



Fapas® – Water and Environmental Report DWM019

Drinking Water Microbiology

December 2017-January 2018

PARTICIPANT LABORATORY NUMBER

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SUMMARY

1. The test materials for Fapas® Drinking Water Microbiology proficiency test DWM019 were dispatched in December 2017. Three test materials were provided for seven examinations in this proficiency test:

Test Material A	DWM0119 Enumeration of total coliforms
Test Material A	DWM0119 Enumeration of <i>Escherichia coli</i>
Test Material B	DWM0219 Colony count after 3 days at 22°C
Test Material B	DWM0219 Colony count after 2 days at 37°C
Test Material C	DWM0319 Enumeration of enterococci
Test Material C	DWM0319 Enumeration of <i>Pseudomonas aeruginosa</i>
Test Material C	DWM0319 Enumeration of <i>Clostridium perfringens</i>

2. An assigned value (x_a) was determined for each 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 for this proficiency test are summarised as follows:

examination	assigned value, x_a	units	number of scores, $ z \leq 2$	total number of scores	% $ z \leq 2$
enumeration of total coliforms	8.60	SQRTcfu/100ml	13	17	76
enumeration of <i>Escherichia coli</i>	5.79	SQRTcfu/100ml	15	16	94
colony count after 3 days at 22°C	14.76	SQRTcfu/ml	12	13	92
colony count after 2 days at 37°C	14.18	SQRTcfu/ml	20	22	91
enumeration of enterococci	11.05	SQRTcfu/100ml	14	15	93
enumeration of <i>Pseudomonas aeruginosa</i>	7.35	SQRTcfu/100ml	15	16	94
enumeration of <i>Clostridium perfringens</i>	5.43	SQRTcfu/100ml	8	8	100

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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[®] – Water and Environmental proficiency tests are available in our protocols [4, 5].

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].

Each test material comprised of a small glass vial containing an inoculum pellet, sealed with a rubber bung and crimp-capped. The organisms present in the inoculum pellets were as follows:

Test Material A	<i>Escherichia coli</i> and <i>Klebsiella planticola</i>
Test Material B	<i>Enterococcus faecalis</i> and <i>Staphylococcus epidermidis</i>
Test Material C	<i>Enterococcus faecalis</i> , <i>Clostridium perfringens</i> and <i>Pseudomonas aeruginosa</i>

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

2.2. Homogeneity

To test for homogeneity, 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.

2.3. Dispatch

The start date was 05 December 2017. Test materials were sent to 39 participants.

3. RESULTS

The instructions for reporting results were as follows:

- Start the analysis between 05 December and 14 December 2017.
- Report results in cfu/100ml for total coliforms, *Escherichia coli*, enterococci, *Clostridium perfringens* and *Pseudomonas aeruginosa* and in cfu/ml for colony count after 3 days at 22°C and colony count after 2 days at 37°C.

Results were submitted by 35 participants (90%) before the closing date for this test, 03 January 2018.

Each participant was given a laboratory number, assigned in order of receipt of results. The reported results are given in Tables 1-7.

The analytical methods used by each participant are summarised in APPENDIX I.

4. STATISTICAL EVALUATION OF RESULTS

The results submitted by participants were statistically analysed in order to provide an assigned value for each analyte. The assigned values were then used in combination with the standard deviation for proficiency, σ_p , to calculate a z-score [6] for each result. The procedure is detailed in the relevant protocols [4, 5].

Further background on the procedure followed can be found in the IUPAC International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [7].

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 a square root transformation of submitted results to obtain a normal distribution.

The following results were excluded from the calculation of the assigned value:

- i) results reported as approximately 100 or 1000 × greater or smaller than the majority of submitted results (as these were considered to be reporting errors),
- ii) non-numerical results i.e. qualitative or semi-quantitative results,
- iii) results where the analysis commenced outside the specified time period.

For each examination this procedure was straightforward and the median was chosen as the assigned value as this was considered the best measure of consensus due to the low number of data points.

The assigned values for all examinations are shown in Table 8.

4.2. Standard Deviation for Proficiency, σ_p

A fixed standard deviation has been set at a value that reflects best practice for the analyses in question and the appropriate members of the Fapas[®] Advisory Committee have agreed these values.

The standard deviation for proficiency assessment (σ_p) values are given in Table 8.

4.3. Individual z-Scores

Participants' z-scores were calculated as:

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

- where x = the participant's reported result,
 x_a = the assigned value
 and σ_p = the standard deviation for proficiency.

Participants' z-scores for all analytes are given in Tables 1-7 and shown as histograms in Figures 1-7. 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 8.

The number and percentage of z-scores in the range $-2 \leq z \leq 2$ and/or percentage satisfactory assessments are given in Table 9.

Participants' comments are given in Table 10.

5. INTERPRETATION OF SCORES

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 [7].

6. REFERENCES

- 1 Adobe Approved Trust List, <https://helpx.adobe.com/acrobat/kb/approved-trust-list2.html#Whatisit> accessed 01/06/2017.
- 2 GlobalSign PDF Signing Tool, <https://www.globalsign.com/en/pdf-signing/> accessed 01/06/2017.
- 3 ISO/IEC 17043:2010, Conformity assessment – General requirements for proficiency testing.
- 4 Fapas[®], 2017, Protocol for Proficiency Testing Schemes, Version 6, April 2017, Part 1 – Common Principles.
- 5 Fapas[®], 2017, Protocol for Proficiency Testing Schemes, Version 6, April 2017, Part 5 – Fapas[®] Water and Environmental scheme (LEAP).
- 6 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.
- 7 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 Total Coliforms

laboratory number	total coliforms		
	assigned value 8.60 SQRTcfu/100ml		
	result cfu/100ml	result SQRTcfu/100ml	z-score
002	92	9.59	0.7
003	31	5.57	-2.0
004	6	2.45	-4.1
006			
007	70	8.37	-0.2
009	29	5.39	-2.1
010	62	7.87	-0.5
012	78	8.83	0.2
013	60	7.75	-0.6
016	30	5.48	-2.1
021	37.12	6.09	-1.7
023	89	9.43	0.6
024	35	5.92	-1.8
026	86	9.27	0.4
027	80	8.94	0.2
030	138	11.75	2.1
032	81	9.00	0.3
035	85	9.22	0.4

z-scores outside $|z| > 2$ are shown in **bold**, see Section 5

Table 2: Results and z-Scores for Enumeration of *Escherichia coli*

laboratory number	<i>Escherichia coli</i>		
	assigned value 5.79 SQRTcfu/100ml		
	result cfu/100ml	result SQRTcfu/100ml	z-score
002	50	7.07	0.9
003	30	5.48	-0.2
004	5	2.24	-2.4
006	58	7.62	1.2
007	31	5.57	-0.1
009			
010	32	5.66	-0.1
012	45	6.71	0.6
013	31	5.57	-0.1
016	26	5.10	-0.5
021	29.3	5.41	-0.2
023	41	6.40	0.4
024	27	5.20	-0.4
026	47	6.86	0.7
027	46	6.78	0.7
030			
032	35	5.92	0.1
035	67	8.19	1.6

z-scores outside $|z| > 2$ are shown in **bold**, see Section 5

Table 3: Results and z-Scores for Colony Count after 3 days at 22°C

laboratory number	colony count, 3 days/22°C		
	assigned value 14.76 SQRTcfu/ml		
	result cfu/ml	result SQRTcfu/ml	z-score
001			
007	218	14.76	0.0
008			
009			
010	215	14.66	-0.1
011			
012	260	16.12	1.1
015	220	14.83	0.1
017	240	15.49	0.6
018			
019			
021			
024			
026	226	15.03	0.2
027	200	14.14	-0.5
028	197	14.04	-0.6
029	225	15.00	0.2
031	176	13.27	-1.2
032	198	14.07	-0.6
033	220	14.83	0.1
034			
035	117	10.82	-3.2

z-scores outside $|z| > 2$ are shown in **bold**, see Section 5

Table 4: Results and z-Scores for Colony Count after 2 days at 37°C

laboratory number	colony count, 2 days/37°C		
	assigned value 14.18 SQRTcfu/ml		
	result cfu/ml	result SQRTcfu/ml	z-score
001	148	12.17	-1.6
007	231	15.20	0.8
008	187	13.67	-0.4
009	190	13.78	-0.3
010	214	14.63	0.4
011	2.0E+2	14.14	0.0
012	221	14.87	0.6
015	240	15.49	1.1
017	190	13.78	-0.3
018	*	12.88	-1.0
019	202	14.21	0.0
021	126.95	11.27	-2.3
024	200	14.14	0.0
026	290	17.03	2.3
027	210	14.49	0.3
028	216	14.70	0.4
029	236	15.36	0.9
031	180	13.42	-0.6
032	201	14.18	0.0
033	200	14.14	0.0
034	203	14.25	0.1
035	149	12.21	-1.6

z-scores outside $|z| > 2$ are shown in **bold**, see Section 5

* samples analysed outside of the required time frame

Table 5: Results and z-Scores for Enumeration of Enterococci

laboratory number	enterococci		
	assigned value 11.05 SQRTcfu/100ml		
	result cfu/100ml	result SQRTcfu/100ml	z-score
003	117	10.82	-0.2
004	65	8.06	-2.4
005	1.10E+02	10.49	-0.4
006	119	10.91	-0.1
007	125	11.18	0.1
010	120	10.95	-0.1
012	135	11.62	0.5
014			
020	113	10.63	-0.3
021	130.0	11.40	0.3
022			
023	122	11.05	0.0
024	113	10.63	-0.3
025	140	11.83	0.6
026	135	11.62	0.5
032	148	12.17	0.9
035	122	11.05	0.0

z-scores outside $|z| > 2$ are shown in **bold**, see Section 5

Table 6: Results and z-Scores for Enumeration of *Pseudomonas aeruginosa*

laboratory number	<i>Pseudomonas aeruginosa</i>		
	assigned value 7.35 SQRTcfu/100ml		
	result cfu/100ml	result SQRTcfu/100ml	z-score
003	37	6.08	-0.8
004	44	6.63	-0.5
005	3.8E+01	6.16	-0.8
006			
007	57	7.55	0.1
010	61	7.81	0.3
012	63	7.94	0.4
014	65	8.06	0.5
020	52	7.21	-0.1
021	59.0	7.68	0.2
022	~ 57	7.55	0.1
023	13	3.61	-2.5
024	54	7.35	0.0
025	63	7.94	0.4
026	54	7.35	0.0
032	36	6.00	-0.9
035	45	6.71	-0.4

z-scores outside $|z| > 2$ are shown in **bold**, see Section 5

~ Analysed by Most Probable Number method (MPN)

Table 7: Results and z-Scores for Enumeration of *Clostridium perfringens*

laboratory number	<i>Clostridium perfringens</i>		
	assigned value 5.43 SQRTcfu/100ml		
	result cfu/100ml	result SQRTcfu/100ml	z-score
003	38	6.16	0.5
004			
005			
006			
007	27	5.20	-0.2
010	24	4.90	-0.4
012	38	6.16	0.5
014			
020	<1		
021	46.0	6.78	0.9
022			
023			
024			
025	32	5.66	0.2
026	22	4.69	-0.5
032			
035	13	3.61	-1.2

Table 8: Assigned Values and Standard Deviations for Proficiency

examination	data points, n	assigned value, x_a	units	uncertainty u	standard deviation for proficiency, σ_p
enumeration of total coliforms	16	8.60	SQRTcfu/100ml	0.313	1.5
enumeration of <i>Escherichia coli</i>	16	5.79	SQRTcfu/100ml	0.242	1.5
colony count after 3 days at 22°C	13	14.76	SQRTcfu/ml	0.256	1.25
colony count after 2 days at 37°C	21	14.18	SQRTcfu/ml	0.163	1.25
enumeration of enterococci	15	11.05	SQRTcfu/100ml	0.159	1.25
enumeration of <i>Pseudomonas aeruginosa</i>	16	7.35	SQRTcfu/100ml	0.218	1.5
enumeration of <i>Clostridium perfringens</i>	8	5.43	SQRTcfu/100ml	0.386	1.5

Table 9: Number and Percentage of z-Scores where $|z| \leq 2$ and Percentage Satisfactory Assessments

examination	number of scores where $ z \leq 2$	total number of scores	% $ z \leq 2$
enumeration of total coliforms	13	17	76
enumeration of <i>Escherichia coli</i>	15	16	94
colony count after 3 days at 22°C	12	13	92
colony count after 2 days at 37°C	20	22	91
enumeration of enterococci	14	15	93
enumeration of <i>Pseudomonas aeruginosa</i>	15	16	94
enumeration of <i>Clostridium perfringens</i>	8	8	100

Table 10: Participants' Comments

laboratory number	comments
002	Total coliforms: LES endo agar-green metallic sheen, E.coli: Chromogenic coliform agar-dark blue (Test Material A)
004	IDEXX Colilert-18 (Test Material A)
004	IDEXX Enterolert-DW, IDEXX Pseudalert (Test Material C)
015	Sample received 2 days late due to delay in custom clearance. (Test Material B)
017	Test Method: ISO 6222 / IS 5402 (Test Material B)
022	Results are MPNGU as per MFLP-61B (Test Material C)
027	The result can be with Three forms: $210=2,1.10^2 = 2E^2$ & $200=2E^2=2.10^2$ (Test Material B)
035	Presumptive TC = 60, Presumptive EC= 25. 3 out of 10 TC colonies came out as TC, being 7 colonies EC. TC = $18+42+25 = 85$, EC = $42+25= 67$ (Test Material A)
035	All presumptive <i>Pseudomonas aeruginosa</i> came out as confirmed (100%) (Test Material C)

comments are as submitted by participants

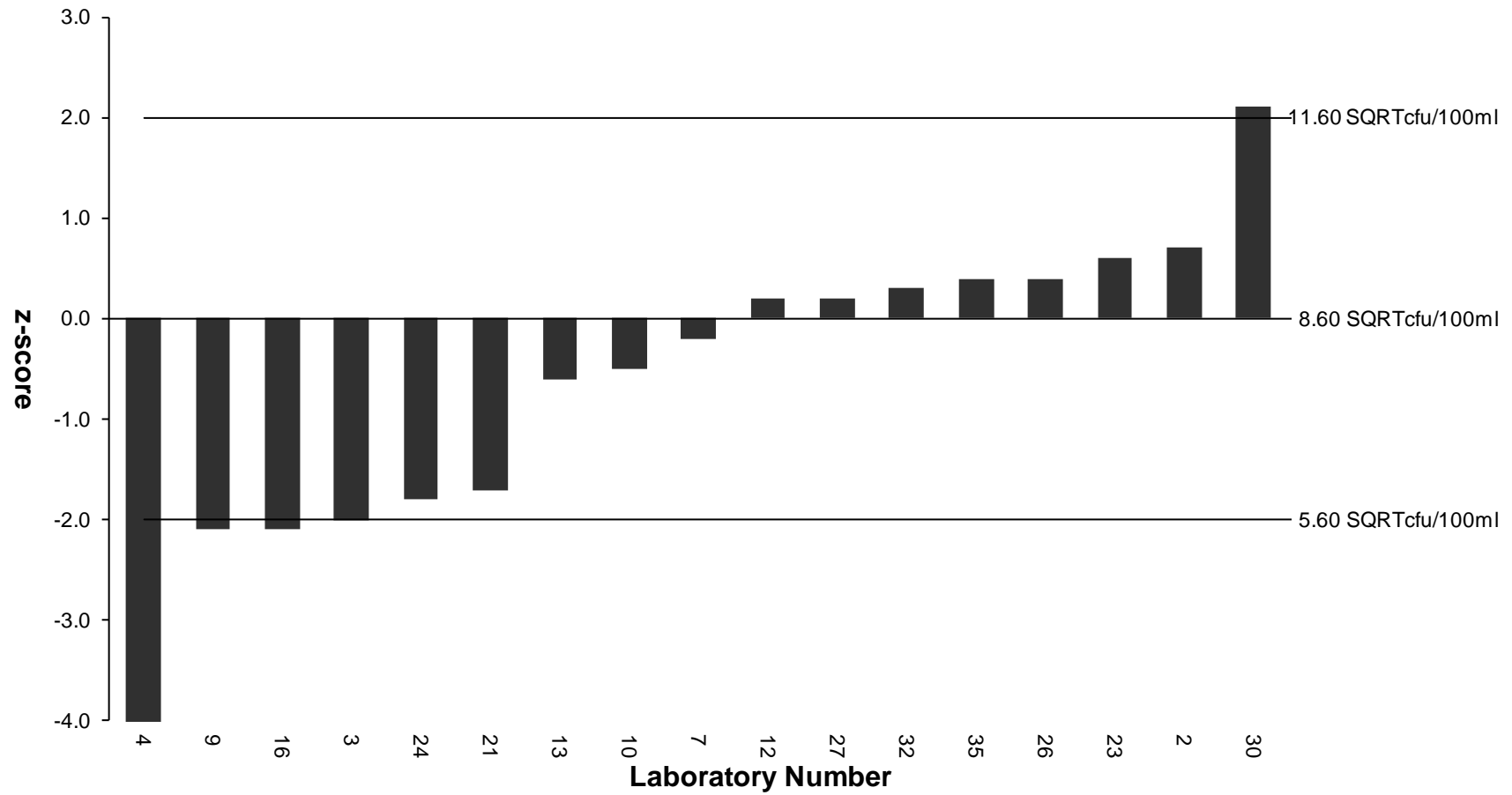


Figure 1: z-Scores for Enumeration of Total Coliforms

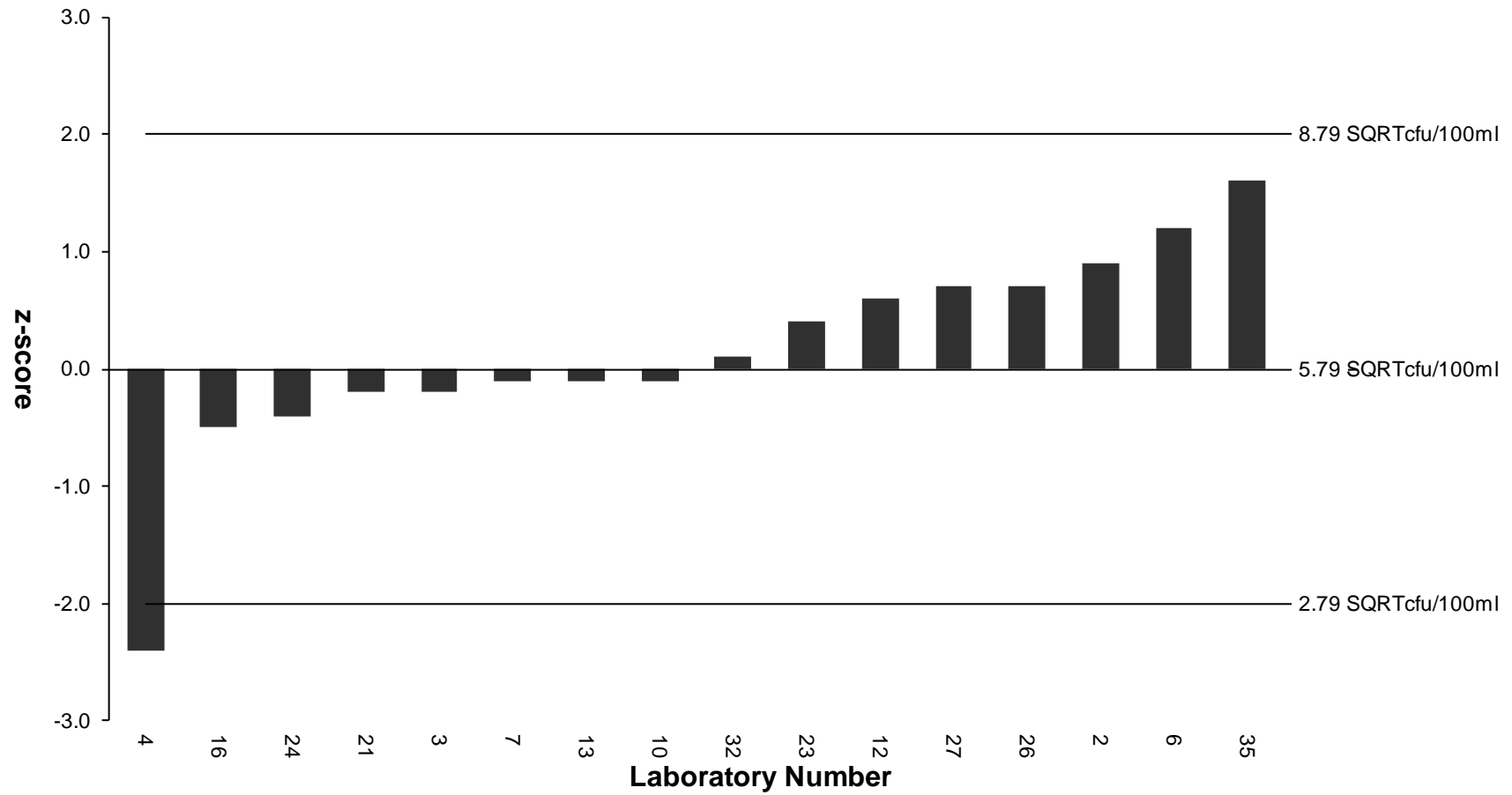


Figure 2: z-Scores for Enumeration of *Escherichia coli*

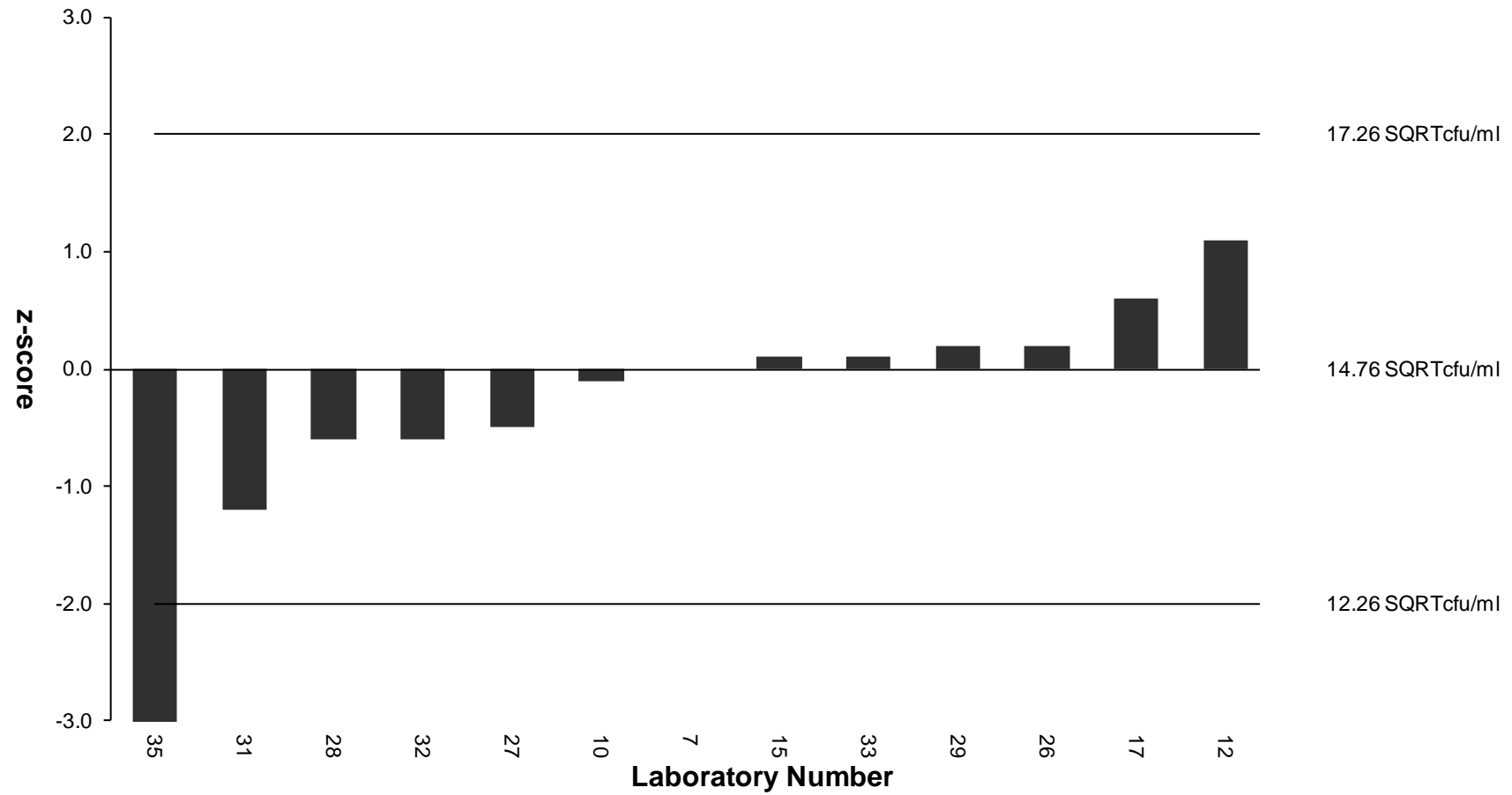


Figure 3: z-Scores for Colony Count after 3 days at 22°C

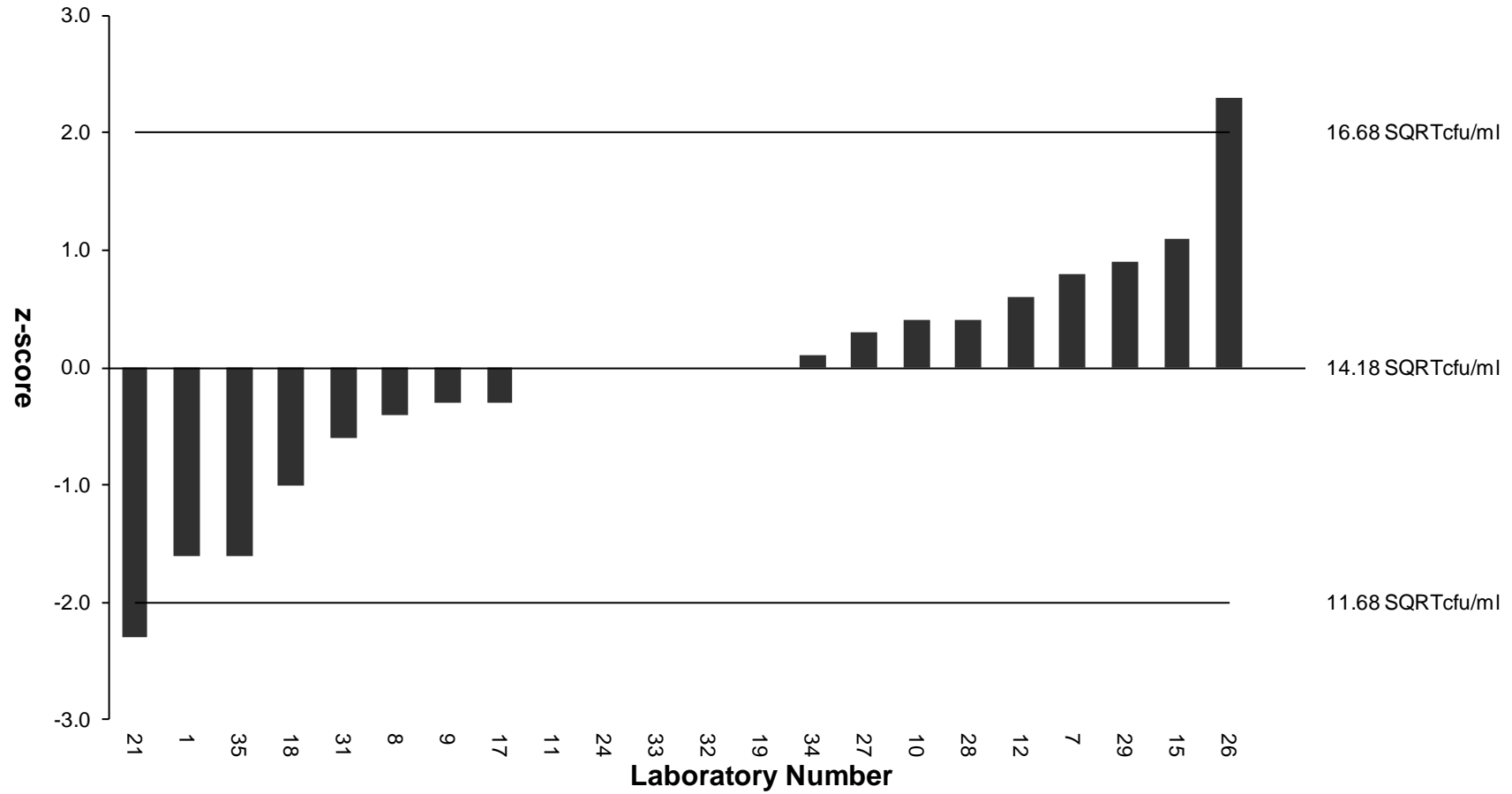


Figure 4: z-Scores for Colony Count after 2 days at 37°C

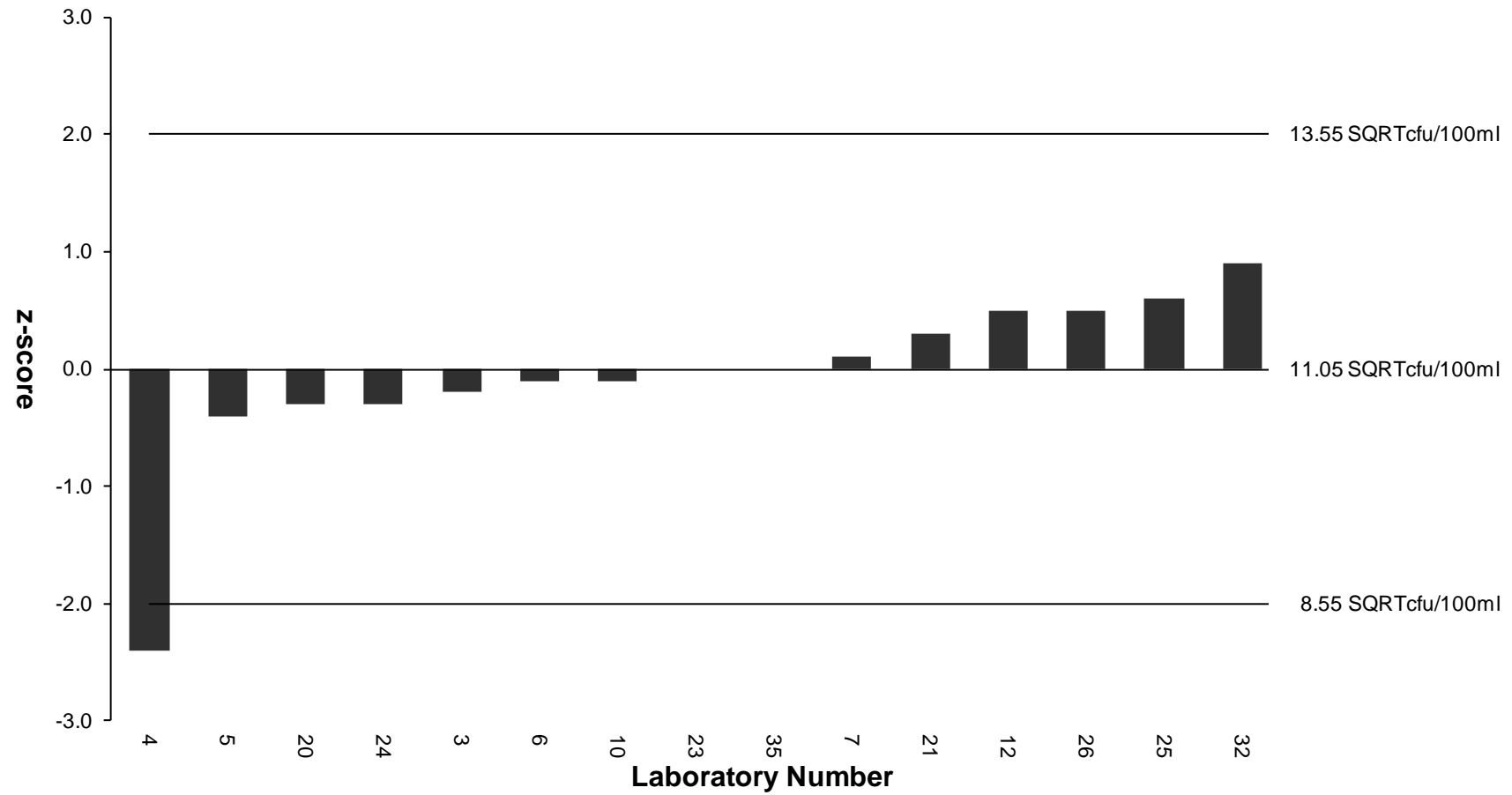


Figure 5: z-Scores for Enumeration of Enterococci

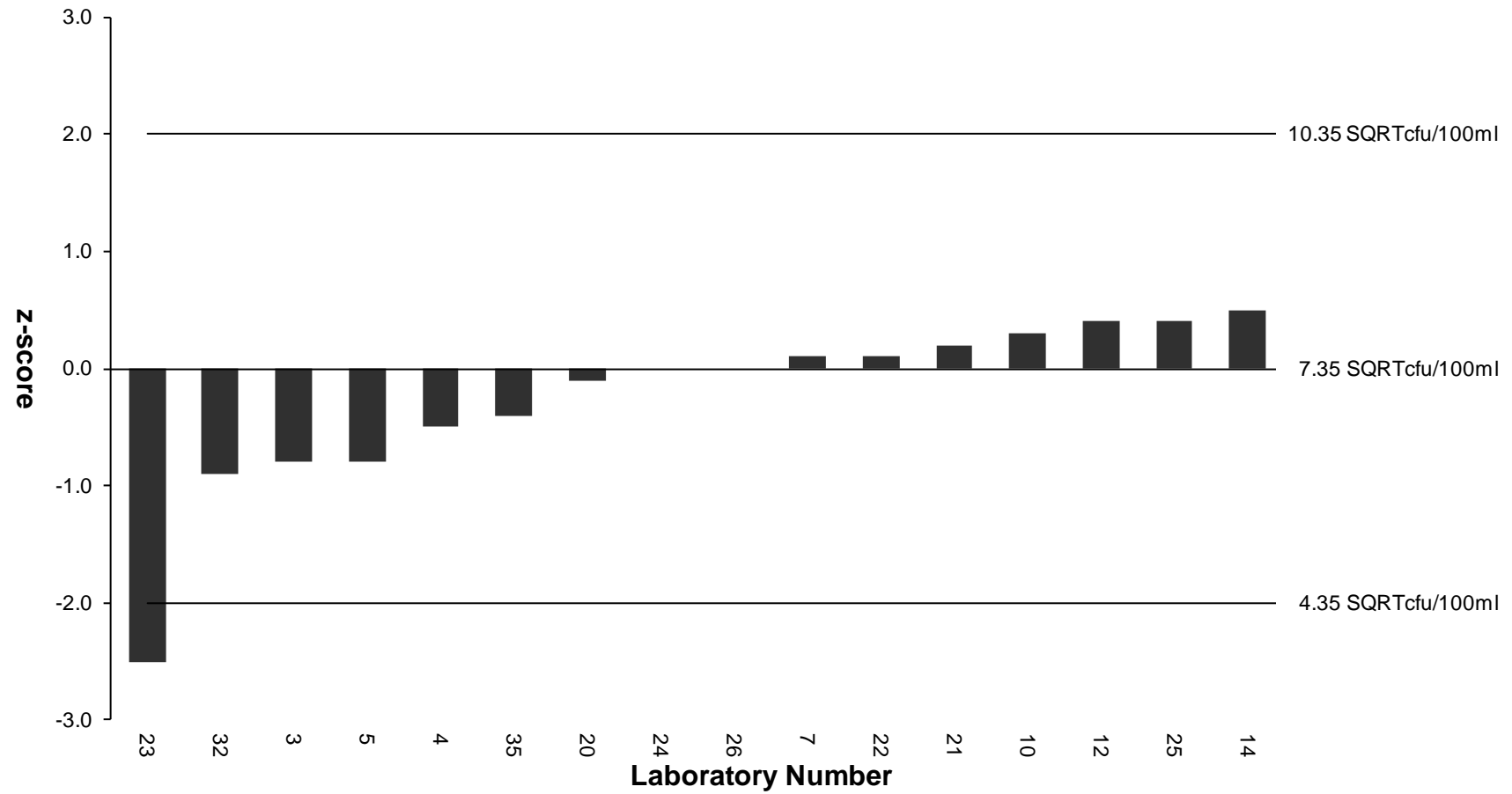


Figure 6: z-Scores for Enumeration of *Pseudomonas aeruginosa*

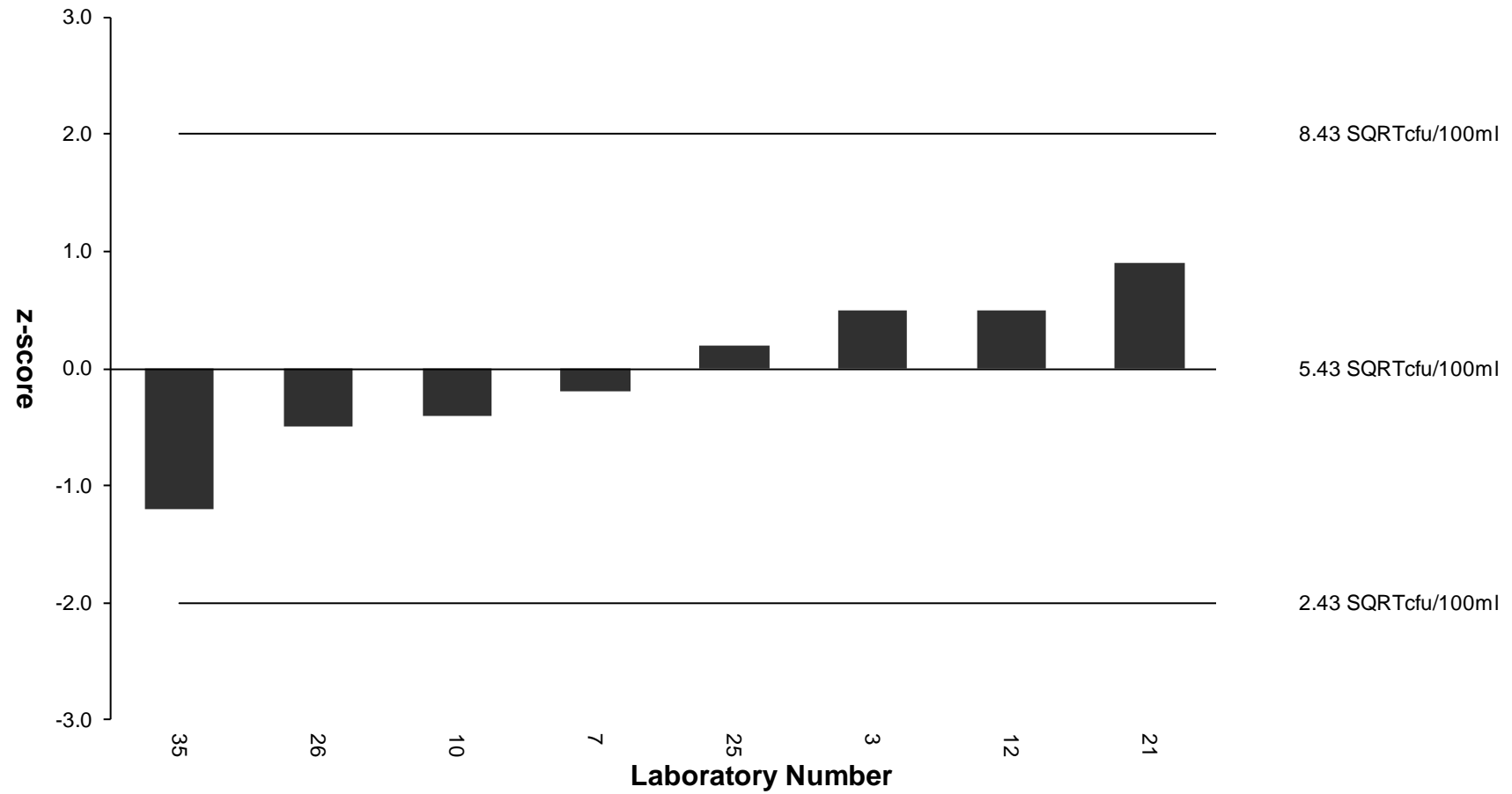


Figure 7: z-Scores for Enumeration of *Clostridium perfringens*

APPENDIX I: Analytical 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.

Total Coliforms

Accredited Method Used	laboratory number
yes	003 007 010 012 016 021 023 024 026 027 030 032 035
no	013

National or International Standard (ISO)	laboratory number
ISO 9308-1:2014 (membrane filtration)	003 013 016 026 027
ISO 9308-2:2012 (MPN - most probable number)	007
SCA MoDW (2009) - Part 4	010 012 035
APHA	024
environmental Agency	023
Korean Food Standards Codex	030
Standard Methods for the examination of water and wastewater 22nd edn	021

If the method is not an ISO Standard, state a reference for the method.	laboratory number
9221	021
APHA 9222H	024
Environmental Agency 2009, Part 4	023
Korean Food Standards Codex	030
The Microbiology of Drinking Water (2009) part 4	012

Method	laboratory number
membrane filtration	003 010 013 016 023 024 026 027 030 035
Colilert-18	007 012
multiple tube (MPN - most probable number)	021

Media	laboratory number
Colilert-18	007 012
Membrane Lactose Glucoronide Agar (MLGA)	010
Membrane Lauryl Sulphate Broth (MLSB)	023 035
Chromogenic Coliform Agar (CCA)	003 013 027
Lactose TTC Agar	026
Endo Agar	016
Lauryal Tryptose Broth	021
Methylene Blue Agar	030
Millipore MCOLIBLUE	024

Incubation Time (hours) / Incubation Temperature (°C)	laboratory number
4/30 then 14/37	010 013 023 026 035
18/37	012
22hrs / 37C	007
24(Hours)/ 35 (°C)	030
24/37	016 027
24hours/35°C	024
36/21	003
48/35	021

Confirmation of the identity of the colonies grown	laboratory number
yes	003 010 013 016 021 023 024 026 035
no	007 012 027 030

Number of colonies used for confirmation	laboratory number
1	021
2	024
5	003 013
10	010 023 026 035
30	016
Confirmed result	012

Confirmation Tests	laboratory number
Oxidase	010 013 016 023 026 035
Indole	003 010 035
Lactose fermentation	003 010 016 023 026 035
API	021 024

Confirmation (Selective Media)	laboratory number
Tryptone Nutrient Agar	013
Brilliant Green Bile Broth (BGBB)	021 024
Lactose Peptone Water	010 026
confirmed result	012
lactose peptone water and tryptone water	035
tryptone soya agar	016

Escherichia coli

Accredited Method Used	laboratory number
yes	003 006 007 010 012 016 021 023 024 026 027 032 035
no	013

National or International Standard (ISO)	laboratory number
ISO 9308-1:2014 (membrane filtration)	003 013 016 026 027
ISO 9308-2:2012 (MPN - most probable number)	007
SCA MoDW (2009) - Part 4	006 010 012 035
APHA	024
environmental Agency	023
Standard Methods for the examination of water and wastewater 22nd edn	021

If the method is not an ISO Standard, state a reference for the method.	laboratory number
9221 F	021
APHA 9222H	024
Environmental Agency 2009,Part 4	023
The Microbiology of Drinking Water (2009) part 4	012

Method	laboratory number
membrane filtration	003 006 010 013 016 023 024 026 027 035
Colilert-18	007 012
multiple tube (MPN - most probable number)	021

Media	laboratory number
Colilert-18	007 012
Membrane Lactose Glucoronide Agar (MLGA)	006 010
Membrane Lauryl Sulphate Broth (MLSB)	023 035
Chromogenic Coliform Agar (CCA)	003 013 027
Lactose TTC Agar	026
Endo Agar	016
Lauryal Tryptose Broth	021
Millipore MCOLIBLUE	024

Incubation Time (hours) / Incubation Temperature (°C)	laboratory number
4/30 then 14/37	010 013 023 026
4/30 then 14/44	006 035
18/37	012
22hrs / 37C	007
24/37	027
24/44	016
24/44.5	021
24hours/35°c	024
36/21	003

confirmation the identity of the colonies grown	laboratory number
yes	003 010 013 016 021 023 024 026 035
no	006 007 012 027

Number of colonies used for confirmation	laboratory number
1	021
2	024
5	003 013
9	026
10	010 023 035
30	016
Confirmed result	012
Not required	006

Confirmation Tests	laboratory number
Oxidase	010 013 016 023 026 035
Indole	003 010 016 023 026 035
Lactose fermentation	003 010 016 023 035
API	021 024

Confirmation (Selective Media)	laboratory number
Tryptone Nutrient Agar	013
Brilliant Green Bile Broth (BGBB)	021 024 026
Lactose Peptone Water	010
confirmed result	012
lactose peptone water and tryptone water	035
Not required	006
tryptophan broth	016

Colony Counts (22°C/3 days)

Accredited Method Used	laboratory number
yes	007 010 012 017 026 027 032 033 035
no	015 028

Which National or International Standard (ISO)	laboratory number
ISO 8199:2005	028
ISO 6222:1999	017 026 027
SCA MoDW (2012) - Part 7	007 010 012 035
IS: 5402:2012	033
Standard Method for Examination of Water and Wastewater	015

If the method is not an ISO Standard, state a reference for the method.	laboratory number
APHA/AWWA-SM 9215C	015
BIS	033
The Microbiology of Drinking Water (2012)- Part 7- Methods for the enumeration of heterotrophic bacteria.	012

Method	laboratory number
multiple tube (MPN - most probable number)	026
Spread plate	015
Pour plate	007 010 012 017 028 033 035

Media	laboratory number
Plate Count Agar (PCA)	017 028 033
Yeast Extract Agar (YEA)	007 010 012 026 027 035
R2A Agar	015

Colony Counts (37°C/2 days)

Accredited Method Used	laboratory number
yes	007 008 010 011 012 015 017 018 019 024 026 027 032 033 035
no	021 028 034

National or International Standard (ISO)	laboratory number
ISO 8199:2005	028
ISO 6222:1999	015 017 026 027 034
SCA MoDW (2012) - Part 7	007 010 012 035
APHA 9215D	024
APHA, 2005	011
IS: 5402:2012	033
MUK 4.2.1018-01	019
Not ISO	008
Standard Methods for the examination of water and wastewater 22nd edn	021

If the method is not an ISO Standard, state a reference for the method.	laboratory number
9230A,B	021
APHA, 9215B	011
BIS	033
SM, 9215 AB	008
The Microbiology of Drinking Water (2012)- Part 7- Methods for the enumeration of heterotrophic bacteria.	012

Method	laboratory number
multiple tube (MPN - most probable number)	026
Spread plate	021
Pour plate	007 008 010 011 012 017 019 028 033 034 035
Membrane Filtration	015
Membrane Filtration Method	024

Media	laboratory number
Plate Count Agar (PCA)	008 011 017 021 028 033
Yeast Extract Agar (YEA)	007 010 012 015 026 027 034 035
m-TGE with indicator	024
Nutrient Agar for cultivation of microorganisms dry (GRM-Agar)	019

Enterococci

Accredited Method Used	laboratory number
yes	003 005 006 007 010 012 023 025 026 032
no	021 024 035

National or International Standard (ISO)	laboratory number
ISO 7899-2:2000	003 005 023 025 026
SCA MoDW (2012) - Part 5	006 007 010 012 035
APHA 9230C	024
Standard Methods for the examination of water and wastewater 22nd edn	021

If the method is not an ISO Standard, state a reference for the method.	laboratory number
9230	021
APHA 9230C, 22nd edition	024
The Microbiology of Drinking Water (2012)- Part 5-Methods for the isolation and enumeration of Enterococci by membrane filtration.	012

Method	laboratory number
membrane filtration	003 005 006 007 010 012 023 024 025 026 035
multiple tube (MPN - most probable number)	021

Media	laboratory number
KF Streptococcus Agar	024
Slanetz and Bartley Agar	003 005 006 007 010 012 023 025 026 035
Azide dextrose	021

Incubation Time (hours) / Incubation Temperature (°C)	laboratory number
24/41	005
44/37	003 006 023
48/37	007 010 012 025 026 035
48 hours/35C	024
48/35	021

Confirmation of the identity of the colonies grown	laboratory number
yes	003 005 006 007 010 012 021 023 024 025 026
no	035

Number of colonies used for confirmation	laboratory number
100%	021
2	024
5	003
10	007 010 012
14	025 026
119	006
all	023
MEMBRANE PUT FOR 2 HOURS ON BILE ASCULIN AZIDE	005

Confirmation Tests	laboratory number
Aesculin hydrolysis by sub-culture	005 007 012
Aesculin hydrolysis by membrane transfer	006 023 026
Catalase reaction	010 024
Bile tolerance	010
Salt tolerance	024
Bile-aesculin-azide	025
MALDI	003
pfizer selective enterococcus agar,Brain heart infusion broth	021

Pseudomonas aeruginosa

Accredited Method Used	laboratory number
yes	003 005 007 010 021 022 024 025 026 032 035
no	012 023

National or International Standard (ISO)	laboratory number
ISO 16266:2006	003 005 025 026
SCA MoDW (2010) - Part 8	007 010 035
APHA 9213E	024
MFLP-61B	022
Standard Methods for the examination of water and wastewater 22nd edn	021
The Microbiology of Drinking Water (2002)- part 8-Methods for the isolation and enumeration of Aeromonas and Pseudomonas aeruginosa by membrane filtration.	012

If the method is not an ISO Standard, state a reference for the method.	laboratory number
9213F	021
APHA 9213E; 22nd edition	024
Health Canada Compendium of Analytical Methods	022
HPA Standard method 2007 w6 issue 3	023
Pr EN 12780	026
The Microbiology of Drinking Water (2002)- part 8-Methods for the isolation and enumeration of Aeromonas and Pseudomonas aeruginosa by membrane filtration.	012

Method	laboratory number
membrane filtration	003 005 007 010 012 022 023 024 025 026 035
multiple tube (MPN - most probable number)	021

Media	laboratory number
Pseudomonas Agar with CFC supplement	005
Pseudomonas Agar with CN supplement	003 007 010 012 022 023 025 026 035
Asparagine broth	021
Millipore Pseudomonas Selective Broth	024

Incubation Time (hours) / Incubation Temperature (°C)	laboratory number
20/30	005
48/37	003 007 010 012 023 025 026 035
48/35	022
48/36	021
72hours/30C	024

Confirmation of the identity of the colonies grown	laboratory number
yes	003 005 007 010 012 021 022 023 024 025 026 035

Number of colonies used for confirmation	laboratory number
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1	022
100%	021
2	024
5	003
10	007 010 012 025 026 035
all	023

Tests used to confirm identity	laboratory number
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Oxidase	005 007 010 024 025 026 035
Casein hydrolysis	007 012 035
API 20 NE	024
Acetamide, API-VITEK	021
MALDI	003
milk Agar	023
Vitek - GN card	022

Clostridium perfringens

Accredited Method Used	laboratory number
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yes	003 007 012 025 026
no	010 021 035

National or International Standard (ISO)	laboratory number
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ISO 6461-1:1986 (MPN)	026
ISO 6461-2:1986 (membrane filtration)	003
ISO 14189:2013 (membrane filtration)	025
SCA MoDW (2010) - Part 6	007 010 012 035

If the method is not an ISO Standard, state a reference for the method.	laboratory number
membrane filtration	021
The Microbiology of Drinking Water (2010). Methods for the examination of waters and associated materials. Part 6 Methods for the isolation and enumeration of sulphite reducing clostridia and Clostridium perfringens by membrane filtration.	012

Method	laboratory number
anaerobic jar	007 010 035
membrane filtration	003 012 021 025 026

Media	laboratory number
Tryptose Sulphite Cycloserine Agar (TSC) with egg	026
Tryptose Sulphite Cycloserine Agar (TSC) without egg	007 012 025 035
PERFRINGENS AGAR BASE	003
perfringens Agar base	021

Incubation Time (hours) / Incubation Temperature (°C)	laboratory number
21/37	003 026
21/44	007 010 012 025 035
24/35	021

Confirmation of the identity of the colonies grown	laboratory number
yes	003 007 010 012 021 025 026
no	035

Number of colonies used for confirmation **laboratory number**

100%	021
5	003
10	007 010 012 025
12	026

Tests used to confirm identity **laboratory number**

Lactose fermentation	010
Gelatin liquifaction	025
acid phosphatase reaction	007 012 026
MALDI	003
Vitek 2 system	021

Method used for acid phosphatase test **laboratory number**

by dropping reagent on the colonies	007
by smearing colony on pre-soaked filter paper	012 025
membrane transfer	026

APPENDIX II: 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, in Acrobat PDF format, of proficiency tests in which they have participated.

2. PROTOCOL

The Protocols [4, 5] set out how Fapas[®] – Water and Environmental is organised. Copies can be downloaded from our website.

3. CONTACT DETAILS

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

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