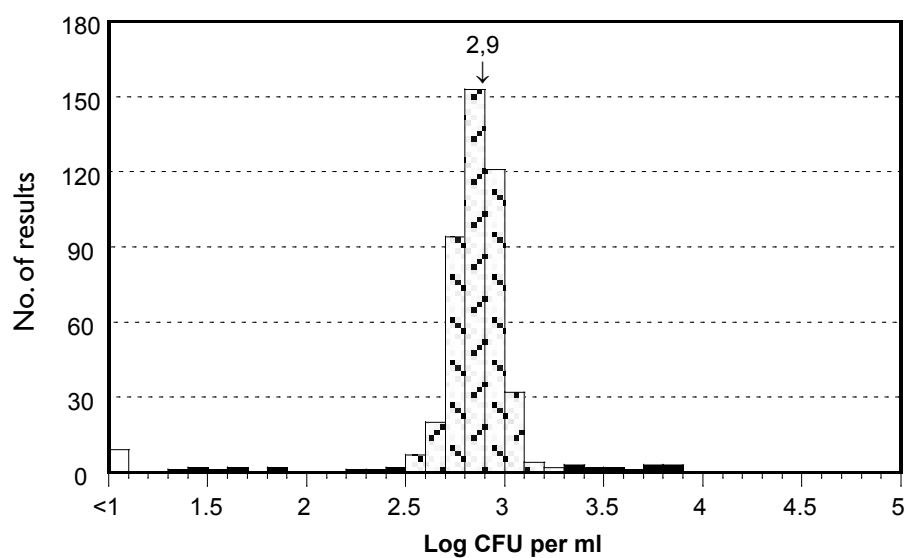


Proficiency testing

Food Microbiology

– October 2012

by Laurence Nachin, Christina Normark and Irina Boriak



Proficiency Testing
Microbiology – Food
October 2012

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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.

Purpose 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.

Edition

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Appendix 1: Results obtained by the participants

Appendix 2: z-scores of all participants

Abbreviations

Media

BA	Blood Agar
BcS	Bacillus cereus Selective agar
BGB	Brilliant Green Broth
BP	Baird-Parker agar
BP+RPF	Baird-Parker agar + Rabbit Plasma Fibrinogen
MPCA	Milk Plate Count Agar
MPN	Most Probable Number
MYP	Mannitol-Egg Yolk-Polymyxin agar
P	Polymyxin
PCA	Plate Count Agar
S&B	Slanetz & Bartley agar
PCA	Plate Count Agar
SFA	Sugar-Free Agar
TBX	Tryptone Bile X-Glucuronide agar
TSA	Trypticase Soy Agar
VRB	Violet Red Bile agar
VRBG	Violet Red Bile Glucose agar

Organisations

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

Design and analyses

The proficiency testing reported in this document was performed during October 2012 and is registered as no. 2822/2012 at the National Food Agency, Uppsala.

Analyses performed

- Quantitative analyses

Aerobic microorganisms, 30°C and 20°C

Contaminating microorganisms

Enterobacteriaceae

Coliform bacteria, 30°C and 37°C

Thermotolerant coliform bacteria

Escherichia coli

Presumptive *Bacillus cereus*

Coagulase-positive *Staphylococci*

Enterococci

- Qualitative analysis

Gram-negative bacteria in pasteurized milk and cream. Detection of recontamination.

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). 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 participants*

Mixture ¹	Microorganism	Strain no.
A	<i>Aeromonas caviae</i>	SLV-206
	<i>Enterobacter cloacae</i>	SLV-011
	<i>Bacillus cereus</i> group (atypical)	SLV-517
	<i>Enterococcus durans</i>	SLV-078
B	<i>Micrococcus sp.</i>	SLV-055
	<i>Proteus vulgaris</i>	SLV-476
	<i>Enterococcus faecalis</i>	SLV-051
C	<i>Micrococcus sp.</i>	SLV-055
	<i>Escherichia coli</i>	SLV-524
	<i>Bacillus cereus</i> group	SLV-518
	<i>Staphylococcus aureus</i>	SLV-280

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

Quality control of the mixtures

It is essential to have homogeneous mixture and uniform volume in all vials in order to allow comparison of all freeze-dried samples 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. 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 log₁₀ units and 0.5 log₁₀ units, respectively.

Table 2. Concentration mean (*m*) and standard deviation (*s*) from analyses of 10 randomly selected vials per mixture, expressed in log₁₀ cfu (colony forming units) per ml of sample.

Analysis and method	A		B		C	
	m	s	m	s	m	s
Aerobic microorganisms 30°C NMKL-method nr. 86	4.03	0.06	5.19	0.03	4.88	0.03
Aerobic microorganisms 20°C NMKL-method nr. 86	3.97	0.07	5.05	0.04	4.87	0.05
Contaminating microorganisms ISO-method nr. 13559:2002 IDF-method nr. 153:2002	4.09	0.09	5.13	0.05	4.93	0.04
Enterobacteriaceae NMKL-method nr. 144	3.00	0.05	4.37	0.04	3.23	0.04
Coliform bacteria 30°C NMKL-method nr. 44	2.88	0.06	–	–	3.16	0.05
Coliform bacteria. 37°C NMKL-method nr. 44	2.94	0.05	–	–	3.17	0.04
Thermotolerant coliform bacteria NMKL-method nr. 125	–	–	–	–	3.24	0.03
<i>Escherichia coli</i> NMKL-method nr. 125	–	–	–	–	3.24	0.03
Presumptive <i>Bacillus cereus</i> NMKL-method nr. 67	3.00	0.03	–	–	3.60	0.05
Coagulase-positive <i>Staphylococci</i> NMKL-method nr. 66	–	–	–	–	4.74	0.04
<i>Enterococci</i> NMKL-method nr. 68	3.70	0.03	3.86	0.04	–	–
Gram-negative bacteria in pasteurized milk and cream. Detection of recontamination* NMKL-method nr. 192	pos	–	pos	–	pos	–

– No target organism

* NFA is not accredited for this analysis

Laboratory results

General information regarding the results

Samples were sent to 223 laboratories, 54 in Sweden, 153 in other European countries, and 16 outside Europe. 214 laboratories reported results, 108 (50%) provided at least one result that received an annotation. In the previous round (October 2011) with similar analyses, the proportion was 46%.

Highly deviating values that did not belong to a strictly normal distribution were identified as statistical outliers (Grubbs' test modified by Kelly (3)). 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 Appendix 1.

Description of mixture A

Mixture A contained *Aeromonas caviae*, *Enterobacter cloacae*, presumptive *Bacillus cereus* group, and *Enterococcus durans*

Table 3. Outcome of each analysis for mixture A

Analysis	Organism	m ^a	s ^b	F+	F-	Outl<	Outl>	n ^c
Aerobic microorgs, 30 °C	<i>A. caviae</i> <i>E. durans</i>	4.05	0.20	0	0	3	8	197
Aerobic microorgs, 20 °C	<i>A. caviae</i> <i>E. durans</i>	3.99	0.16	0	0	2	1	42
Contaminating microorg	<i>A. caviae</i> <i>E. durans</i>	3.82	0.27	0	2	1	1	27
Enterobacteriaceae	<i>E. cloacae</i>	2.98	0.23	0	1	0	3	160
<i>Escherichia coli</i>	(<i>E. cloacae</i>)	-	-	6	0	-	-	149
Thermotolerant coliform	(<i>E. cloacae</i>)	-	-	5	0	-	-	62
Coliform bacteria 30°C	<i>E. cloacae</i>	2,96	0.26	0	3	0	1	78
Coliform bacteria 37°C	<i>E. cloacae</i>	2.96	0.23	0	5	0	2	113
Presumptive <i>B. cereus</i>	Pres. <i>B. cereus</i>	2.85	0.29	0	53	0	1	143
Coagulase pos. staph.	-	-	-	0	0	-	-	134
Enterococci	<i>E. durans</i>	3.67	0.12	0	11	6	3	93
Gram negative bact. in dairy products	<i>A. caviae</i> <i>E. cloacae</i>	pos	-	0	2	-	-	11

^a mean value and standard deviation of laboratory results expressed in log₁₀ cfu/ml (Appendix 1)

^b standard deviation of laboratory results

^c number of analyses performed

F+ and F-: numbers of false positive and false negative results, respectively.

Outl < and Outl >: number of low and high outliers, respectively.

- : no target organism, () : false positive organism in a presumptive analysis

Aerobic microorganisms 30°C and 20°C

The colonies counted for these analyses are mainly from the strains of *Aeromonas caviae* and *Enterococcus durans* present in the mixture at the highest concentration. Some colonies were quite small after incubation at 30 or 20°C and were counted under magnifier at National Food Agency. The small colonies could explain the dispersion of the results and the deviating results obtained.

Contaminating microorganisms

As for the analysis of aerobic microorganisms, colonies are mainly from the strains of *A. caviae* and *E. durans*. Only 27 laboratories performed this analysis. The average value is slightly lower than for the total count of aerobic microorganisms. No confirmation step is required for this analysis according to standard method ISO 13559:2002/IDF 153:2002, but a catalase test can be performed. Both catalase-positive and catalase-negative microorganisms present in mixture A form colonies on SFA, which could explain the dispersion of the results depending if all or only catalase negative colonies were counted.

Enterobacteriaceae, coliform bacteria 30°C and 37°C

Mixture A contained a strain of *Enterobacter cloaceae* which forms typical colonies on VRBG and VRB medium. Few laboratories reported divergent results for these analyses. Indeed, other colonies appeared on these media but they were atypical and differentiate from enterobacteriaceae and coliforms bacteria in the confirmations tests (oxidase-positive and no fermentation of lactose in BGB)

Thermotolerant coliform bacteria and Escherichia coli

Mixture A did not contain any strain of *E. coli* or thermotolerant coliform however five and six false positive results were obtained for these analyses, respectively. The strain of *E. cloaceae* can form colonies if plates are incubated at a temperature slightly below 44°C and be therefore misjudged as thermotolerant coliform bacteria. It is worth noticing that all laboratories that reported false positive results for the analysis of thermotolerant coliform bacteria reported an absence of *E. coli* in the mixture, indicating a correct interpretation of the confirmation steps. Concerning the *E. coli* analysis, none of the laboratories that reported a false positive result had carried out the analysis of thermotolerant coliform bacteria; moreover the analysis was performed at a temperature below 44°C and / or did not include confirmations steps.

Presumptive Bacillus cereus

The strain included in mixture A belongs to *B. cereus* group and was isolated from a cream sauce that caused food poisoning. This strain forms atypical colonies, shiny with a small haemolysis zone on BA medium. On Mossed/MYP-agar and BcS, colonies appear pink and light blue, respectively and on both media the precipitation zone is weak or even absent. 53 laboratories reported a false negative result for this analysis. No correlation between method and false results can be established.

Due to the high difficulty of the analysis, the results are not evaluated and therefore no z-score will be calculated. Moreover, these results are not taken into account in the tables under the box plots.

Coagulase-positive Staphylococci

Mixture A did not contain any target organism for this analysis and did not cause any major problem.

Enterococci

Mixture A contained a strain of *Enterococcus durans* which forms typical colonies on Slanetz-Bartley medium and is positive for esculine hydrolysis. However, 11 laboratories reported a false negative result and several reported outliers results.

Gram-negative bacteria in pasteurized milk and cream. Detection of recontamination

E. cloacae was the target organism for this analysis. Only eleven results were reported, among which two false negative.

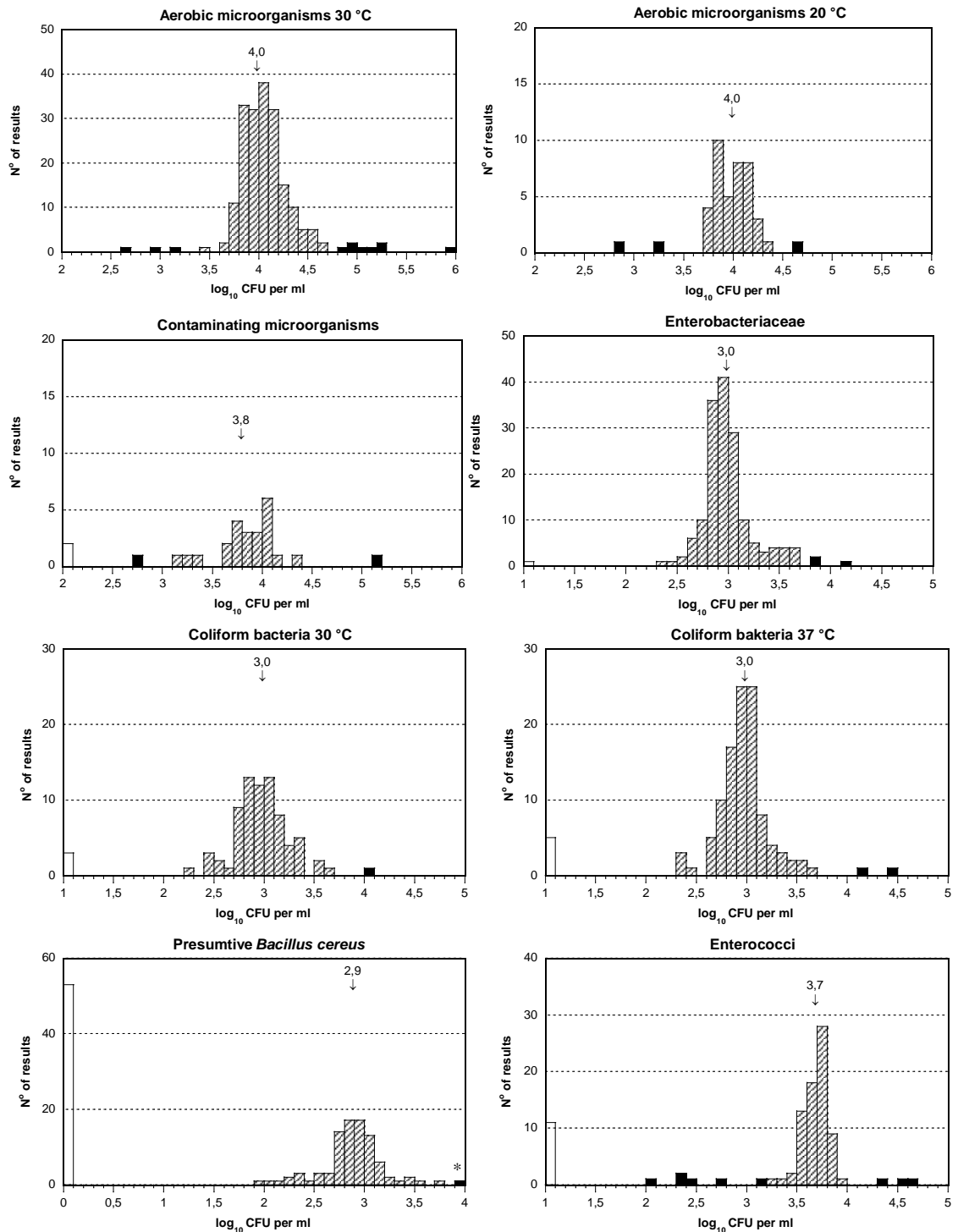


Figure 1. Histograms of all analytical results obtained for the mixture A. ▨ values within the interval of acceptance (Appendix I), ■ outliers, □ false negative results, * outliers outside of the x-axis scale. The mean value of the analysis results is indicated in the histograms

Description of mixture B

Mixture B contained *Micrococcus* sp., *Proteus vulgaris* and *Enterococcus faecalis*.

Table 4. Outcome of each analysis for mixture B

Analysis	Organism	m ^a	s ^b	F+	F-	Outl<	Outl>	n ^c
Aerobic microorgs, 30 °C	<i>Micrococcus</i> <i>P. vulgaris</i>	4.96	0.27	0	0	2	0	198
Aerobic microorgs, 20 °C	<i>Micrococcus</i> <i>P. vulgaris</i>	4.66	0.40	0	0	0	0	41
Contaminating microorg	<i>Micrococcus</i> <i>P. vulgaris</i>	4.81	0.48	0	1	0	0	28
Enterobacteriaceae	<i>P. vulgaris</i>	4.10	0.14	0	1	4	1	160
<i>Escherichia coli</i>	-	-	-	4	0	-	-	149
Thermotolerant coliform	-	-	-	0	0	-	-	62
Coliform bacteria, 30°C	(<i>P. vulgaris</i>)	-	-	24	0	-	-	77
Coliform bacteria, 37°C	(<i>P. vulgaris</i>)	-	-	23	0	-	-	115
Presumptive <i>B. cereus</i>	(<i>P. vulgaris</i>)	-	-	7	0	-	-	143
Coagulase pos. staph.	(<i>P. vulgaris</i>)	-	-	14	0	-	-	135
Enterococci	<i>E. faecalis</i>	3.84	0.10	0	0	7	2	93
Gram negative bact. in dairy products	<i>P. vulgaris</i>	pos	-	0	0	-	-	11

^a mean value and standard deviation of laboratory results expressed in log₁₀ cfu/ml (Appendix 1)

^b standard deviation of laboratory results

^c number of analyses performed

F+ and F-: numbers of false positive and false negative results, respectively.

Outl < and Outl >: number of low and high outliers, respectively.

- : no target organism

(): false positive organism in a presumptive analysis

Aerobic microorganisms 30 °C and 20 °C

Micrococcus and *P. vulgaris* were the two microorganisms at the higher concentration in mixture B. The participants results are quite spread for both analyses with a long tail of lower results for the count of aerobic microorganisms at 30°C. This outcome can be explained by the use of different methods and/or substrate and is discussed further in the section “outcome of the methods”

Contaminating microorganisms

As for the analysis of aerobic microorganisms, colonies are mainly from the strains of *Micrococcus* and *P. vulgaris*. Few laboratories participate in this analysis and, like for mixture A, the results are quite spread without any obvious main peak. This can be linked to the swarming characteristic of *P. vulgaris* colonies which makes difficult the plate reading.

Enterobacteriaceae

P. vulgaris was the target organism for this analysis which present only few difficulties.

Thermotolerant coliform bacteria and Escherichia coli

Mixture B did not contain any strain of *E. coli* or thermotolerant coliform and only four false positive results were obtained for the analysis of *E. coli*.

Coliform bacteria 30°C and 37°C

Mixture B did not contain any coliform bacteria but a strain of *P. vulgaris* which forms very small colonies without precipitation zone on VRB agar. Moreover, in the confirmation step, *P. vulgaris* does not produce gas in BGB and can therefore be distinguished from coliform bacteria. However, 34 laboratories reported a false positive result for this analysis at 30°C, 37°C or both temperatures. This indicated that colonies of *P. vulgaris* were considered as coliform bacteria and that the confirmation step failed or was not performed.

Presumptive Bacillus cereus

Mixture B did not contain any presumptive *B. cereus* but the *P. vulgaris* strain which forms swarming colonies on Blood agar could make difficult the reading of the plates. However, *P. vulgaris* grows on MYP medium forming *B. cereus*-like colonies which could explained that seven laboratories reported a false positive result.

Coagulase-positive Staphylococci

No coagulase positive *Staphylococci* was present in mixture B, but the strain of *P. vulgaris* which forms black colonies with a surrounding zone on BP-agar can be misinterpreted as *Staphylococcus*. However, these bacteria can be differentiated from each other in the confirmation step of the analysis: *P. vulgaris* is coagulase-negative. On BP-agar with RPF, *P. vulgaris* forms colonies without any zone and cannot therefore be misinterpreted as a coagulase-positive *Staphylococcus*. Many laboratories (~10%) reported a false positive result, 10 of them used BP-agar or3 Petrifilm™ Staph.

Enterococci

Enterococcus faecalis was the target organism for this analysis. Several laboratories reported outliers but no explanation could be found from the method information given by the participants.

Gram-negative bacteria in pasteurized milk and cream. Detection of recontamination

P. vulgaris was the target organism for this analysis.

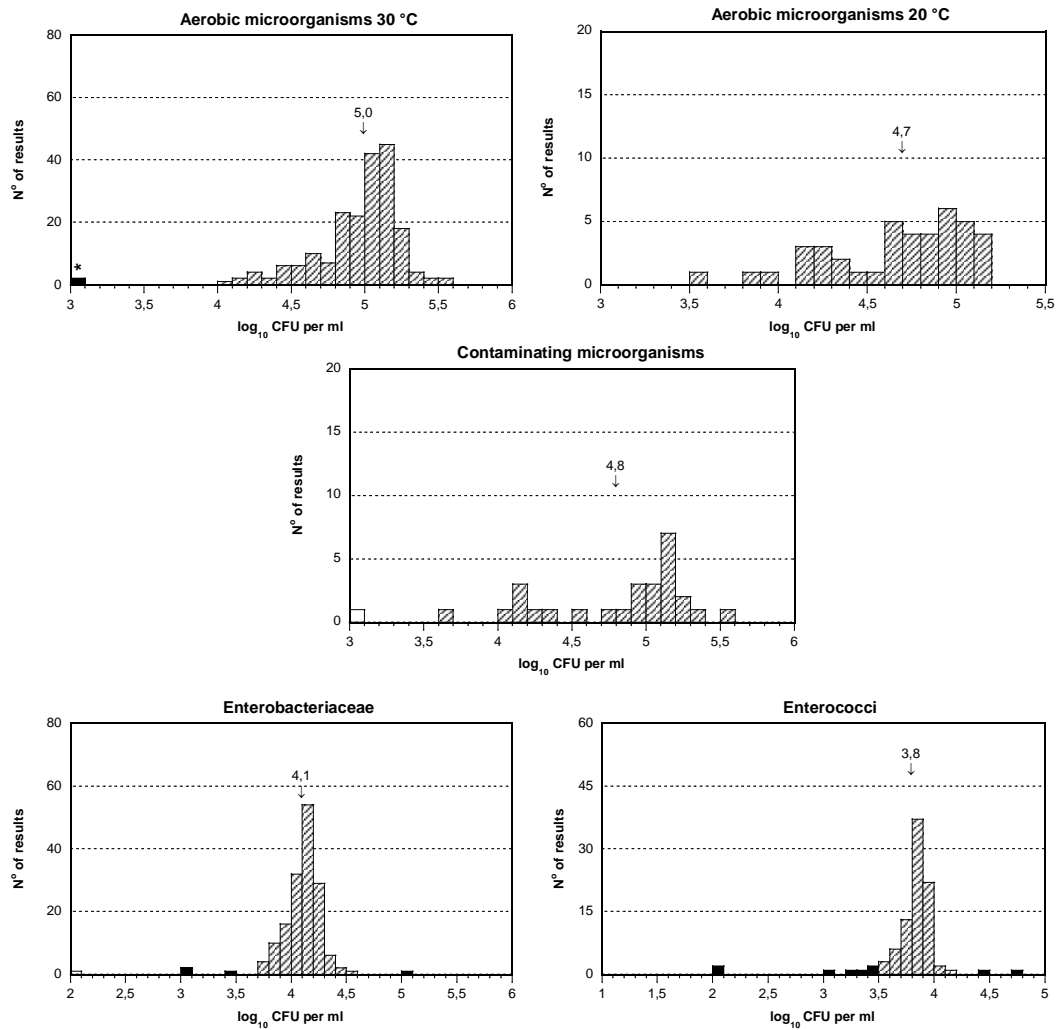


Figure 2. Histograms of all analytical results obtained for mixture B. For details, see legend to Figure 1.

Description of mixture C

Mixture C contained *Micrococcus sp.*, *Escherichia coli*, presumptive *Bacillus cereus* and *Staphylococcus aureus*.

Table 5. Outcome of each analysis for mixture C

Analysis	Organism	m ^a	s ^b	F+	F-	Outl<	Outl>	n ^c
Aerobic microorgs, 30 °C	<i>Micrococcus S. aureus</i>	4.82	0.14	0	0	10	2	197
Aerobic microorgs, 20 °C	<i>Micrococcus S. aureus</i>	4.69	0.21	0	0	4	0	42
Contaminating microorg	<i>Micrococcus S. aureus</i>	4.48	0.61	0	0	0	0	27
Enterobacteriaceae	<i>E. coli</i>	3.03	0.14	0	0	2	2	160
<i>Escherichia coli</i>	<i>E. coli</i>	3.08	0.14	0	5	10	2	147
Thermotolerant coliform	<i>E. coli</i>	3.08	0.17	0	1	1	1	61
Coliform bacteria, 30°C	<i>E. coli</i>	2.97	0.16	0	0	2	4	78
Coliform bacteria, 37°C	<i>E. coli</i>	3.00	0.23	0	1	0	1	112
Presumptive <i>B. cereus</i>	Pres. <i>B. cereus</i>	3.52	0.16	0	2	6	2	142
Coagulase pos. staph.	<i>S. aureus</i>	4.62	0.11	0	4	4	1	134
Enterococci	-	-	-	1	0	-	-	93
Gram negative bact. in dairy products	<i>E. coli</i>	pos	-	0	0	-	-	11

^a mean value and standard deviation of laboratory results expressed in log₁₀ cfu/ml (Appendix 1)

^b standard deviation of laboratory results

^c number of analyses performed

F+ and F-: numbers of false positive and false negative results, respectively.

Outl < and Outl >: number of low and high outliers, respectively.

- : no target organism

(): false positive organism in a presumptive analysis

Aerobic microorganisms

The organisms detected by these analyses were mainly *Micrococcus spp.* and *Staphylococcus aureus* which should not cause any particular difficulties. However, ten and four low outliers were obtained for the analysis of aerobic microorganisms at 30°C and 20°C, respectively. No method or medium could be linked to the low values obtained after incubation at 30°C. On the other hand, all participants who carried out the analysis at 20°C and used MPCA, obtained values regarded as low outliers for the mixture C.

Contaminating microorganisms

As for the analysis of aerobic microorganisms, colonies are mainly from the strains of *Micrococcus* and *S. aureus*. Few laboratories participate in this analysis and the results are quite spread without any obvious main peak.

Enterobacteriaceae, E. coli, thermotolerant coliform, and coliform bacteria 30°C and 37°C

The *E. coli* strain present in mixture C was the target organism for the five analyses, which is reflected by similar mean values obtained. The analysis of enterobacteriaceae did not revealed any difficulties. For the analysis of *E. coli*, 5 false negative and 10 low outliers results were reported. No obvious explanation for these results appeared when looking at the method or medium used by the participants. Concerning the analysis of coliform bacteria, at 30C, the results are distributed in a wide peak, while at 37C they separate in one major and one minor peak centered around 3.0 and 2.5, respectively. This distribution of the results could not be linked to the method and/or medium used for the analysis.

Presumptive Bacillus cereus

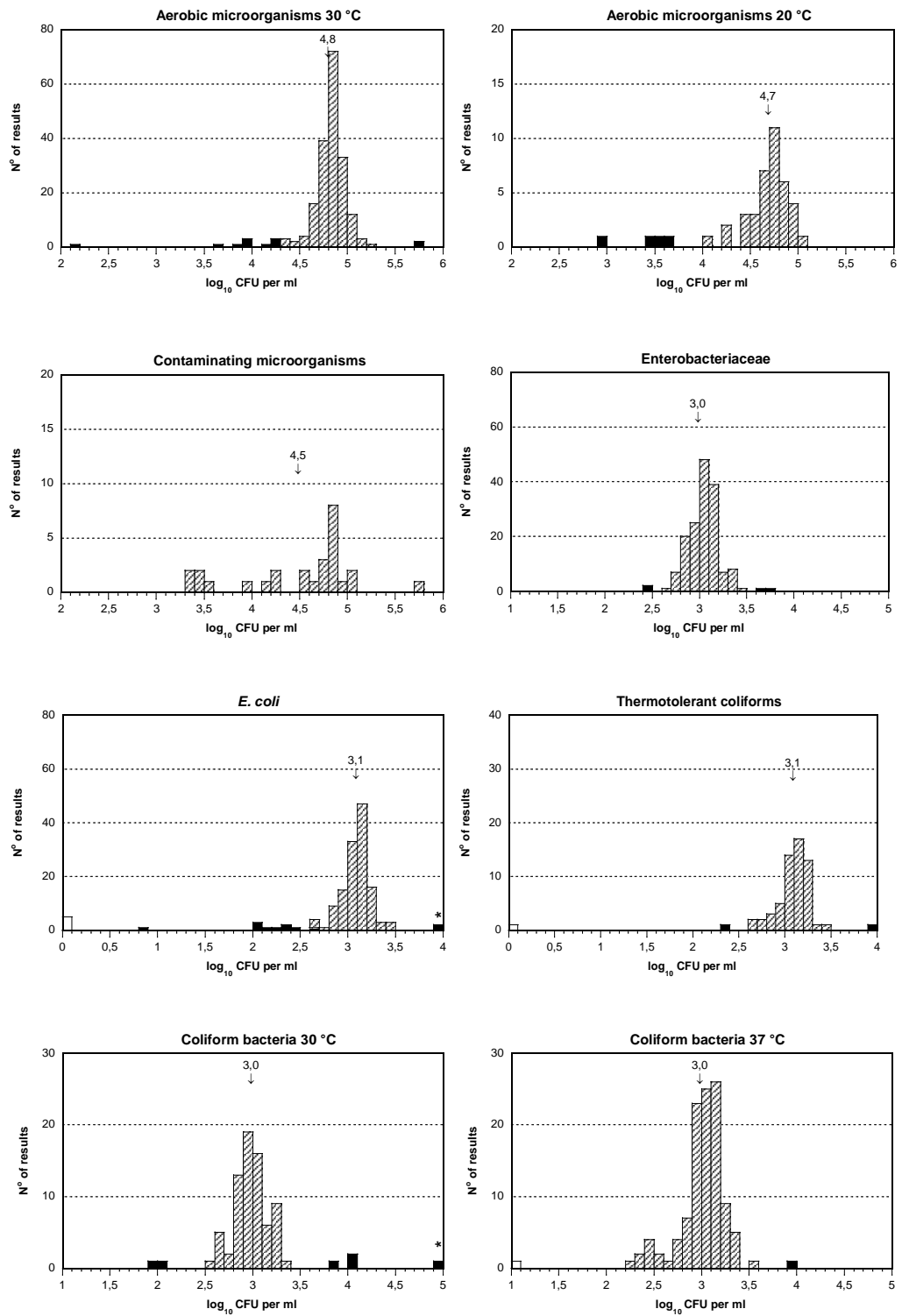
Mixture C contained a typical strain belonging to the *B. cereus* group. This strain forms typical colonies on BA, BcS and MYP media. For an unexplained reason, two false negative and eight outliers results were reported.

Coagulase-positive Staphylococci

Mixture C contained a strain of *S. aureus* which forms typical colonies on both BP and BP+RPF medium. On the former, the coagulase reaction is not tested directly on the plate and must be performed with rabbit plasma. On the latter, coagulase-positive strain form grey/black colonies surrounded by a precipitation halo. Some laboratories reported outliers results but none of them used BP+RPF. This suggest that the results interpretation was more difficult with other media or that the confirmation steps failed.

Gram-negative bacteria in pasteurized milk and cream. Detection of recontamination

E. coli was the target organism for this analysis.



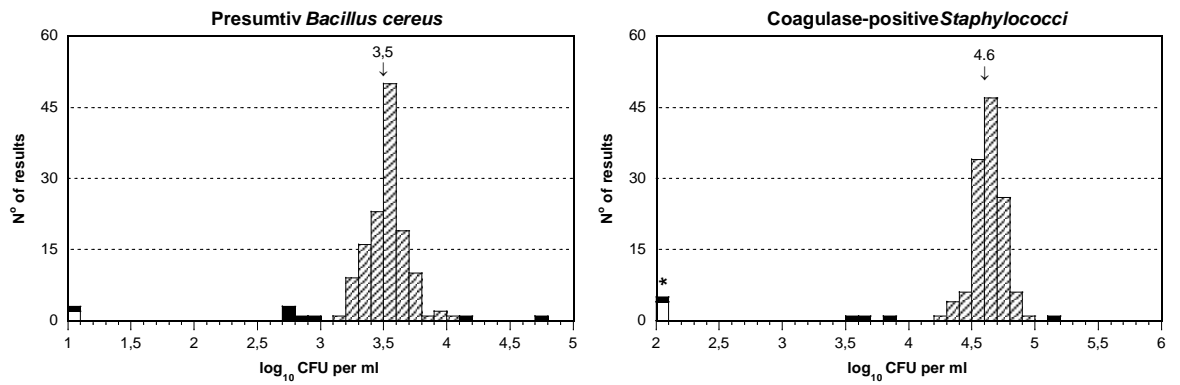


Figure 3. Histograms of all analytical results obtained for mixture C. For details, see legend to Figure 1.

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, 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. Therefore, first the distribution of methods used for each analysis is presented (Table 6). Thereafter, for each analysis, the results are divided according to the medium used.

In the tables of this section, the following symbols have been used:

n	amount of laboratory that performed the analysis
m	mean value of laboratory results in log ₁₀ cfu/ml (false results and outliers excluded)
s	standard deviation of laboratory results
<	amount of low outliers and false negative
>	amount of high outliers
F+	amount of false positive

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

Analys	n	NMKL	ISO/IDF	Petrifilm™	Other	Several
Aerob. microorg. 30°C	198	70	63	39	25	1
Aerob. microorg. 20°C	42	25	8	4	5	0
Contaminating microorg.	28	1	12	0	15	0
Enterobacteriaceae	160	82	33	33	12	0
<i>Escherichia coli</i>	149	41	20	58	30*	2
Thermotolerant coliform count.	62	45	2	5	9*	1
Coliform bacteria, 30°C	78	31	30	7	10*	0
Coliform bacteria, 37°C	115	42	24	29	19*	1
Presumptive <i>Bacillus cereus</i>	143	90	27	0	25	1
Coagulase positive. Staphylococci.	135	67	28	22	18	0
Enterococci	93	70	6	0	17	0
Gram negative bact. in dairy products	11	1	0	0	1	0

* NMKL-MPN (coliform 30°C, 37°C), NMKL and ISO-MPN-methods (coliform 44°C, *E. coli*) are included

Aerobic microorganisms

30°C	Mixture A					Mixture B					Mixture C				
	n	m	s	<	>	n	m	s	<	>	n	m	s	<	>
PCA	117	3.99	0.17	2	4	117	5.03	0.24	1	0	117	4.82	0.13	5	2
Petrifilm™	37	4.26	0.17	0	2	38	4.71	0.27	0	0	37	4.81	0.17	1	0
MPCA	25	4.01	0.20	0	2	25	5.02	0.18	0	0	25	4.84	0.18	1	0
TSA	9	4.03	0.14	0	0	9	4.96	0.22	0	0	9	4.89	0.15	1	0
Other	9	-	-	1	0	9	-	-	1	0	9	-	-	1	0
20°C	n	m	s	<	>	n	m	s	<	>	n	m	s	<	>
PCA	29	3.96	0.15	0	0	28	4.81	0.28	0	0	29	4.71	0.19	0	0
Petrifilm™	4	4.27	-	1	1	4	4.59	0.32	0	0	4	4.63	0.39	1	0
MPCA	3	3.90	-	1	0	3	3.78	0.17	0	0	3	-	-	3	0
Other	6	-	-	0	0	6	-	-	0	0	6	-	-	0	0

The results obtained for these analyses are similar but some trends are noticeable when using Petrifilm™, both at 30°C and 20°C: results are higher for mixture A, lower for mixture B and similar to the results obtained with other media for mixture C (Fig 4). For mixture A, some colonies were quite small, hence it is possible that the presence of tetrazolium in the Petrifilm™ facilitates their enumeration. The results for mixture B spread with a tail of lower values, mainly linked to the use of Petrifilm™. Mixture B contained *P. vulgaris*, forming swarming colonies that could render difficult the results interpretation. Few laboratories performed the analysis at 20°C but , for the three mixtures, the use of MPCA led to results considered as low outliers and/or close to the lower limits of the interval of acceptance. This was not the case at 30°C.

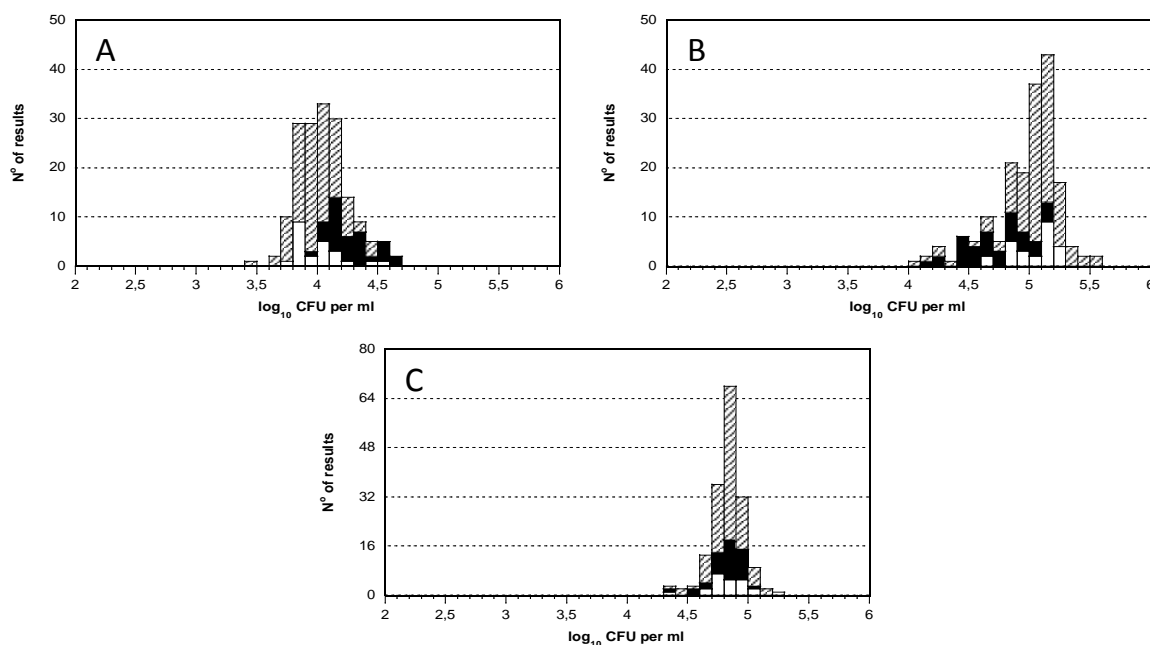


Figure 4. Analytical results of aerobic microorganisms at 30 °C for mixture A-C according to the medium used: ▨ PCA, □ MPCA, ■ Petrifilm™

Contaminating microorganisms

	Mixture A					Mixture B					Mixture C				
	n	m	s	<	>	n	m	s	<	>	n	m	s	<	>
SFA	22	3.81	0.29	2	0	23	4.75	0.49	1	0	22	4.36	0.59	0	0
MPCA	3	3.93	0.09	0	0	3	4.97	0.22	0	0	3	4.82	0.08	0	0
Other	2	-	-	1	1	2	-	-	0	0	2	-	-	0	0

Most of the laboratories that performed the analysis used SFA. The high standard deviations reflect the large spreading of the results. Due to their different size and/or morphology, colonies can be difficult to enumerate on this medium. Moreover, some laboratories performed confirmation tests and other not.

Enterobacteriaceae

	Mixture A					Mixture B					Mixture C				
	n	m	s	<	>	n	m	s	<	>	n	m	s	<	>
VRBG	120	2.93	0.21	1	2	120	4.08	0.13	3	0	120	3.00	0.13	2	1
Petrifilm™	34	3.10	0.22	0	1	34	4.14	0.15	2	1	34	3.12	0.13	2	1
Other	6	-	-	0	0	6	-	-	0	0	6	-	-	0	1

Similar results are obtained for this analysis with the different media used.

E. coli and thermotolerant coliform bacteria

<i>E. coli</i>	Mixture A		Mixture B		Mixture C				
	n	F+	n	F+	n	m	s	<	>
Petrifilm™ EC	32	2	33	1	32	3.11	0.10	2	1
Petrifilm™ SEC	29	0	29	0	29	3.16	0.11	1	0
TSA/VRB	26	1	26	1	27	3.08	0.13	1	1
TBX	18	0	18	0	18	2.95	0.12	2	0
VRB	17	1	16	0	16	3.06	0.08	4	0
Other	27	2	27	2	25	-	-	5	0
MPN	11	0	11	0	9	3.07	0.27	2	0

Thermo	Mixture A		Mixture B		Mixture C				
	n	F+	n	F+	n	m	s	<	>
Petrifilm™ EC	5	1	5	0	5	2.94	0.15	0	1
TSA/VRB	26	1	26	0	26	3.14	0.16	0	0
VRB	21	3	21	0	21	3.06	0.12	0	0
Other	10	0	10	0	9	-	-	2	0

Similar results are obtained for this analysis with the different media used.

Coliform bacteria

37°C	Mixture A					Mixture B		Mixture C				
	n	m	s	<	>	n	F+	n	m	s	<	>
Petrifilm™ CC	11	2.98	0.10	0	0	11	1	11	3.07	0.08	0	0
Petrifilm™ EC	19	2.97	0.11	2	0	19	1	19	3.07	0.18	0	0
TSA/VRB	7	3.03	0.20	0	0	7	1	7	3.19	0.17	0	0
VRB	64	2.96	0.24	2	2	64	15	64	2.95	0.22	0	1
Other	12	-	-	1	0	13	5	11	-	-	1	0

30°C	Mixture A					Mixture B		Mixture C				
	n	m	s	<	>	n	F+	n	m	s	<	>
Petrifilm™ CC	4	2.96	0.27	0	0	4	1	4	3.00	0.21	0	0
Petrifilm™ EC	3	3.02	0.31	0	0	3	0	3	3.06	0.22	0	0
TSA/VRB	5	3.18	0.21	0	0	5	1	5	3.16	0.15	0	0
VRB	61	2.93	0.27	3	1	60	22	61	2.95	0.14	1	4
Other	5	-	-	0	0	5	0	5	-	-	1	0

The different media used for these analyses led to similar results for mixture A and C, but approximately 30% of the laboratories that used VRB medium reported a false positive result for mixture B. An explanation for this outcome is the interpretation of *P. vulgaris* as coliform bacteria even though this strain forms very small colonies without precipitation zone on VRB agar.

Presumptive Bacillus cereus

	Mixture A					Mixture B		Mixture C				
	n	m	s	<	>	n	F+	n	m	s	<	>
BA	77	2.82	0.32	26	1	77	1	76	3.53	0.17	3	1
BA+P	5	2.89	0.13	1	0	5	0	5	3.52	0.23	0	0
BcS	4	2.82	-	2	0	4	1	4	3.50	0.11	0	0
BcS+P	13	2.93	0.32	2	0	13	0	13	3.48	0.14	1	1
Chrom	9	2.90	0.36	1	0	9	0	9	3.60	0.07	1	0
Mossel/MYP	33	2.89	0.17	20	0	33	5	33	3.47	0.13	3	1
Other	2	-	-	1	0	2	0	2	-	-	0	0

Most of the false negative results reported for mixture A were obtained with BA or Mossel/MYP but these media were also the most used. Therefore, the high amount of false negative results cannot be linked to a particular medium but is simply due to the atypical characteristics of the strain present in mixture A.

Coagulase-positive Staphylococci

	Mixture A		Mixture B		Mixture C				
	n	F+	n	F+	n	m	s	<	>
BP	82	2	82	10	82	4.62	0.11	5	1
BP+RPF	23	0	23	0	23	4.63	0.13	0	0
Petrifilm™	22	2	22	3	22	4.61	0.07	1	0
Other	7	0	8	1	7	-	-	2	0

None of the laboratories that used BP+RPF reported false positive or outliers results. This suggests that the direct test of coagulase reaction in BP+RPF makes the reading of the plate easier and diminishes the risk of misinterpretation.

Enterococci

	Mixture A					Mixture B					Mixture C	
	n	m	s	<	>	n	m	s	<	>	n	F+
S&B	78	3.66	0.13	17	1	78	3.84	0.10	6	1	78	1
TSA+S&B	6	3.67	0.09	0	1	6	3.90	0.06	0	0	6	0
Other	9	-	-	0	1	9	-	-	1	1	9	0

Almost all laboratories used S&B medium with or without pre-incubation in TSA. Although all false negative or low outliers are from analysis performed without pre-incubation, it is difficult to draw a conclusion as it concerns only six laboratories.

Gram-negative bacteria in pasteurized milk and cream. Detection of recontamination

The new standard method, NMKL 192:2011, describes a qualitative analysis for the detection of recontamination of dairy products by gram-negative bacteria. The method consists of a pre-incubation at 25C, 24h or at room temperature, 28h, followed by streaking 10 or 100µl of the sample on VRBG, respectively. Eleven laboratories performed this analysis and only two gave method information. The report of method information was not mandatory for this analysis.

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.

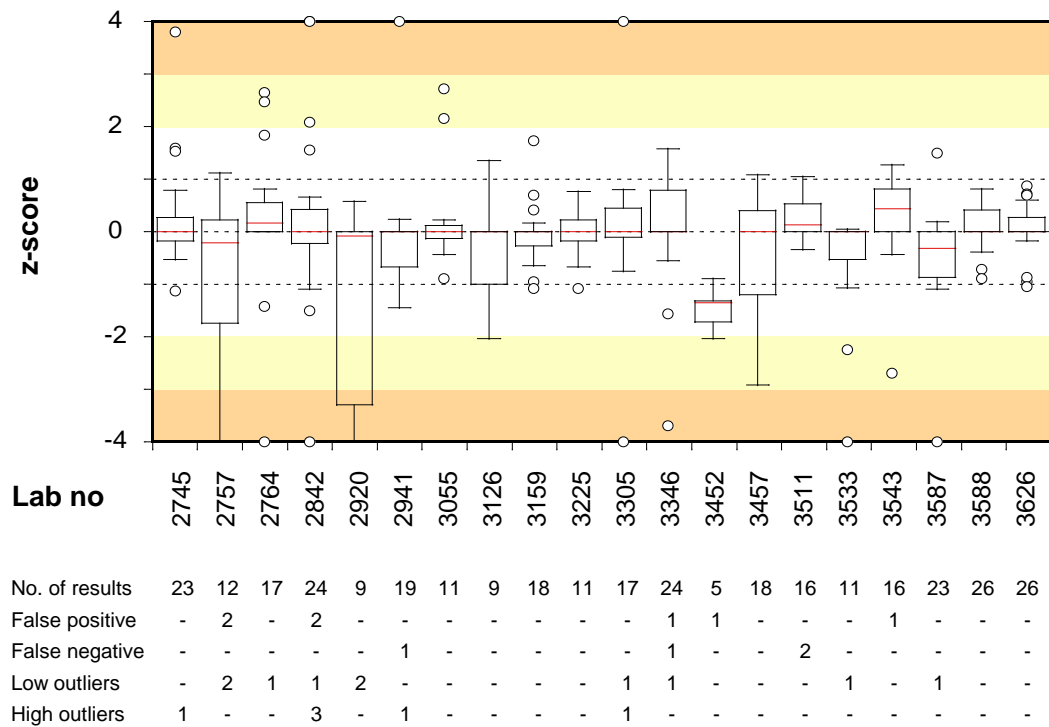
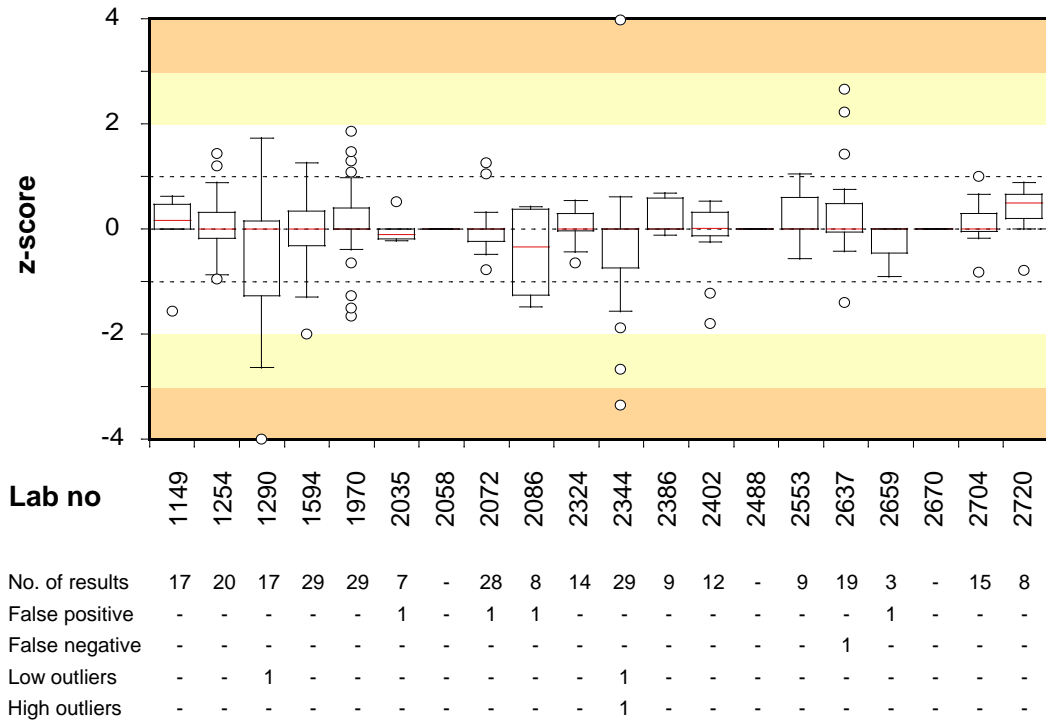
All the results from each laboratory – outliers included and false results excluded – were compiled into a box plot (Figure 5) based on their z-scores. The smaller and more centred round zero the box of a laboratory is, the closer its results are to the general mean values calculated for all laboratory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

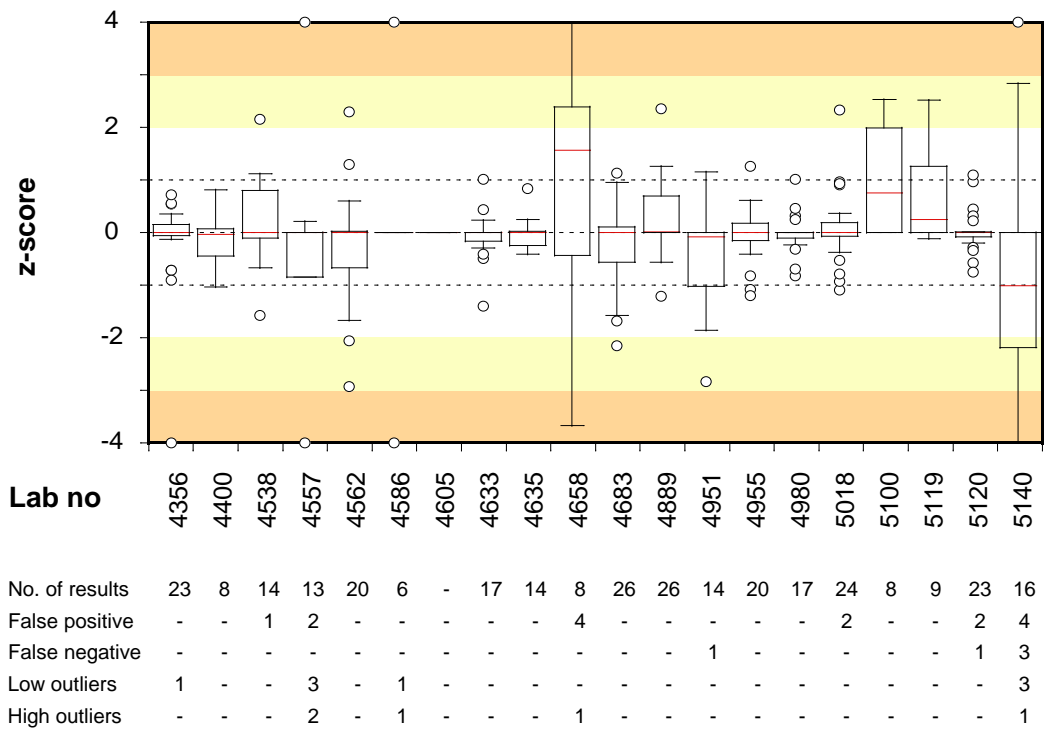
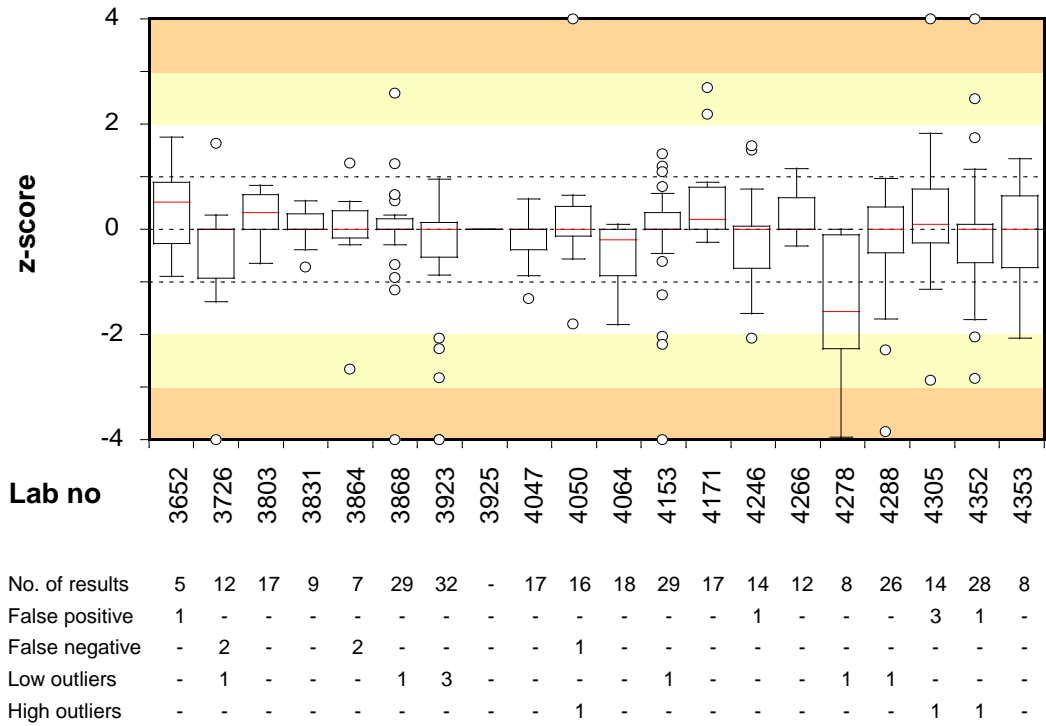
The laboratories were not grouped or ranked based on their results. However, for each laboratory, the number of false results and outliers is presented below the box plots. These results are also highlighted in Appendix 1, where all the reported results are listed, and the minimum and maximum accepted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

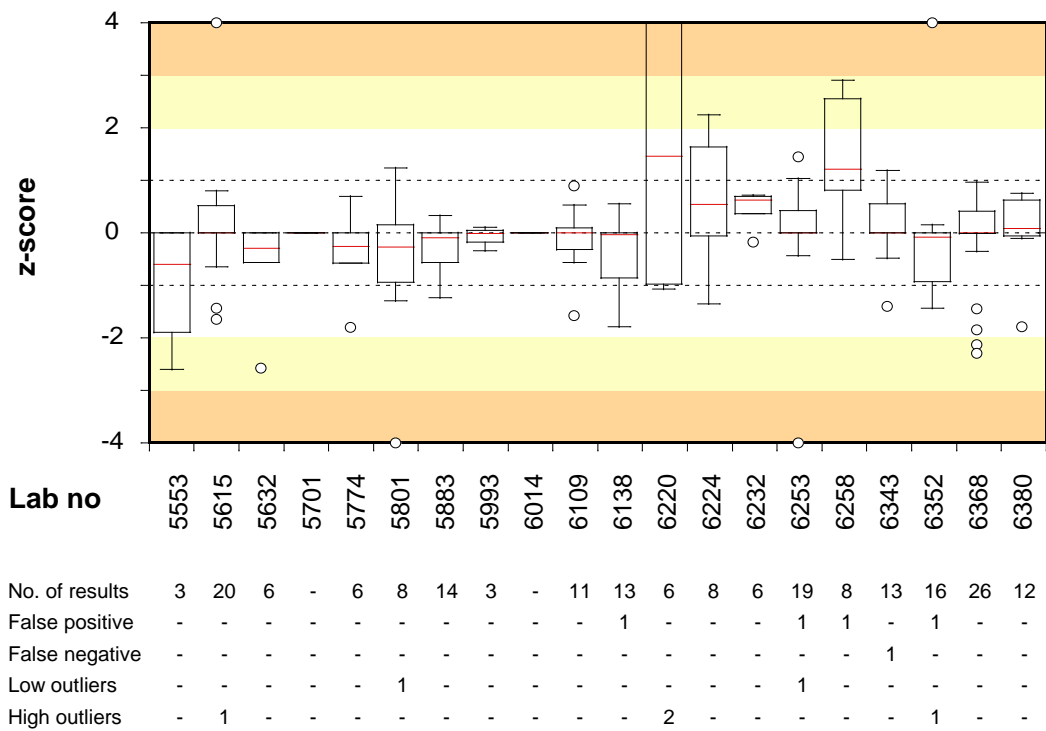
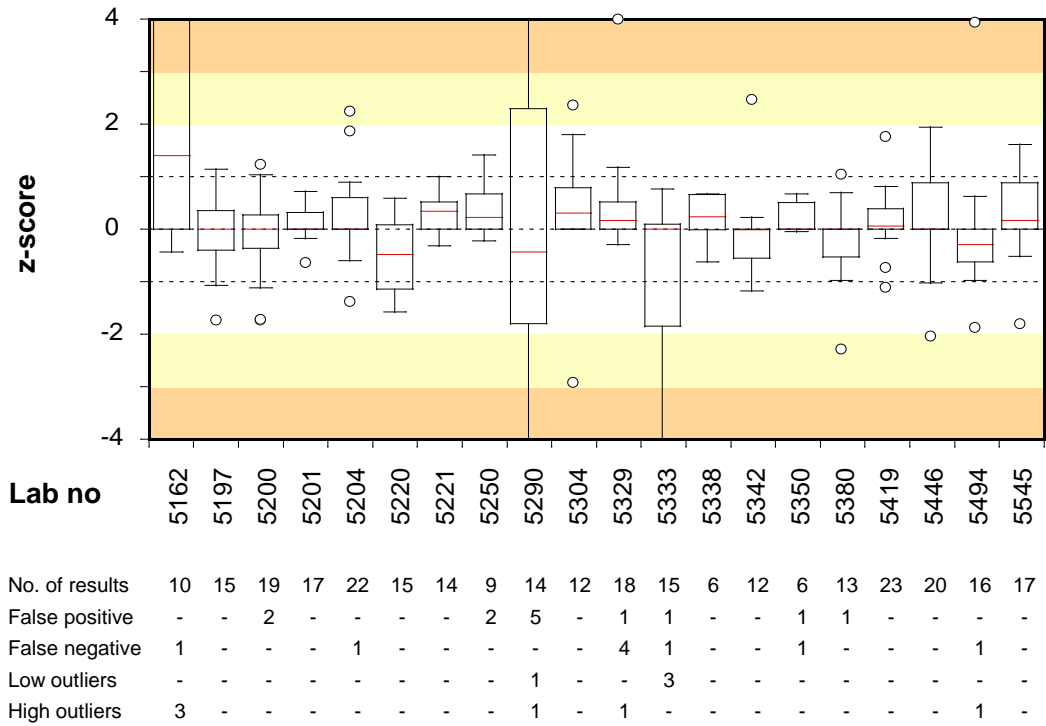
Information on the results processing and recommendations for follow-up work are given in the Scheme Protocol (2). Samples for follow-up can be ordered, free of charge, via our website: www.slv.se/pt_extra

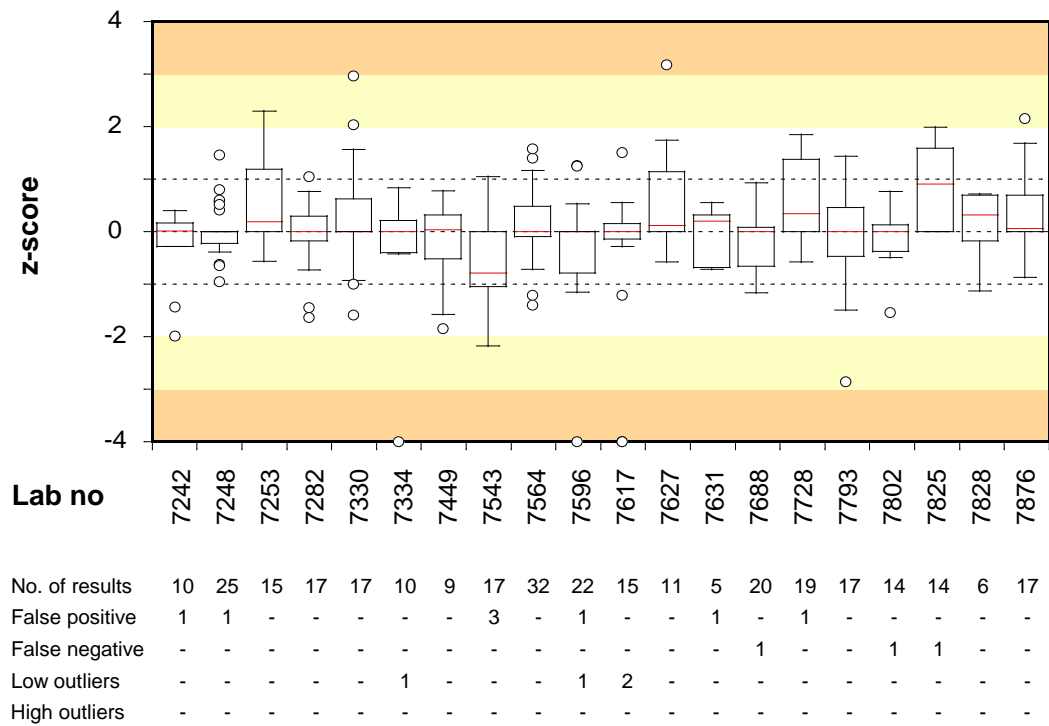
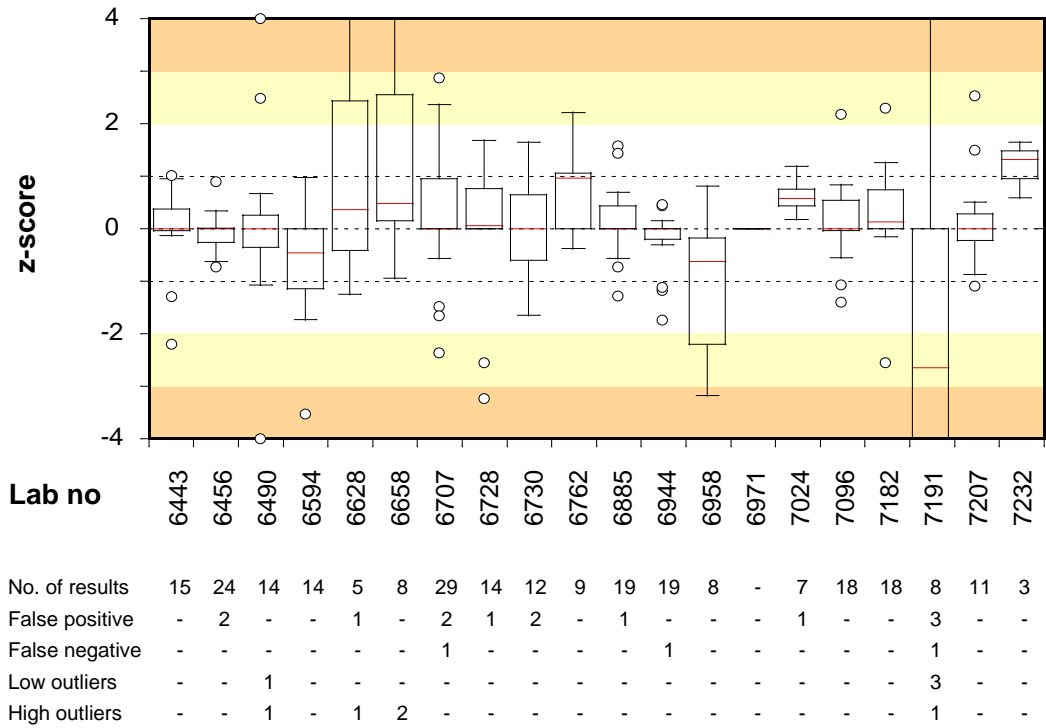
Figure 5. Box plots and number of deviating results for each laboratory.

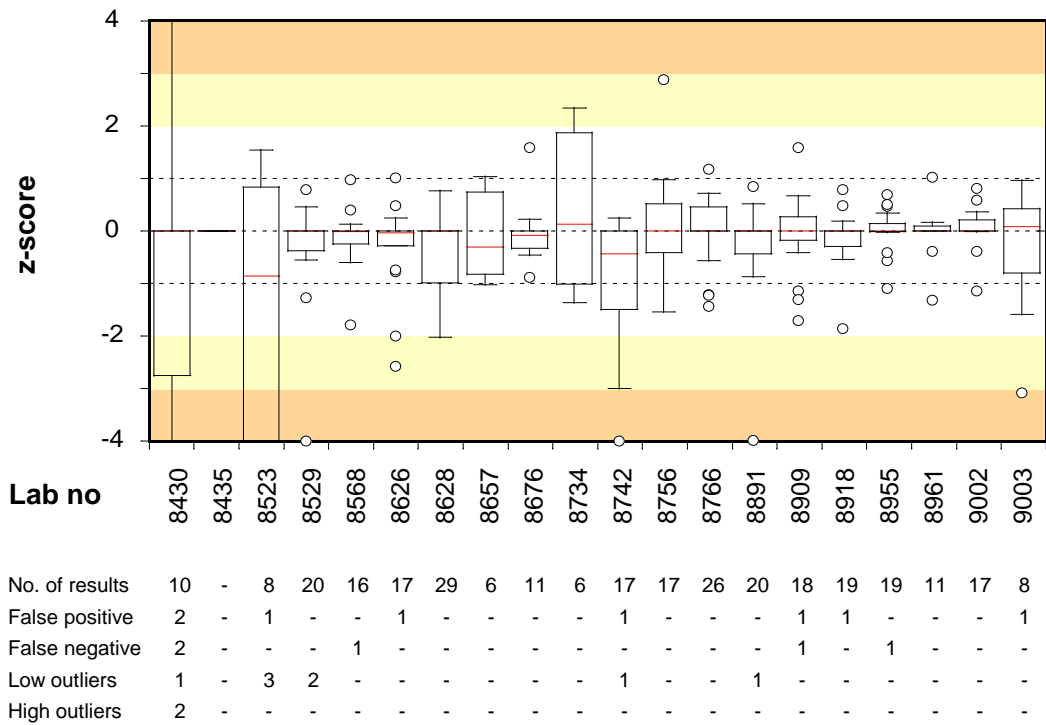
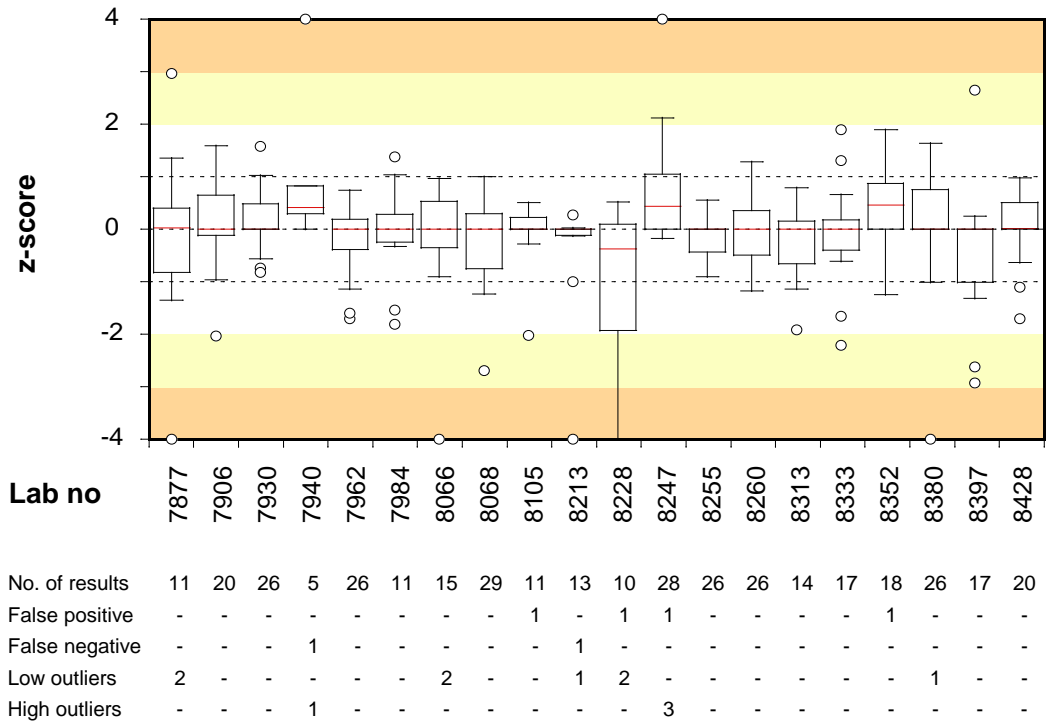
- The plots are based on the laboratory results from all analyses (results of presumptive *B. cereus* mixture A excluded) transformed into z-scores calculated according to the formula: $z = (x-m)/s$, where x is the result of the individual laboratory, m is the mean of the results of all participating 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 $- 1.5 \times$ (the highest result in the box $-$ the lowest result in the box) or the highest result in the box $+ 1.5 \times$ (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.

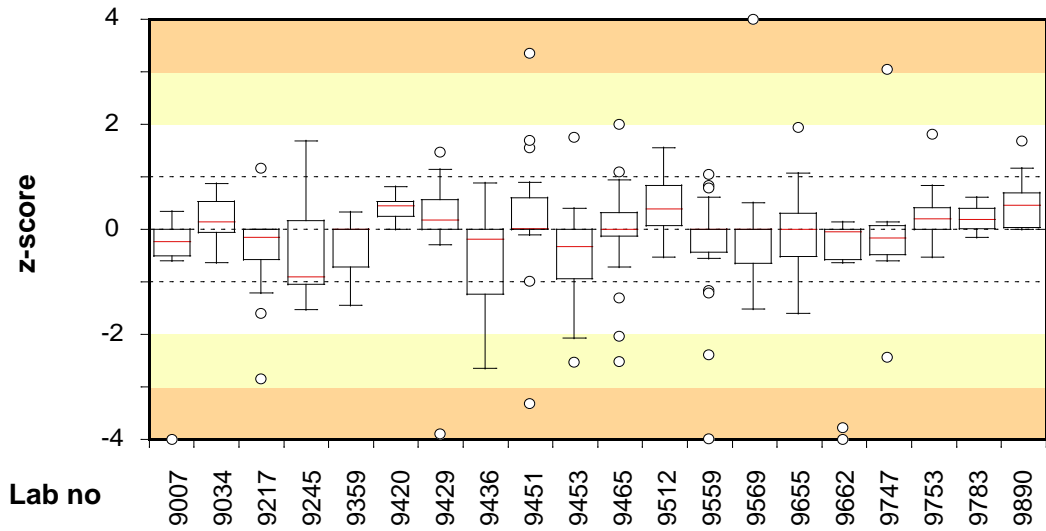




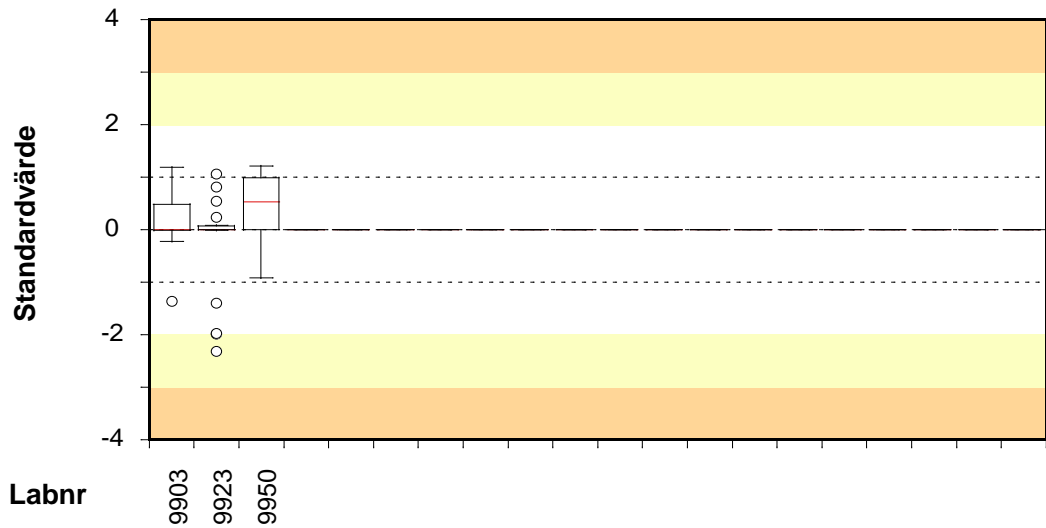








Lab no	9007	9034	9217	9245	9359	9420	9429	9436	9451	9453	9465	9512	9559	9569	9655	9662	9747	9753	9783	9890
No. of results	8	12	14	8	23	9	29	26	26	23	21	8	25	28	20	16	8	21	3	17
False positive	1	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-
False negative	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Low outliers	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-	2	-	-	-	-
High outliers	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-



Labnr	9903	9923	9950
No. of results	19	20	14
False positive	-	-	2
False negative	1	-	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" have been regarded as zero (negative).

Results regarded as "> value are excluded in the calculations.

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

Outliers and false results are highlighted and summarized for each analysis in the end of the table.

Results from analysis of presumptive *B. cereus* i sample A, are neither included in the calculatin of z-values nor the compilations of number of deviant results (Appendix 2 and figure 5).

Lab no.	Code no.	Aerobic microorg. 30 °C			Aerobic microorg. 20 °C			Contaminating microorg.			Enterobacteriaceae			<i>Escherichia coli</i>			Thermotolerant coliform bact.			Coliform bact. 37 °C			Coliform bact. 30 °C			Presumptive <i>Bacillus cereus</i>			Coagulase pos. <i>Staphylococcus</i>			Enterococcus			Gram neg in diary prod.			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								
1149	3 2 1	4.08	5.09	4.88	-	-	-	-	-	-	3.1	4.19	3.05	<1	<1	2.86	-	-	-	3.05	<1	3.04	-	-	-	3	<1	3.59	<3	<3	4.69	-	-	-	-	-	-	1149				
1254	1 2 3	3.94	5.14	4.88	-	-	-	-	-	-	-	-	-	<1	<1	3.28	<1	<1	3.28	2.9	<1	2.98	2.71	<1	2.83	2.99	<1	3.45	-	-	-	3.7	3.93	<2	-	-	-	1254				
1290	1 3 2	3.79	5.29	4.88	-	-	-	-	-	-	2.38	4.25	3.28	<1	<1	3.04	-	-	-	-	-	-	2.42	<1	2.04	2.81	<1	3.54	<1	<1	4.46	-	-	-	-	-	-	1290				
1594	2 1 3	4.08	5.3	4.96	-	-	-	3.28	5.34	4.28	2.92	4.15	3.15	<1	<1	3.2	<1	<1	3.2	2.76	<1	3.04	2.83	<1	2.92	<1	<1	3.69	<3	<3	4.58	3.51	3.78	<2	-	-	-	1594				
1970	2 3 1	4.05	5.46	4.77	4.04	4.16	4.56	-	-	-	2.6	3.89	3.06	<1	<1	3.26	<1	<1	3.26	3.16	<1	3.08	3.34	<1	3.13	2.71	<1	3.67	<3	<3	4.63	3.72	3.83	<2	-	-	-	1970				
2035	3 1 2	4	5.1	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	<1	3.5	<3	<3	4.6	-	-	-	-	-	-	2035					
2058	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2058				
2072	2 1 3	3.96	5.3	4.8	4	4.6	4.63	-	-	-	3.04	4.08	3.08	<1	<1	2.97	2.9	<1	3	2.9	<1	3	2.9	<1	2.93	3.23	<1	3.53	<3	<3	4.6	3.8	3.81	<2	-	-	-	2072				
2086	3 1 2	3.96	5.07	4.65	-	-	-	3.75	4.2	3.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2086				
2324	2 3 1	4.09	5.04	4.79	-	-	-	-	-	-	3.1	4.17	3.03	-	-	-	-	-	-	-	-	-	-	-	-	0	0	3.45	0	0	4.63	3.59	3.87	0	-	-	-	2324				
2344	2 1 3	4	5.11	4.87	4.04	-	4.64	-	5.11	-	3.88	4.11	2.83	<1	<1	2.61	<1	<1	2.82	2.79	<1	2.91	2.7	<1	2.85	3.49	<1	3.53	<1	<1	4.57	3.34	3.64	<1	-	-	-	2344				
2386	1 3 2	4.18	4.93	4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.01	<1	3.13	-	-	-	-	-	-	<3	<3	4.61	-	-	-	-	-	-	2386				
2402	1 2 3	4.05	4.48	4.79	-	-	-	-	-	-	3.07	3.93	3.11	<1	<1	3.11	-	-	-	3	<1	3.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2402				
2488	2 3 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2488			
2553	1 3 2	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2553			
2637	3 2 1	3.96	5.08	4.93	-	-	-	-	-	-	2.95	4.06	3.11	<1	<1	3.45	<1	<1	3.45	<1	<1	3.32	-	-	-	2.56	<1	3.3	<1	<1	4.61	-	-	-	-	-	-	-	2637			
2659	3 2 1	-	4.72	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2659			
2670	2 1 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2670			
2704	2 3 1	4.18	5.23	4.8	-	-	-	-	-	-	2.95	4.09	3.08	<1	<1	3.09	-	-	-	3.02	<1	3.12	-	-	-	-	-	-	<3	<3	4.53	-	-	-	-	-	-	-	2704			
2720	2 3 1	4.14	5.11	4.88	-	-	-	-	-	-	2.8	4.21	3.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2720			
2745	2 1 3	3.94	4.82	4.81	3.81	4.72	4.64	-	-	-	3.84	4.05	3.12	<1	<1	3.12	<1	<1	3.12	-	-	-	-	-	-	2.94	<1	3.6	<3	<3	4.8	3.86	3.79	<2	-	-	-	-	2745			
2757	1 2 3	3.89	5.18	4.8	3.26	3.59	3.45	-	-	-	3.08	4.26	3	-	-	-	-	-	-	-	-	-	2.93	4.11	2.97	2.92	4.1	3.41	-	-	-	-	-	-	-	-	-	-	2757			
2764	2 3 1	4.08	5.11	4.18	-	-	-	-	-	-	3.58	4.36	3.15	<0.60	<0.60	2.88	-	-	-	3.52	<0.60	3.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2764			
2842	2 1 3	4.18	4.94	4.85	-	-	-	5.11	5.56	5.75	2.77	4.04	2.88	<1	<1	3.06	<1	<1	2.83	-	-	-	2.88	2.97	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2842			
2920	3 1 2	3.19	4.08	3.91	-	-	-	-	-	-	2.96	4.06	3.09	<1	<1	3.16	<1	<1	3.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2920		
2941	3 2 1	3.83	4.84	4.67	-	-	-	-	-	-	2.65	3.96	2.91	<1	<1	3.1	-	-	-	-	-	-	2.88	<1	3.01	<1	<1	3.53	<1	<1	4.6	<1	4.79	<1	-	-	-	-	2941			
3055	2 3 1	4.01	4.94	4.7	-	-	-	-	-	-	3.03	4.04	3.34	-	-	-	-	-	-	-	-	-	-	-	-	3.04	0	3.94	-	-	-	-	-	-	-	-	-	-	Pos	Pos	Pos	3055
3126	2 1 3	4.32	4.51	4.54	-	-	-	-	-	-	-	-	-	<1	<1	3.07	-	-	-	-	-	-	-	-	-	-	-	<1	<1	4.51	-	-	-	-	-	-	-	Pos	-	-	3126	
3159	3 1 2	4.13	4.96	4.81	-	-	-	-	-	-	2.9	4.2	2.9	<1	<1	3.32	<1	<1	2.9	2.9	<1	2.85	-	-	-	-	-	<3	<3	4.64	-	-	-	-	-	-	-	Pos	Pos	Pos	3159	
3225	3 1 2	4.2	4.9	4.73	-	-	-	-	-	-	2.95	3.95	3.1	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	3.6	-	-	-	-	-	-	-	-	-	-	-	3225		
3305	3 1 2	5	4.79	3.94	-	-	-	-	-	-	3.08	4.18	3.02	<1	<1	3.19	<1	<1	3.19	-	-	-	-	-	-	<1	<1	3.4	<3	<3	4.55	-	-	-	-	-	-	-	3305			
3346	2 1 3	3.73	5.07	4.81	-	-	-	-	-	-	3.12	4.24	3.08	<1	<1	3.2	<1	<1	3.2	3.2	<1	3.28	3.2	<1	3.23	2.51	<2	3.59	<2	<2	3.9	4.56	<2	<2	<2	<2	<2	<2	-	-	3346	
3452	1 2 3	3.78	4.6	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.43	3.65	2.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3452		
3457	1 2 3	3.74	4.64	4.46	3.76	4.96	4.09	-	-	-	2.74	4.07	3.08	-	-	-	<1	<1	3.24	-	-	-	-	-	-	-	<3	<3	4.7	3.72	3.95	<2	-	-	-	-	-	-	3457			
3511	2 1 3	-	-	-	4.08	4.53	4.68	-	-	-	3.09	4.14	3.12	<1	<1	3.12	-	-	-	<1	<1	3.12	-	-	-	-	-	<1	<1	4.74	<1	3.92	<1	-	-	-	-	-	-	3511		
3533	2 1 3	-	-	-	3.82	4.68	4.23	-	-	-	-	-	-	<0.48	<0.48	>3.04	<0.48	<0.48	>3.04	>3.04	<0.48	>3.04	-	-	-	-	-	<1	<1	3.58	-	-	-	-	-	-	-	-	-	3533		
3543	3 2 1	4.15	5.08	5	-	-	-	-	-	-	3.04	4.28	3.18	-	-	-	-	-	-	-	-	-	3.11	4.25	3.04	<1	<1	3.45	<3	<3	4.32	3.76	3.93	<2	-	-	-	-	3543			
3587	2 1 3	3.86	4.87	4.78	-	-	-	-	-	-	2.83	4.12	2.88	<1	<1	2.04	-	-	-	2.76	<1	3.04	2.72	<1	2.83	<1	<1	3.38	<3	<3	4.79	3.62	3.78	<2	-	-	-	-	3587			
3588	1 2 3	4.06	5.18	4.9	-	-	-	-	-	-	3.07	4.16	3.02	<1	<1	3.17	<1	<1	3.17	-	-	-	-	-	-	<1	<1	3.46	<3	<3	4.71	3.56	3.91	<2	-	-	-	-	-	3588		
m	4.0	5.0	4.8	4.0	4.7	4.7	3.8	4.8	4.5	3.0	4.1	3.0	<1	<1	3.1	<1	<1	3.1	3.0	<1	3.0	3.0	<1	3.0	2.9	<1	3.5	<1	<1	4.6	3.7	3.8	<1	pos	pos	pos	m					
s	0.20	0.27	0.14	0.16	0.40	0.21	0.27	0.48	0.61	0.23	0.14	0.14	-	-	0.14	-	-	0.17	0.23	-	0.23	0.26	-	0.16	0.29	-	0.16	-	-	0.11	0.12	0.11	-	-	-	-	s					

Lab no.	Code no.	Aerobic microorg. 30 °C			Aerobic microorg. 20 °C			Contaminating microorg.			Enterobacteriaceae			Escherichia coli			Thermotolerant coliform bact.			Coliform bact. 37 °C			Coliform bact. 30 °C			Presumptive Bacillus cereus			Coagulase pos. Staphylococcus			Enterococcus			Gram neg in diary prod.			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							
5342	1 3 2	3.92	4.83	4.66	-	-	-	-	-	-	2.83	4.45	3.03	<1	<1	3.11	-	-	-	-	-	-	-	-	-	-	<1	<1.02	4.59	-	-	-	-	-	-	5342					
5350	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	3	<1	3.15	-	-	-	<1	<1	3.15	-	-	-	3.18	<1	3.51	-	-	-	-	-	-	-	5350					
5380	3 2 1	3.85	4.35	4.75	-	-	-	-	-	-	2.95	4.2	3.03	<1	<1	2.98	-	-	-	-	-	-	-	-	-	3.04	<1	3.68	-	-	-	-	-	-	-	5380					
5419	3 2 1	4.01	5.01	4.67	-	-	-	3.97	5.06	4.71	2.99	4.16	3.15	<1	<1	3.11	-	-	-	-	-	-	3.01	<1	3.26	<1	<1	3.53	<1	<1	4.54	3.72	3.84	<1	-	-	5419				
5446	3 1 2	3.84	4.98	4.79	-	-	-	-	-	-	3.42	4.27	3.31	<1	<1	3	-	-	-	-	-	-	3.09	<1	3.05	3.34	<1	3.26	<1	<1	3.2	<1	<1	4.67	-	-	-	5446			
5494	3 2 1	3.85	5.13	4.79	-	-	-	3.83	<1	3.35	2.9	4.09	2.95	-	-	-	-	-	-	-	-	-	2.81	<1	2.85	2.84	<1	2.89	<1	<1	4.13	-	-	-	-	-	5494				
5545	3 1 2	4.08	5.23	5	-	-	-	4.1	5.21	5.02	2.86	4.11	2.78	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	3.48	<1	<1	4.7	3.87	3.93	<1	-	-	-	5545			
5553	3 1 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5553				
5615	3 2 1	5.2	4.52	4.92	-	-	-	-	-	-	2.83	3.9	3.11	<1	<1	3.15	-	-	-	-	-	-	-	-	-	<1	<1	3.59	<3	<3	4.64	3.77	3.86	<2	-	-	-	5615			
5632	3 1 2	-	-	-	-	-	-	-	-	-	2.9	3.74	3	<1	<1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5632				
5701	3 2 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5701			
5774	3 2 1	-	-	-	-	-	-	-	-	-	2.86	4.02	2.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5774			
5801	3 1 2	4.11	4.85	3.87	-	-	-	-	-	-	2.95	3.92	2.95	-	-	-	-	-	-	-	-	-	-	-	-	2.95	<1	3.71	-	-	-	-	-	-	-	-	-	5801			
5883	3 2 1	3.89	5.05	4.8	-	-	-	-	-	-	2.85	4.11	2.86	<1	<1	3.04	-	-	-	-	-	-	-	-	-	2.86	<1	3.45	<3	<3	4.54	-	-	-	-	-	-	5883			
5993	2 1 3	-	-	-	-	-	-	-	-	-	2.9	4.1	3.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5993			
6014	1 2 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6014			
6109	3 1 2	3.97	4.54	4.95	-	-	-	-	-	-	-	-	-	-0.6	<0.6	3	-	-	-	-	-	-	2.9	<0.6	3.04	-	-	-	2.97	<1	3.6	-	-	-	-	-	-	6109			
6138	2 1 3	4.12	5.11	4.82	-	-	-	-	-	-	2.86	3.85	2.85	<1	<1	2.96	-	-	-	-	-	-	-	-	-	<1	<1	3.51	<3	3.3	4.46	-	-	-	-	-	-	6138			
6220	2 1 3	5.97	4.7	5.2	-	-	-	-	-	-	-	-	-	-	-	3.11	-	-	-	-	-	-	-	-	2.68	-	3.89	-	-	-	-	-	-	-	-	-	-	6220			
6224	1 3 2	4.5	4.6	4.9	-	-	-	-	-	-	3.1	4.3	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6224			
6232	3 2 1	4.19	5.13	4.91	-	-	-	-	-	-	3.06	4.2	3.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6232			
6253	1 3 2	4.08	5.18	4.97	-	-	-	-	-	-	3	4.18	3.08	<1	<1	2.49	-	-	-	-	-	-	2.9	4.15	3.04	<1	<1	3.45	<1	<1	4.67	3.85	3.81	<1	-	-	-	6253			
6258	3 2 1	4.56	5.18	5.05	-	-	-	-	-	-	3.56	4.51	3.15	-	-	-	-	-	-	-	-	-	-	-	3.17	3.92	2.89	-	-	-	-	-	-	-	-	-	-	6258			
6343	3 1 2	3.95	5.11	4.76	-	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	3.23	<1	3.18	2.54	<1	3.3	<3	<3	4.7	-	-	-	6343			
6352	2 1 3	3.85	4.95	4.7	-	-	-	-	-	-	2.8	3.9	3.7	<1	<1	3.1	-	-	-	-	-	-	2.7	<1	2.9	-	-	-	<1	3.4	3.5	<2	<3	4.5	-	-	-	6352			
6368	1 2 3	4	5.11	4.96	4.15	4.83	4.62	-	-	-	2.56	4.11	2.83	<1	<1	3.18	<1	<1	3.18	-	-	2.48	<1	2.48	-	-	-	<1	<1	3.52	<3	<3	4.62	3.69	3.88	<2	-	-	6368		
6380	2 3 1	4.04	5.14	4.81	4.09	4.96	4.73	4.02	4.78	4.73	-	-	-	0	0	2.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6380			
6443	3 2 1	4.02	5.04	4.89	-	-	-	-	-	-	2.48	4.2	3.17	<1	<1	3.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6443		
6456	3 2 1	3.92	5.2	4.82	-	-	-	-	-	-	2.84	4.15	2.95	<1	<1	3.05	<1	<1	3.05	-	-	2.89	4.2	2.99	2.77	4.14	3	2.75	<1	3.43	<1	<1	4.64	3.68	3.84	<1	-	-	6456		
6490	1 3 2	3.83	5.03	4.74	-	-	-	-	-	-	2.95	3.42	3.13	-	-	-	-	-	-	-	-	-	-	-	-	-	3.52	<1	3.5	<3	<3	4.9	4.56	3.8	<2	-	-	-	6490		
6594	1 2 3	3.81	4.79	4.89	-	-	-	-	-	-	2.86	4	2.79	<0.6	<0.6	2.92	-	-	-	-	-	-	-	-	-	-	2.94	<1	3.67	-	-	-	-	-	-	-	-	-	6594		
6628	3 2 1	4.12	4.85	4.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.59	3.62	4.04	-	-	-	-	-	-	-	-	-	-	-	6628		
6658	1 2 3	4.83	5.29	5.71	-	-	-	-	-	-	3.09	3.97	3.08	-	-	-	-	-	-	-	-	-	-	-	-	-	2.95	<1	3.59	-	-	-	-	-	-	-	-	-	6658		
6707	2 3 1	4.26	5.01	4.86	4.18	5.04	4.99	3.18	4.11	3.48	2.91	4.08	3.18	0	0	3	3	0	3.15	-	-	3.61	0	3.11	3.57	0	3.11	3.08	0	0	0	4.2	4.72	3.65	4	0	-	-	6707		
6728	2 3 1	4.35	5.13	4.95	-	-	-	-	-	-	-	-	-	<1	<1	3.17	-	-	-	-	-	-	-	-	-	-	<2	4.4	4.81	3.27	3.57	<2	-	-	-	-	-	-	6728		
6730	1 2 3	4.38	4.7	4.73	-	-	-	-	-	-	-	-	-	<1	<1	3.16	-	-	-	-	-	-	-	-	-	-	2.83	3.8	3.26	<3	4.5	4.72	-	-	-	-	-	-	6730		
6762	2 3 1	4.26	4.86	4.96	-	-	-	-	-	-	3.48	4.27	3.18	<1	<1	3.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6762			
6885	1 3 2	4.09	4.62	4.8	-	-	-	-	-	-	3.08	4.2	3.11	<1	<1	3	-	-	-	-	-	-	-	-	3	4.11	3.23	3.04	<1	3.74	<3	<3	4.54	3.67	3.88	<2	-	-	-	6885	
6944	2 3 1	-	-	-	3.71	4.62	4.63	-	-	-	-	-	-	<1	<1	3.1	<1	<1	3.03	-	-	3.06	<1	3.1	-	-	-	<1	<1	3.51	<1	<1	4.49	<1	3.72	<1	-	-	-	6944	
6958	1 2 3	3.88	4.85	4.38	-	-	-	-	-	-	2.9	3.85	3.15	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7	<1	3.11	-	-	-	-	-	-	-	-	-	6958		
6971	2 3 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6971		
7024	2 3 1	4.2	5.07	4.85	-	-	-	-	-	-	3.11	4.27	3.14	-	-	-	-	-	-	-	-	-	-	-	-	-	2.81	3.9	3.59	-	-	-	-	-	-	-	-	-	7024		
7096	2 1 3	4.18	5.13	4.9	4.13	4.24	4.58	-	-	-	-	-	-	<1	<1	3.01	-	-	-	-	-	-	-	-	-	3.01	<1	2.99	-	-	-	-	-	-	-	-	-	-	7096		
7182	2 3 1	4.18	5.13	4.84	4.2	4.6	4.95	-	-	-	3.5	4.27	3.14	<1	<1	3.08	-	-	-	-	-	-	-	-	2.96	<1	2.42	3	<1	3.08	-	-	-	-	-	-	-	-	7182		
7191	2 3 1	2.63	2.43	5.76	-	-	-	-	-	-	-	-	-	0.47	0.47	2.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7191			
7207	1 2 3	3.87	4.97	5.18	-	-	-	-	-	-	2.88	4.11	2.88	-	-	-	-	-	-	-	-	-	-	-	-	-	2.11	<1	3.75	-	-	-	-	-	3.67	3.89	<1	-	-	-	7207
7232	1 3 2	4.38	5.12	5.01																																					

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.

□ $2 < |z| \leq 3$, □ $|z| > 3$

Lab no.	Aerobic microorg. 30 °C			Aerobic mikroorg. 20 °C			Contaminating bacteria			Enterobacteriaceae			Escherichia coli			Thermotol. coliform bact.			Coliforma bacteria 37 °C			Coliform bacteria 30 °C			Presumptive Bacillus cereus			Coag. pos. Staphylococcus			Enterococcus			Gram neg. in diary prod.			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	
1149	0.169	0.481	0.396						0.540	0.628	0.108	0	0	-1.567				0.394	0	0.189				0	0	0.470	0	0	0.609							1149	
1254	-0.523	0.668	0.396											1.442	0	0	1.204	-0.269	0	-0.076	-0.955	0	-0.865	0	-0.430				0.240	0.890	0				1254		
1290	-1.266	1.228	0.396						-2.632	1.054	1.729	0	0	-0.278				-2.074	0	<4	0	0.149	0	0	-1.442										1290		
1594	0.169	1.266	0.966					-2.002	1.093	-0.337				0.869	0	0	0.723	-0.888	0	0.189	-0.492	0	-0.315	0	1.113	0	0	-0.372	-1.297	-0.543	0				1594		
1970	0.021	1.863	-0.389	0.283	-1.270	-0.644			-1.663	-1.505	0.178	0	0	1.298	0	0	1.084	0.881	0	0.366	1.475	0	0.968	0	0.984	0	0	0.074	0.401	-0.066	0				1970		
2035	-0.227	0.519	-0.175																					0	-0.108	0		-0.194							2035		
2058																																				2058	
2072	-0.425	1.266	-0.175	0.038	-0.158	-0.306			0.275	-0.154	0.319	0	0	-0.779	0	-0.480	-0.269	0	0.012	-0.222	0	-0.254	0	0.085	0	0	-0.194	1.048	-0.257	0				2072			
2086	-0.415	0.403	-1.224				-0.268	-1.298	-1.478																											2086	
2324	0.219	0.294	-0.246						0.540	0.485	-0.033													0	-0.430	0	0	0.074	-0.650	0.317	0				2324		
2344	-0.227	0.556	0.324	0.283		-0.257		0.611	3.976	0.059	-1.443	0	0	-3.358	0	0	-1.562	-0.756	0	-0.386	-0.994	0	-0.743	0	0.085	0	0	-0.461	-2.672	-1.880	0				2344		
2386	0.664	-0.117	0.681															0.217	0	0.587						0	0	-0.105							2386		
2402	0.021	-1.798	-0.246						0.407	-1.221	0.531	0	0	0.224				0.173	0	0.499															2402		
2488																																					2488
2553												0	0	-0.564							-0.222	0	0.784					1.048	0.603	0					2553		
2637	-0.425	0.444	0.752						-0.121	-0.297	0.531	0	0	2.659	0	0	2.226				0	1.428			0	-1.393	0	0	-0.105							2637	
2659		-0.901																									0									2659	
2670																																					2670
2704	0.664	1.004	-0.175						-0.121	-0.083	0.319	0	0	0.081				0.262	0	0.543						0	0	-0.818							2704		
2720	0.466	0.556	0.396						-0.782	0.770	0.883													0	0.534											2720	
2745	-0.523	-0.528	-0.104	-1.125	0.145	-0.257			3.799	-0.368	0.601	0	0	0.296	0	0	0.242							0	0.791	0	0	1.589	1.534	-0.448	0					2745	
2757	-0.771	0.817	-0.175	<-4	-2.710	<-4			0.451	1.125	-0.245										-0.106	-0.010			-0.687										2757		
2764	0.169	0.556	<-4						2.654	1.836	0.813	0	0	-1.424				2.472	0	0.366				0	0.342			-0.003	0.221	0					2764		
2842	0.664	-0.079	0.182				>4	1.554	2.083	-0.914	-0.439	-1.091	0	0	-0.134	0	0	-1.501			-0.299	0.173		0	<-4	0	0.163	>4	>4	0					2842		
2920	<-4	-3.292	<-4						-0.077	-0.297	0.390	0	0	0.582																							2920
2941	-1.068	-0.453	-1.102						-1.443	-1.007	-0.879	0	0	0.152							-0.299	0	0.235	0	0.085	0	0	-0.194			>4	0			2941		
3055	-0.177	-0.079	-0.888						0.231	-0.439	2.152													0	2.719								0	0	0	3055	
3126	1.356	-1.686	-2.030									0	0	-0.063											0	0	-0.996									3126	
3159	0.416	-0.005	-0.104						-0.342	0.699	-0.950	0	0	1.728	0	0	-1.081	-0.269	0	-0.652					0	0.163							0	0	0	3159	
3225	0.763	-0.229	-0.674						-0.121	-1.078	0.460													0	0.534											3225	
3305	>4	-0.640	<-4						0.451	0.557	-0.104	0	0	0.797	0	0	0.663							0	-0.751	0	0	-0.639								3305	
3346	-1.562	0.406	-0.104						0.628	0.983	0.319	0	0	0.869	0	0	0.723	1.057	0	1.251	0.935	0	1.579	0	0.470	0	-0.550	-3.695	0						3346		
3452	-1.315	-1.350	-0.888																		-2.035	-1.721														3452	
3457	-1.513	-1.200	-2.600	-1.431	0.752	-2.917			-1.046	-0.225	0.319				0	0	0.963								0	0	0.698	0.401	1.081	0					3457		
3511				0.527	-0.335	-0.064			0.496	0.272	0.601	0	0	0.296				0	0.543							0	0	1.054								3511	

Lab no.	Aerobic microorg. 30 °C			Aerobic mikroorg. 20 °C			Contaminating bacteria			Enterobacteriaceae			<i>Escherichia coli</i>			Thermotol. coliform bact.			Coliforma bacteria 37 °C			Coliform bacteria 30 °C			Presumptive <i>Bacillus cereus</i>			Coag. pos. <i>Staphylococcus</i>			Enterococcus			Gram neg. in diary prod.			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			
3533				-1.064	0.044	-2.240						0	0		0	0		0					0	0	<-4										3533				
3543	0.515	0.444	1.252									0.275	1.267	1.024								0.588	0.418		0	-0.430	0	0	-2.690	0.725	0.890	0			3543				
3587	-0.919	-0.341	-0.318									-0.650	0.130	-1.091			<-4					-0.888	0	0.189	-0.916	0	-0.865	0	-0.879	0	0	1.500	-0.408	-0.543	0	3587			
3588	0.070	0.817	0.538									0.407	0.414	-0.104			0	0	0.654	0	0	0.543	-0.711	0	-0.386	0.395	0	-0.132	0	-0.365	0	0	0.787	-0.893	0.699	0	3588		
3626	0.268	0.519	-0.175									0.099	0.699	-0.950			0	0	0.869	0	0	0.723	0.173	0	-0.873	0.164	0	-1.049	0	-0.108	0	0	0.698	0.240	0.603	0	3626		
3652	1.752	0.519	-0.888																				-0.269	0.897												3652			
3726	-0.672	1.639	-0.104									0.275		-1.372			0	0	<-4				0						0	0	-1.174					3726			
3803							0.717	0.653	0.733			-0.650	0.841	-0.033			0	0	0.439				0.483	0	0.809			0	0	0.663			0.321	-0.352	0	3803			
3831	-0.721	0.220	-0.389														0	0	0.296				0.394	0	0.543											3831			
3864	1.257	-2.657	0.182									-0.033	-0.297	0.531																					0	3864			
3868	-0.029	0.182	1.252				0.276	-0.919	0.223			0.099	0.201	-0.668			0	0	0.654	0	0	0.543	-1.153	0	-0.298	0.086	0	0.662	0	2.590	0	0	-0.015	<-4	0.126	0	3868		
3923	-0.870	-0.266	0.039	-0.268	0.954	0.759	0.313	0.234	0.651			-0.430	-2.074	0.813			0	0	<-4	0	0	<-4	-0.490	0	-2.820	0.858	0	<-4	0	0.277	0	0	-0.015	-0.569	-2.262	0	3923		
3925																																						3925	
4047	0.169	-1.312	-0.389									-0.209	-0.723	-0.738			0	0	0.582									0	-0.879	0	0	-0.194			0	0	0	4047	
4050	>4	0.556	0.324				0.653	0.585				-0.165	-0.083	-1.795									-0.222	0	-0.560			0	0.020						0	0	0	4050	
4064	-1.810	-0.565	-1.316	-0.880	-1.244	-1.079						0.099	-0.012	-0.245			0	0	-0.206	0	0	-0.179			-0.531	0	-0.193										4064		
4153	0.318	0.631	0.681	-1.248	-2.028	<-4						0.099	0.343	0.813			0	0	1.442	0	0	1.204	0.129	0	0.012	-0.608	0	1.090	0	0.277	0	0	-0.461	-2.187	0.126	0	4153		
4171	0.169	-0.117	0.396									0.892	2.191	-0.245			0	0	0.510				2.693	0	0.189			0	0.470				0.806	0.890	0	4171			
4246	0.763	-1.051	-0.746									1.509	0.059	1.588			0	0	-0.707				-1.596	-2.068													4246		
4266	0.075	-0.120	1.159														0	0	0.897						0.680	0	-0.322						0.528					4266	
4278	-1.414	-2.620	-3.955									-0.165	-1.931	-0.033													0	-1.714									4278		
4288	-1.711	0.967	-0.888				-0.496	0.779	0.585			-1.002	0.699	-3.840			0	0	0.510	0	0	0.422	-0.446	0	-2.289			0	0.406	0	0	0.163	0.644	0.030	0	4288			
4305	0.763	1.042	1.822									-0.297	0.485	0.108									0.085	-0.254	0.742	>4		0	-1.136	0	0	-2.868					4305		
4352				1.139	0.044	1.049	1.746	-1.715	0.140			2.478	0.557	-0.597			0	0	-0.278	0	0	-2.042	-0.667	0	0.012	-0.994	0.051		0	-1.136	0	0	-0.729	>4	-2.835	0	4352		
4353	-0.029	1.340	1.180																																			4353	
4356	-0.721	0.145	0.538									-0.121	0.557	0.319			0	0	0.725	0	0	-0.720	0.350	0	-0.121	0.086	0	0.173		0	<-4	0	0	-0.907			4356		
4400	-0.474	-0.416	-1.031									0.143	-0.012	0.813														0	-0.044								4400		
4538	-0.177	-1.574	-0.674									1.112	1.125	2.152			0	0	0.797						0.434	0.173												4538	
4557	-0.845	0.216	-0.510														0	0	>4			0	>4															4557	
4562	-2.057	-0.864	-1.673									-0.518	0.059	-0.245			0	0	-2.928				2.295	0	0.189			0	-0.430	0	0	-0.818	1.291	0.603	0	4562			
4586																	0	0	<-4										0	0								4586	
4605																																							4605
4633																	0	0	1.012				-0.490	0	-0.298	-0.415	0	-0.132		0	-1.393	0	0	0.430	0.240	-0.161	0	4633	
4635	0.021	-0.416	-0.318									0.011	0.841	-0.104															0	-0.301	0	0	0.252	-0.246	0.221	0	4635		
4658	1.999	-1.723	-3.670									1.905	>4	2.787			0.869																					4658	
4683	-1.315	0.668	0.110	-1.309	1.131	0.952						-1.575	-2.145	-1.443			0	0	-0.564	0	0	-1.682	0.129	0	-0.386	0.164	0	0.112		0	-0.108	0	0	-0.461				4683	
4889	0.911	0.817	0.396	1.262	0.828	0.275						-0.562	0.059	0.037			0	0	-0.564	0	0	-0.480	0.173	0	2.358			0	0.406	0	0	0.698	-1.216	0.699	0	4889			
4951	-1.018	-0.827	-1.102									1.156	-0.154	-0.245			0	0	-1.853				0.748	0														4951	
4955	1.257	-0.416	0.610									-0.297	0.201	0.249			0	0	0.152	0	0	-1.081	0.085	0	0.587			0	-1.201	0	0	-0.818					4955		
4980	1.010	-0.229	0.324									-0.826	-0.083	-0.104			0	0	-0.063				-0.313	0	0.455			0	-0.687	0	0	0.252					4980		
5018	-0.523	0.369	0.110									0.143	0.912	-1.091			0	0	-0.922	0	0	-0.780	0.969	-0.076	0.935	-0.377		0	2.333	0	0	-0.015	0.240	-0.066	0	5018			
5100	1.901	2.088	2.536														0	0					1.013	0	0.499													5100	
5119	1.257	-0.117	0.253														0	0	2.516						0.318	0	1.579											5119	
5120	-0.276	0.444	0.966									-0.342	-0.012	0.319			0	0	0.009	0	0	0.002	-0.137	0.012	-0.569	1.090		0	-0.751	0	0	-0.194		0.221	0	5120			
5140	2.840	-1.985	<-4	>4	0.272	-2.385	-1.506	-1.868				-0.342	-1.078	-0.950			0	0	<-4																	0	0	5140	
5162	>4	2.200	2.393																				>4	0	>4			0	-0.430					0.603	0		5162		
5197	-0.820	0.855	0.396									-0.430	-0.368	-1.725			0	0	-1.066																		5197		
5200	-1.117	0.892	1.038	-1.064	1.232	0.952											0	0	-0.278	0	0	-0.239	0.350	0.189	-1.726	-1.721			0	0	-0.461						5200		

Lab no.	Aerobic microorg. 30 °C			Aerobic mikroorg. 20 °C			Contaminating bacteria			Enterobacteriaceae			<i>Escherichia coli</i>			Thermotol. coliform bact.			Coliforma bacteria 37 °C			Coliform bacteria 30 °C			Presumptive <i>Bacillus cereus</i>			Coag. pos. Staphylococcus			Enterococcus			Gram neg. in diary prod.			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			
5201	0.318	0.257	-0.175						0.716	0.414	0.319	0	0	-0.636				0.129	0	0.455				0	-0.044	0	0	0.341							5201				
5204	2.247	-0.602	0.538						0.099	0.699	1.870	0	0	0.869	0	0	0.122		0	0.897				0	-0.108	0	0	-0.194	-1.378	0.603	0				5204				
5220	-1.463	0.593	0.538	-1.187	0.449	0.178			-1.090	-1.576	-1.091	0	0	-1.424				-0.711	0	-0.475															5220				
5221	0.318	1.004	0.182					0.643	0.380	0.519								0.659	0	0.366				0	0.406										5221				
5250														0	0.224			0.677	0	0.406				0	1.408			1.412	-0.228	0					5250				
5290	>4	-0.939	0.253						3.139	-0.865	-1.795			<-4				2.295	-1.094	2.594	-2.454			0	0	-1.888									5290				
5304	1.802	-2.919	0.681						0	0	2.373							0.659	0	0.897				0	0	0.609									5304				
5329	0.367	1.079	0.467	1.078	1.181	0.517			-0.297	>4				0	0								0	0.020	0	0.520			0.317	0	0	0			5329				
5333	0.021	-0.005	-3.456						0.760	0.770	-0.245												0.742	0.173	0	<-4	0	0	<-4	<-4	0					5333			
5338	-0.622	0.668	0.467															0.665	0	-0.010																5338			
5342	-0.622	-0.490	-1.174						-0.650	2.476	-0.033	0	0	0.224											0	0	-0.283									5342			
5350														0	0.510				0	0.676				0	-0.044											5350			
5380	-0.969	-2.283	-0.532						-0.121	0.699	-0.033	0	0	-0.707									0.202	0	1.762	0	1.048	0	0.609								5380		
5419	-0.177	0.182	-1.102				0.533	0.506	0.371	0.055	0.414	0.813	0	0	0.224								1.475	0	1.762	0	0.085	0	0	-0.729	0.401	0.030	0				5419		
5446	-1.018	0.070	-0.246						1.949	1.196	1.941	0	0	-0.564				0.571	0	0.233				0	-2.036	0	0	0.430									5446		
5494	-0.969	0.631	-0.246				0.019	-1.868	-0.342	-0.083	-0.597							-0.667	0	-0.652	-0.454	0	-0.499	0	>4											5494			
5545	0.169	1.004	1.252				1.011	0.821	0.881	-0.518	0.059	-1.795												0	-0.237	0	0	0.698	1.615	0.890	0						5545		
5553																		-1.198	0	-2.599																	5553		
5615	>4	-1.648	0.681						-0.650	-1.434	0.531	0	0	0.510				-0.004	0	0.676				0	0.470	0	0	0.163	0.806	0.221	0						5615		
5632									-0.342	-2.571	-0.245	0	0	-0.564																								5632	
5701																																						5701	
5774									-0.518	-0.581	-1.795															0	0	0.698											5774
5801	0.318	-0.416	<-4						-0.121	-1.292	-0.597													0	1.241													5801	
5883	-0.771	0.332	-0.175						-0.562	0.059	-1.232	0	0	-0.278										0	-0.430	0	0	-0.729										5883	
5993									-0.342	-0.012	0.108																											5993	
6014																																						6014	
6109	-0.375	-1.574	0.895											0	0	-0.564		-0.269	0	0.189				0	0.534												6109		
6138	0.367	0.556	-0.032						-0.518	-1.789	-1.302	0	0	-0.851										0	-0.044	0	-1.442											6138	
6220	>4	-0.980	2.707											0.224								-1.071	>4														6220		
6224	2.247	-1.350	0.538						0.540	1.409	1.870													0	-0.108													6224	
6232	0.713	0.631	0.610						0.363	0.699	-0.174																											6232	
6253	0.169	0.817	1.038						0.099	0.557	0.319	0	0	<-4									-0.222	0.418	0	-0.430	0	0	0.430	1.453	-0.257	0					6253		
6258	2.544	0.817	1.608						2.566	2.902	0.813												0.819	-0.499														6258	
6343	-0.474	0.556	-0.460											0	0			1.190	0	0.809				0	-1.393	0	0	0.698										6343	
6352	-0.969	-0.042	-0.888						-0.782	-1.434	>4	0	0	0.152				-1.153	0	-0.431					-0.108	0	0	-1.085										6352	
6368	-0.227	0.556	0.966	0.956	0.423	-0.354			-1.839	0.059	-1.443	0	0	0.725	0	0	0.603	-2.126	0	-2.289				0	0.020	0	0	-0.015	0.159	0.412	0						6368		
6380	-0.029	0.668	-0.104	0.589	0.752	0.178	0.717	-0.081	0.404					0	0	-1.782																						6380	
6443	-0.128	0.294	0.467						-2.192	0.699	0.954	0	0	1.012				0.262	0	0.278																		6443	
6456	-0.622	0.892	-0.032						-0.606	0.343	-0.597	0	0	-0.206	0	0	-0.179	-0.313	-0.032	-0.724	0.173			0	-0.558	0	0	0.163	0.078	0.030	0						6456		
6490	-1.068	0.257	-0.603						-0.121	<-4	0.672													0	-0.108	0	0	2.481	>4	-0.352	0							6490	
6594	-1.167	-0.640	0.467						-0.518	-0.723	-1.725	0	0	-1.137				-0.402	0	-3.528				0	0.984													6594	
6628	0.367	-0.416	-1.245																				2.439	>4														6628	
6658	3.879	1.228	>4						0.496	-0.936	0.319													0	0.470													6658	
6707	1.060	0.182	0.253	1.139	0.954	1.436	-2.369	-1.485	-1.654	-0.297	-0.154	1.024	0	0	-0.564	0	0.422	2.870	0	0.499	2.362	0	0.846	0	0	0.876	-0.165	1.558	0							6707			
6728	1.505	0.631	0.895											0	0	0.654							0.129	0	0.764													6728	
6730	1.653	-0.976	-0.674											0	0	0.582							-0.534	0	0.720												6730		
6762	1.060	-0.378	0.966						2.214	1.196	1.024	0	0	0.510											-1.650	0	0.876											6762	
6885	0.219	-1.275	-0.175						0.451	0.699	0.531	0	0	-0.564									0.164	1.579	0	1.434	0	0	-0.729	-0.003	0.412	0					6885		

Lab no.	Aerobic microorg. 30 °C			Aerobic mikroorg. 20 °C			Contaminating bacteria			Enterobacteriaceae			<i>Escherichia coli</i>			Thermotol. coliform bact.			Coliforma bacteria 37 °C			Coliform bacteria 30 °C			Presumptive <i>Bacillus cereus</i>			Coag. pos. <i>Staphylococcus</i>			Enterococcus			Gram neg. in diary prod.			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	
6944				-1.737	-0.107	-0.306						0	0	0.152	0	0	-0.299	0.438	0	0.455				0	-0.044	0	0	-1.174	-1.116	0				6944			
6958	-0.820	-0.416	-3.171									-0.342	-1.789	0.813									0	-2.614										6958			
6971																																			6971		
7024	0.763	0.406	0.182									0.584	1.196	0.742										0.470										7024			
7096	0.664	0.631	0.538	0.833	-1.067	-0.547						0	0	-0.492				0.217	0	-0.032					0	0	0.341	2.181	-1.403	0				7096			
7182	0.664	0.631	0.110	1.262	-0.158	1.242						2.302	1.196	0.742	0	0	0.009	-0.004	0	-2.555	0.164	0	0.662											7182			
7191	<-4	<-4	>4																																7191		
7207	-0.870	0.033	2.536									-0.430	0.059	-1.091										0	1.498			-0.003	0.508	0				7207			
7232	1.653	0.593	1.323																																7232		
7242	-0.261	0.037	-1.438																																7242		
7248	-0.622	-0.005	-0.389									-0.280	-1.981	0.291							0.164	0	0.039		0	0.406								7248			
7253	0.911	0.369	1.466									-0.650	0.414	-0.950	0	0	0.582	0	0	-0.059	-0.225	0	-0.254	-0.106	0	-0.254		0	0.520	0.806	1.463	0		7253			
7282	0.763	0.294	0.396									2.081	1.694	0.813	0	0	-0.564	-0.269	0	0.189	-0.269	0	0.189				0	0	1.054	0.563	-0.066	0		7282			
7330	0.911	0.631	-0.460									-0.342	-0.723	-1.443	0	0	-1.639								0	-0.173	0	0	1.054	0.563	-0.066	0		7330			
7334	-0.425	0.840	0.217									2.962	0.272	-1.584	0	0	-0.994							0	1.562	0	0	2.035	-0.003	-0.925	0			7334			
7449	0.318	0.780	0.467									-0.425	0.840	0.217							-0.402	0	0.534											7449			
7543	-0.721	-2.171	-1.816	-0.942	-0.815	-1.031						-0.518	-1.576	0.037							-1.842	0	0.051											7543			
7564	-0.622	0.444	-0.175	-0.452	-0.714	0.082	0.937	0.255	0.535			0	0	-1.925				0.350	-0.785	0.125	-1.049			0	-1.522	0	0	1.054						7564			
7596	-0.721	1.266	1.252	-0.574	0.095	0.517						-0.386	0.343	1.165	0	0	0.869	0	0	0.723	-0.004	0	0.366	1.398	0	1.579		0	-0.550	-1.216	0.890	0		7596			
7617	1.505	0.556	0.110									-0.782	-0.723	-0.950	0	0	<-4	0	0	-1.081	-1.153	-0.431				0	0.534	0	0	-1.085				7617			
7627	0.120	0.817	-0.460									0	0	-0.278				0.262	0	0.189															7627		
7631	-0.721	0.556	0.324																		1.455	0	1.738				0	0.149							7631		
7688	-1.167	0.556	-0.246	-0.758	0.929	0.662						-0.721	0.556	-0.246				-0.650	0.130	-0.668															7688		
7728	-0.573	1.154	1.252	-0.452	1.282	1.581																														7728	
7793	-0.078	0.481	0.467									0	0	1.657	0	0	1.384	1.853	1.384					0	0.342	0	0	1.500							7793		
7802	0.763	-0.378	0.253									-0.474	-2.855	-1.443	0	0	-1.495				0.129	0	0.410	-0.492	0	-1.537									7802		
7825	1.891	0.971	0.845									1.584	1.822	1.990							0	0	0.218												7825		
7828	0.713	-1.125	-0.175									0.099	0.699	0.531																					7828		
7876	-0.721	0.743	1.394									-0.870	0.059	2.152	0	0	0.582								0	1.691	0	0	0.430	0.401	0.699	0			7876		
7877	1.356	-0.303	0.396	<-4	-1.345	<-4						2.962	0.414	0.108											0	0.020									7877		
7906	-0.870	0.892	-0.032				-0.202	0.590	-0.962			-0.826	0.770	0.460	0	0	1.585	0.173	0	1.340					0	-2.036	0	0	0.698						7906		
7930	0.664	0.406	0.538									-0.562	0.485	-0.738	0	0	-0.564	0	0	-0.480	0.350	0	1.030	0.742	0	1.579		0	0.342	0	0	-0.818	0.725	-0.448	0	7930	
7940	>4	0.294	0.824																																	7940	
7962	-0.523	0.743	0.253									0.187	0.201	0.319	0	0	0.367	0	0	0.302	-0.446	0	-0.386	-0.106	0	-0.193		0	-1.136	0	0	-0.729	-1.702	-1.594	0	7962	
7984	1.040	-1.809	0.560									-0.328	-0.162	1.377												0	-1.535							0	0	0	7984
8066				-0.697	0.600	0.468												0	0	0.869	0.969	0	0.897				0	0	-0.907	<-4	<-4	0			8066		
8068	-1.068	0.892	0.538	-1.064	1.005	0.275						0.319	-1.221	-1.232	0	0	0.367	0	0	0.302	-1.153	0	-0.165	-2.691	0	-0.988		0	-0.751	0	0	-0.550	0.321	0.699	0	8068	
8105	0.169	-2.022	0.182															0	0	0.510	0.262	0.455						0	0	-0.283					8105		
8213	0.268	-0.117	-0.104									-0.121	<-4	-0.033	0	0	-0.994									0	0.020							0	0	8213	
8228	0.219	0.519	<-4	0.099	-1.926	<-4																														8228	
8247	1.653	0.220	0.396	2.119	0.474	0.227						>4	0.628	0.742	0	0	0.654	0	1.144	>4	0	0.941	>4	0	1.518		0	-0.173	0	0	0.698	0.644	0.317	0	8247		
8255	-0.474	0.444	0.110									-0.342	0.557	-0.386	0	0	0.510	0	0	0.422	-0.579	0	-0.431	-0.608	0	-0.010		0	-0.237	0	0	-0.907	-0.812	-0.734	0	8255	
8260	-1.018	0.406	-1.174									1.244	0.485	-0.527	0	0	-0.492	0	0	-0.419	1.278	0	0.543	0.974	0	0.357		0	-0.430	0	0	-0.639	-0.812	-0.543	0	8260	
8313	0.644	-1.910	-0.282									-0.654	0.158	-0.950	0	0	-1.144									0	0.791	0	0	0.760						8313	
8333	0.664	0.182	1.894									-0.606	-0.012	-1.654	0	0	-2.212				-0.402	0	-0.431				0	1.305						-0.003	0.508	0	8333
8352	0.812	0.967	1.894									-0.782	0.130	0.954	0	0	0.654				-1.242	0.632					0	0.406	0	0	0.876	1.615	0.508	0	8352		
8380	-0.919	0.444	0.110	-0.697	0.752	0.468						-0.121	<-4	0.108	0	0	1.084	0	0	0.903	1.632	0	0.897	1.436	0	1.395		0	-1.008	0	0	0.341				8380	
8397	2.643	-2.620	-1.316									-0.165	-1.007	0.037	0	0	-2.928										0	0.020	0	0	0.252	-1.135	-0.830	0	8397		

Lab no.	Aerobic microorg. 30 °C			Aerobic mikroorg. 20 °C			Contaminating bacteria			Enterobacteriaceae			<i>Escherichia coli</i>			Thermotol. coliform bact.			Coliforma bacteria 37 °C			Coliform bacteria 30 °C			Presumptive <i>Bacillus cereus</i>			Coag. pos. <i>Staphylococcus</i>			Enterococcus			Gram neg. in diary prod.			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	
8428	0.021	0.108	-0.032				0.056	-1.108	-1.703	0.143	0.983	0.813	0	0	-0.636										0	0.534	0	0	0.698	0.482	0.603	0				8428	
8430	-2.750	-1.088	-2.886										0	0	>4										0	0	<-4								8430		
8435																																			8435		
8523	<-4	<-4	<-4							0.231	0.557	-1.936								1.544	1.119														8523		
8529	0.466	0.444	-0.318							-1.267	-0.439	0.178	0	0	-0.063	0	0	-0.059						0	0.791	0	0	-0.550	<-4	<-4	0				8529		
8568	-0.029	-0.602	-0.246							0.980	-0.154	-0.245	0	0					0.129	0	-0.298			0	0.406				-0.084	-1.785	0				8568		
8626	-0.771	0.481	-0.746	1.017	0.247	-0.160				-0.121	-2.002	-0.033	0	0	-0.278	0	0	-0.239	-2.568	0.189															8626		
8628	-0.672	-0.042	-1.530	0.772	-0.992	-0.983				-0.209	-1.007	-1.302	0	0	0.296	0	0	0.242	-0.048	0	-1.139	-0.299	0	-2.026	0	-1.843	0	0	0.430	-0.893	0.603	0			8628		
8657	-1.018	0.743	1.038							-0.826	0.201	-0.809																								8657	
8676	-0.276	-0.453	-0.175							0.231	-0.083	1.588												0	-0.879	0	0	-0.372								8676	
8734	2.346	-1.013	0.610							-0.342	-1.363	1.870																								8734	
8742	-1.068	-0.079	<-4							-0.430	-0.723	-0.950	0	0	-3.000	0	0	-2.523	-2.568	-1.493						0	0	0.252								8742	
8756	2.890	-1.536	-0.532							0.848	0.983	0.601	0	0	-0.063									0	-1.265	0	0	0.520	-0.408	-1.021	0					8756	
8766	-1.216	0.519	-0.175							-1.223	-1.434	0.460	0	0	-0.564	0	0	0.723	0.173	0	0.455	0.164	0	-0.438	0	1.177	0	0	0.698	0.240	0.603	0				8766	
8891	-0.870	-0.453	-0.318				-3.986	0.443	0.848				0	0	0.009									0	-0.430	0	0	0.520								8891	
8909	0.416	0.668	0.467							-1.707	0.272	-0.174	0	0	-1.137									0	0.085	0	0	1.589	-0.408	-1.307	0					8909	
8918	-0.276	-0.303	-0.318				-1.855	0.066	0.486				0	0	-0.063									0	0.791	0	0	-0.194	-0.327	-0.543	0					8918	
8955				-0.024	0.701	0.468				-0.562	0.343	-1.091	0	0		0	0	0.002						0	0.277	0	0	-0.015	-0.408	0.508	0					8955	
8961	0.169	0.108	-1.316							-0.386	0.059	1.024												0	0.085									0	0	0	8961
9002	0.070	0.369	-0.389							0.099	0.201	0.813	0	0	0.367									0	-1.136	0	0	-0.015									9002
9003	0.674	-3.083	-1.587										0	0	0.181									0.156	0.968												9003
9007	-0.406	-0.600	<-4										0	0	-0.354																					9007	
9034	0.169	0.108	-0.104	0.527	-0.638	0.275				-0.386	0.699	0.531	0	0	0.869																					9034	
9217	-1.216	-2.844	-1.602							-0.342	-0.012	1.165												0	-0.108	0	0	-0.194	-0.569	-0.352	0						9217
9245	-0.969	0.332	-1.530							-1.134	-0.936	-0.879												0	1.691												9245
9359	-0.969	0.332	-0.104							-0.474	-0.368	-1.443	0	0	0.224	0	0	0.182	-0.756	0	-0.917	-0.646	0	-1.232	0	-0.687	0	0	-0.818							9359	
9420	0.318	0.817	0.253							0.451	0.557	0.531	0	0	0.510																						9420
9429	0.664	0.892	0.824				0.643	0.695	0.568	-0.297	0.557	-0.245	0	0	0.224	0	0	0.182	0.173	0	0.012	1.475	0	0.418	0	0.406	0	0	1.144	0.401	-3.886	0				9429	
9436	-1.117	-0.117	-0.532							-1.487	-2.287	-2.641	0	0	-1.853	0	0	-2.283	-1.065	0	-1.227	-0.762	0	-1.843	0	0.149	0	0	-1.085	0.887	-0.257	0				9436	
9451	0.169	0.705	0.039							0.892	1.552	0.531	0	0	0.725	0	0	0.603	0.350	0	1.694	-0.106	0	-0.988	0	3.361	0	0	-3.314	0.401	0.508	0				9451	
9453	-1.315	0.406	-0.318				-0.716	-0.542	-0.600	-0.650	-0.723	-1.161	0	0		0	0	-2.523	0.318	0	-1.904	0.318	0	-1.904	0	-1.393	0	0	-2.066	-0.327	1.749	0				9453	
9465	-0.128	0.145	-0.532							-1.311	0.201	0.319	0	0	0.940	0	0	0.783	-0.711	0.809	1.089	1.089	2.006	0	-2.036	0	0	-2.512								9465	
9512	0.318	0.556	0.467							0.143	1.552	-0.527												0	1.113												9512
9559	0.614	-0.416	-0.460	0.833	-1.168	-0.547	0.790	-2.386	-0.403	-0.430	-0.439	-3.981	0	0	-1.209				0.085	-0.386				0	1.048	0	0	0.430					0	0	0	9559	
9569	-1.513	0.369	-0.817				-0.275	0.213	0.108	-0.562	-1.078	-0.386	0	0		0	0	-0.179	-1.065	0	-0.209	-0.762	0	0.173	0	>4	0	0	-0.729	-1.297	0.508	0				9569	
9655	-0.919	1.079	0.396				0.092	0.821	0.618				0	0	0.224				-1.596	0	-0.475	-1.418	0	-0.560	0	-1.008	0	0	1.946							9655	
9662	-0.622	0.145	0.039							-0.077	<-4	-0.527	0	0	-0.636				-0.358	0	-0.032			0	-3.770				-0.066	0						9662	
9747	-0.227	0.145	-0.104							3.050	-2.429	-0.597												0	-0.365												9747
9753	0.367	-0.528	0.324							1.817	0.841	0.460	0	0	0.224	0	0	0.422	0.306	0	0.410	0.202	0	0.540			0	0	-0.015							9753	
9783	-0.152	0.190	0.610																																		9783
9890	0.565	0.743	0.467	1.690	0.524	0.323				1.156	0.699	1.165	0	0	0.582				0.040	0	0.455				0	0.149										9890	
9903	-1.364	0.444	0.324	0.527	0.903	1.194				-0.165	-0.225	-0.033	0	0	0.725										0	0.727	0	0	-0.105		0.221	0				9903	
9923	1.060	-1.985	-2.315							0.055	0.059	0.813	0	0	0.081										0	0.020	0	0	-1.977	0.240	-1.403	0					9923
9950	-0.919	1.079	0.895				-0.312	0.674	0.535										0	1.204					0	0.534	0	0	-1.977	0.240	-1.403	0					9950

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 rests substanser 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 matfettblandningar – 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 nyckelhålmärkning 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.

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, October 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.
9. 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.
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11. Nordiskt kontrollprojekt 2012. Märkning av allergener och ”kan innehålla spår av allergener” – resultat av de svenska kontrollerna av U Fäger.
12. Proficiency Testing – Drinking Water Microbiology, 2012:1, March by T Slapokas, M Lindqvist and K Mykkänen.
13. Länsstyrelsens rapportering av livsmedelskontroll inom primärproduktionen 2010-2011 av L Eskilsson och K Bäcklund Stålenheim.
14. Vetenskapligt underlag för råd om mängden frukt och grönsaker till vuxna och barn av H Eneroth.
15. Kommuners och Livsmedelsverkets rapportering av livsmedelskontrollen 2011 av L Eskilsson.
16. Sammanställning av resultat från en projektinriktad kontrollkurs om skyddade beteckningar 2012 av P Elvingsson.
17. Nordic Expert Survey on Future Foodborne and Waterborne Outbreaks by T Andersson, Å Fulke, S Pesonen and J Schlundt.
18. Riksprojekt 2011. Kontroll av märkning – redlighet och säkerhet av C Spens, U Colberg, A Göransdotter Nilsson och P Bergkvist.
19. Från nutritionsforskning till kostråd – så arbetar Livsmedelsverket av I Mattisson, H Eneroth och W Becker.
20. Proficiency Testing – Food Microbiology, October 2012 by L Nachin, C Normark and I Boriak.