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PROFICIENCY TEST « RAEMA »

SCHEME N° 69
(1st OCTOBER 2019)

GENERAL REPORT

ACCREDITATION N°1-1836 SCOPE AVAILABLE ON WWW.COFRAC.FR

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1. GENERAL DATA

1.1.PARTICIPATING LABORATORIES

356 laboratories participated to the 69th scheme. The sending was made on Tuesday 1st October 2019.
We received **349** answers (98.0%).

1.2.DELIVERY TIME OF THE PARCEL

Reception	J0	J0+1	J0+2	J0+3	J0+4	J0+6	J0+7	J0+8	J0+13
Nb of laboratories	10	217	75	28	3	7	5	2	2

1.3.INFORMATIONS ABOUT SAMPLE

1.3.1. NATURE

The sample included :
- one strain of *Enterococcus sp*. at a concentration level of 10^5 cfu/g in 5 units ;
- one strain of *Citrobacter sp.* at a concentration level of 10^3 cfu/g in 5 units ;
- one strain of *Serratia liquefaciens* at a concentration level of 10^3 cfu/g in 5 units ;
- one strain of *Escherichia coli* at a concentration level of 10^2 cfu/g in 5 units ;
- one strain of *Clostridium perfringens* at a concentration level of 5.10^2 cfu/g in 3 units ;
- one strain of *Staphylococcus aureus* at a concentration level of 10^3 cfu/g in 5 units ;
- one strain of *Salmonella* Anatum at a concentration level of 50 cfu/g in 2 units ;
- one strain of *Listeria monocytogenes* at a concentration level of 10^3 cfu/g in 3 units .

1.3.2. SIZE

200 kilogrammes of powder were produced, and distributed after contamination in bottles containing 70 grammes at least. Bottles were covered by a label with a 6 digit identification number.

[(1)]Coordinator of the proficiency test « RAEMA »

1.3.3. HOMOGENEITY AND STABILITY TEST OF THE CONTAMINATION

Homogeneity and stability of samples are checked during the statistical analysis of participants results.
A supplementary check of the contamination's homogeneity was realized on 10 samples for each unit by a double enumeration of aerobic microorganisms at 30°C.
The contamination's stability was also checked by enumeration / detection of all flora on 7, 14 and 21 October 2019. These checks were realized by a subcontractor accreditated by Cofrac.

1.3.4. FLORA FOR ENUMERATION / DETECTION

Enumeration of the following flora was proposed : microorganisms at 30°C, Enterobacteriaceae, total and thermotolerant coliforms, beta-glucuronidase positive *Escherichia coli*, anaerobic sulfite-reducing bacteria, *Clostridium perfringens*, coagulase positive staphylococci, *Listeria monocytogenes*, as well as detection of *Salmonella* and *Listeria monocytogenes*.

1.4.EXECUTION OF ANALYZES

1.4.1. DELIVERY TIME OF SAMPLES / BEGINNING OF ANALYZES

349 laboratories (100%) specified it.

Analysis time	J0+1	J0+2	J0+3	J0+4	J0+5	J0+6	J0+7	J0+8	J0+9	J0+10	J0+13	J0+14	J0+22
Nb of laboratories	33	37	21	2	3	150	66	11	5	3	11	6	1

1.4.2. PRESERVATION TEMPERATURE OF SAMPLES BEFORE ANALYSIS

347 laboratories (99.4%) specified it. The average temperature is **3.9°C** with a standard deviation of 0.8°C. The given data 20, 22, 24, and 28°C given by 6 laboratories were not taken into account for this calculation.

2. EXPLOITATION OF ANALYSIS REPORT

2.1.PREPARATION OF THE INITIAL SUSPENSION

For **348** answers (99.7%) :
225 laboratories (64.4%) prepare the initial suspension with adding diluent to powder.
122 laboratories (35.0%) prepare the initial suspension with adding powder to diluent.
1 laboratory (0.3%) prepares the initial suspension in a different way.

2.2.HOMOGENEIZATION TECHNIQUE

For **347** answers (99.4%) :
330 laboratories (94.5%) homogeneize their sampling with a StomacherND.
17 laboratories (4.9%) used another technique (manual, magnétic or other).

2.3. RESUSCITATION'S CONDITIONS

2.3.1. DURATION

328 laboratories (94.0%) specified it.
The average duration is **27.7 min** with a standard deviation of 14.9 min. The data 120 and 1440 min given by 5 laboratories was not taken into account for this calculation.

2.3.2. TEMPERATURE

333 laboratories (95.4%) specified it.
The average temperature is **21.5°C** with a standard deviation of 3.5°C.

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2.4. MICROORGANISMS AT 30°C

331 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF EN ISO 4833-1	210
	AFNOR 3M-01/1-09/89	52
	NF EN ISO 4833-2	16
	AFNOR BIO-12/35-05/13	16
	NM ISO 4833-1	15
	XP V08-034	7
	Other	15
	+ V08-100 (spiral)	13
Culture medium	Plate Count Agar	245
	Petrifilms	53
	Plate Count Agar + Milk	17
	Tempo AC	16
	Other	0
Preparation	Home made	115
	Ready to use not pre-poured	140
	Ready to use, plate, film, card	75
Plating method	Surface	68
	Pour	244
	Culture medium for card	16
1st dilution retained	- 1	10
	- 2	16
	- 3	278
	- 4	8
	- 5	2
	1/400	8
	1/4000	4
Incubation temperature	30°C	326
	37°C	3
	25°C	1
Incubation duration	69-73 h	276
	44-48 h	49
	24-26 h	3
	30 h	1
	144 h	1

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2.5.ENTEROBACTERIACEA

295 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF V08-054	120
	→ *NM 08.0.109*[(1)]	21
	NF EN ISO 21528-2	73
	AFNOR 3M-01/6-09/97	51
	AFNOR BIO-12/21-12/06	12
	AFNOR AES-10/07-01/08	10
	AFNOR BRD-07/24-11/13	3
	Other	4
	+ V08-100 (spiral)	1
Culture medium	VRBG	216
	Petrifilms	52
	Tempo EB	12
	Rebecca	11
	Rapid'Enterobacteriaceae	3
	Other	0
Preparation	Home made	93
	Ready to use not pre-poured	137
	Ready to use, plate, film, card	65
1st dilution retained	- 1	98
	- 2	178
	- 3	6
	1/40	1
	1/400	7
Incubation temperature	37±1°C	175
	30°C	107
	35°C	12
Incubation duration	20-24 h	288
	48 h	5

(1) *Similar method to NF V08-054 according to ONSSA (Office National de Sécurité Sanitaire des produits Alimentaires).*

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2.6.TOTAL COLIFORMS

240 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF V08-050	129
	→ *NM 08.0.142*[(2)]	7
	NF ISO 4832	53
	AFNOR 3M	25
	NM ISO 4832	11
	AFNOR BIO-12/17-12/05	8
	AFNOR BRD-07/08-12/04	4
	Other	2
	+ V08-100 (spiral)	3
Culture medium	VRBL	200
	Petrifilms	25
	Tempo TC	8
	Rapid Ecoli	6
	Other	1
Preparation	Home made	91
	Ready to use not pre-poured	116
	Ready to use, plate, film, card	32
1st dilution retained	-1	115
	-2	115
	1/40	2
	1/400	4
Incubation temperature	30°C	222
	37±1°C	18
Incubation duration	20-27 h	234
	48 h	5
	2 h	1

AFNOR 3M method including :

3 laboratories specified utilization of AFNOR 3M-01/02-09/89 A method.
1 laboratory specified utilization of AFNOR 3M-01/02-09/89 B method.
1 laboratory specified utilization of AFNOR 3M-01/02-09/89 C method.

(2) *Similar method to NF V 08-050 according to ONSSA.*

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2.7.THERMOTOLERANT COLIFORMS

221 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF V08-060	165
	→ *NM 08.0.124*(3)	22
	AFNOR 3M	24
	NF ISO 4832	9
	Other	1
	+ V08-100 (spiral)	0
Culture medium	VRBL	195
	Petrifilms	25
	Other	1
Preparation	Home made	84
	Ready to use not pre-poured	114
	Ready to use, plate, film, card	23
1st dilution retained	-1	119
	-2	96
	-3	1
Incubation temperature	42-45°C	220
	37°C	1
Incubation duration	20-24 h	219
	48 h	2

AFNOR 3M method including :

1 laboratory specified utilization of AFNOR 3M-01/02-09/89 B method.
3 laboratories specified utilization of AFNOR 3M-01/02-09/89 C method.
1 laboratory specified utilization of AFNOR 3M-01/05-03/97 method.
1 laboratory specified utilization of AFNOR 3M-01/05-03/97 B method.

(3) *Similar method to NF V08-060 according to ONSSA.*

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2.8.ESCHERICHIA COLI

308 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF ISO 16649-2	181
	AFNOR 3M	45
	NM ISO 16649-2	16
	AFNOR BRD-07/01-07/93	15
	AFNOR BIO-12/13-02/05	13
	AFNOR AES-10/06-01/08	10
	AFNOR BIO-12/05-01/99	5
	NF EN ISO 16649-3	4
	Other	19
	+ V08-100 (spiral)	4
Culture medium	TBX	208
	Petrifilms	46
	Rapid E. coli	19
	Tempo EC	13
	Rebecca	12
	Coli ID	8
	Other	2
Preparation	Home made	91
	Ready to use not pre-poured	162
	Ready to use, plate, film, card	55
Plating method	Surface	46
	Pour	247
	Culture medium for card	14
1st dilution retained	-1	278
	-2	14
	1/40	4
	1/400	6
Incubation temperature	41-46°C	267
	37±1°C	38
	30°C	2
Incubation duration	16-25 h	303
	48 h	4

AFNOR 3M method including :

14 laboratories specified utilization of AFNOR 3M-01/08-06/01 (SELECT'E. COLI) method.

1 laboratory specified utilization of AFNOR 3M-01/04-09/92 method.

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2.9.ANAEROBIC SULFITE-REDUCING BACTERIA

248 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF V08-061	168
	→ *NM 08.0.154*[4]	3
	→ *NM 08.0.125*[4]	9
	NF ISO 15213	41
	NM ISO 15213	15
	Other	11
Culture medium	TSC	230
	TSN	8
	Iron Sulfite agar	6
	Other	4
Preparation	Home made	97
	Ready to use not pre-poured	118
	Ready to use, plate, film, card	32
1st dilution retained	-1	179
	-2	64
Incubation temperature	44-46°C	179
	37°C	67
	30°C	1
Incubation duration	18-24 h	209
	44-48 h	31
	72 h	6
	10 h	1

[4] *Similar method to NF V08-061 according to ONSSA.*

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2.10. CLOSTRIDIUM PERFRINGENS

198 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF EN ISO 7937	161
	NM ISO 7937	19
	Other	18
Culture medium	TSC	196
	Other	2
Preparation	Home made	67
	Ready to use not pre-poured	127
	Ready to use, plate, film, card	3
1st dilution retained	-1	161
	-2	31
Incubation temperature	34-37°C	186
	44-46°C	12
Incubation duration	18-24 h	190
	48 h	7
	72 h	1
Confirmation test	None	29
	Lactose-sulfite	150
	Strip	9
	Other	5

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2.11. COAGULASE POSITIVE STAPHYLOCOCCI

308 laboratories performed the enumeration.

Parameters	Mode	Nb laboratories
Method	NF EN ISO 6888-2	135
	NF V 08-057-1	57
	→ *NM 08.0.112*[5]	5
	NF EN ISO 6888-1	44
	AFNOR 3M-01/9-04/03	18
	NM ISO 6888-1	17
	AFNOR BIO-12/28-04/10	13
	AFNOR BKR-23/10-12/15	10
	NordVal No :049	1
	NM ISO 6888-2	1
	Other	6
	+ V08-100 (spiral)	3
Culture medium	RPF	137
	BP+egg yolk tellurite	99
	BP+egg yolk tellurite+ sulfamethazine	22
	Petrifilm	19
	Easy Staph	13
	Tempo STA	13
	Rapid Staph	2
	Other	3
Preparation	Home made	70
	Ready to use not pre-poured	128
	Ready to use, plate, film, cards	110
Plating method	Surface	160
	Pour	134
	Culture medium for card	13
1st dilution retained	-1	123
	-2	165
	-3	4
	1/40	7
	1/400	2
Incubation temperature	37±1°C	304
	30°C	3
Incubation duration	41-49 h	212
	18-25 h	94
	72 h	1
Confirmation test	None	180
	Staphylo-coagulase	95
	Clumping factor	11
	DNase	11
	Other	8

[5] *Similar method to NF V 08-057-1 according to ONSSA.*

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2.12. LISTERIA MONOCYTOGENES – ENUMERATION

248 laboratories performed the enumeration.

RESUSCITATION

195 laboratoires announce the realization of a resuscitation step.
The average duration for these laboratories is **45.5 min** with a standard deviation of 22.1 min.
The average temperature for these laboratories is **21.5°C** with a standard deviation of 3.4°C.

Parameters	Mode	Nb laboratories
Method	NF EN ISO 11290-2	71
	AFNOR AES-10/05-09/06	70
	AFNOR BKR-23/05-12/07	44
	AFNOR BRD-07/05-09/01	27
	NM ISO 11290-2	20
	AFNOR BRD-07/17-01/09	8
	Other	8
Resuscitation step	Yes	97
	No	139
Resuscitation medium	Buffered Peptone Water	70
	Fraser base	15
	Other	8
Enumeration medium	ALOA Count	118
	Compass Listeria	67
	Rapid Lmono	29
	AL Agar	16
	OCLA	6
	Palcam	2
	Other	7
Preparation	Home made	34
	Ready to use not pre-poured	55
	Ready to use, plate, film, card	159
Plating method	Surface	203
	Pour	44
	Culture medium for card	0

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Parameters	Mode	Nb laboratories
1st dilution retained	-1	206
	-2	34
	-3	1
	-7	1
Incubation temperature	37°C	246
	30°C	1
	22°C	1
Incubation duration	40-48 h	202
	22-24 h	45
	1 h	1
Confirmation test	None	42
	Biochemical	150
	Biochemical + CAMP	36
	Other	11
Nb of colonies tested per plate	1	72
	2-4	20
	5	109
	6	1
	150	1

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2.13. SALMONELLA – DETECTION

315 laboratories performed the detection.
Methods used by laboratories are clarified in the following table :

Parameter	Mode	Nb laboratories
Method	NF EN ISO 6579-1	94
	AFNOR BKR 23/07-10/11 (IRIS Salmonella)	72
	AFNOR BRD 07/11-12/05 (Rapid Salmonella)	37
	NM ISO 6579-1	31
	AFNOR BIO 12/16-09/05 (VIDAS Easy Salmonella)	25
	AFNOR BIO 12/41-03/17 (SALMA One day)	24
	AFNOR BIO 12/32-10/11 (VIDAS SPT)	19
	Other	13

No detail of methodology was asked to laboratories using other methods than NF EN ISO 6579-1 and NM ISO 6579-1 methods and proposed in the questionnaire.

You will find below a short description of these methods :

Method	Pre-enrichment	Enrichment	Isolation
AFNOR BIO 12/16-09/05 **VIDAS Easy Salmonella**	BPW / 37°C - 16/20h	SX2 / 41,5°C - 22/26h	Chrom ID / 37°C - 24h
AFNOR BIO 12/32-10/11 **VIDAS SPT**		BPW + Salmonella supplement / 41,5°C - 18/24h	Chrom ID / 37°C - 24h
AFNOR BKR 23/07-10/11 **IRIS Salmonella**		IRIS Salmonella Enrichment / 41,5°C - 18±2h	IRIS / 37°C - 24±3h
AFNOR BRD 07/11-12/05 **Rapid Salmonella**		BPW + Salmonella capsule / 41,5°C - 18±2h	Rapid Salmonella / 37°C - 24±2h
AFNOR BIO 12/41-03/17 **SALMA One day**		BPW + Salmonella supplement / 41.5°C – 16/24h	SALMA / 37°C - 24±3h

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The detail of the methodology followed by 125 laboratories using NF EN ISO 6579-1 and NM ISO 6579-1 method, and the 13 laboratories using another method, is clarified in the following table :

Parameter	Mode	Nb laboratories
Method	NF EN ISO 6579-1	94
	NM ISO 6579-1	31
	Other	13
Pre-enrichment medium	Buffered Peptone Water	124
	Other	7
Pre-enrichment temperature	35-37°C	124
	41-42.5°C	5
	22°C	1
Pre-enrichment duration	18-20 h	90
	22-24 h	39
	42 h	1
Enrichment medium	RVS	116
	MKTTn	111
	Selenite-cystine broth	22
	Other	7
Isolation medium	XLD	111
	Hektoen	37
	Bismuth Sulfate	18
	ASAP	14
	Rapid Salmonella	13
	IRIS Salmonella agar	13
	GVB	11
	Brilliance Salmonella	7
	SS	7
	Compass Salmonella	4
	Rambach	3
	Other	16
Confirmation test	Biochemical	48
	Biochemical + serological agglutination	75
	Other	5

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2.14. LISTERIA MONOCYTOGENES – DETECTION

279 laboratories performed the detection.

Parameter	Mode	Nb laboratories
Method	AFNOR AES 10/03-09/00 (ALOA one day)	65
	NF EN ISO 11290-1	62
	AFNOR BKR 23/02-11/02 (Compass L. mono)	53
	AFNOR BRD 07/04-09/98 (Rapid' L. mono)	29
	NM ISO 11290-1	25
	AFNOR BIO 12/11-03/04 (VIDAS LMO2-37°C)	11
	AFNOR BIO 12/27-02/10 (VIDAS LMX)	7
	AFNOR BRD 07/16-01/09 (Agar Listeria)	6
	AFNOR BIO 12/02-06/94 (VIDAS Listeria)	6
	AFNOR UNI 03/04-04/05 (Listeria Precis)	2
	Other	13

No detail of methodology was asked to laboratories using other method than NF EN ISO 11290-1 and NM ISO 11290-1 methods and proposed in the questionnaire.

You will find below a short description of these methods :

Méthod	Primary enrichment		Secondary enrichment		Isolation
	Medium	Incubation	Medium	Incubation	
AFNOR BRD 07/04-09/98 **Rapid' L. mono**	Fraser 1/2	30°C - 24±2h			Rapid L'mono 37°C – 24h
AFNOR BIO 12/02-06/94 **VIDAS Listeria**	Fraser 1/2	37°C - 26/30h	Fraser	30°C - 24/26h	Palcam et Oxford 37°C – 24h
AFNOR BIO 12/27-02/10 **VIDAS LMX**	LMX	37°C - 26/30h			ChromID 37°C – 24h
AFNOR BIO 12/11-03/04 **VIDAS LMO2 (37°C)**	Fraser 1/2	30°C - 24/26h	Fraser	37°C - 24/26h	ChromID 37°C – 24h
AFNOR AES 10/03-09/00 **ALOA one day**	Fraser 1/2	30°C - 24±2h			ALOA One Day 37°C – 24/48h
AFNOR BKR 23/02-11/02 **Compass L. mono**	Fraser 1/2	30°C - 24±2h			Compass Listeria Agar 37°C – 24h
AFNOR BRD 07/16-01/09 **Agar Listeria**	Fraser 1/2	30°C - 24±2h			Agar Listeria 37°C – 24h
AFNOR UNI 03/04-04/05 **Listeria Precis**	One Broth Listeria	30°C - 24±2h			Brilliance Listeria 37°C – 24h

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The detail of the methodology followed by 87 laboratories using NF EN ISO 11290-1 and NM ISO 11290-1 methods, and the 13 laboratories using another method, is clarified in the following table :

Parameter	Mode	Nb laboratories
Method	NF EN ISO 11290-1	62
	NM ISO 11290-1	25
	Other	13
Primary enrichment medium	Half-Fraser	89
	One broth Listeria	3
	Other	8
Primary enrichment temperature	30°C	95
	37°C	5
Primary enrichment duration	20-26 h	100
Secondary enrichment medium	Fraser	85
	Other	2
Secondary enrichment temperature	37±1°C	82
	30°C	4
Secondary enrichment duration	20-26 h	69
	48 h	16
	72 h	1
Isolation medium	Palcam	63
	Ottaviani et Agosti	57
	Compass Listeria	29
	Oxford	15
	Rapid L'mono	7
	Brilliance Listeria	3
	Other	2
Isolation temperature	37±1°C	96
	30°C	1
Isolation duration	40-48 h	65
	22-24 h	32
Confirmation test	None	3
	Biochemical	61
	Biochemical + CAMP	28
	Other	5
Nb of colonies per plate	1	25
	2-4	11
	5	51

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3. ASSESSMENT OF PERFORMANCE (INDIVIDUEL REPORTS)

3.1.PERFORMANCES IN ENUMERATION

Performance is assessed on two criteria : **precision and trueness**.
The assigned value of the contamination used to assess the trueness and the reference value for the assessment of the precision are consensual values obtained with the results of all the participants. These values are obtained by robust estimation methods in order to eliminate influence of aberrant results. However some results are excluded of the statistical analysis. That is the case when laboratories do not give results for all contaminated units, when results are "less than CFU/g", when samples are analyzed after the deadline (time of receipt > 4 days after sending or time of analysis >15 days after sending) or when this information is not specified.

A statistical analysis has also be done to highlight potential relations between techniques used (delay of analysis, preservation temperature, preparation of the initial suspension, homogenization technique, resuscitation conditions , method used, media used, manufacturers of media, preparation mode, plating method, incubation conditions) and results obtained. We need to clarify that this statistical link is not involved in a cause - effect relationship. Indeed, this link may be due to a not documented factor.

When a significant statistical link is identified between use of a technique and the obtained results, the assessment of performance is done considering the influence of one or several factors involved if their effect translates into a contamination's difference higher than 0.15 log CFU/g for non-selective media or higher than 0.30 log CFU/g for selective media (these limits match with productivity limits of culture media usually recommended in the standard NF EN ISO 11133).

PRECISION
The precision reflects the repeatability (or reproducibility intra-laboratory) of your work.

The standard deviation of your results, *s*, is compared to the robust estimation of the standard deviation (reference standard deviation of precision), *s**, obtained with algorithm S from the standard ISO 13528 applied to all standard deviations obtained by laboratories included in the statistical analysis.

An index score is then calculated using the following formula : $i = (k-1) \cdot \frac{s^2}{s^{*2}}$ (with k, number of contaminated units and retained in the statistical analysis, usually 5).

The standard ISO 13528 do not provide warning and action limits for this score, so its interpretation is left to your discretion.

As an indicator, we suggest following values by analogy with those indicated for the evaluation of trueness.
For k=5, a score lower than 0.1 or higher than 18 may be considered as an action signal and a score lower than 0.45 or higher than 11.5 may be considered as a warning signal.
For k=4, a score lower than 0.03 or higher than 15.5 may be considered as an action signal and a score lower than 0.2 or higher than 9.5 may be considered as a warning signal.
For k=3, a score lower than 0.003 or higher than 13.2 may be considered as an action signal and a score lower than 0.05 or higher than 7.5 may be considered as a warning signal.
For k=2, a score lower than 0.000002 or higher than 10.3 may be considered as an action signal and a score lower than 0.0008 or higher than 5.2 may be considered as a warning signal.

TRUENESS

The trueness reflects the closeness of the mean of your results to the contamination's assigned value of samples. It has been evaluated for all enumerated flora.

The mean of your results in log CFU/g, *m* (on contaminated units and included in the statistical analysis), is compared to the contamination's assigned value, m_{pt}, obtained with algorithm A from the standard ISO 13528 applied to all laboratories mean included in the statistical analysis.

A z score is then calculated with the following formula : $z = \frac{m - m_{pt}}{\sigma_{pt}}$, where σ_{pt} is the standard deviation for proficiency assessment (robust estimation of the standard deviation obtained by participants).

The standard ISO 13528 specifies that *z* score lower than -3 or higher than +3 must be considered as an action signal and that a z score lower than -2 or higher than +2 must be considered as a warning signal.

In this report, we specify, estimations of interlaboratories standard deviation for enumerations proposed as well as reproducibility standard deviation or global standard deviation for the test (parameters including interlaboratories variability and the variability of the precision).

INDIVIDUAL REPORTS – FOR EACH CRITERIA YOU FIND THE FOLLOWING INFORMATIONS

- your results in logarithm base 10 (-1 when the answer is < limit and NaN when there is no answer). Comment : the presentation order of your results does not necessarily correspond to the order you sent them, this order is the same for all the flora.
- histogram for the studied parameter (laboratories standard deviations for the precision and laboratorie's means for the trueness) with an asterisk indicating the location of your result,
- standard deviation (precision) or mean (trueness) of your results (on contaminated units and retained in the statistical analysis),
- the method declared in your results input,
- when necessary, your group in relation to the technique used,
- precision score or z score,
- number of laboratories which made analysis (and belonging to your group),
- number of laboratories included in the statistical analysis,
- reference standard deviation for the precision or assigned value of the contamination and standard deviation aptitude assessment (trueness),
- number of laboratories with a satisfactory signal,
- number of laboratories with a warning signal,
- number of laboratories with an action signal.

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3.1.1. MICROORGANISMS AT 30°C

A significant "effect" of the incubation duration has been highlighted. This effect results in a contamination's difference lower than 0.15 log CFU/g, then results have been gathered in one group :

Microorganisms at 30°C	
Assigned value of the contamination (log CFU/g)	4.910
Assigned value uncertainty (log CFU/g)	0.0060
Standard deviation for proficiency assessment (log CFU/g)	0.0853
Standard deviation for precision (log CFU/g)	0.0564
Interlaboratory's standard deviation (log CFU/g)	0.0815
Reproducibility standard deviation (log CFU/g)	0.0991

3.1.2. ENTEROBACTERIACEAE

A significant "effect" of the manufacturer and the retained dilution has been highlighted. This effect results in a contamination's difference higher than 0.3 log CFU/g, then results have been gathered in two groups :

Enterobacteriaceae	Group 1	Group 2
Assigned value of the contamination (log CFU/g)	3.001	3.592
Assigned value uncertainty (log CFU/g)	0.0254	0.0168
Standard deviation for proficiency assessment (log CFU/g)	0.1888	0.1872
Standard deviation for precision (log CFU/g)	0.0907	
Interlaboratory's standard deviation (log CFU/g)	0.1844	0.1828
Reproducibility standard deviation (log CFU/g)	0.2055	0.2040

3.1.3. TOTAL COLIFORMS

A significant "effect" of the culture media, manufacturer and the retained dilution has been highlighted. This effect results in a contamination's difference higher than 0.3 log CFU/g, then results have been gathered in three groups :

Total coliforms	Group 1	Group 2	Group 3
Assigned value of the contamination (log CFU/g)	2.609	2.901	3.426
Assigned value uncertainty (log CFU/g)	0.0591	0.0323	0.0299
Standard deviation for proficiency assessment (log CFU/g)	0.2411	0.2161	0.2727
Standard deviation for precision (log CFU/g)	0.1051		
Interlaboratory's standard deviation (log CFU/g)	0.2365	0.2109	0.2686
Reproducibility standard deviation (log CFU/g)	0.2588	0.2356	0.2884

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3.1.4. THERMOTOLERANT COLIFORMS

A significant "effect" of the culture media, manufacturer and the retained dilution has been highlighted. This effect results in a contamination's difference higher than 0.3 log CFU/g, then results have been gathered in three groups :

Thermotolerant coliforms	Group 1	Group 2	Group 3
Assigned value of the contamination (log CFU/g)	2.629	2.837	3.350
Assigned value uncertainty (log CFU/g)	0.0505	0.0375	0.0357
Standard deviation for proficiency assessment (log CFU/g)	0.2739	0.2304	0.2884
Standard deviation for precision (log CFU/g)		0.1056	
Interlaboratory's standard deviation (log CFU/g)	0.2698	0.2255	0.2845
Reproducibility standard deviation (log CFU/g)	0.2896	0.2488	0.3033

3.1.5. *ESCHERICHIA COLI*

A significant "effect" of the preparation mode has been highlighted. This effect results in a contamination's difference lower than 0.3 log CFU/g, then results have been gathered in one group :

Escherichia coli	
Assigned value of the contamination (log CFU/g)	2.442
Assigned value uncertainty (log CFU/g)	0.0138
Standard deviation for proficiency assessment (log CFU/g)	0.1890
Standard deviation for precision (log CFU/g)	0.1154
Interlaboratory's standard deviation (log CFU/g)	0.1818
Reproducibility standard deviation (log CFU/g)	0.2153

3.1.6. ANAEROBIC SULFITE-REDUCING BACTERIA

Only units n°3, 4 and 5 were artificially contaminated.

A significant "effect" of the retained dilution has been highlighted. This effect results in a contamination's difference lower than 0.3 log CFU/g, then results have been gathered in one group :

Anaerobic sulfite-reducing bacteria	
Assigned value of the contamination (log CFU/g)	2.475
Assigned value uncertainty (log CFU/g)	0.0148
Standard deviation for proficiency assessment (log CFU/g)	0.1806
Standard deviation for precision (log CFU/g)	0.1242
Interlaboratory's standard deviation (log CFU/g)	0.1658
Reproducibility standard deviation (log CFU/g)	0.2071

Comment :
- 4 laboratories detected ASR in unit n°1 non-artificially contaminated by *C. perfringens* with a contamination level from 80 to 5900 CFU/g.
- 5 laboratories detected ASR in unit n°2 non-artificially contaminated by *C. perfringens* with a contamination level from 100 to 8600 CFU/g.

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3.1.7. *CLOSTRIDIUM PERFRINGENS*

Only units n°3, 4 and 5 were artificially contaminated.

None significant effect of the analysis technique has been highlighted.

Clostridium perfringens	
Assigned value of the contamination (log CFU/g)	2.458
Assigned value uncertainty (log CFU/g)	0.0199
Standard deviation for proficiency assessment (log CFU/g)	0.2156
Standard deviation for precision (log CFU/g)	0.1183
Interlaboratory's standard deviation (log CFU/g)	0.2045
Reproducibility standard deviation (log CFU/g)	0.2362

Comment :
- 4 laboratories detected *C. perfringens* in unit n°1 non-artificially contaminated by *C. perfringens* with a contamination level from 510 to 5200 CFU/g.
- 3 laboratories detected *C. perfringens* in unit n°2 non-artificially contaminated by *C. perfringens* with a contamination level from 10 to 1600 CFU/g.

3.1.8. COAGULASE POSITIVE STAPHYLOCOCCI

A significant "effect" of the preparation method has been highlighted. This effect results in a contamination's difference lower than 0.3 log CFU/g, then results have been gathered in one group :

Coagulase positive Staphylococci	
Assigned value of the contamination (log CFU/g)	3.410
Assigned value uncertainty (log CFU/g)	0.0112
Standard deviation for proficiency assessment (log CFU/g)	0.1529
Standard deviation for precision (log CFU/g)	0.0842
Interlaboratory's standard deviation (log CFU/g)	0.1482
Reproducibility standard deviation (log CFU/g)	0.1704

3.1.9. *LISTERIA MONOCYTOGENES*

Only units n°3, 4 and 5 were artificially contaminated.

A significant "effect" of the culture media, preparation mode and the retained dilution has been highlighted. This effect results in a contamination's difference lower than 0.3 log CFU/g, then results have been gathered in one group :

Listeria monocytogenes	
Assigned value of the contamination (log CFU/g)	3.093
Assigned value uncertainty (log CFU/g)	0.0085
Standard deviation for proficiency assessment (log CFU/g)	0.1055
Standard deviation for precision (log CFU/g)	0.0696
Interlaboratory's standard deviation (log CFU/g)	0.0975
Reproducibility standard deviation (log CFU/g)	0.1198

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3.2.PERFORMANCES IN DETECTION

The performance is assessed by the capacity to detect only samples contaminated by *Salmonella* and *Listeria monocytogenes* (no false positive or false negative results).

3.2.1. DETECTION – *SALMONELLA*

Only units n°4 and 5 were artificially contaminated.
303 laboratories obtained correct results.
9 laboratories obtained false positive results (respectively 4, 5 and 1 false-positive for units n°1, 2 and 3).
6 laboratories obtained false negative results (respectively 5 and 2 false-negative for units n°4 and 5).

3.2.2. DETECTION – *LISTERIA MONOCYTOGENES*

Only units n°3, 4 and 5 were artificially contaminated.
271 laboratories obtained correct results.
5 laboratories obtained false positive results (respectively 3 and 3 false-positive for units n°1 and 2).
5 laboratories obtained false negative results (respectively 2, 3 and 2 false-negative for units n°3, 4 and 5).

3.3.EVOLUTION OF PERFORMANCE

You will find, on each page of your performance's assessment, a graph representing evolution of it on different tests since the 49th scheme.

In order to interpret your control card with z scores, you can refer to the standard ISO 13528 §10.8.2.2, explaining the 3 « out of control » situations :

- Just one overtaking of the action limit (z<-3 or z>3),
- 2 consecutives z scores out of 3 overtaking of the warning limit (2<z<3 or -3<z<-2),
- 6 consecutives z scores regularly increasing or decreasing.

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