiser subsequently evaluates the results using statistical tools and finally compiles them in a report.

Benefits of the National Food Agency's proficiency tests

1. Laboratories are externally evaluated with respect to their analytical competence, including usage of methods, documentation and orderliness.
2. Accreditation bodies are provided with a tool for inspections regarding new accreditation or maintenance of accreditation.
3. Laboratories and the organiser improve their knowledge of the efficiency of analytical methods used routinely by participating laboratories with respect to various types of organisms.

Design and analyses

The proficiency testing reported in this document was performed during April 2012 and is registered as no. 867/2012 at the National Food Agency, Uppsala.

Quantitative analyses performed

Aerobic microorganisms, 30 ºC
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 °C
Hydrogen sulphide-producing bacteria in fish products
Yeasts
Moulds

Test material

Each laboratory received three freeze-dried microbial mixtures designated A-C.

The manufactured test material was freeze-dried in portions of 0.5 ml in vials, as described by Peterz and Steneryd (1). Each laboratory received one vial of each mixture. Before analysing the samples, the contents of each vial had to be dissolved in 254 ml of diluent. The organisms present in the mixtures are listed in Table 1.

Table 1. *Microorganisms present in mixture A-C supplied to test laboratories*

Mixture [1]	Microorganism	Strain no.
A	*Pseudomonas aeruginosa*	SLV-395
	Escherichia coli	SLV-085
	Bacillus weihenstephanensis	SLV-563
	Lactobacillus plantarum	SLV- 475
	Clostridium perfringens	SLV-442
	Candida glabrata	SLV-052
B	*Brochotrix thermosphacta*	SLV-220
	Enterococcus hirae	SLV-536
	Shewanella putrefaciens	SLV-520
	Hanseniaspora uvarum	SLV-555
C	*Escherichia coli*	SLV-477
	Serratia marcesens	SLV-040
	Staphylococcus aureus	SLV-185
	Aspergillus flavus	SLV-480
	Penicillium roqueforti	SLV-510

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

Quality control of the mixtures

It is essential to have a homogeneous mixture and a uniform volume in all vials in order to allow comparison of all freeze-dried samples derived from one mixture. Quality control was performed in conjunction with manufacture of the mixtures according to Scheme Protocol (2). The results are presented in Table 2.

The standard deviations for the mixtures analysed ranged from 0.03 to 0.13 $\log_{10}$ units. Homogeneity requires that the standard deviation and the difference between the highest and lowest value of results from 10 samples analysed do not exceed 0.15 $\log_{10}$ units and 0.5 $\log_{10}$ units, respectively.

Table 2. *Concentration mean (m) and standard deviation (s) from analyses of 10 randomly selected vials per mixture, expressed in $\log_{10}$ cfu (colony forming units) per ml of sample.*

Analysis and method	A		B		C	
	m	**s**	**m**	**s**	**m**	**s**
Aerobic microorganisms, 30 ºC NMKL method no. 86	4.5	0.05	4.4	0.06	5.2	0.04
Enterobacteriaceae NMKL method no. 144	3.8	0.03	–	–	4.7	0.05
Escherichia coli NMKL method no. 125	3.9	0.05	–	–	4.3	0.05
Presumptive *Bacillus cereus* NMKL method no. 67	3.3	0.05	–	–	–	–
Coagulase-positive staphylococci NMKL method no. 66	–	–	–	–	5.0	0.05
Lactic acid bacteria NMKL method no. 140	3.9	0.04	4.3	0.04	–	–
Clostridium perfringens NMKL method no. 95	3.1	0.04	–	–	–	–
Anaerobic sulphite-reducing bacteria NMKL method no. 56	3.5	0.09	–	–	–	–
Aerobic microorganisms in fish products NMKL method no. 184, JA	4.5	0.10	4.6	0.12	5.3	0.04
H_2S-producing bacteria in fish products NMKL method no 184, JA	–	–	4.2	0.13		
Yeasts NMKL method no. 98, DRBC	3.6	0.04	3.6	0.06	–	–
Moulds NMKL method no. 98, DRBC	–	–	–	–	4.1	0.10

– = No target organism

Laboratory results

General information regarding the results

Samples were sent to 187 laboratories, 44 of which were in Sweden, 128 in other European countries and 15 outside Europe.

For the 184 laboratories that reported results, 97 laboratories (53%) provided at least one analytical result that received an annotation. In the previous round (April 2011), which comprised similar analyses, the proportion was 58%. In general, rounds including analyses of yeasts and moulds cause more results with annotation than other rounds.

Highly deviating values that did not belong to a strictly normal distribution were identified as statistical outliers and are illustrated by black bars in the histograms. They appeared in most analyses. The statistical tool Grubbs' test as modified by Kelly (3) was used to identify outliers. The method is objective in theory, but in order to obtain correct outliers the results have to be normally distributed. In some cases, subjective adjustments were made to set the right limits, based on knowledge of the mixture's contents. The number of false results and outliers obtained by each laboratory are presented below the box plots (Figure 5). False results and outliers were not included in the calculations of means and standard deviations. Results reported as ">value" could not be evaluated statistically and were hence excluded from the evaluation. Results reported as "<value" were interpreted as being zero (negative result). All reported results are presented in Appendix 1.

Description of mixture A

Mixture A contained *Escherichia coli, Pseudomonas aeruginosa, Bacillus weihenstephanensis, Lactobacillus plantarum, Clostridium perfringens* and *Candida glabrata*.

The results obtained did not reveal any major difficulties in the analyses of this mixture. For each analysis, the results are quite well distributed, with a small dispersion (Table 3 and Figure 1).

Analysis of Enterobacteriaceae and E. coli

Escherichia coli was the target organism for both the analysis of Enterobacteriaceae and of *E. coli*. Hence, the majority of the laboratories reported similar results for these analyses. However, mixture A also contained *Pseudomonas aeruginosa*, which is a gram-negative but oxidase-positive bacteria and therefore does not belong to the Enterobacteriaceae. Its presence in the mixture could explain the high outlier results for analysis of Enterobacteriaceae obtained by some laboratories.

Analysis of presumptive B. cereus

Although mixture A did not contain a strain of *B. cereus*, a positive result is correct for the analysis of presumptive *B. cereus*. The mixture contained *B. weihenstephanensis*, which is not distinguished from *B. cereus* (or *B. thuringensis*) by methods ISO 7932 and NMKL 67. All three species give a haemolytic zone on blood agar and a lecitinase reaction on egg yolk medium. More, none of these species produces acid from mannitol.

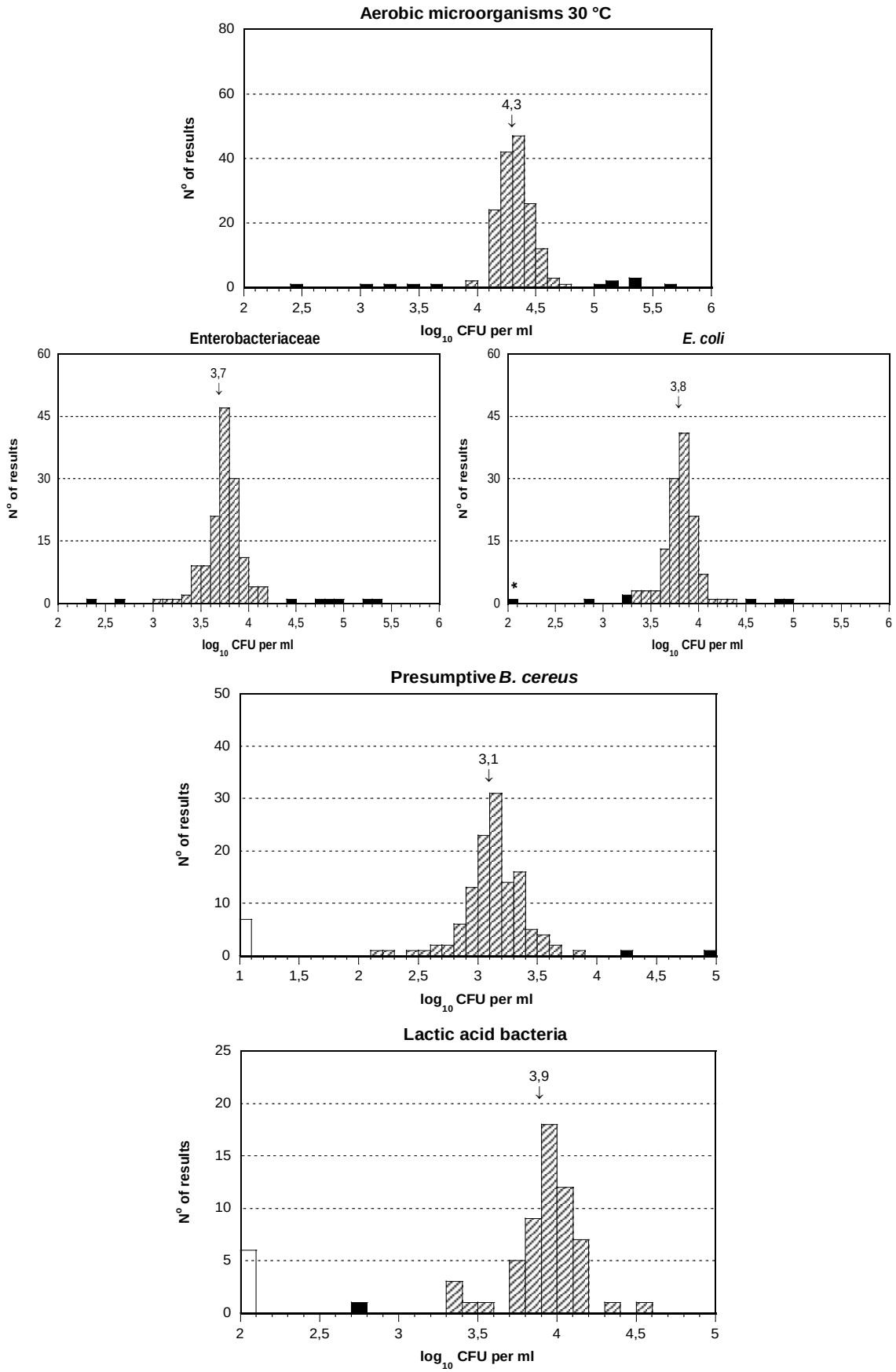
Analysis of C. perfringens and anaerobic sulphite-reducing bacteria

There is a good correlation between the results of these two analyses, as *C. perfringens* was the microorganism detected in both cases. Low outlier results were obtained for both analyses, by the same laboratories (3 cases) or by laboratories that performed only one analysis. Examination of the method and/or medium employed for these analyses did not reveal any obvious cause for these low values.

Table 3. *Outcome of each analysis for mixture A*

Analysis	**Organism**	**m**[1]	**s**[2]	**F+**	**F−**	**Outl<**	**Outl>**	**n**[3]
Aerobic microorgs, 30 ºC	*E. coli* *P. aeruginosa*	4.31	0.12	0	0	5	7	169
Enterobacteriaceae	*E. coli*	3.73	0.17	0	0	2	6	148
Escherichia coli	*E. coli*	3.80	0.16	0	0	4	3	131
Presumptive *B. cereus*	*B. weihenstephanensis*	3.12	0.25	0	7	0	2	132
Coagulase pos. staph.	–	–	–	0	0	0	0	119
Lactic acid bacteria	*L. plantarum*	3.92	0.21	0	6	1	0	65
Clostridium perfringens	*C. perfringens*	3.36	0.18	0	0	6	1	70
Anaerobic sulph.-red. bact.	*C. perfringens*	3.32	0.22	0	0	6	0	75
Aerobic microorgs in fish prod.	*E. coli* *P. aeruginosa*	4.20	0.13	0	0	0	0	23
H_2S-prod. bact. in fish prod.	–	–	–	0	0	0	0	21
Yeasts	*C. glabrata*	3.59	0.14	0	2	6	3	152
Moulds	–	–	–	3	0	0	0	148

[1]Mean value of all laboratory results expressed in $\log_{10}$ cfu/ml (Appendix 1)
[2]Standard deviation of all laboratory results (Appendix 1)
F+ and F- = numbers of false positive and false negative results, respectively.
Outl < and Outl> = number of low and high outliers, respectively.
[3]Number of analyses performed
– = No target organism


Aerobic microorganisms 30 °C
N° of results
log10 CFU per ml
4,3
Enterobacteriaceae
3,7
E. coli
3,8
*
Presumptive B. cereus
3,1
Lactic acid bacteria
3,9

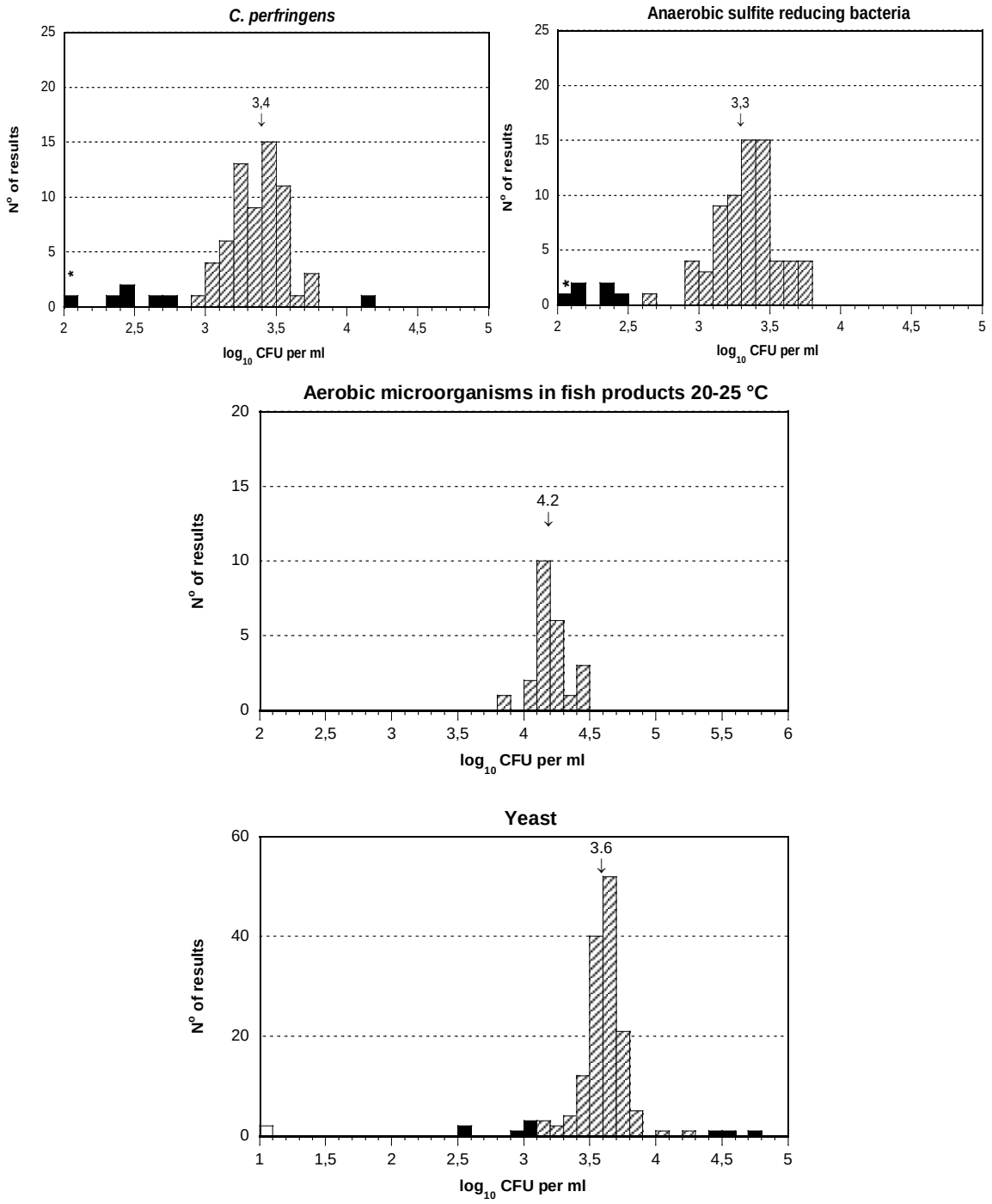


Figure 1. *Histograms of all analytical results obtained for the mixture A.* ▨ *values within the interval of acceptance (Appendix 1),* ■ *outliers,* □ *false negative results, * outliers outside of the x-axis scale. The mean value of the analysis results is indicated in the histograms.*

Description of mixture B

Mixture B contained *Brochotrix thermosphacta, Shewanella putrefaciens, Enterococcus hirae* and *Hanseniaspora uvarum*.

Table 4. *Outcome of each analysis for mixture B*

Analysis	Organism	m[1]	s[2]	F+	F−	Outl<	Outl>	n[3]
Aerobic microorgs, 30 ºC	*B. thermosphacta* *S. putrefaciens* *E. hirae*	4.43	0.31	0	1	3	3	169
Enterobacteriaceae	–	–	–	2	0	0	0	147
Escherichia coli	–	–	–	0	0	0	0	130
Presumptive *B. cereus*	–	–	–	1	0	0	0	132
Coagulase-pos. staph.	–	–	–	1	0	0	0	120
Lactic acid bacteria	*E. hirae*	4.21	0.09	0	17	4	5	64
Clostridium perfringens	–	–	–	0	0	0	0	71
Anaerobic sulph.-red. bact.	–	–	–	1	0	0	0	76
Aerobic microorgs in fish prod.	*B. thermosphacta* *S. putrefaciens* *E. hirae*	4.67	0.33	0	0	0	0	23
H_2S-prod. bact. in fish prod.	*S. putrefaciens*	3.61	0.32	0	0	0	0	22
Yeasts	*H. uvarum*	3.32	0.13	0	6	6	2	150
Moulds	–	–	–	3	0	0	0	148

[1]Mean value of all laboratory results expressed in $\log_{10}$ cfu/ml (Appendix 1)
[2]Standard deviation of all laboratory results (Appendix 1)
F+ and F- = numbers of false positive and false negative results, respectively.
Outl < and Outl> = number of low and high outliers, respectively.
[3]Number of analyses performed
– = No target organism

Analysis of aerobic microorganisms

The histogram presenting the results obtained for the analysis of aerobic microorganisms at 30 ºC revealed a major peak centred around the overall mean value of 4.4, but also a minor peak around 5.0 (Figure 2). Moreover, the results obtained for the analysis of aerobic microorganisms in fish products at 20-25 ºC showed a higher mean value of 4.7, even though theoretically the same microorganism should be detected in the two analyses. However, mixture B contained *B. thermosphacta*, which grows better at 20-25 ºC than at 30 ºC. *Brochotrix thermosphacta* was present at the highest concentration in the mixture and we therefore believe it is this strain that caused the tails of higher values seen in the analysis of aerobic microorganisms at 30 ºC. A correlation between these

high values and the method used is discussed later in this report, in the section "*Outcome of the method*".

Analysis of lactic acid bacteria

One in four of the laboratories that performed this analysis did not detect any lactic acid bacteria in mixture B, even though it contained *Enterococcus hirae*. According to NMKL method 140, *Carnobacterium*, *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Pediococcus* and *Weisella* are the most common lactic acid bacteria of food spoilage-associated genera, but this group also includes *Enterococcus*. The laboratories that reported negative results for the analysis probably did not interpret *Enterococcus* as being lactic acid bacteria.

Analysis of H_2S-producing bacteria in fish products

Only 22 laboratories performed this analysis. The standard deviation of the results is similar for the analysis of aerobic microorganisms at 30 ºC and aerobic microorganisms in fish products at 20-25 ºC. In this analysis, the microorganism detected was *S. putrefaciens*, which forms black colonies on iron agar. However, the high concentration of the background flora (10-fold) could impede accurate reading of the plates. More, colonies can bleach if the plates are not overlaid or are incubated at too high a temperature. The pH of the medium is also important, as the iron sulphide produced by *S. putrefaciens* from cysteine is acid-labile.

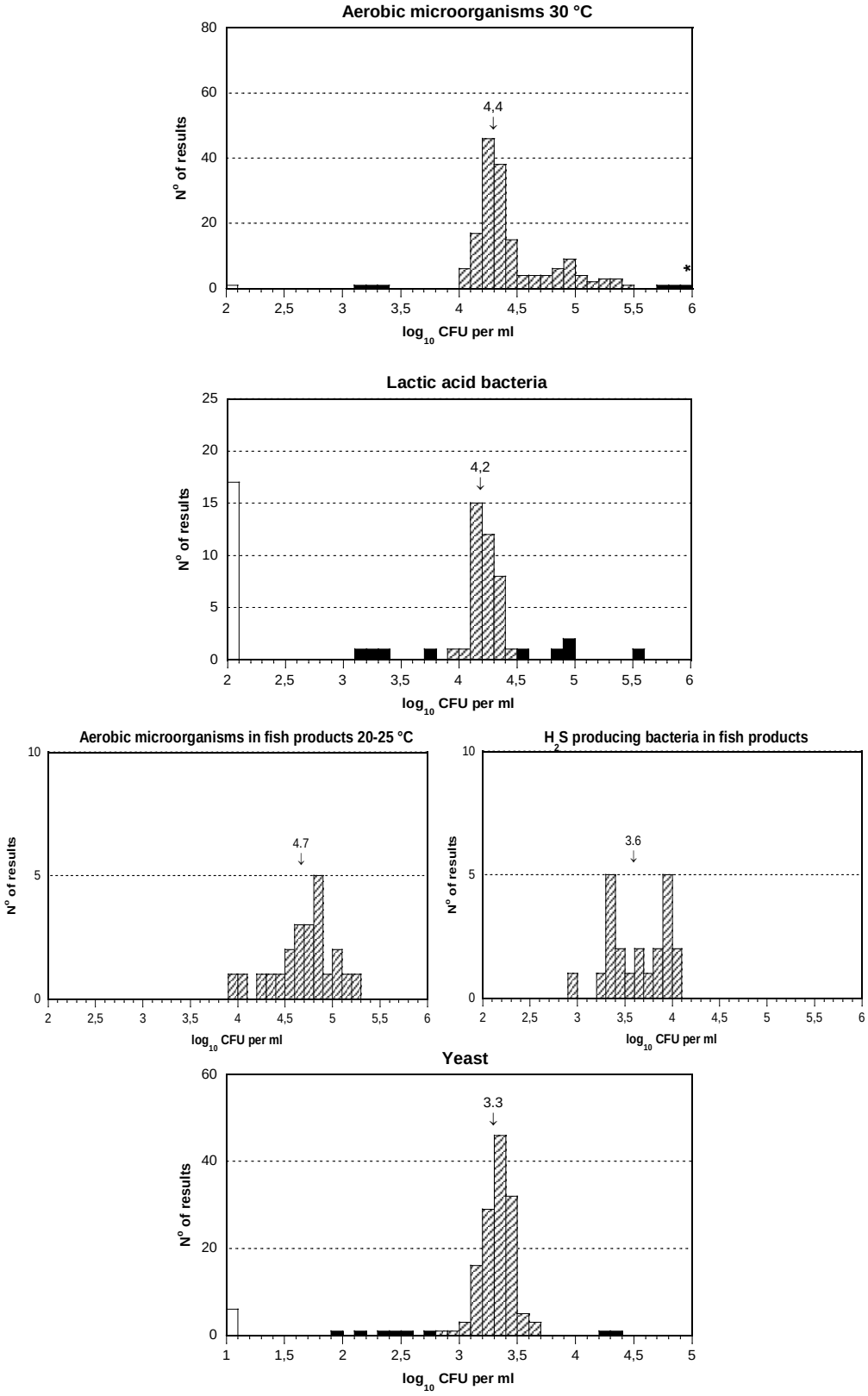


Figure 2. *Histograms of all analytical results obtained for mixture B. For details, see legend to Figure 1.*

Description of mixture C

Mixture C contained *Escherichia coli*, *Serratia marcesens*, *Staphylococcus aureus*, *Aspergillus flavus* and *Penicillium roqueforti*.

Table 5. *Outcome of each analysis for mixture C*

Analysis	Organism	m[1]	s[2]	F+	F−	Outl<	Outl>	n[3]
Aerobic microorgs, 30 ºC	*E. coli* *S. marcesens* *S. aureus*	5.18	0.24	0	0	3	3	169
Enterobacteriaceae	*E. coli* *S. marcesens*	4.50	0.14	0	0	4	5	148
Escherichia coli	*E. coli*	4.17	0.17	0	1	2	4	132
Presumptive *B. cereus*	–	–	–	10	0	0	0	131
Coagulase-pos. staph.	*S. aureus*	5.10	0.31	0	2	3	2	118
Lactic acid bacteria	–	–	–	16	0	0	0	63
Clostridium perfringens	–	–	–	0	0	0	0	71
Anaerobic sulph.-red. bact.	–	–	–	0	0	0	0	76
Aerobic microorgs in fish prod.	*E. coli* *S. marcesens* *S. aureus*	5.14	0.19	0	0	0	0	23
H_2S-prod. bact. in fish prod.	–	–	–	0	0	0	0	21
Yeasts	–	–	–	20	0	0	0	150
Moulds	*A. flavus* *P. roqueforti*	3.64	0.32	0	2	1	0	149

[1]Mean value of all laboratory results expressed in $\log_{10}$ cfu/ml (Appendix 1)
[2]Standard deviation of all laboratory results (Appendix 1)
F+ and F- = numbers of false positive and false negative results, respectively.
Outl < and Outl> = number of low and high outliers, respectively.
[3] Number of analyses performed
– = No target organism

Analysis of presumptive B. cereus

Ten laboratories reported the presence of presumptive *B. cereus* in mixture C, although it did not contain any, but rather a strain of *S. marcesens*. This bacterium could be misinterpreted, as it gives a positive lecitinase reaction on egg yolk medium. However on blood agar, *S. marcesens* forms atypical colonies without a haemolytic zone, which rules out the possibility of it being presumptive *B. cereus*.

Analysis of coagulase-positive staphylococci

The results obtained are widely spread, with $\log_{10}$ cfu values from 4.1 till 6.1. This distribution is reflected by a high standard deviation (0.31). The histogram reveals

two groups of results, at around 4.7 and 5.1 (Figure 3). However, investigation of the methods reported did not allow conclusions to be drawn on any correlation between the results obtained and the method and/or medium employed for this analysis.

Analysis of lactic acid bacteria

Surprisingly, 25% of the reported results indicated the presence of lactic acid bacteria. At the National Food Agency, none of the strains included in mixture C grew on MRS-aB medium, but both strains of *E. coli* and *S. aureus* formed colonies on MRS medium. The reference methods NMKL 140:2007 and ISO 15214:1998 indicate the use of MRS-aB and MRS, respectively.

Analysis of moulds

Mixture C contained *A. flavus* and *P. roqueforti*. The *A. flavus* concentration was 10-fold higher than the *P. roqueforti* concentration. On DG 18 and DRBC, *A. flavus* forms large green colonies, while colonies of *P. roqueforti* are lighter in colour, with a blue-green centre. The difficulty in reading plates containing these two moulds can partly explain the large dispersion in the results reported. Indeed, it could be difficult to count single colonies of *A. flavus* if the concentration on the plate is too high. More, because of the large size of its colonies, this mould can hide colonies of *P. roqueforti*. It should be therefore easier to count single colonies of *P. roqueforti* by looking at plates from underneath.

Finally, when analysing moulds, plates should be incubated in an upright position and should not be touched until reading to avoid spores disseminating and generating “new” colonies.

Analysis of yeasts

The mixture did not contain any yeast. Nevertheless, many laboratories reported the presence of yeast in the mixture.

At the National Food Agency, none of the bacteria present in the mixture grew on DG 18 or DRBC agar. More, the appearance of the two mould strains, *A. flavus* and *P. roqueforti*, on these media was unambiguous (see above). A less selective medium such as Sabouraud or malt extract agar could potentially support the growth of bacteria, which could be misinterpreted as yeast. However, the majority of the laboratories that reported false positive results actually used selective medium for their analyses. Another hypothesis to explain false positive results is the interpretation of *P. roqueforti* colonies as yeast colonies when reading the plate from underneath (see above).

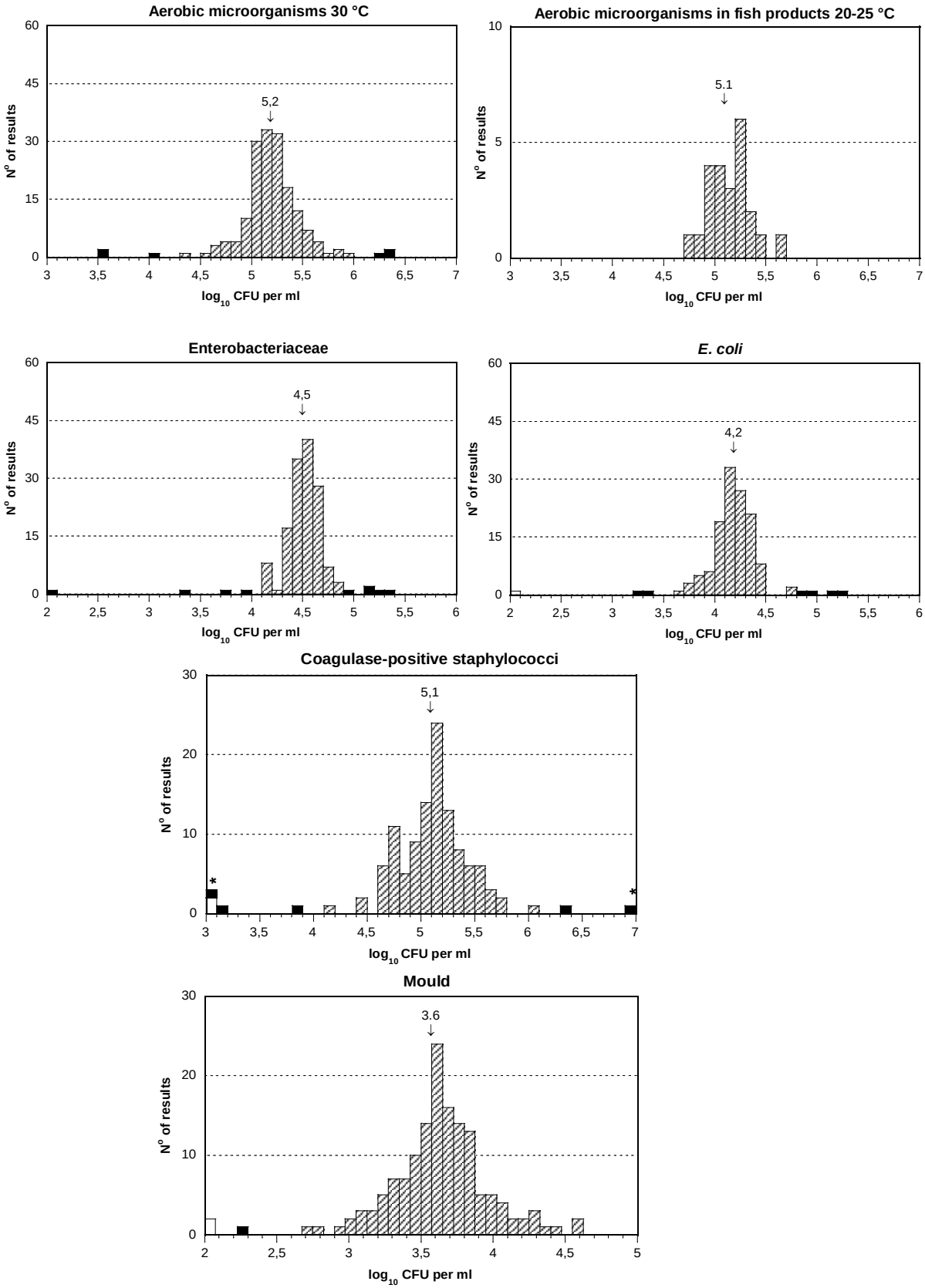


Figure 3. *Histograms of all analytical results obtained for mixture C. For details, see legend to Figure 1.*

Outcome of the methods

General comments

According to EN ISO/IEC 17043, for which the proficiency testing programme organised by the National Food Agency is accredited since early 2012, it is mandatory for the participating laboratories to give method information for all analyses for which they report results. However, the method information is sometimes difficult to interpret, e.g. many laboratories choose a medium that differs from that in the reported standard methods (Table 6).

Table 6. *Distribution of the methods used by the laboratories for each analysis.*

Analysis	n[1]	NMKL	ISO/IDF	Petrifilm™	Other	Several
Aerobic microorgs, 30 ºC	169	63	53	25	25	2
Enterobacteriaceae	148	82	29	20	13	4
Escherichia coli	132	44	27	42	19	0
Presumptive *B. cereus*	132	85	24	0	22	1
Coagulase-pos. staph.	120	60	33	13	12	2
Lactic acid bacteria	65	41	9	0	15	0
Clostridium perfringens	71	48	18	0	5	0
Anaerobic sulph.-red. bact.	76	49	16	0	11	0
Aerobic microorgs in fish prod.	23	23	0	0	0	0
H_2S-prod. bact. in fish prod.	22	22	0	0	0	0
Yeast	152	60	58	10	24	0
Mould	150	58	58	8	26	0

[1]Number of laboratories that supplied method information for the respective analyses

In the following, we focus on the analysis of total aerobic microorganisms at 30 ºC.

Analysis of aerobic microorganisms

Most of the participating laboratories (69%) used either the NMKL or ISO/IDF method for their analyses, but a substantial amount (15%) routinely used the Petrifilm™ method (Table 6). Looking at the results obtained with these three different methods, no obvious difference could be seen regarding mixtures A and C. However, the cfu counts for mixture B were significantly higher when the

analytical method chosen was Petrifilm™ (Figure 4 and Table 7). This difference is clearly visible on the histogram of mixture B results, where 20 of the 23 results reported were above 4.5 $\log_{10}$ cfu ml^{-1} (Figure 4).

The organism present at the highest concentration in mixture B was *B. thermosphacta*, which is the bacteria mainly detected in analysis of aerobic microorganisms in fish products at 20-25 ºC (Figure 2). In view of the results, it seems that these bacteria also appear more at 30 ºC when the Petrifilm™ method is used. It is known that some strains exhibit different behaviour and growth rate depending on the method and/or substrate used for their detection. It is possible that *B. thermosphacta* cells grow better on Petrifilm™ than on traditional plates, or that they generally form small colonies at 30 ºC but the presence of tetrazolium in the Petrifilm™ facilitates their enumeration. In either case this is a good illustration of the variability in enumeration that can occur depending on method and/or substrate used for a specific analysis.

Table 7. *Analytical results of aerobic microorganisms at 30 ^{o}C for mixture A-C according to the method and the medium employed*

	Mixture	A			B			C		
		n[1]	m[2]	s[3]	N[1]	m[2]	s[3]	N[1]	m[2]	s[3]
Method	Petrifilm™	22	4.31	0.14	23	**4.84**	0.25	23	5.22	0.22
	NMKL	59	4.32	0.29	62	4.33	0.26	62	5.17	0.31
	ISO/IDF	49	4.31	0.09	53	4.33	0.28	51	5.16	0.29
Medium	PCA	105	4.32	0.12	108	4.33	0.23	110	5.17	0.24
	Petrifilm™	21	4.32	0.12	22	**4.82**	0.24	22	5.21	0.22
	MPCA	13	4.31	0.11	13	4.38	0.27	12	5.18	0.16
	TSA	9	4.25	0.16	9	4.52	0.31	9	5.24	0.21
	TGE	3	4.23	-	3	4.22	-	3	5.11	-
	TEMPO®	3	4.41	-	3	4.45	-	3	5.24	-

[1]Number of laboratories that supplied method information
[2] Mean value expressed in $\log_{10}$cfu/ml
[3] Standard deviation

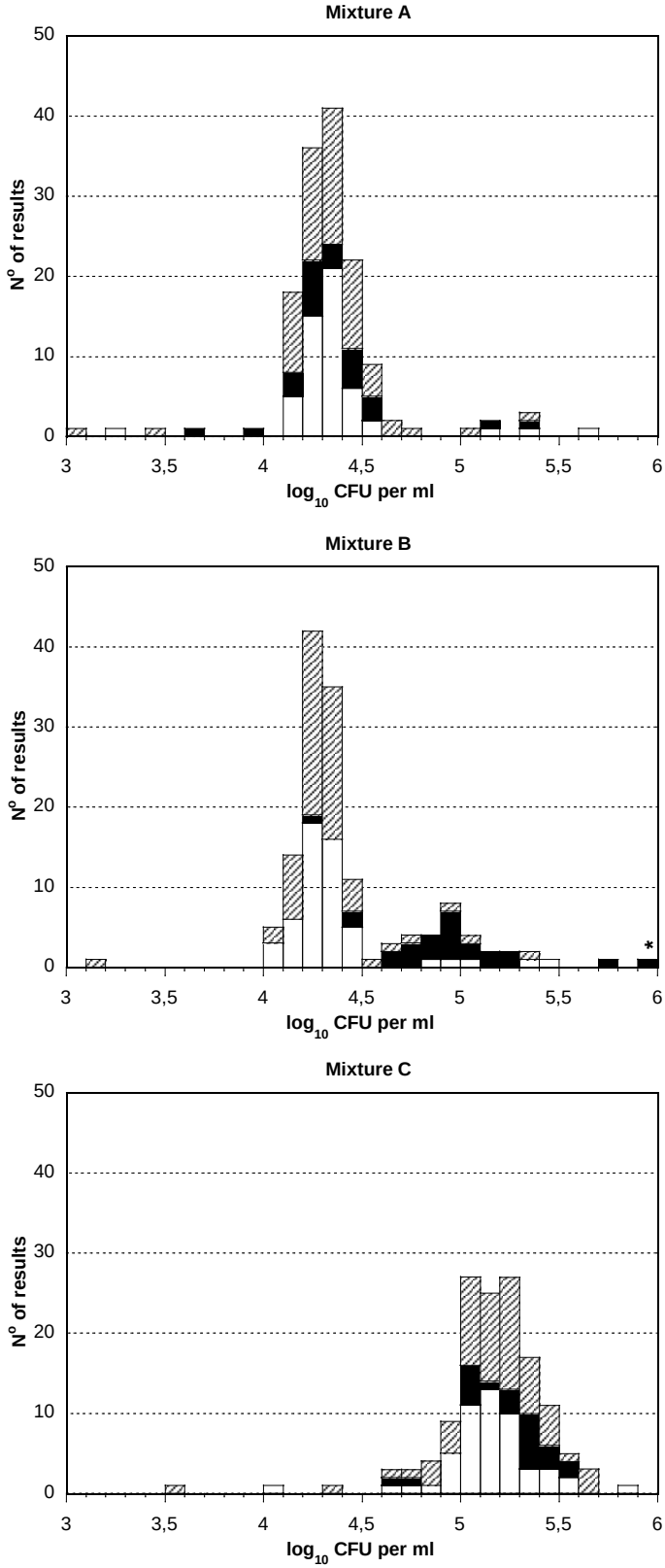


Figure 4. *Analytical results of aerobic microorganisms at 30 °C for mixture A-C according to the method employed:▨ NMKL,□ ISO/IDF, ■ Petrifilm™.*:value>6*

General outcome of the results - assessment

In order to allow comparison of the results from different analyses and mixtures, all the results from quantitative analyses were transformed into standard values (z-scores). 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 z-scores obtained, which are listed in Appendix 2, can be used as a tool by laboratories when following up on the results.

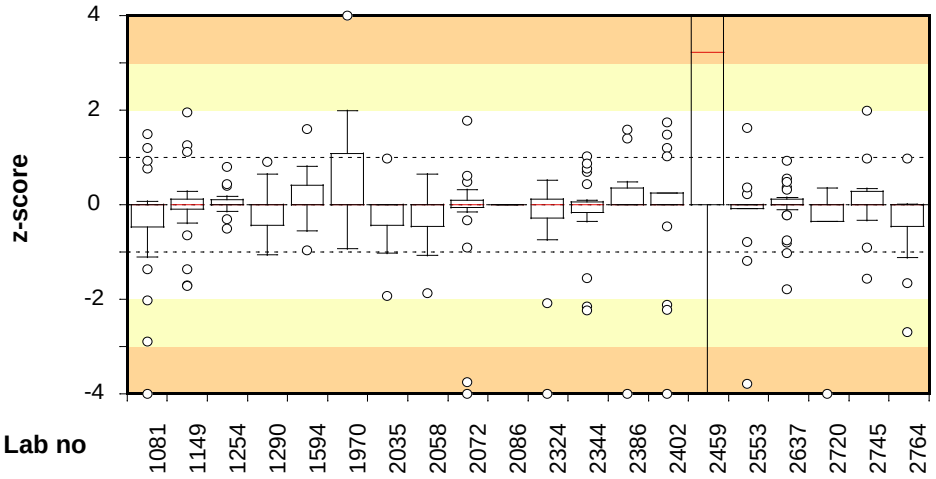
All the results from each laboratory – outliers included and false results excluded – were compiled into a box plot (Figure 5) based on their z-scores. The smaller and more centred round zero the box of a laboratory is, the closer its results are to the general mean values calculated for all laboratory results.

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

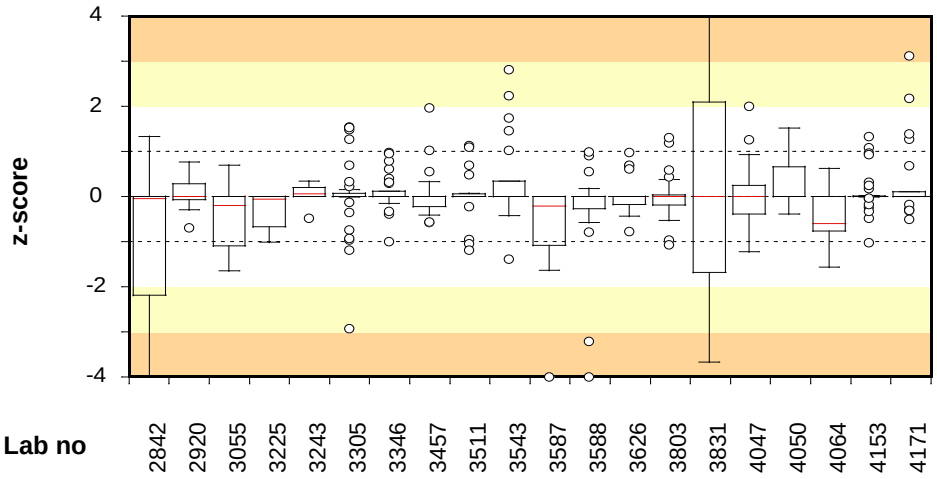
Information on the results processing and recommendations for follow-up work are given in the Scheme Protocol (2). Samples for follow-up can be ordered, free of charge, by e-mailing PT-micro@slv.se.

Figure 5. *Box plots and number of deviating results for each laboratory.*

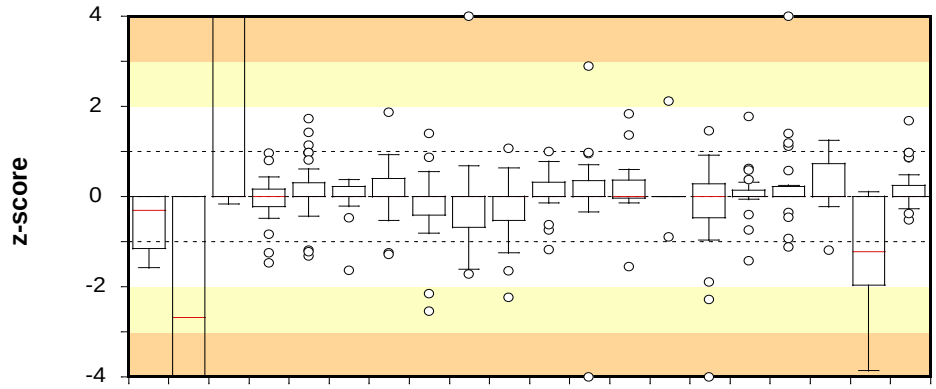
- *The plots are based on the laboratory results from all analyses transformed into z-scores calculated according to the formula: $z = (x-m)/s$, where x is the result of the individual laboratory, m is the mean of the results of all participating laboratories, and s is the standard deviation.*
- *The laboratory median value is illustrated by a horizontal red line in the box.*
- *The box includes 50% of a laboratory's results (25% of the results above the median and 25% of the results below the median). The remaining 50% are illustrated by lines and circles outside the box.*
- *Very deviating results are represented by circles and are calculated as follow: the lowest result in the box − 1.5 × (the highest result in the box − the lowest result in the box) or the highest result in the box + 1.5 × (the highest result in the box − the lowest result in the box). z-scores greater than +4 and less than −4 are positioned at +4 and −4, respectively, in the plot.*
- *The background is divided by lines and shaded fields to indicate ranges in order to simplify location of laboratory results.*



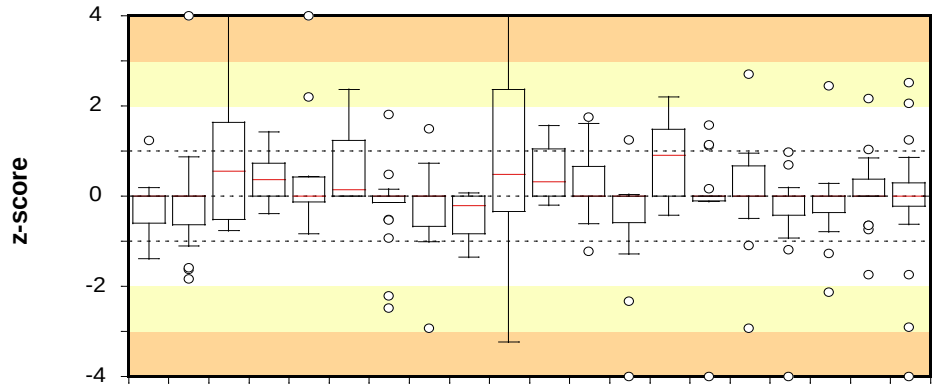
Lab no	1081	1149	1254	1290	1594	1970	2035	2058	2072	2086	2324	2344	2386	2402	2459	2553	2637	2720	2745	2764
No. of results	27	21	18	21	27	34	18	21	23	-	18	26	15	18	9	18	30	15	18	23
False positive	-	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-
False negative	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Low outliers	2	-	-	-	-	-	-	-	2	-	1	-	1	1	1	1	-	2	-	-
High outliers	-	-	-	-	-	1	-	-	-	-	-	-	-	-	4	-	-	-	-	-



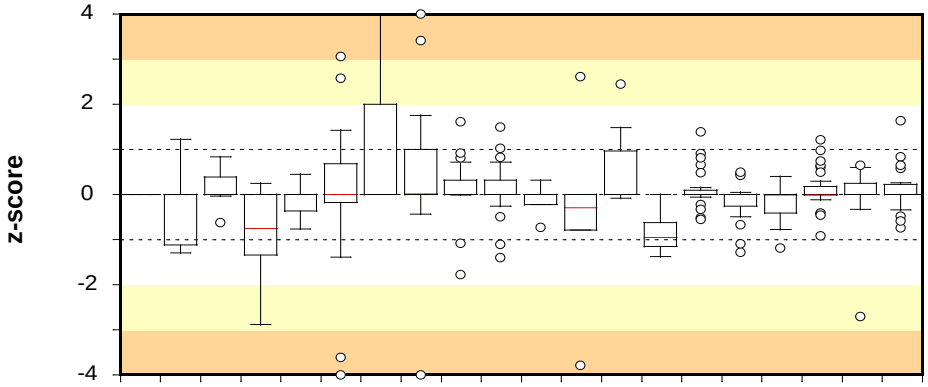
Lab no	2842	2920	3055	3225	3243	3305	3346	3457	3511	3543	3587	3588	3626	3803	3831	4047	4050	4064	4153	4171
No. of results	30	12	14	15	6	33	30	26	20	21	22	26	18	33	8	20	18	9	33	21
False positive	-	-	1	-	-	1	-	-	-	-	-	-	-	-	3	1	-	-	-	-
False negative	-	-	-	-	-	2	-	1	1	-	1	1	-	-	4	-	-	-	-	2
Low outliers	4	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-



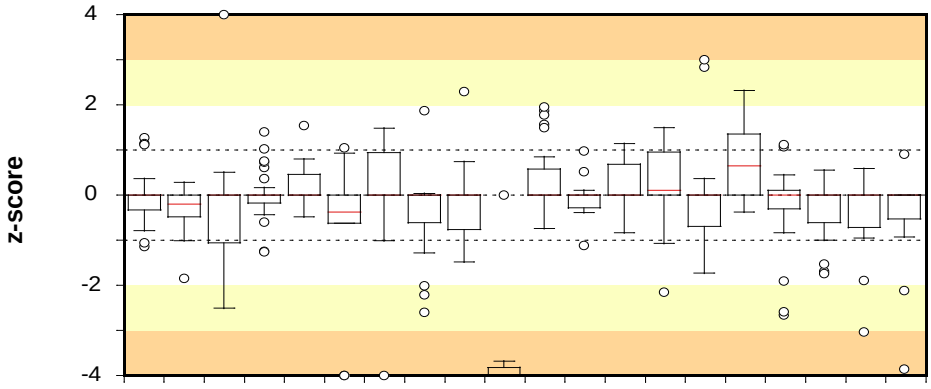
Lab no	4246	4278	4288	4305	4339	4352	4353	4356	4400	4562	4633	4635	4658	4689	4713	4817	4840	4889	4951	4955
No. of results	6	15	27	18	36	18	15	23	15	27	26	24	12	6	32	23	23	29	15	30
False positive	-	-	-	2	-	-	-	1	-	-	1	-	-	-	-	-	1	-	-	-
False negative	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-
Low outliers	-	7	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	1	-
High outliers	-	-	9	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-



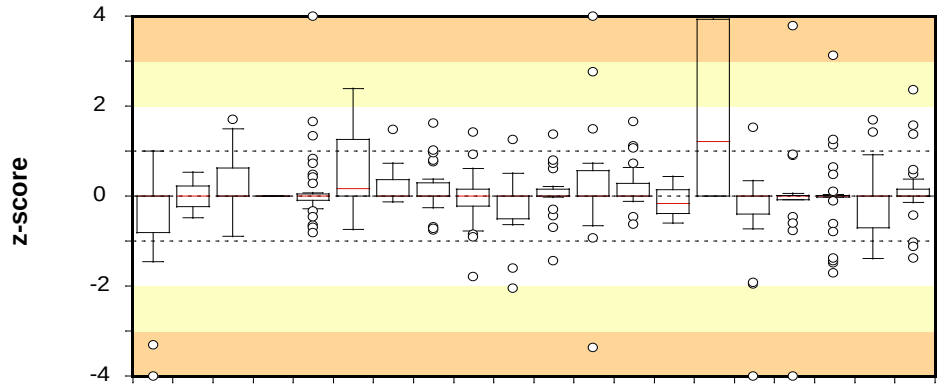
Lab no	4980	5018	5100	5119	5162	5197	5201	5204	5220	5250	5304	5329	5333	5338	5350	5380	5545	5553	5615	5647
No. of results	21	30	8	6	12	18	21	23	15	8	15	20	15	9	18	17	19	15	26	24
False positive	-	-	-	-	-	-	-	1	-	2	-	-	3	-	-	-	2	-	1	-
False negative	-	-	-	-	-	-	-	3	-	-	-	1	-	-	-	-	-	-	-	-
Low outliers	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	1	-	-	1
High outliers	-	1	1	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-



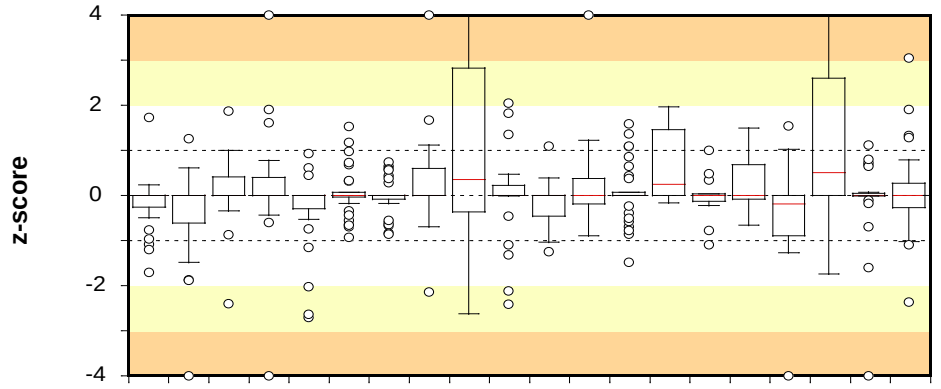
Lab no	5701	5764	5774	5801	5883	5893	5993	6052	6109	6138	6175	6220	6224	6232	6253	6343	6352	6368	6456	6490
No. of results	-	6	12	15	24	18	3	20	20	24	6	6	9	6	24	27	27	33	27	21
False positive	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
False negative	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Low outliers	-	-	-	-	-	2	-	1	-	-	-	1	-	-	-	-	-	-	-	-
High outliers	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-



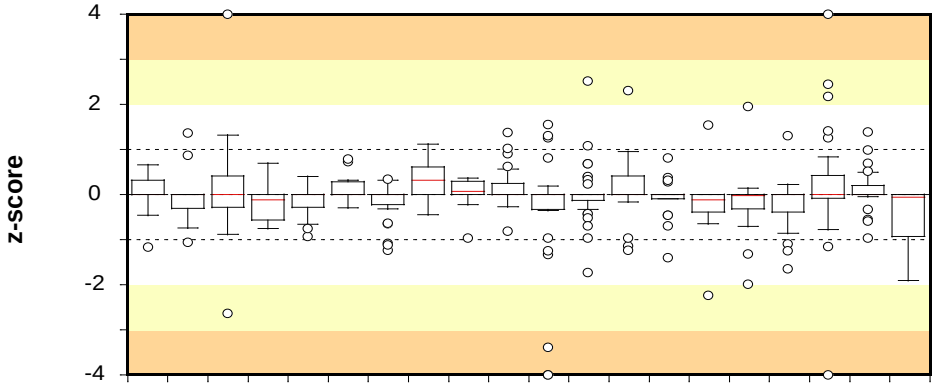
Lab no	6594	6628	6658	6707	6720	6762	6852	6944	6958	6971	6992	7024	7096	7182	7207	7232	7242	7248	7253	7334
No. of results	20	9	9	32	27	9	15	24	15	7	24	14	15	16	14	8	20	29	15	17
False positive	1	-	-	-	-	-	1	-	-	2	-	1	-	1	-	1	1	1	-	1
False negative	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-
Low outliers	-	-	-	-	-	1	1	-	-	5	-	-	-	-	-	-	-	-	-	1
High outliers	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



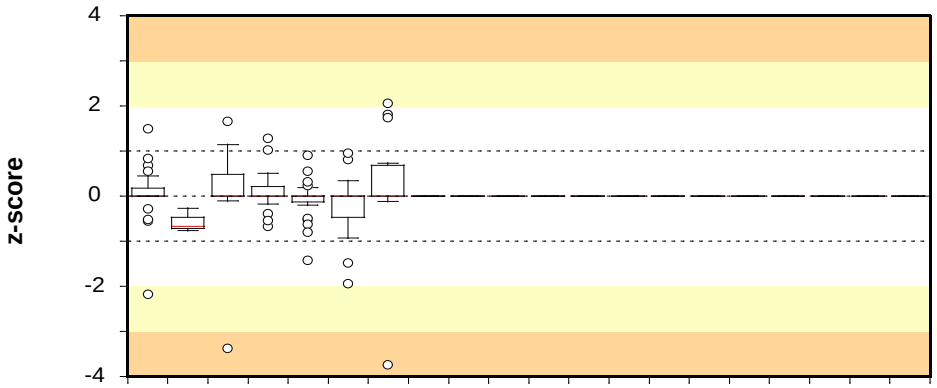
Lab no	7438	7449	7533	7543	7564	7596	7627	7688	7728	7825	7876	7906	7930	7940	7946	7962	8066	8068	8105	8255
No. of results	26	11	15	-	35	24	14	27	23	18	24	24	27	3	22	21	17	30	14	29
False positive	1	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
False negative	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	1
Low outliers	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
High outliers	-	-	-	-	1	-	-	-	-	-	-	1	-	-	6	-	1	1	-	-



Lab no	8260	8313	8333	8352	8380	8397	8428	8435	8523	8529	8568	8626	8628	8657	8676	8734	8742	8756	8766	8891
No. of results	27	24	23	26	29	33	29	24	8	29	23	12	33	12	14	14	30	18	24	21
False positive	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	1	3	3	-	-
False negative	-	-	1	1	1	-	1	-	2	1	1	-	-	-	-	-	-	-	-	-
Low outliers	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-
High outliers	-	-	-	2	-	-	-	1	2	-	-	1	-	-	-	-	-	4	-	-



Lab no	8909	8918	9002	9034	9217	9245	9359	9408	9420	9429	9436	9441	9451	9453	9465	9512	9555	9559	9569	9747
No. of results	20	27	26	11	15	18	27	9	12	27	29	35	24	18	15	14	24	26	30	10
False positive	1	-	1	-	-	-	-	-	-	-	1	1	-	1	-	1	-	1	-	-
False negative	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Low outliers	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-
High outliers	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-



Lab no	9763	9783	9886	9890	9903	9923	9950
No. of results	24	3	29	21	24	23	15
False positive	-	-	-	-	-	1	-
False negative	-	-	1	-	-	-	-
Low outliers	-	-	-	-	-	-	-
High outliers	-	-	-	-	-	-	-

References

1. Peterz. M. Steneryd. A.C. 1993. Freeze-dried mixed cultures as reference samples in quantitative and qualitative microbiological examinations of food. J. Appl. Bacteriol. 74:143-148.
2. Anonymous, 2007. Protocol. Microbiology. Drinking Water & Food. The National Food Agency.
3. Kelly, K. 1990. Outlier detection in collaborative studies. J. Assoc. Off. Anal. Chem. 73:58-64.

Appendix 1.

Results from the participating laboratories.

All results are expressed in log10 cfu per ml sample.

Results reported as "< value" were regarded as zero (negative).

Results reported as "> value" were excluded from the calculations.

A dash in the table indicates that the analysis was not performed.

Outliers and false results are highlighted and counted for each analysis at the end of the table

Lab. no.	Sample			Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase pos. *Staphylococcus*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish. 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
1081	3	2	1	4.41	4.34	5.2	3.94	0	4.34	3.95	0	3.94	3	0	0	0	0	5.56	-	-	-	**2.38**	0	0	**2.38**	0	0	-	-	-	-	-	-	3.53	2.95	0	0	0	2.99	1081
1149	1	2	3	4.33	4.31	5.25	3.95	<1	4.66	3.7	<1	3.94	3.6	<1	<1	<1	<1	5.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.35	3.1	<1	<1	<1	3.61	1149
1254	2	3	1	-	-	-	3.75	<2	4.48	3.83	<2	4.18	-	-	-	<3	<3	4.95	-	-	-	3.43	<1	<1	-	-	-	-	-	-	-	-	-	3.71	3.28	<1	<1	<1	3.78	1254
1290	3	2	1	4.3	4.1	5.4	3.8	<1	4.4	3.7	<1	4	-	-	-	<1	<1	5.3	-	-	-	3.2	<1	<1	-	-	-	-	-	-	-	-	-	3.6	3.3	<1	<1	<1	3.5	1290
1594	1	2	3	4.34	4.26	5.34	3.71	<2	4.58	3.89	<2	4.23	3.32	<1	<1	<3	<3	5.26	-	-	-	-	-	-	3.67	<1	<1	-	-	-	<2	3.3	<2	3.63	3.36	<1	<1	<1	3.81	1594
1970	1	2	3	4.45	4.14	5.48	3.76	<2	4.43	3.91	<2	4.3	3.32	<1	<1	<3	<3	5.11	**<1**	**4.91**	**4.63**	3.54	<1	<1	3.4	<1	<1	4.46	5.28	5.45	<2	3.34	<2	3.79	3.46	<1	<1	<1	4.08	1970
2035	3	1	2	-	-	-	-	-	-	3.8	<1	4.1	-	-	-	-	-	-	3.7	4.3	<1	3.2	<1	<1	2.9	<1	<1	-	-	-	-	-	-	3.5	3.3	<1	<1	<1	3.6	2035
2058	3	2	1	4.22	4.28	5.34	-	-	-	3.87	0	3.99	3.05	0	0	0	0	5.26	-	-	-	3.36	0	0	-	-	-	-	-	-	-	-	-	3.53	3.08	0	0	0	3.34	2058
2072	1	2	3	4.3	4.15	5.3	4.04	<2	**3.7**	3.9	<2	4.2	3.04	<1	**3.53**	<3	<3	5.2	-	-	-	**2.7**	<1	<1	-	-	-	-	-	-	-	-	-	3.6	3.3	<1	<1	<1	3.7	2072
2086	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2086
2324	1	2	3	4.28	4.2	5.11	3.79	0	4.54	-	-	-	3.15	0	0	0	0	**3.15**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.67	3.36	0	0	0	2.97	2324
2344	1	2	3	4.28	4.46	5.1	3.46	0	4.6	3.46	0	3.79	3.08	0	-	0	0	5.11	3.93	-	-	3.54	0	0	3.49	0	0	-	-	-	-	-	-	3.57	3.43	**3.7**	0	0	3.78	2344
2386	3	2	1	4.49	4.93	5.3	-	-	-	3.85	<2	4.24	3.2	<1	<1	<3	<3	5.11	-	-	-	-	-	-	**2.3**	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	2386
2402	1	2	3	4.5	4.48	4.68	3.94	<1	4.18	4.08	<1	4.35	-	-	-	-	-	-	-	-	-	**1.54**	<1	<1	-	-	-	-	-	-	-	-	-	3.62	3.26	<1	<1	<1	3.72	2402
2459	2	3	1	**5.12**	**6.29**	**6.34**	-	-	-	**0.9**	0	**5.26**	-	-	-	0	0	6.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2459
2553	1	2	3	-	-	-	-	-	-	**3.2**	<2	4.04	3.1	<1	<1	<3	<3	5.6	3.9	4.1	<1	3.4	<1	<1	3.4	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	2553
2637	2	3	1	4.36	4.36	5.26	3.82	<1	4.58	3.95	<1	4.2	3.15	<1	<1	<1	<1	4.86	3.87	4.2	<1	3.18	<1	<1	2.93	<1	<1	-	-	-	-	-	-	3.61	3.38	<1	<1	<1	3.4	2637
2720	3	1	2	4.28	4.32	5.1	3.67	<1	4.55	-	-	-	3.18	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2.93**	**2.59**	<1	<1	<1	3.58	2720
2745	3	2	1	4.12	4.15	5.12	3.79	<2	4.54	3.75	<2	4.2	3.36	<1	<1	<3	<3	5.2	-	-	-	3.71	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2745
2764	2	3	1	3.98	4.41	5.15	3.7	<1	4.64	3.67	<0.60	3.89	3.08	<0	<0	-	-	-	3.84	**<2**	<2	-	-	-	3.2	<0	<0	-	-	-	-	-	-	3.45	3.32	<1	<1	<1	3.28	2764
2842	2	3	1	**3.26**	4.08	4.65	3.54	<1	4.15	3.4	<1	**3.23**	2.86	<1	<1	<1	<1	5.51	3.78	**3.79**	<2	3.08	<1	<1	3.3	<1	<1	-	-	-	-	-	-	**3.08**	3.04	<1	0	0	3.18	2842
2920	2	1	3	4.41	4.34	5.25	3.79	<1	4.48	3.85	<1	4.19	-	-	-	-	-	-	-	-	-	-	-	-	3.17	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	2920
3055	3	2	1	4.11	4.29	4.88	3.54	<1	4.32	-	-	-	3.29	<1	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.54	3.32	<1	<1	<1	3.35	3055
3225	3	1	2	4.2	4.22	5.18	3.72	<1	4.46	-	-	-	2.9	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.45	3.25	<1	<1	<1	3.43	3225
3243	2	1	3	4.34	4.28	5.21	3.79	<1	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3243
3305	1	2	3	4.5	4.2	5.1	4	<2	4.6	3.8	<2	4.2	**<1**	<1	<1	<3	<3	**<3**	3.3	4.1	**4.5**	3.4	<1	<1	3.6	<1	<1	4.4	4.7	5.2	<2	3.3	<2	3.6	3.2	<1	<1	<1	3.6	3305
3346	2	1	3	4.19	4.31	5.33	3.8	<1	4.64	3.85	<1	4.31	3.11	<2	<2	<2	<2	5.2	3.92	4.18	<2	3.38	<1	<1	3.53	<1	<1	-	-	-	-	-	-	3.61	3.32	<2	<2	<2	3.59	3346
3457	2	3	1	4.56	4.25	5.16	3.63	<2	4.44	-	-	-	-	-	-	<3	<3	4.93	3.87	4.19	<1	3.54	<1	<1	-	-	-	4.16	4.54	5.2	<2	3.55	<2	**<1**	3.39	<1	<1	<1	3.66	3457
3511	1	3	2	-	-	-	3.74	<1	4.51	3.65	<1	**<1**	-	-	-	<1	<1	5.45	-	-	-	-	-	-	-	-	-	4.29	4.33	5.23	<1	3.23	<1	3.6	3.29	<1	<1	<1	3.99	3511
3543	3	2	1	4.28	4.54	5.22	4.12	<1	4.71	-	-	-	3.06	<1	<1	<1	<1	4.68	-	-	-	-	-	-	3.23	<1	<1	-	-	-	-	-	-	4	3.45	<1	<1	<1	4.2	3543
3587	3	1	2	4.18	4.2	5.01	3.61	<1	4.44	3.6	<1	4.06	**<1**	<1	<1	<1	<1	4.7	-	-	-	-	-	-	**2.15**	<1	<1	-	-	-	-	-	-	3.41	3.11	<1	<1	<1	-	3587
3588	3	1	2	4.3	4.3	5.15	3.89	<2	4.58	3.96	<2	**3.31**	2.98	<1	<1	<3	<3	4.12	3.86	**<1**	<1	-	-	-	3.15	<1	<1	-	-	-	-	-	-	3.62	3.27	<1	<1	<1	3.66	3588
3626	2	3	1	4.4	4.3	5	3.7	<2	4.6	3.9	<2	4.1	3.1	<1	<1	<3	<3	5.4	-	-	-	3.3	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3626
3803	2	1	3	4.32	4.35	5.08	-	-	-	3.85	<2	4.14	3.19	<1	<1	<1	<1	5.04	4.01	4.23	<1	3.19	<1	<1	3.28	<1	<1	4.06	4.8	5.06	<2	3.44	<2	3.68	3.47	<1	<1	<1	4.06	3803
3831	1	3	2	**5.09**	4.28	4.31	-	-	-	4.33	<1	3.68	-	-	-	-	-	-	**<1**	**<1**	**3.58**	-	-	-	-	-	-	-	-	-	-	-	-	**<1**	3.43	**3.59**	**3.72**	<1	**<1**	3831
4047	2	3	1	4.22	5.06	5.2	3.84	<1	4.56	3.95	<1	4.17	3.43	<1	**4.85**	<1	<1	4.73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.45	3.2	<1	<1	<1	3.3	4047
m				4.31	4.43	5.18	3.73	–	4.50	3.80	–	4.17	3.12	–	–	–	–	5.10	3.92	4.21	–	3.36	–	–	3.32	–	–	4.2	4.67	5.14	–	3.61	–	3.59	3.32	–	–	–	3.64	**m**
s				0.12	0.31	0.24	0.17	–	0.14	0.16	–	0.17	0.25	–	–	–	–	0.30	0.21	0.09	–	0.18	–	–	0.22	–	–	0.13	0.33	0.19	–	0.32	–	0.14	0.13	–	–	–	0.32	**s**

Lab. no.	Sample			Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase pos. *Staphylococcus*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish. 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
4050	2	3	1	4.4	4.31	5.17	3.72	<2	4.52	-	-	-	3.3	<1	<1	-	-	-	4.17	4.35	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.69	3.37	<1	<1	<1	3.61	4050
4064	3	2	1	4.12	4.19	5.04	3.66	<1	4.59	3.68	<1	4.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4064
4153	3	1	2	4.45	4.28	5.26	3.69	<2	4.69	3.83	<2	4.34	3.11	<1	<1	<3	<3	5.11	3.97	4.18	<1	3.18	<1	<1	3.32	<1	<1	-	-	-	<2	3.91	<2	3.57	3.32	<1	<1	<1	3.63	4153
4171	2	3	1	4.28	4.83	5.11	3.7	<1	4.7	4.15	<0.60	4.71	**<0**	<0	<0	-	-	-	3.81	**<2**	<2	-	-	-	>3.18	<0	<0	-	-	-	-	-	-	3.61	3.28	<1	<1	<1	3.86	4171
4246	2	3	1	4.3	4.28	4.91	-	-	-	-	-	-	-	-	-	<2	<2	4.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4246
4278	3	1	2	**3**	**3.15**	**3.57**	**2.6**	0	**3.36**	-	-	-	2.78	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2.54**	**2.15**	0	0	0	2.78	4278
4288	1	2	3	**5.38**	5.3	**6.26**	**4.96**	0	**5.3**	**4.93**	0	**4.95**	3.08	0	0	0	0	**6.3**	-	-	-	**4.1**	0	0	3.74	0	0	-	-	-	-	-	-	3.78	**4.39**	0	0	0	4.62	4288
4305	2	1	3	4.16	4.28	5.24	3.76	<2	4.38	-	-	-	**<1**	<1	<1	-	-	-	4.12	4.25	**5.16**	-	-	-	3	<1	<1	-	-	-	-	-	-	3.71	3.29	**3.23**	<1	<1	3.62	4305
4339	2	1	3	4.3	4.4	4.9	3.9	<2	4.5	3.9	<2	4.1	3.4	<1	<1	<3	<3	4.7	4	4.3	<1	3.4	<1	<1	3.7	<1	<1	4.2	5	4.9	<2	3.6	<2	3.8	3.3	<1	<1	<1	3.9	4339
4352	2	3	1	-	-	-	-	-	-	-	-	-	3.18	<2	<2	<3	<3	5.04	-	-	-	-	-	-	-	-	-	4.23	4.52	5.18	<2	3.7	<2	3.65	3.11	<2	<2	<2	3.66	4352
4353	2	3	1	4.43	4.04	5.63	-	-	-	-	-	-	3.23	<1	<1	-	-	-	-	-	-	-	-	-	3.4	<1	<1	-	-	-	-	-	-	3.52	3.43	<1	<1	<1	3.23	4353
4356	3	1	2	4.28	4.87	5.04	3.79	<2	4.58	3.8	<2	4.08	2.92	<1	<1	<3	<3	4.86	-	-	-	2.98	<1	<1	-	-	-	-	-	-	-	-	-	3.23	3.43	**3.94**	<1	<1	3.81	4356
4400	2	1	3	4.4	4.2	4.8	3.8	0	4.4	-	-	-	**4.2**	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	3.1	0	0	0	3.5	4400
4562	1	3	2	4.26	4.41	5.04	3.73	<1	4.32	3.69	<1	3.79	3.2	<1	<1	<1	<1	4.91	3.98	4.15	<1	3.4	<1	<1	-	-	-	-	-	-	-	-	-	3.75	3.4	<1	<1	<1	3.11	4562
4633	1	3	2	4.44	4.2	5.33	3.82	<1	4.33	3.88	<1	4.15	3.2	<1	<1	<1	<1	5.34	-	-	-	3.43	<1	<1	3.36	<1	<1	-	-	-	-	-	-	3.61	3.35	**2.44**	<1	<1	3.44	4633
4635	2	3	1	**3.46**	5.34	5.41	3.72	<2	4.45	-	-	-	3.16	<1	<1	<3	<3	5.32	4	4.3	<1	-	-	-	3.41	<1	<1	-	-	-	-	-	-	3.56	3.36	<1	<1	<1	3.58	4635
4658	2	3	1	4.33	4.62	5.51	3.46	<2	4.49	3.82	<2	4.49	-	-	-	<3	<3	5.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4658
4689	1	2	3	-	-	-	4.1	0	4.5	-	-	-	2.9	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4689
4713	2	3	1	4.4	4.18	5.36	3.68	<1	4.61	**2.85**	<2	4.28	3.48	<1	<1	<3	<3	5.18	4.11	**<1**	-	3.2	<1	<1	3.2	<1	<1	4.15	3.92	4.77	-	3.3	-	3.64	3.38	<1	<1	<1	3.4	4713
4817	2	3	1	4.32	4.2	5.17	3.74	<2	4.59	3.84	<2	4.48	**<1**	<1	<1	<3	<3	4.98	-	-	-	3.11	<1	<1	-	-	-	-	-	-	-	-	-	3.68	3.36	<1	<1	<1	3.76	4817
4840	2	3	1	4.34	4.32	5.45	3.75	<1	4.67	3.82	<1	4.2	-	-	-	<1	<1	5.18	4.04	4.34	<1	3.28	<1	<1	-	-	-	-	-	-	-	-	-	**4.41**	3.2	**4.04**	<1	<1	3.28	4840
4889	3	1	2	4.3	4.36	5.34	3.85	0	4.62	3.94	0	4.38	3.3	0	0	0	0	**0**	-	-	-	-	-	-	3.48	0	0	4.18	4.96	5.38	0	3.97	0	3.6	3.38	0	0	0	3.26	4889
4951	1	3	2	4.15	4.05	4.9	3.29	<1	4.19	3.82	<1	3.87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**3.04**	2.85	<1	<1	<1	3.24	4951
4955	1	2	3	4.25	4.96	5.39	3.74	<2	4.64	3.76	<2	4.11	3.18	<1	<1	<3	<3	5.07	4.1	4.3	<1	3.34	<1	<1	3.34	<1	<1	-	-	-	-	-	-	3.61	3.38	<1	<1	<1	3.72	4955
4980	2	3	1	4.23	4.82	5.09	3.76	<2	4.3	3.69	<2	3.98	3.08	<1	<1	<3	<3	4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.57	3.24	<1	<1	<1	3.7	4980
5018	1	3	2	4.21	4.24	5.04	3.62	<1	4.34	3.51	<1	4.15	2.72	<1	<1	<1	<1	4.9	4.1	**4.88**	<1	3.08	<1	<1	3.12	<1	<1	-	-	-	-	-	-	3.58	3.31	<1	<1	<1	3.76	5018
5100	2	1	3	4.22	4.25	5.48	-	-	-	3.73	-	4.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**4.52**	3.36	-	-	-	4.29	5100
5119	2	3	1	4.35	4.31	5.29	-	-	-	4.03	<1	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5119
5162	3	2	1	4.37	**5.83**	5.71	-	-	-	-	-	-	2.97	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.56	3.37	<1	<1	<1	3.37	5162
5197	3	1	2	4.6	4.5	5.2	4.1	<1	4.7	4	<1	4.3	-	-	-	<1	<1	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	3.4	<1	<1	<1	4.4	5197
5201	2	1	3	4.25	5	5.15	3.57	<2	4.5	3.45	<2	4.2	2.51	<1	<1	<3	<3	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.58	3.38	<1	<1	<1	3.47	5201
5204	1	3	2	4.2	4.9	5.2	3.7	<2	4.4	3.8	<2	4	3.3	<2	<2	<3	<3	4.9	**<1**	**<1**	**4.1**	3.2	<1	<1	-	-	-	-	-	-	-	-	-	3.5	**<1**	<1	<1	<1	2.7	5204
5220	2	3	1	4.19	4.01	5.2	-	-	-	3.74	0	4.06	-	-	-	0	0	5.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.55	3.19	0	0	0	3.27	5220
5250	3	2	1	-	-	-	**5.22**	>1.0	4.42	4.24	>1.0	4.31	-	-	-	-	-	-	4.34	4.23	**5.23**	-	-	-	-	-	-	-	-	-	-	-	-	3.13	**>1.0**	**5.57**	**>1.0**	**>1.0**	3.61	5250
5304	1	2	3	4.51	4.67	5.26	-	-	-	3.96	<1	4.14	-	-	-	-	-	-	-	-	-	3.57	<1	<1	-	-	-	-	-	-	-	-	-	3.72	3.46	<1	<1	<1	4	5304
5329	1	2	3	4.4	4.24	5.57	3.99	<2	4.6	-	-	-	2.82	<1	<1	<2	<2	5.64	3.96	**<1**	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.65	3.4	<1	<1	<1	3.48	5329
5333	3	1	2	4.32	4.28	**4.03**	3.62	<2	4.49	-	-	-	2.99	<1	**4.96**	<3	<3	4.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.26	3.32	<1	**3.26**	**2.3**	4.04	5333
5338	2	3	1	4.5	4.3	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8	3.6	<1	<1	<1	4.32	5338
5350	2	1	3	4.3	4.4	5.56	-	-	-	3.98	<2	4.37	3.16	<1	<1	-	-	-	-	-	-	-	-	-	3.3	<1	<1	-	-	-	-	-	-	**2.53**	**2.45**	<1	<1	<1	**2.26**	5350
5380	2	1	3	3.95	5.28	5.41	3.85	<2	4.54	3.74	<2	4.26	3	<1	<1	<2	<2	5.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.71	3.18	-	-	-	-	5380
5545	2	1	3	4.3	4.2	4.9	3.7	<1	4.6	-	-	-	3.1	<1	**4.5**	<1	<1	5.4	3.9	**3.1**	**4.9**	-	-	-	-	-	-	-	-	-	-	-	-	3.5	3.2	<1	<1	<1	3.7	5545
5553	1	2	3	-	-	-	3.36	<1	4.44	3.6	<1	4.04	3.19	<1	<1	<1	<1	5.01	-	-	-	3.79	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5553
5615	3	2	1	4.4	5.11	5.43	3.81	<2	4.54	3.7	<2	4.32	3.23	<1	<1	<3	<3	5.18	-	-	-	3.23	<1	<1	3.18	<1	<1	-	-	-	-	-	-	3.65	3.32	**4.15**	<1	<1	3.08	5615
5647	1	3	2	4.47	4.33	4.77	4.17	0	4.41	3.34	0	4.07	-	-	-	0	0	5.28	-	-	-	**2.46**	0	0	3.77	0	0	-	-	-	-	-	-	3.72	3.42	0	0	0	3.6	5647
5701	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5701
5764	2	3	1	-	-	-	3.94	<1	4.31	-	-	-	2.85	<2	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5764
m				4.31	4.43	5.18	3.73	–	4.50	3.80	–	4.17	3.12	–	–	–	–	5.10	3.92	4.21	–	3.36	–	–	3.32	–	–	4.2	4.67	5.14	–	3.61	–	3.59	3.32	–	–	–	3.64	**m**
s				0.12	0.31	0.24	0.17	–	0.14	0.16	–	0.17	0.25	–	–	–	–	0.30	0.21	0.09	–	0.18	–	–	0.22	–	–	0.13	0.33	0.19	–	0.32	–	0.14	0.13	–	–	–	0.32	**s**

Lab. no.	Sample			Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase pos. *Staphylococcus*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish. 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
5774	1	3	2	-	-	-	3.81	<2	4.41	-	-	-	-	-	-	<3	<3	5.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.59	3.4	<1.70	<1.70	<1.70	3.74	5774
5801	3	1	2	4.11	4.15	4.74	3.6	<2	4.34	-	-	-	3.18	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.18	3.16	<1	<1	<1	3.18	5801
5883	1	3	2	4.24	4.26	5.22	3.66	<2	4.46	3.68	<2	4.12	2.98	<1	<1	<3	<3	5.08	-	-	-	3.23	<1	<1	-	-	-	-	-	-	-	-	-	3.66	3.36	<1	<1	<1	3.59	5883
5893	2	1	3	4.4	**3.3**	5.8	3.7	0	4.3	4	0	4.7	-	-	-	-	-	-	-	-	-	-	-	-	**1.9**	0	0	-	-	-	-	-	-	3.8	3.2	0	0	0	3.7	5893
5993	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	0	0	**8.89**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5993
6052	3	2	1	4.74	4.98	5.14	3.91	<1	4.64	3.84	<1	4.3	-	-	-	<1	<1	5.11	4	**3.2**	<1	-	-	-	-	-	-	-	-	-	-	-	-	4.24	**4.2**	**4.84**	<1	<1	3.5	6052
6109	3	1	2	4.18	4.43	5.57	-	-	-	3.52	<1.6	3.87	3.32	<1	<1	-	-	-	4.11	**<2**	<2	-	-	-	3.36	<1	<1	-	-	-	-	-	-	3.62	3.41	<1	<1	<1	3.79	6109
6138	2	3	1	4.14	4.9	5.38	3.79	<2	4.34	3.85	<1	4.13	3.18	<2	<2	<2	<2	5.23	-	-	-	3.54	<1	<1	-	-	-	-	-	-	-	-	-	3.6	3.41	<2	<2	<2	3.48	6138
6175	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.49	3.36	0	0	0	3.57	6175
6220	3	2	1	4.25	5.25	5.17	-	-	-	**3.2**	<1	4.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6220
6224	2	3	1	4.5	5.2	5.3	3.9	<1	4.5	-	-	-	3.1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6224
6232	2	1	3	4.19	4.15	4.91	3.49	<1	4.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6232
6253	3	1	2	4.25	4.36	5.17	3.89	<1	4.7	3.81	<1	4.18	3.04	<1	<1	<1	<1	5.15	-	-	-	-	-	-	3.2	<1	<1	-	-	-	-	-	-	3.69	3.38	<1	<1	<1	3.9	6253
6343	2	1	3	4.32	4.22	5.11	3.81	<1	4.56	3.81	<1	4.15	3	<2	<1	<3	<1	5.04	-	-	-	3.28	<1	<1	3.04	<1	<1	-	-	-	-	-	-	3.54	3.18	<1	<1	<1	3.8	6343
6352	1	2	3	4.27	4.19	5	3.7	<2	4.4	3.8	<2	4.1	3	<2	<2	<3	<3	4.74	3.9	4.16	<1	3.3	<1	<1	-	-	-	-	-	-	-	-	-	3.54	3.37	<1	<1	<1	3.55	6352
6368	2	1	3	4.3	4.3	5.19	3.66	<2	4.64	3.85	<2	4.28	3.28	<1	<1	<3	<3	5.08	3.91	4.2	<1	-	-	-	3.32	<1	<1	4.08	4.84	5.28	<2	4	<2	3.62	3.26	<1	<1	<1	3.73	6368
6456	2	3	1	4.39	4.33	5.19	3.81	<1	4.11	3.78	<1	4.27	3.13	<1	<1	<1	<1	5.18	-	-	-	3.35	<1	<1	3.43	<1	<1	-	-	-	-	-	-	3.63	3.36	<1	<1	<1	3.85	6456
6490	1	3	2	4.26	4.2	5.23	3.67	<2	4.42	-	-	-	3.18	<1	<1	<3	<3	5.6	-	-	-	-	-	-	3.45	<1	<1	-	-	-	-	-	-	3.72	3.4	<1	<1	<1	3.72	6490
6594	2	3	1	4.3	4.83	5.11	3.93	**4.34**	4.45	3.62	<2	4.04	2.86	<1	<1	-	-	-	-	-	-	-	-	-	3.4	<1	<1	-	-	-	-	-	-	3.58	3.26	<1	<1	<1	4	6594
6628	2	3	1	4.29	4.36	5.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.33	3.19	0	0	0	3.73	6628
6658	3	1	2	**5.17**	4.28	4.83	3.82	<1	4.14	-	-	-	2.86	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6658
6707	2	3	1	4.36	4.38	5.08	3.76	<2	4.32	3.76	<2	4.28	3.11	<1	<1	<3	<3	5.53	-	-	-	3.54	<1	<1	3.48	<1	<1	4.16	4.26	5.06	<2	3.85	<2	3.51	**<1**	<1	<1	<1	3.58	6707
6720	2	1	3	4.41	4.35	5.13	3.83	<1	4.6	3.73	<1	4.21	3.16	<1	<1	<1	<1	5.14	-	-	-	3.48	<1	<1	3.49	<1	<1	-	-	-	-	-	-	3.65	3.42	<1	<1	<1	4.13	6720
6762	2	1	3	**3.66**	4.76	5.08	3	<1	4.41	3.95	<1	4.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6762
6852	1	2	3	4.5	4.4	5.4	3.9	0	**3.9**	4	0	4	-	-	-	-	**4.2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8	3.4	0	0	0	3.8	6852
6944	3	1	2	-	-	-	-	-	-	3.77	<1	4.14	3.58	<1	<1	<1	<1	5.02	3.86	4.14	<1	-	-	-	-	-	-	3.86	4.01	4.95	<1	2.9	<1	3.41	3.26	<1	<1	<1	3.65	6944
6958	2	3	1	4.21	4	5.04	3.86	<1	4.83	-	-	-	2.95	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.51	3.13	<1	<1	<1	3.18	6958
6971	3	1	2	**2.48**	**3.28**	**3.53**	**2.3**	0	**2**	-	-	-	2.15	**2.86**	**3.43**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6971
6992	3	2	1	4.51	4.53	5.63	4.04	<1	4.48	4.04	<1	4.32	2.98	<2	<2	<0.48	<0.48	5.7	-	-	-	3.23	<1	<1	-	-	-	-	-	-	-	-	-	3.62	3.23	<1	<1	<1	3.67	6992
7024	3	1	2	4.38	4.42	5.11	3.75	<1	4.64	-	-	-	3.05	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.54	3.31	**3.85**	<1	<1	3.28	7024
7096	1	3	2	4.36	4.79	5.34	-	-	-	3.74	<2	4.3	-	-	-	<3	<3	5.32	-	-	-	-	-	-	-	-	-	4.18	4.4	5.18	<2	3.95	<2	-	-	-	-	-	-	7096
7182	3	2	1	4.45	4.9	5.24	3.82	<1	4.19	3.82	<1	3.99	-	-	-	-	-	-	4.14	4.29	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.61	**<1**	<1	<1	**3.35**	3.99	7182
7207	1	3	2	4.36	5.32	5.9	3.43	<1	4.4	-	-	-	-	-	-	-	-	-	3.78	**<1**	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.41	3.12	<1	<1	<1	3.59	7207
7232	1	2	3	4.51	5.16	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.76	3.37	**3.69**	<1	<1	3.52	7232
7242	2	3	1	4.26	4.37	4.99	3.4	0	4.65	3.38	0	4.2	2.48	0	**3.75**	-	-	-	-	-	-	3.44	0	0	-	-	-	-	-	-	-	-	-	3.61	3.46	0	0	0	3.7	7242
7248	3	1	2	4.19	4.24	4.99	3.66	<2	4.48	3.88	<2	4.15	3.03	<1	<1	<3	<3	4.85	3.56	4.05	**4.62**	3.09	<1	<1	3.16	<1	<1	-	-	-	-	-	-	3.67	3.39	<1	<1	<1	3.64	7248
7253	1	3	2	4.33	4.25	4.98	3.4	<1	4.48	3.32	<1	4.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.55	3.36	<1	<1	<1	3.83	7253
7334	2	1	3	4.26	4.17	5.1	-	-	-	**>1**	<1	**>1**	2.6	<1	**3.54**	<1	<1	**>1**	-	-	-	-	-	-	3.52	<1	<1	-	-	-	-	-	-	**3.04**	3.2	<1	<1	<1	3.47	7334
7438	3	1	2	4.2	4.11	5.05	3.59	<1	4.29	3.83	<1	4.09	3.08	<1	<1	<1	<1	5.03	-	-	-	**2.63**	<1	<1	2.6	<1	<1	-	-	-	-	-	-	3.74	3.18	**3.64**	<1	<1	3.8	7438
7449	3	1	2	4.26	4.28	5.29	3.68	<2	4.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.57	3.38	**4**	<2	<1	3.81	7449
7533	2	1	3	4.39	4.63	5.59	-	-	-	-	-	-	2.9	<1	<1	<1	<1	5.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	3.28	<1	<1	<1	3.57	7533
7543	2	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7543
7564	1	2	3	4.28	4.23	5.2	3.72	<2	4.57	3.87	<2	4.46	3.04	<1	<1	<3	<3	5.11	3.89	**4.93**	**5.04**	3.41	<1	<1	3.26	<1	<1	4.11	4.6	5.3	<2	4.04	<2	3.7	3.26	<1	<1	<1	3.38	7564
7596	3	2	1	4.4	4.2	5.6	3.8	<2	4.8	4	<2	4.3	3.2	<2	<2	<3	<2	5.5	-	-	-	-	-	-	3.6	<1	<1	4.2	5.1	5.6	<2	3.8	<2	-	-	-	-	-	-	7596
7627	2	3	1	4.5	4.4	5.2	-	-	-	-	-	-	**<1**	<1	<1	-	-	-	-	-	-	-	-	-	3.4	<1	<1	-	-	-	-	-	-	3.7	3.4	<1	<1	<1	3.6	7627
7688	3	2	1	4.23	4.35	5.2	3.6	<1	4.61	3.93	<1	4.34	3.1	<1	<1	-	-	-	3.98	4.36	<1	3.41	<1	<1	3.36	<1	<1	-	-	-	-	-	-	3.65	3.45	<1	<1	<1	3.41	7688
m				4.31	4.43	5.18	3.73	–	4.50	3.80	–	4.17	3.12	–	–	–	–	5.10	3.92	4.21	–	3.36	–	–	3.32	–	–	4.2	4.67	5.14	–	3.61	–	3.59	3.32	–	–	–	3.64	**m**
s				0.12	0.31	0.24	0.17	–	0.14	0.16	–	0.17	0.25	–	–	–	–	0.30	0.21	0.09	–	0.18	–	–	0.22	–	–	0.13	0.33	0.19	–	0.32	–	0.14	0.13	–	–	–	0.32	**s**

Lab. no.	Sample			Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase pos. *Staphylococcus*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish. 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
7728	1	2	3	4.21	4.19	5.27	-	-	-	3.95	<1	4.42	2.96	<1	<1	<1	<1	5.29	-	-	-	3.2	<1	<1	2.93	<1	<1	-	-	-	-	-	-	3.64	3.36	**3.83**	<1	<1	3.5	7728
7825	2	1	3	4.24	4.34	5.13	3.82	<1	4.68	-	-	-	-	-	-	<1	<1	5.01	3.95	4.15	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.3	3.11	<1	<1	<1	3.48	7825
7876	3	1	2	4.26	4.34	5.19	3.48	<2	4.53	3.9	<2	4.17	3.3	<1	<1	<3	<3	5.16	-	-	-	3.38	<1	<1	-	-	-	-	-	-	-	-	-	3.71	3.23	<1	<1	<1	4.08	7876
7906	1	3	2	4.2	4.9	5.3	3.7	<2	4.6	3.7	<2	4.3	**4.9**	<1	<1	<3	<3	5.2	4.5	3.9	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.5	3.4	<1	<1	<1	3.8	7906
7930	2	3	1	4.3	4.29	5.26	3.71	<1	4.53	3.98	<1	4.46	3.18	<1	<1	<1	<1	5.11	-	-	-	3.46	<1	<1	3.48	<1	<1	-	-	-	-	-	-	3.75	3.4	<1	<1	<1	3.44	7930
7940	3	2	1	4.37	4.38	5.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7940
7946	1	3	2	**5.62**	5.48	5.87	**4.88**	0	**5.16**	**4.55**	0	**4.85**	3.81	0	0	0	0	5.78	4.03	**0**	0	-	-	-	-	-	-	-	-	-	-	-	-	**4.76**	**0**	0	0	0	4.25	7946
7962	3	2	1	4.32	4.34	5.09	3.79	<2	4.72	3.73	<2	4.2	2.64	<1	<1	<3	<3	4.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.32	**2.72**	<1	<1	<1	3.61	7962
8066	2	3	1	-	-	-	3.89	0	4.39	3.8	0	4.16	-	-	-	0	0	**1.64**	3.93	**4.56**	**4.61**	-	-	-	-	-	-	4.14	4.68	5.02	0	3.91	0	-	-	-	-	-	-	8066
8068	1	2	3	4.13	4.24	5.34	3.48	<2	**4.95**	3.82	<2	4.17	3.4	<1	<1	<3	<3	5.49	4.02	4.2	<1	3.22	<1	<1	2.95	<1	<1	-	-	-	-	-	-	3.6	3.32	<1	<1	<1	3.2	8068
8105	1	3	2	4.16	4.72	5.03	-	-	-	3.69	>1.0	4.12	-	-	-	<1	<1	4.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.84	3.5	<1	<1	<1	3.3	8105
8255	1	2	3	4.3	4.3	5.18	3.49	<2	4.84	3.78	<2	4.26	3.46	<1	<1	<3	<3	5.15	3.95	**<1**	<1	3.18	<1	<1	3.45	<1	<1	-	-	-	-	-	-	3.65	3.52	<1	<1	<1	3.28	8255
8260	3	1	2	4.18	4.13	5.14	3.75	<1	4.46	3.68	<1	4.15	3.06	<1	<1	<1	<1	5.16	-	-	-	3.06	<1	<1	3.06	<1	<1	-	-	-	-	-	-	3.63	3.54	<1	<1	<1	3.48	8260
8313	2	3	1	4.13	4.62	5.08	3.69	<2	4.35	3.51	<2	3.85	3.11	<1	<1	<3	<3	**3.83**	-	-	-	-	-	-	3.3	<1	<1	-	-	-	-	-	-	3.48	3.48	<1	<1	<1	3.76	8313
8333	3	1	2	4.44	4.16	5.34	3.82	<2	4.45	3.84	<1.6	4.14	3.3	<1	<1	-	-	-	3.41	**<2**	<2	-	-	-	3.31	<1	<1	-	-	-	-	-	-	3.64	3.44	<1	<1	<1	4.24	8333
8352	2	1	3	4.24	5.03	5.57	3.8	<1	**5.26**	3.8	<1	**5.15**	3.2	<1	<1	<1	<1	5.34	4.07	**<1**	<1	-	-	-	**2.16**	<1	<1	-	-	-	-	-	-	3.58	3.32	<1	<1	<1	3.5	8352
8380	3	1	2	4.26	4.34	5.18	3.53	<2	4.11	3.9	<2	4.14	3.11	<1	<1	<3	<3	4.94	3.36	**<1**	<1	3.23	<1	<1	3.31	<1	<1	-	-	-	-	-	-	3.66	3.06	<1	<1	<1	3.94	8380
8397	1	3	2	4.4	4.8	5.2	3.7	<1	4.4	3.7	<1	4.3	3.2	<2	<2	<1	<1	5.1	3.8	4.3	<1	3.3	<1	<1	-	-	-	4.4	4.7	5.2	<1	3.6	<1	3.5	3.2	<1	<1	<1	3.5	8397
8428	3	1	2	4.37	4.22	5.04	3.7	<2	4.54	3.7	<2	4.08	3.28	<1	<1	<3	<3	4.85	3.9	**<2**	<1	3.49	<1	<1	3.45	<1	<1	-	-	-	-	-	-	3.65	3.21	<2	<2	<2	3.82	8428
8435	1	2	3	**5.36**	4.54	5.45	3.76	<1	4.74	3.95	<1	4.3	3.3	<1	<1	<3	<3	4.45	-	-	-	-	-	-	3.17	<1	<1	-	-	-	-	-	-	3.59	3.38	<1	<1	<1	3.6	8435
8523	1	2	3	4.52	**<1**	4.56	**4.44**	**5.79**	**5.16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.49	3.41	**4**	<1	<1	**<1**	8523
8529	1	2	3	4.36	4.29	4.68	3.77	<2	4.51	3.8	<2	3.76	3.23	<1	<1	<3	<3	4.7	**<2**	4.25	<2	3.72	<1	<1	3.72	<1	<1	-	-	-	-	-	-	3.79	3.18	<1	<1	<1	3.79	8529
8568	1	2	3	4.16	4.49	5	3.55	<2	4.44	3.72	<2	4.09	3.39	<1	<1	-	-	-	4	**<2**	<2	-	-	-	3.2	<1	<1	-	-	-	-	-	-	3.59	3.28	<1	<1	<1	3.62	8568
8626	3	2	1	4.32	4.36	5.15	**4.76**	<1	4.52	3.66	<0.3	4.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.36	4.88	5.12	-	-	-	-	-	-	-	-	-	8626
8628	1	2	3	4.45	4.31	5.02	3.63	<2	4.51	3.94	<2	4.25	3.51	<1	<1	<3	<3	4.65	-	-	-	3.6	<1	<1	3.56	<1	<1	4.17	4.7	4.97	<2	3.45	<2	3.65	3.22	<1	<1	<1	3.85	8628
8657	2	1	3	4.56	4.38	5.56	3.98	<1	4.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.71	3.51	<1	<1	<1	3.6	8657
8676	2	1	3	4.44	4.41	5	3.79	0	4.57	-	-	-	3.09	0	0	0	0	4.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	3.29	**3.98**	-	-	-	8676
8734	2	1	3	4.4	4.9	5.3	3.8	0	4.6	-	-	-	-	-	-	-	-	-	3.9	4.2	0	-	-	-	-	-	-	-	-	-	-	-	-	3.5	3.5	**4.4**	0	0	3.5	8734
8742	3	1	2	4.17	4.19	5.01	4	<1	4.53	3.66	<1	4.04	2.88	<1	**4.08**	<1	<1	4.78	3.76	4.18	**4.62**	**2.4**	<1	<1	**2.41**	**1**	<1	4.14	4.61	4.89	-	-	-	3.43	3.45	<1	<1	<1	3.58	8742
8756	2	3	1	**5.38**	**5.78**	**6.32**	**5.32**	<1	4.69	3.96	<1	4.48	3.39	<1	<1	<1	<1	5.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	3.65	**3.08**	**3.6**	**3.65**	3.08	8756
8766	3	1	2	4.4	4.4	5.2	3.7	<1.3	4.4	3.8	<2	3.9	3.3	<1	<1	<3	<3	5.3	-	-	-	3.5	<1	<1	-	-	-	-	-	-	-	-	-	3.6	**1.9**	<1	<1	<1	4	8766
8891	3	1	2	4.48	4.25	4.94	3.54	<3	4.16	3.76	<3	4.22	3.59	<2	<2	<4	<4	4.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.78	3.42	<2	<2	<2	4.62	8891
8909	2	3	1	4.36	4.29	5.19	3.81	<1	4.57	3.85	<1	4.23	3.06	<1	<1	<1	<1	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.69	3.17	**3.76**	<1	<1	3.74	8909
8918	1	2	3	4.28	4.86	5.03	-	-	-	3.78	<2	4.11	2.95	<1	<1	<3	<3	4.78	3.76	4.18	<1	3.32	<1	<1	3.32	<1	<1	-	-	-	-	-	-	3.51	3.3	<1	<1	<1	3.92	8918
9002	3	1	2	4.28	4.29	5.33	3.82	<2	4.63	**4.84**	<2	4.4	3.28	<1	<1	<3	<3	5.23	3.36	4.2	<1	-	-	-	3.13	<1	<1	-	-	-	-	-	-	3.55	3.21	**3.19**	<1	<1	3.53	9002
9034	1	2	3	4.3	4.26	5.04	3.6	<2	4.6	3.71	<2	4.19	-	-	-	-	-	-	**<1**	4.19	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9034
9217	2	1	3	4.2	4.3	5.2	3.8	<1	4.5	-	-	-	-	-	-	<3	<3	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	3.3	<1	<1	<1	3.4	9217
9245	2	3	1	4.35	4.34	5.26	3.68	<2	4.54	3.82	<2	4.16	3.3	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	3.42	<1	<1	<1	3.56	9245
9359	3	2	1	4.18	4.23	4.89	3.62	<2	4.46	3.79	<2	4.23	3.11	<1	<1	<3	<3	4.76	-	-	-	3.42	<1	<1	3.38	<1	<1	-	-	-	-	-	-	3.57	3.32	<1	<1	<1	3.54	9359
9408	2	3	1	-	-	-	-	-	-	3.86	<2	4.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.28	5	5.05	<2	3.97	<2	-	-	-	-	-	-	9408
9420	2	1	3	4.36	4.36	5.26	3.78	<2	4.54	3.86	<1	4.2	-	-	-	-	-	-	-	-	-	-	-	-	3.11	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	9420
9429	2	1	3	4.32	4.4	5.28	3.59	<1	4.59	3.76	<1	4.41	3.26	<1	<1	<2	<2	5.11	-	-	-	3.52	<1	<1	3.32	<1	<1	-	-	-	-	-	-	3.63	3.45	<1	<1	<1	3.72	9429
9436	1	2	3	4.15	4.32	5.23	3.14	<1	4.32	3.75	<1	4.14	3.32	<1	<1	<1	<1	5.49	3.9	**3.34**	**4.11**	3.59	<1	<1	3.11	<1	<1	-	-	-	-	-	-	3.59	**2.3**	<1	<1	<1	4.14	9436
9441	3	1	2	4.26	4.3	5.18	3.43	<2	4.49	3.72	<2	4.36	3.04	<1	<1	<3	<3	5.08	4	4.18	**4.04**	3.48	<1	<1	3.28	<1	<1	4.11	4.81	5.2	<2	3.3	<2	3.63	3.64	<1	<1	<1	3.86	9441
9451	1	3	2	4.6	4.73	4.91	3.75	<1	4.53	3.9	<1	4.23	3.08	<1	<1	<1	<1	4.72	-	-	-	3.45	<1	<1	3.38	<1	<1	4.28	4.89	4.95	-	-	-	-	-	-	-	-	-	9451
9453	2	3	1	4.14	4.29	5.02	3.65	<1	4.54	-	-	-	3.32	<1	<1	<1	<1	5.1	**<1**	**<1**	**5.04**	-	-	-	-	-	-	-	-	-	-	-	-	3.65	3.36	<1	<1	<1	3.61	9453
m				4.31	4.43	5.18	3.73	–	4.50	3.80	–	4.17	3.12	–	–	–	–	5.10	3.92	4.21	–	3.36	–	–	3.32	–	–	4.2	4.67	5.14	–	3.61	–	3.59	3.32	–	–	–	3.64	**m**
s				0.12	0.31	0.24	0.17	–	0.14	0.16	–	0.17	0.25	–	–	–	–	0.30	0.21	0.09	–	0.18	–	–	0.22	–	–	0.13	0.33	0.19	–	0.32	–	0.14	0.13	–	–	–	0.32	**s**

Lab. no.	Sample			Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coagulase pos. *Staphylococcus*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish. 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
9465	1	2	3	4.3	4.23	5.06	3.7	<2	4.45	3.75	<2	4.1	3.5	<1	<1	<3	<3	4.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9465
9512	3	2	1	4.3	4.21	5.11	3.7	<1	4.52	-	-	-	3.6	<1	**4.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.59	3.15	<1	<1	<1	3	9512
9555	1	3	2	4.11	4.09	5.09	3.72	<1	4.32	3.74	<1	4.2	2.98	<1	<1	<1	<1	5.11	-	-	-	3.59	<1	<1	-	-	-	-	-	-	-	-	-	3.55	3.21	<1	<1	<1	3.71	9555
9559	3	2	1	4.62	4.32	5.01	3.73	<1	4.62	3.87	<1	4.16	3.02	<1	<1	<1	<1	5.49	**2.77**	**5.51**	**4.2**	-	-	-	3.63	<1	<1	-	-	-	-	-	-	3.43	3.22	<1	<1	<1	4.34	9559
9569	1	2	3	4.34	4.44	5.35	3.74	<1	4.7	3.96	<1	4.26	3.11	<1	<1	<1	<1	5.22	3.93	4.18	<1	3.19	<1	<1	3.2	<1	<1	-	-	-	-	-	-	3.67	3.35	<1	<1	<1	3.45	9569
9747	1	3	2	4.14	4.14	4.73	-	-	-	-	-	-	**<1**	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.51	**<1**	<1	<1	<1	3.6	9747
9763	2	3	1	4.35	4.26	5.06	3.85	<1	4.58	-	<1	3.8	3.14	<1	<1	<1	<1	5.56	-	-	-	-	<1	<1	3.26	<1	<1	-	-	-	-	-	-	3.66	-	<1	<1	<1	3.91	9763
9783	1	3	2	4.22	4.22	5.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9783
9886	2	3	1	4.43	4.95	5.27	3.88	<1	4.61	3.88	<1	4.27	3.11	<1	<1	<1	<1	5.15	3.96	4.2	<1	3.56	<1	<1	3.51	<1	<1	-	-	-	-	-	-	3.11	**<1**	<1	<1	<1	3.75	9886
9890	2	3	1	4.37	4.22	5.49	3.82	0	4.53	3.74	0	4.35	3.18	0	0	-	-	-	3.88	4.16	0	-	-	-	-	-	-	-	-	-	-	-	-	3.61	3.33	0	0	0	3.6	9890
9903	3	1	2	4.29	4.27	5.23	3.73	0	4.63	3.84	0	4.27	3	0	0	0	0	4.67	-	-	-	3.25	0	0	-	-	-	-	-	-	-	-	-	3.48	3.31	0	0	0	3.74	9903
9923	3	1	2	4.28	4.26	4.72	3.57	<2	4.38	3.74	<2	4.08	3.13	<1	<1	<3	<3	4.65	4.09	4.22	**4.72**	-	-	-	-	-	-	-	-	-	-	-	-	3.58	3.44	<1	<1	<1	3.75	9923
9950	3	1	2	4.3	5	5.6	-	-	-	-	-	-	2.2	<1	<1	-	-	-	4	4.4	<1	-	-	-	-	-	-	-	-	-	-	-	-	3.7	3.4	<1	<1	<1	3.7	9950
m				4.31	4.43	5.18	3.73	–	4.50	3.80	–	4.17	3.12	–	–	–	–	5.10	3.92	4.21	–	3.36	–	–	3.32	–	–	4.2	4.67	5.14	–	3.61	–	3.59	3.32	–	–	–	3.64	**m**
s				0.12	0.31	0.24	0.17	–	0.14	0.16	–	0.17	0.25	–	–	–	–	0.30	0.21	0.09	–	0.18	–	–	0.22	–	–	0.13	0.33	0.19	–	0.32	–	0.14	0.13	–	–	–	0.32	**s**
n				169	169	169	148	147	148	131	130	132	132	132	131	119	120	118	65	64	63	70	71	71	75	76	76	23	23	23	21	22	21	152	150	150	148	148	149	**n**
Min				2.48	0	3.53	2.3	0	2	0.9	0	0	0	0	0	0	0	0	0	0	0	1.54	0	0	1.9	0	0	3.86	3.92	4.77	0	2.9	0	0	0	0	0	0	0	**Min**
Max				5.62	6.29	6.34	5.32	5.79	5.3	4.93	0	5.26	4.9	2.86	4.96	0	4.2	8.89	4.5	5.51	5.23	4.1	0	0	3.77	1	0	4.46	5.28	5.6	0	4.04	0	4.76	4.39	5.57	3.72	3.65	4.62	**Max**
Median				4.3	4.315	5.18	3.74	0	4.51	3.81	0	4.18	3.11	0	0	0	0	5.11	3.93	4.2	0	3.38	0	0	3.32	0	0	4.18	4.7	5.18	0	3.6	0	3.6	3.325	0	0	0	3.612	**Median**
m				4.31	4.43	5.18	3.73	–	4.50	3.80	–	4.17	3.12	–	–	–	–	5.10	3.92	4.21	–	3.36	–	–	3.32	–	–	4.2	4.67	5.14	–	3.61	–	3.59	3.32	–	–	–	3.64	**m**
s				0.12	0.31	0.24	0.17	–	0.14	0.16	–	0.17	0.25	–	–	–	–	0.30	0.21	0.09	–	0.18	–	–	0.22	–	–	0.13	0.33	0.19	–	0.32	–	0.14	0.13	–	–	–	0.32	**s**
F+				0	0	0	0	2	0	0	0	0	0	1	10	0	1	0	0	0	16	0	0	0	0	1	0	0	0	0	0	0	0	0	0	20	3	3	0	**F+**
F-				0	1	0	0	0	0	0	0	1	7	0	0	0	0	2	6	17	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	2	**F-**
Outl<				5	3	3	2	0	4	4	0	2	0	0	0	0	0	3	1	4	0	6	0	0	6	0	0	0	0	0	0	0	0	6	6	0	0	0	1	**Outl<**
Outl>				7	3	3	6	0	5	3	0	4	2	0	0	0	0	2	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	**Outl>**
L. value OK				3.95	4	4.31	3	0	4.11	3.32	0	3.68	2.15	0	0	0	0	4.12	3.3	3.9	0	2.98	0	0	2.6	0	0	3.86	3.92	4.77	0	2.9	0	3.11	2.85	0	0	0	2.7	**L. OK**
H. value OK				4.74	5.48	5.9	4.17	0	4.84	4.33	0	4.71	3.81	0	0	0	0	6.09	4.5	4.4	0	3.79	0	0	3.77	0	0	4.46	5.28	5.6	0	4.04	0	4.24	3.65	0	0	0	4.62	**H. 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
Outl< = low outlier
Outl> = high outlier
L. value OK = lowest accepted value
H. value OK = higest accepted value

Appendix 2.

z-scores of all participants

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

x = result of the individual laboratory

m = mean of the results of all participating laboratories

s = standard deviation of the results of all participating laboratories

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

False results did not generate a z-score.

☐ *2 < |z| ≤ 3,* ☐ *|z|>3*

Lab. no.	Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coag. pos. *Staphylococcu*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
1081	0.765	-0.292	0.068	1.200	0	-1.108	0.926	0	-1.362	-0.489	0	0	0	0	1.495				<4	0	0	<4	0	0							-0.453	-2.888	0	0	0	-2.024	1081
1149	0.122	-0.388	0.278	1.258	0	1.116	-0.643	0	-1.362	1.950	0	0	0	0	0.285																-1.703	-1.713	0	0	0	-0.092	1149
1254				0.111	0	-0.135	0.173	0	0.035				0	0	-0.500				0.401	0	0										0.797	-0.302	0	0	0	0.437	1254
1290	-0.119	-1.058	0.907	0.398	0	-0.691	-0.643	0	-1.013				0	0	0.645				-0.906	0	0										0.033	-0.146	0	0	0	-0.435	1290
1594	0.203	-0.547	0.655	-0.119	0	0.560	0.550	0	0.326	0.812	0	0	0	0	0.514							1.597	0	0				0	-0.966	0	0.241	0.325	0	0	0	0.531	1594
1970	1.086	-0.930	1.242	0.168	0	-0.483	0.675	0	0.733	0.812	0	0	0	0	0.023		>4		1.026	0	0	0.361	0	0	1.992	1.822	1.614	0	-0.841	0	1.352	1.108	0	0	0	1.372	1970
2035							-0.015	0	-0.431							-1.027	0.973	0	-0.906	0	0	-1.928	0	0							-0.661	-0.146	0	0	0	-0.123	2035
2058	-0.761	-0.483	0.655				0.424	0	-1.071	-0.285	0	0	0	0	0.514				0.003	0	0										-0.453	-1.870	0	0	0	-0.933	2058
2072	-0.119	-0.898	0.487	1.774	0	<4	0.613	0	0.151	-0.326	0		0	0	0.318				-3.747	0	0										0.033	-0.146	0	0	0	0.188	2072
2086																																					2086
2324	-0.279	-0.739	-0.310	0.340	0	0.282				0.121	0	0	0	0	<4																0.519	0.325	0	0	0	-2.086	2324
2344	-0.279	0.091	-0.352	-1.552	0	0.699	-2.150	0	-2.235	-0.163	0		0	0	0.023	0.062			1.026	0	0	0.773	0	0							-0.175	0.873		0	0	0.437	2344
2386	1.407	1.590	0.487				0.299	0	0.384	0.324	0	0	0	0	0.023							<4	0	0													2386
2402	1.487	0.155	-2.113	1.200	0	-2.221	1.743	0	1.024										<4	0	0										0.172	-0.459	0	0	0	0.250	2402
2459	>4	>4	>4				<4	0	4.000				0	0	3.228																						2459
2553							-3.783	0	-0.780	-0.082	0	0	0	0	1.626	-0.080	-1.193	0	0.231	0	0	0.361	0	0													2553
2637	0.363	-0.228	0.319	0.512	0	0.560	0.926	0	0.151	0.121	0	0	0	0	-0.794	-0.222	-0.110	0	-1.019	0	0	-1.790	0	0							0.103	0.481	0	0	0	-0.746	2637
2720	-0.279	-0.356	-0.352	-0.348	0	0.352				0.243	0	0																			<4	<4	0	0	0	-0.186	2720
2745	-1.564	-0.898	-0.268	0.340	0	0.282	-0.329	0	0.151	0.975	0	0	0	0	0.318				1.992	0	0																2745
2764	-2.688	-0.069	-0.142	-0.176	0	0.977	-0.832	0	-1.653	-0.163	0	0				-0.364		0				-0.555	0	0							-1.009	0.011	0	0	0	-1.120	2764
2842	<4	-1.121	-2.239	-1.093	0	-2.429	-2.527	0	<4	-1.058	0	0	0	0	1.331	-0.648	<4	0	-1.588	0	0	-0.097	0	0							-3.578	-2.183	0	0	0	-1.432	2842
2920	0.765	-0.292	0.278	0.340	0	-0.135	0.299	0	0.093													-0.692	0	0													2920
3055	-1.644	-0.451	-1.274	-1.093	0	-1.247				0.690	0																				-0.384	0.011	0	0	0	-0.902	3055
3225	-0.921	-0.675	-0.016	-0.061	0	-0.274				-0.895	0	0																			-1.009	-0.537	0	0	0	-0.653	3225
3243	0.203	-0.483	0.110	0.340	0	0.004																															3243
3305	1.487	-0.739	-0.352	1.544	0	0.699	-0.015	0	0.151		0	0	0	0		-2.921	-1.193		0.231	0	0	1.276	0	0	1.532	0.074	0.327	0	-0.966	0	0.033	-0.929	0	0	0	-0.123	3305
3346	-1.002	-0.388	0.613	0.398	0	0.977	0.299	0	0.792	-0.041	0	0	0	0	0.318	0.015	-0.327	0	0.117	0	0	0.956	0	0							0.103	0.011	0	0	0	-0.155	3346
3457	1.969	-0.579	-0.100	-0.577	0	-0.413							0	0	-0.566	-0.222	-0.219	0	1.026	0	0				-0.306	-0.408	0.327	0	-0.186	0		0.560	0	0	0	0.064	3457
3511				0.053	0	0.073	-0.957	0					0	0	1.135										0.690	-1.041	0.482	0	-1.184	0	0.033	-0.224	0	0	0	1.091	3511
3543	-0.279	0.346	0.152	2.232	0	1.464				-0.245	0	0	0	0	-1.383							-0.417	0	0							2.811	1.030	0	0	0	1.746	3543
3587	-1.082	-0.739	-0.729	-0.692	0	-0.413	-1.271	0	-0.664		0	0	0	0	-1.318							<4	0	0							-1.286	-1.635	0	0	0		3587
3588	-0.119	-0.420	-0.142	0.914	0	0.560	0.989	0	<4	-0.570	0	0	0	0	-3.215	-0.269		0				-0.783	0	0							0.172	-0.381	0	0	0	0.064	3588
3626	0.684	-0.420	-0.771	-0.176	0	0.699	0.613	0	-0.431	-0.082	0	0	0	0	0.972				-0.338	0	0																3626
3803	0.042	-0.260	-0.436				0.299	0	-0.198	0.284	0	0	0	0	-0.206	0.441	0.215	0	-0.963	0	0	-0.188	0	0	-1.072	0.376	-0.394	0	-0.529	0	0.589	1.187	0	0	0	1.309	3803
3831	>4	-0.483	-3.665				3.312	0	-2.876																							0.873			0		3831

Lab. no.	Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coag. pos. *Staphylococcu*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
4047	-0.761	2.005	0.068	0.627	0	0.421	0.926	0	-0.023	1.259	0		0	0	-1.220																-1.009	-0.929	0	0	0	-1.058	4047
4050	0.684	-0.388	-0.058	-0.061	0	0.143				0.731	0	0				1.199	1.514	0												0.658	0.403	0	0	0	-0.092	4050
4064	-1.564	-0.770	-0.603	-0.405	0	0.630	-0.769	0	-0.664																											4064
4153	1.086	-0.483	0.319	-0.233	0	1.325	0.173	0	0.966	-0.041	0	0	0	0	0.023	0.252	-0.327	0	-1.019	0	0	-0.005	0	0				0	0.937	0	-0.175	0.011	0	0	0	-0.030	4153
4171	-0.279	1.271	-0.310	-0.176	0	1.394	2.182	0	3.120		0	0				-0.506		0					0	0							0.103	-0.302	0	0	0	0.687	4171
4246	-0.119	-0.483	-1.148										0	0	-1.579																					4246
4278	<4	<4	<4	<4	0	<4				-1.390	0	0																		<4	<4	0	0	0	-2.683	4278
4288	>4	2.771	>4	>4	0	>4	>4	0	>4	-0.163	0	0	0	0	3.915				>4	0	0	1.917	0	0							1.283	>4	0	0	0	3.054	4288
4305	-1.243	-0.483	0.236	0.168	0	-0.830					0	0				0.962	0.431					-1.470	0	0							0.797	-0.224		0	0	-0.061	4305
4339	-0.119	-0.101	-1.190	0.971	0	0.004	0.613	0	-0.431	1.137	0	0	0	0	-1.318	0.394	0.973	0	0.231	0	0	1.734	0	0	0.001	0.979	-1.217	0	-0.030	0	1.422	-0.146	0	0	0	0.811	4339
4352										0.243	0	0	0	0	-0.206										0.230	-0.468	0.224	0	0.282	0	0.380	-1.635	0	0	0	0.064	4352
4353	0.925	-1.249	1.871							0.446	0	0										0.361	0	0							-0.523	0.873	0	0	0	-1.276	4353
4356	-0.279	1.399	-0.603	0.340	0	0.560	-0.015	0	-0.547	-0.814	0	0	0	0	-0.794				-2.156	0	0										-2.536	0.873		0	0	0.531	4356
4400	0.684	-0.739	-1.610	0.398	0	-0.691				>4	0	0																			-0.661	-1.713	0	0	0	-0.435	4400
4562	-0.440	-0.069	-0.603	-0.004	0	-1.247	-0.706	0	-2.235	0.324	0	0	0	0	-0.631	0.299	-0.652	0	0.231	0	0										1.075	0.638	0	0	0	-1.650	4562
4633	1.005	-0.739	0.613	0.512	0	-1.178	0.487	0	-0.140	0.324	0	0	0	0	0.775				0.401	0	0	0.178	0	0							0.103	0.246		0	0	-0.622	4633
4635	<4	2.898	0.949	-0.061	0	-0.344				0.162	0	0	0	0	0.710	0.394	0.973	0				0.407	0	0							-0.245	0.325	0	0	0	-0.186	4635
4658	0.122	0.601	1.368	-1.552	0	-0.066	0.110	0	1.839				0	0	-0.140																					4658
4689				2.118	0	0.004				-0.895	0	0																									4689
4713	0.684	-0.802	0.739	-0.291	0	0.769	<4	0	0.617	1.463	0	0	0	0	0.252	0.915			-0.906	0	0	-0.555	0	0	-0.382	-2.276	-1.887		-0.966		0.311	0.481	0	0	0	-0.746	4713
4817	0.042	-0.739	-0.058	0.053	0	0.630	0.236	0	1.781		0	0	0	0	-0.402				-1.417	0	0										0.589	0.325	0	0	0	0.375	4817
4840	0.203	-0.356	1.116	0.111	0	1.186	0.110	0	0.151				0	0	0.252	0.583	1.406	0	-0.451	0	0										>4	-0.929		0	0	-1.120	4840
4889	-0.119	-0.228	0.655	0.684	0	0.838	0.864	0	1.199	0.731	0	0	0	0								0.727	0	0	-0.153	0.858	1.254	0	1.125	0	0.033	0.481	0	0	0	-1.183	4889
4951	-1.323	-1.217	-1.190	-2.527	0	-2.151	0.110	0	-1.770																						-3.856	-3.672	0	0	0	-1.245	4951
4955	-0.520	1.686	0.865	0.053	0	0.977	-0.267	0	-0.373	0.243	0	0	0	0	-0.108	0.867	0.973	0	-0.110	0	0	0.086	0	0							0.103	0.481	0	0	0	0.250	4955
4980	-0.681	1.239	-0.394	0.168	0	-1.387	-0.706	0	-1.129	-0.163	0	0	0	0	-0.598																-0.175	-0.616	0	0	0	0.188	4980
5018	-0.841	-0.611	-0.603	-0.635	0	-1.108	-1.836	0	-0.140	-1.627	0	0	0	0	-0.664	0.867	>4	0	-1.588	0	0	-0.921	0	0							-0.106	-0.067	0	0	0	0.375	5018
5100	-0.761	-0.579	1.242				-0.455		0.792																						>4	0.325				2.026	5100
5119	0.283	-0.388	0.445				1.429	0	0.733																												5119
5162	0.443	>4	2.207							-0.611	0	0																			-0.245	0.403	0	0	0	-0.840	5162
5197	2.290	0.219	0.068	2.118	0	1.394	1.240	0	0.733				0	0	0.318																0.033	0.638	0	0	0	2.369	5197
5201	-0.520	1.814	-0.142	-0.921	0	0.004	-2.213	0	0.151	-2.480	0	0	0	0	-0.010																-0.106	0.481	0	0	0	-0.528	5201
5204	-0.921	1.495	0.068	-0.176	0	-0.691	-0.015	0	-1.013	0.731	0	0	0	0	-0.664				-0.906	0	0										-0.661		0	0	0	-2.927	5204
5220	-1.002	-1.345	0.068				-0.392	0	-0.664				0	0	-0.206																-0.314	-1.008	0	0	0	-1.151	5220
5250				>4		-0.587	2.722		0.803							2.014	0.160														-3.231					-0.083	5250
5304	1.567	0.761	0.319				0.989	0	-0.198										1.197	0	0										0.866	1.108	0	0	0	1.123	5304
5329	0.684	-0.611	1.620	1.487	0	0.699				-1.220	0	0	0	0	1.756	0.204		0													0.380	0.638	0	0	0	-0.497	5329
5333	0.042	-0.483	<4	-0.635	0	-0.066				-0.529	0		0	0	-1.285																-2.328	0.011	0			1.247	5333
5338	1.487	-0.420	0.907																												1.422	2.206	0	0	0	2.119	5338
5350	-0.119	-0.101	1.578				1.115	0	1.141	0.162	0	0										-0.097	0	0							<4	<4	0	0	0	<4	5350
5380	-2.929	2.707	0.949	0.684	0	0.282	-0.392	0	0.500	-0.489	0	0	0	0	0.677																0.797	-1.086					5380
5545	-0.119	-0.739	-1.190	-0.176	0	0.699				-0.082	0		0	0	0.972	-0.080	<4														-0.661	-0.929	0	0	0	0.188	5545
5553				-2.125	0	-0.413	-1.271	0	-0.780	0.284	0	0	0	0	-0.304				2.446	0	0																5553
5615	0.684	2.165	1.032	0.455	0	0.282	-0.643	0	0.850	0.446	0	0	0	0	0.252				-0.735	0	0	-0.646	0	0							0.380	0.011		0	0	-1.743	5615
5647	1.246	-0.324	-1.736	2.519	0	-0.622	-2.904	0	-0.606				0	0	0.579				<4	0	0	2.055	0	0							0.866	0.795	0	0	0	-0.123	5647
5701																																					5701
5764				1.223	0	-1.296				-1.119	0	0																									5764
5774				0.455	0	-0.622							0	0	0.841																-0.036	0.638	0	0	0	0.313	5774

Lab. no.	Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coag. pos. *Staphylococcu*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
5801	-1.644	-0.898	-1.861	-0.749	0	-1.108				0.243	0	0																			-2.883	-1.243	0	0	0	-1.432	5801
5883	-0.600	-0.547	0.152	-0.405	0	-0.274	-0.769	0	-0.315	-0.570	0	0	0	0	-0.075				-0.735	0	0										0.450	0.325	0	0	0	-0.155	5883
5893	0.684	-3.610	2.584	-0.176	0	-1.387	1.240	0	3.062													<4	0	0							1.422	-0.929	0	0	0	0.188	5893
5993													0	0	>4																						5993
6052	3.414	1.750	-0.184	1.028	0	0.977	0.236	0	0.733				0	0	0.023	0.394	<4	0													>4	>4		0	0	-0.435	6052
6109	-1.082	-0.005	1.620				-1.773	0	-1.770	0.812	0	0				0.915		0				0.178	0	0							0.172	0.717	0	0	0	0.468	6109
6138	-1.403	1.495	0.823	0.340	0	-1.108	0.299	0	-0.256	0.243	0	0	0	0	0.416				1.026	0	0										0.033	0.717	0	0	0	-0.497	6138
6175																															-0.731	0.325	0	0	0	-0.217	6175
6220	-0.520	2.611	-0.058				-3.783	0	-0.780																												6220
6224	1.487	2.452	0.487	0.971	0	0.004				-0.082	0	0																									6224
6232	-1.002	-0.898	-1.148	-1.380	0	-0.622																															6232
6253	-0.520	-0.228	-0.058	0.914	0	1.394	0.047	0	0.035	-0.326	0	0	0	0	0.154							-0.555	0	0							0.658	0.481	0	0	0	0.811	6253
6343	0.042	-0.675	-0.310	0.455	0	0.421	0.047	0	-0.140	-0.489	0	0	0	0	-0.206				-0.451	0	0	-1.287	0	0							-0.384	-1.086	0	0	0	0.500	6343
6352	-0.359	-0.770	-0.771	-0.176	0	-0.691	-0.015	0	-0.431	-0.489	0	0	0	0	-1.187	-0.080	-0.544	0	-0.338	0	0										-0.384	0.403	0	0	0	-0.279	6352
6368	-0.119	-0.420	0.026	-0.405	0	0.977	0.299	0	0.617	0.650	0	0	0	0	-0.075	-0.032	-0.110	0				-0.005	0	0	-0.918	0.496	0.739	0	1.218	0	0.172	-0.459	0	0	0	0.282	6368
6456	0.604	-0.324	0.026	0.455	0	-2.707	-0.141	0	0.559	0.040	0	0	0	0	0.252				-0.054	0	0	0.498	0	0							0.241	0.325	0	0	0	0.655	6456
6490	-0.480	-0.742	0.194	-0.337	0	-0.587				0.227	0	0	0	0	1.639							0.576	0	0							0.839	0.646	0	0	0	0.263	6490
6594	-0.119	1.271	-0.310	1.143		-0.344	-1.146	0	-0.780	-1.058	0	0										0.361	0	0							-0.106	-0.459	0	0	0	1.123	6594
6628	-0.199	-0.228	-0.477																												-1.842	-1.008	0	0	0	0.282	6628
6658	>4	-0.483	-1.484	0.512	0	-2.499				-1.058	0	0																									6658
6707	0.363	-0.164	-0.436	0.168	0	-1.247	-0.267	0	0.617	-0.041	0	0	0	0	1.397				1.026	0	0	0.727	0	0	-0.306	-1.252	-0.394	0	0.750	0	-0.592		0	0	0	-0.186	6707
6720	0.797	-0.247	-0.247	0.587	0	0.713	-0.480	0	0.227	0.170	0	0	0	0	0.112				0.668	0	0	0.778	0	0							0.346	0.779	0	0	0	1.540	6720
6762	<4	1.048	-0.436	<4	0	-0.622	0.926	0	-0.373																												6762
6852	1.487	-0.101	0.907	0.971	0	<4	1.240	0	-1.013																						1.422	0.638	0	0	0	0.500	6852
6944							-0.204	0	-0.198	1.869	0	0	0	0	-0.271	-0.269	-0.760	0							-2.603	-2.005	-0.960	0	-2.214	0	-1.286	-0.459	0	0	0	0.032	6944
6958	-0.841	-1.377	-0.603	0.742	0	2.298				-0.692	0	0																			-0.592	-1.478	0	0	0	-1.432	6958
6971	<4	-3.680	<4	<4	0	<4				-3.960																											6971
6992	1.567	0.314	1.871	1.774	0	-0.135	1.492	0	0.850	-0.570	0	0	0	0	1.953				-0.735	0	0										0.172	-0.694	0	0	0	0.095	6992
7024	0.524	-0.037	-0.310	0.111	0	0.977				-0.285	0	0																			-0.384	-0.067		0	0	-1.120	7024
7096	0.363	1.144	0.655				-0.392	0	0.733				0	0	0.710										-0.153	-0.830	0.224	0	1.062	0							7096
7182	1.086	1.495	0.236	0.512	0	-2.151	0.110	0	-1.071							1.057	0.864	0													0.103		0	0		1.091	7182
7207	0.363	2.834	3.003	-1.724	0	-0.691										-0.648		0													-1.286	-1.556	0	0	0	-0.155	7207
7232	1.567	2.324	0.907																												1.144	0.403		0	0	-0.373	7232
7242	-0.408	-0.193	-0.834	-1.908	0	1.068	-2.652	0	0.134	-2.586	0								0.452	0	0										0.082	1.124	0	0	0	0.197	7242
7248	-1.002	-0.611	-0.813	-0.405	0	-0.135	0.487	0	-0.140	-0.367	0	0	0	0	-0.827	-1.690	-1.735		-1.531	0	0	-0.738	0	0							0.519	0.560	0	0	0	0.001	7248
7253	0.122	-0.579	-0.855	-1.896	0	-0.135	-3.029	0	-0.955																						-0.314	0.325	0	0	0	0.593	7253
7334	-0.440	-0.834	-0.352					0		-2.115	0		0	0								0.910	0	0							-3.856	-0.929	0	0	0	-0.528	7334
7438	-0.921	-1.026	-0.561	-0.807	0	-1.456	0.173	0	-0.489	-0.163	0	0	0	0	-0.239				<4	0	0	-3.301	0	0							1.005	-1.086		0	0	0.500	7438
7449	-0.440	-0.483	0.445	-0.291	0	-0.066																									-0.175	0.481		0	0	0.531	7449
7533	0.604	0.633	1.703							-0.895	0	0	0	0	1.495																0.727	-0.302	0	0	0	-0.217	7533
7543																																					7543
7564	-0.279	-0.643	0.068	-0.061	0	0.491	0.424	0	1.665	-0.326	0	0	0	0	0.023	-0.127	>4		0.287	0	0	-0.280	0	0	-0.689	-0.227	0.842	0	1.343	0	0.727	-0.459	0	0	0	-0.809	7564
7596	0.684	-0.739	1.745	0.398	0	2.090	1.240	0	0.733	0.324	0	0	0	0	1.299							1.276	0	0	0.001	1.280	2.386	0	0.594	0							7596
7627	1.487	-0.101	0.068								0	0										0.361	0	0							0.727	0.638	0	0	0	-0.123	7627
7688	-0.681	-0.260	0.068	-0.749	0	0.769	0.801	0	0.966	-0.082	0	0				0.299	1.622	0	0.287	0	0	0.178	0	0							0.380	1.030	0	0	0	-0.715	7688
7728	-0.841	-0.770	0.361				0.926	0	1.432	-0.651	0	0	0	0	0.612				-0.906	0	0	-1.790	0	0							0.311	0.325		0	0	-0.435	7728
7825	-0.568	-0.308	-0.226	0.512	0	1.262							0	0	-0.307	0.176	-0.630	0													-2.043	-1.603	0	0	0	-0.507	7825
7876	-0.440	-0.292	0.026	-1.437	0	0.213	0.613	0	-0.023	0.731	0	0	0	0	0.187				0.117	0	0										0.797	-0.694	0	0	0	1.372	7876

Lab. no.	Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coag. pos. *Staphylococcu*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
7906	-0.921	1.495	0.487	-0.176	0	0.699	-0.643	0	0.733	>4	0	0	0	0	0.318	2.762	-3.359	0													-0.661	0.638	0	0	0	0.500	7906
7930	-0.119	-0.451	0.319	-0.119	0	0.213	1.115	0	1.665	0.243	0	0	0	0	0.023				0.572	0	0	0.727	0	0							1.075	0.638	0	0	0	-0.622	7930
7940	0.443	-0.164	-0.603																																		7940
7946	>4	3.345	2.878	>4	0	>4	>4	0	3.935	2.804	0	0	0	0	2.214	0.536		0													>4		0	0	0	1.901	7946
7962	0.042	-0.292	-0.394	0.340	0	1.533	-0.455	0	0.151	-1.952	0	0	0	0	-0.729																-1.911	<4	0	0	0	-0.092	7962
8066				0.914	0	-0.761	-0.015	0	-0.082				0	0	<4	0.062	3.788								-0.459	0.014	-0.600	0	0.937	0							8066
8068	-1.483	-0.611	0.655	-1.437	0	3.132	0.110	0	-0.023	1.137	0	0	0	0	1.266	0.489	-0.110	0	-0.792	0	0	-1.699	0	0							0.033	0.011	0	0	0	-1.369	8068
8105	-1.243	0.920	-0.645				-0.706		-0.315				0	0	-1.383																1.700	1.422	0	0	0	-1.058	8105
8255	-0.119	-0.420	-0.016	-1.380	0	2.368	-0.141	0	0.500	1.381	0	0	0	0	0.154	0.157		0	-1.019	0	0	0.590	0	0							0.380	1.579	0	0	0	-1.120	8255
8260	-1.082	-0.962	-0.184	0.111	0	-0.274	-0.769	0	-0.140	-0.245	0	0	0	0	0.187				-1.701	0	0	-1.195	0	0							0.241	1.735	0	0	0	-0.497	8260
8313	-1.483	0.611	-0.423	-0.233	0	-1.025	-1.868	0	-1.880	-0.025	0	0	0	0	<4							-0.092	0	0							-0.800	1.265	0	0	0	0.363	8313
8333	1.005	-0.866	0.655	0.512	0	-0.344	0.236	0	-0.198	0.731	0	0				-2.400		0				-0.051	0	0							0.311	0.952	0	0	0	1.870	8333
8352	-0.600	1.909	1.620	0.398	0	>4	-0.015	0	>4	0.324	0	0	0	0	0.775	0.725		0				<4	0	0							-0.106	0.011	0	0	0	-0.435	8352
8380	-0.440	-0.292	-0.016	-1.151	0	-2.707	0.613	0	-0.198	-0.041	0	0	0	0	-0.533	-2.637		0	-0.735	0	0	-0.051	0	0							0.450	-2.026	0	0	0	0.936	8380
8397	0.684	1.176	0.068	-0.176	0	-0.691	-0.643	0	0.733	0.324	0	0	0	0	-0.010	-0.553	0.973	0	-0.338	0	0				1.532	0.074	0.327	0	-0.030	0	-0.661	-0.929	0	0	0	-0.435	8397
8428	0.443	-0.675	-0.603	-0.176	0	0.282	-0.643	0	-0.547	0.650	0	0	0	0	-0.827	-0.080		0	0.742	0	0	0.590	0	0							0.380	-0.851	0	0	0	0.562	8428
8435	>4	0.346	1.116	0.168	0	1.672	0.926	0	0.733	0.731	0	0	0	0	-2.135							-0.692	0	0							-0.036	0.481	0	0	0	-0.123	8435
8523	1.648		-2.616	>4		>4																									-0.731	0.717		0	0		8523
8529	0.363	-0.451	-2.113	0.226	0	0.073	-0.015	0	-2.410	0.446	0	0	0	0	-1.318		0.431	0	2.049	0	0	1.826	0	0							1.352	-1.086	0	0	0	0.468	8529
8568	-1.243	0.187	-0.771	-1.036	0	-0.413	-0.518	0	-0.489	1.097	0	0				0.394		0				-0.555	0	0							-0.036	-0.302	0	0	0	-0.061	8568
8626	0.042	-0.228	-0.142	>4	0	0.143	-0.894	0	-0.780																1.226	0.617	-0.085										8626
8628	1.086	-0.388	-0.687	-0.577	0	0.073	0.864	0	0.442	1.585	0	0	0	0	-1.481				1.367	0	0	1.093	0	0	-0.229	0.074	-0.857	0	-0.498	0	0.380	-0.772	0	0	0	0.655	8628
8657	1.969	-0.164	1.578	1.430	0	0.491																									0.797	1.500	0	0	0	-0.123	8657
8676	1.005	-0.069	-0.771	0.340	0	0.491				-0.123	0	0	0	0	-1.089																0.033	-0.224					8676
8734	0.684	1.495	0.487	0.398	0	0.699										-0.080	-0.110	0													-0.661	1.422		0	0	-0.435	8734
8742	-1.162	-0.770	-0.729	1.544	0	0.213	-0.894	0	-0.780	-0.976	0		0	0	-1.056	-0.743	-0.327		<4	0	0	<4		0	-0.459	-0.197	-1.269				-1.147	1.030	0	0	0	-0.186	8742
8756	>4	>4	>4	>4	0	1.325	0.989	0	1.781	1.097	0	0	0	0	-0.304																0.033	2.597				-1.743	8756
8766	0.684	-0.101	0.068	-0.176	0	-0.691	-0.015	0	-1.595	0.731	0	0	0	0	0.645				0.799	0	0										0.033	<4	0	0	0	1.123	8766
8891	1.327	-0.579	-1.023	-1.093	0	-2.360	-0.267	0	0.268	1.910	0	0	0	0	-0.566																1.283	0.795	0	0	0	3.054	8891
8909	0.363	-0.451	0.026	0.455	0	0.491	0.299	0	0.326	-0.245	0	0	0	0	0.318																0.658	-1.164		0	0	0.313	8909
8918	-0.279	1.367	-0.645				-0.141	0	-0.373	-0.692	0	0	0	0	-1.056	-0.743	-0.327	0	-0.224	0	0	-0.005	0	0							-0.592	-0.146	0	0	0	0.873	8918
9002	-0.279	-0.451	0.613	0.512	0	0.908	>4	0	1.315	0.650	0	0	0	0	0.416	-2.637	-0.110	0				-0.875	0	0							-0.314	-0.851		0	0	-0.342	9002
9034	-0.119	-0.547	-0.603	-0.749	0	0.699	-0.581	0	0.093								-0.219	0																			9034
9217	-0.921	-0.420	0.068	0.398	0	0.004							0	0	-0.010																-0.661	-0.146	0	0	0	-0.746	9217
9245	0.283	-0.292	0.319	-0.291	0	0.282	0.110	0	-0.082	0.731	0	0																			0.727	0.795	0	0	0	-0.248	9245
9359	-1.082	-0.643	-1.232	-0.635	0	-0.274	-0.078	0	0.326	-0.041	0	0	0	0	-1.122				0.344	0	0	0.269	0	0							-0.175	0.011	0	0	0	-0.310	9359
9408							0.361	0	0.326																0.613	0.979	-0.445	0	1.125	0							9408
9420	0.363	-0.228	0.319	0.283	0	0.282	0.361	0	0.151													-0.967	0	0													9420
9429	0.042	-0.101	0.403	-0.807	0	0.630	-0.267	0	1.374	0.568	0	0	0	0	0.023				0.912	0	0	-0.005	0	0							0.241	1.030	0	0	0	0.250	9429
9436	-1.323	-0.356	0.194	-3.387	0	-1.247	-0.329	0	-0.198	0.812	0	0	0	0	1.266	-0.080	<4		1.310	0	0	-0.967	0	0							-0.036	<4	0	0	0	1.559	9436
9441	-0.440	-0.420	-0.016	-1.724	0	-0.066	-0.518	0	1.083	-0.326	0	0	0	0	-0.075	0.394	-0.327		0.685	0	0	-0.188	0	0	-0.689	0.406	0.327	0	-0.966	0	0.241	2.519	0	0	0	0.687	9441
9451	2.306	0.959	-1.136	0.099	0	0.219	0.594	0	0.326	-0.168	0	0	0	0	-1.239				0.498	0	0	0.269	0	0	0.598	0.653	-0.965										9451
9453	-1.403	-0.451	-0.687	-0.463	0	0.282				0.812	0	0	0	0	-0.010																0.380	0.325	0	0	0	-0.092	9453
9465	-0.119	-0.643	-0.519	-0.176	0	-0.344	-0.329	0	-0.431	1.544	0	0	0	0	-2.233																						9465
9512	-0.119	-0.707	-0.310	-0.176	0	0.143				1.950	0																				-0.036	-1.321	0	0	0	-1.992	9512
9555	-1.644	-1.090	-0.394	-0.061	0	-1.247	-0.392	0	0.151	-0.570	0	0	0	0	0.023				1.310	0	0										-0.314	-0.851	0	0	0	0.219	9555
9559	2.451	-0.356	-0.729	-0.004	0	0.838	0.424	0	-0.082	-0.407	0	0	0	0	1.266	<4	>4					1.414	0	0							-1.147	-0.772	0	0	0	2.182	9559
9569	0.203	0.027	0.697	0.053	0	1.394	0.989	0	0.500	-0.041	0	0	0	0	0.383	0.062	-0.327	0	-0.963	0	0	-0.555	0	0							0.519	0.246	0	0	0	-0.591	9569

Lab. no.	Aerobic microorg. 30 °C			Entero-bacteriaceae			*Escherichia coli*			Presumptive *Bacillus cereus*			Coag. pos. *Staphylococcu*			Lactic acid bacteria			*Clostridium perfringens*			Anaerobic sulphite red.			Aerobic m.o. in fish 20-25 °C			Hydr.sulph. prod. bacteria in fish			Yeast			Mould			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	
9747	-1.403	-0.930	-1.903								0	0																			-0.592		0	0	0	-0.123	9747
9763	0.283	-0.547	-0.519	0.684	0	0.560		0	-2.177	0.081	0	0	0	0	1.495					0	0	-0.280	0	0							0.450		0	0	0	0.842	9763
9783	-0.761	-0.675	-0.268																																		9783
9886	0.925	1.654	0.361	0.856	0	0.769	0.487	0	0.559	-0.041	0	0	0	0	0.154	0.204	-0.110	0	1.140	0	0	0.865	0	0							-3.369		0	0	0	0.344	9886
9890	0.443	-0.675	1.284	0.512	0	0.213	-0.392	0	1.024	0.243	0	0				-0.174	-0.544	0													0.103	0.090	0	0	0	-0.123	9890
9903	-0.199	-0.515	0.194	-0.004	0	0.908	0.236	0	0.559	-0.489	0	0	0	0	-1.416				-0.622	0	0										-0.800	-0.067	0	0	0	0.313	9903
9923	-0.279	-0.547	-1.945	-0.921	0	-0.830	-0.392	0	-0.547	0.040	0	0	0	0	-1.481	0.820	0.106														-0.106	0.952	0	0	0	0.344	9923
9950	-0.119	1.814	1.745							-3.741	0	0				0.394	2.056	0													0.727	0.638	0	0	0	0.188	9950

Rapporter som utgivits 2011

1. Lunch och lärande – skollunchens betydelse för elevernas prestation och situation i klassrummet av M Lennernäs.
2. Kosttillskott som säljs via Internet – en studie av hur kraven i lagstiftningen uppfylls av A Wedholm Pallas, A Laser Reuterswärd och U Beckman-Sundh.
3. Vetenskapligt underlag till råd om bra mat i äldreomsorgen. Sammanställt av E Lövestram.
4. Livsmedelssvinn i hushåll och skolor – en kunskapssammanställning av R Modin.
5. Riskprofil för material i kontakt med livsmedel av K Svensson, Livsmedelsverket och G Olafsson, Rikisendurskodun (Environmental and Food Agency of Iceland).
6. Proficiency Testing – Food Microbiology, January 2011 by C Normark and I Boriak
7. Proficiency Testing – Food Chemistry, Nutritional Components of Food, Round N 47.
8. Proficiency Testing – Food Chemistry, Trace Elements in Food, Round T-22 by C Åstrand and Lars Jorhem.
9. Riksprojekt 2010. Listeria monocytogenes i kyld ätfärdig mat av C Nilsson och M Lindblad.
10. Kontroll av restsubstanser i levande djur och animaliska livsmedel. Resultat 2010 av I Nordlander, Å Kjellgren, A Glynn, B Aspenström-Fagerlund, K Granelli, I Nilsson, C Sjölund Livsmedelsverket och K Girma, Jordbruksverket.
11. Proficiency Testing – Food Microbiology, April 2011 by C Normark, I Boriak, M Lindqvist and I Tillander.
12. Bär – analys av näringsämnen av V Öhrvik, I Mattisson, A Staffas och H S Strandler.
13. Proficiency Testing – Drinking Water Microbiology, 2011:1, March by T Slapokas, C Lantz and M Lindqvist.
14. Kontrollprogrammet för tvåskaliga blötdjur – Årsrapport 2009-2010 – av av I Nordlander, M Persson, H Hallström, M Simonsson, Livsmedelsverket och B Karlsson, SMHI.
15. Margariner och matfettsblandningar – analys av fettsyror av R Åsgård och S Wretling.
16. Proficiency Testing – Food Chemistry, Nutritional Components of Food, Round N 48.
17. Kontroll av bekämpningsmedelsrester i livsmedel 2009 av A Jansson, X Holmbäck och A Wannberg.
18. Klimatpåverkan och energianvändning från livsmedelsförpackningar av M Wallman och K Nilsson.
19. Klimatpåverkan i kylkedjan – från livsmedelsindustri till konsument av K Nilsson och U Lindberg.
20. Förvara maten rätt så håller den längre – vetenskapligt underlag om optimal förvaring av livsmedel av R Modin och M Lindblad.
21. Råd om mat för barn 0-5 år. Vetenskapligt underlag med risk- och nyttovärderingar och kunskapsöversikter.
22. Råd om mat för barn 0-5 år. Hanteringsrapport som beskriver hur risk- och nyttovärderingar, tillsammans med andra faktorer, har lett fram till Livsmedelsverkets råd.
23. Proficiency Testing – Food Chemistry, Trace Elements in Food, Round T-23 by C Åstrand and L Jorhem.
24. Proficiency Testing – Food Chemistry, Vitamins in Food, Round V-9 by A Staffas and H S Strandler.
25. Nordiskt kontrollprojekt om nyckelhålsmärkning 2011 av I Lindeberg.
26. Rapport från GMO-projektet 2011. Undersökning av förekomsten av GMO i livsmedel av Z Kurowska.
27. Fat Quality – Trends in fatty acid composition over the last decade by I Mattisson, S Trattner and S Wretling.
28. Proficiency Testing – Drinking Water Microbiology, 2011:2, September by T Slapokas and M Lindqvist.
29. Kontrollen roll skiljer sig mellan livsmedelsbranscherna av T Ahlström, G Jansson och S Sylvén.
30. Kommuners och Livsmedelsverkets rapportering av livsmedelskontrollen 2011 av C Svärd och L Eskilsson.
31. Proficiency Testing – Food Microbiology, October 2011 by C Normark and I Boriak.

Rapporter som utgivits 2012

1. Fisk, skaldjur och fiskprodukter – analys av näringsämnen av V Öhrvik, A von Malmborg, I Mattisson, S Wretling och C Åstrand.
2. Normerande kontroll av dricksvattenanläggningar 2007-2010 av T Lindberg.
3. Tidstrender av tungmetaller och organiska klorerade miljöföroreningar i baslivsmedel av J Ålander, I Nilsson, B Sundström, L Jorhem, I Nordlander, M Aune, L Larsson, J Kuivinen, A Bergh, M Isaksson och A Glynn.
4. Proficiency Testing – Food Microbiology, Octorber 2011 by C Normark, I Boriak and L Nachin.
5. Mögel och mögelgifter i torkad frukt av E Fredlund och J Spång.
6. Mikrobiologiska dricksvattenrisker ur ett kretsloppsperspektiv – behov och åtgärder av R Dryselius.
7. Market Basket 2010 – chemical analysis, exposure estimation and health-related assessment of nutrients and toxic compounds in Swedish food baskets.
8. Proficiency Testing – Food Microbiology, April 2012 by L Nachin ,C Normark, I Boriak and I Tillander.

LIVSMEDELS VERKET
NATIONAL FOOD AGENCY, Sweden

ISSN 1104-7089