



**EXPERTISE AND SERVICE PROVISION
QUALITY OF LABORATORIES**

**EXTERNAL QUALITY ASSESSMENT
IN VETERINARY DIAGNOSIS**

**DEFINITIVE GLOBAL REPORT
Proficiency Testing in Veterinary Diagnosis
Bovine Tuberculosis
SURVEY 2021/05**

Sciensano/PT VET Bovine Tuberculosis/2-E

Expertise and service provision
Quality of laboratories
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Bernard China 

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Introduction

This survey was dedicated to the detection of specific antibodies to Mycobacterium tuberculosis complex in serum and to the detection of gamma-interferon in bovine plasma by ELISA.

The samples

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

Samples for the detection of specific antibodies to Mycobacterium tuberculosis complex in serum: Positive sera were collected from 2 animals and originated from a bovine tuberculosis outbreak in Belgium. The 2 animals collected were skin test positive. The 3 positive sera used for the survey were then prepared by dilution with negative sera.

Samples for the detection of gamma-interferon in bovine plasma by ELISA: a positive plasma was first prepared by stimulation of bovine whole blood with pokeweed and then the different positive plasmas used for this survey were prepared by dilution with negative serum.

1. Serology

1.1. The samples

The panel consisted of 5 different samples with repetitions leading to a panel of 20 samples: 10 positive and 10 negative.

Sample ID	Status	repetition
PT2021BTUSERP1 (Addim 20/29)	Positive	5
PT2021BTUSERP2 (Addim 202/28)	Positive	3
PT2021BTUSERP3 (Addim 202/13)	Positive	2
PT2021BTUSERN1 (mamar 21/01)	Negative	5
PT2021BTUSERN2 (mamar 21/02)	Negative	5

Homogeneity

The homogeneity of the samples was tested by the NRL before the survey using ELISA. The samples were considered as homogeneous.

Target Values

The target value was determined by the NRL based on the homogeneity tests. PT2021TUBSERN1 and PT2021TUBSERN2 are negative. PT2021TUBSERP3, PT2021TUBSERP2, and PT2021TUBSERP1 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

4 laboratories participated to the bovine tuberculosis serology survey: Sciensano ; Arsia, DGZ, Lavetan.

1.2. Randomization

Laboratory	97504	97507	97508	97509
Sample ID				
BTUBSER21-1	PT2021BTUSERN2	PT2021BTUSERN2	PT2021BTUSERP2	PT2021BTUSERN1
BTUBSER21-2	PT2021BTUSERN2	PT2021BTUSERP1	PT2021BTUSERP1	PT2021BTUSERP2
BTUBSER21-3	PT2021BTUSERN2	PT2021BTUSERP1	PT2021BTUSERN2	PT2021BTUSERP1
BTUBSER21-4	PT2021BTUSERN1	PT2021BTUSERP1	PT2021BTUSERP1	PT2021BTUSERN2
BTUBSER21-5	PT2021BTUSERP3	PT2021BTUSERN2	PT2021BTUSERP2	PT2021BTUSERN2
BTUBSER21-6	PT2021BTUSERP1	PT2021BTUSERN1	PT2021BTUSERN2	PT2021BTUSERP2
BTUBSER21-7	PT2021BTUSERP3	PT2021BTUSERN1	PT2021BTUSERP3	PT2021BTUSERN1
BTUBSER21-8	PT2021BTUSERN1	PT2021BTUSERP2	PT2021BTUSERN1	PT2021BTUSERN1
BTUBSER21-9	PT2021BTUSERN2	PT2021BTUSERN2	PT2021BTUSERN2	PT2021BTUSERN1
BTUBSER21-10	PT2021BTUSERP1	PT2021BTUSERP3	PT2021BTUSERP1	PT2021BTUSERP3
BTUBSER21-11	PT2021BTUSERN2	PT2021BTUSERP2	PT2021BTUSERN1	PT2021BTUSERN2
BTUBSER21-12	PT2021BTUSERN1	PT2021BTUSERN2	PT2021BTUSERN1	PT2021BTUSERP3
BTUBSER21-13	PT2021BTUSERN1	PT2021BTUSERP2	PT2021BTUSERN1	PT2021BTUSERP1
BTUBSER21-14	PT2021BTUSERP2	PT2021BTUSERN2	PT2021BTUSERP3	PT2021BTUSERN2
BTUBSER21-15	PT2021BTUSERP1	PT2021BTUSERN1	PT2021BTUSERP1	PT2021BTUSERN2
BTUBSER21-16	PT2021BTUSERN1	PT2021BTUSERN1	PT2021BTUSERN1	PT2021BTUSERP2
BTUBSER21-17	PT2021BTUSERP2	PT2021BTUSERP1	PT2021BTUSERN2	PT2021BTUSERN1
BTUBSER21-18	PT2021BTUSERP2	PT2021BTUSERP3	PT2021BTUSERP1	PT2021BTUSERP1
BTUBSER21-19	PT2021BTUSERP1	PT2021BTUSERN1	PT2021BTUSERN2	PT2021BTUSERP1
BTUBSER21-20	PT2021BTUSERP1	PT2021BTUSERP1	PT2021BTUSERP2	PT2021BTUSERP1

2. g-interferon

2.1. The samples

The panel consisted of 6 different samples with repetitions leading to a panel of 20 samples: 12 positive and 8 negative.

Sample ID	Status	repetition
PT2021BTUIP1 (Addim 20/02)	Positive	2
PT2021BTUIP2 (Addim 20/03)	Positive	3
PT2021BTUIP3 (Addim 20/09)	Positive	5
PT2021BTUIP4 (Addim 20/04)	Positive	2
PT2021BTUIN1 (Addim 20/10)	Negative	4
PT2021BTUIN2 (Addim 20/11)	Negative	4

Homogeneity

The homogeneity of the samples was tested by the NRL before the survey using ELISA. The samples were considered as homogeneous.

Target Values

The target value was determined by the NRL based on the homogeneity tests.

PT2021BTUIN1 and PT2021BTUIN2 are negative.

PT2021BTUIP1, PT2021BTUIP2, PT2021BTUIP3 and PT2021BTUIP4 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

4 laboratories participated to the bovine tuberculosis serology survey: Sciensano ; Arsia, DGZ, Lavetan.

2.2.Randomization

Laboratory	97504	97507	97508	97509
Sample ID				
BTUBIFNg21-1	PT2021BTUIP3	PT2021BTUIN1	PT2021BTUIP2	PT2021BTUIN1
BTUBIFNg21-2	PT2021BTUIP1	PT2021BTUIP3	PT2021BTUIN1	PT2021BTUIN1
BTUBIFNg21-3	PT2021BTUIP2	PT2021BTUIN2	PT2021BTUIP3	PT2021BTUIP3
BTUBIFNg21-4	PT2021BTUIP3	PT2021BTUIP3	PT2021BTUIN1	PT2021BTUIP3
BTUBIFNg21-5	PT2021BTUIN2	PT2021BTUIP1	PT2021BTUIP3	PT2021BTUIN2
BTUBIFNg21-6	PT2021BTUIN1	PT2021BTUIP1	PT2021BTUIP3	PT2021BTUIP4
BTUBIFNg21-7	PT2021BTUIP4	PT2021BTUIP2	PT2021BTUIP1	PT2021BTUIP4
BTUBIFNg21-8	PT2021BTUIP4	PT2021BTUIN1	PT2021BTUIN1	PT2021BTUIP2
BTUBIFNg21-9	PT2021BTUIN2	PT2021BTUIP3	PT2021BTUIP2	PT2021BTUIN1
BTUBIFNg21-10	PT2021BTUIP2	PT2021BTUIP2	PT2021BTUIP4	PT2021BTUIP3
BTUBIFNg21-11	PT2021BTUIN2	PT2021BTUIP4	PT2021BTUIN2	PT2021BTUIN2
BTUBIFNg21-12	PT2021BTUIN1	PT2021BTUIN1	PT2021BTUIP4	PT2021BTUIP2
BTUBIFNg21-13	PT2021BTUIP3	PT2021BTUIP3	PT2021BTUIN2	PT2021BTUIN2
BTUBIFNg21-14	PT2021BTUIP2	PT2021BTUIN2	PT2021BTUIN2	PT2021BTUIP3
BTUBIFNg21-15	PT2021BTUIN2	PT2021BTUIN2	PT2021BTUIN2	PT2021BTUIN1
BTUBIFNg21-16	PT2021BTUIN1	PT2021BTUIN1	PT2021BTUIP2	PT2021BTUIN2
BTUBIFNg21-17	PT2021BTUIP1	PT2021BTUIN2	PT2021BTUIP1	PT2021BTUIP3
BTUBIFNg21-18	PT2021BTUIN1	PT2021BTUIP3	PT2021BTUIP3	PT2021BTUIP1
BTUBIFNg21-19	PT2021BTUIP3	PT2021BTUIP4	PT2021BTUIP3	PT2021BTUIP2
BTUBIFNg21-20	PT2021BTUIP3	PT2021BTUIP2	PT2021BTUIN1	PT2021BTUIP1

Survey Timeline

Transfer of the samples from NRL to QL:29/04/2021

Randomization of the samples by QL: 06/05/2021

Sending samples to participants: The samples were sent on.10/05/2020

Deadline for the results encoding: 31/05/2021

Preliminary report: 05/08/2021

Results

1.Serology

The panel consisted of 20 serum samples: 10 positive samples and 10 negative samples.

1.1.Results per sample

4 laboratories encoded results.

Table R1. Results per sample

Sample ID	Expected result	Number of repetitions (total results)	Observed result
PT2021TUBSERN1	Negative	5 (20)	20negative results
PT2021TUBSERN2	Negative	5 (20)	20 negative results
PT2021TUBSERP1	Positive	5 (20)	20 Positive results
PT2021TUBSERP2	Positive	3 (12)	12 Positive results
PT2021TUBSERP3	Positive	2 (8)	8 positive results

Globally, on 80 encoded results, 100% were considered as correct.

1.2.Used methods

All the 4 participants used the same method: IDEXX M. tuberculosis Ab test and the same batch number (JS828).

1.3.Conclusion

All the participants encoded correct results and used the same method.

2. Gamma Interferon

The panel consisted of 20 serum samples: 8 negative and 12 positive samples.

2.1. Results per sample

4 laboratories encoded results.

Table R2. Result per sample

Sample	Status	Repetition (results)	Encoded results
PT2021BTUIP1	Positive	2 (8)	8 positive results
PT2021BTUIP2	Positive	3 (12)	12 positive results
PT2021BTUIP3	Positive	5 (20)	20 positive results
PT2021BTUIP4	Positive	2 (8)	8 positive results
PT2021BTUIN1	Negative	4 (16)	16 negative results
PT2021BTUIN2	Negative	4 (16)	16 negative results

On the 80 encoded results, 100% were correct.

2.2. Used methods

All participants used the same method: IDVET-IDSCREEN Ruminant IFN-g and the same batch number (H07).

2.3. Conclusion

All the participants gave correct results.

ANNEXES

Annex 1. Quantitative data for Bovine tuberculosis survey (not under accreditation)

1. Serology

Sample PT2021BTUSERN1

Table A1. Quantitative normalized values (%)

Lab	97504	97507	97508	97509
Method	IDEXX M. tuberculosis Ab test			
rep1	-0.06	-0.0905	-0.035	-0.062
rep2	-0.07	-0.0967	-0.121	-0.053
rep3	-0.07	-0.0364	-0.115	-0.076
rep4	-0.06	-0.0343	-0.115	-0.041
rep5	-0.07	-0.0343	-0.096	-0.063
average	-0.066	-0.058	-0.096	-0.059
SD	0.005	0.032	0.036	0.0130
CV	-8.3%	-55.1%	-36.9%	-22.0%

Rn= repetition n

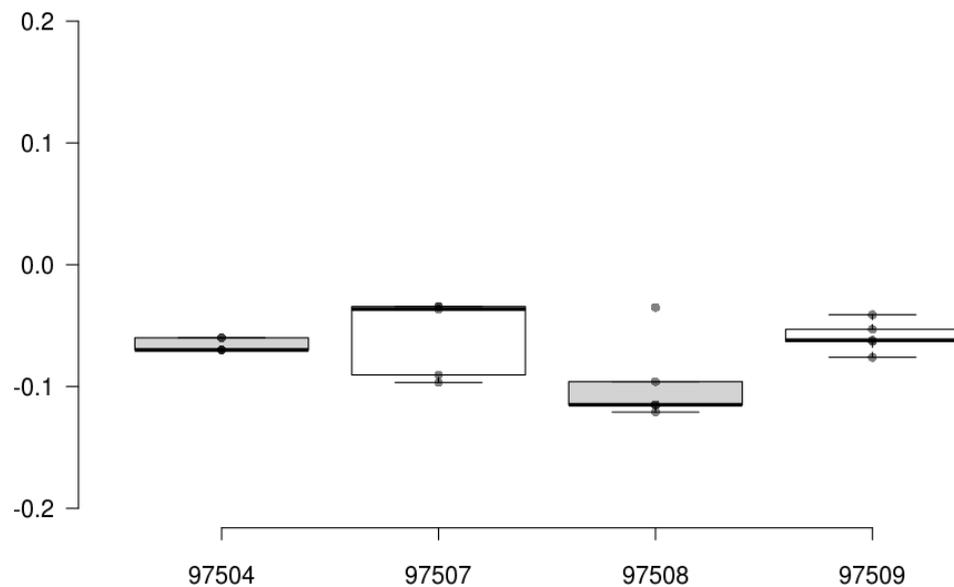


Figure A1. Boxplot dispersion of the results per participant for the sample N1

Table A2. Quantitative normalized values

Lab	97504	97507	97508	97509
Method	IDEXX M. tuberculosis Ab test			
R1	-0.06	-0.0801	-0.092	-0.049
R2	-0.06	-0.0634	-0.088	-0.06
R3	-0.05	0.0031	-0.106	-0.049
R4	-0.06	-0.0405	-0.102	-0.043
	-0.06	-0.0426	-0.106	-0.038
Mean	-0.058	-0.045	-0.099	-0.048
SD	0.004	0.031	0.008	0.008
CV	-7.7%	-69.9%	-8.4%	-17.2%

Rn: repetition n

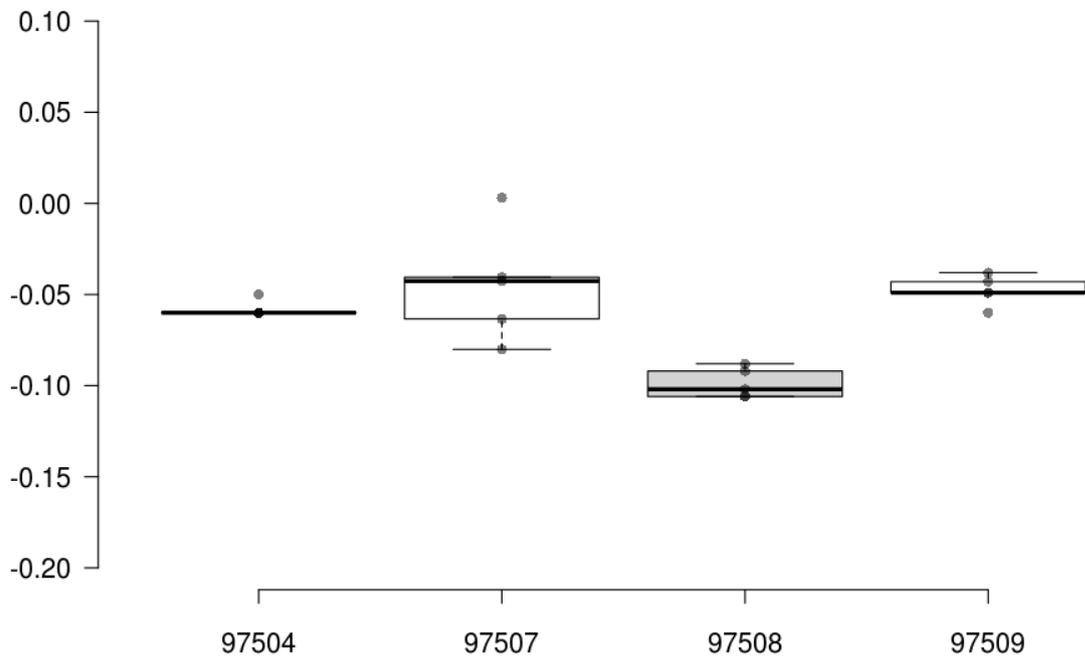


Figure A2. Boxplot dispersion of the results per participant for the sample N2

Table A3. Quantitative normalized values (%)

Lab	97504	97507	97508	97509
Method	IDEXX M. tuberculosis Ab test			
R1	0.51	0.519	0.792	0.362
R2	0.6	0.552	0.71	0.522
R3	0.64	0.577	0.714	0.556
R4	0.61	0.854	0.716	0.578
R5	0.74	0.765	0.63	0.499
Mean	0.62	0.654	0.712	0.503
SD	0.083	0.147	0.057	0.085
CV	13.35%	22.52%	8.05%	16.82%

Rn: repetition n

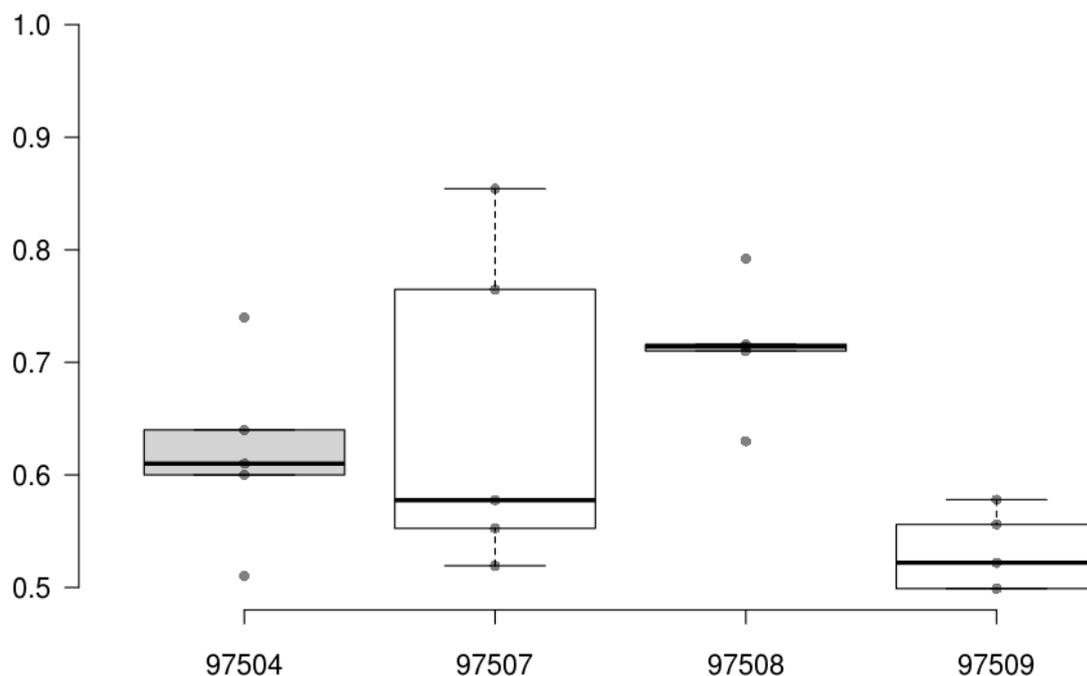


Figure A3. Boxplot dispersion of the results per participant for the sample P1

Table A4. Quantitative normalized values (%)

Lab	97504	97507	97508	97509
Method	IDEXX M. tuberculosis Ab test			
R1	2.280	2.503	3.666	1.328
R2	2.120	2.825	3.177	1.678
R3	2.390	2.384	2.692	1.240
Mean	2.263	2.571	3.178	1.415
SD	0.136	0.228	0.487	0.232
CV	6.00%	8.88%	15.32%	16.37%

Rn: repetition n

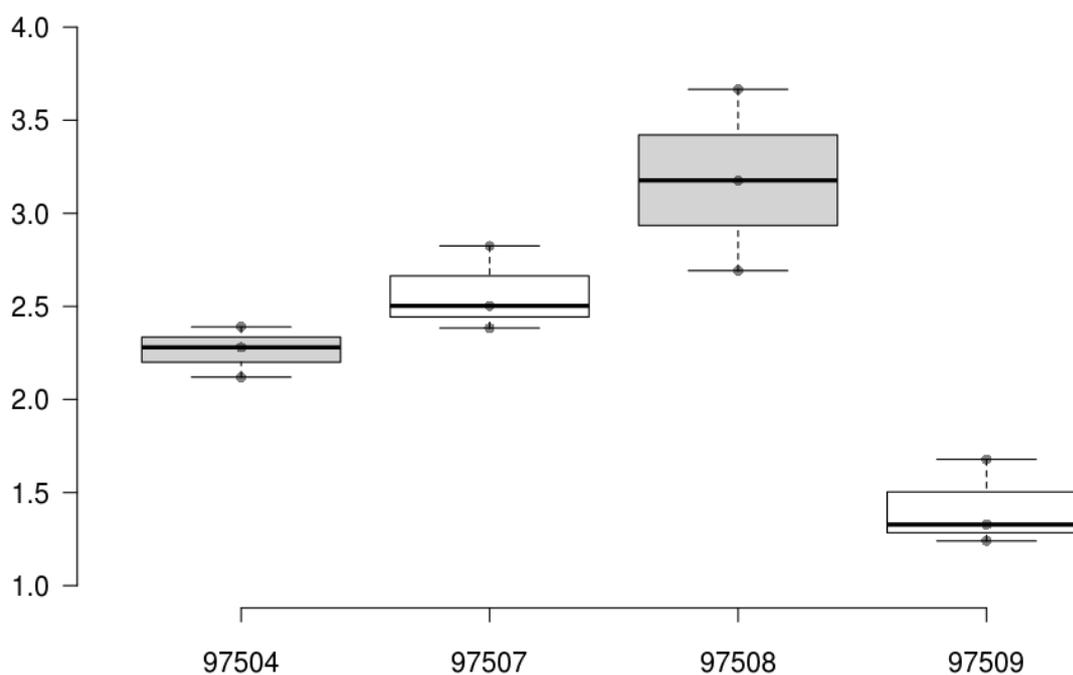


Figure A4. Boxplot dispersion of the results per participant for the sample P2

Table A5. Quantitative normalized values

Lab	97504	97507	97508	97509
Method	IDEXX M. tuberculosis Ab test			
R1	0.330	0.519	0.473	0.361
R2	0.320	0.523	0.418	0.364
Mean	0.325	0.521	0.446	0.363
SD	0.007	0.003	0.039	0.002
CV	2.18%	0.56%	8.73%	0.59%

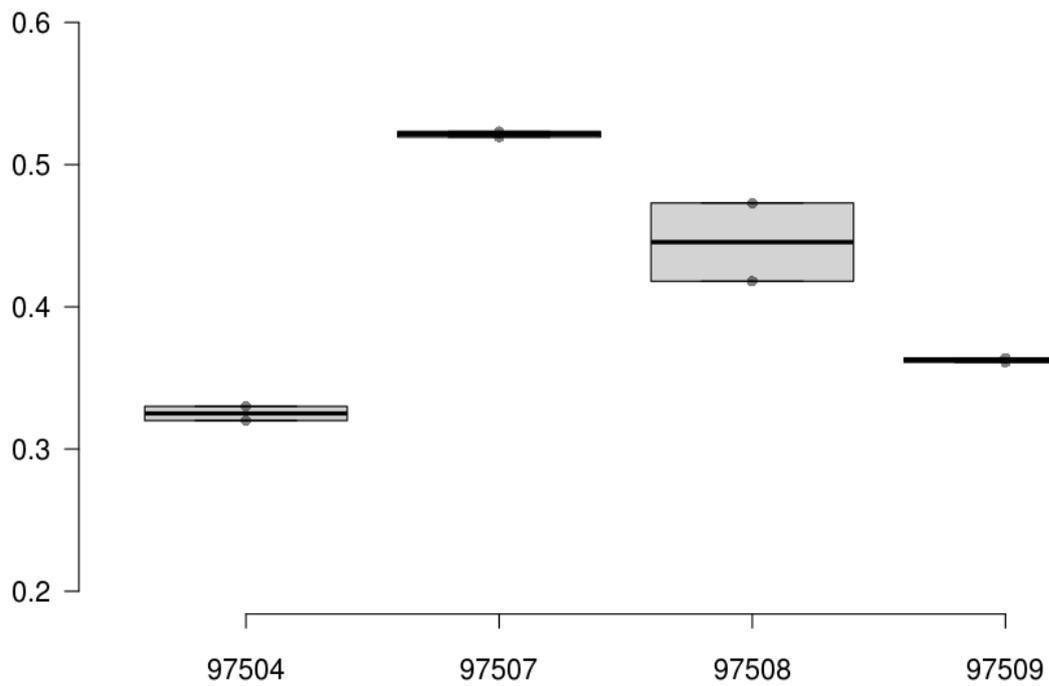


Figure A5. Boxplot dispersion of the results per participant for the sample P3

2. Gamma Interferon

Sample PT2021BTUIN1

Table A6. Quantitative normalized values

Lab	97504	97507	97508	97509
Method	IDVET-IDSCREEN Ruminant IFN-g			
R1	2.301	13.44	7.404	1.889
R2	3.068	13.44	7.583	1.889
R3	2.78	10.4	7.226	1.444
R4	2.685	12.72	7.315	2
Mean	2.709	12.500	7.382	1.806
SD	0.317	1.441	0.152	0.247
CV	11.69%	11.52%	2.06%	13.66%

Rn=repetition n

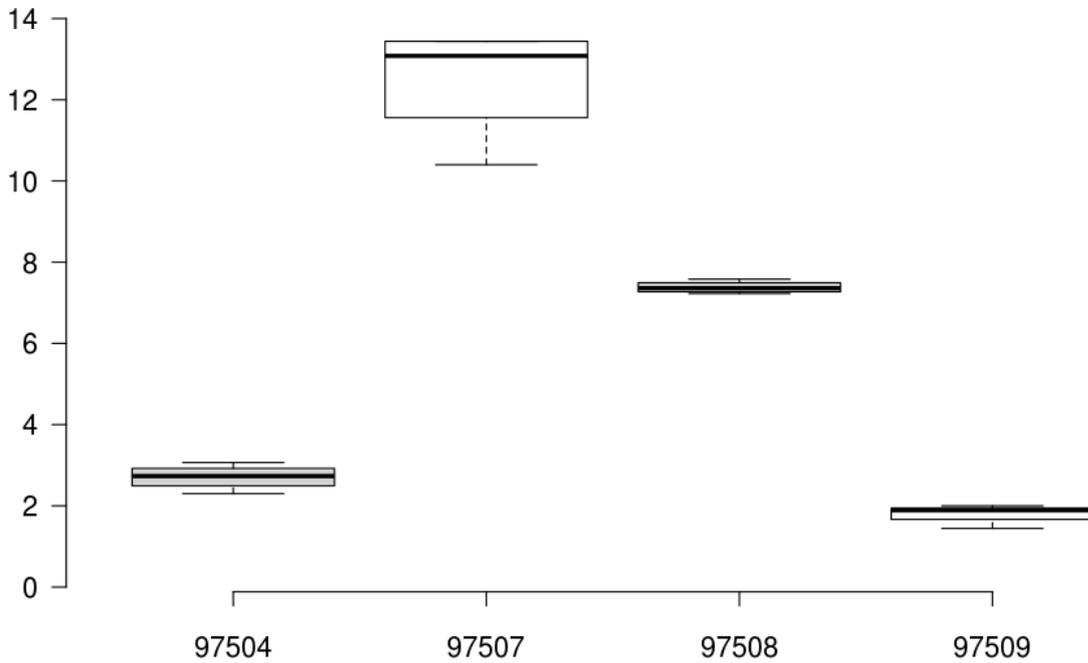


Figure A6. Boxplot dispersion of the results per participant for the sample IN1

Table A7. Quantitative normalized values

Lab	L97504	L97507	L97508	L97509
Method	IDVET-IDSCREEN Ruminant IFN-g			
R1	2.78	12.14	7.672	2
R2	2.876	11.42	7.939	2.333
R3	3.452	12.43	7.672	2.222
R4	2.876	13.87	7.672	3.222
Mean	2.996	12.465	7.739	2.444
SD	0.307	1.028	0.134	0.537
CV	10.26%	8.25%	1.73%	21.96%

Rn=repetition n

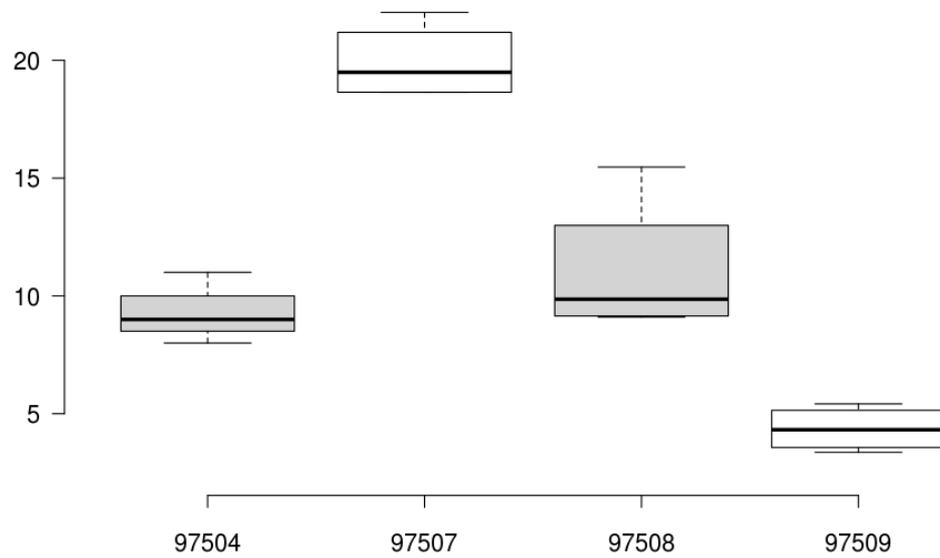


Figure A7. Boxplot dispersion of the results per participant for the sample INS2

Table A8. Quantitative normalized values

Lab	97504	97507	97508	97509
Method	IDVET-IDSCREEN Ruminant IFN-g			
R1	122.82	154.05	64.05	80.11
R2	112.46	150.00	112.22	106.89
Mean	117.64	152.03	88.14	93.50
SD	7.32	2.86	34.06	18.93
CV	6.22%	1.88%	38.65%	20.25%

Rn=repetition n

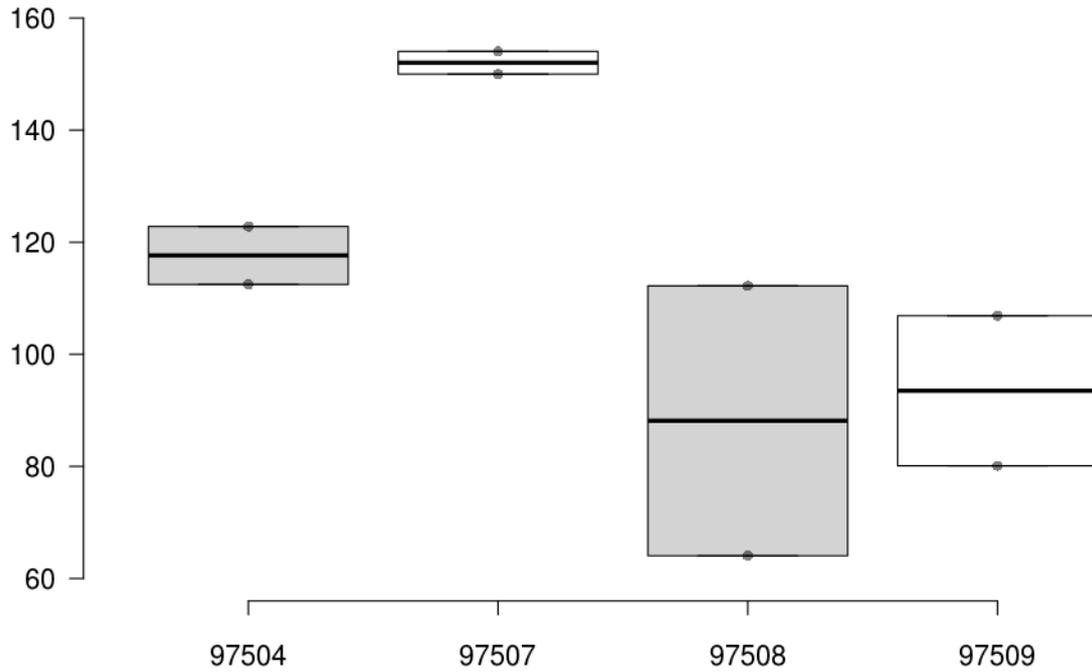


Figure A8. Boxplot dispersion of the results per participant for the sample IP1

Table A9. Quantitative normalized values

Lab	97504	97507	97508	97509
Method	IDVET-IDSCREEN Ruminant IFN-g			
R1	56.86	83.82	63.87	56.22
R2	60.88	85.98	61.64	55.11
R3	58.20	77.31	60.57	55.67
Mean	58.65	82.37	62.03	55.67
SD	2.050	4.513	1.684	0.556
CV	3.50%	5.48%	2.72%	1.00%

Rn=repetition n

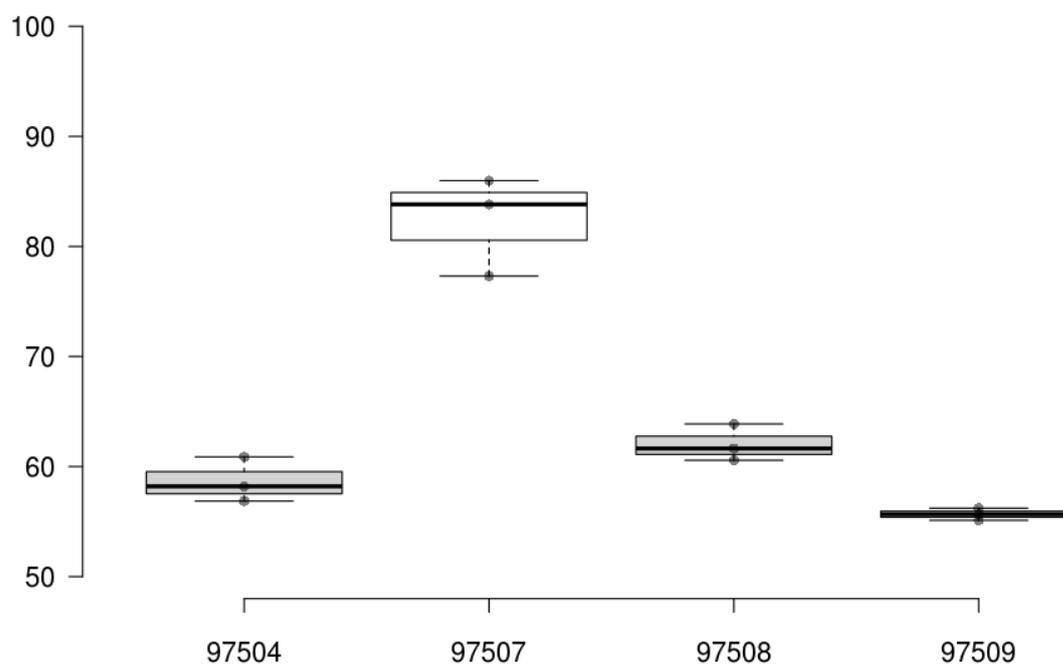


Figure A9. Boxplot dispersion of the results per participant for the sample IP2

Table A10. Quantitative normalized values

Lab	97504	97507	97508	97509
Method	IDVET-IDSCREEN Ruminant IFN-g			
R1	41.515	56.94	48.082	40.667
R2	39.022	57.66	43.711	37
R3	36.337	62.57	43.8	35.444
R4	37.584	54.48	44.603	36.556
R5	36.337	55.64	44.246	35.111
Mean	38.159	57.458	44.888	36.956
SD	2.178	3.107	1.821	2.215
CV	5.71%	5.41%	4.06%	5.99%

Rn=repetition n

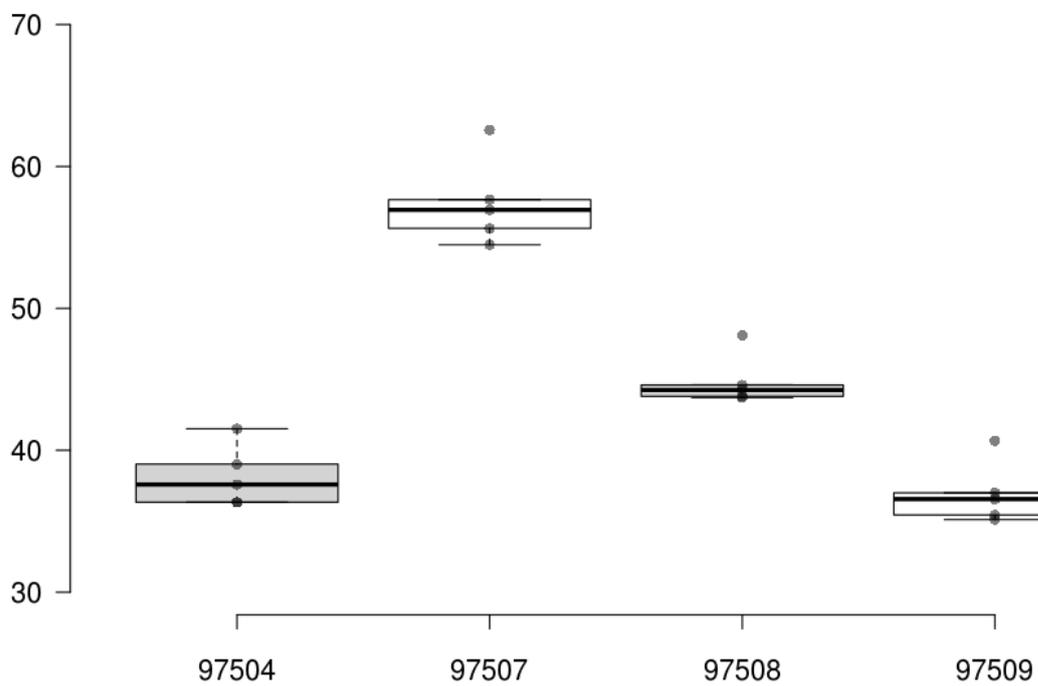


Figure A10. Boxplot dispersion of the results per participant for the sample IP3

Lab	97504	97507	97508	97509
Method	IDVET-IDSCREEN Ruminant IFN-g			
R1	40.94	55.49	46.655	39.667
R2	40.748	54.34	49.242	41.778
Mean	40.844	54.915	47.948	40.722
SD	0.136	0.813	1.829	1.493
CV	0.33%	1.48%	3.82%	3.67%

Rn=repetition n

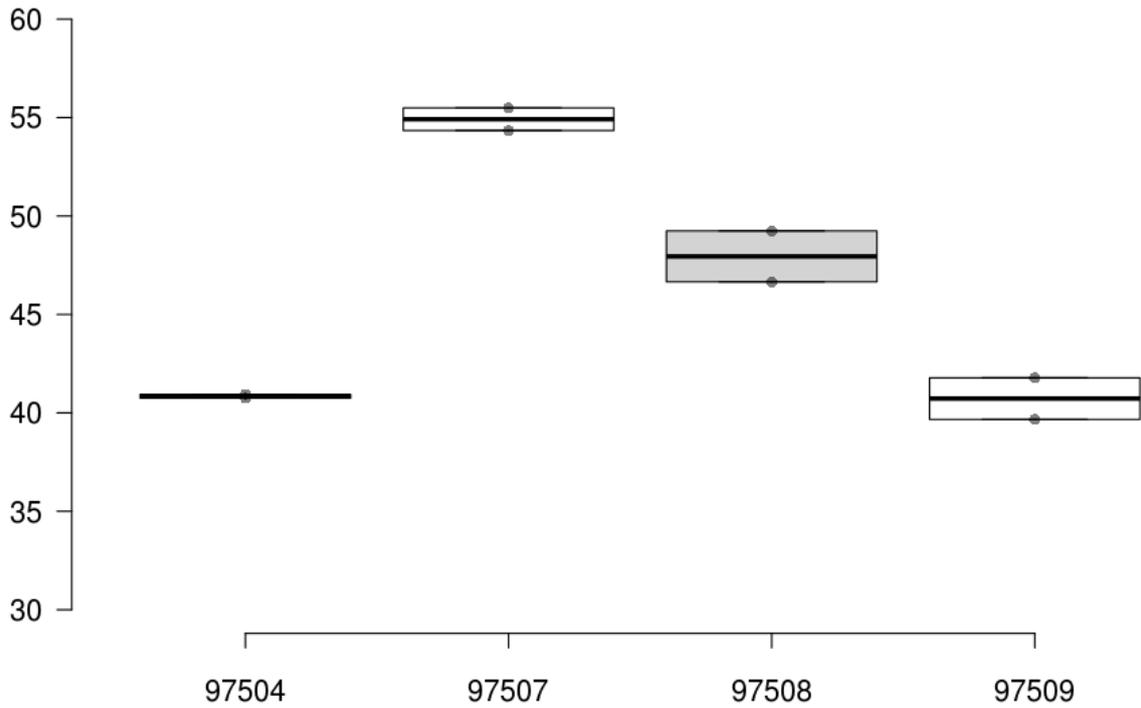


Figure A11. Boxplot dispersion of the results per participant for the sample IP4

Annex 2: 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:

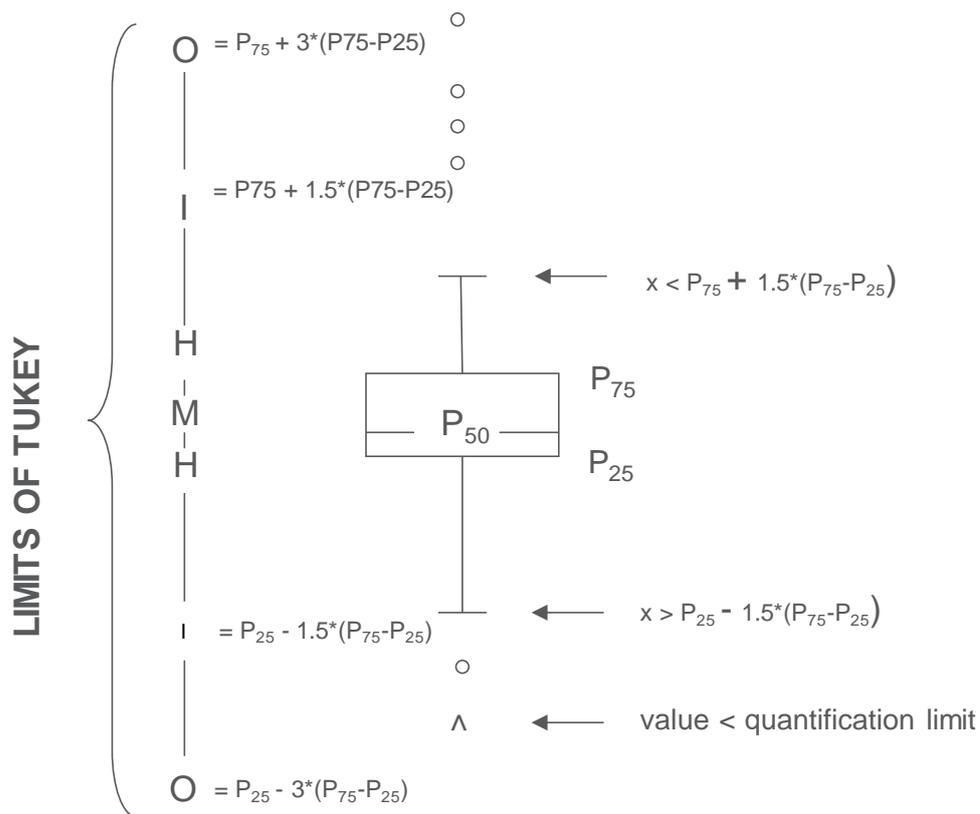
The link is:

[Calendrier EEQ 2021 version 07-10-2021 WEBSITE.pdf \(wiv-isp.be\)](#)

Graphical representation

Besides the tables with the results a "Box and whisker" plot is added. It contains the following elements for the methods with at least 6 participants:

- 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.



Corresponding limits in case of normal distribution

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