

# Summary of Results

## External Quality Assessment for Food Microbiology

### Food Law Scheme

**Distribution Number:** FL9

**Sample Numbers:** FL025, FL026 & FL027

Distribution Date:	<b>May 2009</b>
Results Due:	<b>5 June 2009</b>
Report Date:	<b>10 July 2009</b>
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**Contents:**

	<b>Page number(s)</b>
Sample: FL025	2
Sample: FL026	3 – 4
Sample: FL027	5 – 7
Fig. 1 Scatter graph	8
Fig. 2 Scatter graph	9
Fig. 3 Scatter graph	10
Fig. 4 Scatter graph	11
Performance assessment	12
General Information	13 – 14

**This Scheme provides external quality assessment samples for laboratories that examine foods products in accordance with European legislation specified in Regulation (EC) 1441/2007 (which amended Regulation (EC) No. 2073/2005 and came into force on 25 December 2007) Microbiological Criteria for Foodstuffs associated with Regulation (EC) 852/2004**

If you require further information on the scheme, samples, quality control, how results are assessed, how scores are allocated, interpretation of low scores and performance assessments please refer to the 'General Information Section' on pages 13 – 14.

**Participants are reminded that the purpose of scoring is to draw attention to incorrect or outlying results. Participants who report outlying results for enumerations on single occasions only should not be alarmed, although they should still assess the reason(s) for the outlying result.**

All participants are reminded that incorrect or incomplete identification of pathogens from food samples could have serious public health implications. Similarly, the levels of micro-organisms reported in the sample may affect the subsequent outcome for the product.

If you experienced problems with these examinations please refer to the 'Troubleshooting' PDF at <http://www.hpa.org.uk/eqa/foodlaw>

Please contact FEPTU staff for advice and information. Contact details are provided below.

Information about other Health Protection Agency functions and services is available from the web-site [www.hpa.org.uk](http://www.hpa.org.uk)

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## Sample: FL025

**Sample Details:** A sample of mechanically-separated meat taken from the market during the shelf-life.

**Sample Request:** Test to determine whether this sample complies with the **food safety criteria** stipulated in Commission Regulation (EC) No. 2073/2005 as amended by 1441/2007.

**Contents:**

- *Citrobacter brackii* (10<sup>4</sup>)
- *Enterobacter aerogenes* (10<sup>4</sup>)
- *Escherichia coli* (10<sup>2</sup>)
- *Lactobacillus plantarum* (10<sup>5</sup>)
- *Pseudomonas aeruginosa* (10<sup>5</sup>)
- *Salmonella* Typhimurium 1,4,[5],12:l:1,2 phage DT(10)

All levels are presented as colony forming units (cfu) per ml reconstituted sample

**Required Examinations:** *Salmonella* detection only

### Examination 1 Expected Results:

Examination 1	Expected Result	Your Result	Your score
Name of examination	<i>Salmonella</i> detection		
Stipulated method	ISO 6579*		
Amount of sample examined	10g		
No. of samples from a batch required for compliance	5 (n = 5)		
Expected range	Present		
Limits for compliance	Absence in 10g (c = 0)		
Conclusion about the batch from result	Your conclusion has been scored in relation to your reported result		

\* The most recent edition of the standard should be used

**Results returned**

**Total score out of**

### Examination 1 Comments on Performance:

<b>Salmonella sp.</b>	Total participants reporting for <i>Salmonella</i> sp.	40
	Participants reporting correctly the <b>presence</b> of <i>Salmonella</i> sp.	40 (100%)
<b>Total sent sample</b>		40

### Examination 1 Specific Comments:

- **Three** participants examined this sample additionally for *L.monocytogenes* which is not required to determine compliance with the **food safety criteria**.

## Sample: FL026

**Sample Details:** A sample of mechanically-separated meat sampled at the end of the manufacturing process.

**Sample Request:** Test to determine whether this sample complies with the **process hygiene criteria** stipulated in Commission Regulation (EC) No. 2073/2005 as amended by 1441/2007.

**Contents:**

- *Citrobacter brackii* ( $10^4$ )
- *Enterobacter aerogenes* ( $10^4$ )
- *Escherichia coli* ( $10^2$ )
- *Lactobacillus plantarum* ( $10^5$ )
- *Pseudomonas aeruginosa* ( $10^5$ )
- *Salmonella* Typhimurium 1,4,[5],12:I:1,2 phage DT(10)

All levels are presented as colony forming units (cfu) per ml reconstituted sample

**Required Examinations:** Aerobic colony count and *E.coli* enumeration

### Examination 1 Expected Results:

Examination 1	Expected Result	Your Result	Your score
Name of examination	Aerobic colony count (ACC)		
Stipulated method	ISO 4833 (enumeration)*		
Amount of sample examined	1/10 suspension		
No. of samples from a batch required for compliance	5 (n = 5)		
Expected range	$3.5 \times 10^4$ – $3.5 \times 10^5$ cfu per g		
Limits for compliance	m = $5 \times 10^5$ cfu/g; M = $5 \times 10^6$ cfu/g (c = 2)		
Conclusion about the batch from result	Your conclusion has been scored on your reported result		

\* The most recent edition of the standard should be used

**Results returned**

**Total score out of**

### Examination 1 Comments on Performance:

<b>ACC</b>	Total participants reporting for ACC	40
Refer to Fig. 1 (page 8)	Participants' median	$1.2 \times 10^5$ cfu g <sup>-1</sup> (5.05 log <sub>10</sub> )
	No. of outlying counts	3 (3 low)
	Participants' mean	$8.9 \times 10^4$ cfu g <sup>-1</sup> (4.95 log <sub>10</sub> )
	Standard deviation of participants' results	0.21 cfu g <sup>-1</sup>
	FEPTU QC median (ISO 4833)	$1.3 \times 10^5$ cfu g <sup>-1</sup> (5.10 log <sub>10</sub> )

**Total sent sample** 41

**Returned as 'not examined' for this sample** 1

## Sample: FL026

**Sample Details:** A sample of mechanically-separated meat sampled at the end of the manufacturing process.

**Sample Request:** Test to determine whether this sample complies with the **process hygiene criteria** stipulated in Commission Regulation (EC) No. 2073/2005 as amended by 1441/2007.

**Contents:**

- *Citrobacter brackii* ( $10^4$ )
- *Enterobacter aerogenes* ( $10^4$ )
- *Escherichia coli* ( $10^2$ )
- *Lactobacillus plantarum* ( $10^5$ )
- *Pseudomonas aeruginosa* ( $10^5$ )
- *Salmonella* Typhimurium 1,4,[5],12:I:1,2 phage DT(10)

All levels are presented as colony forming units (cfu) per ml reconstituted sample

**Required Examinations:** Aerobic colony count and *E.coli* enumeration

### Examination 2 Expected Results:

Examination 2	Expected Result	Your Result	Your score
Name of examination	<i>E.coli</i> enumeration		
Stipulated method	ISO 16649 1 or 2 (enumeration)*		
Amount of sample examined	1/10 suspension		
No. of samples from a batch required for compliance	5 (n = 5)		
Expected range	$1.4 \times 10^2 - 1.4 \times 10^3$ cfu per g		
Limits for compliance	m = 50 cfu/g; M = $5 \times 10^2$ cfu/g (c = 2)		
Conclusion about the batch from result	Your conclusion has been scored on your reported result		

\* The most recent edition of the standard should be used

**Results returned**

**Total score out of**

### Examination 2 Comments on Performance:

<b><i>E.coli</i></b>	Total participants enumerating for <i>E.coli</i>	39
Refer to Fig. 2 (page 9)	Participants reporting a definitive count	39
	<ul style="list-style-type: none"> <li>• ISO 16649-1 (10)</li> <li>• ISO 16649-2 (20)</li> <li>• ISO 16649 used but part 1 or 2 not specified (5)</li> <li>• Other (4)</li> </ul>	
	Participants' median	$4.6 \times 10^2$ cfu g <sup>-1</sup> (2.65 log <sub>10</sub> )
	No. of outlying counts	1 (1 low)
	Participants' mean	$4.0 \times 10^2$ cfu g <sup>-1</sup> (2.60 log <sub>10</sub> )
	Standard deviation of participants' results	0.23 cfu g <sup>-1</sup>
	FEPTU QC medians	
	<ul style="list-style-type: none"> <li>• ISO 16649-1</li> <li>• ISO 16649-2</li> </ul>	8.5x10 <sup>2</sup> cfu g <sup>-1</sup> (2.95 log <sub>10</sub> ) 4.0x10 <sup>2</sup> cfu g <sup>-1</sup> (2.60 log <sub>10</sub> )
<b>Total sent sample</b>		41
<b>Returned as 'not examined' for this sample</b>		2

## Sample: FL027

**Sample Details:** A swab sample taken from a cattle carcass using a cellulose acetate sponge. The sample was taken after dressing, but before chilling. The area swabbed is equal to **100 cm<sup>2</sup>**.

**Sample Request:** Test to determine whether this sample complies with the **process hygiene criteria** stipulated in Commission Regulation (EC) No. 2073/2005 as amended by 1441/2007.

**Contents:**

- *Citrobacter freundii* (10<sup>5</sup>)
- *Enterobacter aerogenes* (10<sup>5</sup>)
- *Escherichia coli* (10<sup>5</sup>)
- *Lactobacillus plantarum* (10<sup>4</sup>)
- *Pseudomonas aeruginosa* (10<sup>5</sup>)

All levels are presented as colony forming units (cfu) per ml reconstituted sample

**Required Examinations:** *Salmonella* detection, aerobic colony count and Enterobacteriaceae enumeration

### Examination 1 Expected Results:

Examination 1	Expected Result	Your Result	Your score
<b>Name of examination</b>	<i>Salmonella</i> detection		
<b>Stipulated method</b>	ISO 6579*		
<b>Amount of sample examined</b>	swabbed area 100cm <sup>2</sup>		
<b>No. of samples from a batch required for compliance</b>	50 (n = 50)		
<b>Expected range</b>	Present		
<b>Limits for compliance</b>	Absence in the area tested (c = 2)		
<b>Conclusion about the batch from result</b>	Your conclusion has been scored in relation to your reported result		
		<b>Results returned</b>	
		<b>Total score out of</b>	

\* The most recent edition of the standard should be used

### Examination 1 Comments on Performance:

<b><i>Salmonella</i> sp.</b>	Total participants reporting for <i>Salmonella</i> sp.	34
	Participants reporting correctly the <b>absence</b> of <i>Salmonella</i> sp.	33 (97%)
	Participants reporting incorrectly the <b>presence</b> of <i>Salmonella</i> sp.	1
<b>Total sent sample</b>		39
<b>Returned as 'not examined' for this sample</b>		5

### Examination 1 Specific Comments:

Chapter 3 of Commission Regulation (EC) No. 2073/2005, as amended by 1441/2007, stipulates that when sampling for *Salmonella*, the total sampling area should be a minimum of 400cm<sup>2</sup>. A number of participants referred correctly to the number of samples required for compliance (n=50, c=2) but did not comment further on the minimum sampling area.

## Sample: FL027

**Sample Details:** A swab sample taken from a cattle carcass using a cellulose acetate sponge. The sample was taken after dressing, but before chilling. The area swabbed is equal to **100 cm<sup>2</sup>**.

**Sample Request:** Test to determine whether this sample complies with the **process hygiene criteria** stipulated in Commission Regulation (EC) No. 2073/2005 as amended by 1441/2007.

**Contents:**

- *Citrobacter freundii* (10<sup>5</sup>)
- *Enterobacter aerogenes* (10<sup>5</sup>)
- *Escherichia coli* (10<sup>5</sup>)
- *Lactobacillus plantarum* (10<sup>4</sup>)
- *Pseudomonas aeruginosa* (10<sup>5</sup>)

All levels are presented as colony forming units (cfu) per ml reconstituted sample

**Required Examinations:** *Salmonella* detection, aerobic colony count and Enterobacteriaceae enumeration

### Examination 2 Expected Results:

Examination 2	Expected Result	Your Result	Your score
Name of examination	Aerobic colony count (ACC)		
Stipulated method	ISO 4833 (enumeration)*		
Amount of sample examined	swabbed area 100cm <sup>2</sup>		
No. of samples from a batch required for compliance	N/A		
Expected range	5.35 – 6.35 log cfu/cm <sup>2</sup>		
Limits for compliance	m = 3.5 log cfu/cm <sup>2</sup> daily mean log; M = 5.0 log cfu/cm <sup>2</sup> daily mean log		
Conclusion about the batch from result	Your conclusion has been scored on your reported result		

\* The most recent edition of the standard should be used

**Results returned**

**Total score out of**

### Examination 2 Comments on Performance:

<b>ACC</b>	Total participants reporting for ACC	33
Refer to Fig. 3 (page 10)	Participants reporting results as log cfu/cm <sup>2</sup>	20
	Participants reporting results as colony count	13
	Participants' median*	7.1x10 <sup>5</sup> cfu g <sup>-1</sup> (5.85 log <sub>10</sub> )
	No. of outlying counts	5 (5 low)
	Participants' mean	5.6x10 <sup>5</sup> cfu g <sup>-1</sup> (5.75 log <sub>10</sub> )
	Standard deviation of participants' results	0.24 cfu g <sup>-1</sup>
	FEPTU QC median (ISO 4833)	7.1x10 <sup>5</sup> cfu g <sup>-1</sup> (5.85 log <sub>10</sub> )

**Total sent sample** 39

**Returned as 'not examined' for this sample** 6

### Examination 2 Specific Comments:

\*The results from **two** participants imply that they divided their ACC by 100 in order to report the result as cfu per cm<sup>2</sup>. Those results are not included in Figure 3, and were not included in the calculation of the participants' median and mean values. The Regulation requires that results are reported as log cfu/cm<sup>2</sup>, in relation to the daily mean log values. We have acknowledged that the details that we provided for this sample lacked clarity so points were only deducted from scores where results were clearly misleading.

## Sample: FL027

**Sample Details:** A swab sample taken from a cattle carcass using a cellulose acetate sponge. The sample was taken after dressing, but before chilling. The area swabbed is equal to **100 cm<sup>2</sup>**.

**Sample Request:** Test to determine whether this sample complies with the **process hygiene criteria** stipulated in Commission Regulation (EC) No. 2073/2005 as amended by 1441/2007.

**Contents:**

- *Citrobacter freundii* (10<sup>5</sup>)
- *Enterobacter aerogenes* (10<sup>5</sup>)
- *Escherichia coli* (10<sup>5</sup>)
- *Lactobacillus plantarum* (10<sup>4</sup>)
- *Pseudomonas aeruginosa* (10<sup>5</sup>)

All levels are presented as colony forming units (cfu) per ml reconstituted sample

**Required Examinations:** *Salmonella* detection, aerobic colony count and Enterobacteriaceae enumeration

### Examination 3 Expected Results:

Examination 3	Expected Result	Your Result	Your score
Name of examination	Enterobacteriaceae		
Stipulated method	ISO 21528-2		
Amount of sample examined	swabbed area 100cm <sup>2</sup>		
No. of samples from a batch required for compliance	N/A		
Expected range	4.70 – 5.90 log cfu/cm <sup>2</sup>		
Limits for compliance	m = 1.5 log cfu/cm <sup>2</sup> daily mean log; M = 2.5 log cfu/cm <sup>2</sup> daily mean log		
Conclusion about the batch from result	Your conclusion has been scored on your reported result		

\* The most recent edition of the standard should be used

**Results returned**

**Total score out of**

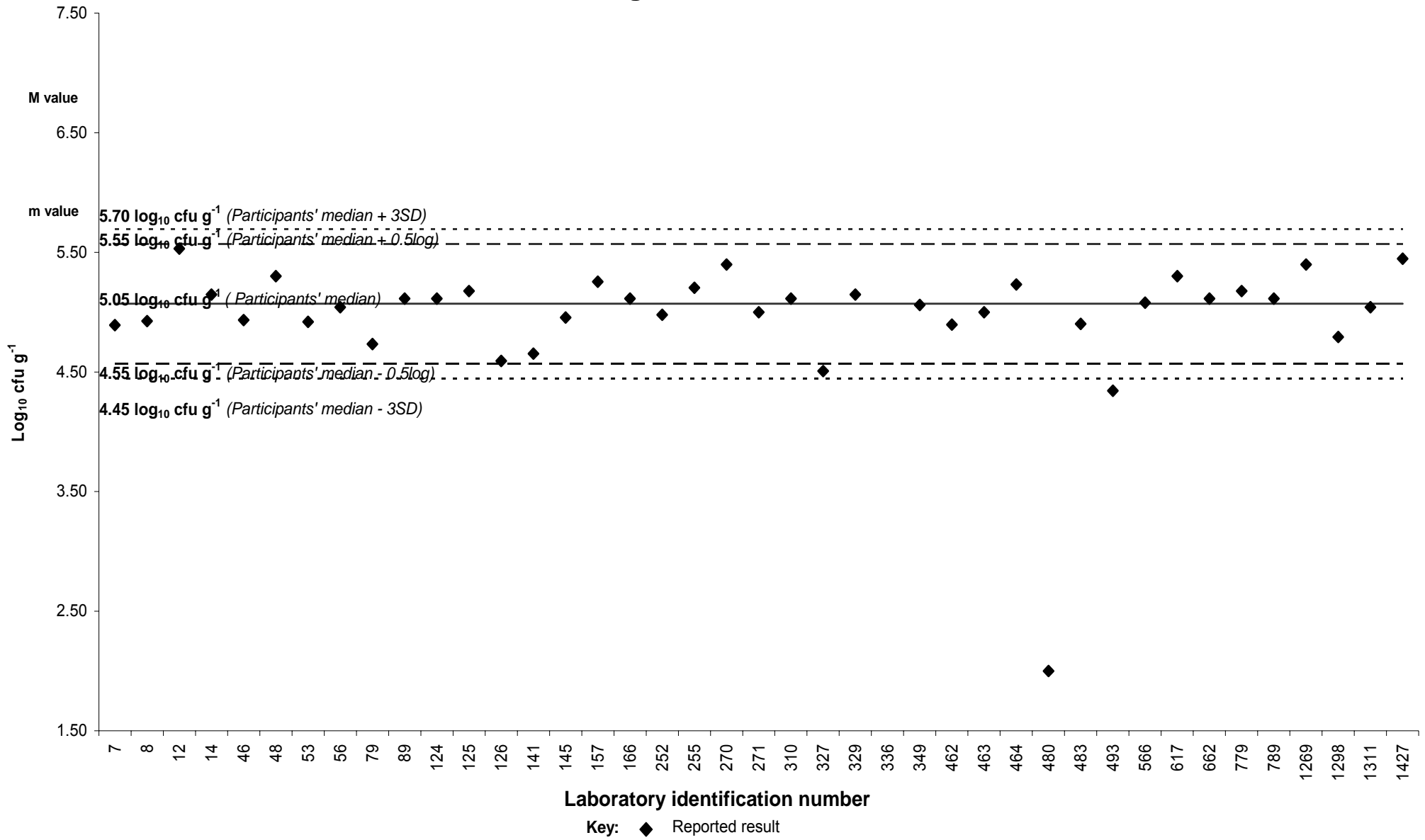
### Examination 3 Comments on Performance:

<b>Enterobacteriaceae</b>	Total participants enumerating for Enterobacteriaceae	33
Refer to Fig. 4 (page 11)	Participants reporting results as log cfu/cm <sup>2</sup>	16
	Participants reporting results as colony count	16
	Participants reporting incorrectly the <b>absence</b> of Enterobacteriaceae	1
	<ul style="list-style-type: none"> <li>• ISO 21528-2 (30)</li> <li>• Other (3)</li> </ul>	
	Participants reporting a censored value	4 (4 high)
	Participants' median*	2.0x10 <sup>5</sup> cfu g <sup>-1</sup> (5.30 log <sub>10</sub> )
	No. of outlying counts	1 (1 high)
	Participants' mean	2.0x10 <sup>5</sup> cfu g <sup>-1</sup> (5.30 log <sub>10</sub> )
	Standard deviation of participants' results	0.27 cfu g <sup>-1</sup>
	FEPTU QC median	3.3x10 <sup>5</sup> cfu g <sup>-1</sup> (5.50 log <sub>10</sub> )
<b>Total sent sample</b>		39
<b>Returned as 'not examined' for this sample</b>		6

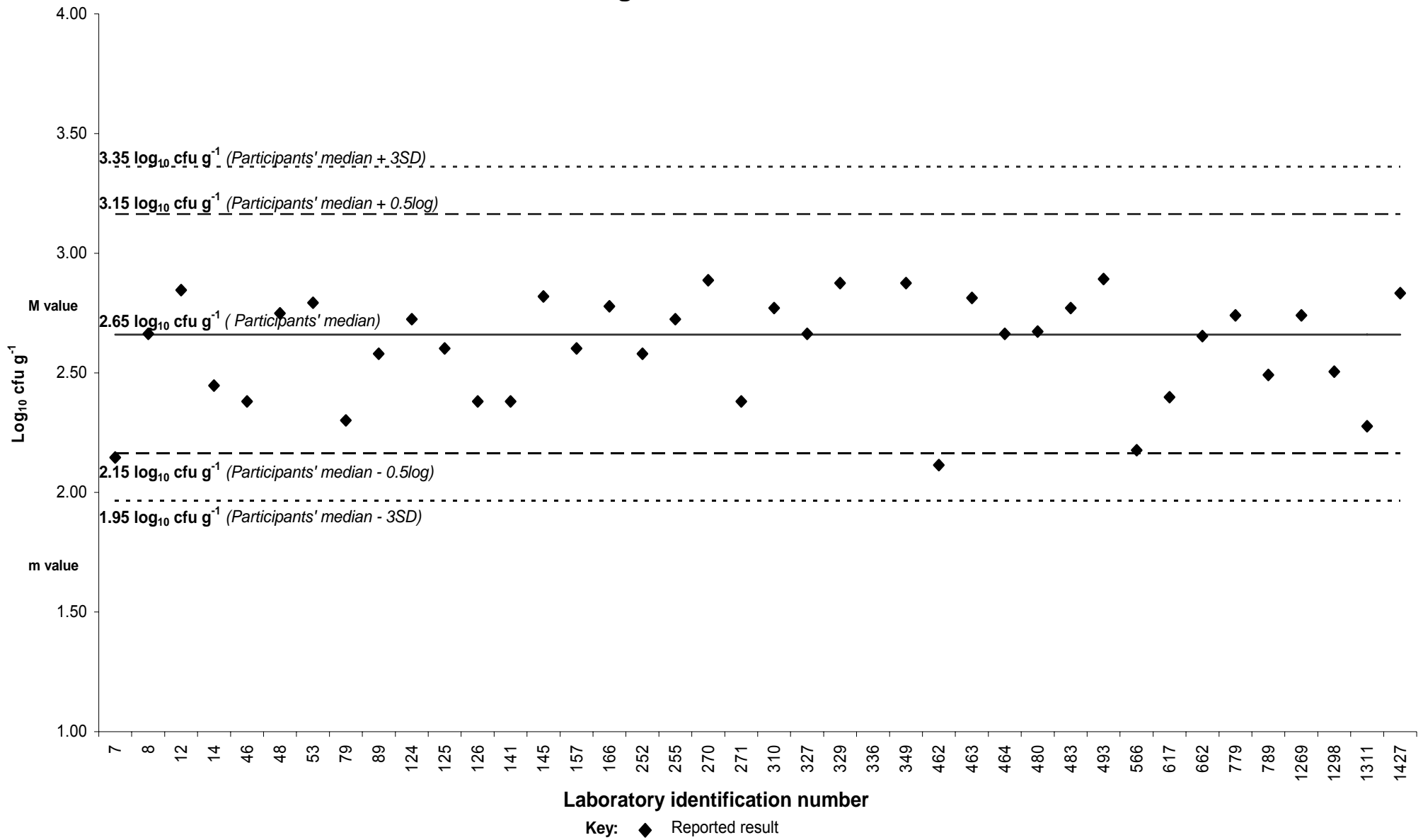
### Examination 3 Specific Comments:

\*The results from **three** participants imply that they divided their Enterobacteriaceae count by 100 in order to report the result as cfu per cm<sup>2</sup>. Those results are not included in Figure 4, and were not included in the calculation of the participants' median and mean values. The Regulation requires that results are reported as log cfu/cm<sup>2</sup>, in relation to the daily mean log values. It also notes that the limits for m and M only apply when samples are taken by a destructive method, which means that conclusions about the batch cannot be derived from the result of a single sample. Nevertheless, we have acknowledged that the details that we provided for this sample lacked clarity so points were only deducted from scores where results were clearly misleading.

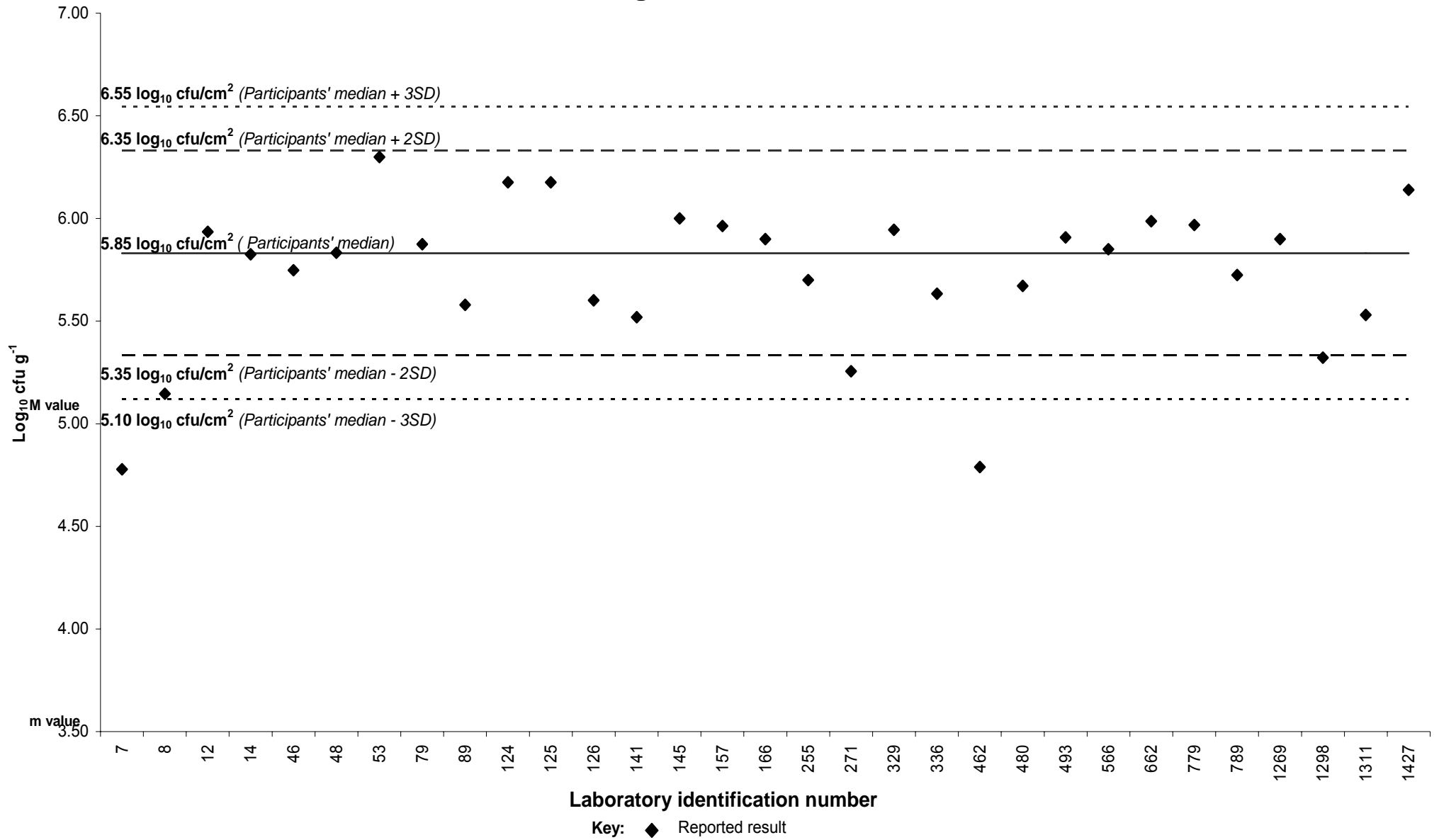
Fig. 1: FL026 - ACC Results



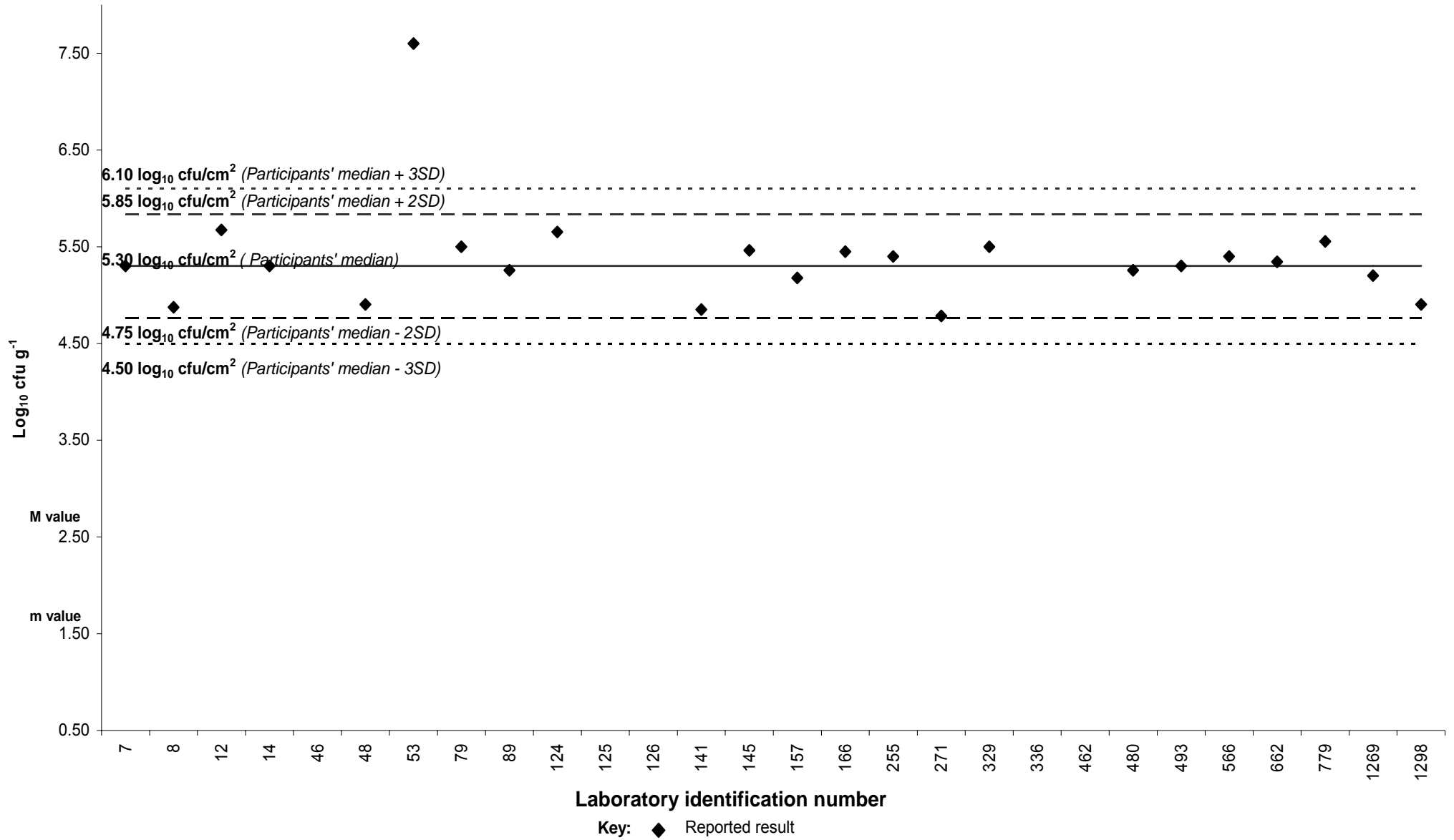
**Fig. 2: FL026 - *E.coli* Results**



**Fig. 3: FL027 - ACC Results**



**Fig. 4: FL027 - Enterobacteriaceae Results**

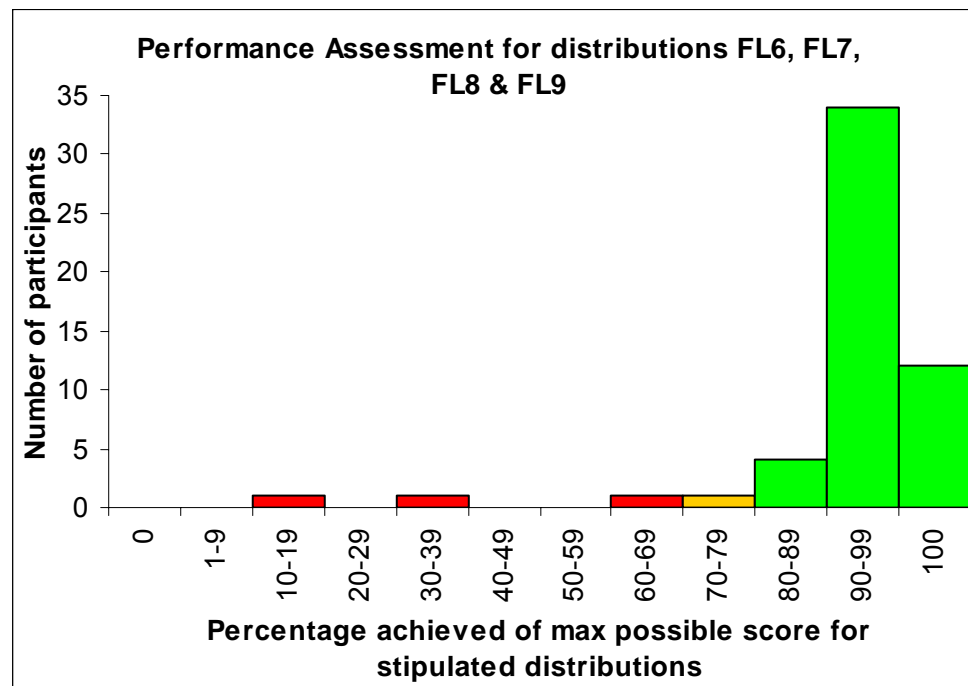


## Performance Assessment Sheet

Performance assessments are designed to identify laboratories with on-going problems with their examinations and are undertaken after every distribution. Scores are allocated to results reported for every sample to help assess participants' performance.

Cumulative scores are calculated for every participant for all examinations for the current and previous three distributions. Participants' cumulative scores for each of the examinations are compared with the maximum possible scores after every distribution.

Distribution	Sample	Examination	Your score	Your %
FL6	FL016	<i>L.monocytogenes</i>		
	FL017	Enterobacteriaceae		
	FL018	Enterobacteriaceae		
	FL018	Coagulase-positive staphylococci		
FL7	FL019	<i>Salmonella</i> sp.		
	FL019	<i>L.monocytogenes</i>		
	FL020	Enterobacteriaceae		
	FL020	<i>B.cereus</i>		
	FL021	<i>E.coli</i>		
FL8	FL022	<i>L.monocytogenes</i>		
	FL023	<i>L.monocytogenes</i>		
	FL023	<i>Salmonella</i> sp.		
	FL024	<i>E.coli</i>		
	FL024	Coagulase-positive staphylococci		
FL9	FL025	<i>Salmonella</i> sp.		
	FL026	Aerobic colony count		
	FL026	<i>E.coli</i>		
	FL027	<i>Salmonella</i> sp.		
	FL027	Aerobic colony count		
	FL027	Enterobacteriaceae		



### Performance Assessment Comment:

Laboratories that achieve <70% of the maximum possible score are likely to be experiencing significant problems with their tests and are advised to a) refer to the relevant sample reports for specific comments b) refer to the hpa website ([www.hpa.org.uk/eqa/foodlaw](http://www.hpa.org.uk/eqa/foodlaw)) c) contact the organisers for advice.

## General Information

**Scheme:** Food Law

**Sample Type:** LENTICULE discs

**Safety Data Sheet:** Contact the Organisers or [www.hpa.org.uk/eqa/foodlaw](http://www.hpa.org.uk/eqa/foodlaw)

**Examinations:** In accordance with the EC Microbiological Criteria for Foodstuffs (EC) Regulation 2073/2005 amended by (EC) 1441/2007.

### Enumerations:

Aerobic colony count

*B.cereus*

Coagulase-positive staphylococci

*E.coli*

Enterobacteriaceae

*L.monocytogenes*

### Presence/absence:

*Listeria monocytogenes*

*Salmonella* spp.

*Cronobacter sakazakii*

### Most Probable Number (MPN) Estimations:

Enterobacteriaceae

*Escherichia coli*

### Quality Control:

Minimum of 10 samples, selected randomly from the batch and examined for the test parameters as indicated on the request/report forms, using the relevant method as stipulated in Annex 1 of Reg 1441/2007.

### Results Analyses and Scores:

Scores are allocated for **each examination** as follows:

	Expected result	Score allocated
<b>Name of examination</b>	Correct examination	1
<b>Stipulated method</b>	Not scored	
<b>Amount of sample examined</b>	Not scored	
<b>No. of samples from a batch required for compliance</b>	Correct value	1
<b>Expected range</b>	Correct presence/absence or within range* <i>Outlier</i>	3 2 or 0
<b>Limits for compliance</b>	Not scored	
<b>Conclusion about the batch from result</b>	Correct conclusion Partial conclusion e.g. about sample not batch No conclusion or misleading conclusion	2 1 0
<b>Return result</b>		1
<b>Max possible score</b>		8 points

\*see scoring of enumerations

### Scoring of enumerations

(Aerobic colony count (ACC), *B.cereus*, coagulase-positive staphylococci, *E.coli*, Enterobacteriaceae, *L.monocytogenes*)

The expected range for enumerations are determined from the median result reported by participants' and takes into account the following criteria: (1) median  $\pm$  2 MAD (2) median  $\pm$  3 MAD and (3) median  $\pm$  0.5 log<sub>10</sub> units.

If the range in (1) and/or (2) are less than the median  $\pm$  0.5 log<sub>10</sub> units then the expected range is extended as described in (3). Using these criteria participants' results are defined as follows:

		Points
Expected range	within the range according to criteria (1)	<b>3</b>
Outlying results (1)	within the range of criteria (2) but not within criteria (1)	<b>2*</b>
Outlying results (2)	outside the range of criteria (2)	<b>0*</b>

\*If interpretation of an outlying result affects the outcome for the product in relation to the Directive standards/guidelines then the lower score indicated is allocated.

MAD is the median absolute deviation from the median value and is a robust estimate of the standard deviation (SD). It is only possible to calculate a precise estimate of the SD if more than 20 participants report enumeration results.

If a low censored value (< value) arises by chance because the target organism(s) or group is present at a low level then the maximum score of **three** points is allocated.

### Scoring of MPN values

The expected range for enterobacteriaceae MPN result is determined from the median result reported by participants'  $\pm$  3 standard deviations (SD). Outlying results are defined as follows:

		Points
Expected range	median $\pm$ 3 SD	<b>3</b>
Outlying results (1)	median $\pm$ > 3 $\pm$ $\leq$ 5 SD	<b>2*</b>
Outlying results (2)	median $\pm$ > 5 SD	<b>0*</b>

\*If interpretation of an outlying result affects the outcome for the product in relation to the Directive standards/guidelines then the lower score indicated is allocated.

If an incorrect dilution or incorrect MPN (due to mis-reading of the MPN table) is reported then only **one** point is allocated.

If the sample contains low level of Enterobacteriaceae the limits for low outlying counts may fall below the limit of detection for the test, e.g. <3 or 0.3 per g. Therefore, the limits for low outlying counts cannot be applied, i.e. <3 SD or <5 SD.

### Scoring of results for presence/absence tests

(*L.monocytogenes*, *Salmonella* spp. and *Enterobacter sakazakii*)

	Points
Fully correct result	<b>3</b>
Incorrect species/serogroup identification	<b>2</b>
False positive or false negative result	<b>0</b>

**Participants who do not return report forms or return report forms after the specified return date (late results) are allocated a score of zero.**

### Results charts:

Scatter graphs summarising participants' results are included where appropriate.

### Performance Analyses:

- Designed to identify laboratories with ongoing problems with their examinations
- Will be undertaken after four distributions

**Accreditation:** The HPA Food Law EQA Scheme is accredited by the United Kingdom Accreditation Service (UKAS) to ISO/IEC Guide 43-1:1997 through assessment against ILAC G13: 2007.



0006