EXPERTISE AND SERVICE PROVISION
QUALITY OF LABORATORIES

EXTERNAL QUALITY ASSESSMENT
IN VETERINARY DIAGNOSIS

DEFINITIVE GLOBAL REPORT

Proficiency Testing in Veterinary Diagnosis
Q FEVER

SURVEY 2020/5

Sciensano/PT VET QFEVER/1-E

Expertise and service provision
Quality of laboratories
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A preliminary version of this report was submitted to the National reference laboratory: 21/09/2020

Authorization to release the report: By Bernard China, scheme coordinator, on 29/09/2020.

Bernard China

All the reports are also available on our webpage:
https://www.wiv-isp.be/QML/activities/PT%20VET/nl/originaux/rapports_annee.htm
https://www.wiv-isp.be/QML/activities/PT%20VET/fr/originaux/rapports_annee.htm

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Introduction

This survey was dedicated to the detection of antibodies specific to *Coxiella burnetii*, the agent of Q Fever by ELISA on serum and on milk samples.

The samples

The samples were prepared by the National Reference Laboratory, Veterinary Bacteriology, Scientific Directorate infectious diseases in animals, Sciensano.

A. Serum serology

Homogeneity

For Serum ELISA, 5 different lyophilised serum samples were used:
PT2020QFVSERNS1; PT2020QFVSERNS2; PT2020QFVSERPS1; PT2020QFVSERPS2
PT2020QFVSERPS3.
The homogeneity of the samples were tested by the NRL before the survey.
The samples were considered as homogeneous.

Target Values

The target value was determined by the NRL based on the homogeneity tests.
PT2020QFVSERNS1 and PT2020QFVSERNS2 are negative.
PT2020QFVSERPS1, PT2020QFVSERPS2 and PT2020QFVSERPS3 are positive.

Stability

The stability was determined by comparison of the pre-survey results and the results obtained by the NRL during and after the survey. The samples were considered as stable.

The participants

6 laboratories participated to the Q Fever serum survey:
Sciensano ; Arsia (Ciney) , DGZ (Torhout), Gezondheihsdienst voor Dieren (NL), Animal and Plant Health Agency (UK), Anses-SOPHIA ANTIPOLIS (Fr)

Randomisation and panel composition

Since a specific number has been assigned to each laboratory, the randomisation has been performed as follow:

Laboratory	Group 1 97504, 97508, 97520	Group 2 97507, 97519, 97523
Sample Order		
QF 2001	PT2020QFVSERNS1	PT2020QFVSERNS2
QF 2002	PT2020QFVSERNS1	PT2020QFVSERNS2
QF 2003	PT2020QFVSERNS1	PT2020QFVSERNS2
QF 2004	PT2020QFVSERNS1	PT2020QFVSERNS2
QF 2005	PT2020QFVSERPS1	PT2020QFVSERPS2
QF 2006	PT2020QFVSERPS2	PT2020QFVSERPS3
QF 2007	PT2020QFVSERPS1	PT2020QFVSERPS3
QF 2008	PT2020QFVSERPS2	PT2020QFVSERPS1
QF 2009	PT2020QFVSERPS1	PT2020QFVSERPS2
QF 2010	PT2020QFVSERPS2	PT2020QFVSERPS1
QF 2011	PT2020QFVSERPS1	PT2020QFVSERPS3
QF 2012	PT2020QFVSERPS3	PT2020QFVSERPS3
QF 2013	PT2020QFVSERPS3	PT2020QFVSERPS1
QF 2014	PT2020QFVSERPS3	PT2020QFVSERPS2
QF 2015	PT2020QFVSERPS3	PT2020QFVSERPS2
QF 2016	PT2020QFVSERPS2	PT2020QFVSERPS1
QF 2017	PT2020QFVSERNS2	PT2020QFVSERNS1
QF 2018	PT2020QFVSERNS2	PT2020QFVSERNS1
QF 2019	PT2020QFVSERNS2	PT2020QFVSERNS1
QF 2020	PT2020QFVSERNS2	PT2020QFVSERNS1

The panel was constituted of 20 lyophilised samples to be reconstituted in 1 mL.

B. Milk Serology

Homogeneity

5 different samples were used:
PT2020QFVSERNM1, PT2020QFVSERNM2, PT2020QFVSERPM1, PT2020QFVSERPM2 and PT2020QFVSERPM3
The homogeneity of the samples were tested by the NRL on 10 exemplars of each sample.
The samples were considered as homogeneous.

The participants

3 laboratories participated to the Q Fever Milk Serology survey: Sciensano, Arsia (Ciney), Gezondheihsdienst voor Dieren (NL)

Target values

The target values were determined by the NRL using the homogeneity results.
PT2020QFVSERNM1, PT2020QFVSERNM2 and PT2020QFVSERNM3 are considered as negative.
PT2020QFVSERPM1 and PT2020QFVSERPM2 are considered as positive.

<u>Stability</u>

The samples were tested before, during and after the survey. The results were compared and the samples were considered as stable.

<u>Randomisation and panel composition</u>

Since a specific number has been assigned to each laboratory, the randomisation has been performed as follow:

Laboratory	Group 1 97504	Group 2 97507 and 97519
Sample Order		
QF 2001 Milk	PT2020QFVSERNM2	PT2020QFVSERNM1
QF 2002 Milk	PT2020QFVSERPM1	PT2020QFVSERPM2
QF 2003 Milk	PT2020QFVSERNM2	PT2020QFVSERNM1
QF 2004 Milk	PT2020QFVSERPM1	PT2020QFVSERPM2
QF 2005 Milk	PT2020QFVSERNM2	PT2020QFVSERNM1
QF 2006 Milk	PT2020QFVSERPM1	PT2020QFVSERPM2
QF 2007 Milk	PT2020QFVSERNM2	PT2020QFVSERNM1
QF 2008 Milk	PT2020QFVSERPM1	PT2020QFVSERPM2
QF 2009 Milk	PT2020QFVSERPM3	PT2020QFVSERPM3
QF 2010 Milk	PT2020QFVSERNM1	PT2020QFVSERNM2
QF 2011 Milk	PT2020QFVSERPM3	PT2020QFVSERPM1
QF 2012 Milk	PT2020QFVSERNM1	PT2020QFVSERNM2
QF 2013 Milk	PT2020QFVSERPM2	PT2020QFVSERPM1
QF 2014 Milk	PT2020QFVSERNM1	PT2020QFVSERNM2
QF 2015 Milk	PT2020QFVSERPM2	PT2020QFVSERPM1
QF 2016 Milk	PT2020QFVSERNM1	PT2020QFVSERNM2
QF 2017 Milk	PT2020QFVSERPM2	PT2020QFVSERPM1
QF 2018 Milk	PT2020QFVSERPM3	PT2020QFVSERPM3
QF 2019 Milk	PT2020QFVSERPM3	PT2020QFVSERPM3
QF 2020 Milk	PT2020QFVSERPM2	PT2020QFVSERPM3

The Q fever milk serology panel consisted of 20 lyophilised milk samples to be reconstituted in 500 ul.

Survey Timeline

Transfer of the samples from NRL to QL: 19/05/2020
Randomization of the samples by QL: 21/05/2020
Sending samples to participants: 25/05/2020. The samples were sent on dry ice.
Deadline for encoding the results: 30/06/2020
Preliminary report: 14/07/2020

Results

1.Sera

1.1.Results per sample

6 laboratories encoded results giving 6 datasets.

Table R1. Results per sample

Sample ID	Expected result	Number of repetitions (total results)	Observed result
PT2020QFVSERNS1	Negative	4 (24)	24 negative results
PT2020QFVSERNS2	Positive	4 (24)	24 negative results
PT2020QFVSERPS1	Positive	4 (24)	24 positive results
PT2020QFVSERPS2	Positive	4 (24)	23 positive results 1 negative results
PT2020QFVSERPS3	Positive	4 (24)	23 positive results 1 negative result

On 120 encoded results, 118 (98.3%) were correct. 2 false negative results were encoded.

1.2.Used methods

Table R2. Results per method

Method	N	NR	NCR	%	FP	FN
PrioCHECK Ruminant Q Fever Ab Plate Kit	5	100	98	98	0	2
LSIvet Ruminant Milk/serum Q fever*	1	20	20	100	0	0
Total	6	120	118	98.3	0	2

NR: number of results, NCR: Number of correct results, FP:false positive, FN: false negative.
*Since 04/2017, the kit is called PrioCHECK and the last kit of the series LSIvet expired 08/2018.

1.3. Results per laboratory

Table R3. Results per laboratory

Sample	Rep	Lab ID 97504 PrioCHECK Ruminant Q Fever Ab Plate Kit	97507 LSIvet Ruminant Milk/serum Q fever	97508 PrioCHECK Ruminant Q Fever Ab Plate Kit	97519	97520	97523
PT2020QFVSERNS1	R1	NEG	NEG	NEG	NEG	NEG	NEG
	R2	NEG	NEG	NEG	NEG	NEG	NEG
	R3	NEG	NEG	NEG	NEG	NEG	NEG
	R4	NEG	NEG	NEG	NEG	NEG	NEG
2	R1	NEG	NEG	NEG	NEG	NEG	NEG
	R2	NEG	NEG	NEG	NEG	NEG	NEG
	R3	NEG	NEG	NEG	NEG	NEG	NEG
	R4	NEG	NEG	NEG	NEG	NEG	NEG
PT2020QFVSERPS1	R1	POS	POS	POS	POS	POS	POS
	R2	POS	POS	POS	POS	POS	POS
	R3	POS	POS	POS	POS	POS	POS
	R4	POS	POS	POS	POS	POS	POS
PT2020QFVSERPS2	R1	POS	POS	POS	POS	POS	POS
	R2	POS	POS	POS	POS	POS	POS
	R3	POS	POS	POS	POS	POS	POS
	R4	POS	POS	POS	POS	POS	NEG
PT2020QFVSERPS3	R1	POS	POS	POS	POS	POS	POS
	R2	POS	POS	POS	POS	POS	POS
	R3	POS	POS	POS	POS	POS	POS
	R4	POS	POS	POS	POS	POS	NEG
Score (/20)		20	20	20	20	20	18

2. Milk

The panel consisted of 20 samples (5 different samples and 4 repetitions of each): 12 positive and 8 negative.

2.1. Results per sample

3 laboratories encoded results.

Table R3. Result per sample

Sample	Expected result	Number of repetition	Observed result
PT2020QFVSERNM1	Negative	4	12 Negative
PT2020QFVSERNM2	Negative	4	12 Negative
PT2020QFVSERPM1	Negative	4	12 Positive
PT2020QFVSERPM1	Positive	4	12 Positive
PT2020QFVSERPM1	Positive	4	12 Positive

0n the 60 encoded results, 100% were correct.

2.2. Used methods

Table R4. Used methods

Method	N
PrioCHECK Ruminant Q Fever Ab Plate Kit	2
LSIvet Ruminant Milk/serum Q fever*	1

*:*Since 04/2017, the kit is called PrioCHECK and the last kit of the series LSIvet expired 08/2018.

ANNEXES

Annex 1.Quantitative data for serum

Sample PT2020QFVSERNS1

Table A1. Quantitative normalized values (%)

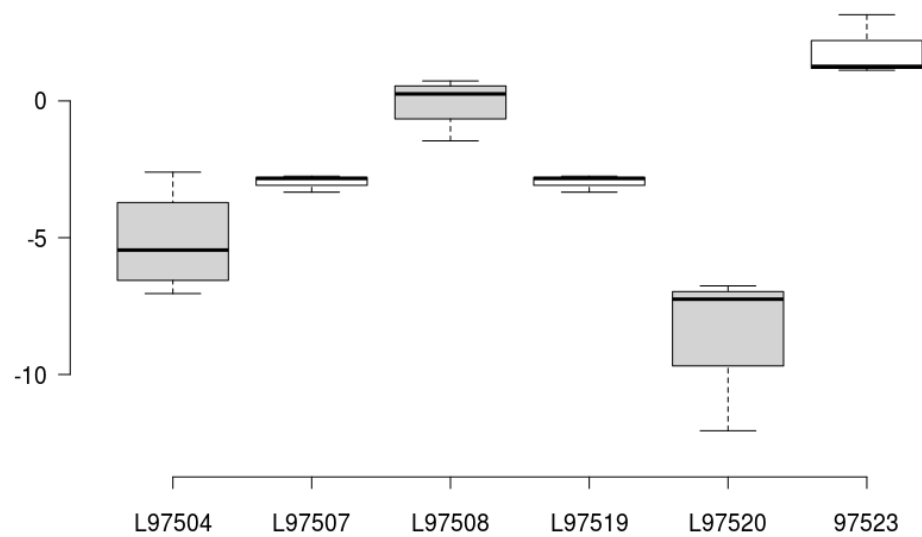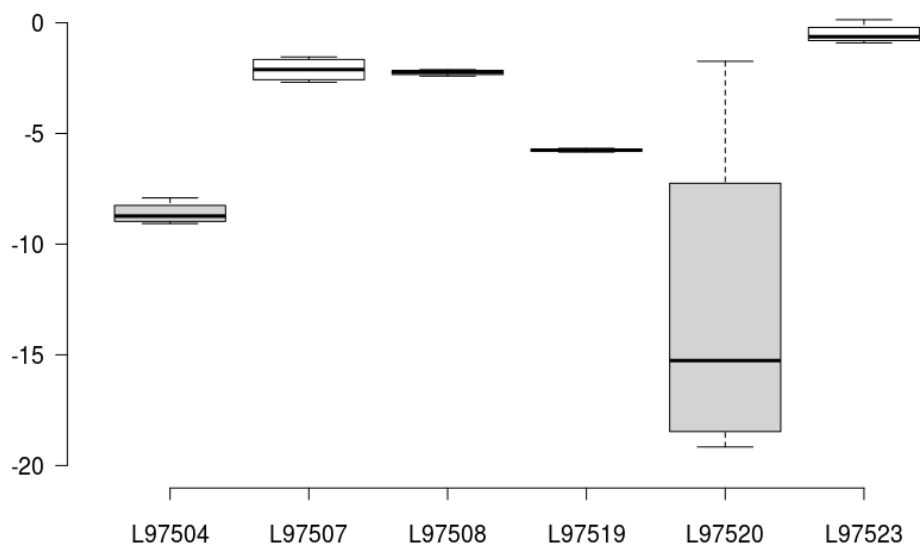| Lab ID	L97504	L97507	L97508	L97519	L97520	L97523
R1	-4,824	-2,752	-1,460	-2,752	-6,76	3,151
R2	-2,605	-2,836	0,365	-2,836	-12,056	1,261
R3	-7,043	-2,836	0,730	-2,836	-7,178	1,12
R4	-6,078	-3,336	0,146	-3,336	-7,317	1,261
mean	-5,137	-2,940	-0,055	-2,940	-8,328	1,698
SD	1,917	0,267	0,967	0,267	2,496746	0,971
CV (%)	-37,319	-9,082	-1766,771	-9,082	-29,981	57,163

Rn: repetition n

Figure A1. Boxplot dispersion of the results per participant for the sample PT2020QFVSERNS1

Sample PT2020QFVSERNS2

Table A2. Quantitative normalized values (%)

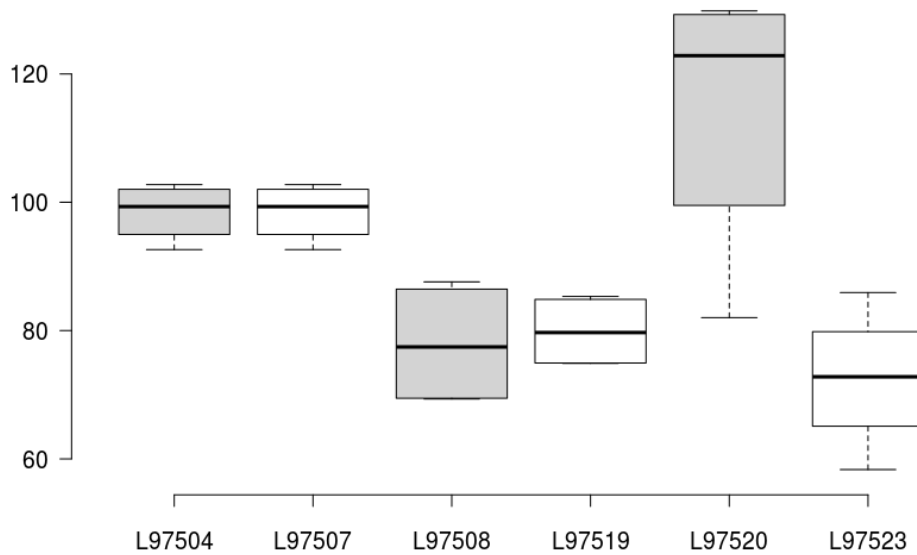| Lab ID	L97504	L97507	L97508	L97519	L97520	L97523
R1	-7,911	-1,543	-2,409	-5,755	-1,742	0,14
R2	-9,069	-1,771	-2,263	-5,755	-12,753	-0,56
R3	-8,876	-2,457	-2,190	-5,838	-19,164	-0,91
R4	-8,587	-2,686	-2,117	-5,671	-17,77	-0,7
Mean	-8,611	-2,114	-2,245	-5,755	-12,857	-0,508
SD	0,507	0,544	0,125	0,068	7,905	0,455
CV (%)	-5,885	-25,741	-5,554	-1,183	-61,483	-89,655

Rn: repetition n

Figure A2. Boxplot dispersion of the results per participant for the sample PT2020QFVSERNS2

Sample PT2020QVSERPS1

Table A3. Quantitative normalized results (%)

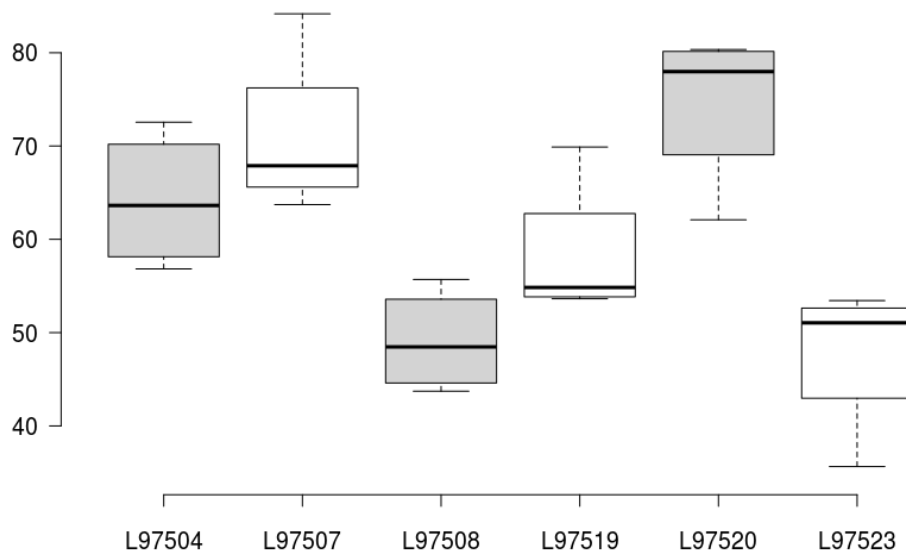| Lab ID	L97504	L97507	L97508	L97519	L97520	L97523
R1	101,302	101,302	69,562	74,979	82,021	85,924
R2	102,750	102,750	69,343	85,321	128,711	73,739
R3	97,347	97,347	85,328	84,404	129,826	71,849
R4	92,619	92,619	87,591	74,896	117,003	58,333
mean	98,505	98,505	77,956	79,900	114,390	72,461
SD	4,540	4,540	9,863	5,742	22,345	11,297
CV (%)	4,609	4,609	12,652	7,187	19,534	15,590

Rn: repetition n

Figure A3. Boxplot dispersion of the results per participant for the sample PT2020QFVSERPS1

Sample PT2020QFVSERPS2

Table A4. Quantitative normalized values (%)

Lab ID	L97504	L97507	L97508	L97519	L97520	L97523
R1	67,824	63,714	45,474	54,045	76,028	53,431
R2	72,552	84,171	43,723	55,630	79,93	51,821
R3	59,431	67,486	51,460	53,628	62,091	50,28
R4	56,826	68,286	55,693	69,892	80,348	35,644
mean	64,158	70,914	49,088	58,299	74,599	47,794
SD	7,303	9,060	5,511	7,777	8,563	8,202
CV (%)	11,383	12,776	11,226	13,339	11,478	17,160

Rn: repetition n

Figure A4. Boxplot dispersion of the results per participant for the sample PT2020QFVSERPS2.

Sample PT2020QFVSERPS3

Table A4. Quantitative normalized values (%)

Lab ID	L97504	L97507	L97508	L97519	L97520	L97523
R1	66,763	85,771	72,993	60,050	75,749	58,894
R2	68,307	78,229	74,745	58,549	93,031	62,185
R3	67,824	84,971	68,175	82,819	99,024	84,104
R4	66,763	81,086	58,029	62,052	93,031	-2,910
mean	67,414	82,514	68,485	65,867	90,209	50,568
SD	0,777	3,514	7,504	11,392	10,045	37,367
CV (%)	1,153	4,259	10,957	17,295	11,136	73,894

Rn: repetition n
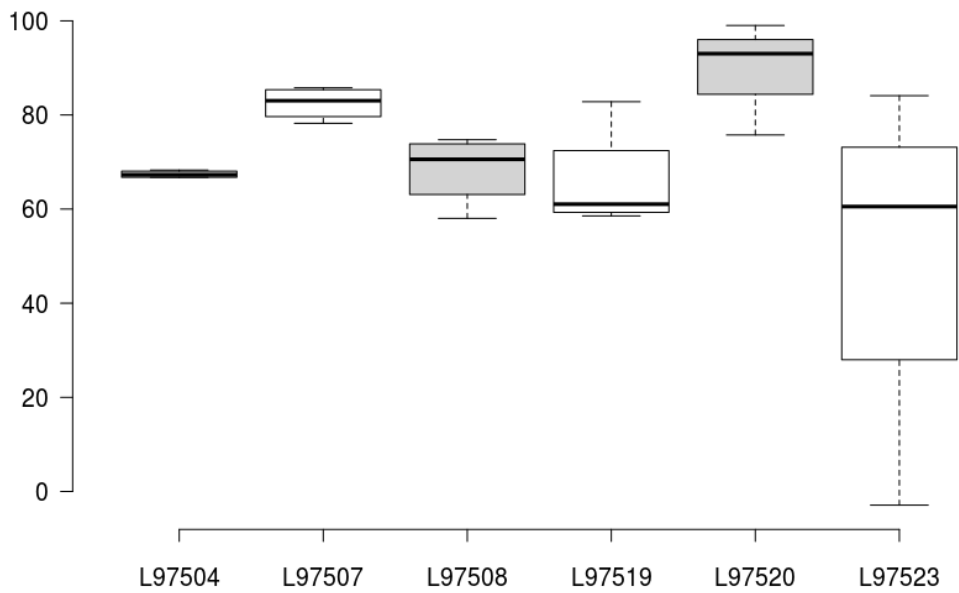
Figure A5. Boxplot dispersion of the results per participant for the sample PT2020QFVSERPS3

Annex 2. Quantitative data for milk

Sample PT2020QFVSERNM1

Table A6. Quantitative normalized value (%)

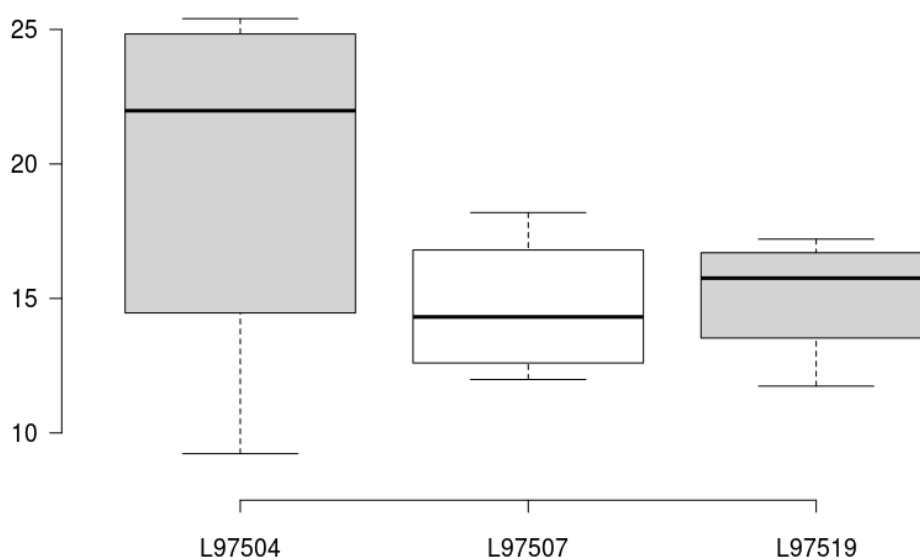| Lab ID	L97504	L97507	L97519
Method	PrioCHECK Ruminant Q Fever Ab Plate Kit	LSIvet Ruminant Milk/serum Q fever	PrioCHECK Ruminant Q Fever Ab Plate Kit
R1	-10,086	-7,141	-7,085
R2	-10,086	-6,494	-7,018
R3	-9,990	-6,042	-7,490
R4	-10,086	-7,076	-7,490
mean	-10,062	-6,688	-7,271
SD	0,048	0,520	0,255
CV (%)	-0,473	-7,770	-3,503

Rn: repetition n
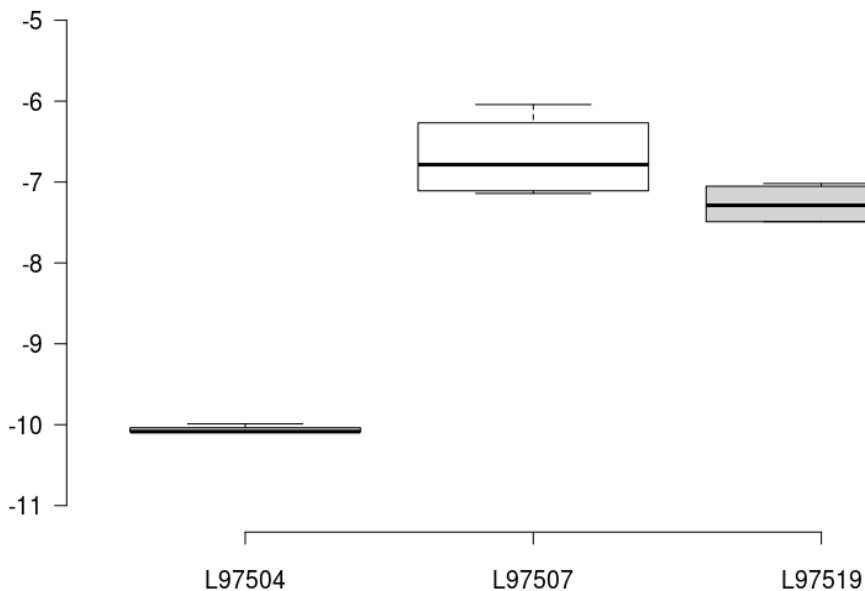
Figure A6. Boxplot dispersion of the results per participant for the sample PT2020QFVSERNM1

Sample PT2020QFVSERNM2

Table A7. Normalized quantitative results (%) per laboratory

Lab ID	L97504	L97507	L97519
Method	PrioCHECK Ruminant Q Fever Ab Plate Kit	LSIvet Ruminant Milk/serum Q fever	PrioCHECK Ruminant Q Fever Ab Plate Kit
R1	24,263	11,987	16,194
R2	9,229	18,191	17,206
R3	25,404	15,412	11,741
R4	19,696	13,215	15,317
mean	19,648	14,701	15,115
SD	7,371	2,724	2,378
CV (%)	37,514	18,528	15,733

Rn: repetition n

Figure A7. Boxplot dispersion of the results per participant for the sample PT2020QFVSERNM2

Sample PT2020QFVSERPM1

Table A8. Normalized quantitative results (%) per laboratory

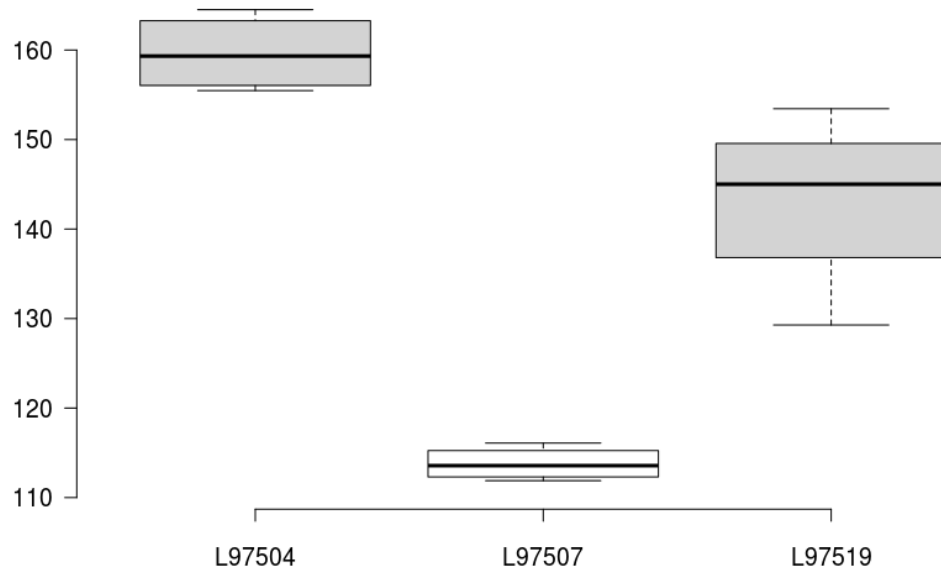| Lab ID	L97504	L97507	L97519
Method	PrioCHECK Ruminant Q Fever Ab Plate Kit	LSIvet Ruminant Milk/serum Q fever	PrioCHECK Ruminant Q Fever Ab Plate Kit
R1	96,004	82,811	102,767
R2	121,789	78,481	92,848
R3	109,800	82,229	101,957
R4	114,748	84,879	97,908
mean	110,585	82,100	98,870
SD	10,895	2,667	4,543
CV (%)	9,852	3,248	4,595

Rn: repetition n
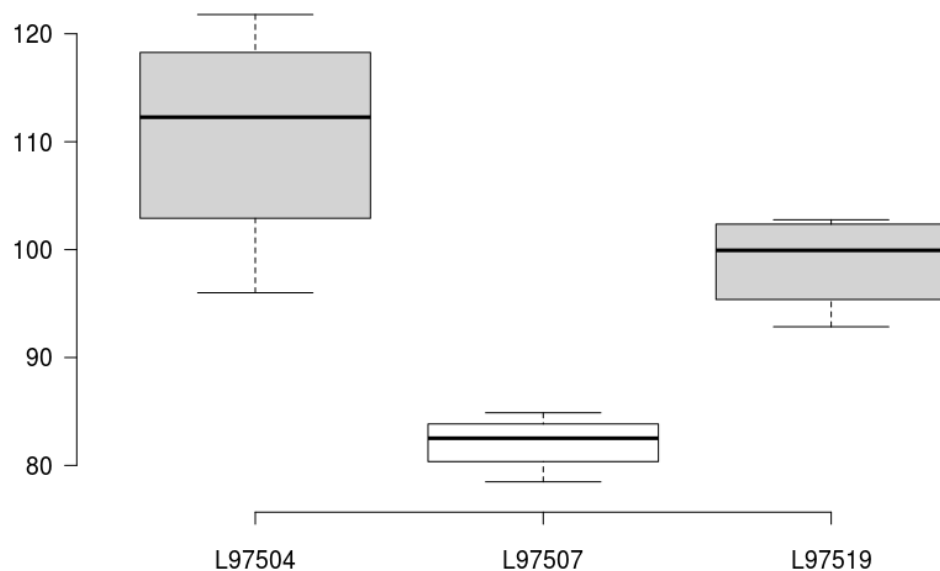
Figure A8. Boxplot dispersion of the results per participant for the sample PT2020QFVSERPM1

Sample PT2020QFVSERPM2

Table A9. Normalized quantitative values (%)

Lab ID	L97504	L97507	L97519
Method	PrioCHECK Ruminant Q Fever Ab Plate Kit	LSIvet Ruminant Milk/serum Q fever	PrioCHECK Ruminant Q Fever Ab Plate Kit
R1	162,036	116,090	145,682
R2	156,613	114,410	153,441
R3	164,510	111,890	144,332
R4	155,471	112,730	129,285
mean	159,657	113,780	143,185
SD	4,321	1,863	10,099
CV (%)	2,706	1,637	7,053

Rn: repetition n

Figure A9. Boxplot dispersion of the results per participant for the sample PT2020QFVSERPM2

Sample PT2020QFVSERPM3

Table A10. Normalized quantitative results per laboratory.

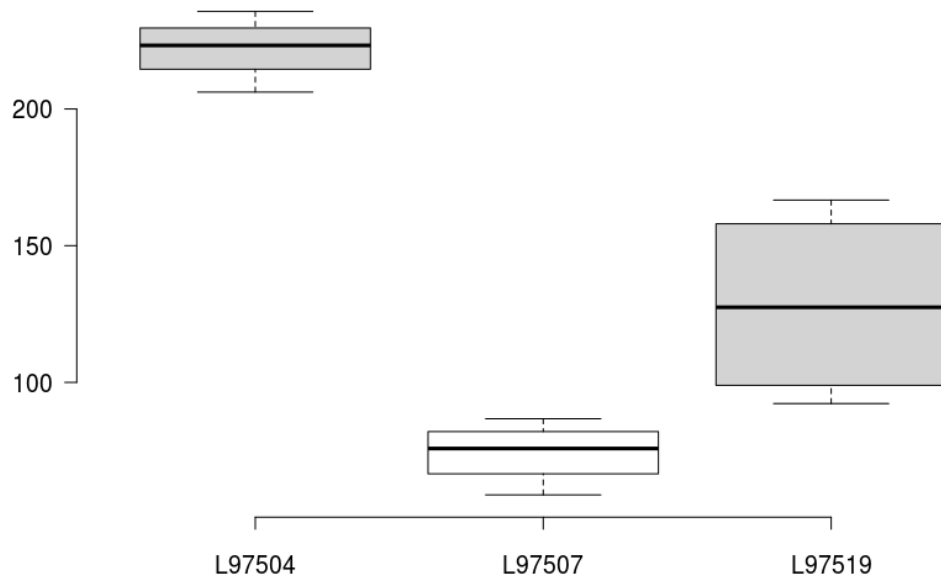| Lab ID	L97504	L97507	L97519
Method	PrioCHECK Ruminant Q Fever Ab Plate Kit	LSIvet Ruminant Milk/serum Q fever	PrioCHECK Ruminant Q Fever Ab Plate Kit
R1	222,931	74,281	92,240
R2	206,185	86,688	149,325
R3	223,597	58,837	166,667
R4	235,680	77,318	105,601
mean	222,098	74,281	128,458
SD	12,120	11,571	35,259
CV (%)	5,457	15,578	27,448

Rn: repetition n

Figure A10. Boxplot dispersion of the results per participant for the sample PT2020QFVSERPM3

Annex 3: additional information

PRELIMINARY REPORT

The preliminary report of this survey is available on our website via the following link:

https://www.wiv-isp.be/QML/activities/PT%20VET/fr/originaux/rapports_annee.htm

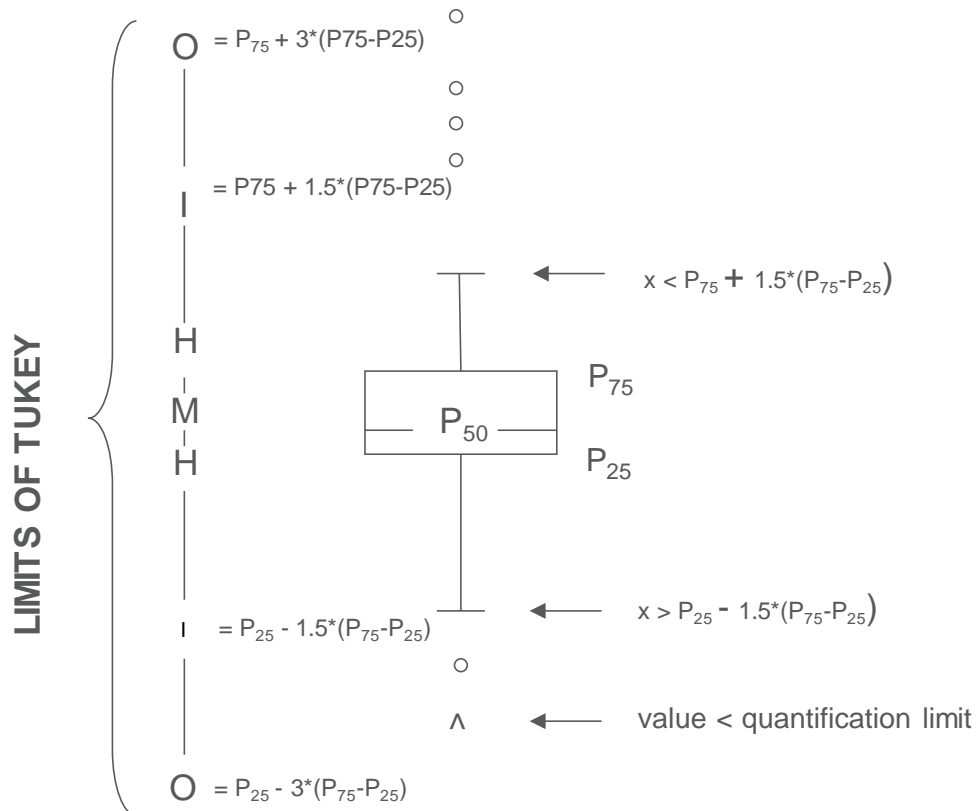The calendar for Proficiency Testing in Veterinary diagnosis is available on our website:

The link is:

https://www.wiv-isp.be/QML/activities/external_quality/calendar/calender_PT%20VET/_fr/Calendrier_2020-PT%20VET%202.htm

Graphical representation

Besides the tables with the results a "Box and whisker" plot is added. a rectangle ranging from percentile 25 (P_{25}) to percentile 75 (P_{75})

- a central line representing the median of the results (P_{50})
- a lower limit showing the smallest value $x > P_{25} - 1.5 * (P_{75} - P_{25})$
- an upper limit representing the largest value $x < P_{75} + 1.5 * (P_{75} - P_{25})$
- all points outside this interval are represented by a dot.

LIMITS OF TUKEY

O = P_{75} + 3*(P75-P25)

= P75 + 1.5*(P75-P25)

I

H

M

H

$x < P_{75} + 1.5*(P_{75}-P_{25})$

P_{75}

P_{50}

P_{25}

I = $P_{25} - 1.5*(P_{75}-P_{25})$

$x > P_{25} - 1.5*(P_{75}-P_{25})$

value < quantification limit

O = P_{25} - 3*(P_{75}-P_{25})

	O		I		H	M	H		I		O	
M - 4.7s		M - 2.7s		P_{25}				P_{75}		M + 2.7s		M + 4.7s

Corresponding limits in case of normal distribution

END