



# Summary of Results

## External Quality Assessment of Water Microbiology Drinking Water Scheme

Distribution Number: W206

Sample Numbers: W206A, W206B

Distribution Date:	<b>January 2023</b>
Results Due:	<b>10 February 2023</b>
Report Date:	<b>21 February 2023</b>
Samples prepared and quality control tested by:	<b>Divya George Nafeesa Hussain Cansev Katar Margaret Njenga Zak Prior Jake Videlefsky</b>
Data analysed by:	<b>Joanna Donn Nita Patel</b>
Report compiled by:	<b>Joanna Donn Nita Patel</b>
Authorised by:	<b>Nita Patel</b>

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For further information on the scheme please refer to:

**Scheme Guide:** <https://www.gov.uk/government/publications/food-and-water-proficiency-testing-schemes-scheme-guide>

**Guide to Scoring and Statistics:**

<https://www.gov.uk/government/publications/food-and-water-proficiency-testing-schemes-scoring-systems-and-statistics>

**General guidance for z-scores:**

Participants' enumeration results are converted into z-scores using the following formula:

$$Z = \frac{(X_i - X_{pt})}{\sigma_{pt}}$$

$X_i$  = participants' result expressed (expressed as a log<sub>10</sub> value)  
 $X_{pt}$  = assigned value (participants' consensus median (expressed as a log<sub>10</sub> value))  
 $\sigma_{pt}$  = the fixed standard deviation for the examination (calculated by FEPTU)

The  $\sigma_{pt}$ -value expresses the acceptable difference between the individual participant's result and the participants' consensus median. The  $\sigma_{pt}$ -value used for calculating z-scores for all parameters in the Drinking Water Scheme is 0.35. A guide to interpreting z-scores follows, although laboratories must interpret their scores in the context of their own laboratory situation.

z = -1.99 to +1.99                    **satisfactory**  
z = -2 to -2.99 or +2 to +2.99      **questionable**  
z = < -3.00 or > + 3.00              **unsatisfactory**

It is usually recommended that z-scores exceeding +/-2 are investigated to establish the possible cause. As a general rule, UKHSA recommends that all questionable and unsatisfactory results are investigated.

**FEPTU Quality Control:** To demonstrate homogeneity of the sample, a minimum of 10 LENTICULE® discs, selected randomly from a batch, are tested in duplicate for parameters requiring enumeration.

To demonstrate stability of the sample, a minimum of six LENTICULE discs, selected randomly from a batch, are examined throughout the distribution period for enumeration parameters.

UKHSA uses methods stipulated in the Environmental Agency Standing Committee of Analysts series of documents: Microbiology of Water and Associated Materials (2017) - Practices and Procedures for Laboratories. However for *Escherichia coli* and coliform examinations, ISO 9308-1:2014 Water quality - Enumeration of *Escherichia coli* and coliform bacteria Part 1: Membrane filtration method for waters with low bacterial background flora is followed.

The FEPTU results are used for guidance in the preliminary intended results notification, letters are posted on the website immediately after every distribution; electronic notification of their availability is sent to all participants.

Refer to section 17.0 of the Scheme Guide if you have experienced difficulties with any of the examinations.

<https://www.gov.uk/government/publications/food-and-water-proficiency-testing-schemes-scheme-guide>

Participants are reminded that reporting an incorrect or false negative results could have serious public health implications.

**Results, as summarised in the performance assessment sheet included in this report, provide a more effective indication of on-going problems with the enumeration of low levels of indicator organisms in drinking water samples. Performance assessment cannot be undertaken as effectively if laboratories do not participate in all distributions for the Drinking Water Scheme.**

Please contact FEPTU staff for advice and information:

<b>Repeat samples</b>	Carmen Gomes or Kermin Daruwalla	<b>Tel:</b> +44 (0)20 8327 7119
<b>Data Analysis</b>	Nita Patel	<b>Fax:</b>
<b>Microbiological advice</b>	Nita Patel or Zak Prior	<b>Email:</b> foodeqa@ukhsa.gov.uk
<b>General comments and complaints</b>	Nita Patel or Zak Prior	<a href="#">FEPTU's website</a>
<b>Scheme consultants</b>	Stephen Bullock	
<b>Scheme Co-ordinator</b>	Nita Patel	

**Accreditation:** UKHSA Water EQA Scheme for Drinking Water is accredited by the United Kingdom Accreditation Service (UKAS) to ISO/IEC 17043:2010.



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## Sample: W206A

**Contents:** *Citrobacter freundii* (14) (NCTC 9750), *Pseudomonas aeruginosa* (34) (wild strain), *Clostridium perfringens* (40) (wild strain), *Staphylococcus saprophyticus* (29 per mL) (wild strain) - all levels are per 100mL unless otherwise stated

### Expected Results:

All counts are expressed as colony forming units (cfu) per 100mL except the colony counts at 37°C/48h and 22°C/72h which are cfu per mL.

Parameter	Coliform bacteria	E.coli	Enterococci	P.aeruginosa	C.perfringens	Colony count 37°C/48h	Colony count 22°C/72h
FEPTU median	15	0	0	32	41	28	29
No. results returned	94	96	87	77	66	89	86
Assigned value (Participants median all results)	18	0	0	34	54	25	27
Uncertainty of assigned value*	0.07	N/A	N/A	0.04	0.02	0.02	0.02
Participants Algorithm A mean (all results)	18	0	0	33	52	25	26
Expected Range	1 - 57	N/A	N/A	11 - 106	17 - 171	8 - 79	8 - 84
Standard deviation** (log <sub>10</sub> )	0.49	N/A	N/A	0.24	0.11	0.14	0.12
No of outlying counts	16	N/A	N/A	10	5	5	5
False positives	N/A	0	5	N/A	N/A	N/A	N/A
False negatives	8	N/A	N/A	6	0	0	0
Your result							
Score for performance assessment							
Z-score							
Analyst 2 Result							
Analyst 2 Z-score							
Analyst 3 Result							
Analyst 3 Z-score							

\*  $U(X_{pt})$  is based on results transformed to a log<sub>10</sub> scale

\*\* Robust  $S^*$  based on median absolute deviation about the participants' median ( $MAD_e$ ) and is based on logged data

Total sent samples	103
Not examined	2
Non returns	2
Late returns	0

## Sample: W206B

**Contents:** *Enterobacter cloacae* (12) (wild strain), *Escherichia coli* (19) (wild strain), *Enterococcus faecalis* (53) (wild strain),  
*Pseudomonas aeruginosa* (22) (wild strain), *Clostridium perfringens* (20) (wild strain), *Microbacterium* sp. (56 per mL) (wild strain) - all levels are per 100mL unless otherwise stated

### Expected Results:

All counts are expressed as colony forming units (cfu) per 100mL except the colony counts at 37°C/48h and 22°C/72h which are cfu per mL.

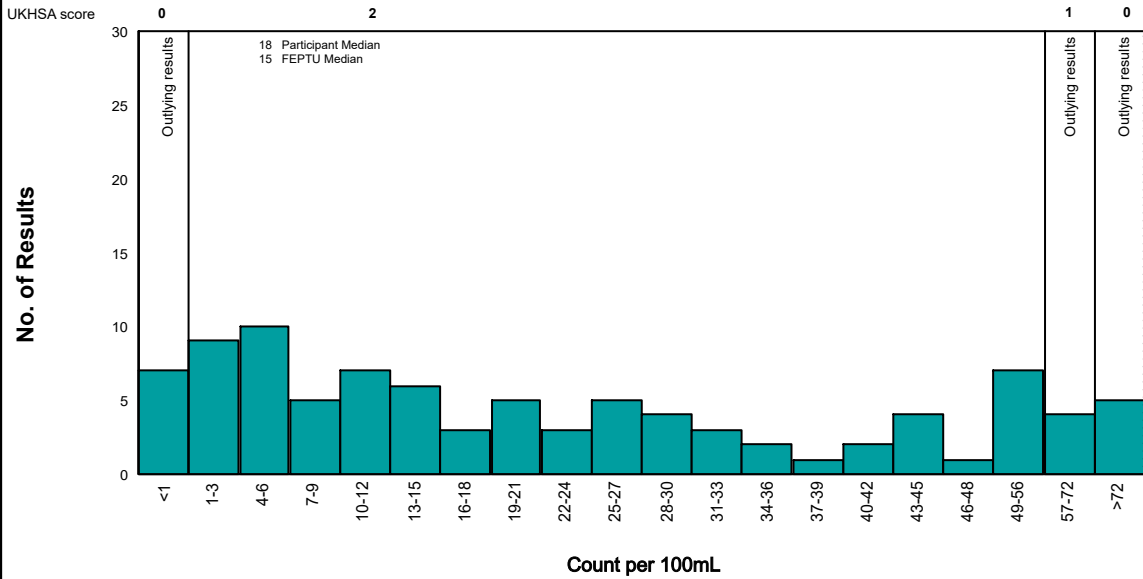
Parameter	Coliform bacteria	E.coli	Enterococci	P.aeruginosa	C.perfringens	Colony count 37°C/48h	Colony count 22°C/72h
FEPTU median	31	19	50	23	20	2	56
No. results returned	93	96	87	77	66	87	86
Assigned value (Participants median all results)	43	31	61	24	27	2	71
Uncertainty of assigned value*	0.03	0.03	0.01	0.03	0.03	0.04	0.02
Participants Algorithm A mean (all results)	41	30	61	22	27	2	70
Expected Range	14 - 136	10 - 96	19 - 193	8 - 76	9 - 85	0 - 6	22 - 225
Standard deviation** (log <sub>10</sub> )	0.21	0.23	0.1	0.23	0.16	0.25	0.12
No of outlying counts	3	3	2	8	5	3	4
False positives	N/A	N/A	N/A	N/A	N/A	N/A	N/A
False negatives	0	0	1	2	1	0	0
Your result							
Score for performance assessment							
Z-score							
Analyst 2 Result							
Analyst 2 Z-score							
Analyst 3 Result							
Analyst 3 Z-score							

\*  $U(X_{pt})$  is based on results transformed to a log<sub>10</sub> scale

\*\* Robust  $S^*$  based on median absolute deviation about the participants' median ( $MAD_e$ ) and is based on logged data

Total sent samples	103
Not examined	3
Non returns	2
Late returns	0

**W206A: Coliform bacteria**



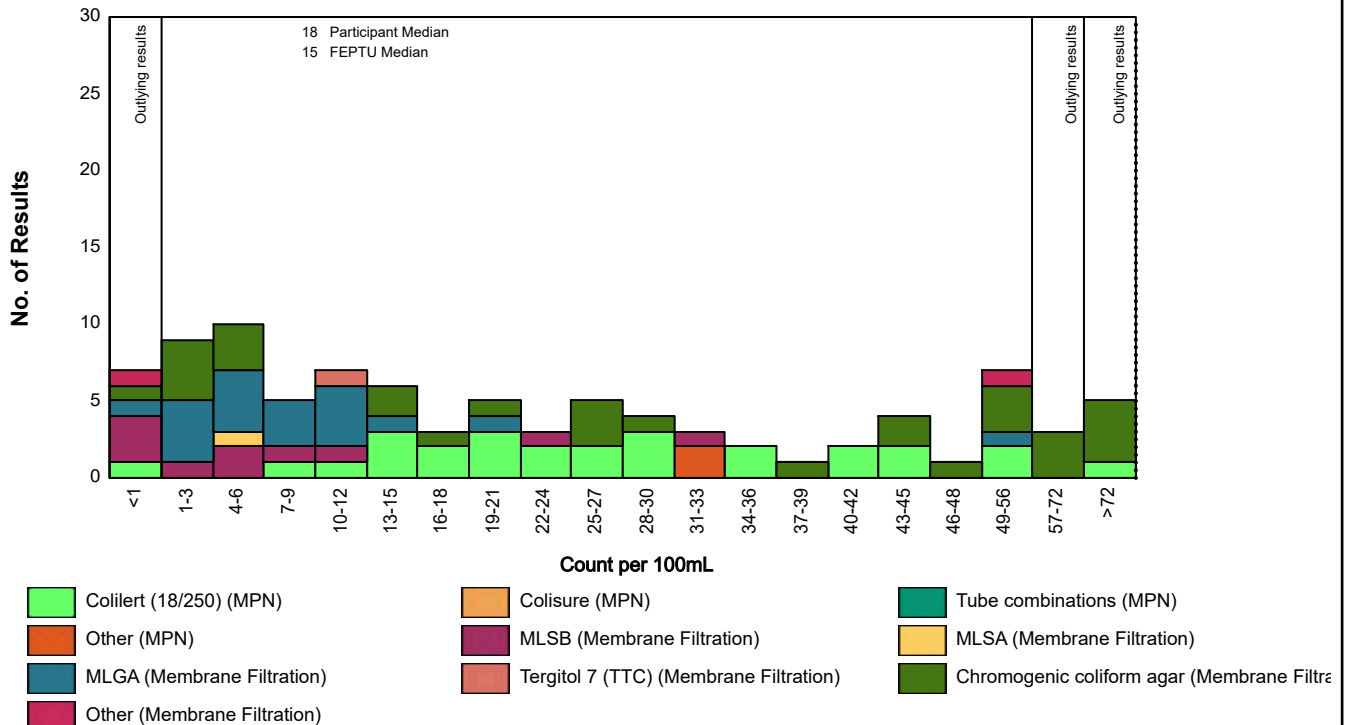
**Method based presentation**

W206A : Coliform bacteria

FEPTU Method: Chromogenic coliform agar

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Colilert (18/250)	27	0	29	25	0.24	0 - 84
Colisure	0	0	0			
Tube combinations	0	0	0			
Other (MPN)	2	0	2			
MLSB	10	0	10	5	0.31	0 - 32
MLSA	1	0	1			
MLGA	19	0	20	7	0.30	0 - 50
Tergitol 7 (TTC)	1	0	1			
Chromogenic coliform agar	30	1	32	29	0.53	0 - 194
Other (Membrane filtration)	2	0	2			

**W206A: Coliform bacteria**



W206A: *Escherichia coli*

No data for graph

### Method based presentation

W206A : *Escherichia coli*

FEPTU Method: Chromogenic coliform  
agar

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Colilert (18/250)	20	6	25	0	0.00	0 - 0
Colisure	0	0	0			
Tube combinations	0	0	0			
Other (MPN)	2	0	2			
TBX	0	0	0			
MLGA	14	5	18	0	0.00	0 - 0
MLSB	10	0	12	0	0.00	0 - 0
MLSA	1	0	1			
Tergitol 7 (TTC)	1	0	1			
Chromogenic coliform agar	28	6	36	0	0.00	0 - 0
Other (Membrane filtration)	1	0	1			

W206A: *Escherichia coli*

No data for graph

**W206A: Enterococci**

No data for graph

**Method based presentation**

W206A : Enterococci

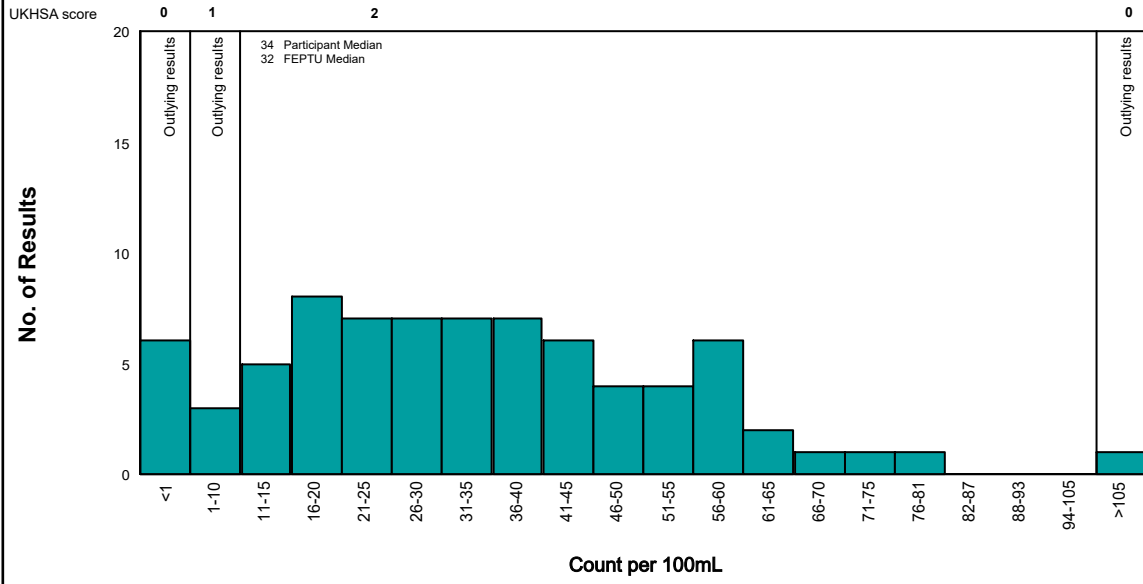
FEPTU Method: S+B

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Enterolert (E/DW/250)	4	3	5			
Other (MPN)	0	0	0			
Enterococcus agar	6	1	8			
Other (Membrane filtration)	5	1	7			
S+B	54	12	78	0	0.00	0 - 1200

**W206A: Enterococci**

No data for graph

**W206A: *Pseudomonas aeruginosa***



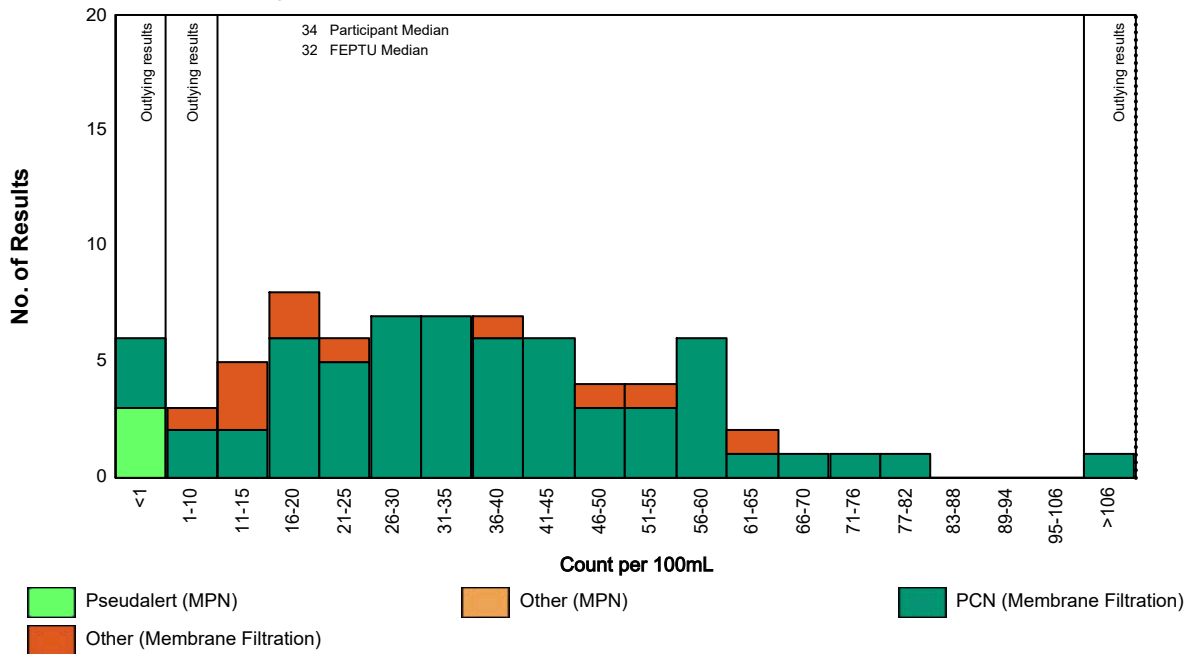
**Method based presentation**

W206A : *Pseudomonas aeruginosa*

FEPTU Method: PCN

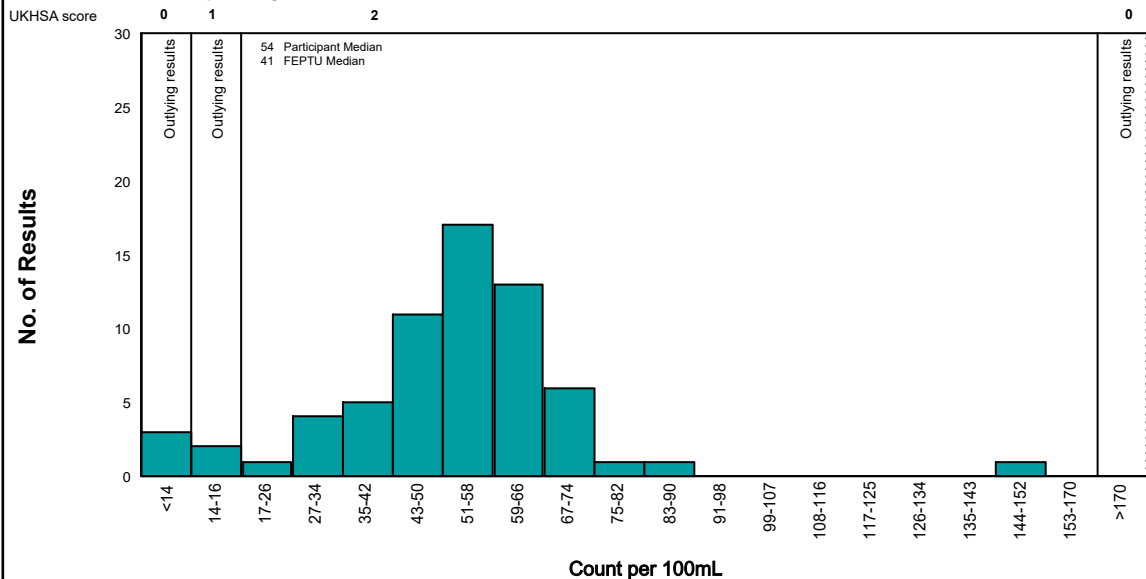
Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Pseudalert	1	2	1			
Other (MPN)	0	0	0			
PCN	61	1	83	35	0.22	0 - 120
Other (Membrane filtration)	11	0	15	20	0.34	3 - 62

**W206A: *Pseudomonas aeruginosa***





**W206A: Clostridium perfringens**



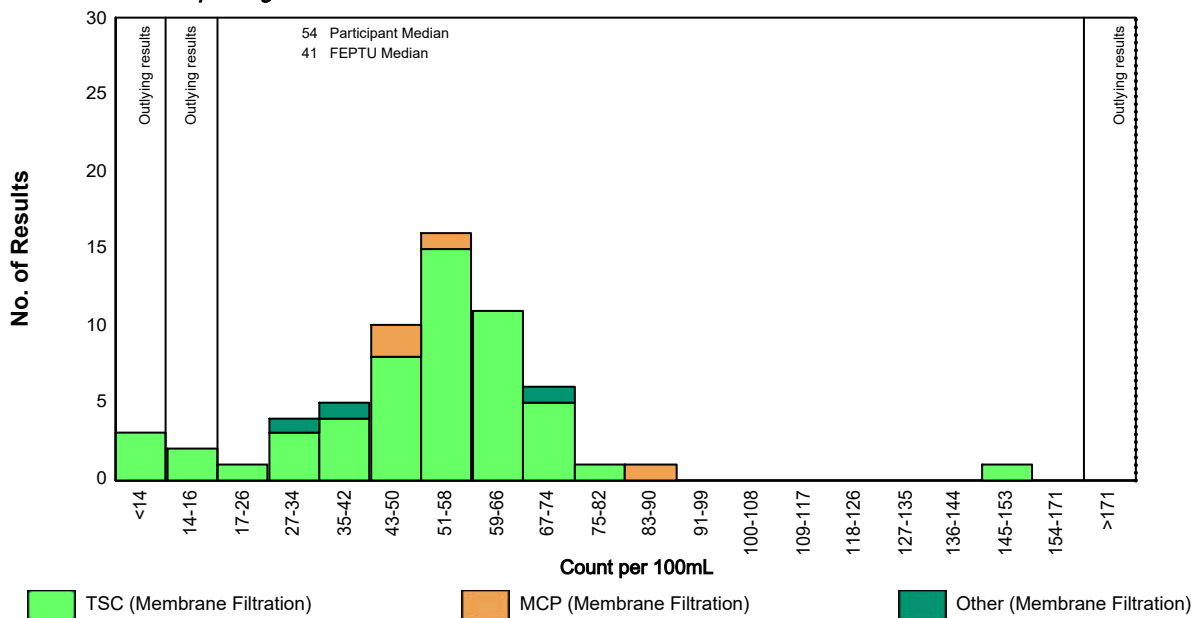
**Method based presentation**

W206A : Clostridium perfringens

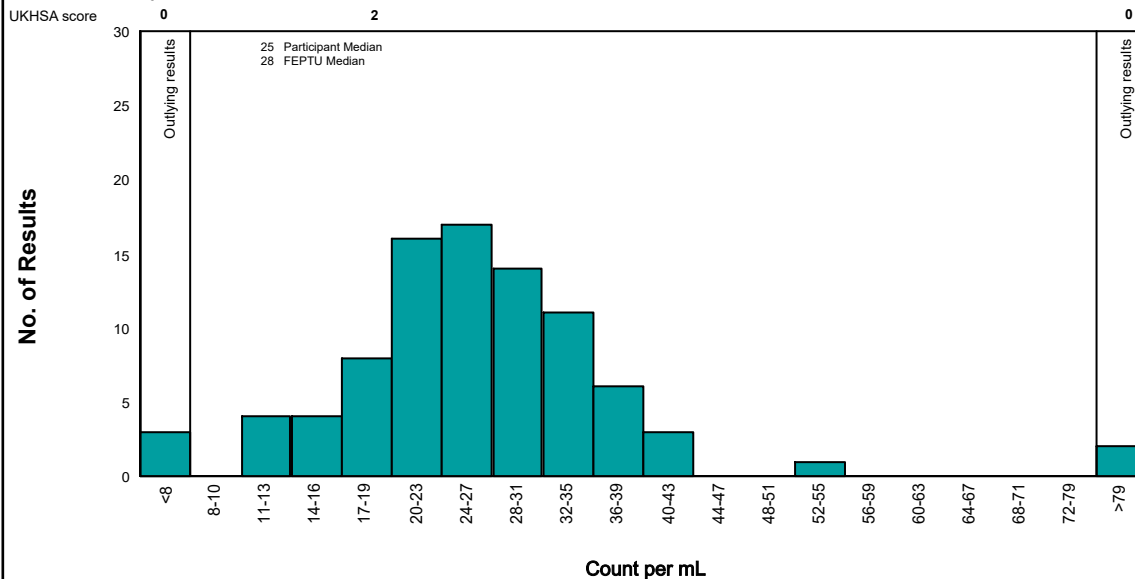
FEPTU Method: TSC

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
TSC	54	1	88	54	0.11	6 - 150
MCP	4	0	6			
Other (Membrane filtration)	3	0	4			

**W206A: Clostridium perfringens**



**W206A: Colony Count 37°C/48 h**



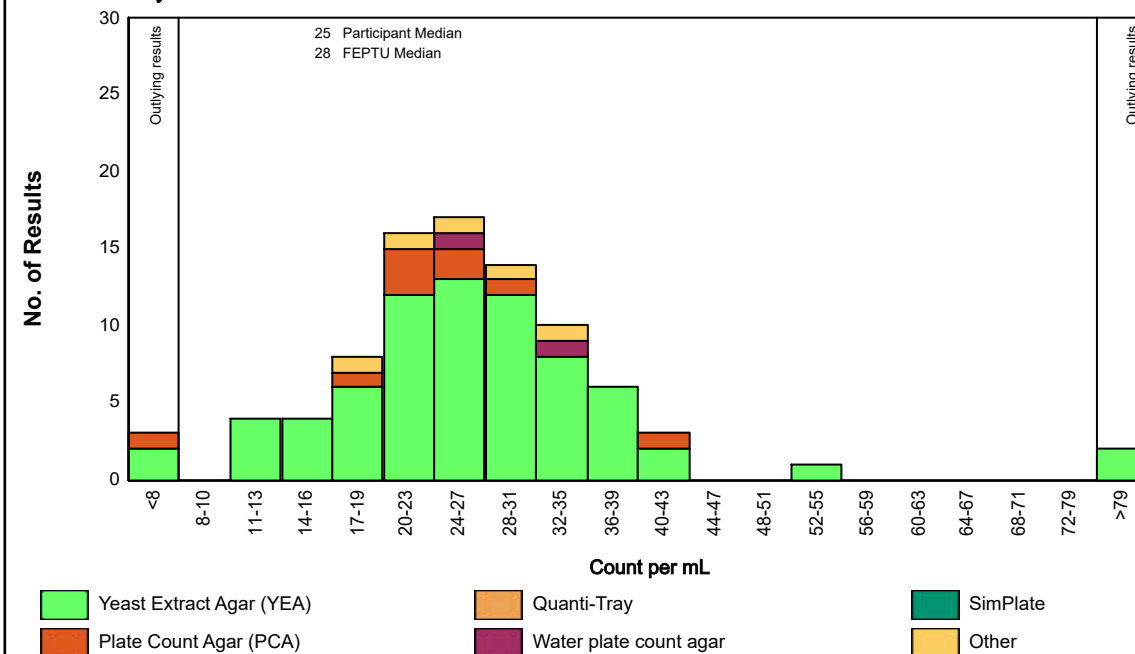
**Method based presentation**

W206A : Colony Count 37°C/48 h

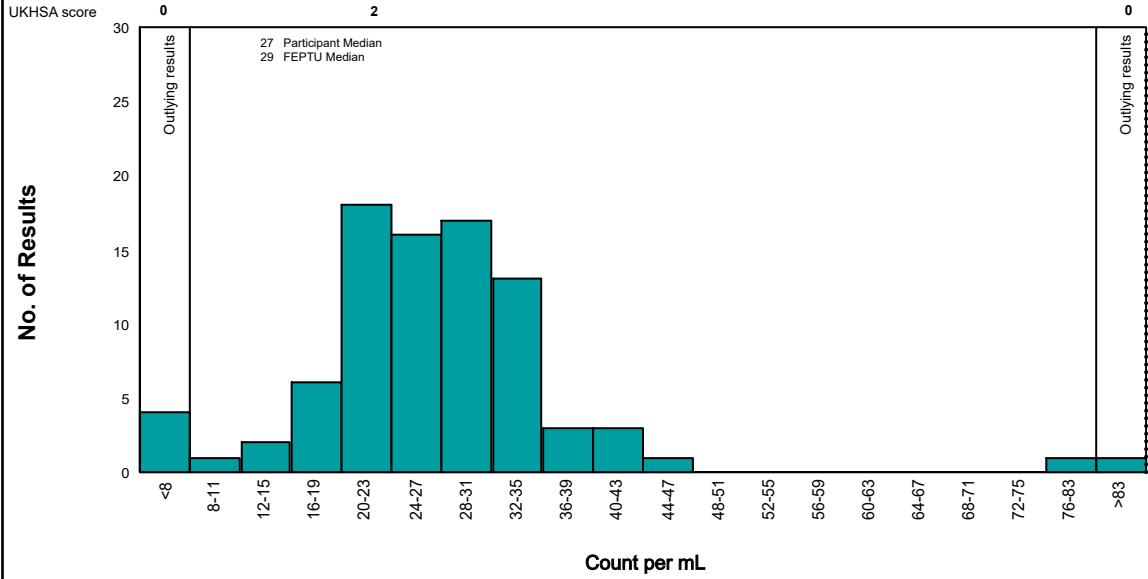
FEPTU Method: Yeast Extract Agar (YEA)

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Yeast Extract Agar (YEA)	72	0	81	26	0.15	2 - 92
Quanti-Tray	0	0	0			
SimPlate	0	0	0			
Plate Count Agar (PCA)	9	0	10			
Water plate count agar	2	0	2			
Other	5	0	5			

**W206A: Colony Count 37°C/48 h**



**W206A: Colony Count 22°C/72 h**



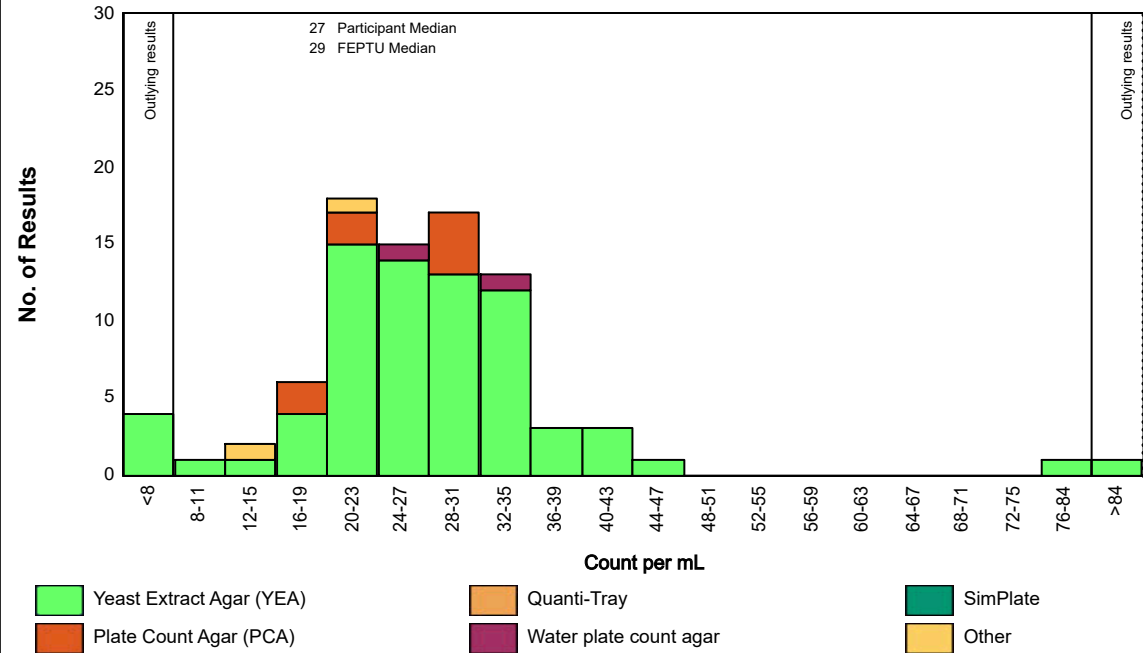
**Method based presentation**

W206A : Colony Count 22°C/72 h

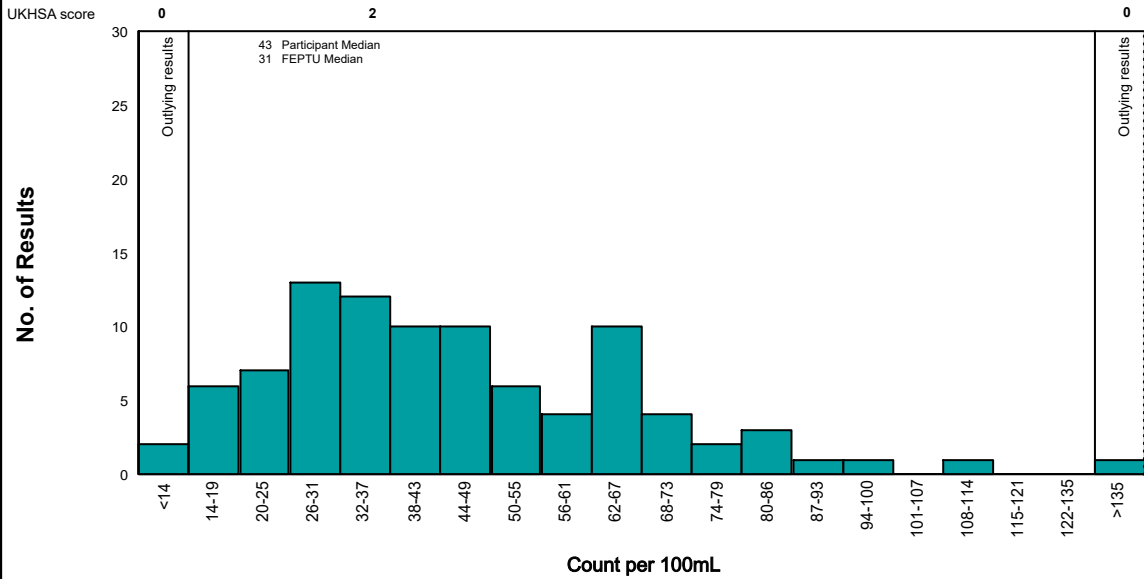
FEPTU Method: Yeast Extract Agar (YEA)

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Yeast Extract Agar (YEA)	73	1	85	27	0.13	1 - 93
Quanti-Tray	0	0	0			
SimPlate	0	0	0			
Plate Count Agar (PCA)	8	0	9			
Water plate count agar	2	0	2			
Other	2	0	2			

**W206A: Colony Count 22°C/72 h**



**W206B: Coliform bacteria**



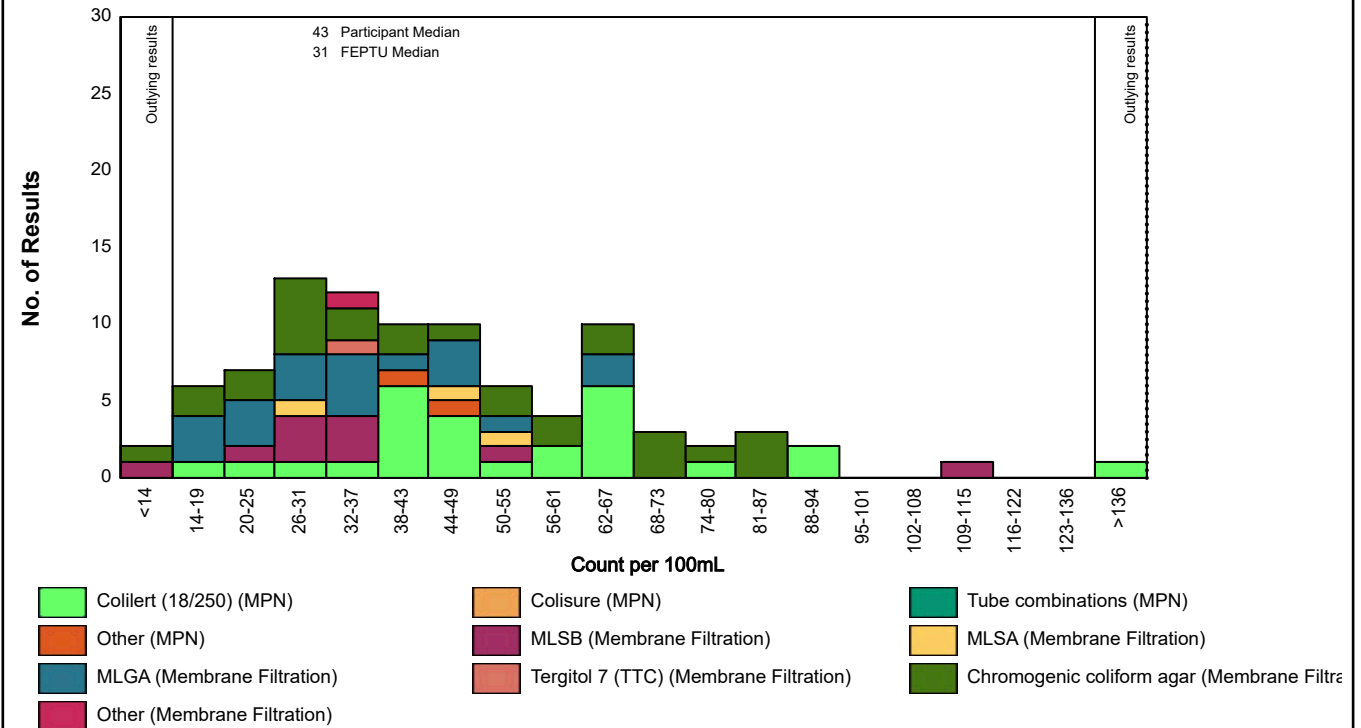
**Method based presentation**

W206B : Coliform bacteria

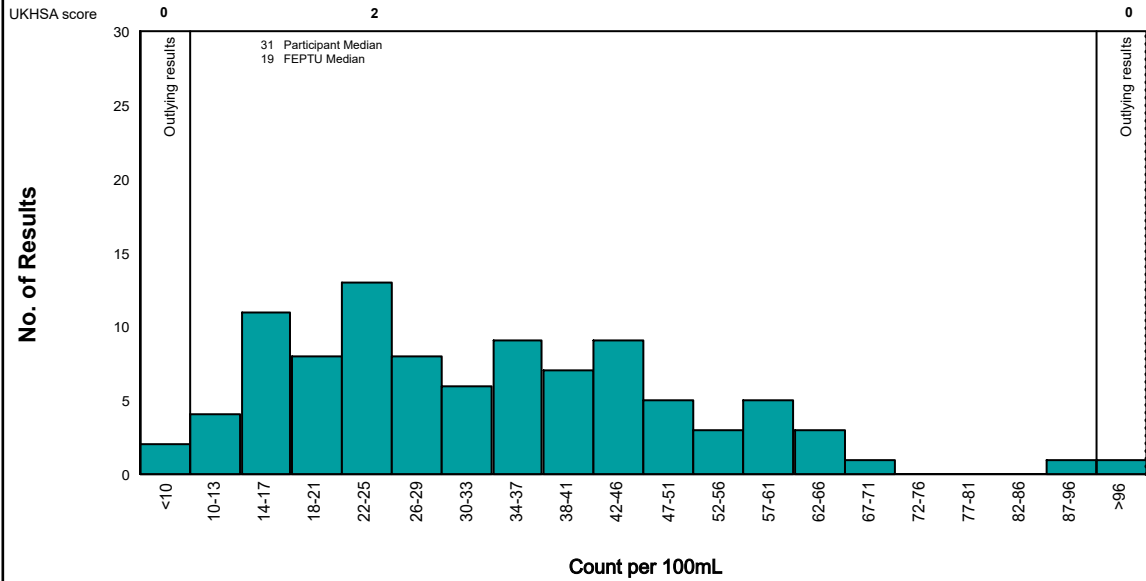
FEPTU Method: Chromogenic coliform agar

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Colilert (18/250)	27	0	29	47	0.14	15 - 201
Colisure	0	0	0			
Tube combinations	0	0	0			
Other (MPN)	2	0	2			
MLSB	10	0	10	33	0.14	13 - 112
MLSA	3	0	3			
MLGA	20	0	21	34	0.21	15 - 66
Tergitol 7 (TTC)	1	0	1			
Chromogenic coliform agar	28	0	30	44	0.25	13 - 84
Other (Membrane filtration)	1	0	1			

**W206B: Coliform bacteria**



**W206B: *Escherichia coli***



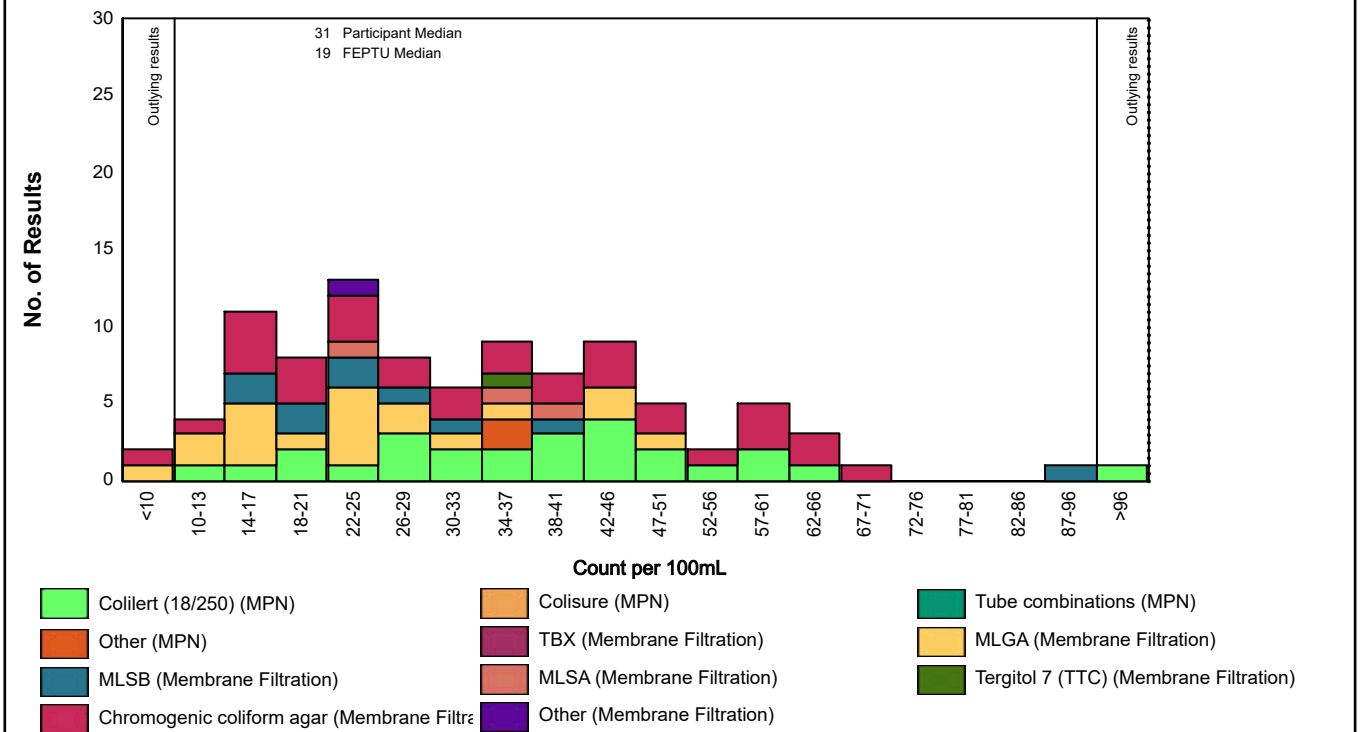
**Method based presentation**

W206B : *Escherichia coli*

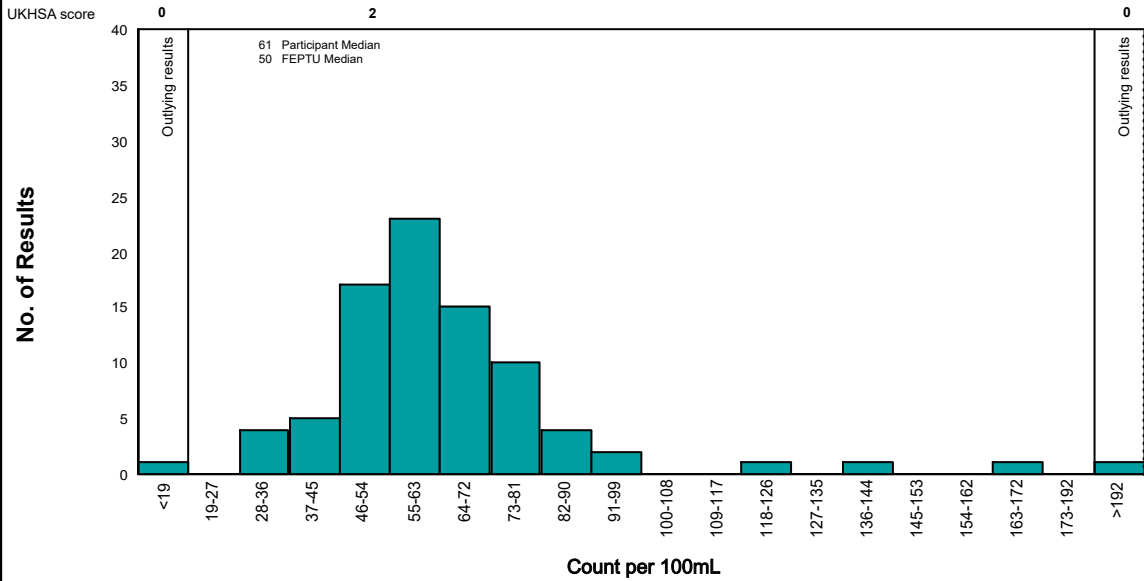
FEPTU Method: Chromogenic coliform agar

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Colilert (18/250)	26	0	27	38	0.19	12 - 182
Colisure	0	0	0			
Tube combinations	0	0	0			
Other (MPN)	2	0	2			
TBX	0	0	0			
MLGA	20	0	21	22	0.24	9 - 49
MLSB	10	0	10	23	0.16	16 - 95
MLSA	3	0	3			
Tergitol 7 (TTC)	1	0	1			
Chromogenic coliform agar	32	0	33	34	0.26	5 - 71
Other (Membrane filtration)	1	0	1			

**W206B: *Escherichia coli***



**W206B: Enterococci**



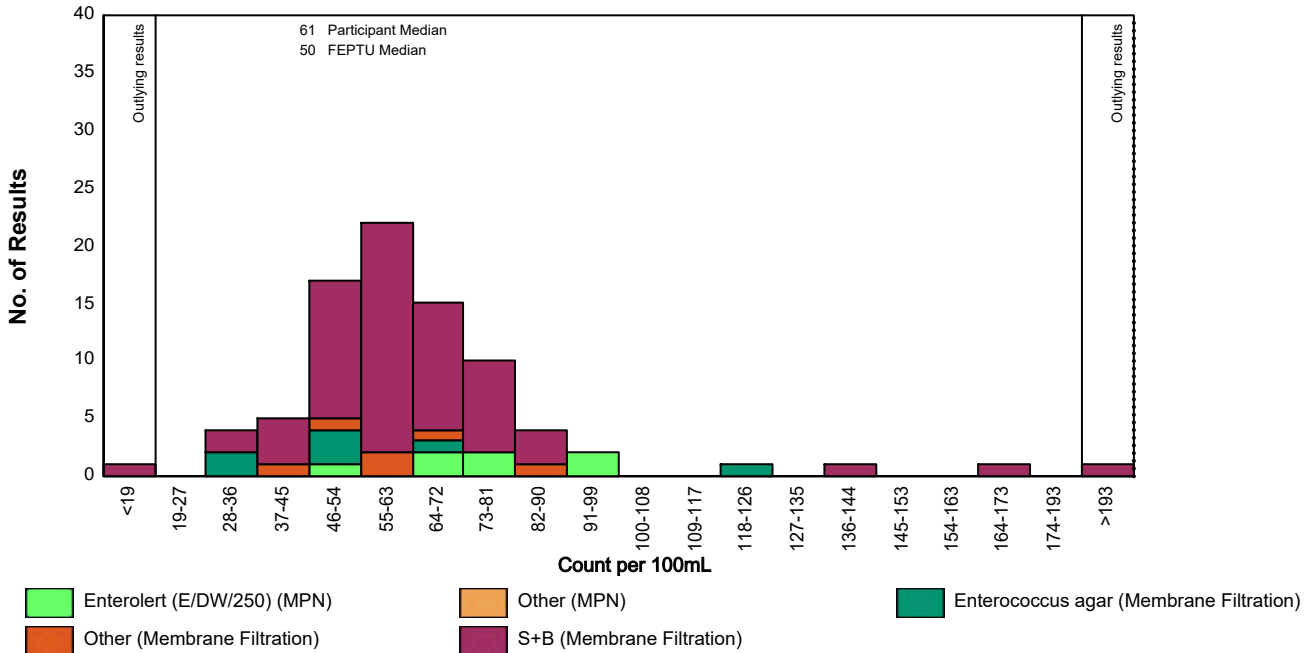
**Method based presentation**

W206B : Enterococci

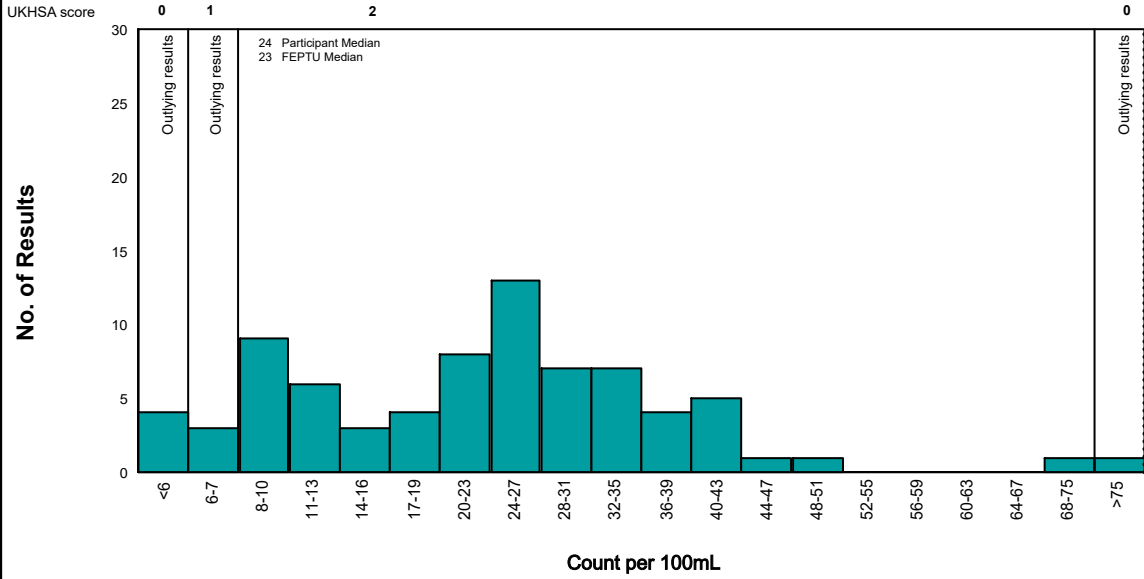
FEPTU Method: S+B

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Enterolert (E/DW/250)	7	0	8			
Other (MPN)	0	0	0			
Enterococcus agar	7	0	8			
Other (Membrane filtration)	6	0	7			
S+B	63	3	75	61	0.09	29 - 272

**W206B: Enterococci**



**W206B: *Pseudomonas aeruginosa***



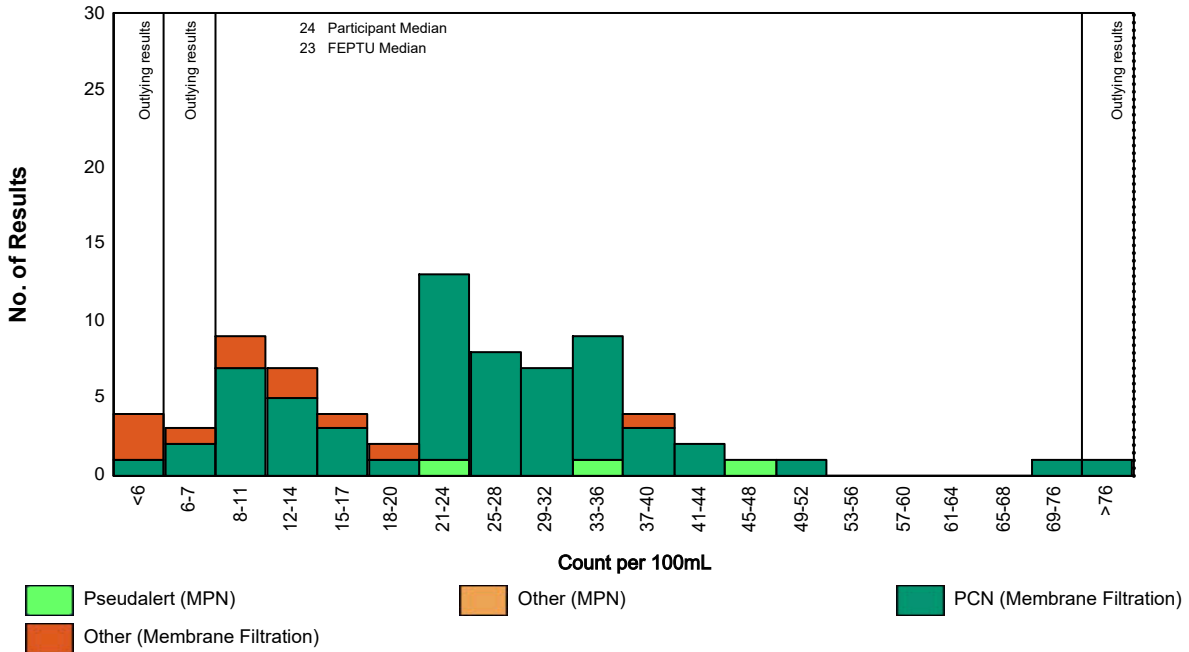
**Method based presentation**

W206B : *Pseudomonas aeruginosa*

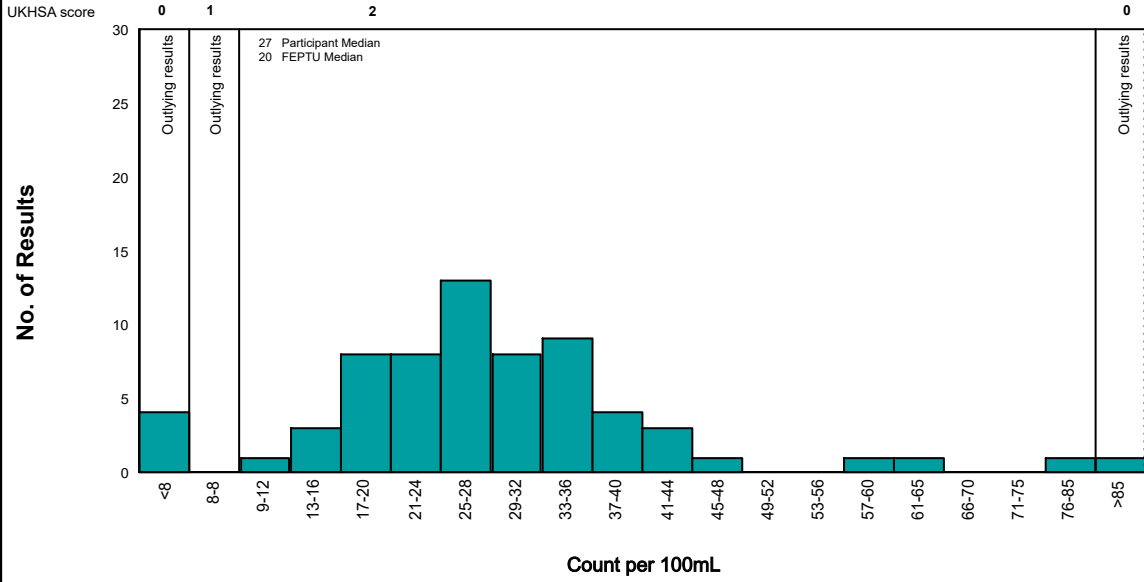
FEPTU Method: PCN

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Pseudalert	3	0	3			
Other (MPN)	0	0	0			
PCN	62	0	81	25	0.22	4 - 80
Other (Membrane filtration)	11	0	14	9	0.26	0 - 38

**W206B: *Pseudomonas aeruginosa***



**W206B: Clostridium perfringens**



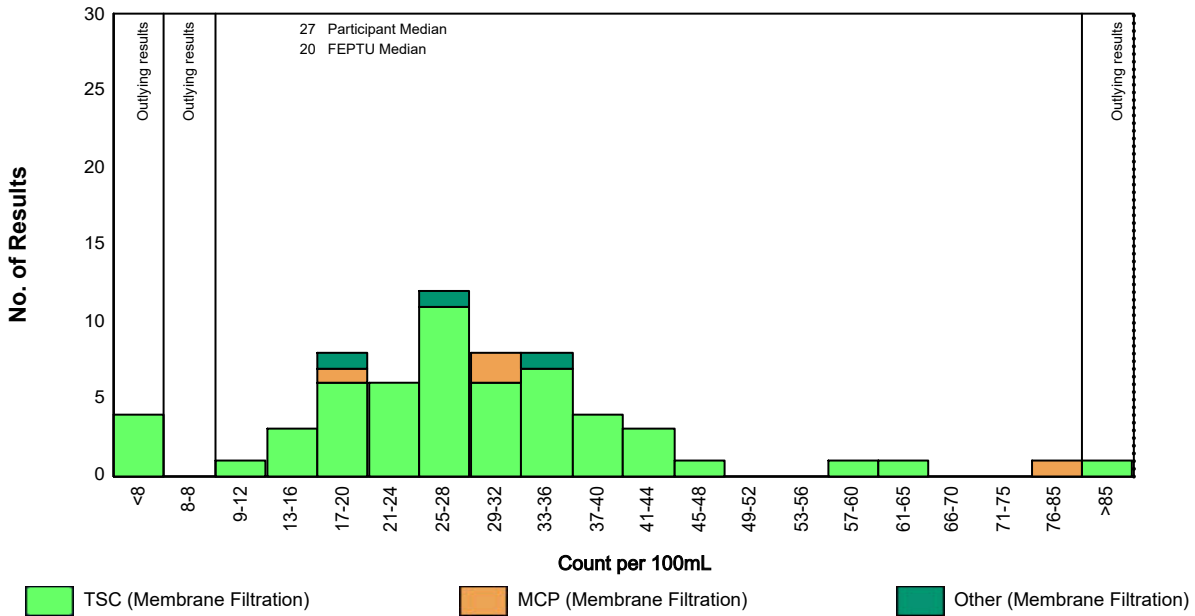
**Method based presentation**

W206B : Clostridium perfringens

FEPTU Method: TSC

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
TSC	55	0	88	27	0.17	0 - 89
MCP	4	0	6			
Other (Membrane filtration)	3	0	4			

**W206B: Clostridium perfringens**





W206B: Colony Count 37°C/48 h

No data for graph

**Method based presentation**

W206B : Colony Count 37°C/48 h

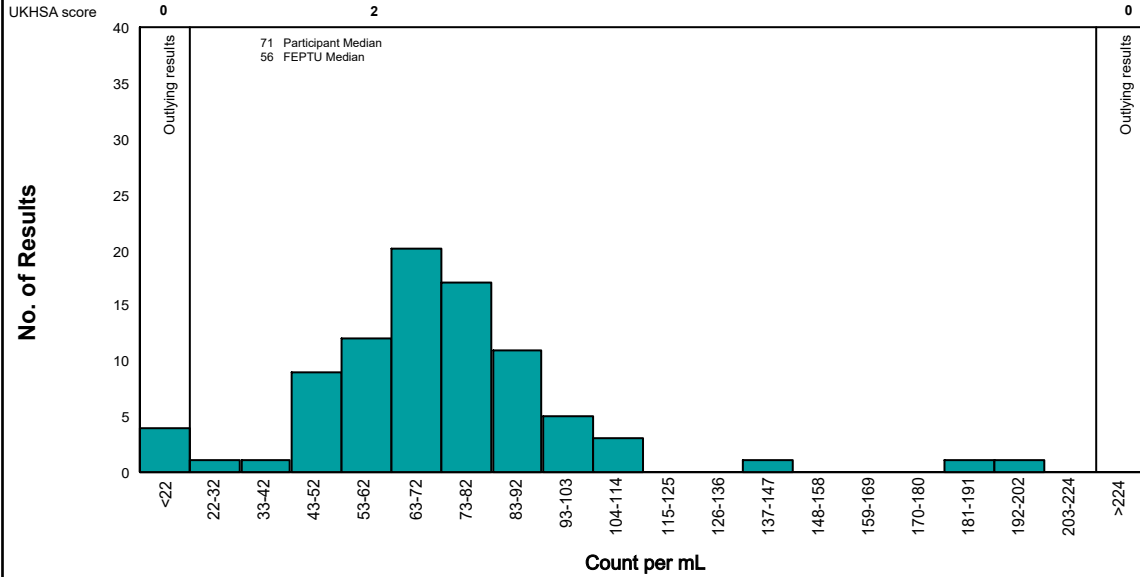
FEPTU Method: Yeast Extract Agar  
(YEA)

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Yeast Extract Agar (YEA)	69	3	83	2	0.26	0 - 48
Quanti-Tray	0	0	0			
SimPlate	0	0	0			
Plate Count Agar (PCA)	8	0	9			
Water plate count agar	1	1	1			
Other	5	0	6			

W206B: Colony Count 37°C/48 h

No data for graph

**W206B: Colony Count 22°C/72 h**



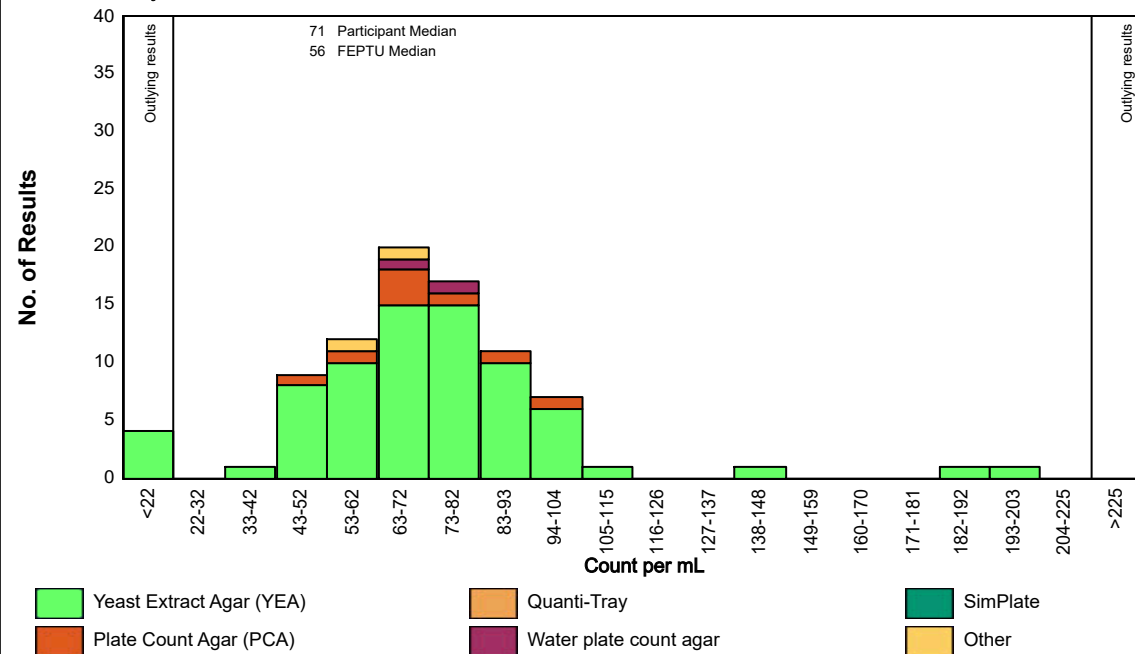
**Method based presentation**

W206B : Colony Count 22°C/72 h

FEPTU Method: Yeast Extract Agar (YEA)

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S* (Log <sub>10</sub> )	Range Reported
Yeast Extract Agar (YEA)	73	1	85	72	0.12	2 - 202
Quanti-Tray	0	0	0			
SimPlate	0	0	0			
Plate Count Agar (PCA)	8	0	9			
Water plate count agar	2	0	2			
Other	2	0	2			

**W206B: Colony Count 22°C/72 h**



# Performance Assessment Sheet

Distribution	Sample	Coliform bacteria score	<i>Escherichia coli</i> score	Enterococci score	<i>Pseudomonas aeruginosa</i> score	<i>Clostridium perfringens</i> score	Colony Count 37°C/48 h score	Colony Count 22°C/72 h score
W206	W206A							
	W206B							
W205	W205A							
	W205B							
W204	W204A							
	W204B							
W203	W203A							
	W203B							
W202	W202A							
	W202B							
W201	W201A							
	W201B							
Total maximum possible score								
Total percentage								

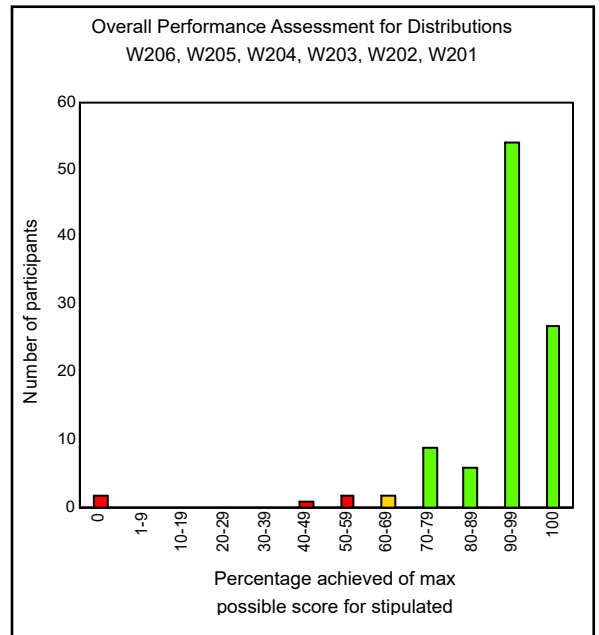
**Performance Assessment Comment:**

Participants are reminded that to take advantage of the performance assessment overtime tool provided in the reports they need to take part in more than one distribution a year.

Performance assessments are designed to alert participants to on-going problems with their examinations and are provided after every distribution. Scores are allocated to results reported for every parameter, for every sample to help assess performance.

Cummulative scores are calculated for the current and previous **five** distributions for the Drinking Water Scheme. Participants' cummulative scores for each of the examinations are compared with the maximum possible scores after every distribution.

Your overall performance with the enumerations of low levels of indicator organisms in drinking water proficiency testing samples for the current and last five distributions is collated in the chart to the right.



**Performance Assessment Comment:**

Laboratories that achieve less than 70% of the maximum possible score are likely to be experiencing significant problems with their examinations and are advised to:

- a) refer to the relevant distribution reports for sample-specific comments
- b) refer to the website guidance documents: <https://www.gov.uk/government/collections/external-quality-assessment-ega-and-proficiency-testing-pt-for-food-water-and-environmental-microbioloav>

### Sample specific comment

#### **W206A: Coliform**

This sample contained a *Citrobacter freundii* which is a Gram negative coliform bacteria in the *Enterobacteriaceae* family. In the FEPTU laboratory this organism grew as <0.5mm pink translucent colonies on coliform chromogenic agar following incubation at 37°C for 24 hours.

8/94 (9%) laboratories reported a false negative result for this examination, the standard deviation was also wide. A Kolmogorov–Smirnov (KS) test showed that the data was evenly distributed. Laboratories reporting an incorrect PT result should request a repeat sample for their own internal investigation.

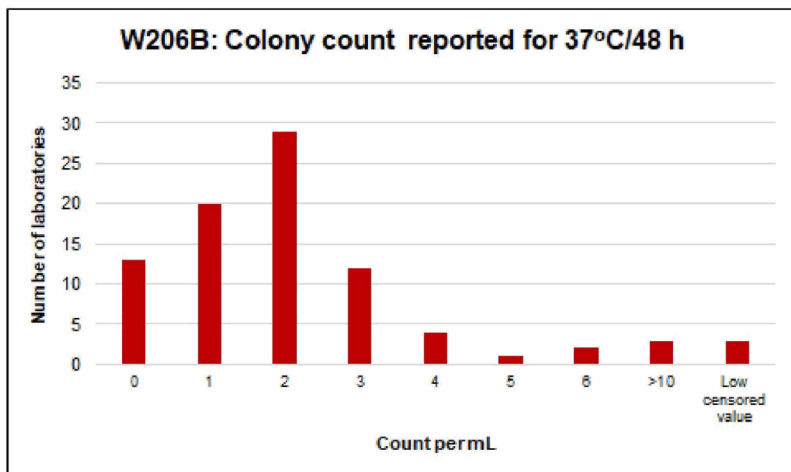
Please note that the species of the *Citrobacter* was incorrectly shown on the intended results published on the 13 February 2023. This sample contained a *C. freundii* and not *C. braakii*, this error will not have an impact on the results reported and the performance of the laboratories with this examination. FEPTU's reference number is FNC742.

#### **W206A: *Pseudomonas aeruginosa***

This strain of *P. aeruginosa* generates a negative reaction in the Pseudalert method. This suggests that this strain does not have the enzyme that cleaves the substrate in the reagent to produce a blue fluorescence under ultraviolet light for results to be positive in the Pseudalert system. Participants reporting a false negative result that used a Pseudalert have been score correctly. It is important that participants understand the limitations of the methods they use and the impact this may have on public health.

#### **W206B: Colony count 37°C/48 h**

Below is a graph of the colony counts reported at 37°C/48h by the participants, which is not shown in the main scheme report.



### General comments:

#### Method based presentation of results:

Participants are advised if less than 10 laboratories report a result for a method, no data is shown for the Median, Robust S\* and the Range Reported in the 'Method based presentation' tables.

Numbers shown in the 'Excluded Results' column are laboratories that reported a censored value.

#### Trend analysis:

Plotting your PT results over a period can help to identify potential problems. If you need the latest file, please email us on [foodeqa@ukhsa.gov.uk](mailto:foodeqa@ukhsa.gov.uk).

If you do not return a result for a distribution, you will not be able to view all the participants' results data in your individualised report. Please contact us if you require this information on [foodeqa@ukhsa.gov.uk](mailto:foodeqa@ukhsa.gov.uk).

End of report

