Fapas® – Food Microbiology Proficiency Test Report 298

June-July 2024

PARTICIPANT LABORATORY NUMBER

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Laboratory numbers are displayed in SecureWeb next to the download link for this report.

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SUMMARY

1. The test materials for Fapas® – Food Microbiology proficiency test Distribution 298 were dispatched in June 2024. The test materials available in this Distribution were for the following proficiency tests:

M297e15	Enumeration of Yeasts and Moulds (equivalent to 10 g Beef),
M298e14	Enumeration of Coagulase Positive Staphylococci (equivalent to 10 g Beef),
M298e24	Enumeration of APC / Enterobacteriaceae / Coliforms / *Escherichia coli* (equivalent to 10 g Ready To Eat [RTE] Meal),
M298d04	Detection of Enterobacteriaceae / Coliforms / *Escherichia coli* (equivalent to 10 g Infant Formula + glass vial, x2),
M298d071	Detection of *Salmonella* spp. (equivalent to 25 g Egg [Dried], x2),
M298d072	Detection of *Salmonella* spp. (equivalent to 25 g Herbs, x2),
M298d17	Detection of *Campylobacter* spp. (equivalent to 25 g Milk Powder, x2).

2. An assigned value (x_a) was determined for each proficiency test in enumeration and in conjunction with the standard deviation for proficiency (σ_p) was used to calculate a z-score for each result.

3. Results and assessments for the proficiency tests in enumeration are summarised as follows:

Proficiency test in enumeration	assigned value, x_a $\log_{10}$ cfu/g	number of scores, $\lvert z\rvert \leq 2$	total number of scores	% $\lvert z\rvert \leq 2$
Yeasts and Moulds (sum of) in Beef	2.27	31	36	86
Coagulase Positive Staphylococci in Beef	3.66	48	54	89
Aerobic Plate Count in Ready To Eat (RTE) Meal	4.29	82	89	92
Enterobacteriaceae in Ready To Eat (RTE) Meal	4.14	70	77	91
Coliforms in Ready To Eat (RTE) Meal	4.09	75	80	94
Escherichia coli in Ready To Eat (RTE) Meal	3.58	82	89	92

4. Qualitative results for the proficiency tests in detection are assessed based on the presence or absence of the target organism in both of the test materials issued.

5. Results for the proficiency tests in detection are summarised as follows:

Proficiency test in detection	intended result	number of satisfactory assessments	total number of assessments	satisfactory / agreement with intended result, %	false negatives, %	false positives, %
Enterobacteriaceae in Infant Formula	test material A not detected test material B detected	21	21	100	0	0
Coliforms in Infant Formula	test material A not detected test material B detected	10	10	100	0	0
Escherichia coli in Infant Formula	test material A not detected test material B detected	9	10	90	10	0
Salmonella spp. in Dried Egg	test material A detected test material B not detected	24	25	96	4	0
Salmonella spp. in Herbs	test material A detected test material B not detected	20	20	100	0	0
Campylobacter spp. in Milk Powder	test material A detected test material B not detected	8	10	80	20	10

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1. INTRODUCTION

1.1. Proficiency Testing

Proficiency testing aims to provide an independent assessment of the competence of participating laboratories. Together with the use of validated methods, proficiency testing is an essential element of laboratory quality assurance.

Further details of the Fapas® – Food Microbiology proficiency tests are available in our protocols [7, 8].

2. TEST MATERIAL

2.1. Preparation

Preparation of the samples for this proficiency test was sub-contracted to a laboratory meeting the quality requirements of the scheme's accreditation [3].

Fapas® – Food Microbiology test materials include background flora to simulate real conditions. Information for these organisms is given in APPENDIX I.

The test materials were stored at +4°C ±2°C until dispatch.

2.2. Homogeneity and Validation

For each proficiency test in enumeration, randomly selected test materials were analysed in duplicate by a laboratory meeting the quality requirements of the scheme's accreditation [3].

These data showed sufficient homogeneity and were not included in the subsequent calculation of the assigned values.

For each proficiency test in detection, ten percent of the test materials were analysed to verify the presence/absence of the target organism. In addition, two of each of the test materials positive for the target organism were also analysed by the most probable number technique to verify the level of organisms present. The data obtained is given in APPENDIX II.

2.3. Dispatch

The start date was 17 June 2024. Test materials were sent to 233 participants.

2.4. Storage and Preparation Instructions

Instructions regarding sample storage and preparation were made available on the Fapas® website [9].

Participants are reminded that it is crucial to the outcome of the proficiency tests that the instructions for the preparation of the test materials are followed exactly.

3. RESULTS

The instructions for reporting results were as follows:

- Start the analysis between 17 June and 26 June 2024.
- The results for enumeration tests must be reported as cfu/g.

- The results for detection tests must be reported as detected/not detected in 25 g (in English).

Results were submitted by 218 participants (94%) before the closing date for this test, 08 July 2024.

Each participant was given a laboratory number, assigned in order of receipt of results. The reported results are given in Tables 1 to 8.

The methods used by each participant are summarised in APPENDIX III.

4. STATISTICAL EVALUATION OF RESULTS

The results submitted by participants were statistically analysed in order to provide an assigned value for each proficiency test in enumeration. The assigned values were then used in combination with the standard deviation for proficiency, σ_p, to calculate a z-score [10] for each result. The procedure is detailed in the relevant protocols [7, 8].

Further background on the procedure followed can be found in the IUPAC International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [11].

4.1. Calculation of the Assigned Value, x_a

The assigned value, x_a, for each test in enumeration was derived from the consensus of the results submitted by participants.

The procedure used to derive this consensus involved:

i) exclusion, if present, of any non numerical results i.e. qualitative or semi-quantitative results or results reported as zero,

ii) a $\log_{10}$ transformation of submitted results to obtain a normal distribution,

iii) exclusion, if present, of any results that were approximately 10, 100 or 1000 × greater or smaller than the majority of submitted results (as these were considered to be reporting errors).

For all proficiency tests in enumeration, this procedure was straightforward and the robust mean was chosen as the assigned value.

The assigned values for all proficiency tests in enumeration, together with their uncertainties are shown in Table 9.

4.2. Standard Deviation for Proficiency, σ_p

The standard deviation for proficiency, σ_p, was set at a value that reflects fitness-for-purpose for the analyses in question. The appropriate members of the Fapas® Advisory Committee have agreed this value corresponds to 0.25 $\log_{10}$ cfu/g.

The values for σ_p used to calculate z-scores from the reported results of this test are given in Table 9.

4.3. Individual z-Scores and Assessments

Participants' z-scores were calculated as:

$$z = \frac{(x - x_a)}{\sigma_p}$$

where x = the participant's reported result expressed as $\log_{10}$,
x_a = the assigned value, see Table 9,
and σ_p = the standard deviation for proficiency, see Table 9.

Participants' z-scores for all proficiency tests in enumeration are given in Tables 1 to 4 and shown as histograms in Figures 1 to 6. It is possible for the z-scores published in this report to differ slightly from the z-score that can be calculated using the formula given above. These differences arise from the necessary rounding of the actual assigned values and standard deviations for proficiency prior to their publication in Table 9.

The number and percentage of z-scores in the range $-2 \leq z \leq 2$ for all proficiency tests in enumeration are given in Table 10.

Participants' results for the proficiency tests in detection are assessed based on the presence or absence of the target organism in both of the test materials issued. Assessments are given in Tables 5 to 8.

Intended results for these detection tests are shown in Table 11.

The number and percentage of satisfactory assessments are given in Table 12.

5. INTERPRETATION OF SCORES AND ASSESSMENTS

In normal circumstances, over time, about 95% of z-scores will lie in the range $-2 \leq z \leq 2$. Occasional scores in the range $2 < |z| < 3$ are to be expected, at a rate of 1 in 20. Whether or not such scores are of importance can only be decided by considering them in the context of the other scores obtained by that laboratory.

Scores where $|z| > 3$ are to be expected at a rate of about 1 in 300. Given this rarity, such z-scores very strongly indicate that the result is not fit-for-purpose and almost certainly requires investigation.

The consideration of a set or sequence of z-scores over time provides more useful information than a single z-score. Examples of suitable methods of comparison are provided in the IUPAC International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [11].

Results submitted by participants for detections tests are assessed as either satisfactory (S) or not satisfactory (NS) as compared to the intended result.

6. REFERENCES

1 Adobe Approved Trust List, https://helpx.adobe.com/acrobat/kb/approved-trust-list2.html#Whatisit accessed 23/02/2024.

2 GlobalSign AATL Document Signing FAQs, https://support.globalsign.com/aatl-document/aatl-document-signing-faqs accessed 23/02/2024.

3 ISO/IEC 17043:2010, Conformity assessment – General requirements for proficiency testing.

4 The ILAC Mutual Recognition Arrangement, https://ilac.org/ilac-mra-and-signatories/ accessed 23/02/2024.

5 Fera Science Ltd, Standards & Accreditations, https://www.fera.co.uk/about-us/standards-and-accreditation accessed 23/02/2024.

6 Lloyd's Register, Learn about ISO 9001 Quality Management Systems (QMS), https://www.lrqa.com/en-gb/iso-9001/?epslanguage=en-GB#accordion-whatarethebenefitsofiso9001certification accessed 23/02/2024.

7 Fapas®, 2023, Protocol for Proficiency Testing Schemes, Version 8, January 2023, Part 1 – Common Principles.

8 Fapas®, 2023, Protocol for Proficiency Testing Schemes, Version 6, January 2023, Part 3 – Fapas® Food Microbiology scheme (FEPAS).

9 Fapas® – Food Microbiology safety data sheet and preparation instructions, https://fapas.com/technical-documentation, accessed 23/02/2024.

10 AMC Tech Brief No. 74, z-Scores and other scores in chemical proficiency testing – their meanings, and some common misconceptions, *Anal. Methods*, 2016, **8**, 5553.

11 Thompson, M., Ellison, S.L.R. and Wood, R., 2006, The International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories, *Pure Appl. Chem.*, **78**, No. 1, 145–196.

Table 1: Results and z-Scores for Enumeration of Yeasts and Moulds (sum of) in Beef

laboratory number	proficiency test		
	Yeasts and Moulds (sum of) assigned value: 2.27 $\log_{10}$ cfu/g		
	result	$\log_{10}$	z-score
016	200	2.3	0.1
027	1.3E+2	2.1	-0.6
030	100	2.0	-1.1
033	110	2.0	-0.9
048	5.4E2	2.7	1.8
050	127	2.1	-0.7
053	2.2E+2	2.3	0.3
065	1.6E+2	2.2	-0.3
069	330	2.5	1.0
070	5.0E+1	1.7	**-2.3**
071	120	2.1	-0.8
075	7.0E+2	2.8	**2.3**
098	<100		
103	1.0E+2	2.0	-1.1
108	7.0E+1	1.8	-1.7
110	2.1E+2	2.3	0.2
111	270	2.4	0.6
121	7.0E+1	1.8	-1.7

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 1 (continued): Results and z-Scores for Enumeration of Yeasts and Moulds (sum of) in Beef

laboratory number	proficiency test		
	Yeasts and Moulds (sum of) assigned value: 2.27 $\log_{10}$ cfu/g		
	result	$\log_{10}$	z-score
123	3.5E+2	2.5	1.1
124	3.6E+2	2.6	1.1
136	410	2.6	1.4
139	3.5E+2	2.5	1.1
141	1.0E+2	2.0	-1.1
146	240	2.4	0.4
147	1E+3	3.0	**2.9**
160	2.7E+2	2.4	0.6
168	1.4E+2	2.1	-0.5
170	4270	3.6	**5.4**
172	8.0E+1	1.9	-1.5
174	3.1E+2	2.5	0.9
179	1.1E+2	2.0	-0.9
183	110 *	2.0	-0.9
185	210	2.3	0.2
206	1.6E+2	2.2	-0.3
207	1000	3.0	**2.9**
215	7.70E+01	1.9	-1.5
216	3.00E+2	2.5	0.8

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 2: Results and z-Scores for Enumeration of Coagulase Positive Staphylococci in Beef

laboratory number	proficiency test		
	Coagulase Positive Staphylococci assigned value: 3.66 $\log_{10}$ cfu/g		
	result	$\log_{10}$	z-score
014	4.0E+3	3.6	-0.3
015	3.8E+3	3.6	-0.3
016	5820	3.8	0.4
017	7.3E+3	3.9	0.8
019	2.7E+3	3.4	-0.9
024	2.8E+3	3.4	-0.9
028	3100	3.5	-0.7
031	7.4E3	3.9	0.8
033	9100	4.0	1.2
034	2200	3.3	-1.3
036	3.8E+3	3.6	-0.3
037	7.5E+3	3.9	0.8
040	7.1E+3	3.9	0.7
043	2.0E+3	3.3	-1.5
045	19728	4.3	**2.5**
047	3900	3.6	-0.3
050	4000	3.6	-0.3
051	1.3E+3	3.1	**-2.2**

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 2 (continued): Results and z-Scores for Enumeration of Coagulase Positive Staphylococci in Beef

laboratory number	proficiency test		
	Coagulase Positive Staphylococci assigned value: 3.66 $\log_{10}$ cfu/g		
	result	$\log_{10}$	z-score
052	5500	3.7	0.3
054	7000	3.8	0.7
063	4.6E+3	3.7	0.0
066	3.4E+3	3.5	-0.5
068	9.5E+3	4.0	1.2
078	5.0E+3	3.7	0.1
083	6.0E+2	2.8	**-3.5**
095	6.0E+3	3.8	0.5
116	2600	3.4	-1.0
123	5.3E+3	3.7	0.2
126	1700	3.2	-1.7
128	2.1E+3	3.3	-1.4
130	8.8E+3	3.9	1.1
133	5.6E+3	3.7	0.3
136	1450	3.2	-2.0
139	7.8E+3	3.9	0.9
141	9.0E+3	4.0	1.2
143	4400	3.6	-0.1

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 2 (continued): Results and z-Scores for Enumeration of Coagulase Positive Staphylococci in Beef

laboratory number	proficiency test		
	Coagulase Positive Staphylococci assigned value: 3.66 $\log_{10}$ cfu/g		
	result	$\log_{10}$	z-score
147	1.4E+4	4.1	1.9
148	3.1E+3	3.5	-0.7
154	3000	3.5	-0.8
155	6.8E+4	4.8	**4.7**
160	9.7E+3	4.0	1.3
161	2.8E+3	3.4	-0.9
162	2.6E+3	3.4	-1.0
176	4.2E+3	3.6	-0.2
180	6400	3.8	0.6
182	2900	3.5	-0.8
185	6000	3.8	0.5
190	3100	3.5	-0.7
198	4.2E+3	3.6	-0.2
199	7.6E+3 *	3.9	0.9
205	3140	3.5	-0.7
206	8.7E+3	3.9	1.1
216	2.6E+4	4.4	**3.0**
218	1.9E+2	2.3	**-5.5**

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 3: Results and z-Scores for Aerobic Plate Count / Enumeration of Enterobacteriaceae in Ready To Eat (RTE) Meal

laboratory number	proficiency test						
	Aerobic Plate Count assigned value: 4.29 $\log_{10}$ cfu/g			Enterobacteriaceae assigned value: 4.14 $\log_{10}$ cfu/g			
	result	$\log_{10}$	z-score	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score
001	100000	5.0	**2.9**				
004				2.9E+4	4.5	No	1.3
005				1.5E+4	4.2	No	0.2
006	1.9E+4	4.3	0.0	2.4E+4	4.4	No	1.0
007	2.7E+4	4.4	0.6	2.2E+4	4.3	NO	0.8
010	1.8E+4	4.3	-0.1	1.2E+4	4.1	no	-0.2
011	2.6E+4	4.4	0.5	2.3E+4	4.4	No	0.9
015	1.3E+4	4.1	-0.7	1.3E+4	4.1	no	-0.1
018	2.4E+4	4.4	0.4	1.3E+4	4.1	no	-0.1
023	31000	4.5	0.8	15000	4.2	NO	0.2
026	2.4E+4	4.4	0.4	2.6E+4	4.4	No	1.1
028	30000	4.5	0.8	14000	4.1	No	0.0
031	2.0E4	4.3	0.1	2.2E4	4.3	No	0.8
033	24000	4.4	0.4	16000	4.2	no	0.3
035	28.2E+3	4.5	0.7	15E+3	4.2	NO	0.2
036	2.0E+4	4.3	0.1	1.4E+4	4.1	NO	0.0
037	1.9E+4	4.3	0.0	1.4E+4	4.1	NO	0.0
038	19000	4.3	0.0	17000	4.2	Yes	0.4
039	1E+4	4.0	-1.1	4.6E+3	3.7	yes	-1.9
040	1.8E+4	4.3	-0.1	1.6E+4	4.2	No	0.3

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 3 (continued): Results and z-Scores for Aerobic Plate Count / Enumeration of Enterobacteriaceae in Ready To Eat (RTE) Meal

laboratory number	proficiency test						
	Aerobic Plate Count assigned value: 4.29 log_{10} cfu/g			Enterobacteriaceae assigned value: 4.14 log_{10} cfu/g			
	result	log_{10}	z-score	result	log_{10}	Most probable number technique used (yes/no)	z-score
041	22000	4.3	0.2				
045	21682	4.3	0.2	16182	4.2	no	0.3
046	15272.72	4.2	-0.4	11772.72	4.1	no	-0.3
047				11000	4.0	si	-0.4
057	1.5E+4	4.2	-0.4	1.5E+4	4.2	No	0.2
058	11000	4.0	-1.0	9000	4.0	no	-0.7
059							
060	2.7E+4	4.4	0.6				
061	18000	4.3	-0.1				
062	33000	4.5	0.9	11000	4.0	yes	-0.4
069	2.5E+4	4.4	0.5	2E+4	4.3	yes	0.7
076	2.1E+4	4.3	0.1	1.7E+4	4.2	NO	0.4
077	1.9E+4	4.3	0.0	1.5E+4	4.2	no	0.2
078	1.7E+4	4.2	-0.2				
079	3.6E+5	5.6	**5.1**				
080							
081				1.7E+3	3.2	no	**-3.6**
082	1.9E+4	4.3	0.0	1.6E+4	4.2	NO	0.3
084	1.8E+4	4.3	-0.1				
086	1.85E+4	4.3	-0.1	1.78E+4	4.3	Yes	0.5

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 3 (continued): Results and z-Scores for Aerobic Plate Count / Enumeration of Enterobacteriaceae in Ready To Eat (RTE) Meal

laboratory number	proficiency test						
	Aerobic Plate Count assigned value: 4.29 $\log_{10}$ cfu/g			Enterobacteriaceae assigned value: 4.14 $\log_{10}$ cfu/g			
	result	$\log_{10}$	z-score	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score
090	1.45E+4	4.2	-0.5	5.8E+3	3.8	NO	-1.5
091	1.5E+4	4.2	-0.4				
092	5.2E+3 *	3.7	**-2.3**	1.9E+3 *	3.3	NO	**-3.4**
094	1.7E+4	4.2	-0.2	1.4E+4	4.1	no	0.0
096	2E+4	4.3	0.1	1.3E+4	4.1	no	-0.1
097	24000	4.4	0.4				
101	1.7E+4	4.2	-0.2	8.9E+3	3.9	no	-0.7
114	1.4E+4	4.1	-0.6	1.4E+4	4.1	No	0.0
115	9.7E+3	4.0	-1.2	5.9E+3	3.8	NO	-1.5
118	1.9E+4	4.3	0.0	1.3E+4	4.1	no	-0.1
119	1.9E+4	4.3	0.0	1.7E+4	4.2	No	0.4
122	1.5E+4	4.2	-0.4	9.8E+3	4.0	Y	-0.6
127	1.8E+4	4.3	-0.1	1.7E+4	4.2	no	0.4
129	1.8E+4	4.3	-0.1	3.7E+3	3.6	no	**-2.3**
131	20000	4.3	0.1	82000	4.9	no	**3.1**
133	1.47E+4	4.2	-0.5	1.26E+4	4.1	no	-0.1
134	1.9E+4	4.3	0.0	1.5E+4	4.2	no	0.2
138	27.59E+3	4.4	0.6	21.87E+2	3.3	NO	**-3.2**
140	21900	4.3	0.2	13181	4.1	yes	-0.1
142	1.55E+4	4.2	-0.4	1.0E+4	4.0	1	-0.5

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 3 (continued): Results and z-Scores for Aerobic Plate Count / Enumeration of Enterobacteriaceae in Ready To Eat (RTE) Meal

laboratory number	proficiency test						
	Aerobic Plate Count assigned value: 4.29 $\log_{10}$ cfu/g			Enterobacteriaceae assigned value: 4.14 $\log_{10}$ cfu/g			
	result	$\log_{10}$	z-score	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score
145	2.4E+4 *	4.4	0.4				
146	15000	4.2	-0.4	9500	4.0	no	-0.6
149	1.8E+4	4.3	-0.1	1.7E+4	4.2	NO	0.4
150	1.9E+4	4.3	0.0	1.9E+4	4.3	no	0.6
151	1.8E+4	4.3	-0.1				
152	2.0E+4	4.3	0.1	1.5E+4	4.2	no	0.2
153				6.4E+3	3.8	no	-1.3
154	23500	4.4	0.3	18000	4.3	no	0.5
156	2.2e+4 *	4.3	0.2				
158	1.3E+4	4.1	-0.7	1.1E+4	4.0	no	-0.4
159	37000	4.6	1.1				
163	22000	4.3	0.2	25000	4.4	yes	1.0
165	21273	4.3	0.2	19182	4.3	y	0.6
169	1.7E+5	5.2	**3.8**	1.7E+4	4.2	NO	0.4
171	4.9E+3	3.7	**-2.4**	2.2E+3	3.3	NO	**-3.2**
173	1.78E+4	4.3	-0.1	1.095E+4	4.0	NO	-0.4
178	1.9E+04	4.3	0.0	1.4E+04	4.1	No	0.0
179	9.4E+3	4.0	-1.2	6.4E+3	3.8	NO	-1.3
180	33000	4.5	0.9	28000	4.4	NO	1.2
181	9000	4.0	-1.3				

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 3 (continued): Results and z-Scores for Aerobic Plate Count / Enumeration of Enterobacteriaceae in Ready To Eat (RTE) Meal

laboratory number	proficiency test						
	Aerobic Plate Count assigned value: 4.29 log_{10} cfu/g			Enterobacteriaceae assigned value: 4.14 log_{10} cfu/g			
	result	log_{10}	z-score	result	log_{10}	Most probable number technique used (yes/no)	z-score
184	21000	4.3	0.1	13000	4.1	NO	-0.1
185	16000	4.2	-0.3	6400	3.8	no	-1.3
186	3.0E+4	4.5	0.8				
187				2.8E+4	4.4	no	1.2
188	2.4E+4	4.4	0.4				
189	1.8E+4	4.3	-0.1	1.3E+4	4.1	no	-0.1
191				1.5E+4	4.2	NO	0.2
192	21000	4.3	0.1				
193	1.5E+4	4.2	-0.4				
194	20182	4.3	0.1	24545	4.4	no	1.0
201	2.2E+4	4.3	0.2	1.9E+4	4.3	NO	0.6
202	7.6E+3	3.9	-1.6	6.5E+3	3.8	no	-1.3
204	1.5E+4	4.2	-0.4	1.2E+4	4.1	yes	-0.2
207	25000	4.4	0.5	15400	4.2	No	0.2
210	24000	4.4	0.4	20000	4.3	Yes	0.7
211	1.6E+4 *	4.2	-0.3	1.1E+4 *	4.0	NO	-0.4
212	5.0E+3 *	3.7	**-2.3**				
213	11.000 *	1.0	**-13.0**	7.300 *	0.9	no	**-13.1**

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 4: Results and z-Scores for Enumeration of Coliforms / *Escherichia coli* in Ready To Eat (RTE) Meal

laboratory number	proficiency test							
	Coliforms assigned value: 4.09 $\log_{10}$ cfu/g				*Escherichia coli* assigned value: 3.58 $\log_{10}$ cfu/g			
	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score
001	9700	4.0	yes	-0.4	5100	3.7	yes	0.5
004					4.6E+3	3.7	No	0.3
005	9.0E+3	4.0	No	-0.5	5.8E+3	3.8	No	0.7
006	1.8E+4	4.3	No	0.7	5.5E+3	3.7	No	0.6
007	2.0E+4	4.3	NO	0.9	4.5E+3	3.7	NO	0.3
010	1.1E+4	4.0	no	-0.2	3.8E+3	3.6	no	0.0
011	7.6E+3	3.9	No	-0.8	4.7E+3	3.7	No	0.4
015					4.3E+3	3.6	no	0.2
018	1.4E+4	4.1	no	0.2	5.7E+3	3.8	no	0.7
023	13000	4.1	NO	0.1	4900	3.7	NO	0.4
026	2.2E+4	4.3	No	1.0	8.0E+3	3.9	No	1.3
028	11000	4.0	No	-0.2	4800	3.7	No	0.4
031	2.1E4	4.3	No	0.9	6.2E3	3.8	No	0.8
033	20000	4.3	no	0.9	5500	3.7	no	0.6
035	5.8E+3	3.8	NO	-1.3	20.6E+3	4.3	NO	**2.9**
036	1.5E+4	4.2	NO	0.4	3.3E+3	3.5	NO	-0.3
037					5.5E+3	3.7	NO	0.6
038	8100	3.9	Yes	-0.7	2600	3.4	Yes	-0.7
039	5.7E+3	3.8	yes	-1.3	3.3E+3	3.5	yes	-0.3
040					3.2E+3	3.5	No	-0.3

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 4 (continued): Results and z-Scores for Enumeration of Coliforms / *Escherichia coli* in Ready To Eat (RTE) Meal

laboratory number	proficiency test							
	Coliforms assigned value: 4.09 log_{10} cfu/g				*Escherichia coli* assigned value: 3.58 log_{10} cfu/g			
	result	log_{10}	Most probable number technique used (yes/no)	z-score	result	log_{10}	Most probable number technique used (yes/no)	z-score
041	16000	4.2	no	0.5	4900	3.7	no	0.4
045	17727	4.2	no	0.6	3600	3.6	no	-0.1
046	9363.63	4.0	no	-0.5	3727.27	3.6	no	0.0
047	12000	4.1	si	0.0	3200	3.5	si	-0.3
057	9.3E+3	4.0	Yes	-0.5	2.3E+3	3.4	No	-0.9
058	8000	3.9	no	-0.7	2300	3.4	no	-0.9
059					3.1E+3	3.5	yes	-0.4
060	2.3E+4	4.4	yes	1.1	2.1E+3	3.3	no	-1.0
061	17000	4.2	NO	0.6	18000	4.3	NO	**2.7**
062	15000	4.2	yes	0.4	3400	3.5	yes	-0.2
069	2.1E+4	4.3	yes	0.9	7.3E+3	3.9	yes	1.1
076	1.5E+4	4.2	YES	0.4	4.3E+3	3.6	YES	0.2
077								
078	1.5E+4	4.2	No	0.4	3.5E+3	3.5	No	-0.2
079					7.0E+4	4.8	no	**5.0**
080					5200	3.7	yes	0.5
081	1.5E+3	3.2	no	**-3.6**	2.4E+3	3.4	yes	-0.8
082								
084								
086	1.65E+4	4.2	Yes	0.5	5.8E+3	3.8	Yes	0.7

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 4 (continued): Results and z-Scores for Enumeration of Coliforms / *Escherichia coli* in Ready To Eat (RTE) Meal

laboratory number	proficiency test							
	Coliforms assigned value: 4.09 log_{10} cfu/g				*Escherichia coli* assigned value: 3.58 log_{10} cfu/g			
	result	log_{10}	Most probable number technique used (yes/no)	z-score	result	log_{10}	Most probable number technique used (yes/no)	z-score
090	6.0E+3	3.8	NO	-1.2	3.4E+3	3.5	NO	-0.2
091	1.3E+4	4.1	NO	0.1	2.4E+3	3.4	NO	-0.8
092	4.5E+3 *	3.7	NO	-1.7	1.3E+3 *	3.1	NO	-1.9
094	2.8E+3	3.4	yes	**-2.6**	2.8E+3	3.4	yes	-0.5
096					2.6E+3	3.4	yes,2.3E+3(MPN/g)	-0.7
097	17000	4.2	No	0.6	5450	3.7	No	0.6
101					3.4E+3	3.5	no	-0.2
114	1.3E+4	4.1	No	0.1	4.2E+3	3.6	No	0.2
115	1.0E+3	3.0	YES	**-4.4**	1.0E+3	3.0	NO	**-2.3**
118	1.5E+4	4.2	yes	0.4	4.3E+3	3.6	yes	0.2
119	8.1E+3	3.9	1.1E+4	-0.7	8.1E+3	3.9	2.4E+4	1.3
122	1.2E+4	4.1	Y	0.0	2.8E+3	3.4	Y	-0.5
127	1.2E+4	4.1	no	0.0	3.6E+3	3.6	no	-0.1
129	1.5E+4	4.2	no	0.4	3.1E+3	3.5	yes	-0.4
131	14000	4.1	no	0.2	3400	3.5	no	-0.2
133	6.6E+3	3.8	no	-1.1	3.1E+3	3.5	no	-0.4
134	1.5E+4	4.2	yes	0.4	4.3E+3	3.6	yes	0.2
138	15.12E+3	4.2	NO	0.4	48.75E+2	3.7	NO	0.4
140	11636	4.1	yes	-0.1	11363	4.1	no	1.9
142	7.15E+3	3.9	1	-0.9	3.62E+3	3.6	1	-0.1

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 4 (continued): Results and z-Scores for Enumeration of Coliforms / *Escherichia coli* in Ready To Eat (RTE) Meal

laboratory number	proficiency test							
	Coliforms assigned value: 4.09 log_{10} cfu/g				*Escherichia coli* assigned value: 3.58 log_{10} cfu/g			
	result	log_{10}	Most probable number technique used (yes/no)	z-score	result	log_{10}	Most probable number technique used (yes/no)	z-score
145	1.8E+4 *	4.3	yes	0.7				
146	8400	3.9	no	-0.7	2700	3.4	no	-0.6
149	1.5E+4	4.2	yes	0.4	3.9E+3	3.6	NO	0.0
150	4.6E+4	4.7	yes	**2.3**	2.4E+3	3.4	yes	-0.8
151	>1.6E+3		yes		>1.6E+3		yes	
152	1.5E+4	4.2	no	0.4	3.3E+3	3.5	no	-0.3
153	1.5E+4	4.2	no	0.4				
154	15250	4.2	no	0.4	4600	3.7	no	0.3
156	1.2e+4 *	4.1	yes	0.0				
158	1.1E+4	4.0	yes	-0.2	4.6E+3	3.7	yes	0.3
159	10000	4.0	No	-0.4	3000	3.5	No	-0.4
163	18000	4.3	yes	0.7	2400	3.4	yes	-0.8
165	18455	4.3	y	0.7	3455	3.5	y	-0.2
169	1.7E+4	4.2	NO	0.6	4.8E+3	3.7	NO	0.4
171					1.1E+3	3.0	NO	**-2.2**
173	1.12E+4	4.0	NO	-0.2	2.03E+3	3.3	NO	-1.1
178	1.2E+04	4.1	No	0.0	4.2E+03	3.6	No	0.2
179	7.0E+3	3.8	NO	-1.0	2.7E+3	3.4	NO	-0.6
180	23000	4.4	NO	1.1	6100	3.8	NO	0.8
181	7000	3.8	yes	-1.0				

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 4 (continued): Results and z-Scores for Enumeration of Coliforms / *Escherichia coli* in Ready To Eat (RTE) Meal

laboratory number	proficiency test							
	Coliforms assigned value: 4.09 $\log_{10}$ cfu/g				*Escherichia coli* assigned value: 3.58 $\log_{10}$ cfu/g			
	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score	result	$\log_{10}$	Most probable number technique used (yes/no)	z-score
184	11000	4.0	NO	-0.2	4300	3.6	NO	0.2
185	9600	4.0	no	-0.4	3800	3.6	no	0.0
186	2.2E+4	4.3	no	1.0	5.7E+3	3.8	no	0.7
187								
188	2.3E+4	4.4	yes	1.1	4.3E+3	3.6	yes	0.2
189	1.2E+4	4.1	no	0.0	2.3E+3	3.4	no	-0.9
191					3.6E+3	3.6	NO	-0.1
192	15000	4.2	no	0.4	4000	3.6	no	0.1
193	1.0E+4	4.0	no	-0.4	2.8E+3	3.4	no	-0.5
194					3545	3.5	no	-0.1
201	1.4E+4	4.1	YES	0.2	4.4E+3	3.6	YES	0.2
202	8.4E+3	3.9	no	-0.7	1.7E+3	3.2	no	-1.4
204	4.3E+3	3.6	3-3-3-1-0	-1.8	4.3E+3	3.6	3-3-3-1-0	0.2
207	14700	4.2	No	0.3	5400	3.7	No	0.6
210	19500	4.3	No	0.8	6400	3.8	No	0.9
211	1.3E+4 *	4.1	NO	0.1	3.0E+3 *	3.5	NO	-0.4
212	2.9E+3 *	3.5	No	**-2.5**	5.5E+2 *	2.7	No	**-3.4**
213					4.600 *	0.7	si	**-11.7**

z-scores outside |z| >2 are shown in **bold,** see Section 5
* samples analysed outside of the required time frame

Table 5: Results and Assessments for Enterobacteriaceae / Coliforms / *Escherichia coli* in Infant Formula

laboratory number	proficiency test								
	Enterobacteriaceae TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 100% detected (positive) (intended result: detected)			Coliforms TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 100% detected (positive) (expected result: detected)			*Escherichia coli* TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 90% detected (positive) (expected result: detected)		
	result, TMA	result, TMB	assessment	result, TMA	result, TMB	assessment	result, TMA	result, TMB	assessment
002	not detected	detected	S				not detected	detected	S
028	not detected	detected	S	not detected	detected	S	not detected	detected	S
029	not detected	detected	S						
032				not detected	detected	S	not detected	not detected	**NS**
064	not detected	detected	S	not detected	detected	S	not detected	detected	S
072				not detected	detected	S			
085	not detected	detected	S						
087	not detected	detected	S						

S = satisfactory
NS = not satisfactory
* samples analysed outside of the required time frame

Table 5 (continued): Results and Assessments for Enterobacteriaceae / Coliforms / *Escherichia coli* in Infant Formula

laboratory number	proficiency test								
	Enterobacteriaceae TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 100% detected (positive) (intended result: detected)			Coliforms TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 100% detected (positive) (expected result: detected)			*Escherichia coli* TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 90% detected (positive) (expected result: detected)		
	result, TMA	result, TMB	assessment	result, TMA	result, TMB	assessment	result, TMA	result, TMB	assessment
099				not detected	detected	S	not detected	detected	S
104	not detected	detected	S	not detected	detected	S	not detected	detected	S
105	not detected	detected	S						
106	not detected	detected	S	not detected	detected	S	not detected	detected	S
109	not detected	detected	S	not detected	detected	S	not detected	detected	S
112	not detected	detected	S				not detected	detected	S
120	not detected	detected	S						
157	not detected *	detected *	S						

S = satisfactory
NS = not satisfactory
* samples analysed outside of the required time frame

Table 5 (continued): Results and Assessments for Enterobacteriaceae / Coliforms / *Escherichia coli* in Infant Formula

laboratory number	proficiency test								
	Enterobacteriaceae TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 100% detected (positive) (intended result: detected)			Coliforms TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 100% detected (positive) (expected result: detected)			*Escherichia coli* TMA consensus: 100% not detected (negative) (intended result: not detected) TMB consensus: 90% detected (positive) (expected result: detected)		
	result, TMA	result, TMB	assessment	result, TMA	result, TMB	assessment	result, TMA	result, TMB	assessment
166				not detected *	detected *	S			
175	not detected *	detected *	S						
177	not detected	detected	S``						
182	not detected	detected	S	not detected	detected	S	not detected	detected	S
195	not detected *	detected *	S						
197	not detected *	detected *	S						
199	not detected *	detected *	S						
203	not detected	detected	S						
214	not detected	detected	S						

S = satisfactory
NS = not satisfactory
* samples analysed outside of the required time frame

Table 6: Results and Assessments for *Salmonella* spp. in Dried Egg

laboratory number	proficiency test		
	Salmonella spp. TMA consensus: 96% detected (positive) (intended result: detected) TMB consensus: 100% not detected (negative) (intended result: not detected)		
	result, TMA	result, TMB	assessment
012	detected	not detected	S
014	detected	not detected	S
021	detected	not detected	S
022	detected	not detected	S
025	detected	not detected	S
036	detected	not detected	S
049	detected	not detected	S
053	detected	not detected	S
056	detected	not detected	S
066	detected	not detected	S
067	detected	not detected	S
074	detected	not detected	S
088	detected	not detected	S
113	detected	not detected	S
125	detected	not detected	S
132	detected	not detected	S
133	detected	not detected	S
137	detected	not detected	S
146	detected	not detected	S
159	not detected	not detected	**NS**
164	detected *	not detected *	S
170	detected	not detected	S
201	detected	not detected	S
209	detected	not detected	S
217	detected	not detected	S

S = satisfactory
NS = not satisfactory
* samples analysed outside of the required time frame

Table 7: Results and Assessments for *Salmonella* spp. in Herbs

laboratory number	proficiency test		
	Salmonella spp. TMA consensus: 100% detected (positive) (intended result: detected) TMB consensus: 100% not detected (negative) (intended result: not detected)		
	result, TMA	result, TMB	assessment
009	detected	not detected	S
013	detected	not detected	S
020	detected	not detected	S
027	detected	not detected	S
036	detected	not detected	S
044	detected	not detected	S
055	detected	not detected	S
058	detected	not detected	S
073	detected	not detected	S
093	detected	not detected	S
100	detected	not detected	S
107	detected	not detected	S
108	detected	not detected	S
117	detected	not detected	S
135	detected	not detected	S
139	detected	not detected	S
178	detected	not detected	S
184	detected	not detected	S
200	detected	not detected	S
202	detected	not detected	S

S = satisfactory
NS = not satisfactory
* samples analysed outside of the required time frame

Table 8: Results and Assessments for *Campylobacter* spp. in Milk Powder

laboratory number	proficiency test		
	Campylobacter spp. TMA consensus: 80% detected (positive) (intended result: detected) TMB consensus: 90% not detected (negative) (intended result: not detected)		
	result, TMA	result, TMB	assessment
003	detected	not detected	S
008	detected	not detected	S
042	detected	not detected	S
089	detected	not detected	S
102	detected	not detected	S
144	not detected	not detected	**NS**
167	detected	not detected	S
196	detected	not detected	S
208	not detected	detected	**NS**
215	detected	not detected	S

S = satisfactory
NS = not satisfactory
* samples analysed outside of the required time frame

Table 9: Assigned Values and Standard Deviations for Proficiency

Proficiency test in enumeration	data points, *n*	assigned value, x_a $\log_{10}$ cfu/g	uncertainty, *u*	standard deviation for proficiency, σ_p	
Yeasts and Moulds (sum of) in Beef	35	2.27	0.06	ffp	0.250
Coagulase Positive Staphylococci in Beef	54	3.66	0.04	ffp	0.250
Aerobic Plate Count in Ready To Eat (RTE) Meal	88	4.29	0.01	ffp	0.250
Enterobacteriaceae in Ready To Eat (RTE) Meal	76	4.14	0.02	ffp	0.250
Coliforms in Ready To Eat (RTE) Meal	80	4.09	0.02	ffp	0.250
Escherichia coli in Ready To Eat (RTE) Meal	88	3.58	0.02	ffp	0.250

ffp = fitness-for-purpose criteria

Table 10: Number and Percentage of z-Scores where $|z| \leq 2$

Proficiency test in enumeration	number of scores where $\|z\| \leq 2$	total number of scores	% $\|z\| \leq 2$
Yeasts and Moulds (sum of) in Beef	31	36	86
Coagulase Positive Staphylococci in Beef	48	54	89
Aerobic Plate Count in Ready To Eat (RTE) Meal	82	89	92
Enterobacteriaceae in Ready To Eat (RTE) Meal	70	77	91
Coliforms in Ready To Eat (RTE) Meal	75	80	94
Escherichia coli in Ready To Eat (RTE) Meal	82	89	92

Table 11: Intended Results for Proficiency Tests in Detection

Proficiency test in detection	test material A	test material B
Enterobacteriaceae in Infant Formula	not detected	detected
Coliforms in Infant Formula	not detected	detected
Escherichia coli in Infant Formula	not detected	detected
Salmonella spp. in Dried Egg	detected	not detected
Salmonella spp. in Herbs	detected	not detected
Campylobacter spp. in Milk Powder	detected	not detected

Table 12: Number and Percentage of Satisfactory Assessments and False Results for Proficiency Tests in Detection

Proficiency test in detection	intended result	number of satisfactory assessments	total number of assessments	satisfactory / agreement with intended result, %	false negatives, %	false positives, %
Enterobacteriaceae in Infant Formula	test material A not detected test material B detected	21	21	100	0	0
Coliforms in Infant Formula	test material A not detected test material B detected	10	10	100	0	0
Escherichia coli in Infant Formula	test material A not detected test material B detected	9	10	90	10	0
Salmonella spp. in Dried Egg	test material A detected test material B not detected	24	25	96	4	0
Salmonella spp. in Herbs	test material A detected test material B not detected	20	20	100	0	0
Campylobacter spp. in Milk Powder	test material A detected test material B not detected	8	10	80	20	10

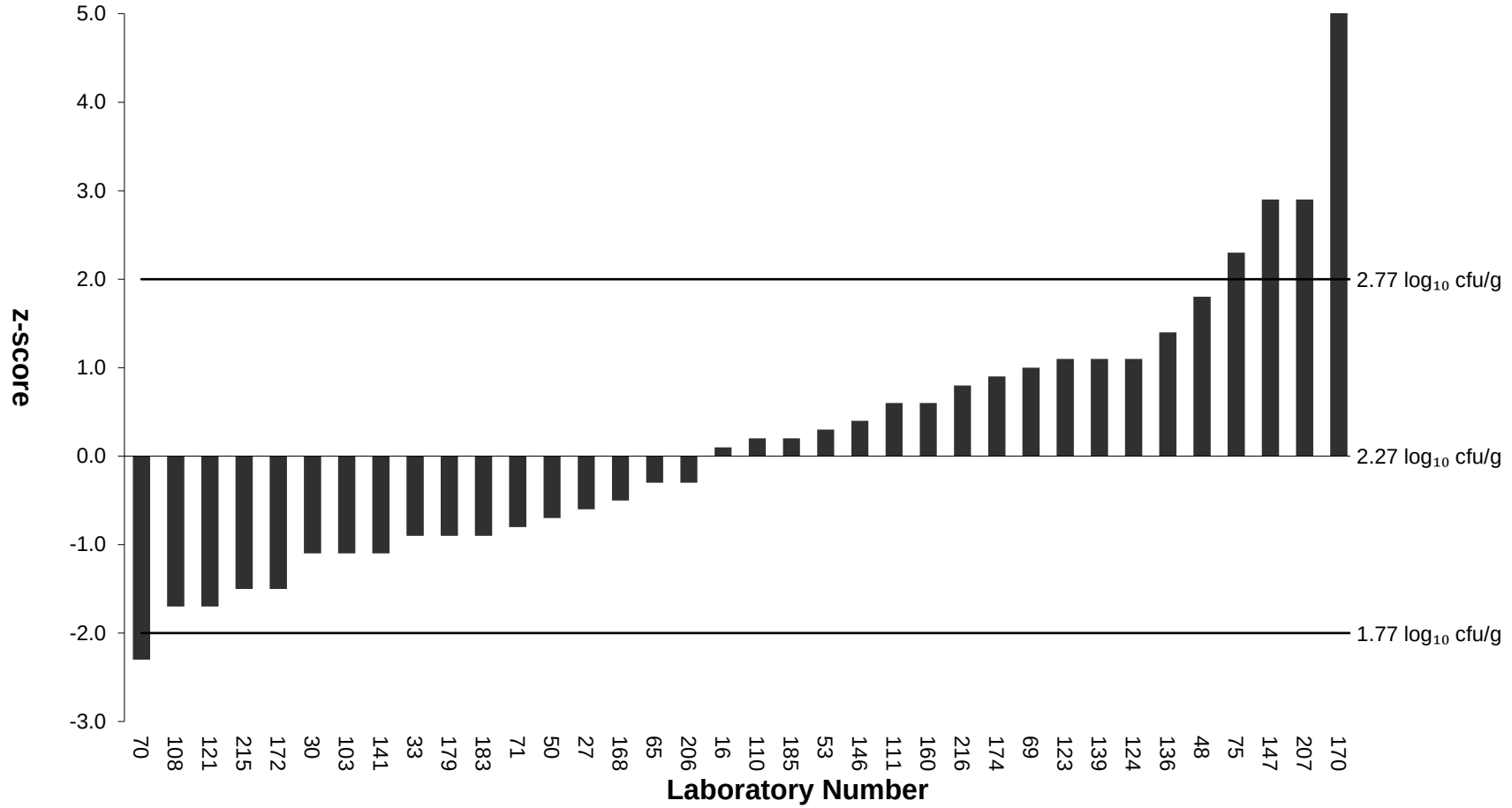

Figure 1: z-Scores for Enumeration of Yeasts and Moulds (sum of) in Beef

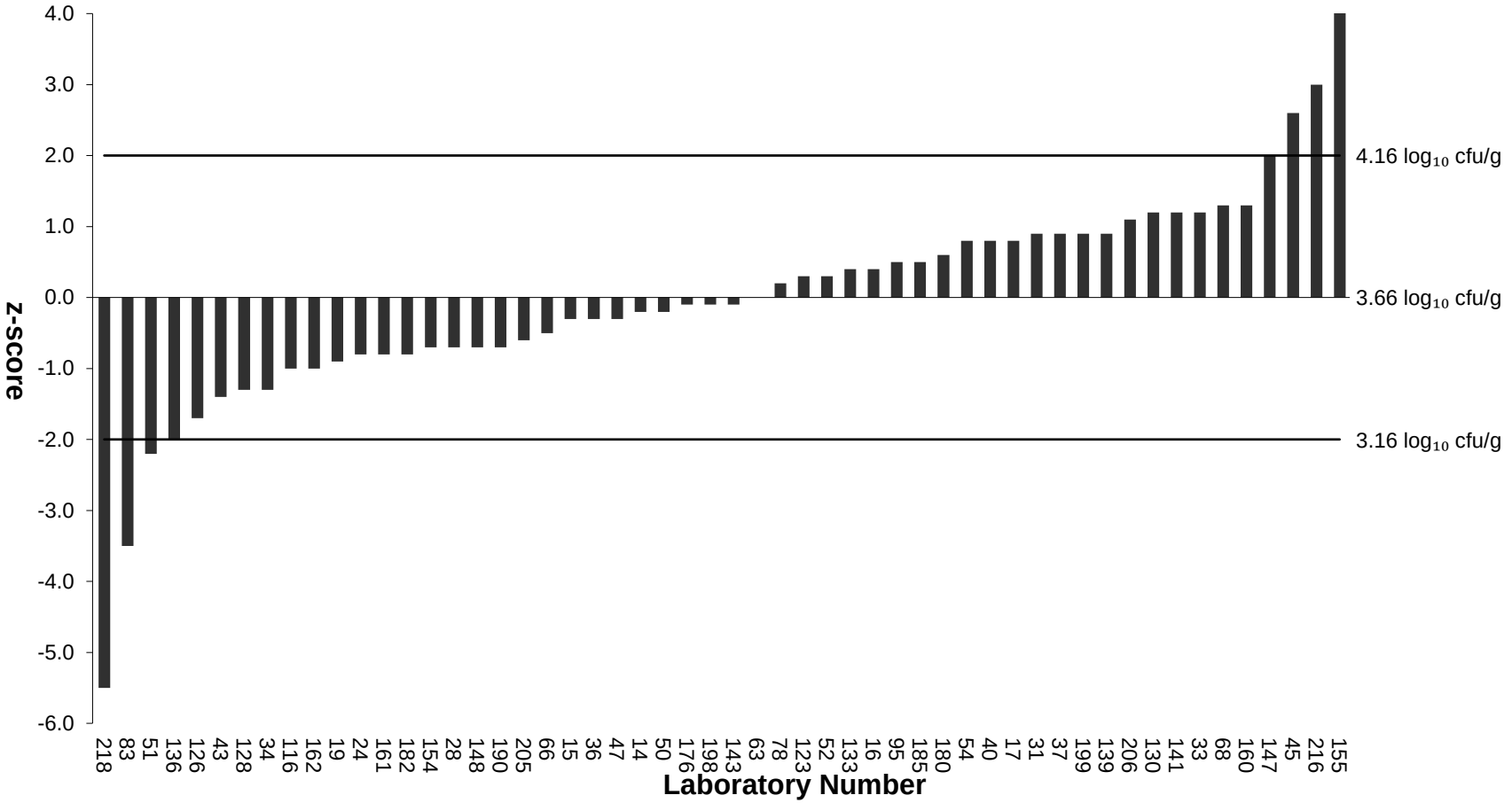

Figure 2: z-Scores for Enumeration of Coagulase Positive Staphylococci in Beef

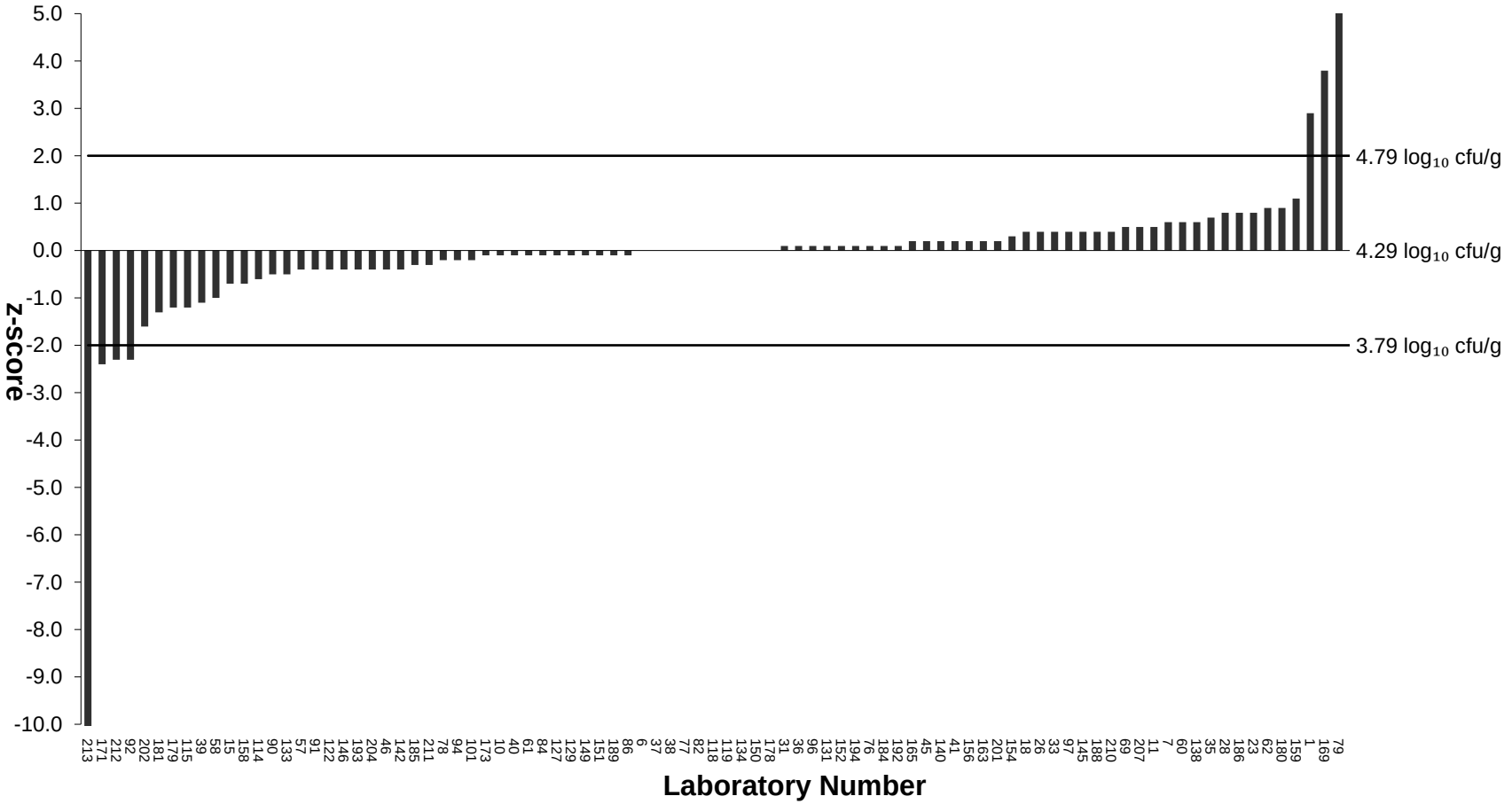

Figure 3: z-Scores for Aerobic Plate Count in Ready To Eat (RTE) Meal

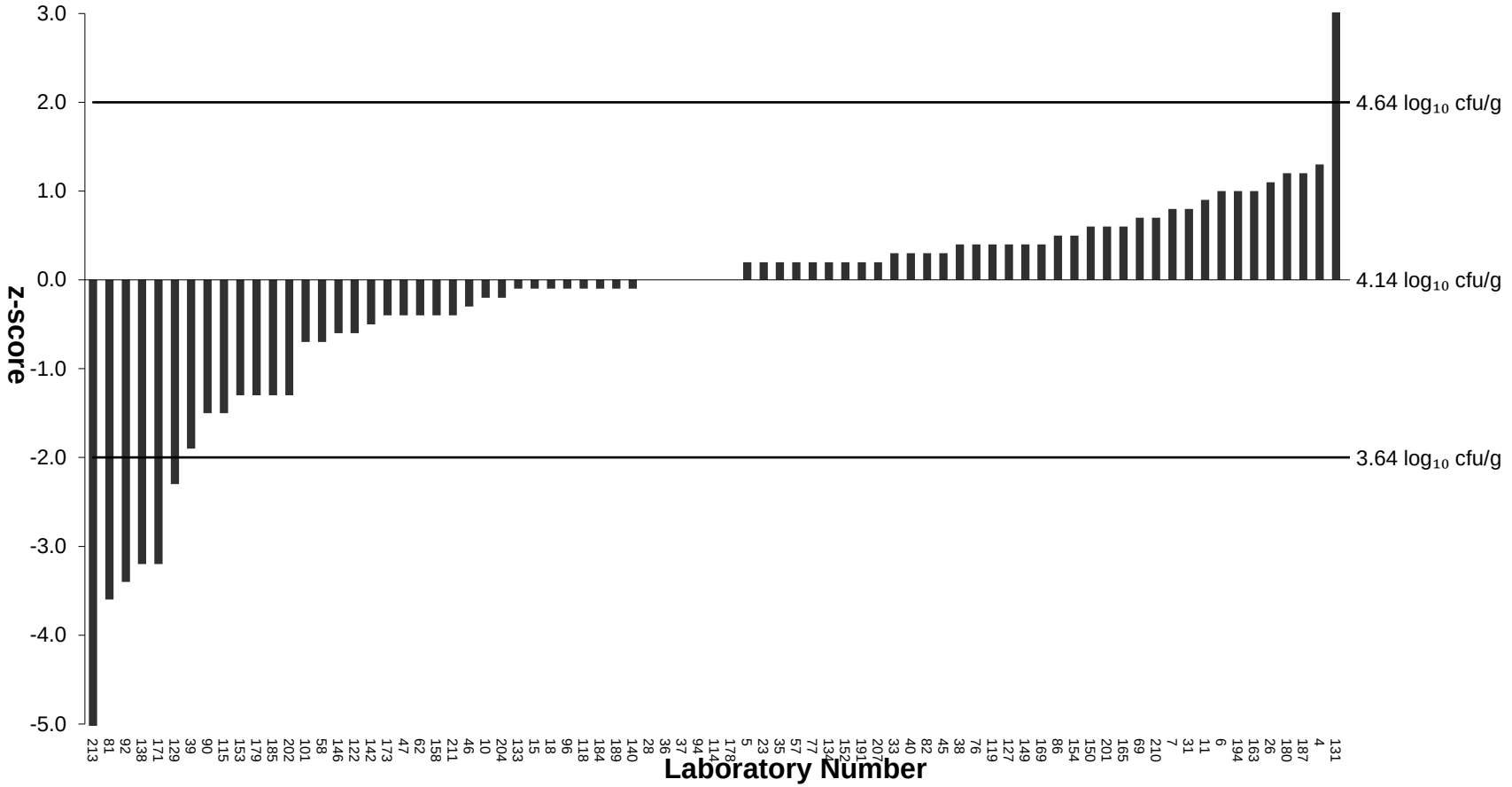

Figure 4: z-Scores for Enumeration of Enterobacteriaceae in Ready To Eat (RTE) Meal

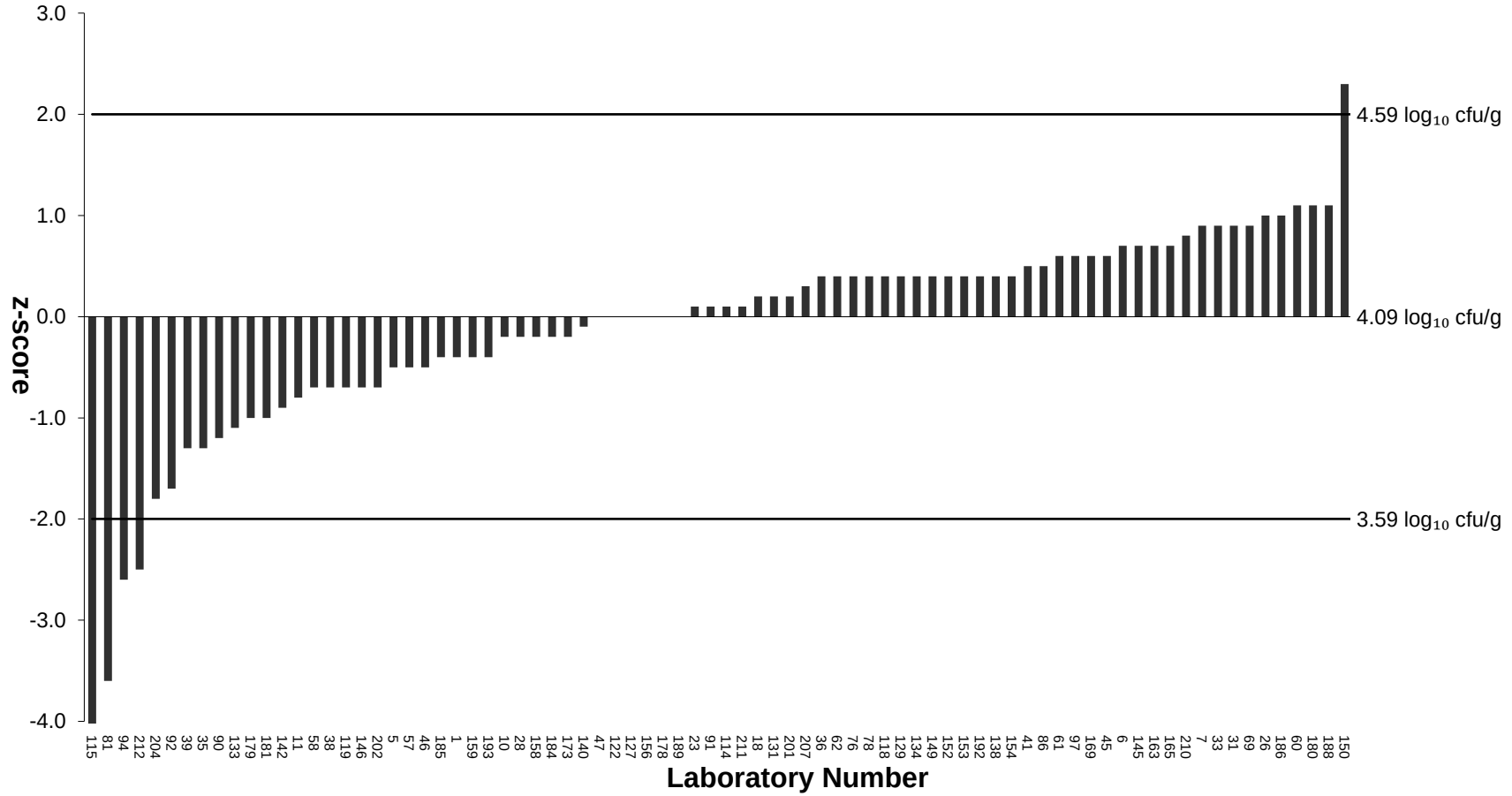

Figure 5: z-Scores for Enumeration of Coliforms in Ready To Eat (RTE) Meal

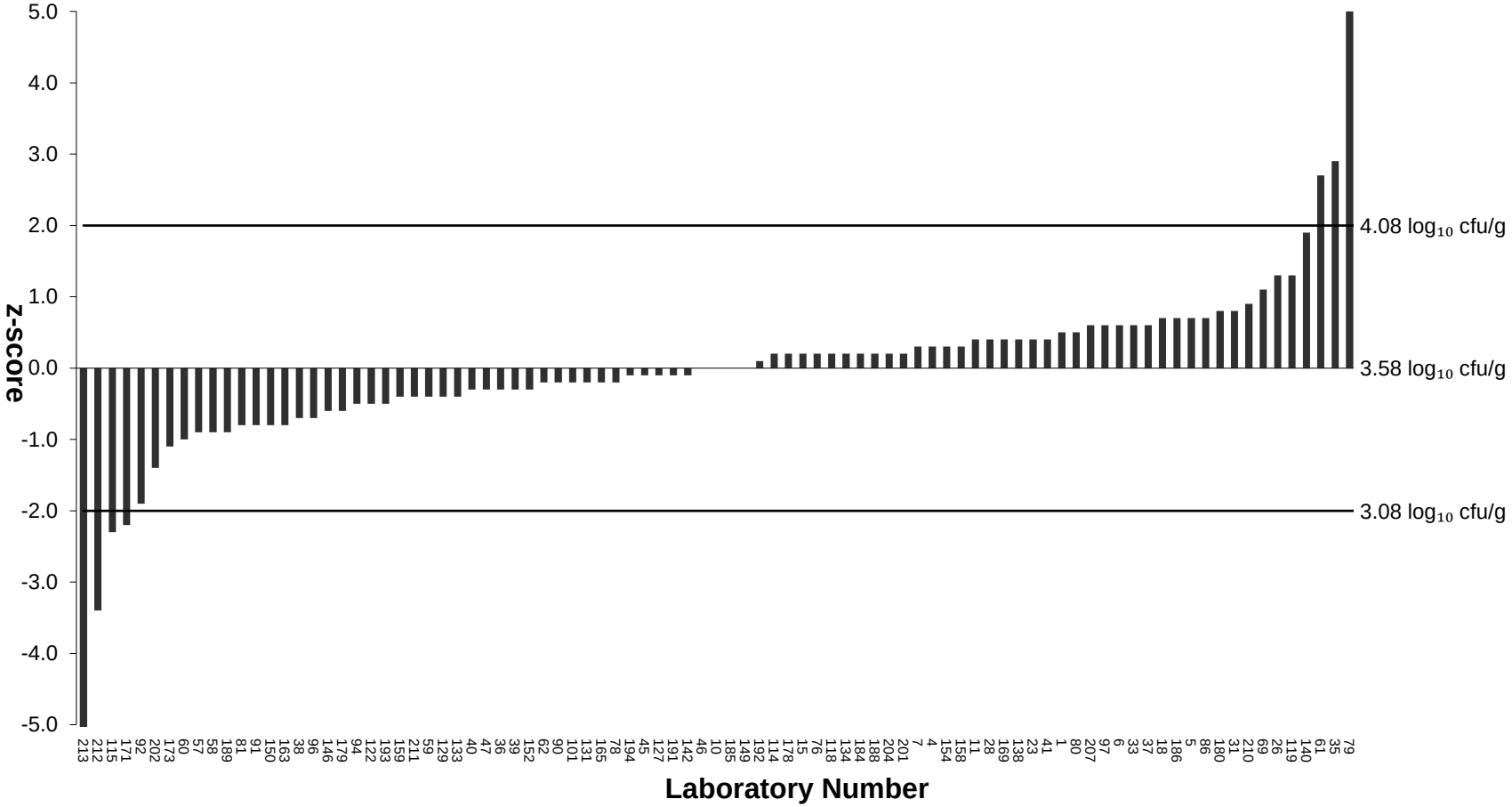

Figure 6: z-Scores for Enumeration of *Escherichia coli* in Ready To Eat (RTE) Meal

APPENDIX I: Organisms present in Fapas® – Food Microbiology Test Materials

proficiency test	matrix	target organism	background flora
enumeration of Yeasts and Moulds (sum of)	Beef	*Saccharomyces cerevisiae*	*Kocuria rhizophila* *Lactobacillus plantarum*
enumeration of Coagulase Positive Staphylococci	Beef	*Staphylococcus aureus*	*Pseudomonas fluorescens* *Escherichia coli* *Bacillus cereus*
enumeration of Aerobic Plate Count / Enterobacteriaceae / Coliforms / *Escherichia coli*	Ready To Eat (RTE) Meal	*E. coli* *Enterobacter aerogenes* *B. cereus*	not applicable
detection of Enterobacteriaceae / Coliforms / *Escherichia coli* test material A	Infant Formula	not applicable	*Pseudomonas aeruginosa* *L. plantarum*
detection of Enterobacteriaceae / Coliforms / *Escherichia coli* test material B	Infant Formula	*E. coli*	*P. aeruginosa* *L. plantarum*
detection of *Salmonella* spp. test material A	Dried Egg	*Salmonella* Cerro	*B. cereus* *E. coli*
detection of *Salmonella* spp. test material B	Dried Egg	not applicable	*B. cereus* *E. coli* *Proteus mirabilis*
detection of *Salmonella* spp. test material A	Herbs	*S.* Cerro	*Bacillus coagulans* *P. aeruginosa*
detection of *Salmonella* spp. test material B	Herbs	not applicable	*B. coagulans* *Citrobacter freundii* *P. aeruginosa*
detection of *Campylobacter* spp. test material A	Milk Powder	*Campylobacter jejuni*	*P. mirabilis* *B. cereus*
detection of *Campylobacter* spp. test material B	Milk Powder	not applicable	*P. aeruginosa* *P. mirabilis* *B. cereus*

APPENDIX II: Verification of Positive Qualitative Test Materials

target organism	level of target organism, as assessed by the most probable number technique, MPN/g
Enterobacteriaceae in Infant Formula	140 (55 to 360*) / 49 (15 to 160*)
Coliforms in Infant Formula	110 (39 to 310*) / 79 (25 to 250*)
Escherichia coli in Infant Formula	79 (25 to 250*) / 49 (15 to 160*)
Salmonella Cerro in Dried Egg	11 (3.8 to 30*) / 4.9 (1.5 to 16*)
Salmonella Cerro in Herbs	23 (7.6 to 70*) / 4.9 (1.5 to 16*)
Campylobacter spp. in Milk Powder	0.45 (0.11 to 1.9*) / 0.45 (0.11 to 1.9*)

*confidence limit at >95%

APPENDIX III: Methods Used by Participants

Methods are tabulated according to the information supplied by participants, but some responses may have been combined or edited for clarity. Text that appears as unreadable symbols are derived from entries made using non-Western characters.

Enumeration of Yeasts and Moulds in Beef

Accredited Method Used	laboratory number
no	030 147
yes	027 048 065 069 071 075 098 103 110 121 123 124 136 139 141 146 168 170 174 179 183 185 206 207

Method Based on an International Standard	laboratory number
no	030 071 141 168 174
yes	027 048 065 069 075 098 103 121 123 124 136 139 146 147 170 179 183 185 206 207

Which International Standard?	laboratory number
Yeasts and Moulds (sum) enumeration (high water availability) ISO 21527-1:2008	027 065 069 103 183 207
Yeasts and Moulds (sum) enumeration (low water availability) ISO 21527-2:2008	075 098 121 147
AOAC Official Method 997.02	123
BAM Chapter 18, 2001	206
Compendium of Methods for the Microbiological Examination of Foods Fifth Edition	030
HRN ISO 21527-1:2012	170
NF V 08-059/2002	179
Petri film plate methods	136
TFDA1021950329	141
YM AOAC OMA 997.02	146

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	027 030 069 103 121 124 136 141 170 174 183
Butterfield's Phosphate Buffer	207
Maximum Recovery Diluent (MRD)	147
Peptone Water	065 098 110 139 146 168 179 185 206
Phosphate Buffered Saline (PBS)	123
0.1% peptone water	075
sterile water	071

Which Primary Enrichment Medium Used	laboratory number
Buffered Peptone Water (BPW)	030 146 174 183
0.1% peptone	185
0.1% peptone water	075
3M™ Petrifilm™ Yeast and Mold Count Plates	123
none	170

Which Secondary Enrichment Medium Used	laboratory number
NA	146
none	170
not have	071

Plating Method Used	laboratory number
Pour plate	071 141 168 174 179 185 206
Spread plate	027 030 065 075 098 103 110 121 139 147 170 183 207
Petrifilm (3M)	123 124 136 146 183

Inoculum Volume (ml)	laboratory number
0.1	030 069 075 098 103 110 147 170 207
1.0	027 065 121 123 124 136 141 146 168 174 183 185 206
>2.0	071
<1 ml	183
0.2	139

Alternative/Rapid Method	laboratory number
MOLDI-TOF	027
Most probable Number - Automated (e.g. TEMPO)	069
PCR	071 168
Petrifilm (3M)	136 146 183

Incubation Temperature (°C)	laboratory number
25	027 030 065 069 075 098 110 121 123 124 136 139 141 146 147 168 170 174 179 183 185 206 207
30	071

Time Incubated (hours) Approximately	laboratory number
48	027
72	069 183
120	027 030 065 071 075 098 121 123 124 136 139 141 146 147 168 170 174 179 185 207

Confirmation of Organism's Identity	laboratory number
Morphology	146
Microscopy	027 071 170 174 207
PCR	168

Which Selective/Chromogenic Medium Used	laboratory number
Dichloran 18% Glycerol Agar (DG18)	075 098 121 141 147 168 185
Dichloran Rose-Bengal Chloramphenicol Agar (DRBC)	016 027 030 048 065 103 136 139 170 183 207
Petrifilm (3M) Yeasts and Moulds	123 124
Potato Dextrose Agar (PDA)	174 206
Yeast Glucose Chloramphenicol Agar (YGC)	110
3M Petrifilm YM	146
Rose Bengal Agar?RBM?	071
simplate	053

Enumeration of Coagulase Positive Staphylococci in Beef

Accredited Method Used	laboratory number
no	047 052 116 147 155 176 190
yes	014 015 017 019 024 028 031 034 037 040 043 051 054 063 066 068 078 083 123 126 128 133 136 139 141 143 148 154 161 162 180 182 185 198 199 205 206 216

Method Based on an International Standard	laboratory number
no	052 054 141 143 154
yes	014 015 017 019 024 028 031 034 037 040 043 047 051 063 066 068 078 083 116 123 126 128 133 136 139 147 148 155 161 162 176 180 182 185 190 198 199 205 206

Which International Standard?	laboratory number
APC FDA/BAM Chapter 3	155
Bacillus cereus enumeration ISO 7932:2004	015
Clostridium perfringens enumeration ISO 7937:2004	017
CPS ISO 6888-1:1999 (Baird Parker)	019 037 040 063 068 083 128 162
CPS ISO 6888-2:1999 (RPF)	031
CPS ISO 6888-3:2003	047
AOAC OMA 2003.07	078
BAM Chapter 12: Staphylococcus aureus	024
CCFRA 3.5.1	182
Food and Drug Administration Bacteriological Analytical Manual. 8th edition, 2001. Chapter 12 AOAC International	148
GB 4789.10-2016	052
ISO 6888	014
ISO 6888-1:1999/Amd.2:2023	206
ISO 6888-1:2021	133
ISO 6888-2:2021	066
KOREA FOOD CODE	143
MOHWM0002.02	198
Petrifilm Method	180

Which International Standard? (continued)	laboratory number
Staphylococcus aureus enumeration FDA/BAM Chapter 12	161
Staphylococcus aureus FDA/BAM Chapter 12	176 190
TFDA 104.10.13 NO. 1041901818	139
TFDA MOHWM0002.02	123
TFDA1041901818	141

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	014 015 019 024 031 034 037 043 047 052 063 083 116 128 133 136 141 148 154 162 182 185 199 205 206
Butterfield's Phosphate Buffer	078 126 139 155 161 176 180 190
Maximum Recovery Diluent (MRD)	040 068 147
Peptone Water	066 198
Phosphate Buffered Saline (PBS)	054 123 143
Ringer's Solution	017

Which Primary Enrichment Medium Used	laboratory number
Buffered Peptone Water (BPW)	019 024 037 047 126 133 161 182 185 199
Baird Parker medium	198
Baird-Parker agar	176
Baird-Parker medium	123
N/A	180
none	054

Which Secondary Enrichment Medium Used	laboratory number
-	148 176
Baird-Parker agar with egg yolk tellurite	161
BPBW	185
N/A	180
none	054

Plating Method Used	laboratory number
Pour plate	019 066 083 136 154 199 206
Spread plate	014 015 017 024 037 040 043 052 063 068 116 123 126 133 139 141 143 147 148 155 161 162 176 182 185 190 198 205
Overlay	031 054 128
Petrifilm (3M)	034 047 078 154 180

Inoculum Volume (ml)	laboratory number
0.1	014 015 017 019 024 040 043 047 063 083 123 128 139 147 154 162 182 198
1.0	031 034 037 051 052 054 066 068 078 116 126 133 136 141 143 148 154 155 161 176 180 185 190 199 206

Alternative/Rapid Method	laboratory number
Compact dry	051
MOLDI-TOF	015
Most probable Number - Automated (e.g. TEMPO)	054
PCR	139
Petrifilm (3M)	078 123 133 155 180

Incubation Temperature (°C)	laboratory number
35	051 054 078 123 126 139 141 148 155 161 176 180 185 190 198 205
37	014 015 017 019 024 031 034 037 040 043 047 052 066 068 083 116 128 133 136 143 147 154 162 182 199 206

Time Incubated (hours) Approximately	laboratory number
24	034 051 078 083 155 162 180
48	014 015 017 019 024 031 037 040 043 047 052 054 063 066 068 123 126 128 133 136 139 141 143 147 148 154 161 176 182 185 190 198 199 205 206
120	116

Confirmation of Organism's Identity	laboratory number
API Staph	128 139 198
Coagulase reaction - tube test	019 037 040 052 054 063 068 083 116 123 126 128 133 155 161 176 180 182 185 190 205 206
Coagulase reaction - slide test	014 024 043
DNase test	078
Morphology	199
Microscopy	054 185
VITEK	063 141 143 162

Which Selective/Chromogenic Medium Used	laboratory number
Baird Parker Agar	014 015 019 043 052 095 141 147 198
Baird Parker Agar with Egg Yolk Potassium Tellurite	017 024 037 040 063 068 083 116 123 126 128 133 136 139 143 148 155 161 162 176 182 185 205
Baird Parker Agar with rabbit plasma fibrinogen (RPF)	031 045 047 066 206
Staph Express Count Plate	180

Enumeration of APC / Enterobacteriaceae / Coliforms / *Escherichia coli* in Ready To Eat [Rte] Meal

Aerobic Plate Count in Ready To Eat [Rte] Meal

Accredited Method Used	laboratory number
no	006 037 039 046 058 086 091 092 097 171 193
yes	007 010 011 015 018 023 026 028 031 035 038 040 041 045 057 060 061 062 069 076 077 078 079 082 084 090 096 101 114 115 118 119 122 127 129 131 133 134 138 140 142 145 146 149 150 151 152 156 159 169 173 178 179 180 181 184 185 186 188 189 194 201 204 207 210 211 212 213

Method Based on an International Standard	laboratory number
no	007 061 077 079 149 181 188 213
yes	006 010 011 015 018 023 026 028 031 035 037 038 039 040 041 045 046 057 058 060 062 069 076 078 082 084 086 090 091 092 096 097 101 114 115 118 119 122 127 129 131 133 134 138 140 142 145 146 150 151 152 156 159 169 171 173 178 179 180 184 185 186 189 193 194 201 204 207 210 212

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	006 011 015 023 026 031 035 037 038 039 045 046 057 060 069 076 077 079 084 090 091 092 097 101 118 119 122 127 133 134 140 145 146 149 150 152 169 171 173 178 181 184 185 189 193 201
Butterfield's Phosphate Buffer	078 131 138 180 186 188 207
Maximum Recovery Diluent (MRD)	040 058
Peptone Water	114 129 179 194 213
Phosphate Buffered Saline (PBS)	007 010 018 041 061 082 096 115 204
Ringer's Solution	086 156 210
saline	159
sterilization saline solution	151

Plating Method Used	laboratory number
Pour plate	007 011 015 023 026 028 035 037 045 057 058 060 061 069 076 077 078 082 086 090 092 096 114 115 119 122 127 129 133 134 140 149 150 152 173 178 179 181 184 185 188 189 204 207
Spread plate	006 040 084 091 101 118 119 151 194 210 213
Overlay	031 171
Petrifilm (3M)	010 018 041 046 079 097 114 119 131 138 145 146 156 159 180 186 193 201 210 212

Inoculum Volume (ml)	laboratory number
0.001	096 119 151
0.01	096 114 119 151
0.05	101
0.1	084 096 114 119 151 169 194 210
1.0	006 007 010 011 015 018 023 026 031 035 037 038 039 040 041 045 046 057 058 060 061 069 076 077 078 079 082 086 090 091 092 097 114 115 118 119 122 127 129 131 133 134 138 140 145 146 149 150 152 156 159 171 173 178 179 180 181 184 185 186 188 189 193 201 204 207 210 212 213
0.0001	119
0.0001?0.00001	096

Which Selective/Chromogenic Medium Used (APC)	laboratory number
Petrifilm (3M) Aerobic Plate Count	010 018 041 046 079 097 114 119 131 138 145 146 156 159 180 186 193 210 212
Plate Count Agar (PCA)	006 007 011 015 023 026 031 035 037 040 045 057 058 060 061 069 076 077 078 082 084 086 092 096 101 114 115 118 119 122 127 129 133 134 140 149 150 151 152 171 173 178 179 181 184 185 188 189 201 204 207 210 213
TEMP	169
Tempo AC	210

Incubation Temperature (°C)	laboratory number
30	006 011 015 023 026 031 035 037 039 040 045 046 057 058 069 084 086 092 101 114 129 140 171 173 178 179 194
35	007 010 018 038 041 060 076 077 078 079 082 091 096 115 118 122 127 131 133 134 138 145 146 149 150 151 152 156 159 180 181 184 185 186 188 189 193 201 204 207 212 213
37	061 090 097 210

Time Incubated (hours) Approximately	laboratory number
24	018 038 058 060 097
48	007 010 039 041 046 061 076 077 078 079 082 090 091 096 115 118 119 122 127 131 133 134 138 145 146 149 150 151 152 156 159 180 181 184 185 186 188 189 193 201 204 207 210 212 213
72	006 011 015 023 026 031 037 040 045 057 069 084 086 092 101 114 119 129 140 171 173 178 179 194

Enterobacteriaceae in Ready To Eat [Rte] Meal

Accredited Method Used	laboratory number
no	004 005 037 039 046 058 086 092 129 131 140 149 171 184 207
yes	006 007 010 011 015 018 023 026 028 031 035 038 040 045 047 057 069 076 077 081 082 090 096 101 114 115 118 119 122 127 133 134 138 142 146 150 152 153 173 178 179 180 185 187 189 191 194 201 204 210 213

Method Based on an International Standard	laboratory number
no	031 077 101 149 187 191 213
yes	004 005 006 007 010 011 015 018 023 026 028 035 037 038 039 040 045 046 047 057 058 069 076 081 082 086 090 092 096 114 115 118 119 122 127 129 131 133 134 138 140 142 146 150 152 153 171 173 178 179 180 184 185 189 194 201 204 207 210

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	004 005 006 011 015 023 026 031 035 037 038 039 045 046 047 057 069 076 077 081 082 090 092 101 118 119 122 127 131 133 134 140 146 149 150 152 153 171 173 178 184 185 187 189 191 201 204
Butterfield's Phosphate Buffer	138 180 207
Maximum Recovery Diluent (MRD)	040 058
Peptone Water	114 129 179 194 213
Phosphate Buffered Saline (PBS)	007 010 018 096 115
Ringer's Solution	086 210

Plating Method Used	laboratory number
Pour plate	004 005 006 011 015 023 026 028 035 037 040 045 047 057 058 076 077 082 086 090 092 114 119 122 127 129 133 134 149 150 152 173 178 179 185 189 191 194 204 207
Spread plate	101 118 153 210
Overlay	023 026 031 096 115 140 171 184 187 204 213
Petrifilm (3M)	007 010 018 046 114 119 131 138 146 180 201 210

Inoculum Volume (ml)	laboratory number
0.001	096 119
0.01	096 114 119
0.05	101
0.1	069 096 114 119
1.0	004 005 006 007 010 011 015 018 023 026 031 035 037 038 039 040 045 046 047 057 058 076 077 081 082 086 090 092 114 115 118 122 127 129 131 133 134 138 140 146 149 150 152 153 171 173 178 179 180 184 185 187 189 191 194 201 204 207 210 213
0.0001	119
0.0001?0.00001	096

Which Selective/Chromogenic Medium Used (Entrob.)	laboratory number
Petrifilm (3M) Enterobacteriaceae	007 010 018 046 119 138 146 153 180 201 210
Violet Red Bile Agar (VRB)	081
Violet Red Bile Dextrose Agar (VRBD)	015 047 101 114 119 129 194
Violet Red Bile Glucose Agar (VRBG)	004 005 006 011 023 026 035 037 040 045 057 058 076 077 082 086 092 096 115 118 122 127 131 133 134 140 149 150 152 171 173 178 179 184 185 187 189 191 204 207 210 213
TEMPO EB	039 210

Incubation Temperature (°C)	laboratory number
30	035 101 133
35	039 069 092 131 180 184 185 191 210 213
37	004 005 006 007 010 011 015 018 023 026 031 037 040 045 046 047 057 058 076 077 081 082 086 090 096 114 115 118 119 122 127 129 134 138 140 146 149 150 152 153 171 173 178 179 187 189 194 201 204 207

Time Incubated (hours) Approximately	laboratory number
24	004 005 006 007 010 011 018 023 026 031 037 038 039 040 045 046 047 057 058 069 076 077 081 082 086 090 092 096 114 115 118 119 122 127 129 131 133 134 138 140 146 149 150 152 153 171 173 178 179 180 184 185 187 189 191 194 201 204 207 210
48	015 101
72	035

Confirmation of Organism's Identity	laboratory number
API 20E	035 047
Fermentation of Carbohydrates	011 023 026 040 057 076 086 114 119 129 131 133 140 150 152 178 210 213
Morphology	180
Microscopy	138
Oxidase reaction	004 005 006 026 037 040 045 057 076 077 082 096 114 115 118 122 129 149 150 171 178 184 191 194 201 204 207
VITEK	015 127 134 153
Triple Sugar Iron Agar (TSI)	037

Coliforms in Ready To Eat [Rte] Meal

Accredited Method Used	laboratory number
no	005 006 023 039 046 057 058 086 091 092 097 193 210
yes	007 010 011 018 026 028 031 035 038 041 045 047 060 061 069 076 078 081 090 114 115 118 119 122 127 129 131 133 134 138 140 142 145 146 149 150 151 152 153 156 159 173 178 179 180 181 184 185 186 188 189 201 204 207 212

Method Based on an International Standard	laboratory number
no	149 181 188
yes	005 006 007 010 011 018 023 026 028 031 035 038 039 041 045 046 047 057 058 060 061 069 076 078 081 086 090 091 092 097 114 115 118 119 122 127 129 131 133 134 138 140 142 145 146 150 151 152 153 156 159 173 178 179 180 184 185 186 189 193 201 204 207 210 212

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	005 006 011 023 026 031 035 038 039 045 046 047 057 060 069 076 081 090 091 092 097 118 119 122 127 133 134 140 145 146 149 150 152 153 173 178 181 184 185 189 193 201 212
Butterfield's Phosphate Buffer	078 131 138 180 186 188 207
Maximum Recovery Diluent (MRD)	058
Peptone Water	114 129 179
Phosphate Buffered Saline (PBS)	007 010 018 041 061 115 204
Ringer's Solution	086 156 210
saline	159
sterilization saline solution	151

Plating Method Used	laboratory number
Pour plate	005 006 011 023 026 028 035 045 047 058 061 086 090 092 114 119 122 129 133 152 178 179 185 207
Spread plate	091 127 140 153 210
Overlay	023 031 118 173 184 212
Petrifilm (3M)	007 010 018 041 046 078 097 114 119 131 138 145 146 156 159 180 181 186 193 201 210

Inoculum Volume (ml)	laboratory number
0.001	057 119 151
0.01	057 114 119 151
0.1	057 069 114 119 140 151 210
1.0	005 006 007 010 011 018 023 026 031 035 038 039 041 045 046 047 058 060 061 076 078 081 086 090 091 092 097 114 115 118 122 127 129 131 133 134 138 145 146 149 150 152 153 156 159 173 178 179 180 181 184 185 186 188 189 193 201 204 207 210 212
0.0001	119

Which Selective/Chromogenic Medium Used (Coliforms)	laboratory number
Brilliant Green Bile Broth (BGBB)	210
Brilliant Green Bile Lactose Broth (BGLB)	041 057 060 061 076 115 118 122 134 149 150 188 204
Chromocult Coliform Agar	005 035 127 152 185 189
Lauryl Tryptose Broth	057 076 119 204
Petrifilm (3M) Colliforms	007 010 018 058 114 119 131 138 145 146 153 156 159 180 181 186 193 201 210 212
Violet Red Bile Agar (VRB)	061 092 114 119 129 140 178 207
Violet Red Bile Lactose Agar (VRBL)	006 011 023 031 045 047 086 133 173 179 184
Brilliant E. coli Coliforms Selective Medium	210
Lactose broth	151
Petrifilm (3M) Coliform	097
Petrifilm (3M) Rapid E. coli/Coliform Count Plates	078
RAPID'E.coli 2 medium (Bio-Rad)	026
TEMPO CT	039

Incubation Temperature (°C)	laboratory number
30	006 031 035 058 069 133
35	007 010 018 038 041 057 060 076 078 091 092 114 115 118 122 127 131 134 138 145 149 150 151 152 153 156 159 180 181 184 185 186 188 189 193 201 204 207 212
37	005 011 023 026 039 045 046 047 061 086 090 097 119 129 140 146 173 178 179 210

Time Incubated (hours) Approximately	laboratory number
24	005 006 007 010 011 018 023 026 031 038 039 041 045 046 047 057 058 060 069 078 086 090 092 097 119 122 127 129 131 133 138 140 145 146 151 152 153 156 159 173 178 179 180 181 184 185 186 189 193 201 204 207 210 212
48	057 076 091 114 115 118 119 134 149 150 188
72	035 061

Confirmation of Organism's Identity	laboratory number
Aesculin hydrolysis	129
API 20A	188
API 20E	035 041 047 193
beta-Galactosidase	026 152 210
beta-glucoronidase activity	210
Fermentation of Carbohydrates	011 023 057 133 150 178
IMViC test	060 091 118 140 204 207
Morphology	146 180
Microscopy	178
VITEK	127 134 153
Triple Sugar Iron Agar (TSI)	138

Escherichia coli in Ready To Eat [Rte] Meal

Accredited Method Used	laboratory number
no	004 037 039 046 058 079 086 091 092 097 171 184 193 210
yes	005 006 007 010 011 015 018 023 026 028 031 035 038 040 041 045 047 057 059 060 061 069 076 078 080 081 090 096 101 114 115 118 119 122 127 129 131 133 134 138 140 142 146 149 150 151 152 159 173 178 179 180 185 186 188 189 191 194 201 204 207 212 213

Method Based on an International Standard	laboratory number
no	079 101 149 188 191 213
yes	004 005 006 007 010 011 015 018 023 026 028 031 035 037 038 039 040 041 045 046 047 057 058 059 060 061 069 076 078 080 081 086 090 091 092 096 097 114 115 118 119 122 127 129 131 133 134 138 140 142 146 150 151 152 159 171 173 178 179 180 184 185 186 189 193 194 201 204 207 210 212

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	004 005 006 011 015 023 026 031 035 037 038 039 045 046 047 057 059 060 069 079 081 090 091 092 097 101 118 119 122 127 133 134 140 146 149 150 152 171 173 178 184 185 189 191 193 201 212
Butterfield's Phosphate Buffer	078 131 138 180 186 188 207
Maximum Recovery Diluent (MRD)	040 058
Peptone Water	114 129 179 194 213
Phosphate Buffered Saline (PBS)	007 010 018 041 061 096 115 204
Ringer's Solution	086 210
Saline	080 159
sterilization saline solution	151

Plating Method Used	laboratory number
Pour plate	004 005 011 015 023 026 028 035 037 040 045 047 057 058 060 061 086 090 092 096 114 115 119 122 129 133 149 152 173 178 179 185 189 191 194 207
Spread plate	006 091 127 140 210
Overlay	031 118 171 184 213
Petrifilm (3M)	007 010 018 041 046 059 078 079 080 097 101 114 119 131 138 159 180 186 193 201 210 212

Inoculum Volume (ml)	laboratory number
0.001	096 119 151
0.01	096 114 119 151
0.1	096 114 119 140 151 210
1.0	004 005 006 007 010 011 015 018 023 026 031 035 037 038 039 040 041 045 046 047 057 058 059 060 061 069 076 078 079 080 081 086 090 091 092 097 101 114 115 118 119 122 127 129 131 133 134 138 146 149 150 152 159 171 173 178 179 180 184 185 186 188 189 191 193 194 201 204 207 210 212 213
0.0001?0.00001	096

Which Selective/Chromogenic Medium Used (E. coli)	laboratory number
Lauryl Sulphate Broth	076 081
Petrifilm (3M) E.Coli	007 010 018 046 059 078 079 080 097 101 114 131 138 146 159 180 186 193 201 210 212
Tryptone Bile Glucuronide Agar (TBX)	004 005 006 011 015 023 031 037 040 045 047 057 058 060 086 090 096 115 119 122 127 129 133 140 149 152 171 173 178 179 185 189 191 194 207
Tryptone Water	210
Eosine Methylene Blue Agar (EMB)	035 041 076 118 134 150 188 204
Brilliant E. coli Coliforms Selective Medium	210
EC broth	151
Minerals Modified Glutamate Medium	119
RAPID'E.coli 2 medium (Bio-Rad)	026
TEMPO EC	039
Violet Red Bile Agar	061
Violet Red Bile Lactose Agar and EC Broth; IMViC Biochemical Reaction	184
VRBA	114

Incubation Temperature (°C)	laboratory number
30	035
35	007 010 018 038 041 059 076 078 079 080 091 092 096 114 118 122 134 138 146 150 159 180 184 186 188 193 204 212 213
37	039 061 069 081 097 115 119 210
41.5	015 171
42	046 101 201
43	047
44	004 005 006 011 026 031 037 040 045 057 058 060 086 090 127 129 133 140 149 152 173 178 179 185 189 191 194 207
45	151

Time Incubated (hours) Approximately	laboratory number
24	004 005 006 011 015 018 023 026 031 037 038 039 040 045 046 047 057 058 060 061 069 078 081 086 090 092 096 097 101 114 115 119 122 127 129 133 140 149 150 151 152 159 173 178 179 184 185 189 191 194 201 204 207 210
48	007 010 041 059 076 079 080 091 118 131 134 138 146 180 186 188 193 212 213
72	035

Confirmation of Organism's Identity	laboratory number
API 20E	035 041 047 114 193 194 207
API 20 NE	090
beta-glucoronidase activity	026 059 129 152 210
IMViC test	057 060 076 091 115 118 122 140 201 204 213
Indole production	092 114 178 184 210
Lysine Iron Agar	138
Morphology	146 180
VITEK	015 127 134 150 189 201
Triple Sugar Iron Agar (TSI)	057

Detection of Enterobacteriaceae / Coliforms / *Escherichia coli* in Infant Formula

Accredited Method Used	laboratory number
no	002 032 109 112 157
yes	028 029 064 072 085 087 099 104 105 120 166 199 203 214

Method Based on an International Standard	laboratory number
no	072 203 214
yes	002 028 029 032 064 085 087 099 104 105 109 112 120 157 166 199

Which International Standard?	laboratory number
Coliforms enumeration ISO 4832:2006	099
Coliforms enumeration ISO 4831:2006	028 166
Coliforms enumeration AOAC 991.14	032
Enterobacteriaceae enumeration ISO 21528-1:2017	002 028 029 085 087 104 105 112 199
Enterobacteriaceae enumeration ISO 21528-2:2017	064
Escherichia coli enumeration ISO 16649-3:2015	028
ISO 21528-1, ISO 4831-2006, ISO 7251-2005	109

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	002 028 029 032 064 085 104 105 109 112 120 157 166 199 203 214
Buffered Sodium Chloride Peptone	099

Which Primary Enrichment Medium Used	laboratory number
Buffered Peptone Water (BPW)	029 032 085 087 104 105 109 199
Tryptone Soya Broth	099
Lauryl Sulphate Broth	064 166
N.A.	002

Which Secondary Enrichment Medium Used	laboratory number
Brilliant Green Bile Broth (BGBB)	064
Brilliant Green Bile Lactose Broth (BGLB)	166
MacConkey Broth for E.coli and BGLBB for Coliform	099
N.A.	002

Plating Method Used	laboratory number
Pour plate	064
Spread plate	002 029 085 099 104
Overlay	112
Petrifilm (3M)	032

Inoculum Volume (ml)	laboratory number
0.001	112
0.01	002 085 104 203
0.1	109
1.0	032 064 099 120 157 214
smear	029

Alternative/Rapid Method	laboratory number
PCR	109
Petrifilm (3M)	032

Incubation Temperature (°C)	laboratory number
30	112
35	032 099
37	002 029 064 085 087 104 105 109 166 203

Time Incubated (hours) Approximately	laboratory number
18	087 109 199
24	002 029 085 104 105 112 157 166 203 214
48	032 064 099

Confirmation of Organism's Identity	laboratory number
API 20E	029 064
Fermentation of Carbohydrates	029 085 087 105 109
Microscopy	203
Oxidase reaction	029 109 112 199
PCR	109

Enterobacteriaceae

Which Selective/Chromogenic Medium Used	laboratory number
Violet Red Bile Agar (VRB)	157
Violet Red Bile Dextrose Agar (VRBD)	106
Violet Red Bile Glucose Agar (VRBG)	002 029 064 085 087 104 105 109 120 182 199
VRBGA	203

Coliforms

Which Selective/Chromogenic Medium Used	laboratory number
Brilliant Green Bile Lactose Broth (BGLB)	099 166
Lauryl Tryptose Broth	109
Petrifilm (3M) Colliforms	032
Violet Red Bile Agar (VRB)	104 106
Violet Red Bile Lactose Agar (VRBL)	064 182

Escherichia coli

Which Selective/Chromogenic Medium Used	laboratory number
Lauryl Sulphate Broth	002 109
Tryptone Bile Glucuronide Agar (TBX)	064 104 106 182

Detection of *Salmonella* spp. in Egg [Dried]

Accredited Method Used	laboratory number
no	012 113 159
yes	014 021 022 025 049 056 066 088 125 132 133 137 146 164 170 201 209

Method Based on an International Standard	laboratory number
no	159
yes	012 014 021 022 025 049 056 066 088 113 125 132 133 137 146 164 170 201 209

Which International Standard?	laboratory number
Salmonella spp. detection ISO 6579-1:2017	012 014 025 066 088 113 132 137 170 209
Salmonella spp. detection FDA/BAM Chapter 5	022 125 201
AFNOR SOL 37/04-12/18	164
AOAC 2003.09	021

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	014 025 049 066 088 113 125 132 133 137 146 159 164 170 201 209
Phosphate Buffered Saline (PBS)	021 022

Which Primary Enrichment Medium Used	laboratory number
Buffered Peptone Water (BPW)	012 021 022 049 088 113 133 164 170 201
Mueller Kauffman Tetrathionate Novobiocin Broth (MKKTn)	025 066 137 209
Rappaport Vassiliadis Broth (RV)	014 137 209
Rappaport Vassiliadis Soya Peptone(RVS)	066 132
3M Salmonella Broth	146
lactose broth	125

Which Secondary Enrichment Medium Used	laboratory number
Rappaport Vassiliadis Broth (RV)	146
Rappaport Vassiliadis Soya Peptone(RVS)	012 014 025 164 170
Tetrathionate Broth	012 014 132 201
RV broth and TT broth	125
SX2 (BioMérieux)	049
WITHOUT SECONDARY ENRICHMENT MEDIUM	088

Plating Method Used	laboratory number
Pour plate	088
Spread plate	049 066 113 132 137 170 201
Overlay	014
Petrifilm (3M)	146

Inoculum Volume (ml)	laboratory number
0.001	113 201
0.01	049 146 170
0.1	012 014 021 022 088 132 209
1.0	012 125

Alternative/Rapid Method	laboratory number
Enzyme Immunoassay	164
MOLDI-TOF	170
PCR	012 132
Petrifilm (3M)	146
RapidChek	159
VIDAS (ELFA)	014 049 133 201
miniVIDAS (ELFA)	025

Incubation Temperature (°C)	laboratory number
35	021 049 137
37	012 014 025 113 132 170 201
41.5	022 133 146 164 209
42	088 159
43	125

Time Incubated (hours) Approximately	laboratory number
18	012 049 088
24	014 021 022 025 113 125 132 133 137 164 170 201 209
48	146 159

Confirmation of Organism's Identity	laboratory number
API 20E	021 022 025 113
API Staph	170
Latex slide agglutination	014 088 164
Lysine Decarboxylase	014 066
Lysine Iron Agar	201
Morphology	012 146
Microscopy	012
Motility	012
PCR	012 113 133 201
VITEK	049 125 201
Triple Sugar Iron Agar (TSI)	066 132 201 209

Which Selective/Chromogenic Medium Used	laboratory number
Bismuth Sulfite Agar (BSA)	125
Brilliant Green Agar (BGA)	021 022 209
Brilliance Salmonella Agar	049
Brilliant Green Phenol Red Lactose Sucrose Agar (BPLS)	012
Chromogenic Salmonella Agar (Oxoid)	133
Hektoen Agar	113 125 137 201
Modified Semi-Solid Rappaport Vassiliadis (MSRV)	113 201
Salmonella Chromogenic Medium	066 088 201
Xylose Lysine Desoxycholate Agar (XLD)	012 025 066 113 125 132 137 164 170 201 209
XLT-4 Agar	014
3M Petrifilm Salmonella	146
MLCB Agar	012

Detection of *Salmonella* spp. in Herbs

Accredited Method Used	laboratory number
no	009 044 058
yes	013 020 027 055 073 100 107 117 135 139 178 184

Method Based on an International Standard	laboratory number
no	009 013 020 055
yes	027 044 058 073 100 107 117 135 139 178 184

Which International Standard?	laboratory number
Salmonella spp. detection ISO 6579-1:2017	027 044 058 107 117 178
Salmonella spp. detection FDA/BAM Chapter 5	073 100 184
AOAC 20th Edition 2013.01 By VIDAS Salmonella SPT Method	178
Chinese Pharamacopoeia 2020	055
RapidChek SELECT Salmonella (AOAC)	013
SureTect Salmonella species PCR assay	009
TFDA 102.12.23 NO.1021951187.	139

Which Initial Suspension/Diluent Used	laboratory number
Buffered Peptone Water (BPW)	009 020 044 058 100 107 135 178 184
Butterfield's Phosphate Buffer	073
Tryptic Soy Broth Medium(TSB)	055

Which Primary Enrichment Medium Used	laboratory number
Buffered Peptone Water (BPW)	009 020 027 044 058 117 135 178
Mueller Kauffman Tetrathionate Novobiocin Broth (MKKTn)	107
Rappaport Vassiliadis Broth (RV)	073
Modified Semi-Solid Rappaport Vassiliadis (MSRV)	107
Rappaport Vassiliadis Soya Peptone(RVS)	107
Tryptone Soya Broth	100 184
Lactose broth	139
Tryptic Soy Broth Medium(TSB)	055

Which Secondary Enrichment Medium Used	laboratory number
Rappaport Vassiliadis Broth (RV)	044 055 100 184
Rappaport Vassiliadis Soya Peptone(RVS)	058 117 139 178
Tetrathionate Broth	073 100
MKTT Broth	178
MKTTN	027 117

Plating Method Used	laboratory number
Pour plate	027
Spread plate	009 044 073 100 107

Inoculum Volume (ml)	laboratory number
0.01	027
0.1	013 044 073 100 107 184
1.0	100
0.02	135

Alternative/Rapid Method	laboratory number
Enzyme Immunoassay	013
Loop Mediated Isothermal Amplification (LAMP)	117
MOLDI-TOF	073 100
PCR	009 020 027 058 139
RapidChek	044
VIDAS (ELFA)	178

Incubation Temperature (°C)	laboratory number
35	055 073 100 139 184
37	009 020 027 044 058 107 117 135 178
42	013

Time Incubated (hours) Approximately	laboratory number
18	117
24	009 013 020 027 044 055 058 073 100 107 135 139 178 184

Confirmation of Organism's Identity	laboratory number
API 20E	139 184
Coagulase reaction - tube test	044
Indole production	178
Latex slide agglutination	009
Lysine Decarboxylase	178
Serological agglutination test	027 117 178
PCR	027 058
VITEK	055 073 100 107
Triple Sugar Iron Agar (TSI)	178

Which Selective/Chromogenic Medium Used (Salmonella spp.)	laboratory number
Bismuth Sulfite Agar (BSA)	073 100
Brilliant Green Agar (BGA)	117 178
Brilliance Salmonella Agar	009
Hektoen Agar	073 100
Modified Semi-Solid Rappaport Vassiliadis (MSRV)	107
Rambach Agar	027
Salmonella Chromogenic Medium	107
Xylose Lysine Desoxycholate Agar (XLD)	020 027 044 055 058 073 100 107 117 139 178 184

Detection of *Campylobacter* spp. in Milk Powder

Accredited Method Used	laboratory number
yes	042 089 102 144 167 196

Method Based on an International Standard	laboratory number
no	042 102 144
yes	089 167 196

Which International Standard?	laboratory number
Campylobacter spp. detection ISO 10272-1:2017	089 167 196

Which Initial Suspension/Diluent Used	laboratory number
Preston broth	144

Which Primary Enrichment Medium Used	laboratory number
Bolton broth	089
Preston broth	042

Which Secondary Enrichment Medium Used	laboratory number
Bolton Broth	102 167
Rappaport Vassiliadis Soya Peptone(RVS)	144

Plating Method Used	laboratory number
Pour plate	144
Spread plate	042 167
Overlay	196

Inoculum Volume (ml)	laboratory number
0.01	042 089 167 196
0.1	144

Alternative/Rapid Method	laboratory number
PCR	102 196

Incubation Temperature (°C)	laboratory number
41.5	089 167
42	042 102 144 196

Time Incubated (hours) Approximately	laboratory number
48	042 089 102 144 167 196

Confirmation of Organism's Identity	laboratory number
Catalase reaction	089
Hippurate Hydrolysis	089
Morphology	089 167
Microscopy	042
Motility	089
Oxidase reaction	089 167
PCR	196

Which Selective/Chromogenic Medium Used	laboratory number
Campylobacter selective blood free agar (CCDA)	042
Modified Campylobacter selective blood free agar (mCCDA)	089 167
Skirrow Agar	089 167 196

APPENDIX IV: Fapas® SecureWeb, Protocol and Contact Details

1. Fapas® SECUREWEB

Access to the secure area of our website is only available to participants in our proficiency tests. Please contact us if you require a UserID and Password. Fapas® SecureWeb allows participants to:

- Obtain their laboratory numbers for the proficiency tests in which they have participated.
- View the results they submitted in past and current proficiency tests.
- Submit their results and methods for current tests.
- Review future tests they have ordered.
- Order proficiency tests, reference materials and quality control materials.
- Freely download copies of reports (PDF file), of proficiency tests in which they have participated.
- View charts of their z-scores obtained in previous Fapas® – Food Microbiology proficiency tests.

2. PROTOCOL

The Protocols [7, 8] set out how Fapas® – Food Microbiology is organised. Copies can be downloaded from our website.

3. CONTACT DETAILS

This report was prepared and authorised on behalf of Fapas® by Stilian Hristov (Round Coordinator). Participants with any comments or concerns about this proficiency test should contact:

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