



EURL-PROFICIENCY TEST-FV-24

Pesticide Residues in Tomato Homogenate

Final Report - August 2022

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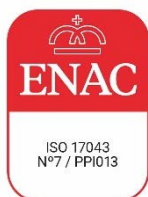
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CONTENTS

1. INTRODUCTION.....	4
2. TEST ITEMS.....	5
2.1 Preparation of the treated test item	5
2.2 Homogeneity test.....	5
2.3 Stability tests.....	6
2.4 Distribution of test items and protocol to participants	9
3. STATISTICAL METHODS.....	9
3.1 False positives and negatives	9
3.2 Estimation of the assigned values (x_{pt}).....	10
3.3 Fixed target standard deviations.....	10
3.4 z scores	10
3.5 Combined z scores	11
4. RESULTS.....	12
4.1 Summary of reported results	12
4.2 Assigned values and target standard deviations.....	15
4.3 Assessment of laboratory performance.....	16
5. CONCLUSIONS	22
6. REFERENCES.....	23
7. ACKNOWLEDGEMENTS.....	23
APPENDIX 1. Homogeneity	24
APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories	26
APPENDIX 3. Results (mg/Kg) and z scores for FFP-SRDD (25 %).....	29
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).....	36
APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.....	59
APPENDIX 6. AZ^2 - Graphical representation for EU/EFTA laboratories in Category A.....	62
ANNEX A. Protocols and Target lists of pesticides to be sought	63
ANNEX B. List of laboratories that agreed to participate in EUPT-FV-24.....	80

EURL-EUROPEAN UNION PROFICIENCY TEST 24
FOR THE DETERMINATION OF PESTICIDES IN FRUITS AND VEGETABLES USING
MULTIRESIDUE METHODS

2022

According to Article 28 of Regulation 396/2005/EC (23rd February 2005) of the European Parliament and of the Council, concerning maximum residue levels for pesticides in or on food and feed of plant and animal origin¹, all laboratories analysing samples for the official control of pesticide residues shall participate in the European Union Proficiency Tests (EUPTs) for pesticide residues organised by the European Union. These proficiency tests are carried out on an annual basis in order to continuously improve the quality, accuracy and comparability of the residue data reported by EU Member States to the European Union, as well as by other Member States, within the framework of the EU multi-annual coordinated control programme and national monitoring programmes.

Regulation (EU) 2017/625² lays down the general tasks, duties and requirements for European Union Reference Laboratories (EURLs)³ for Food, Feed and Animal Health. Among these tasks is the provision for independently organised comparative tests. European Proficiency Test FV-23 has been organised by the EURL in Fruits and Vegetables at the University of Almería, Spain⁴.

Participation in European Proficiency Test FV-24 was mandatory for all National Reference Laboratories (NRLs), as well as all other EU official laboratories, involved in the determination of pesticide residues in fruits and vegetables for the EU multi-annual coordinated control programme or for their own national monitoring programmes. Additionally, laboratories from Argentina, China, Colombia, Costa Rica, India, Kenya, Peru, Serbia, Singapore, Thailand, Turkey, United Kingdom and Uruguay participated in this test.

DG-SANTE will have full access to all data from the EUPTs including the lab-code/lab-name key. The NRLs will also have that information for the OfFs within their network. This report may be presented to the European Union Standing Committee on Plants, Animals, Food and Feed (PAFF).

¹ Regulation (EC) No 396/2005, published in the OJ of the EU L70 on 16.03.2005, last amended by Regulation 839/2008 published in the OJ of the EU L234 on 30.08.2008.

² Regulation (EU) 2017/625 of the European Parliament and of the Council on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products. Published in the OJ of the EU L95 on 07.04.2017.

³ The Community Reference Laboratory (CRL) changed its name to the European Union Reference Laboratory (EURL) on 1st December 2009 as a result of the Treaty of Lisbon. OJ of the EU C306 on 17.12.2007.

⁴ Commission Regulation (EC) No 776/2006 of 23rd May 2006 - amending Annex VII to Regulation (EC) No 882/2004 of the European Parliament and of the Council as regards European Union Reference Laboratories.

1. INTRODUCTION

One hundred and seventy-nine laboratories agreed to participate in EUPT-FV24.

The proficiency test was performed in 2022 using tomato homogenate. The tomatoes were cultivated in a greenhouse in Almería, Spain, and were treated before harvest using commercial formulations applied by spraying with conventional diffusers. After harvest, they were also treated with analytical standards. In EUPT-FV24, participating laboratories were not provided with a 'blank' sample.

The test item, 200 g of tomato homogenate containing pesticide residues, was shipped to participants on 7th March 2022. The deadline for results submission to the Organiser was 4th April 2022. The participants were asked to determine the residue levels of all the pesticides that they detected and to report the concentrations in mg/kg. The participants were provided with two target pesticide lists, one with pesticides that had to be analysed on a compulsory basis, and a second one with pesticides to be analysed voluntarily. The compulsory list contained 211 target pesticides. The pesticide target list is detailed in Annex A together with the voluntary target list, which contained 43 pesticides. The lists of target pesticides also contained the MRL for each pesticide fixed at 0.01 mg/kg, except for the following pesticides which have lower MRLs based on Regulation (EU) No. 396/2005 and EU Directive 2006/125/EC, or for which EFSA requested lower LOQs: aldrin (0.005 mg/kg), azinphos-methyl (0.005 mg/kg), cadusafos (0.005 mg/kg), carbaryl (0.005 mg/kg), carbofuran (0.005 mg/kg), carbofuran-3-hydroxy (0.005 mg/kg), chlorpyrifos (0.005 mg/kg), demeton-S-methylsulfone (0.005 mg/kg), diazinon (0.005 mg/kg), dichlorvos (0.005 mg/kg), dieldrin (0.005 mg/kg), dimethoate (0.003 mg/kg), ethoprophos (0.005 mg/kg), fenbuconazole (0.005 mg/kg), fipronil (0.004 mg/kg), fipronil sulfone (0.004 mg/kg), imazalil (0.005 mg/kg), monocrotophos (0.005 mg/kg), omethoate (0.003 mg/kg), oxydemeton-methyl (0.005 mg/kg) and triazophos (0.005 mg/kg).

Participants were asked to analyse and report results for any of the pesticides they found which were included in the target lists.

The robust mean values of the analytical data submitted by EU/EFTA participants were used to obtain the assigned (true) values for each of the pesticide residues present. A fit-for-purpose relative target standard deviation (FFP-RSD) of 25 % was chosen to calculate the target standard deviations (σ) as well as the z scores for the individual pesticides.

For the assessment of overall laboratory performance, the Average of the squared z scores (AZ^2) was used. Laboratories that had 'sufficient scope' and were able to analyse at least 90 % of the compulsory pesticides in the target pesticides list, had correctly detected and quantified a sufficiently high percentage of the pesticides present in the Test Item (at least 90 %) and reported no false positives, were classified into Category A. Within this category, the laboratories were also subclassified as 'good', 'satisfactory' or 'unsatisfactory', in relation to the overall accuracy of the results that they reported.

All the other laboratories were classified into Category B. For laboratories in Category B, individual z scores were calculated but the overall accuracy of their results was not assessed.

Laboratories that did not report results have not been classified into any category and are listed in Annex B with the remainder of laboratories that participated in EUPT-FV-24.

2. TEST ITEMS

2.1 Preparation of the treated test item

The tomatoes were cultivated in a greenhouse in Almería, Spain, and were treated before harvest using commercial formulations applied by spraying with conventional diffusers. Additionally, they were post-harvest treated using analytical standards. The pesticides used as commercial formulations were acetamiprid, azoxystrobin, buprofezin, chlorothalonil, fenamiphos, flonicamid, propamocarb, pymetrozine and oxamyl. The pesticides spiked as analytical standards were chlorfenvinphos, chlorpyrifos, deltamethrin, diazinon, fluopyram, flupyradifurone, isofetamid, oxydemeton-methyl, procymidone, spinosad and zoxamide.

Before preparation of the test item, the pesticides and target residue levels were selected, following recommendations made by the QCG, which had been appointed specifically for EUPT-FV-24. Approximately 500 m² of tomato plants were treated with commercial formulations, which were dissolved in water. Four days after the application, a representative sample of the treated tomato was collected and analysed to check if the residue levels present were close to the target levels. As the residue levels in the tomato sample were low for some pesticides, a second treatment in the field was applied. The day after the second treatment, the pesticide residue levels were checked, and as they were close to the target levels, 80 kg of tomatoes were harvested (eight days after the first treatment). The tomatoes were grinded and homogenized in a large capacity stainless steel container. Subsequently, they were spiked with analytical standards dissolved in acetonitrile. Once homogenized, the material was packed in zip bags and frozen at -18° C. Two days later, the resulting ice blocks were crushed with ice crushers, and 200 g portions of the material were weighed out into screw-capped polyethylene plastic bottles, sealed and stored in a freezer at about - 20 °C prior to distribution to participants.

2.2 Homogeneity test

The homogeneity and stability tests were subcontracted to the laboratory Labcolor (accredited under ISO/IEC 17025 by the Spanish accreditation body, ENAC) after evaluation by the organisation of the PT. Ten bottles of the treated test item were randomly chosen from those stored in the freezer and analyses were performed on duplicate portions taken from each bottle. The injection sequence of the 20 extracts that were analysed by GC and LC was also randomly chosen.

The statistical evaluation was performed according to the International Harmonized Protocol published by IUPAC, ISO and AOAC [1]. The individual residues data from the homogeneity tests are given in **Appendix 1**. The results of the statistical analyses (for the evaluated compounds) are given in **Table 1**. The acceptance criteria for the test item to be sufficiently homogenous for the

proficiency test were that: $Ss^2 < c$, where Ss is the between-bottle sampling standard deviation and $c = F_1\sigma_{all}^2 + F_2S_{an}^2$; F_1 and F_2 being constant values of 1.88 and 1.01, respectively, from the ten samples taken, and $\sigma_{all}^2 = (0.3 \times \text{FFP-RSD}(25\%) \times \text{mean concentration})^2$. This was used to demonstrate that the between-bottle variance was not higher than the within-bottle variance.

Table 1. Statistical evaluation of the homogeneity test data (n = 20 analyses)

Pesticide	Mean Conc. (mg/Kg)	Ss^2	c	$Ss^2 < c$ Pass/Fail
Acetamiprid	0,058	6,16667E-07	3,93E-05	Pass
Azoxystrobin	0,089	8,89E-08	9,27E-05	Pass
Buprofezin	0,072	9,79E-06	6,24E-05	Pass
Chlorfenvinphos	0,067	4,48E-06	5,88E-05	Pass
Chlorpyrifos	0,055	1,57E-05	3,98E-05	Pass
Deltamethrin	0,052	2,08E-05	3,55E-05	Pass
Diazinon	0,443	4,66E-04	2,25E-03	Pass
Fenamiphos	0,059	1,76E-06	4,01E-05	Pass
Fonicamid	0,098	5,26E-06	1,10E-04	Pass
Fluopyram	0,430	1,67E-06	2,19E-03	Pass
Oxamyl	0,088	7,32E-06	9,06E-05	Pass
Oxydemeton-methyl	0,111	1,11E-05	1,50E-04	Pass
Procymidone	0,156	1,17E-05	2,71E-04	Pass
Propamocarb	0,597	2,72E-04	4,24E-03	Pass
Spinosad	0,145	0,00E+00	2,63E-04	Pass
Zoxamide	0,039	2,27E-06	1,76E-05	Pass
Voluntary Pesticides				
Flupyradifurone	0,062	1,77E-06	4,51E-05	Pass
Isofetamid	0,043	1,76E-06	2,19E-05	Pass

Ss : Between-Sampling Standard Deviation

As can be seen from **Table 1**, all the pesticides evaluated in the tomato test item passed the homogeneity test.

2.3 Stability tests

Stability tests were also subcontracted to the laboratory Labcolor (accredited under ISO/IEC 17025 by the Spanish accreditation body, ENAC) after evaluation by the organisation of the PT. The tests were performed according to ISO 13528:2015, Annex B [2]. Shortly before the test item shipment, three bottles that were stored in the freezer at -20 °C were chosen randomly and stored in a -80 °C freezer (Day 1). After the deadline for reporting results, those three bottles stored at -80 °C, together with three other bottles that were stored in the freezer at -20 °C and were chosen randomly (Day 2) were analysed by duplicate.

A pesticide was considered to be adequately stable if $|x_1 - y_i| \leq 0.3 \times \sigma$, where x_1 is the mean value of the Day 1 stability test, y_i the mean value of the Day 2 stability test and σ the standard deviation used for proficiency assessment (typically 25 % of the assigned value).

The individual results for the evaluated compounds are given in **Table 2**. This test did not show any significant decrease in the pesticide concentrations with time. This demonstrates that, for the duration of the proficiency test, and provided that the storage conditions prescribed were

followed, the time elapsed until the participants performed the analysis would not have influenced their results.

Table 2. Statistical test for analytical precision and to demonstrate results stability after the interval of time-elapse between the shipment of the test item and the deadline for reporting of results.

(mg/Kg)	Day 1							Day 2							(M2 – M1)	M2-M1 ≤ 0.3σ
	Sample 98_A	Sample 98_B	Sample 162_A	Sample 162_B	Sample 183_A	Sample 183_B	Mean 1	Sample 185_A	Sample 185_B	Sample 246_A	Sample 246_B	Sample 44_A	Sample 44_B	Mean 2		
Acetamiprid	0.056	0.051	0.055	0.055	0.057	0.058	0.055	0.055	0.053	0.054	0.055	0.057	0.056	0.055	0.000	Pass
Azoxystrobin	0.110	0.096	0.100	0.099	0.110	0.110	0.104	0.110	0.100	0.110	0.110	0.110	0.100	0.107	0.003	Pass
Buprofezin	0.070	0.070	0.063	0.065	0.062	0.066	0.066	0.069	0.069	0.064	0.071	0.071	0.071	0.069	0.003	Pass
Chlorfenvinphos	0.070	0.074	0.060	0.061	0.061	0.062	0.065	0.069	0.064	0.065	0.068	0.073	0.071	0.068	0.004	Pass
Chlorpyrifos	0.060	0.060	0.049	0.051	0.050	0.052	0.054	0.056	0.052	0.051	0.055	0.061	0.059	0.056	0.002	Pass
Deltamethrin	0.062	0.064	0.052	0.050	0.049	0.050	0.055	0.056	0.051	0.051	0.052	0.063	0.063	0.056	0.002	Pass
Diazinon	0.760	0.750	0.750	0.710	0.690	0.740	0.733	0.760	0.740	0.780	0.770	0.790	0.760	0.767	0.033	Pass
Fenamiphos	0.067	0.061	0.065	0.063	0.068	0.070	0.066	0.067	0.065	0.070	0.070	0.072	0.066	0.068	0.003	Pass
Fonicamid	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.000	Pass
Fluopyram	0.510	0.510	0.500	0.500	0.510	0.570	0.517	0.560	0.510	0.510	0.540	0.540	0.550	0.535	0.018	Pass
Oxamyl	0.091	0.085	0.088	0.088	0.083	0.089	0.087	0.094	0.093	0.087	0.087	0.094	0.090	0.091	0.003	Pass
Oxidemeton methyl	0.120	0.110	0.120	0.120	0.120	0.120	0.118	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.002	Pass
Procymidone	0.170	0.170	0.150	0.150	0.160	0.150	0.158	0.160	0.150	0.150	0.160	0.170	0.170	0.160	0.002	Pass
Propamocarb	0.660	0.650	0.650	0.650	0.660	0.720	0.665	0.710	0.640	0.630	0.660	0.700	0.700	0.673	0.008	Pass
Spinosad	0.160	0.150	0.150	0.160	0.160	0.170	0.158	0.160	0.160	0.160	0.160	0.170	0.160	0.162	0.003	Pass
Zoxamide	0.048	0.044	0.046	0.045	0.050	0.051	0.047	0.049	0.048	0.050	0.051	0.054	0.051	0.051	0.003	Pass
Voluntary Pesticides																
Flupyradifurone	0.077	0.068	0.074	0.071	0.074	0.078	0.074	0.074	0.074	0.073	0.074	0.076	0.072	0.074	0.000	Pass
Isofetamid	0.048	0.044	0.046	0.045	0.050	0.052	0.048	0.050	0.048	0.049	0.049	0.053	0.050	0.050	0.002	Pass

Moreover, regarding the stability of the sample arriving not completely frozen, a duplicate analysis of three bottles reproducing the delivery conditions that the samples experienced for 48 hours was performed (Day 3). Laboratories could therefore be sufficiently confident in accepting the treated test item even if it was not completely frozen. All the pesticides passed this second stability test. Results for this 48-hour stability test are indicated in **Table 3**.

As one of the parcels sent to an EU Member State arrived after 72 hours of the shipment, an additional stability test reproducing the delivery conditions that the samples experienced for 72 hours was performed (Day 4). All the pesticides passed this third stability test. Results for this 72-hour stability test are indicated in **Table 4**.

Table 3. Statistical test for analytical precision and to demonstrate stability for the 48-hour time-elapse interval.

(mg/Kg)	Day 1							Day 3							(M3 – M1)	M3-M1 ≤ 0.3*σ
	Sample 98_A	Sample 98_B	Sample 162_A	Sample 162_B	Sample 183_A	Sample 183_B	Mean 1	Sample 33_A	Sample 33_B	Sample 39_A	Sample 39_B	Sample 40_A	Sample 40_B	Mean 3		
Acetamidrid	0.056	0.051	0.055	0.055	0.057	0.058	0.055	0.058	0.056	0.053	0.052	0.053	0.050	0.054	-0.002	Pass
Azoxystrobin	0.110	0.096	0.100	0.099	0.110	0.110	0.104	0.120	0.120	0.100	0.100	0.094	0.096	0.105	0.001	Pass
Buprofezin	0.070	0.070	0.063	0.065	0.062	0.066	0.066	0.061	0.071	0.072	0.070	0.060	0.060	0.066	0.000	Pass
Chlorfenvinphos	0.070	0.074	0.060	0.061	0.061	0.062	0.065	0.062	0.072	0.071	0.072	0.062	0.061	0.067	0.002	Pass
Chlorpyrifos	0.060	0.060	0.049	0.051	0.050	0.052	0.054	0.055	0.062	0.060	0.061	0.054	0.051	0.057	0.004	Pass
Deltamethrin	0.062	0.064	0.052	0.050	0.049	0.050	0.055	0.054	0.061	0.063	0.062	0.048	0.047	0.056	0.001	Pass
Diazinon	0.760	0.750	0.750	0.710	0.690	0.740	0.733	0.790	0.840	0.760	0.770	0.600	0.620	0.730	-0.003	Pass
Fenamiphos	0.067	0.061	0.065	0.063	0.068	0.070	0.066	0.076	0.072	0.063	0.062	0.058	0.058	0.065	-0.001	Pass
Fonicamid	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.000	Pass
Fluopyram	0.510	0.510	0.500	0.500	0.510	0.570	0.517	0.570	0.580	0.500	0.530	0.490	0.470	0.523	0.007	Pass
Oxamyl	0.091	0.085	0.088	0.088	0.083	0.089	0.087	0.090	0.090	0.095	0.094	0.094	0.092	0.093	0.005	Pass
Oxidemeton methyl	0.120	0.110	0.120	0.120	0.120	0.120	0.118	0.120	0.120	0.110	0.110	0.110	0.110	0.113	-0.005	Pass
Procymidone	0.170	0.170	0.150	0.150	0.160	0.150	0.158	0.150	0.170	0.170	0.170	0.150	0.150	0.160	0.002	Pass
Propamocarb	0.660	0.650	0.650	0.650	0.660	0.720	0.665	0.660	0.680	0.650	0.710	0.710	0.660	0.678	0.013	Pass
Spinosad	0.160	0.150	0.150	0.160	0.160	0.170	0.158	0.170	0.170	0.160	0.160	0.150	0.140	0.158	0.000	Pass
Zoxamide	0.048	0.044	0.046	0.045	0.050	0.051	0.047	0.057	0.055	0.047	0.045	0.040	0.041	0.048	0.000	Pass
Voluntary Pesticides																
Flupyradifurone	0.077	0.068	0.074	0.071	0.074	0.078	0.074	0.076	0.074	0.073	0.074	0.072	0.069	0.073	-0.001	Pass
Isofetamid	0.048	0.044	0.046	0.045	0.050	0.052	0.048	0.058	0.054	0.047	0.046	0.041	0.040	0.048	0.000	Pass

Table 4. Statistical test for analytical precision and to demonstrate stability for the 72-hour time-elapse interval.

(mg/Kg)	Day 1							Day 4							(M4 – M1)	M4-M1 ≤ 0.3*σ
	Sample 98_A	Sample 98_B	Sample 162_A	Sample 162_B	Sample 183_A	Sample 183_B	Mean 1	Sample 60_A	Sample 60_B	Sample 119_A	Sample 119_B	Sample 121_A	Sample 121_B	Mean 4		
Acetamidrid	0.056	0.051	0.055	0.055	0.057	0.058	0.055	0.054	0.053	0.052	0.057	0.058	0.057	0.055	0.000	Pass
Azoxystrobin	0.110	0.096	0.100	0.099	0.110	0.110	0.104	0.098	0.095	0.098	0.100	0.110	0.110	0.102	-0.002	Pass
Buprofezin	0.070	0.070	0.063	0.065	0.062	0.066	0.066	0.068	0.074	0.063	0.072	0.077	0.073	0.071	0.005	Pass
Chlorfenvinphos	0.070	0.074	0.060	0.061	0.061	0.062	0.065	0.066	0.070	0.066	0.070	0.073	0.070	0.069	0.005	Pass
Chlorpyrifos	0.060	0.060	0.049	0.051	0.050	0.052	0.054	0.054	0.057	0.052	0.058	0.060	0.060	0.057	0.003	Pass
Deltamethrin	0.062	0.064	0.052	0.050	0.049	0.050	0.055	0.055	0.058	0.054	0.061	0.063	0.063	0.059	0.005	Pass
Diazinon	0.760	0.750	0.750	0.710	0.690	0.740	0.733	0.770	0.690	0.760	0.740	0.790	0.830	0.763	0.030	Pass
Fenamiphos	0.067	0.061	0.065	0.063	0.068	0.070	0.066	0.061	0.060	0.062	0.067	0.069	0.066	0.064	-0.002	Pass
Fonicamid	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.120	0.110	0.112	0.002	Pass
Fluopyram	0.510	0.510	0.500	0.500	0.510	0.570	0.517	0.510	0.540	0.500	0.510	0.560	0.530	0.525	0.008	Pass
Oxamyl	0.091	0.085	0.088	0.088	0.083	0.089	0.087	0.089	0.088	0.087	0.094	0.099	0.094	0.092	0.004	Pass
Oxidemeton methyl	0.120	0.110	0.120	0.120	0.120	0.120	0.118	0.120	0.120	0.110	0.120	0.120	0.120	0.118	0.000	Pass
Procymidone	0.170	0.170	0.150	0.150	0.160	0.150	0.158	0.160	0.170	0.150	0.170	0.170	0.160	0.163	0.005	Pass
Propamocarb	0.660	0.650	0.650	0.650	0.660	0.720	0.665	0.690	0.740	0.640	0.660	0.710	0.680	0.687	0.022	Pass
Spinosad	0.160	0.150	0.150	0.160	0.160	0.170	0.158	0.150	0.150	0.150	0.160	0.170	0.160	0.157	-0.002	Pass
Zoxamide	0.048	0.044	0.046	0.045	0.050	0.051	0.047	0.045	0.044	0.044	0.047	0.049	0.049	0.046	-0.001	Pass
Voluntary Pesticides																
Flupyradifurone	0.077	0.068	0.074	0.071	0.074	0.078	0.074	0.072	0.073	0.073	0.076	0.077	0.074	0.074	0.001	Pass
Isofetamid	0.048	0.044	0.046	0.045	0.050	0.052	0.048	0.043	0.043	0.044	0.048	0.050	0.048	0.046	-0.002	Pass

2.4 Distribution of test items and protocol to participants

One bottle of frozen treated test item was shipped to each participant in boxes containing dry ice. The test items were sent out on 7th March 2022. All the shipments to EU/EFTA countries arrived within the first 72 hours.

Before sample shipment, the laboratories received full instructions (Annex A) for the receipt and storage of the test item, and they were encouraged to use their normal sample receipt procedure and method(s) of analysis. These instructions were uploaded onto the open site of the EURL-FV webpage as part of the Specific Protocol. The Application Form was also available as an on-line form. After applying for the test, each participant laboratory received their Lab Code and password, thus allowing them to participate. This ensured that confidentiality was maintained throughout the duration of Proficiency Test 24. The Target Pesticide List and the Minimum Required Reporting Levels (MRRLs), as established by the Advisory Group, were uploaded onto the EURL-FV open website at least three months before the shipment of the test item to allow laboratories enough time to purchase standards and to validate their methods.

3. STATISTICAL METHODS

3.1 False positives and negatives

3.1.1 False positives

These are results of pesticides from the Target Pesticides List, that are reported at, or above, their respective MRRLs although they were: (i) not detected by the Organiser, even after repeated analyses, and/or (ii) not detected by the overwhelming majority (e.g. > 95 %) of the participating laboratories that had targeted the specific pesticides. In certain instances, case-by-case decisions by the EUPT-Panel may be necessary.

Any results reported lower than the MRRL will not be considered as false positives, even though these results should not have been reported.

No z score values have been calculated for false positive results. Any laboratory reporting a false positive, even when reporting the necessary number of pesticides to obtain sufficient scope, has been classified into Category B.

3.1.2 False negatives

These are results for pesticides reported by the laboratories as 'analysed' but without reporting numerical values although they were: a) used by the Organiser to treat the Test Item and b) detected by the Organiser as well as the majority of the participants that had targeted these specific pesticides at or above the respective MRRLs. Results reported as '< RL' (RL= Reporting Limit of the laboratory) will be considered as not detected and will be judged as false negatives. In certain instances, case-by-case decisions by the EUPT-Panel may be necessary.

In cases of the assigned value being less than a factor of 3 times the MRRL, false negatives will typically not be assigned. The EUPT-Panel may decide to take case-by-case decisions in this

respect after considering all relevant factors such as the result distribution and the reporting limits of the affected labs.

z scores have also been calculated for false negatives. However, these z scores were not taken into account in assessing the 90 %, or more, of pesticides present in the sample needed to be classified into Category A.

3.2 Estimation of the assigned values (x_{pt})

In order to minimise the influence of out-lying results on the statistical evaluation, the assigned value (= consensus concentration) was estimated using robust statistics as described in ISO 13528:2015, considering the results reported by EU and EFTA countries laboratories only. Individual results without any numerical values reported, such as detected (D), were not considered. The spread of results for each pesticide was tested for multimodality. Results that were ≥ 10 times above or below the assigned value were excluded for the calculation of the assigned value. In special justifiable cases, the EUPT-Panel may decide to eliminate certain results traceably associated with gross errors or to use only the results of a subgroup consisting of laboratories that have repeatedly demonstrated good performance for the specific compound in the past.

Considering the normative for robust analysis in ISO 13528:2015, the uncertainty accompanying the assigned value for each pesticide was calculated according to the following equation:

$$u(x_{pt}) = 1.25 \frac{s^*}{\sqrt{p}}$$

Where:

- $u(x_{pt})$ is the uncertainty in mg/Kg.
- s^* is the robust standard deviation of the results.
- p is the total number of results.

3.3 Fixed target standard deviations

Based on the experience gained from previous EU proficiency tests and recommendations from the EURL Advisory Group, a fixed relative standard deviation (FFP-RSD) of 25 % was chosen [3]. This is in line with the internationally accepted target Measurement Uncertainty of 50 % for multiresidue analysis of pesticides [4], which is derived from, and linked to, the EUPTs. The same target RSD has been applied to all the pesticides, independent of concentration. For informative purposes the robust relative standard deviation (CVs^*) is calculated according to ISO 13528:2015 Chapter 7.7 (Consensus value from participant results) following Algorithm A in Annex C, and it can be compared to the FFP-RSD in **Table 7**.

3.4 z scores

A z score for each laboratory/pesticide combination was calculated according to the following equation:

$$z_i = \frac{(x_i - x_{pt})}{\sigma_{pt}}$$

Where:

- x_i is the result reported by the participant, or the MRRL or the reporting limit (RL) (whichever one is lower) for those labs that have not detected the presence of the pesticide in the sample.
- X_{pt} is the assigned value.
- σ_{pt} is the target standard deviation (the FFP-RSD of 25 % multiplied by the assigned value).

z score classification is as follows:

$ z \leq 2.0$	Acceptable
$2.0 < z < 3.0$	Questionable
$ z \geq 3.0$	Unacceptable

- Any z score value of $|z| > 5$ has been reported as '>5' and a value of '5' has been used to calculate combined z scores.
- No z score calculations have been performed for false positive results.
- For false negative results, the MRRL (or RL) has been used to calculate the z score. These z scores have also been included in the graphical representation and are marked with an asterisk.

3.5 Combined z scores

In order to evaluate each laboratory's overall performance according to the quality of its results and its scope, two classifications - Category A and B - were used. To be classified into Category A, laboratories had to be able to analyse at least 90 % of the compulsory pesticides in the target pesticides list, to correctly identify and report quantitative results (that is *sought and detected*) for 90 % or more of the total number of pesticides evaluated in the test item and report no false positives (for the 90 % criterion the number of pesticides needed to be correctly analysed to have sufficient scope will be calculated by multiplying the number of compulsory pesticides from the Target Pesticides List by 0.9 and rounded to the nearest full number with 0.5 decimals being rounded downwards). If these three requirements were met, then the combined z scores were calculated as the 'Average of the Squared z scores' (AZ^2) [5].

3.5.1 The Average of the Squared z scores (AZ^2)

The 'Average of the Squared z scores' was introduced for the first time in EUPT-FV12. The AZ^2 is calculated as follows:

$$AZ^2 = \frac{\sum_{i=1}^n Z_i^2}{n}$$

The resultant formula is the sum of the z scores value, multiplied by itself and divided by the number of z scores (n) detected by each laboratory, including those from false negatives.

This formula is subsequently used to produce an overall classification of laboratories with three sub-classifications: 'good', 'satisfactory' and 'unsatisfactory'.

$ AZ^2 \leq 2.0$	Good
$2.0 < AZ^2 < 3.0$	Satisfactory
$ AZ^2 \geq 3.0$	Unsatisfactory

In this way, a simple, single, combined value is also achieved, as with the previous formula. However, this time, it is more mathematically justifiable as it uses the actual z score value rather than the factors 1, 3 and 5. Again, the aim is to encourage laboratories to not only improve the accuracy of their results but also to analyse a greater number of pesticides.

Laboratories that did not detect and quantify sufficient pesticides, that were not able to analyse at least 90 % of the compulsory pesticides or reported a false positive, have been placed in Category B and no combined z score has been calculated.

In **Appendices 5 and 6**, only results of laboratories in Category A have been presented, along with their graphical representations.

4. RESULTS

4.1 Summary of reported results

The laboratories that agreed to participate are listed in Annex B. All results reported by the participants are given in **Appendix 3**, whilst the analytical methods used are given in **Appendix 7** (available in the EURL-FV web page in electronic format).

One hundred and seventy-nine laboratories agreed to participate in this proficiency test. Five did not report results, so the total number of laboratories submitting results was 174. The results reported by all the laboratories are presented in this report. However, only results reported by laboratories from EU-countries and EFTA-countries (Iceland, Norway, and Switzerland) have been included in the statistical treatment. The results from the laboratories in Argentina, China, Colombia, Costa Rica, India, Kenya, Peru, Serbia, Singapore, Thailand, Turkey, United Kingdom and Uruguay have not been included. This last group totals 22 laboratories that reported results.

Sixteen pesticides from the compulsory pesticide target list and two voluntary pesticides were used to treat the sample and were present in the test item at concentrations above the MRRL. Other compounds were present in the sample, but due to their low assigned values, they could not be evaluated: In the case of pymetrozine, chlorothalonil and fenamiphos sulfoxide, their assigned values were 0.012, 0.020 and 0.021 mg/kg, respectively, which are below three times their MRRL (0.01 mg/kg). The SC agreed that they should not be considered for the evaluation of the participants. Information for those compounds will be displayed in the report only for informative purposes. In addition, some other pesticides were present in the test item, but at concentrations below their MRRLs. Those have not been evaluated, nor shown in the report.

The EUPT platform for submission of results allowed laboratories to report spinosad and/or spinosyns A and D. The evaluation of the labs will be made considering only spinosad results. However, the results of the individual components, spinosyn A and D, will be shown for informative purposes. For

compounds not evaluated, no false negatives were assigned, in accordance to the General Protocol of the EUPTs.

A summary of the reported results for the pesticides included in the test item can be seen below in **Table 5**.

Table 5. Summary of Reported Results

Pesticides	No. of Reported Results	No. of False Negative Results	No. of Not Analysed Results	Percentage of Reported Results ^a (out of 155)
Acetamiprid	144	1	10	93
Azoxystrobin	152	1	2	98
Buprofezin	148	1	6	95
Chlorfenvinphos	146	4	5	94
①Chlorothalonil	107	-	18	69
Chlorpyrifos	153	1	1	99
Deltamethrin	144	2	9	93
Diazinon	150	1	4	97
Fenamiphos	146	2	7	94
①Fenamiphos sulfoxide	126	-	23	81
Flonicamid	132	5	18	85
Fuopyram	140	3	12	90
Oxamyl	137	1	17	88
Oxydemeton-methyl	128	6	21	83
Procymidone	142	5	8	92
Propamocarb	136	2	17	88
①Pymetrozine	94	-	22	61
Spinosad	141	0	14	91
①Spinosyn A	92	-	14	59
①Spinosyn D	92	-	14	59
Zoxamide	138	2	15	89
Voluntary Pesticides				
Flupyradifurone	59	3	93	38
Isofetamid	61	4	90	39

^a The percentage of Reported Results comes from 155 laboratories. It does not take into account the twenty-two laboratories from Argentina, China, Colombia, Costa Rica, India, Kenya, Peru, Serbia, Singapore, Thailand, Turkey, United Kingdom and Uruguay.

① Only for informative purposes

4.1.1 False positives

Eleven laboratories (including non-EU countries) reported results for nine additional pesticides that were not present in the test item. These pesticides and the residue levels reported are presented in **Table 6**, together with the MRRLs and reporting limits (RLs). Where the reported concentrations of the erroneously detected pesticide were higher than the assigned MRRL value in the Target Pesticide List (Annex A), the result has been considered as a false positive. If the concentrations reported were below the MRRLs, or if the pesticides did not appear in the pesticide list included in Annex A, then they were not considered to be false positives.

Table 6. Laboratories that reported as quantitative results for pesticides that were not present in the treated test item

Laboratory Code	Pesticide	Concentration (mg/kg)	Determination Technique	RL (mg/kg)	MRRL (mg/kg)
61	Carbofuran	0.233	LC-MS/MS QQQ	0.01	0.005
84	Demeton-S-methylsulfone	0.075	LC-Q-TOF	0.01	0.005
100	Spinetoram	0.025	LC-MS/MS QQQ	0.01	0.01
123 [§]	Fenpropathrin	0.17	LC-MS/MS QQQ	0.01	0.01
123 [§]	Tricyclazole	0.01	GC-MS/MS (QQQ)	0.01	0.01
124	Triflumizole	0.024	GC-MS/MS (QQQ)	0.01	0.01
132	Demeton-S-methylsulfone	0.105	LC-MS/MS QQQ	0.005	0.005
161 [§]	Famoxadone	0.02	GC-MS/MS (QQQ)	0.01	0.01
162	Aldrin	0.073	GC-MS/MS (QQQ)	0.01	0.005
163 [§]	Spinetoram	0.105	LC-MS/MS QQQ	0.01	0.01
181	Thiabendazole	0.010	LC-MS/MS QQQ	0.01	0.01
182	Demeton-S-methylsulfone	0.099	LC-MS/MS QQQ	0.005	0.005

[§] Non-EU/EFTA laboratories

Spinetoram was reported by two participants. This is because spinetoram J shares, at least, two mass transitions with spinosyn D, and two isotopologues of spinosyn D have identical molecular mass to the first decimal unit as the monoisotopic mass of spinetoram J (747.5 Da) (see final report of EUPT-FV23).

Demeton-S-methylsulfone was reported by three participant laboratories at concentrations 0.075, 0.105 and 0.099 mg/kg. That compound might be present in the test item, but at concentrations below 0.005 mg/kg. Therefore, the SC considered it as a false positive.

4.1.2 False negatives

Tables 7 a and b summarise the results from laboratories (including non-EU laboratories, indicated with §) that reported false negatives, presented as 'Not Detected' (ND).

Table 7.a Laboratories that failed to report pesticides that were present in the treated test item.

Laboratory Code	Acetamiprid	Azoxystrobin	Buprofezin	Chlorfenvinphos	Chlorpyrifos	Deltamethrin	Diazinon	Fenamiphos	Flonicamid	Fluopyram	Oxamyl	Oxydemeton-methyl	Procymidone	Propamocarb	Zoxamide
6				ND											
20									ND					ND	
22												ND			
27												ND			
40				ND											
44						ND							ND		
45									ND						
46										ND					
82				ND											ND
84												ND	ND		
90 [§]						ND									
92 [§]													ND	ND	

Laboratory Code	Acetamiprid	Azoxystrobin	Buprofezin	Chlorfenvinphos	Chlorpyrifos	Deltamethrin	Diazinon	Fenamiphos	Flonicamid	Fluopyram	Oxamyl	Oxydemeton-methyl	Procymidone	Propamocarb	Zoxamide
111														ND	
123 [§]									ND		ND	ND		ND	ND
126 [§]										ND					
132												ND			
150	ND										ND				
161 [§]										ND					
163 [§]												ND			ND
166									ND						
167													ND		
169		ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND		ND
179									ND						
182												ND			
184 [§]								ND						ND	
187								ND		ND			ND		

[§] Non-EU/EFTA laboratories

ND: Not detected

Table 7.b

Laboratories that failed to report voluntary pesticides that were present in the treated test item.

Voluntary Pesticides		
Lab Code	Flupyradifurone	Isfetamid
89		ND
182	ND	ND
184 [§]	ND	ND
186	ND	ND
187	ND	ND

[§] Non-EU/EFTA laboratories

ND: Not detected

4.1.3 Distribution of data

The distribution of the concentrations of the pesticides reported by the laboratories has been plotted as histograms with a bandwidth of $0.75 \cdot \sigma$ (σ is the target standard deviation (the FFP-RSD of 25 % multiplied by the assigned value)). The histograms of both the compulsory and voluntary pesticides present in the test item are presented in **Appendix 2**.

4.2 Assigned values and target standard deviations

The assigned values are based on the robust mean values calculated using all the results reported by laboratories from EU and EFTA countries, after exclusion of gross errors (those results ≥ 10 times above or below the assigned value). Only one result reported for zoxamide (0.58 mg/kg) was excluded for the calculation of its assigned value as, following the previously mentioned criterion, it was considered a gross error.

The assigned values for the sixteen compulsory and the two voluntary pesticides and their uncertainties are presented in **Table 8**. The assigned values of pymetrozine, chlorothalonil and

fenamiphos sulfoxide are 0.012, 0.020 and 0.021 mg/kg, respectively, which are below three times their MRRL (0.01 mg/kg). The SC agreed that it should not be considered for the evaluation of the participants. Information for those compounds will be displayed only for informative purposes.

The assigned values of spinosyn A and D will also be shown for informative purposes only.

The target standard deviation was calculated using a fixed FFP-RSD value of 25 %. For comparison, a robust standard deviation (CV*) was also calculated for informative purposes, also employing this value for the calculation of the uncertainty. These RSDs can be seen in **Table 8**.

Table 8. Robust mean values, uncertainty and % RSDs for all pesticides evaluated.

Pesticides	MRRL (mg/kg)	Robust mean (mg/kg)	Uncertainty (mg/kg)	Number of results (n)	FFP-RSD (%)	CV* (%)
Acetamiprid	0.01	0.053	0.001	144	25	13.6
Azoxystrobin	0.01	0.089	0.001	152	25	14.1
Buprofezin	0.01	0.074	0.001	148	25	15.6
Chlorfenvinphos	0.01	0.084	0.001	146	25	16.4
①Chlorothalonil	0.01	0.020	0.001	107	25	27.4
Chlorpyrifos	0.005	0.072	0.001	153	25	15.5
Deltamethrin	0.01	0.087	0.002	144	25	26.0
Diazinon	0.005	0.616	0.011	150	25	16.8
Fenamiphos	0.01	0.057	0.001	146	25	18.2
①Fenamiphos sulfoxide	0.01	0.021	0.000	126	25	19.1
Fonicamid	0.01	0.099	0.002	132	25	14.0
Fluopyram	0.01	0.457	0.009	140	25	17.7
Oxamyl	0.01	0.084	0.001	137	25	15.9
Oxydemeton-methyl	0.005	0.098	0.002	128	25	14.7
Procymidone	0.01	0.177	0.004	142	25	19.2
Propamocarb	0.01	0.588	0.013	136	25	20.0
①Pymetrozine	0.01	0.012	0.000	94	25	20.9
Spinosad	0.01	0.139	0.003	141	25	19.2
①Spinosyn A	0.01	0.117	0.004	92	25	23.2
①Spinosyn D	0.01	0.029	0.001	92	25	40.0
Zoxamide	0.01	0.046	0.001	138	25	21.9
Voluntary Pesticides						
Flupyradifurone	0.01	0.056	0.001	59	25	12.7
Isofetamid	0.01	0.045	0.002	61	25	21.5

①Only for informative purposes

4.3 Assessment of laboratory performance

4.3.1 z scores

z scores were calculated using the FFP-RSD of 25 % for all the pesticides evaluated.

In **Appendix 3** the individual z scores are presented for each laboratory, together with the concentrations reported for each pesticide. The z scores of laboratories from non-EU countries have been included in **Appendix 3**, but have not been considered in **Table 9**, where the classification of z scores reported by EU/EFTA laboratories is shown.

Table 9. Classification of z scores for the pesticides reported (only EU/EFTA participants)

Pesticides	Acceptable (%)	Questionable (%)	Unacceptable (%)
Acetamiprid	97.9	0.7	1.4
Azoxystrobin	95.4	3.3	1.3
Buprofezin	98.7	0.0	1.3
Chlorfenvinphos	94.7	2.0	3.3
① Chlorothalonil	89.7	5.6	4.7
Chlorpyrifos	97.4	1.3	1.3
Deltamethrin	89.0	6.2	4.8
Diazinon	97.4	1.3	1.3
Fenamiphos	94.6	1.4	4.1
① Fenamiphos sulfoxide	96.0	1.6	2.4
Fonicamid	92.7	2.2	5.1
Fluopyram	93.7	2.8	3.5
Oxamyl	94.9	2.2	2.9
Oxydemeton-methyl	92.5	0.0	7.5
Procymidone	93.2	2.7	4.1
Propamocarb	90.6	3.6	5.8
① Pymetrozine	96.8	2.1	1.1
Spinosad	95.0	2.1	2.8
① Spinosyn A	94.6	3.3	2.2
① Spinosyn D	79.3	4.3	16.3
Zoxamide	91.4	2.9	5.7
Voluntary Pesticides			
Flupyradifurone	93.5	1.6	4.8
Isofetamid	92.3	1.5	6.2

① Only for informative purposes

z scores for false negative results have been calculated using the MRRL value given in the Target Pesticide List (Annex A) or the RL value from the laboratory (whichever was lower).

In **Appendix 4**, graphical representations of the z scores of EU/EFTA laboratories are presented. No z scores have been calculated for false positive results; z scores for false negative results have been included on the chart and are indicated by an asterisk. Only the bars of the z score graph for flonicamid are coloured according to the determination technique used for each pesticide, as most of the GC results had negative z scores.

4.3.2 Combined z scores

As previously mentioned in Section 3.5., the AZ² formula has only been applied to those participants categorised into Category A and considering only compulsory pesticides.

The table in **Appendix 5** shows the values of individual z scores for each compulsory pesticide and the combined 'Average of the Squared z scores' (AZ²) for laboratories in Category A (including non-EU countries), which were those laboratories that were able to analyse at least 90 % of the compulsory pesticides in the target pesticides list (14), to detect and quantify at least 90 % of the pesticides present in the Test Item (190), and that did not report any false positive result. A graphical representation of those results for the EU/EFTA laboratories can be found in **Appendix 6**.

One hundred and thirteen of the 155 EU and EFTA laboratories that submitted results were classified into Category A (73 %).

From the AZ², 93 % were classed as 'good', 2 % as 'satisfactory' and 5 % as 'unsatisfactory' (Only considering EU and EFTA laboratories).

Of the 42 EU and EFTA laboratories in Category B, eight had reported a false positive result. Six of them would have been classified into Category A if not for that false positive result.

Table 10 shows all the laboratories in Category A (including non-EU laboratories, indicated with §), the number of pesticides reported, the percentage of pesticides analysed from the compulsory target list, the AZ² values and their sub classifications. Laboratories that reported false negative results in Category A are marked with the symbol ⊖.

Table 10. Performance and Classification of laboratories in Category A using the AZ² formula

Lab Code	No. of pesticides detected (max.16)	% of pesticides analysed from target list	AZ ²	Classification
4 [§]	16	100	11.3	Unsatisfactory
5 [§]	16	100	0.8	Good
6 ⊖	15	100	2.1	Satisfactory
8	16	100	1.0	Good
9	16	100	0.1	Good
10	16	100	0.7	Good
11	16	100	0.5	Good
12 [§]	16	100	0.3	Good
14 [§]	16	97	15.2	Unsatisfactory
17	16	100	0.8	Good
19	16	97	1.1	Good
21	16	100	0.6	Good
23	16	100	0.6	Good
24	15	96	0.2	Good
26	16	100	0.2	Good
29	16	99	0.2	Good
32	16	100	1.4	Good
35	16	100	0.2	Good
36	16	99	0.7	Good
37	16	100	0.3	Good
38	16	100	0.6	Good
39	16	94	2.2	Satisfactory
40 ⊖	15	99	1.4	Good
41	16	99	1.2	Good
42	16	99	0.2	Good
43	16	99	0.4	Good
44 ⊖	14	100	4.6	Unsatisfactory
47	16	100	0.6	Good
48	16	100	0.9	Good
49	16	100	0.4	Good
50	15	96	0.1	Good
51	15	97	0.2	Good

Lab Code	No. of pesticides detected (max.16)	% of pesticides analysed from target list	AZ ²	Classification
52	16	98	1.4	Good
54	16	98	0.2	Good
55	16	99	0.2	Good
58	16	100	0.0	Good
59	15	96	0.1	Good
60	16	96	3.1	Unsatisfactory
63 ^s	16	97	0.9	Good
66	16	98	0.5	Good
68	16	100	1.0	Good
69 ^s	16	97	0.3	Good
70	16	100	0.5	Good
71	16	94	0.8	Good
72	16	100	0.3	Good
73	16	97	0.3	Good
74	16	100	1.8	Good
75	16	100	0.3	Good
76	16	99	0.9	Good
77	16	100	1.0	Good
78	16	97	0.2	Good
80	16	92	0.2	Good
81	16	100	1.2	Good
83 ^s	16	100	0.3	Good
85	16	98	0.8	Good
87	16	100	0.4	Good
88	16	96	0.5	Good
89	16	100	0.6	Good
91	16	100	0.8	Good
93	16	100	0.8	Good
94 ^s	16	98	0.2	Good
95	16	100	0.2	Good
96	16	97	0.3	Good
97	16	91	6.0	Unsatisfactory
98 ^s	14	91	0.6	Good
101	16	100	0.2	Good
103	16	95	0.4	Good
104	16	100	7.2	Unsatisfactory
105	16	98	1.4	Good
106	16	99	0.4	Good
108	16	99	0.2	Good
109	16	100	3.6	Unsatisfactory
110	16	100	0.2	Good
111 \ominus	15	93	3.1	Unsatisfactory
112	16	100	0.3	Good
113	16	100	0.5	Good
114	15	91	0.9	Good
115	16	98	0.4	Good
116	16	95	0.4	Good
119	15	90	1.3	Good
122	16	100	0.2	Good

Lab Code	No. of pesticides detected (max.16)	% of pesticides analysed from target list	AZ ²	Classification
125	16	99	2.0	Good
126 [§] ⊖	14	94	2.1	Satisfactory
127	16	100	0.2	Good
128	16	100	0.9	Good
129	16	99	0.4	Good
130	16	92	0.6	Good
131	16	98	0.3	Good
133	16	95	0.6	Good
134	16	97	0.3	Good
135	16	100	1.8	Good
136	16	100	0.3	Good
137	15	93	0.2	Good
138	16	100	0.4	Good
140	16	100	1.0	Good
142	16	100	0.3	Good
143	16	98	0.8	Good
144	16	98	0.1	Good
145	16	96	0.1	Good
146	16	93	1.5	Good
147	16	100	0.9	Good
148	16	100	0.2	Good
149	16	98	0.1	Good
150 ⊖	14	99	1.6	Good
151	16	99	0.8	Good
154	15	99	0.3	Good
155	16	100	1.3	Good
156	16	100	0.9	Good
158	16	100	0.3	Good
159	16	100	0.7	Good
164	16	100	0.4	Good
165	16	100	0.9	Good
167 ⊖	15	100	1.4	Good
168	16	100	2.0	Good
170	16	100	0.8	Good
171	16	100	0.4	Good
172	16	100	0.8	Good
173 [§]	16	100	1.4	Good
176	16	100	0.6	Good
177	16	100	0.4	Good
180	16	100	0.3	Good
183	16	100	0.1	Good
184 [§] ⊖	14	100	2.6	Satisfactory
185	16	100	0.4	Good
186	16	100	0.4	Good

⊖ Laboratories reporting a false negative result
[§] Non-EU/EFTA laboratories

Table 11 shows all the laboratories in Category B (including non-EU laboratories, indicated with [§]), the number and percentage of results reported, the percentage of pesticides analysed from the

compulsory target list and the number of acceptable z scores. Laboratories reporting a false negative are marked with the symbol \ominus and laboratories reporting a false positive are marked with a '+'.

Table 11. Performance of laboratories in Category B

Lab Code	No. of pesticides detected	% of pesticides detected	% of pesticides analysed from target list	No. of total z scores	No. of acceptable z scores (z score \leq 2.0)
13	7	44	52	7	7
15	11	69	67	11	10
20 \ominus	12	75	74	14	7
22 \ominus	10	63	81	11	10
25	13	81	80	13	13
27 \ominus	13	81	73	14	13
28	15	94	80	15	15
33	14	88	85	14	13
34	6	38	29	6	6
45 \ominus	14	88	87	15	14
46 \ominus	10	63	72	11	10
53	16	100	89	16	16
56	10	63	62	10	10
57	13	81	65	13	11
61+	14	88	79	14	14
62 ^s	7	44	27	7	6
64	7	44	35	7	6
65	15	94	83	15	12
67	11	69	59	11	11
79	11	69	52	11	11
82 \ominus	13	81	79	15	13
84 \ominus +	14	88	99	16	12
86	9	56	48	9	9
90 ^s \ominus	11	69	71	12	11
92 ^s \ominus	13	81	85	15	13
99 ^s	16	100	86	16	15
100+	16	100	98	16	16
107	9	56	56	9	8
117	15	94	89	15	15
118	16	100	89	16	16
120	3	19	18	3	3
121	15	94	85	15	15
123 ^s \ominus +	11	69	100	16	2
124+	16	100	95	16	15
132 \ominus +	15	94	99	16	14
139	6	38	18	6	6
141	3	19	21	3	3
152	16	100	87	16	16
160	9	56	56	9	8
161 ^s \ominus +	12	75	55	13	11
162+	16	100	99	16	16
163 ^s \ominus +	14	88	100	16	13
166 \ominus	15	94	81	16	11

Lab Code	No. of pesticides detected	% of pesticides detected	% of pesticides analysed from target list	No. of total z scores	No. of acceptable z scores (z score ≤ 2.0)
169 [⊖]	4	25	100	16	3
178	10	63	63	10	10
179 [⊖]	10	63	54	11	7
181 ⁺	5	31	18	5	5
182 [⊖] ⁺	15	94	100	16	15
187 [⊖]	13	81	100	16	12

⊖ Laboratories reporting a false negative result
+ Laboratories reporting a false positive result
§ Non-EU/EFTA laboratories

The AZ² graphical representation for EU/EFTA laboratories classified into Category A can be seen in **Appendix 6**. The EU National Reference Laboratories (NRLs) for Fruits and Vegetables have been plotted using a different colour.

5. CONCLUSIONS

One hundred and seventy-nine laboratories agreed to participate in EUPT-FV-24. Five of them did not submit results. From the remaining 174 laboratories that submitted results, 19 did not belong to EU nor EFTA countries, so their results were not considered for the estimation of the assigned value.

Sixteen mandatory and two voluntary pesticides were evaluated in EUPT-FV-24, based on the analysis of tomato homogenate. Chlorothalonil, pymetrozine and fenamiphos sulfoxide had assigned values below three times their MRRL. They have not been considered for participant evaluation, and the information shown for these compounds is for informational purposes only.

Of a total number of 2480 possible determinations from EU/EFTA laboratories (155 laboratories by 16 evaluated pesticides), 91.8 % were reported, 6.7 % were not analysed and 1.5 % were not detected (false negative results).

The total number of evaluated z scores for mandatory compounds of laboratories from EU/EFTA countries was 2314, with 94.4 % of them acceptable, 2.2 % questionable and 3.4 % unacceptable.

73 % of the EU and EFTA laboratories that submitted results were classified into Category A. Of them, 93 % were classed as 'good', 2 % as 'satisfactory' and 5 % as 'unsatisfactory'.

The robust standard deviation (CV*) was below 26 % for all the evaluated compounds, with an average value of 17.4 % for the 16 mandatory pesticides evaluated and the two voluntary ones.

Participation in this year's European Proficiency Test 24 involved at least one laboratory from each Member State. Additionally, laboratories from Norway and Switzerland participated as EFTA countries. As laid down in paragraph 2 (h) of Article 94 of Regulation (EU) 2017/625, one of the EURL's duties is to collaborate with non-EU laboratories that are responsible for analysing food and feed samples and to help them improve the quality of their analyses. Non-European laboratories from Argentina, China, Colombia, Costa Rica, India, Kenya, Peru, Serbia, Singapore, Thailand, Turkey, United Kingdom and Uruguay participated in EUPT-FV-24.

6. REFERENCES

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5. P. Medina-Pastor, M. Mezcuca, C. Rodríguez-Torreblanca, A. R. Fernández-Alba. Laboratory assessment by combined z-score values in proficiency tests: experience gained through the European Union proficiency tests for pesticide residues in fruits and vegetables. *Anal. Bioanal. Chem.*, 2010, 397, 3061–3070.

7. ACKNOWLEDGEMENTS

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APPENDIX 1. Homogeneity.

Acetamiprid (mg/kg)		Azoxystrobin (mg/kg)		Buprofezin (mg/kg)		Chlorfenvinphos (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.058	0.058	0.088	0.090	0.074	0.075	0.067	0.072
0.055	0.053	0.085	0.084	0.074	0.070	0.069	0.070
0.060	0.059	0.090	0.091	0.074	0.073	0.072	0.064
0.056	0.058	0.088	0.091	0.071	0.076	0.069	0.069
0.061	0.058	0.090	0.086	0.071	0.068	0.061	0.065
0.056	0.059	0.087	0.094	0.069	0.063	0.065	0.063
0.055	0.059	0.088	0.093	0.075	0.069	0.066	0.064
0.056	0.061	0.082	0.088	0.069	0.075	0.060	0.071
0.057	0.060	0.085	0.091	0.066	0.066	0.061	0.062
0.058	0.059	0.088	0.092	0.078	0.078	0.071	0.071

Chlorpyrifos (mg/kg)		Deltamethrin (mg/kg)		Diazinon (mg/kg)		Fenamiphos (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.060	0.060	0.059	0.058	0.440	0.480	0.058	0.058
0.056	0.054	0.051	0.053	0.460	0.460	0.056	0.056
0.057	0.052	0.055	0.049	0.460	0.450	0.061	0.061
0.059	0.059	0.053	0.056	0.460	0.470	0.060	0.061
0.049	0.052	0.047	0.048	0.420	0.430	0.062	0.059
0.053	0.051	0.047	0.047	0.420	0.410	0.059	0.062
0.054	0.051	0.047	0.048	0.410	0.430	0.060	0.062
0.051	0.061	0.049	0.058	0.430	0.460	0.055	0.059
0.047	0.049	0.047	0.048	0.410	0.410	0.058	0.062
0.062	0.062	0.061	0.061	0.470	0.480	0.059	0.060

Flonicamid (mg/kg)		Fluopyram (mg/kg)		Oxamyl (mg/kg)		Oxydemeton-methyl (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.096	0.097	0.430	0.440	0.088	0.090	0.110	0.110
0.092	0.091	0.420	0.440	0.085	0.085	0.100	0.100
0.099	0.098	0.420	0.450	0.087	0.087	0.110	0.110
0.092	0.097	0.410	0.440	0.080	0.083	0.110	0.110
0.103	0.098	0.430	0.430	0.096	0.089	0.120	0.110
0.098	0.102	0.400	0.420	0.087	0.091	0.110	0.120
0.091	0.099	0.420	0.450	0.081	0.086	0.110	0.110
0.097	0.101	0.440	0.440	0.086	0.093	0.110	0.120
0.098	0.103	0.400	0.430	0.088	0.093	0.110	0.110
0.099	0.102	0.440	0.450	0.089	0.091	0.110	0.120

The sample numbers used for this test were: 2, 18, 70, 112, 127, 129, 187, 197, 217 and 218.

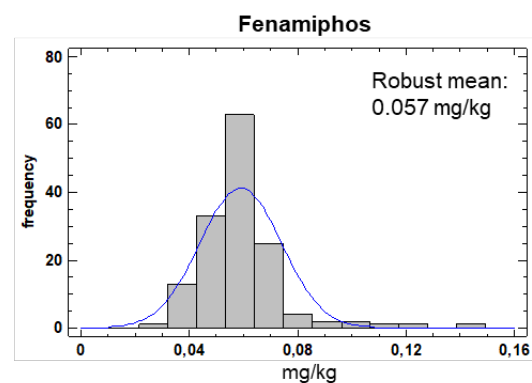
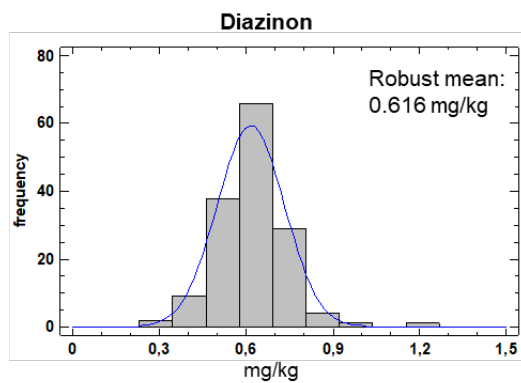
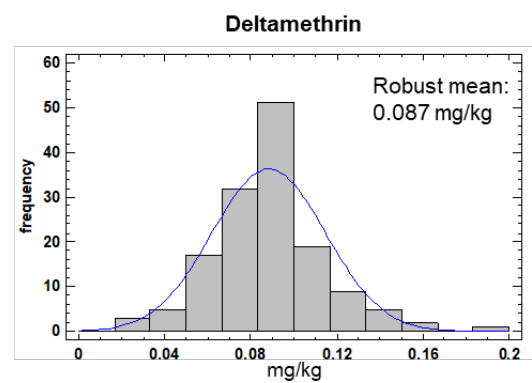
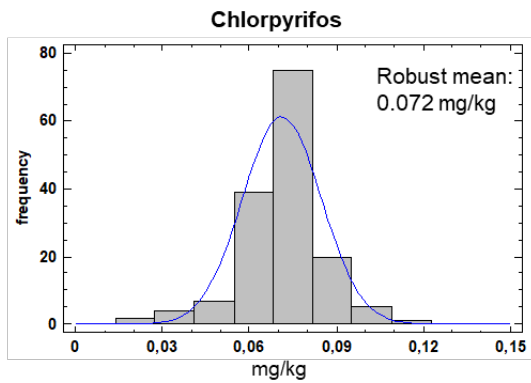
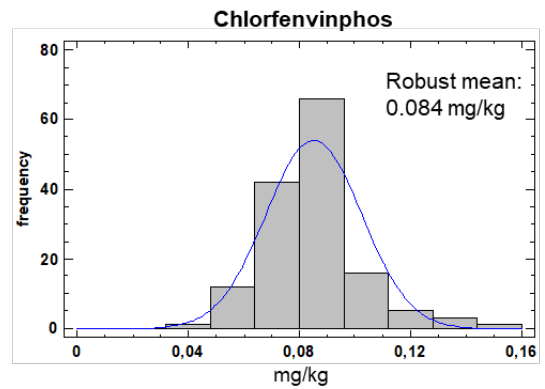
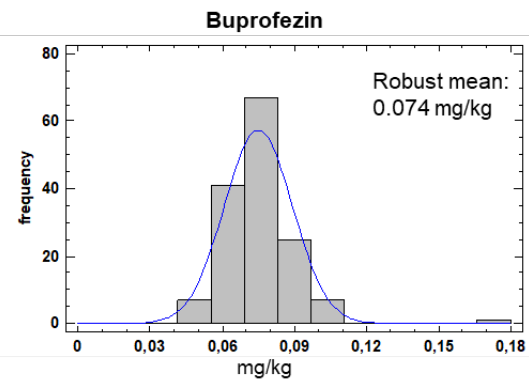
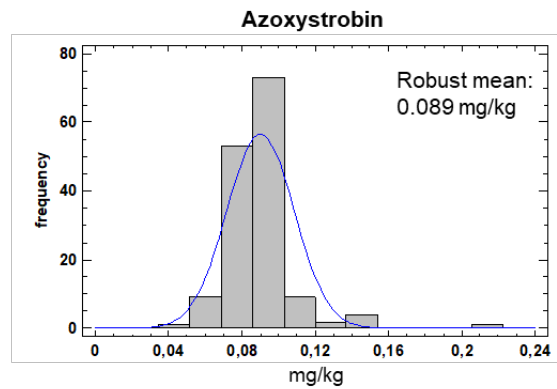
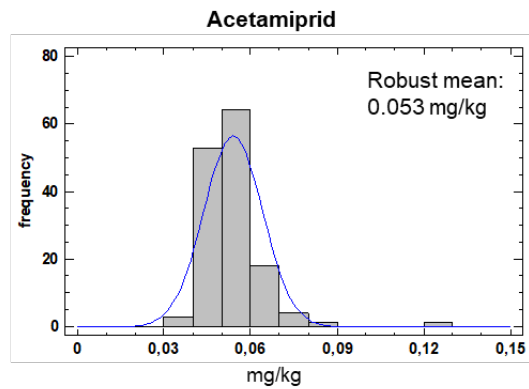
Procymidone (mg/kg)		Propamocarb (mg/kg)		Spinosad (mg/kg)		Zoxamide (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.160	0.160	0.600	0.600	0.140	0.150	0.038	0.039
0.160	0.160	0.570	0.590	0.130	0.140	0.038	0.038
0.160	0.150	0.560	0.610	0.150	0.150	0.041	0.042
0.160	0.160	0.560	0.590	0.140	0.150	0.040	0.041
0.150	0.150	0.610	0.600	0.150	0.140	0.040	0.039
0.150	0.160	0.560	0.580	0.140	0.150	0.040	0.042
0.150	0.150	0.560	0.610	0.140	0.150	0.040	0.042
0.150	0.160	0.620	0.630	0.140	0.150	0.035	0.037
0.150	0.150	0.580	0.630	0.140	0.150	0.037	0.040
0.160	0.160	0.640	0.640	0.150	0.150	0.039	0.039

Voluntary Pesticides

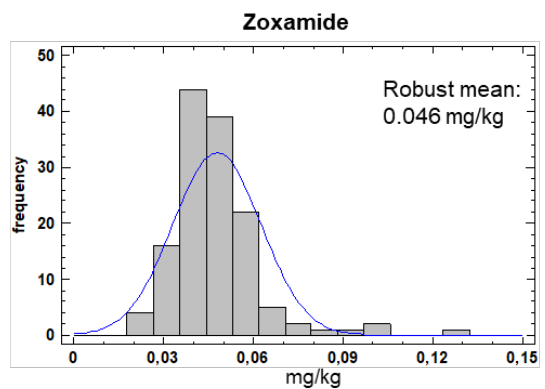
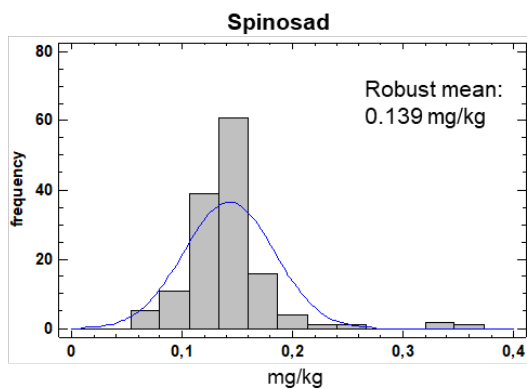
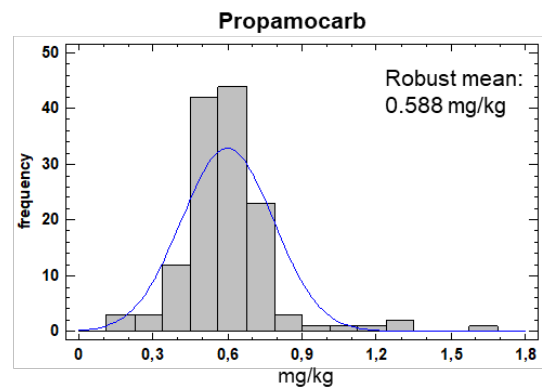
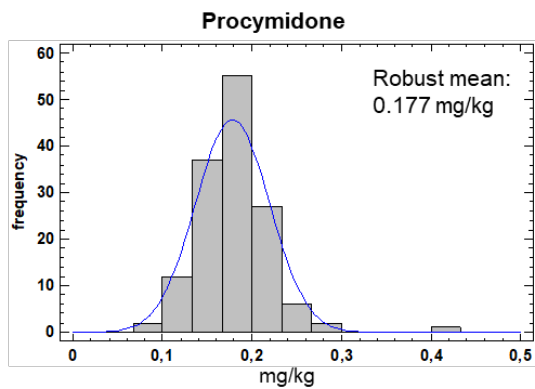
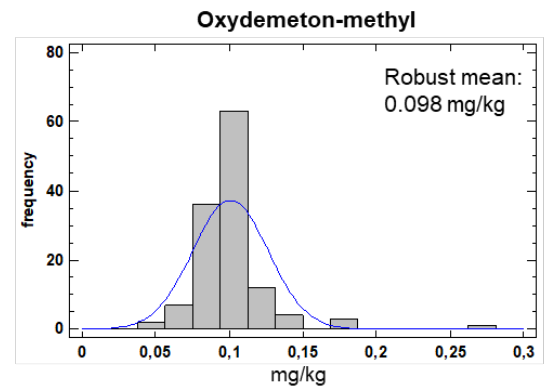
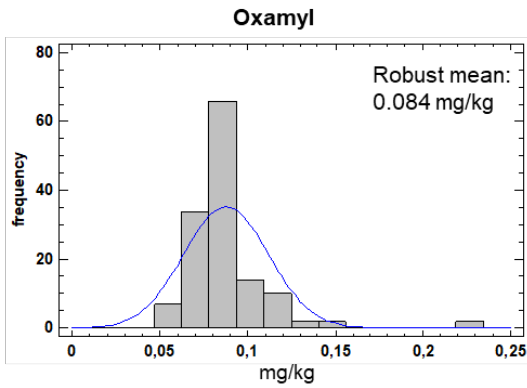
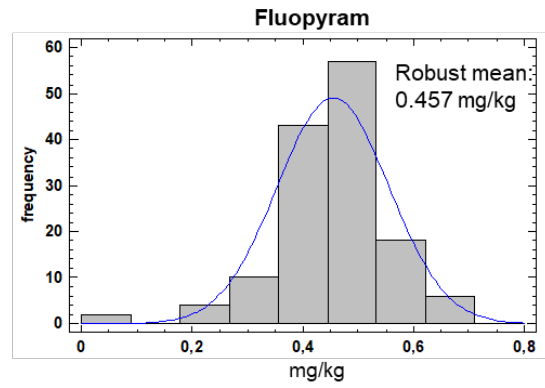
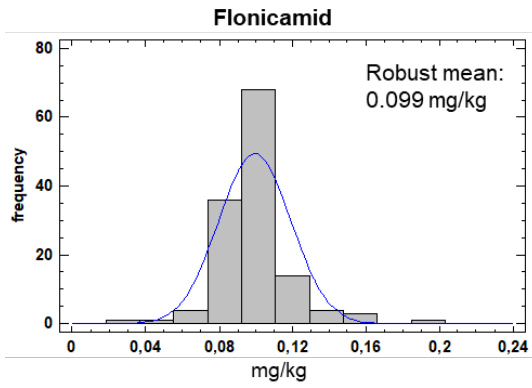
Flupyradifurone (mg/kg)		Isofetamid (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.062	0.062	0.043	0.043
0.058	0.058	0.041	0.041
0.064	0.063	0.045	0.046
0.060	0.063	0.044	0.046
0.065	0.062	0.045	0.042
0.062	0.065	0.043	0.045
0.059	0.063	0.044	0.046
0.061	0.065	0.039	0.042
0.062	0.066	0.041	0.044
0.064	0.065	0.043	0.044

The sample numbers used for this test were: 2, 18, 70, 112, 127, 129, 187, 197, 217 and 218.

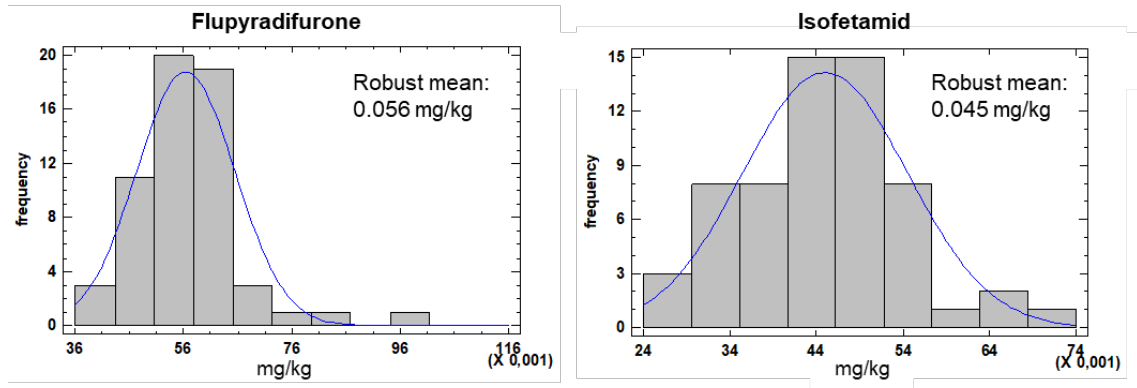
APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.



APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.



Voluntary pesticides



APPENDIX 3. Results (mg/Kg) and z scores for FFP-RSD (25 %).

Results reported by the laboratories for the mandatory pesticides acetamiprid, azoxystrobin, buprofezin, chlorfenvinphos, chlorpyrifos, deltamethrin, diazinon, fenamiphos, flonicamid, fluopyram, oxamyl, oxydemeton-methyl, procymidone, propamocarb, spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad), zoxamide (mg/kg) and their calculated z score value using FFP-RSD 25 %

Lab Code	Acetamiprid	Azoxystrobin		Buprofezin		Chlorfenvinphos		Chlorpyrifos		Deltamethrin		Diazinon		Fenamiphos		Flonicamid		
MRL (mg/kg)	0.01	z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		
Robust mean (mg/kg)	0.053	0.089		0.074		0.084		0.072		0.087		0.616		0.057		0.099		
4	0.0383	-1.1	0.1665	3.5	0.162	4.7	0.2237	6.6	0.1404	3.8	0.3011	9.8	0.8758	1.7	0.0796	1.5	0.0482	-2.0
5	0.0495	-0.3	0.114	1.1	0.1052	1.7	0.1064	1.0	0.0805	0.5	0.1022	0.7	0.6223	0.0	0.0474	-0.7	0.0714	-1.1
6	0.053	0.0	0.093	0.2	0.082	0.4	ND	-3.5	0.072	0.0	0.115	1.3	0.69	0.5	0.061	0.3	0.097	-0.1
8	0.0461	-0.5	0.0665	-1.0	0.0602	-0.8	0.0569	-1.3	0.0549	-0.9	0.0599	-1.3	0.465	-1.0	0.0399	-1.2	0.0762	-0.9
9	0.046	-0.5	0.087	-0.1	0.063	-0.6	0.077	-0.3	0.07	-0.1	0.084	-0.2	0.573	-0.3	0.055	-0.2	0.089	-0.4
10	0.052	-0.1	0.113	1.1	0.089	0.8	0.109	1.2	0.078	0.4	0.127	1.8	0.771	1.0	0.07	0.9	0.094	-0.2
11	0.0533	0.0	0.1	0.5	0.0884	0.8	0.0942	0.5	0.0771	0.3	0.0981	0.5	0.809	1.3	0.0663	0.6	0.096	-0.1
12	0.049	-0.3	0.081	-0.3	0.061	-0.7	0.082	-0.1	0.064	-0.4	0.06	-1.3	0.57	-0.3	0.056	-0.1	0.094	-0.2
13	0.046	-0.5	0.102	0.6	0.089	0.8	0.072	-0.6	NA	NA	NA	NA	NA	0.052	-0.4	NA	NA	-0.2
14	0.0427	-0.8	0.211	5.5	0.162	4.7	0.209	5.9	0.193	6.8	0.226	6.4	1.466	5.5	0.0743	1.2	0.0924	-0.2
15	0.05	-0.2	0.086	-0.1	0.048	-1.4	0.055	-1.4	0.04	-1.8	0.042	-2.1	0.366	-1.6	NA		0.09	-0.3
16		No results reported																
17	0.051	-0.2	0.081	-0.3	0.081	0.4	0.086	0.1	0.073	0.1	0.05	-1.7	0.664	0.3	0.053	-0.3	0.15	2.1
18		No results reported																
19	0.05	-0.2	0.098	0.4	0.086	0.6	0.125	1.9	0.12	2.7	0.072	-0.7	0.783	1.1	0.05	-0.5	0.106	0.3
20	0.078	1.9	0.207	5.4	0.168	5.0	0.09	0.3	0.071	0.0	0.088	0.0	0.653	0.2	0.098	2.8	ND	-3.6
21	0.0519	-0.1	0.0582	-1.4	0.0668	-0.4	0.0774	-0.3	0.0639	-0.4	0.0671	-0.9	0.572	-0.3	0.0549	-0.2	0.114	0.6
22	NA		0.059	-1.3	0.103	1.5	0.113	1.4	0.098	1.5	0.072	-0.7	0.893	1.8	0.075	1.2	NA	
23	0.055	0.2	0.069	-0.9	0.0623	-0.7	0.078	-0.3	0.0565	-0.8	0.0836	-0.2	0.495	-0.8	0.0409	-1.1	0.113	0.6
24	0.0565	0.3	0.078	-0.5	0.0857	0.6	0.0848	0.0	0.0758	0.2	0.0725	-0.7	0.563	-0.3	0.0606	0.2	0.1066	0.3
25	0.067	1.1	0.088	0.0	0.076	0.1	0.081	-0.2	0.083	0.6	NA		0.689	0.5	0.056	-0.1	0.098	0.0
26	0.049	-0.3	0.085	-0.2	0.057	-0.9	0.082	-0.1	0.071	0.0	0.088	0.0	0.65	0.2	0.052	-0.4	0.091	-0.3
27	0.058	0.4	0.102	0.6	0.098	1.3	0.107	1.1	0.079	0.4	0.105	0.8	0.666	0.3	0.059	0.1	0.108	0.4
28	0.047	-0.5	0.059	-1.3	0.053	-1.2	0.062	-1.1	0.054	-1.0	0.057	-1.4	0.663	0.3	0.042	-1.1	0.086	-0.5
29	0.0595	0.5	0.0963	0.4	0.0734	-0.1	0.0791	-0.2	0.0662	-0.3	0.109	1.0	0.61	0.0	0.067	0.7	0.114	0.6
31		No results reported																
32	0.037	-1.2	0.05	-1.7	0.049	-1.4	0.087	0.1	0.05	-1.2	0.074	-0.6	0.527	-0.6	0.039	-1.3	0.094	-0.2
33	0.054	0.1	0.14	2.3	0.11	1.9	0.084	0.0	0.07	-0.1	0.074	-0.6	0.6	-0.1	0.067	0.7	0.097	-0.1
34	NA		0.078	-0.5	NA		0.077	-0.3	0.077	0.3	0.125	1.7	0.464	-1.0	NA		NA	
35	0.055	0.2	0.091	0.1	0.08	0.3	0.088	0.2	0.06	-0.6	0.081	-0.3	0.506	-0.7	0.074	1.2	0.106	0.3
36	0.049	-0.3	0.087	-0.1	0.071	-0.2	0.072	-0.6	0.062	-0.5	0.056	-1.4	0.57	-0.3	0.052	-0.4	0.08	-0.8
37	0.047	-0.5	0.098	0.4	0.077	0.1	0.067	-0.8	0.073	0.1	0.094	0.3	0.473	-0.9	0.061	0.3	0.125	1.1
38	0.0528	0.0	0.0722	-0.7	0.067	-0.4	0.0782	-0.3	0.0625	-0.5	0.1032	0.7	0.56	-0.4	0.0568	0.0	0.109	0.4
39	0.052	-0.1	0.113	1.1	0.087	0.7	0.092	0.4	0.096	1.4	0.187	4.6	0.933	2.1	0.0585	0.1	0.108	0.4
40	0.0558	0.2	0.0745	-0.6	0.0733	-0.1	ND	-3.5	0.0636	-0.4	0.0851	-0.1	0.546	-0.5	0.0505	-0.5	0.0955	-0.1
41	0.056	0.2	0.071	-0.8	0.06	-0.8	0.043	-2.0	0.052	-1.1	0.066	-1.0	0.379	-1.5	0.044	-0.9	0.075	-1.0
42	0.044	-0.7	0.085	-0.2	0.08	0.3	0.099	0.7	0.08	0.5	0.087	0.0	0.616	0.0	0.068	0.7	0.101	0.1
43	0.0629	0.7	0.0852	-0.2	0.0692	-0.3	0.0929	0.4	0.083	0.6	0.0975	0.5	0.628	0.1	0.0718	1.0	0.11	0.5
44	0.067	1.1	0.078	-0.5	0.094	1.1	0.071	-0.6	0.1	1.6	ND	-3.5	1.163	3.6	0.095	2.6	0.051	-1.9
45	0.044	-0.7	0.081	-0.3	0.07	-0.2	0.083	-0.1	0.065	-0.4	0.064	-1.1	0.659	0.3	0.048	-0.7	ND	-3.6
46	0.037	-1.2	0.057	-1.4	0.062	-0.7	0.072	-0.6	0.058	-0.8	0.113	1.2	NA		0.054	-0.2	NA	
47	0.046	-0.5	0.087	-0.1	0.066	-0.5	0.086	0.1	0.065	-0.4	0.061	-1.2	0.834	1.4	0.04	-1.2	0.083	-0.6
48	0.0451	-0.6	0.057	-1.4	0.0584	-0.9	0.057	-1.3	0.0549	-0.9	0.068	-0.9	0.428	-1.2	0.0415	-1.1	0.089	-0.4
49	0.044	-0.7	0.096	0.3	0.081	0.4	0.096	0.6	0.074	0.1	0.098	0.5	0.728	0.7	0.067	0.7	0.098	0.0
50	0.054	0.1	0.095	0.3	0.082	0.4	0.087	0.1	0.08	0.5	NA		0.651	0.2	0.051	-0.4	0.104	0.2
51	0.05	-0.2	0.08	-0.4	0.07	-0.2	0.08	-0.2	0.075	0.2	0.095	0.4	0.55	-0.4	0.059	0.1	0.086	-0.5
52	0.057	0.3	0.111	1.0	0.099	1.3	0.122	1.8	0.086	0.8	0.14	2.4	0.776	1.0	0.071	1.0	0.102	0.1
53	0.057	0.3	0.094	0.2	0.076	0.1	0.074	-0.5	0.07	-0.1	0.072	-0.7	0.638	0.1	0.059	0.1	0.106	0.3
54	0.054	0.1	0.084	-0.2	0.062	-0.7	0.076	-0.4	0.066	-0.3	0.093	0.3	0.52	-0.6	0.059	0.1	0.11	0.5
55	0.047	-0.5	0.083	-0.3	0.071	-0.2	0.091	0.3	0.079	0.4	0.084	-0.2	0.674	0.4	0.058	0.0	0.102	0.1
56	0.047	-0.5	0.076	-0.6	0.06	-0.8	NA		0.054	-1.0	0.071	-0.7	0.54	-0.5	NA		NA	
57	0.063	0.8	0.087	-0.1	0.06	-0.8	NA		0.05	-1.2	0.07	-0.8	0.653	0.2	0.038	-1.4	NA	
58	0.0564	0.3	0.0898	0.1	0.0788	0.2	0.0854	0.1	0.0708	0.0	0.0864	0.0	0.6297	0.1	0.0588	0.1	0.103	0.2
59	0.05	-0.2	0.082	-0.3	0.076	0.1	0.09	0.3	0.078	0.4	0.104	0.8	0.619	0.0	0.056	-0.1	0.094	-0.2
60	0.056	0.2	0.1	0.5	0.086	0.6	0.085	0.0	0.083	0.6	0.11	1.0	0.73	0.7	0.066	0.6	0.1	0.1
61	0.052	-0.1	0.096	0.3	0.086	0.6	0.084	0.0	0.084	0.7	0.101	0.6	0.582	-0.2	0.068	0.7	0.099	0.0
62	0.056	0.2	0.097	0.4	0.081	0.4	0.083	-0.1	0.059	-0.7	NA		0.57	-0.3	NA		NA	
63	0.054	0.1	0.09	0.1	0.054	-1.1	0.069	-0.7	0.055	-0.9	0.053	-1.6	0.56	-0.4	0.042	-1.1	0.11	0.5
64	NA		0.071	-0.8	NA		0.115	1.5	0.089	1.0	0.087	0.0	0.615	0.0	0.102	3.1	NA	
65	0.0762	1.7	0.0978	0.4	0.0743	0.0	0.139	2.6	0.0808	0.5	0.105	0.8	0.642	0.2	0.0856	2.0	NA	
66	0.062	0.7	0.084	-0.2	0.07	-0.2	0.088	0.2	0.067	-0.3	0.107	0.9	0.593	-0.1	0.057	0.0	0.068	-1.2
67	0.045	-0.6	0.093	0.2	0.073	-0.1	NA		0.069	-0.1	NA		0.581	-0.2	0.062	0.3	0.096	-0.1
68	0.0484	-0.3	0.0727	-0.7	0.0607	-0.7	0.0656	-0.9	0.0568	-0.8	0.0577	-1.4	0.503	-0.7	0.0447	-0.9	0.089	-0.4
69	0.058	0.4	0.0932	0.2	0.0997	1.4	0.0917	0.4	0.072	0.0	0.0819	-0.2	0.652	0.2	0.0633	0.4	0.0748	-1.0
70	0.053	0.0	0.102	0.6	0.079	0.2	0.095	0.5	0.08	0.5	0.095	0.4	0.7	0.5	0.065	0.5	0.092	-0.3

APPENDIX 3. Results (mg/Kg) and z scores for FFP-RSD (25 %).

Lab Code	Acetaminiprid	Azoxystrobin		Buprofezin		Chlorfenvinphos		Chlorpyrifos		Deltamethrin		Diazinon		Fenamiphos		Flonicamid		
MRRL (mg/kg)	0.01	0.01		0.01		0.01		0.005		0.01		0.005		0.01		0.01		
Robust mean (mg/kg)	0.053	0.089		0.074		0.084		0.072		0.087		0.616		0.057		0.099		
		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		
142	0.0528	0.0	0.088	0.0	0.0799	0.3	0.0829	-0.1	0.0714	0.0	0.0932	0.3	0.611	0.0	0.057	0.0	0.105	0.3
143	0.073	1.5	0.092	0.2	0.07	-0.2	0.084	0.0	0.072	0.0	0.047	-1.8	0.65	0.2	0.06	0.2	0.14	1.7
144	0.054	0.1	0.094	0.2	0.08	0.3	0.095	0.5	0.073	0.1	0.083	-0.2	0.67	0.4	0.065	0.5	0.094	-0.2
145	0.054	0.1	0.09	0.1	0.082	0.4	0.085	0.0	0.082	0.6	0.087	0.0	0.707	0.6	0.06	0.2	0.107	0.3
146	0.052	-0.1	0.088	0.0	0.086	0.6	0.1	0.7	0.082	0.6	0.079	-0.4	0.5	-0.8	0.064	0.5	0.019	-3.2
147	0.056	0.2	0.096	0.3	0.081	0.4	0.098	0.7	0.099	1.5	0.133	2.1	0.755	0.9	0.059	0.1	0.112	0.5
148	0.056	0.2	0.09	0.1	0.069	-0.3	0.076	-0.4	0.058	-0.8	0.065	-1.0	0.62	0.0	0.055	-0.2	0.11	0.5
149	0.053	0.0	0.084	-0.2	0.075	0.0	0.0853	0.0	0.0634	-0.5	0.0776	-0.4	0.602	-0.1	0.0463	-0.8	0.091	-0.3
150	ND	-3.2	0.0842	-0.2	0.0745	0.0	0.0809	-0.2	0.0722	0.0	0.0828	-0.2	0.576	-0.3	0.0566	-0.1	0.113	0.6
151	0.045	-0.6	0.112	1.1	0.091	0.9	0.111	1.3	0.074	0.1	0.11	1.0	0.702	0.6	0.076	1.3	0.093	-0.2
152	0.05	-0.2	0.083	-0.3	0.063	-0.6	0.11	1.2	0.075	0.2	0.11	1.0	0.69	0.5	0.055	-0.2	0.091	-0.3
154	0.041	-0.9	0.081	-0.3	0.071	-0.2	0.087	0.1	0.082	0.6	0.087	0.0	0.586	-0.2	0.056	-0.1	0.109	0.4
155	0.062	0.7	0.103	0.7	0.102	1.5	0.105	1.0	0.069	-0.1	0.093	0.3	0.635	0.1	0.068	0.7	0.087	-0.5
156	0.05	-0.2	0.09	0.1	0.08	0.3	0.09	0.3	0.06	-0.6	0.15	2.9	0.71	0.6	0.06	0.2	0.13	1.3
157																		
No results reported																		
158	0.059	0.5	0.086	-0.1	0.068	-0.3	0.066	-0.9	0.059	-0.7	0.064	-1.1	0.613	0.0	0.053	-0.3	0.106	0.3
159	0.053	0.0	0.083	-0.3	0.069	-0.3	0.085	0.0	0.067	-0.3	0.053	-1.6	0.598	-0.1	0.029	-2.0	0.111	0.5
160	NA		0.094	0.2	0.077	0.1	0.09	0.3	0.08	0.5	0.078	-0.4	0.69	0.5	0.055	-0.2	NA	
161	0.04	-1.0	0.08	-0.4	0.05	-1.3	0.05	-1.6	0.06	-0.6	0.08	-0.3	0.48	-0.9	NA		NA	
162	0.052	-0.1	0.1	0.5	0.072	-0.1	0.083	-0.1	0.078	0.4	0.071	-0.7	0.58	-0.2	0.051	-0.4	0.092	-0.3
163	0.062	0.7	0.092	0.2	0.088	0.7	0.095	0.5	0.075	0.2	0.115	1.3	0.455	-1.0	0.055	-0.2	0.111	0.5
164	0.049	-0.3	0.082	-0.3	0.0744	0.0	0.079	-0.3	0.0753	0.2	0.13	2.0	0.521	-0.6	0.0493	-0.6	0.0936	-0.2
165	0.051	-0.2	0.139	2.3	0.092	0.9	0.095	0.5	0.086	0.8	0.119	1.5	0.554	-0.4	0.068	0.7	0.099	0.0
166	0.064	0.8	0.115	1.2	0.089	0.8	0.12	1.7	0.084	0.7	0.15	2.9	0.725	0.7	0.123	4.6	ND	-3.6
167	0.0491	-0.3	0.0853	-0.1	0.0613	-0.7	0.0835	0.0	0.0747	0.2	0.0983	0.5	0.734	0.8	0.0546	-0.2	0.101	0.1
168	0.048	-0.4	0.08	-0.4	0.043	-1.7	0.05	-1.6	0.027	-2.5	0.028	-2.7	0.402	-1.4	0.058	0.0	0.102	0.1
169	0.043	-0.8	ND	-3.5	ND	-3.5	ND	-3.5	ND	-3.7	ND	-3.5	ND	-4.0	ND	-3.3	ND	-3.6
170	0.047	-0.5	0.073	-0.7	0.052	-1.2	0.06	-1.2	0.055	-0.9	0.067	-0.9	0.44	-1.1	0.04	-1.2	0.096	-0.1
171	0.057	0.3	0.08	-0.4	0.067	-0.4	0.098	0.7	0.079	0.4	0.096	0.4	0.598	-0.1	0.06	0.2	0.099	0.0
172	0.051	-0.2	0.068	-0.9	0.056	-1.0	0.062	-1.1	0.052	-1.1	0.066	-1.0	0.731	0.7	0.044	-0.9	0.112	0.5
173	0.06	0.5	0.089	0.0	0.075	0.0	0.065	-0.9	0.055	-0.9	0.086	-0.1	0.49	-0.8	0.045	-0.9	0.19	3.7
176	0.055	0.2	0.101	0.6	0.09	0.8	0.11	1.2	0.084	0.7	0.11	1.0	0.76	0.9	0.07	0.9	0.099	0.0
177	0.057	0.3	0.092	0.2	0.08	0.3	0.096	0.6	0.062	-0.5	0.072	-0.7	0.633	0.1	0.058	0.0	0.15	2.1
178	0.065	0.9	0.099	0.5	0.067	-0.4	0.069	-0.7	0.062	-0.5	0.086	-0.1	0.58	-0.2	0.042	-1.1	NA	
179	0.041	-0.9	0.097	0.4	0.065	-0.5	0.086	0.1	0.016	-3.1	NA		0.547	-0.4	0.145	6.1	ND	-3.6
180	0.049	-0.3	0.095	0.3	0.074	0.0	0.08	-0.2	0.067	-0.3	0.097	0.4	0.589	-0.2	0.057	0.0	0.08	-0.8
181	NA		0.093	0.2	NA		NA		0.088	0.9	NA		0.673	0.4	NA		NA	
182	0.059	0.5	0.092	0.2	0.069	-0.3	0.076	-0.4	0.075	0.2	0.098	0.5	0.58	-0.2	0.05	-0.5	0.11	0.5
183	0.052	-0.1	0.096	0.3	0.082	0.4	0.092	0.4	0.08	0.5	0.099	0.5	0.598	-0.1	0.06	0.2	0.099	0.0
184	0.06	0.5	0.111	1.0	0.088	0.7	0.083	-0.1	0.067	-0.3	0.094	0.3	0.585	-0.2	ND	-3.3	0.102	0.1
185	0.06	0.5	0.075	-0.6	0.06	-0.8	0.065	-0.9	0.061	-0.6	0.094	0.3	0.49	-0.8	0.055	-0.2	0.08	-0.8
186	0.06	0.5	0.08	-0.4	0.079	0.2	0.08	-0.2	0.075	0.2	0.1	0.6	0.4	-1.4	0.037	-1.4	0.07	-1.2
187	0.044	-0.7	0.068	-0.9	0.046	-1.5	0.052	-1.5	0.038	-1.9	0.046	-1.9	0.29	-2.1	ND	-3.3	0.087	-0.5

NA: Not analysed ND: Not detected (False negative)

APPENDIX 3. Results (mg/Kg) and z scores for FFP-RSD (25 %).

Lab Code	Fluopyram	z score (FFP-RSD 25 %)		Oxamyl		Oxydemeton-methyl		Procymidone		Propamocarb		Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)		Zoxamide		z score (FFP-RSD 25 %)	
		MRRL (mg/kg)	0.01	0.01	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.01	z score (FFP-RSD 25 %)	0.01	z score (FFP-RSD 25 %)	0.01	z score (FFP-RSD 25 %)	0.01	z score (FFP-RSD 25 %)		
		Robust mean (mg/kg)	0.457	0.084	0.098	0.177	0.588	0.139	0.046	z score (FFP-RSD 25 %)							
4	0.7717	2.8	0.0077	-3.6	0.0723	-1.1	0.3884	4.8	0.527	-0.4	0.1575	0.5	0.1065	5.2			
5	0.5204	0.6	0.0757	-0.4	0.0845	-0.6	0.2573	1.8	0.5624	-0.2	0.1137	-0.7	0.0531	0.6			
6	0.597	1.2	0.09	0.3	0.093	-0.2	0.173	-0.1	0.652	0.4	0.126	-0.4	0.095	4.2			
8	0.329	-1.1	0.0748	-0.5	0.0815	-0.7	0.127	-1.1	0.506	-0.6	0.121	-0.5	0.0253	-1.8			
9	0.491	0.3	0.074	-0.5	0.088	-0.4	0.167	-0.2	0.553	-0.2	0.135	-0.1	0.042	-0.4			
10	0.498	0.4	0.09	0.3	0.1	0.1	0.201	0.6	0.626	0.3	0.153	0.4	0.06	1.2			
11	0.598	1.2	0.0842	0.0	0.0956	-0.1	0.221	1.0	0.635	0.3	0.1485	0.3	0.0585	1.1			
12	0.41	-0.4	0.078	-0.3	0.097	0.0	0.16	-0.4	0.55	-0.3	0.14	0.0	0.032	-1.2			
13	0.461	0.0	NA		NA		NA		NA		NA		0.041	-0.5			
14	0.979	4.6	0.0331	-2.4	0.0413	-2.3	0.56	8.7	0.536	-0.4	0.254	3.3	0.113	5.8			
15	0.402	-0.5	NA		NA		0.11	-1.5	NA		0.071	-2.0	NA				
16							No results reported										
17	0.69	2.0	0.083	-0.1	0.103	0.2	0.173	-0.1	0.688	0.7	0.129	-0.3	0.046	0.0			
18							No results reported										
19	0.459	0.0	0.088	0.2	0.1	0.1	0.239	1.4	0.471	-0.8	0.131	-0.2	0.055	0.8			
20	NA		0.071	-0.6	NA		0.297	2.7	ND	-3.9	0.16	0.6	0.105	5.1			
21	0.407	-0.4	0.0556	-1.4	0.0681	-1.2	0.152	-0.6	0.548	-0.3	0.177	1.1	0.0395	-0.6			
22	0.503	0.4	NA		ND	-3.8	0.237	1.4	NA		NA		0.054	0.7			
23	0.36	-0.8	0.0968	0.6	0.101	0.1	0.143	-0.8	0.697	0.7	0.0957	-1.2	0.0351	-1.0			
24	0.4865	0.3	0.0726	-0.6	0.119	0.8	0.1621	-0.3	NA		0.1211	-0.5	0.0467	0.0			
25	0.528	0.6	0.095	0.5	0.098	0.0	0.188	0.3	NA		NA		0.053	0.6			
26	0.54	0.7	0.082	-0.1	0.098	0.0	0.17	-0.1	0.63	0.3	0.11	-0.8	0.042	-0.4			
27	0.549	0.8	0.092	0.4	ND	-3.8	NA		0.727	0.9	0.174	1.0	NA				
28	0.348	-1.0	0.069	-0.7	0.098	0.0	0.138	-0.9	0.512	-0.5	0.148	0.3	NA				
29	0.464	0.1	0.0876	0.1	0.0988	0.0	0.163	-0.3	0.653	0.4	0.137	-0.1	0.0438	-0.2			
31							No results reported										
32	0.216	-2.1	0.059	-1.2	0.054	-1.8	0.142	-0.8	0.389	-1.4	0.105	-1.0	0.051	0.4			
33	0.69	2.0	NA		NA		0.15	-0.6	0.75	1.1	0.15	0.3	0.064	1.5			
34	NA		NA		NA		0.161	-0.4	NA		NA		NA				
35	0.445	-0.1	0.085	0.0	0.107	0.4	0.151	-0.6	0.519	-0.5	0.122	-0.5	0.049	0.2			
36	0.4	-0.5	0.076	-0.4	0.094	-0.2	0.15	-0.6	0.72	0.9	0.15	0.3	0.02	-2.3			
37	0.363	-0.8	0.085	0.0	0.081	-0.7	0.189	0.3	0.624	0.2	0.146	0.2	0.057	0.9			
38	0.398	-0.5	0.1168	1.5	0.097	0.0	0.134	-1.0	0.3378	-1.7	0.1194	-0.6	0.038	-0.7			
39	0.45	-0.1	0.089	0.2	0.115	0.7	0.284	2.4	0.596	0.1	0.143	0.1	0.044	-0.2			
40	0.491	0.3	0.113	1.4	0.097	0.0	0.132	-1.0	0.283	-2.1	0.0996	-1.1	0.044	-0.2			
41	0.344	-1.0	0.078	-0.3	0.073	-1.0	0.113	-1.4	0.557	-0.2	0.123	-0.5	0.025	-1.8			
42	0.427	-0.3	0.083	-0.1	0.112	0.6	0.221	1.0	0.679	0.6	0.138	0.0	0.043	-0.3			
43	0.619	1.4	0.106	1.0	0.118	0.8	0.166	-0.2	0.57	-0.1	0.123	-0.5	0.0525	0.5			
44	0.213	-2.1	0.05	-1.6	0.055	-1.8	ND	-3.8	0.523	-0.4	0.092	-1.4	0.075	2.5			
45	0.48	0.2	0.07	-0.7	0.086	-0.5	0.158	-0.4	0.434	-1.0	NA		0.052	0.5			
46	ND	-3.9	NA		NA		NA		0.375	-1.4	0.168	0.8	0.028	-1.6			
47	0.516	0.5	0.069	-0.7	0.079	-0.8	0.184	0.2	0.525	-0.4	0.163	0.7	0.035	-1.0			
48	0.376	-0.7	0.0781	-0.3	0.0902	-0.3	0.136	-0.9	0.679	0.6	0.0872	-1.5	0.0368	-0.8			
49	0.479	0.2	0.067	-0.8	0.083	-0.6	0.187	0.2	0.436	-1.0	0.123	-0.5	0.058	1.0			
50	0.471	0.1	0.084	0.0	0.121	0.9	0.164	-0.3	0.654	0.5	0.14	0.0	0.046	0.0			
51	0.389	-0.6	0.078	-0.3	NA		0.16	-0.4	0.464	-0.8	0.12	-0.5	0.05	0.3			
52	0.548	0.8	0.082	-0.1	0.101	0.1	0.241	1.5	0.649	0.4	0.147	0.2	0.07	2.1			
53	0.417	-0.3	0.081	-0.2	0.103	0.2	0.175	0.0	0.54	-0.3	0.145	0.2	0.047	0.1			
54	0.37	-0.8	0.082	-0.1	0.092	-0.3	0.17	-0.1	0.53	-0.4	0.15	0.3	0.037	-0.8			
55	0.458	0.0	0.095	0.5	0.098	0.0	0.216	0.9	0.511	-0.5	0.104	-1.0	0.043	-0.3			
56	NA		0.079	-0.3	0.087	-0.5	NA		0.54	-0.3	0.16	0.6	NA				
57	0.561	0.9	0.067	-0.8	NA		0.151	-0.6	0.15	-3.0	0.15	0.3	0.125	6.8			
58	0.43	-0.2	0.0742	-0.5	0.1033	0.2	0.181	0.1	0.5579	-0.2	0.1383	0.0	0.042	-0.4			
59	0.438	-0.2	0.086	0.1	0.091	-0.3	NA		0.563	-0.2	0.116	-0.7	0.045	-0.1			
60	0.53	0.6	0.086	0.1	0.11	0.5	0.21	0.8	1.25	4.5	0.15	0.3	0.58	46.2			
61	0.494	0.3	0.085	0.0	NA		NA		0.581	0.0	0.146	0.2	0.045	-0.1			
62	NA		NA		NA		NA		NA		0.224	2.4	NA				
63	0.573	1.0	0.094	0.5	0.155	2.3	0.15	-0.6	0.623	0.2	0.167	0.8	0.044	-0.2			
64	NA		NA		NA		0.228	1.2	NA		NA		NA				
65	0.466	0.1	0.0904	0.3	0.122	1.0	0.194	0.4	0.947	2.4	0.0732	-1.9	0.102	4.8			
66	0.495	0.3	0.121	1.7	0.094	-0.2	0.176	0.0	0.778	1.3	0.135	-0.1	0.043	-0.3			
67	0.521	0.6	0.07	-0.7	0.077	-0.9	0.203	0.6	NA		NA		NA				
68	0.359	-0.9	0.0692	-0.7	0.0923	-0.2	0.112	-1.5	0.532	-0.4	0.0644	-2.1	0.033	-1.1			
69	0.411	-0.4	0.0911	0.3	0.0969	-0.1	0.2	0.5	0.61	0.2	0.157	0.5	0.047	0.1			
70	0.545	0.8	0.089	0.2	0.1	0.1	0.201	0.6	0.604	0.1	0.138	0.0	0.074	2.4			
71	0.35	-0.9	0.06	-1.2	0.08	-0.7	0.115	-1.4	0.35	-1.6	0.15	0.3	0.045	-0.1			
72	0.422	-0.3	0.0844	0.0	0.0816	-0.7	0.106	-1.6	0.58	-0.1	0.1306	-0.2	0.0389	-0.6			
73	0.445	-0.1	0.092	0.4	0.07	-1.1	0.14	-0.8	0.65	0.4	0.135	-0.1	0.05	0.3			

APPENDIX 3. Results (mg/Kg) and z scores for FFP-RSD (25 %).

Lab Code	Fluopyram	z score (FFP-RSD 25 %)		Oxamyl	z score (FFP-RSD 25 %)		Oxydemeton-methyl	z score (FFP-RSD 25 %)		Procymidone	z score (FFP-RSD 25 %)		Propamocarb	z score (FFP-RSD 25 %)		Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)	z score (FFP-RSD 25 %)		Zoxamide	z score (FFP-RSD 25 %)	
MRRL (mg/kg)	0.01			0.01			0.005			0.01			0.01			0.01			0.01		
Robust mean (mg/kg)	0.457			0.084			0.098			0.177			0.588			0.139			0.046		
74	0.494	0.3	0.234	7.1	0.107	0.4	0.17	-0.1	0.711	0.8	0.149	0.3	0.055	0.8							
75	0.463	0.1	0.089	0.2	0.101	0.1	0.18	0.1	0.704	0.8	0.156	0.5	0.047	0.1							
76	0.384	-0.6	0.0805	-0.2	0.0961	-0.1	0.17	-0.1	0.335	-1.7	0.135	-0.1	0.0457	0.0							
77	0.611	1.3	0.076	-0.4	0.103	0.2	0.155	-0.5	1.054	3.2	0.177	1.1	0.043	-0.3							
78	0.504	0.4	0.0884	0.2	0.107	0.4	0.177	0.0	0.56	-0.2	0.169	0.9	0.055	0.8							
79	NA		NA		0.101	0.1	0.21	0.8	0.5	-0.6	0.11	-0.8	0.047	0.1							
80	0.48	0.2	0.083	-0.1	0.1	0.1	0.15	-0.6	0.74	1.0	0.15	0.3	0.049	0.2							
81	0.404	-0.5	0.0867	0.1	0.086	-0.5	0.17	-0.1	0.629	0.3	0.157	0.5	0.0462	0.0							
82	0.43	-0.2	0.079	-0.3	0.084	-0.6	0.164	-0.3	0.386	-1.4	NA		ND	-3.1							
83	0.485	0.2	0.084	0.0	0.113	0.6	0.179	0.1	0.494	-0.6	0.134	-0.1	0.038	-0.7							
84	0.62	1.4	0.11	1.2	ND	-3.8	ND	-3.8	0.42	-1.1	0.14	0.0	0.044	-0.2							
85	0.434	-0.2	0.0713	-0.6	0.0678	-1.2	0.177	0.0	0.183	-2.8	0.1	-1.1	0.044	-0.2							
86	NA		NA		NA		0.13	-1.1	NA		NA		0.029	-1.5							
87	0.43	-0.2	0.0752	-0.4	0.0986	0.0	0.0773	-2.2	0.64	0.4	0.13	-0.3	0.0451	-0.1							
88	0.418	-0.3	0.082	-0.1	0.115	0.7	0.175	0.0	0.798	1.4	0.118	-0.6	0.025	-1.8							
89	0.575	1.0	0.0818	-0.1	0.101	0.1	0.208	0.7	0.588	0.0	0.159	0.6	0.0493	0.3							
90	NA		0.081	-0.2	NA		0.132	-1.0	0.698	0.8	0.138	0.0	NA								
91	0.542	0.7	0.071	-0.6	0.092	-0.3	0.226	1.1	0.599	0.1	0.225	2.5	0.055	0.8							
92	0.414	-0.4	0.06	-1.2	0.093	-0.2	ND	-3.8	ND	-3.9	0.088	-1.5	0.044	-0.2							
93	0.526	0.6	0.137	2.5	0.143	1.8	0.163	-0.3	0.533	-0.4	0.112	-0.8	0.038	-0.7							
94	0.554	0.8	0.072	-0.6	0.109	0.4	0.165	-0.3	0.65	0.4	0.151	0.3	0.046	0.0							
95	0.46	0.0	0.086	0.1	0.089	-0.4	0.17	-0.1	0.72	0.9	0.15	0.3	0.045	-0.1							
96	0.35	-0.9	0.082	-0.1	0.1	0.1	0.17	-0.1	0.48	-0.7	0.12	-0.5	0.035	-1.0							
97	0.65	1.7	0.11	1.2	0.28	7.4	0.42	5.5	0.62	0.2	0.17	0.9	0.069	2.0							
98	0.54	0.7	0.096	0.5	0.095	-0.1	0.184	0.2	NA		NA		0.063	1.5							
99	0.438	-0.2	0.111	1.3	0.076	-0.9	0.214	0.8	0.053	-3.6	0.153	0.4	0.05	0.3							
100	0.548	0.8	0.091	0.3	0.109	0.4	0.171	-0.1	0.514	-0.5	0.15	0.3	0.056	0.8							
101	0.497	0.4	0.081	-0.2	0.089	-0.4	0.217	0.9	0.622	0.2	0.152	0.4	0.051	0.4							
102		No results reported																			
103	0.367	-0.8	0.0715	-0.6	0.0722	-1.1	0.16	-0.4	0.477	-0.8	0.111	-0.8	0.0371	-0.8							
104	0.554	0.8	0.23	6.9	0.177	3.2	0.077	-2.3	1.32	5.0	0.066	-2.1	0.056	0.8							
105	0.425	-0.3	0.117	1.5	0.14	1.7	0.17	-0.1	0.601	0.1	0.164	0.7	0.051	0.4							
106	0.48	0.2	0.076	-0.4	0.11	0.5	0.21	0.8	0.53	-0.4	0.12	-0.5	0.058	1.0							
107	0.3085	-1.3	NA		NA		0.1755	0.0	NA		NA		NA								
108	0.43	-0.2	0.085	0.0	0.092	-0.3	0.18	0.1	0.53	-0.4	0.124	-0.4	0.034	-1.1							
109	0.683	2.0	0.151	3.1	0.185	3.5	0.19	0.3	0.618	0.2	0.175	1.0	0.061	1.3							
110	0.42	-0.3	0.069	-0.7	0.11	0.5	0.171	-0.1	0.66	0.5	0.106	-0.9	0.044	-0.2							
111	0.46	0.0	0.123	1.8	0.117	0.8	0.192	0.4	ND	-3.9	0.324	5.3	0.061	1.3							
112	0.49	0.3	0.079	-0.3	0.105	0.3	0.23	1.2	0.584	0.0	0.108	-0.9	0.044	-0.2							
113	0.26	-1.7	0.079	-0.3	0.101	0.1	0.187	0.2	0.475	-0.8	0.102	-1.1	0.04	-0.5							
114	0.37	-0.8	0.098	0.6	NA		0.21	0.8	0.476	-0.8	0.25	3.2	0.048	0.2							
115	0.365	-0.8	0.072	-0.6	0.112	0.6	0.153	-0.5	0.606	0.1	0.117	-0.6	0.038	-0.7							
116	0.42	-0.3	0.076	-0.4	0.082	-0.7	0.18	0.1	0.49	-0.7	0.209	2.0	0.043	-0.3							
117	0.402	-0.5	0.094	0.5	0.082	-0.7	0.177	0.0	NA		0.122	-0.5	0.038	-0.7							
118	0.5	0.4	0.073	-0.5	0.088	-0.4	0.188	0.3	0.59	0.0	0.124	-0.4	0.046	0.0							
119	0.64	1.6	0.096	0.5	0.14	1.7	0.17	-0.1	0.73	1.0	0.14	0.0	NA								
120	NA		NA		NA		0.163	-0.3	NA		NA		NA								
121	NA		0.066	-0.9	0.077	-0.9	0.151	-0.6	0.469	-0.8	0.125	-0.4	0.049	0.2							
122	0.5	0.4	0.091	0.3	0.1	0.1	0.17	-0.1	0.7	0.8	0.146	0.2	0.043	-0.3							
123	1.08	5.5	ND	-3.5	ND	-3.8	0.32	3.3	ND	-3.9	10.26	291.3	ND	-3.1							
124	0.458	0.0	0.073	-0.5	0.093	-0.2	0.198	0.5	1.578	6.7	0.123	-0.5	0.043	-0.3							
125	0.349	-0.9	0.071	-0.6	0.084	-0.6	0.135	-0.9	0.56	-0.2	0.321	5.2	0.034	-1.1							
126	ND	-3.9	0.0639	-1.0	0.0825	-0.6	0.1184	-1.3	0.5478	-0.3	0.1191	-0.6	0.0261	-1.7							
127	0.52	0.6	0.081	-0.2	0.099	0.0	0.23	1.2	0.56	-0.2	0.13	-0.3	0.05	0.3							
128	0.05	-3.6	0.08	-0.2	0.11	0.5	0.18	0.1	0.59	0.0	0.14	0.0	0.05	0.3							
129	0.4	-0.5	0.059	-1.2	0.086	-0.5	0.16	-0.4	0.48	-0.7	0.19	1.5	0.052	0.5							
130	0.551	0.8	0.08	-0.2	0.086	-0.5	0.23	1.2	0.429	-1.1	0.137	-0.1	0.067	1.8							
131	0.491	0.3	0.084	0.0	0.113	0.6	0.201	0.6	0.683	0.6	0.138	0.0	0.057	0.9							
132	0.419	-0.3	0.091	0.3	ND	-3.8	0.184	0.2	0.444	-1.0	0.173	1.0	0.04	-0.5							
133	0.455	0.0	0.056	-1.3	0.068	-1.2	0.193	0.4	0.753	1.1	0.107	-0.9	0.043	-0.3							
134	0.545	0.8	0.098	0.6	0.108	0.4	0.207	0.7	0.605	0.1	0.171	0.9	0.035	-1.0							
135	0.4922	0.3	0.119	1.6	0.1845	3.5	0.1749	0.0	0.63	0.3	0.159	0.6	0.0577	1.0							
136	0.413	-0.4	0.08	-0.2	0.107	0.4	0.157	-0.4	0.556	-0.2	0.144	0.1	0.04	-0.5							
137	0.462	0.0	0.089	0.2	0.095	-0.1	0.205	0.6	0.577	-0.1	0.152	0.4	0.049	0.2							
138	0.556	0.9	0.093	0.4	0.082	-0.7	0.204	0.6	0.655	0.5	0.151	0.3	0.048	0.2							
139	0.439	-0.2	NA		NA		NA		NA		NA		NA								
140	0.385	-0.6	0.143	2.8	0.095	-0.1	0.14	-0.8	0.623	0.2	0.135	-0.1	0.035	-1.0							
141	NA		NA		NA		0.221	1.0	NA		NA		NA								
142	0.693	2.1	0.0914	0.3	0.106	0.3	0.172	-0.1	0.601	0.1	0.152	0.4	0.0476	0.1							

APPENDIX 3. Results (mg/Kg) and z scores for FFP-RSD (25 %).

Lab Code	Fluopyram	z score (FFP-RSD 25 %)		Oxamyl	z score (FFP-RSD 25 %)		Oxydemeton-methyl	z score (FFP-RSD 25 %)		Procymidone	z score (FFP-RSD 25 %)		Propamocarb	z score (FFP-RSD 25 %)		Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)	z score (FFP-RSD 25 %)		Zoxamide	z score (FFP-RSD 25 %)	
		MRRL (mg/kg)	Robust mean (mg/kg)		0.01	0.084		0.005	0.098		0.01	0.177		0.01	0.588		0.01	0.139		0.01	0.046
143	0.45	-0.1	0.093	0.4	0.12	0.9	0.13	-1.1	0.79	1.4	0.15	0.3	0.046	0.0							
144	0.474	0.1	0.085	0.0	0.102	0.2	0.207	0.7	0.6	0.1	0.132	-0.2	0.052	0.5							
145	0.472	0.1	0.089	0.2	0.106	0.3	0.188	0.3	0.539	-0.3	0.14	0.0	0.039	-0.6							
146	0.45	-0.1	0.11	1.2	0.1	0.1	0.2	0.5	0.16	-2.9	0.15	0.3	0.056	0.8							
147	0.475	0.2	0.097	0.6	0.098	0.0	0.175	0.0	0.715	0.9	0.208	2.0	0.04	-0.5							
148	0.42	-0.3	0.062	-1.1	0.095	-0.1	0.16	-0.4	0.54	-0.3	0.15	0.3	0.043	-0.3							
149	0.497	0.4	0.082	-0.1	0.101	0.1	0.1942	0.4	0.62	0.2	0.159	0.6	0.04	-0.5							
150	0.418	-0.3	ND	-3.5	0.117	0.8	0.207	0.7	0.655	0.5	0.137	-0.1	0.0419	-0.4							
151	0.51	0.5	0.092	0.4	0.059	-1.6	0.235	1.3	0.664	0.5	0.176	1.1	0.049	0.2							
152	0.56	0.9	0.077	-0.4	0.093	-0.2	0.23	1.2	0.53	-0.4	0.14	0.0	0.05	0.3							
154	0.425	-0.3	0.064	-1.0	NA		0.204	0.6	0.705	0.8	0.125	-0.4	0.043	-0.3							
155	0.516	0.5	0.09	0.3	0.107	0.4	0.256	1.8	0.644	0.4	0.149	0.3	0.085	3.4							
156	0.51	0.5	0.08	-0.2	0.09	-0.3	0.19	0.3	0.43	-1.1	0.12	-0.5	0.06	1.2							
157							No results reported														
158	0.441	-0.1	0.095	0.5	0.102	0.2	0.14	-0.8	0.705	0.8	0.119	-0.6	0.038	-0.7							
159	0.451	-0.1	0.104	0.9	0.078	-0.8	0.152	-0.6	0.677	0.6	0.163	0.7	0.034	-1.1							
160	0.047	-3.6	NA		NA		0.21	0.8	NA		NA		NA								
161	ND	-3.9	0.07	-0.7	NA		0.17	-0.1	0.46	-0.9	0.31	4.9	0.04	-0.5							
162	0.43	-0.2	0.084	0.0	0.097	0.0	0.17	-0.1	0.61	0.2	0.15	0.3	0.046	0.0							
163	0.388	-0.6	0.096	0.5	ND	-3.8	0.105	-1.6	0.666	0.5	0.266	3.7	ND	-3.1							
164	0.416	-0.4	0.0824	-0.1	0.101	0.1	0.152	-0.6	0.57	-0.1	0.12	-0.5	0.0406	-0.5							
165	0.518	0.5	0.097	0.6	0.115	0.7	0.199	0.5	0.782	1.3	0.167	0.8	0.06	1.2							
166	0.41	-0.4	0.114	1.4	0.1	0.1	0.162	-0.3	1.133	3.7	0.367	6.6	0.063	1.5							
167	0.452	0.0	0.0634	-1.0	0.103	0.2	ND	-3.8	0.512	-0.5	0.2	1.8	0.0305	-1.4							
168	0.192	-2.3	0.103	0.9	0.108	0.4	0.12	-1.3	0.705	0.8	0.181	1.2	0.043	-0.3							
169	ND	-3.9	0.135	2.4	ND	-3.8	ND	-3.8	0.604	0.1	0.098	-1.2	ND	-3.1							
170	0.35	-0.9	0.08	-0.2	0.098	0.0	0.12	-1.3	0.527	-0.4	0.135	-0.1	0.027	-1.7							
171	0.451	-0.1	0.094	0.5	0.138	1.6	0.169	-0.2	0.705	0.8	0.182	1.2	0.042	-0.4							
172	0.348	-1.0	0.079	-0.3	0.102	0.2	0.125	-1.2	0.561	-0.2	0.107	-0.9	0.029	-1.5							
173	0.39	-0.6	0.081	-0.2	0.115	0.7	0.11	-1.5	0.72	0.9	0.136	-0.1	0.036	-0.9							
176	0.461	0.0	0.086	0.1	0.093	-0.2	0.25	1.7	0.542	-0.3	0.15	0.3	0.054	0.7							
177	0.528	0.6	0.091	0.3	0.1	0.1	0.174	-0.1	0.52	-0.5	0.141	0.1	0.055	0.8							
178	NA		NA		NA		0.17	-0.1	NA		0.145	0.2	NA								
179	NA		NA		NA		NA		0.227	-2.5	0.144	0.1	0.034	-1.1							
180	0.458	0.0	0.085	0.0	0.103	0.2	0.171	-0.1	0.871	1.9	0.156	0.5	0.046	0.0							
181	NA		NA		NA		0.184	0.2	NA		0.079	-1.7	NA								
182	0.36	-0.8	0.091	0.3	ND	-3.8	0.14	-0.8	0.58	-0.1	0.12	-0.5	0.04	-0.5							
183	0.496	0.3	0.089	0.2	0.116	0.7	0.164	-0.3	0.635	0.3	0.157	0.5	0.046	0.0							
184	0.591	1.2	0.082	-0.1	0.097	0.0	0.252	1.7	ND	-3.9	0.236	2.8	0.055	0.8							
185	0.353	-0.9	0.068	-0.8	0.09	-0.3	0.171	-0.1	0.446	-1.0	0.115	-0.7	0.04	-0.5							
186	0.4	-0.5	0.086	0.1	0.1	0.1	0.18	0.1	0.56	-0.2	0.12	-0.5	0.04	-0.5							
187	ND	-3.9	0.072	-0.6	0.082	-0.7	ND	-3.8	0.56	-0.2	0.09	-1.4	0.028	-1.6							

NA: Not analysed

ND: Not detected (False negative)

APPENDIX 3. Results (mg/Kg) and z scores for FFP-RSD (25 %).

Results reported by the laboratories for the voluntary pesticides flupyradifurone and isofetamid (mg/kg) and their calculated z score value using FFP-RSD 25 %.

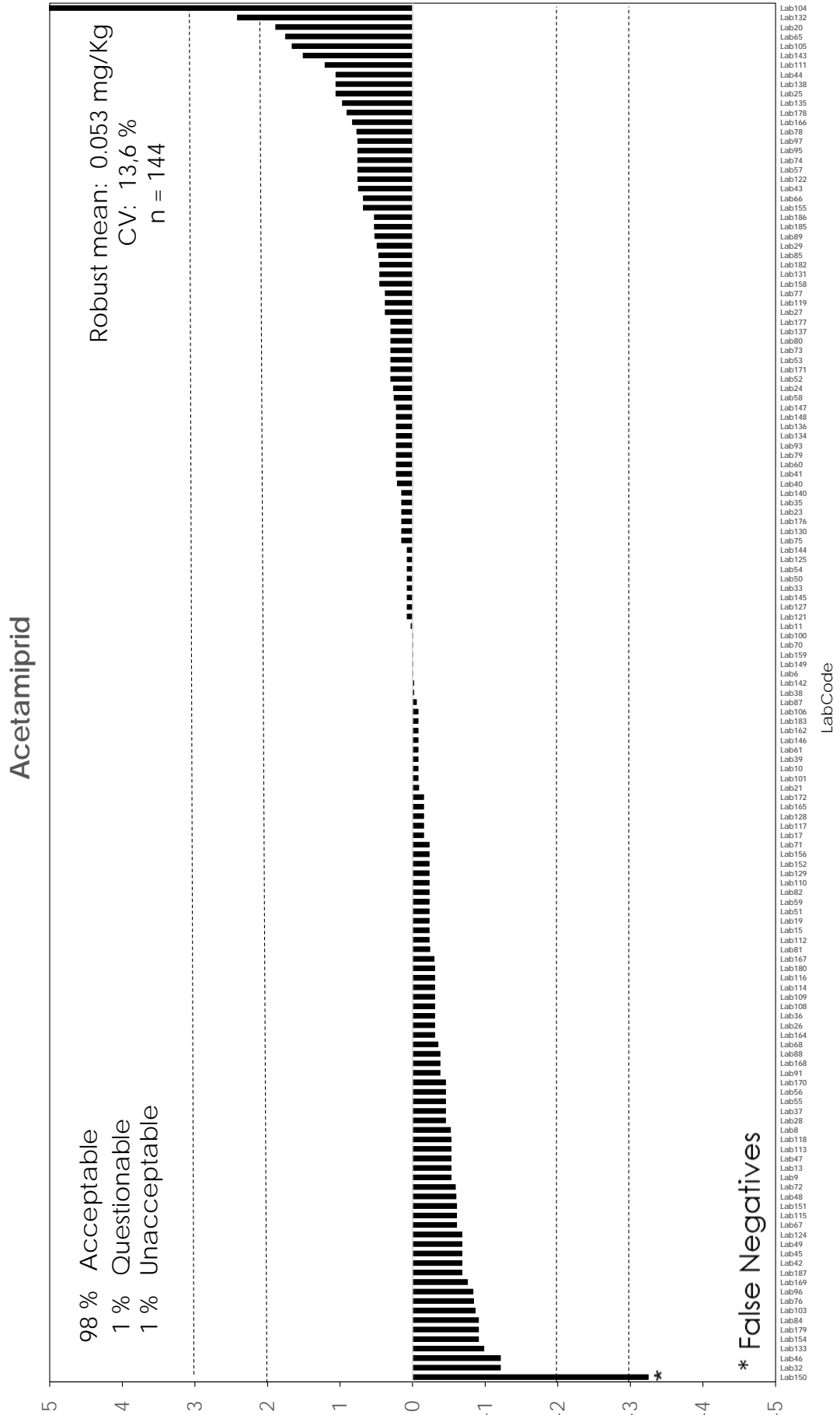
Lab Code	Flupyradifurone	Isofetamid		
MRRL (mg/kg)	0.01	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	
Robust mean (mg/kg)	0.056	0.045		
4	0.0482	-0.5	0.992	4.9
5	0.0509	-0.3	0.0583	1.2
6	0.06	0.3	0.049	0.4
8	0.0425	-0.9	0.0276	-1.5
9	NA		0.044	-0.1
10	0.06	0.3	0.052	0.7
11	NA		0.057	1.1
12	NA		NA	
13	NA		NA	
14	NA		NA	
15	NA		NA	
16	No results reported			
17	0.074	1.3	0.067	2.0
18	No results reported			
19	NA		NA	
20	NA		NA	
21	0.0579	0.2	0.0507	0.5
22	NA		0.041	-0.3
23	0.0595	0.3	0.0304	-1.3
24	NA		NA	
25	NA		NA	
26	0.056	0.0	0.041	-0.3
27	NA		NA	
28	NA		NA	
29	NA		NA	
31	No results reported			
32	0.042	-1.0	0.047	0.2
33	NA		NA	
34	NA		NA	
35	0.047	-0.6	0.043	-0.2
36	NA		NA	
37	0.048	-0.6	0.054	0.8
38	0.0492	-0.5	0.0357	-0.8
39	NA		NA	
40	NA		NA	
41	NA		NA	
42	NA		0.046	0.1
43	0.063	0.5	0.0563	1.0
44	NA		NA	
45	NA		NA	
46	NA		NA	
47	0.055	-0.1	0.036	-0.8
48	0.048	-0.6	0.0314	-1.2
49	NA		0.048	0.3
50	NA		NA	
51	NA		NA	
52	NA		0.054	0.8
53	NA		NA	
54	0.049	-0.5	NA	
55	0.05	-0.4	0.05	0.5
56	NA		NA	
57	NA		NA	
58	0.0536	-0.2	0.0474	0.2
59	NA		0.05	0.5
60	NA		NA	
61	NA		NA	
62	NA		NA	
63	0.068	0.9	0.049	0.4
64	NA		NA	
65	NA		NA	
66	0.061	0.4	NA	
67	NA		NA	
68	NA		NA	

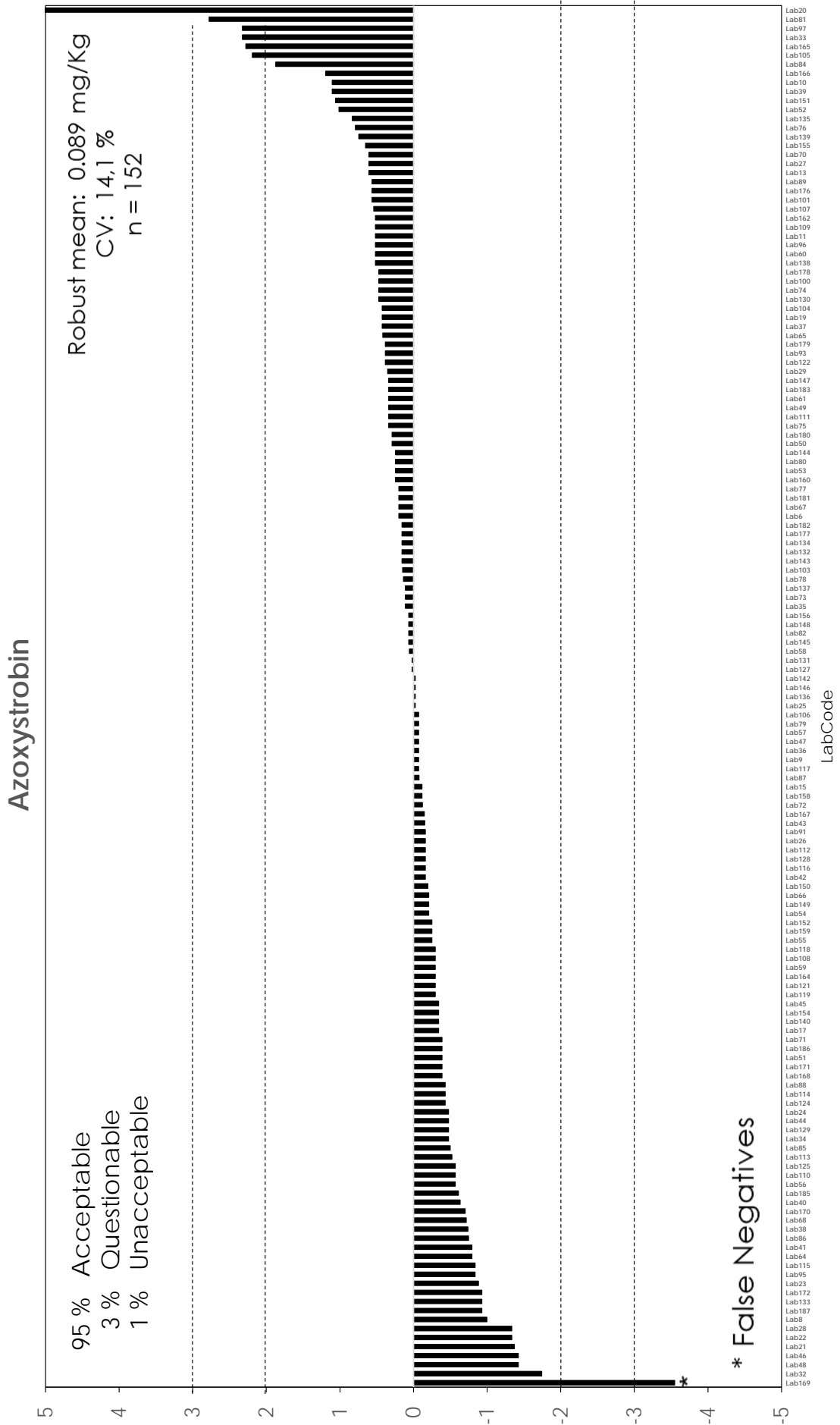
Lab Code	Flupyradifurone	Isofetamid		
MRRL (mg/kg)	0.01	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	
Robust mean (mg/kg)	0.056	0.045		
69	NA		NA	
70	NA		NA	
71	NA		NA	
72	0.0609	0.4	0.0377	-0.6
73	NA		NA	
74	0.061	0.4	0.051	0.6
75	0.058	0.2	0.045	0.0
76	NA		0.0457	0.1
77	0.064	0.6	0.051	0.6
78	NA		NA	
79	NA		NA	
80	NA		NA	
81	0.0508	-0.4	0.038	-0.6
82	NA		NA	
83	NA		NA	
84	NA		NA	
85	NA		NA	
86	NA		NA	
87	NA		NA	
88	NA		NA	
89	NA		ND	-3.1
90	NA		NA	
91	0.051	-0.3	0.045	0.0
92	NA		NA	
93	0.061	0.4	0.032	-1.1
94	NA		NA	
95	0.06	0.3	0.048	0.3
96	0.049	-0.5	NA	
97	0.08	1.7	0.056	1.0
98	NA		NA	
99	NA		NA	
100	NA		NA	
101	0.057	0.1	0.051	0.6
102	No results reported			
103	NA		NA	
104	NA		NA	
105	NA		NA	
106	0.058	0.2	NA	
107	NA		NA	
108	0.056	0.0	0.035	-0.9
109	0.096	2.9	0.069	2.2
110	0.052	-0.3	0.047	0.2
111	NA		NA	
112	0.052	-0.3	0.042	-0.2
113	0.044	-0.8	0.027	-1.6
114	NA		NA	
115	NA		0.036	-0.8
116	NA		NA	
117	NA		NA	
118	NA		NA	
119	NA		NA	
120	NA		NA	
121	NA		NA	
122	0.054	-0.1	0.04	-0.4
123	NA		NA	
124	NA		NA	
125	NA		NA	
126	NA		NA	
127	0.051	-0.3	0.055	0.9
128	0.052	-0.3	NA	
129	NA		NA	
130	0.058	0.2	0.061	1.5
131	NA		0.055	0.9

Lab Code	Flupyradifurone	Isofetamid		
MRRL (mg/kg)	0.01	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	
Robust mean (mg/kg)	0.056	0.045		
132	NA		NA	
133	0.039	-1.2	0.035	-0.9
134	NA		0.049	0.4
135	0.0655	0.7	NA	
136	0.06	0.3	0.044	-0.1
137	NA		NA	
138	NA		NA	
139	NA		NA	
140	NA		NA	
141	NA		NA	
142	NA		0.0475	0.3
143	NA		NA	
144	0.061	0.4	NA	
145	0.055	-0.1	0.04	-0.4
146	NA		NA	
147	0.059	0.2	NA	
148	0.057	0.1	0.044	-0.1
149	0.054	-0.1	0.045	0.0
150	NA		NA	
151	0.057	0.1	NA	
152	NA		0.044	-0.1
154	0.05	-0.4	0.046	0.1
155	NA		NA	
156	NA		NA	
157	No results reported			
158	NA		NA	
159	0.068	0.9	0.039	-0.5
160	NA		NA	
161	NA		NA	
162	NA		NA	
163	0.055	-0.1	NA	
164	0.048	-0.6	NA	
165	0.052	-0.3	0.051	0.6
166	NA		NA	
167	NA		NA	
168	NA		NA	
169	NA		NA	
170	0.056	0.0	0.029	-1.4
171	0.063	0.5	0.034	-1.0
172	0.058	0.2	0.032	-1.1
173	NA		NA	
176	NA		NA	
177	0.054	-0.1	NA	
178	NA		NA	
179	NA		NA	
180	0.057	0.1	0.065	1.8
181	NA		NA	
182	ND	-3.3	ND	-3.1
183	0.067	0.8	0.044	-0.1
184	ND	-3.3	ND	-3.1
185	0.045	-0.8	0.03	-1.3
186	ND	-3.3	ND	-3.1
187	ND	-3.3	ND	-3.1

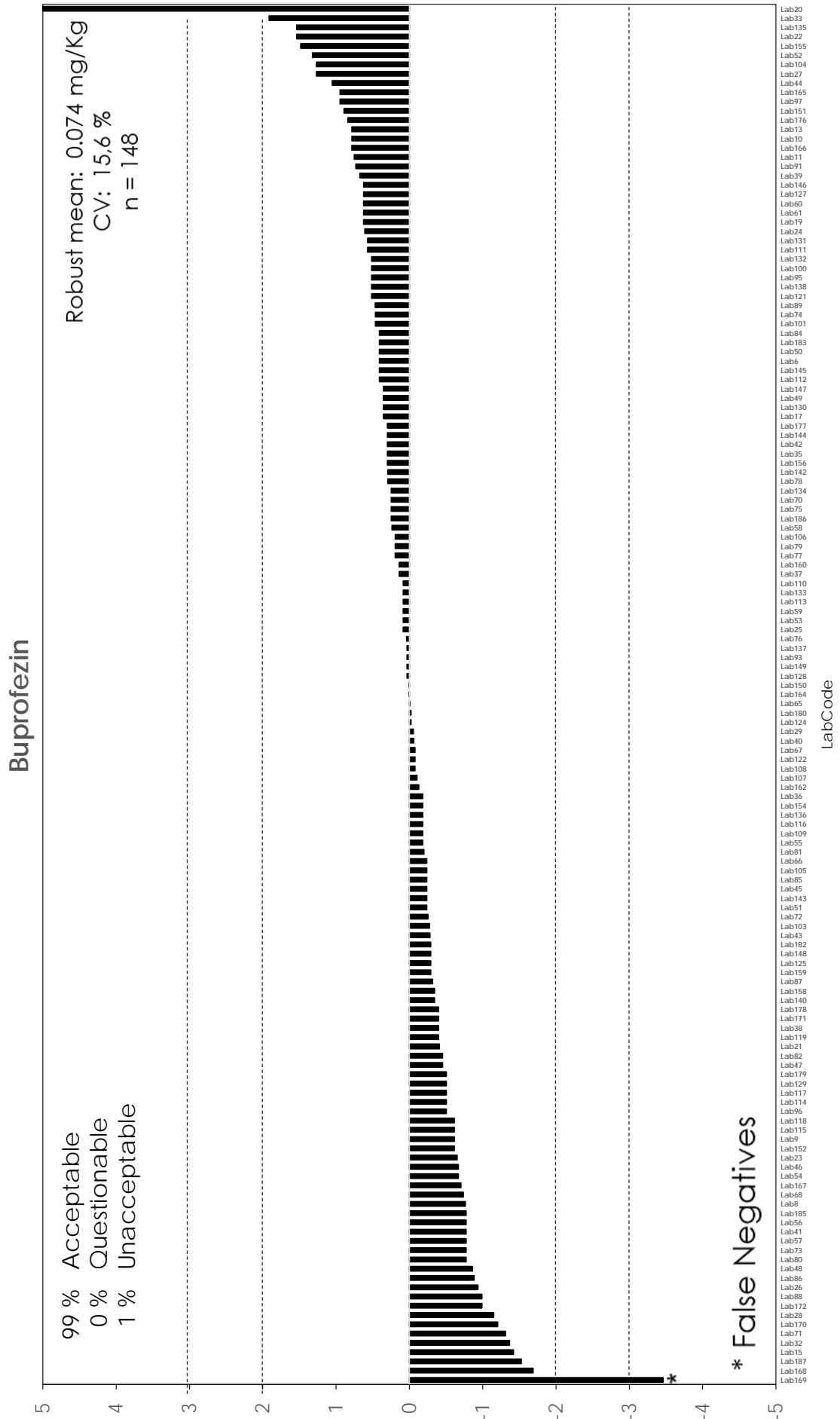
NA: Not analysed ND: Not detected (False negative)

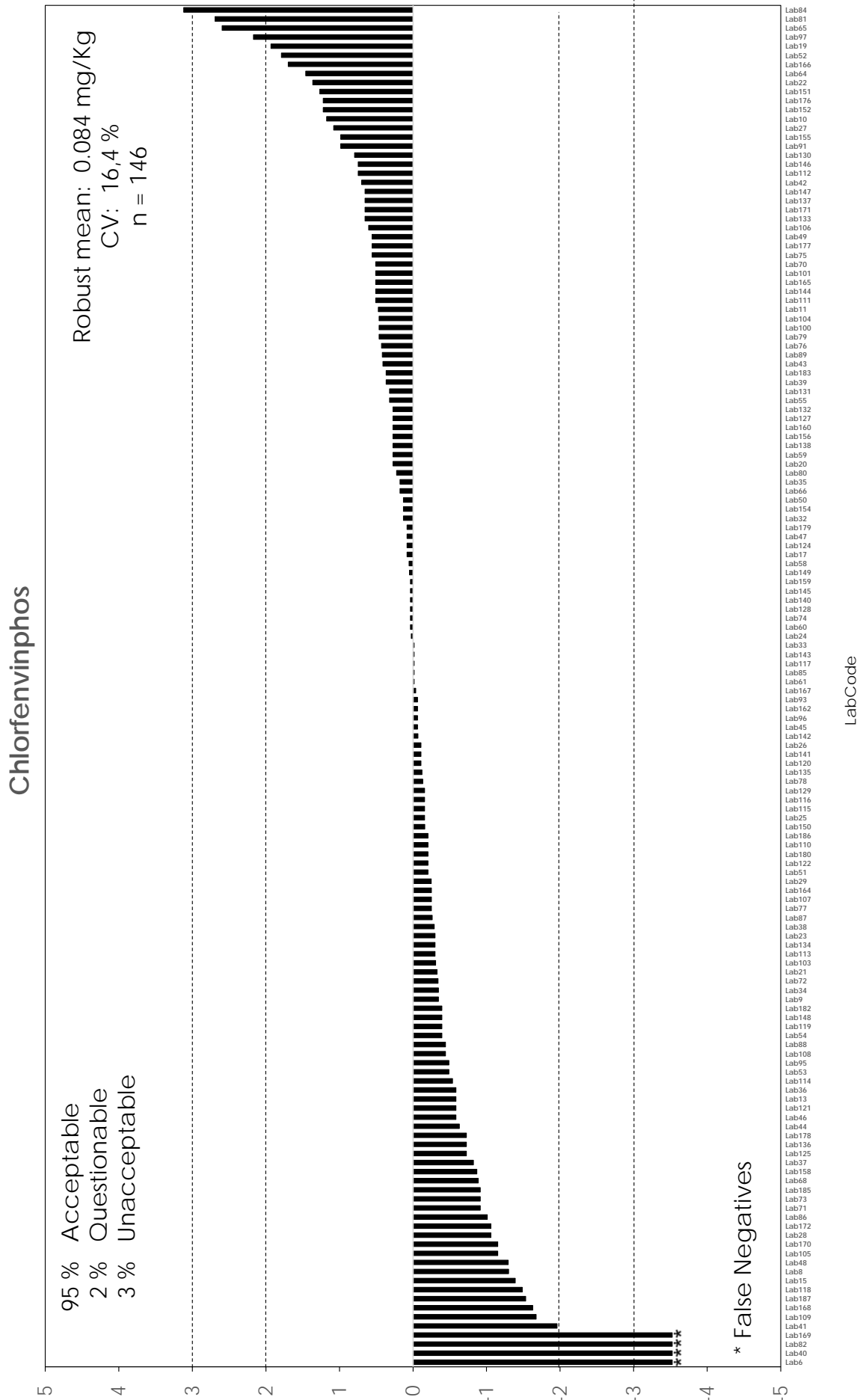
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



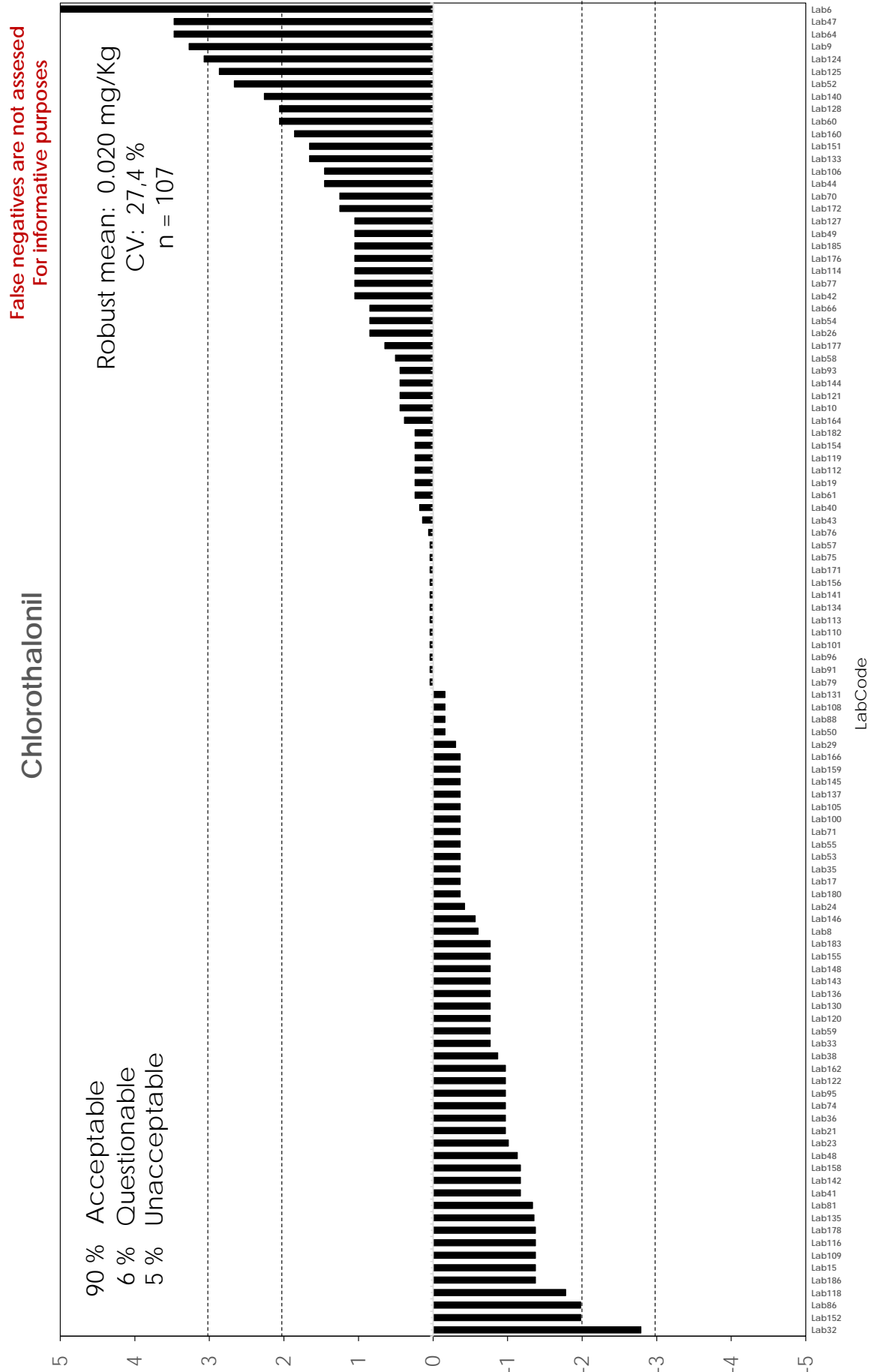


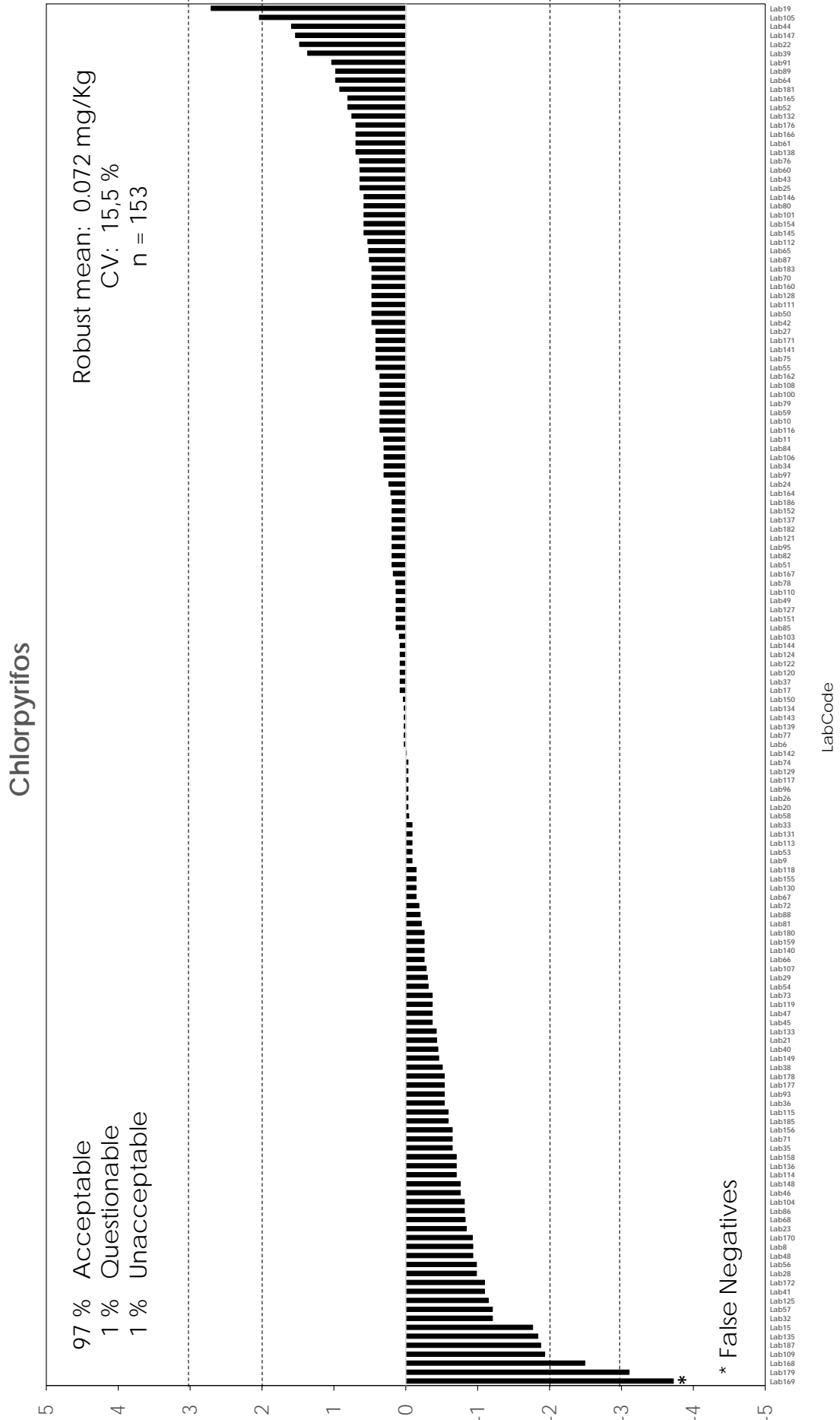
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



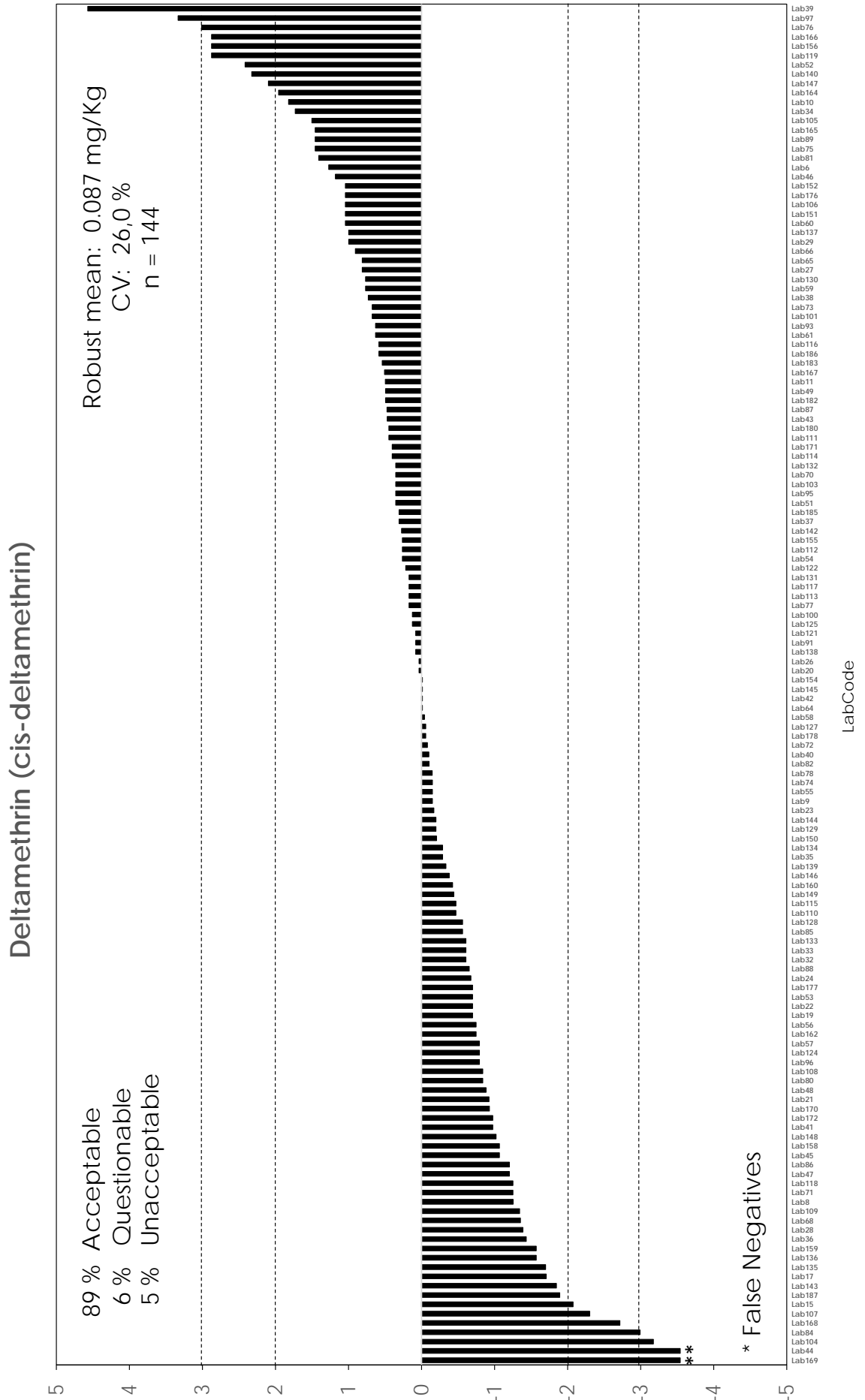


APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

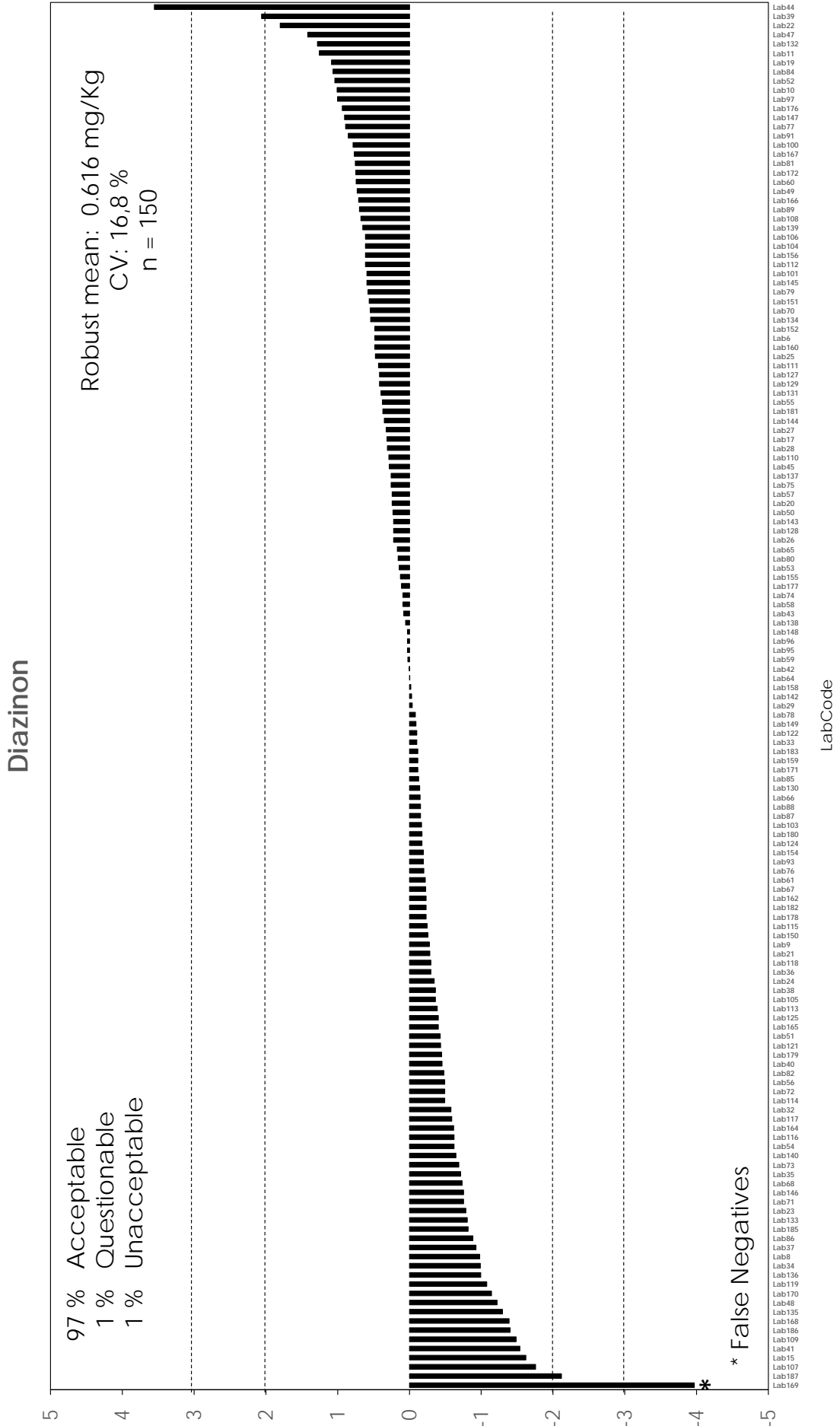




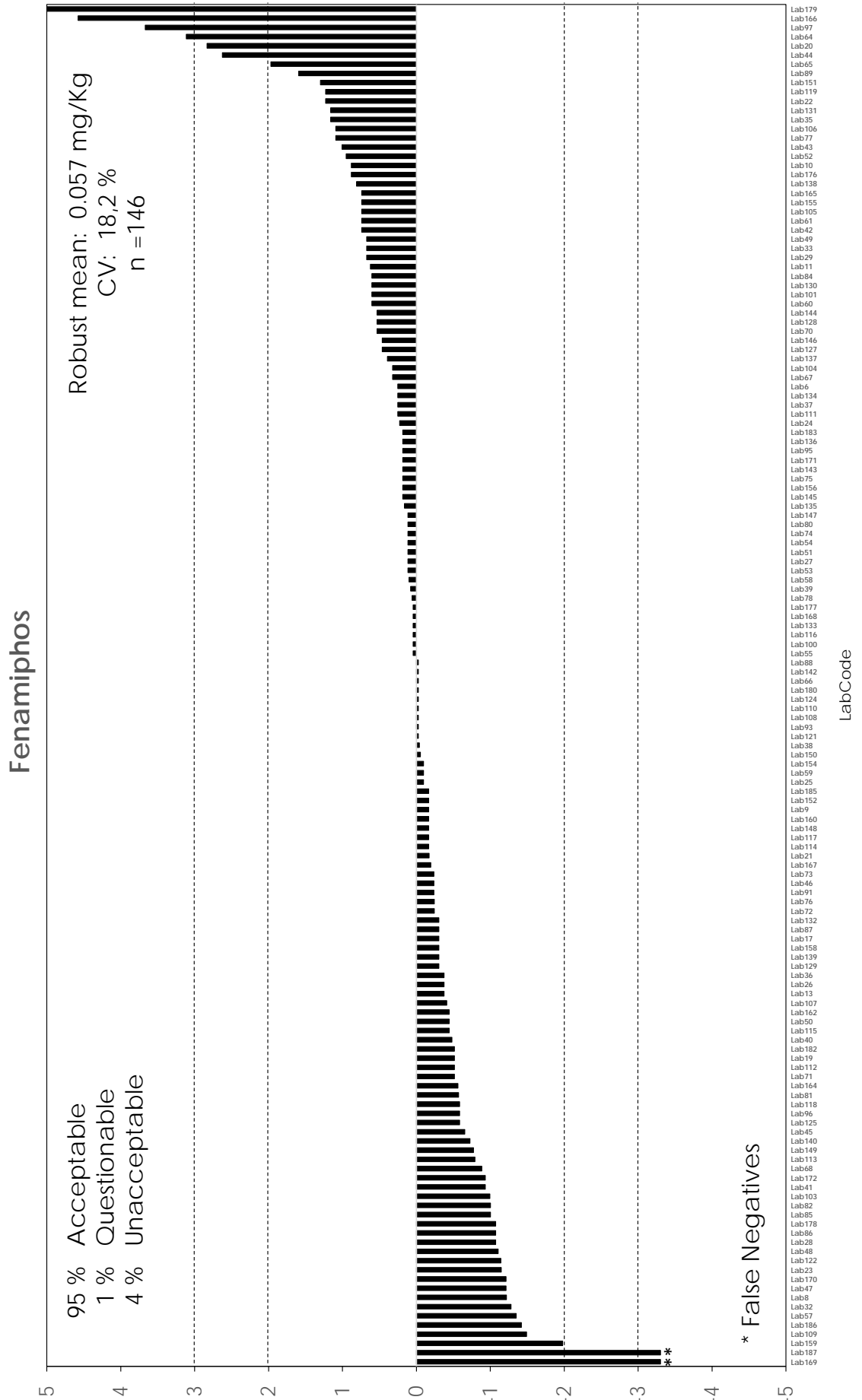
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

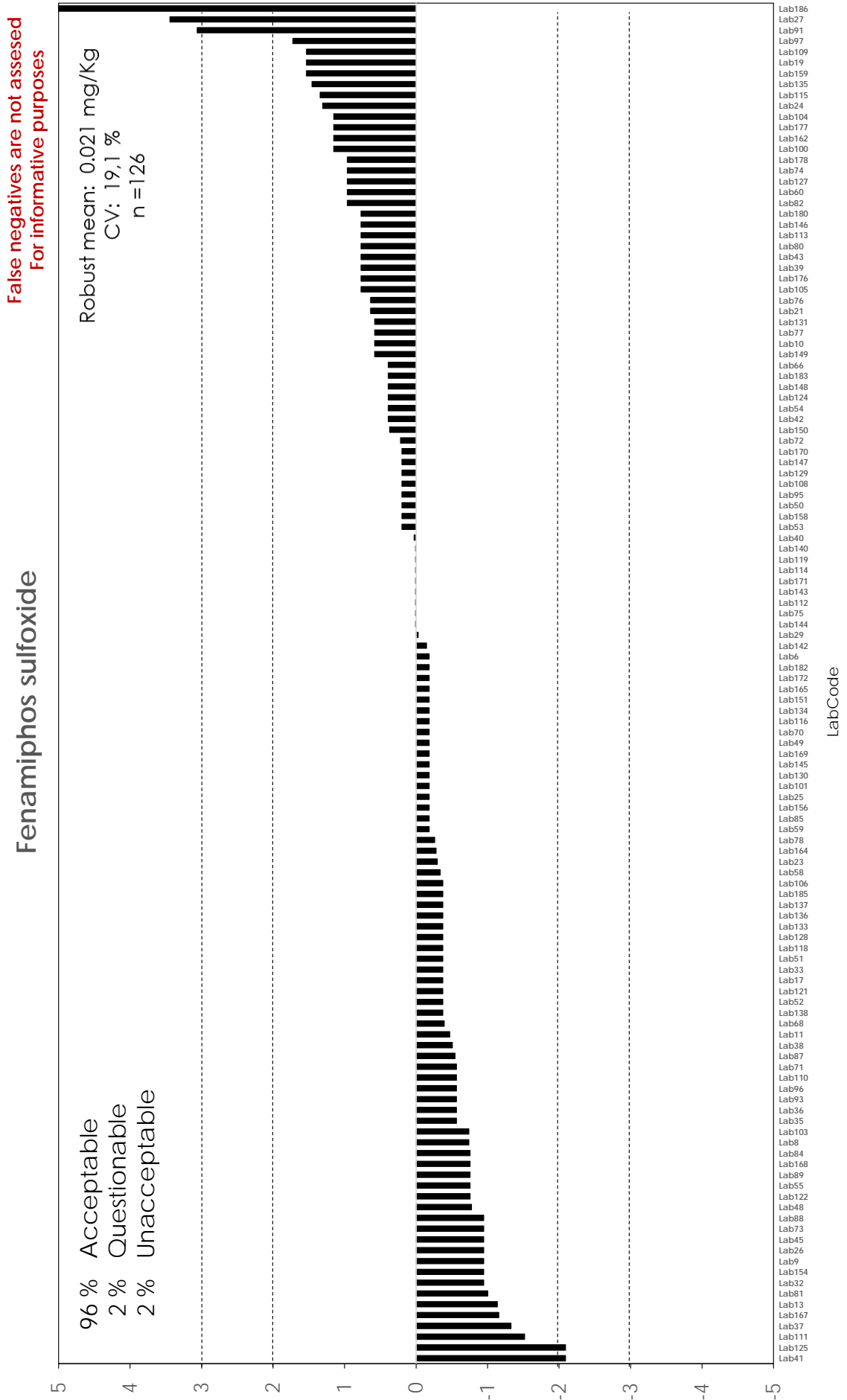


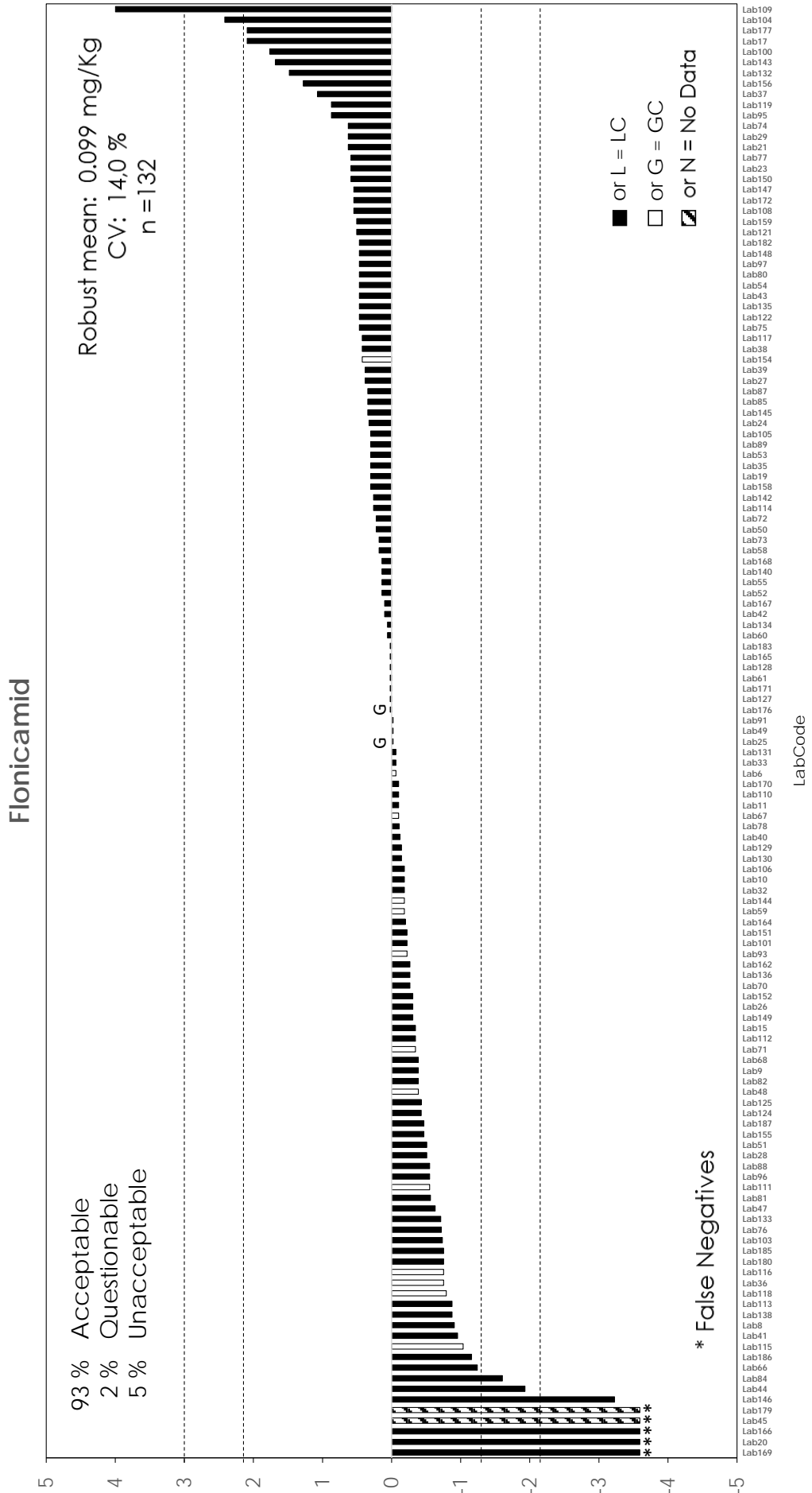
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

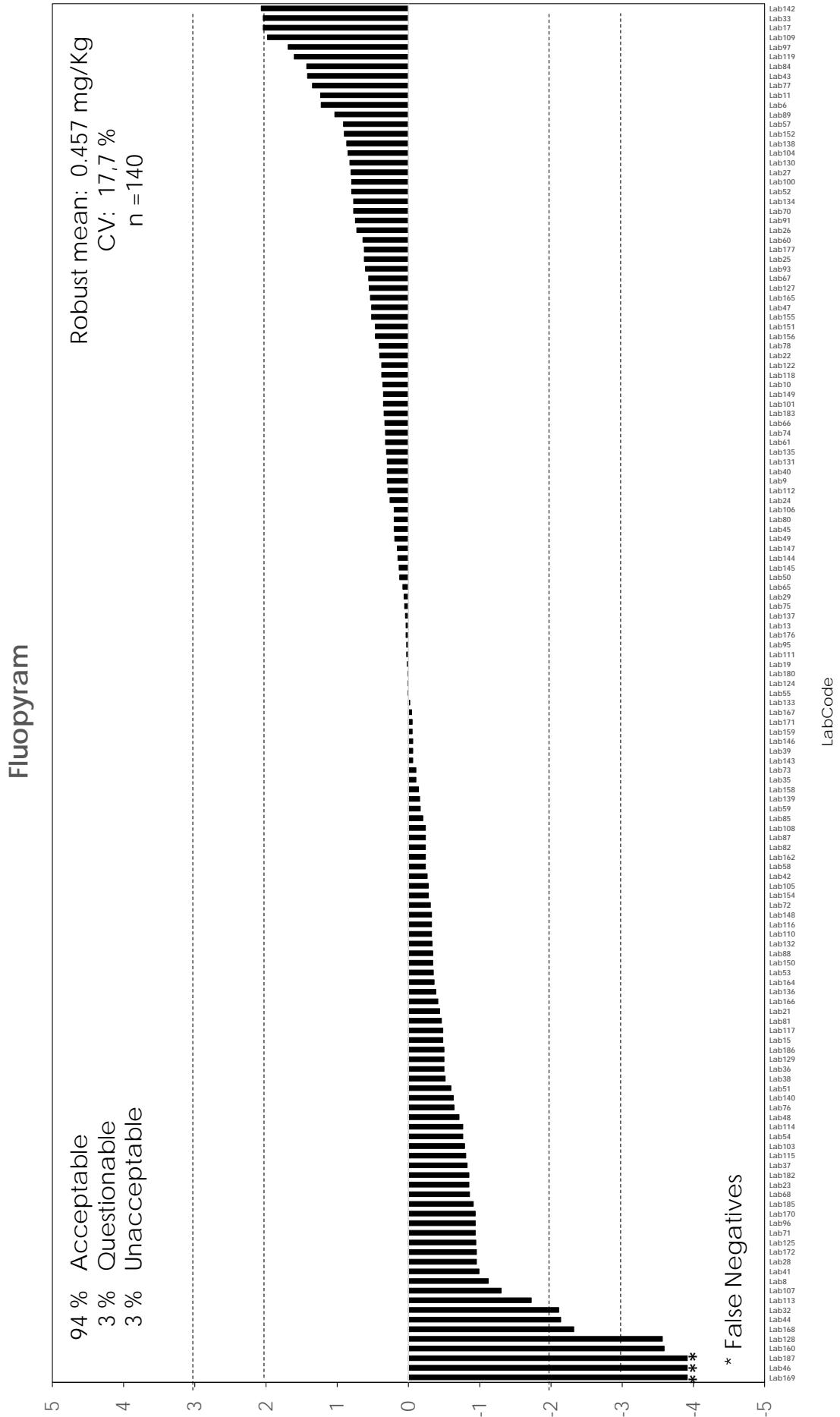


APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

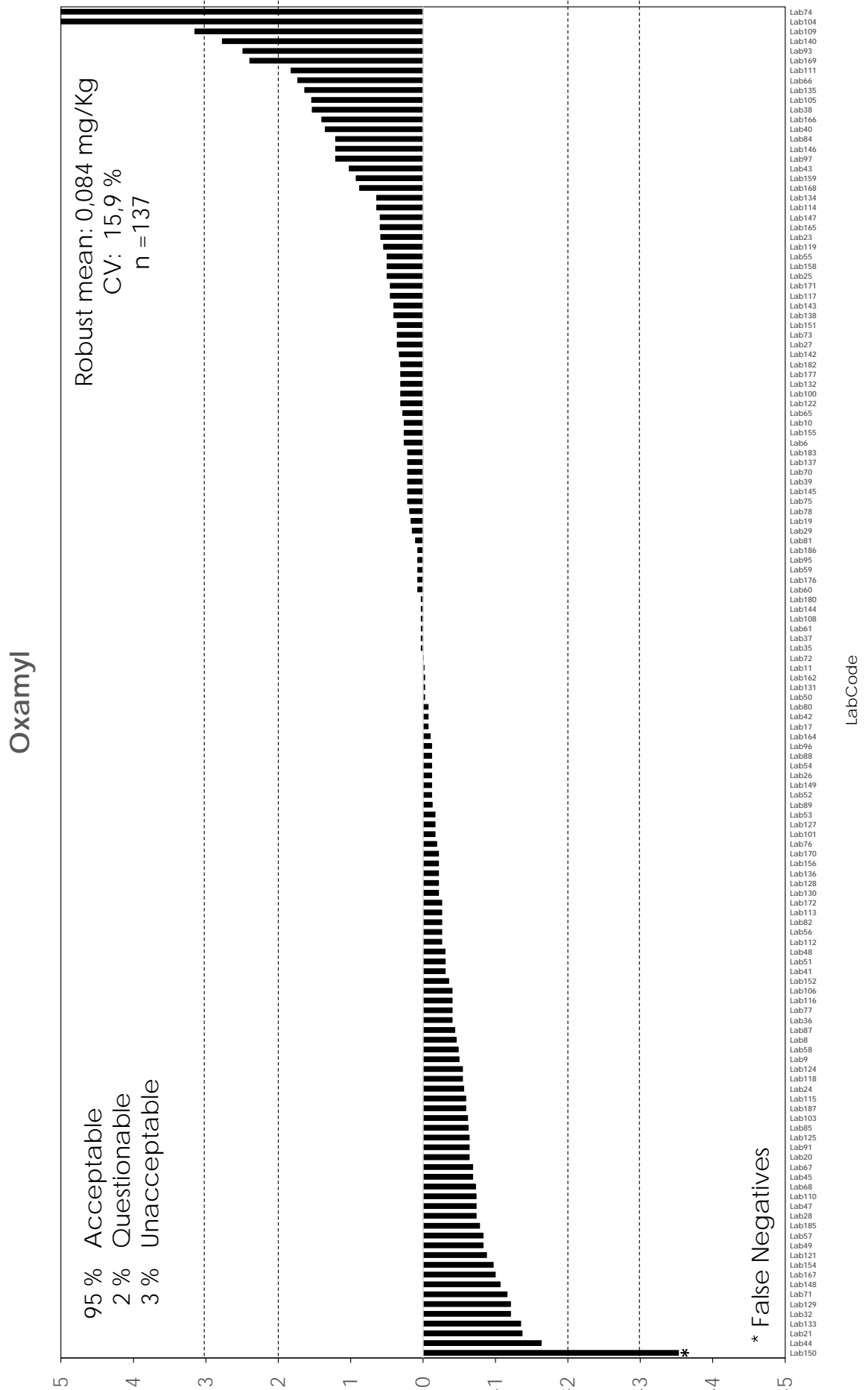


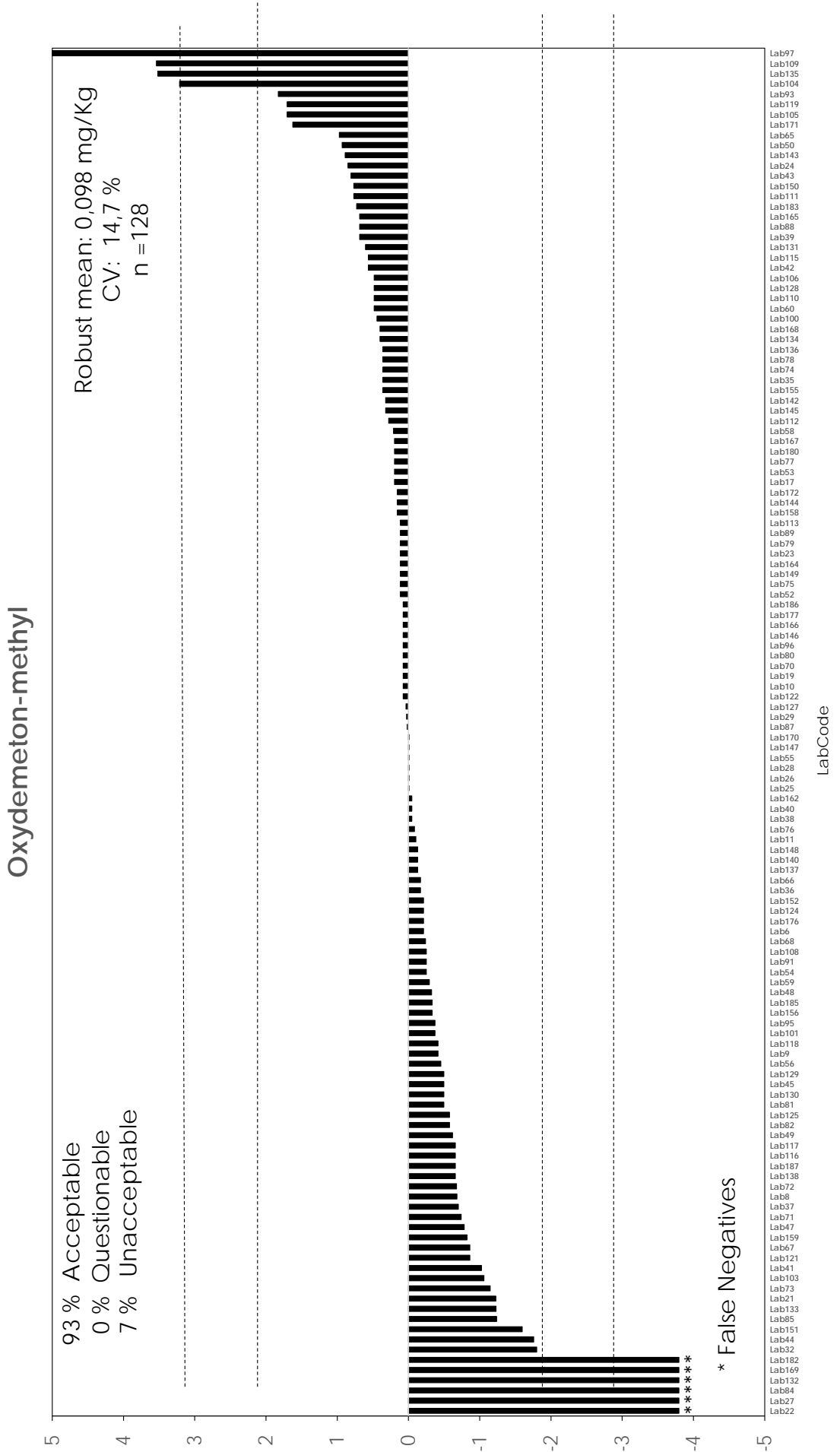




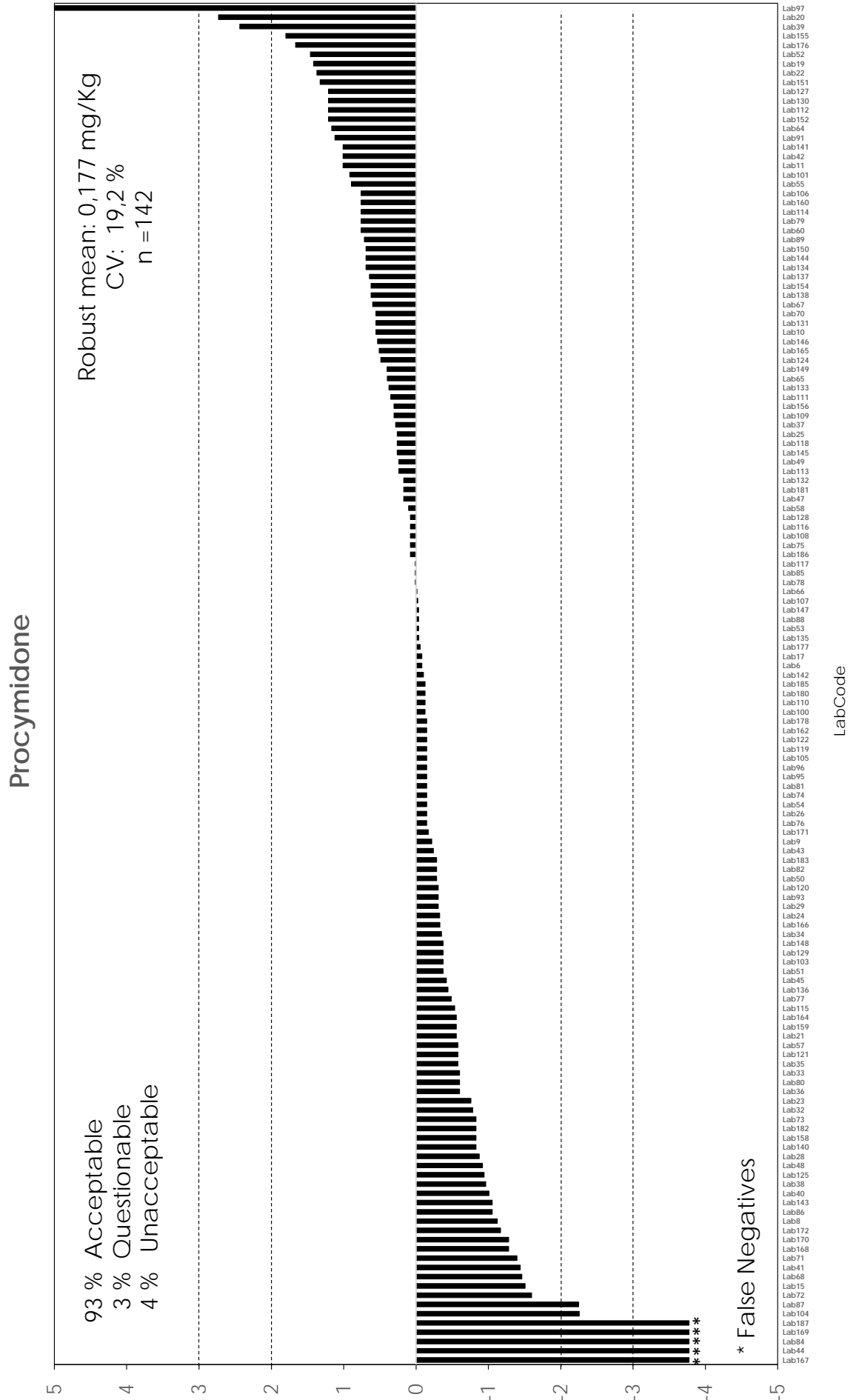


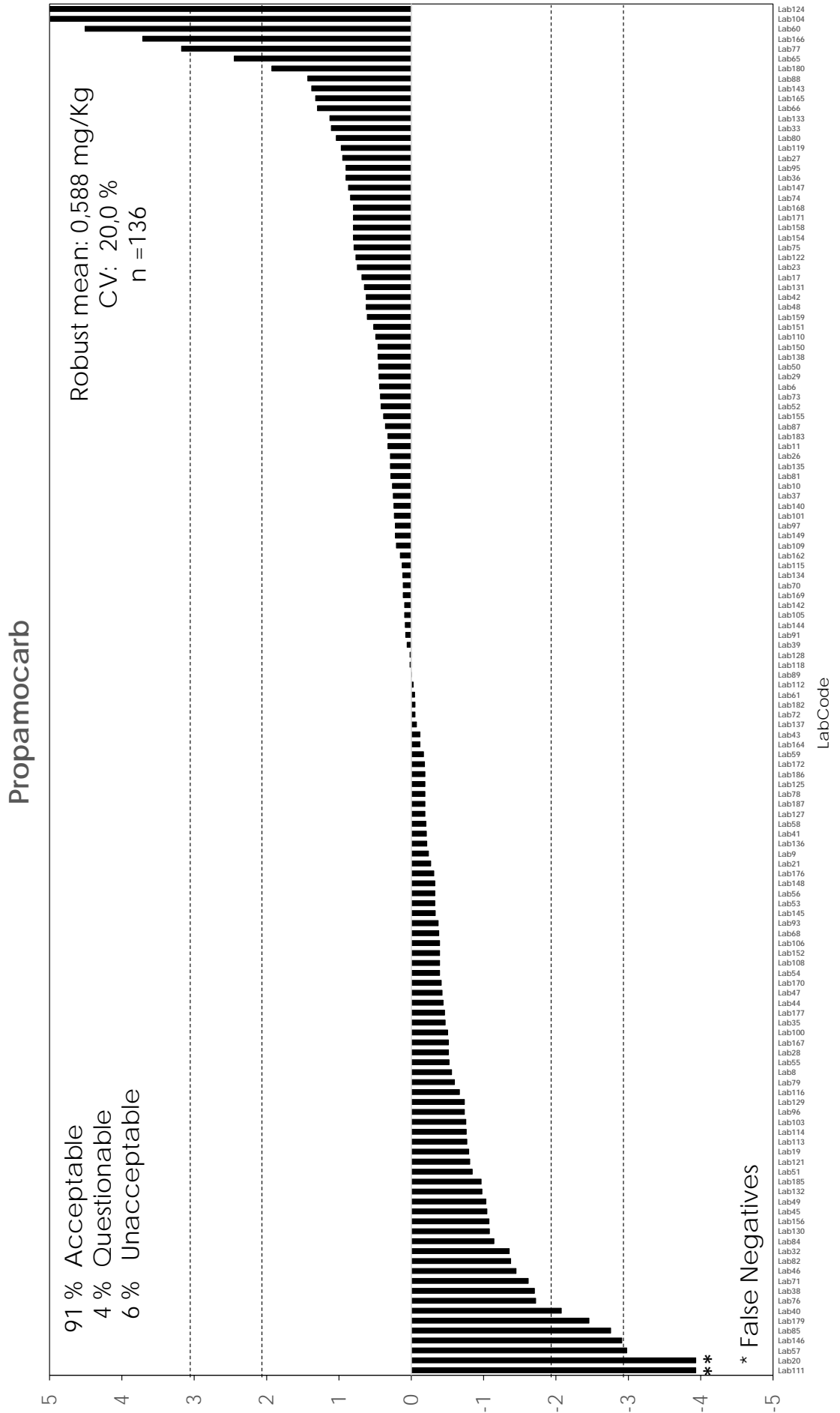
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



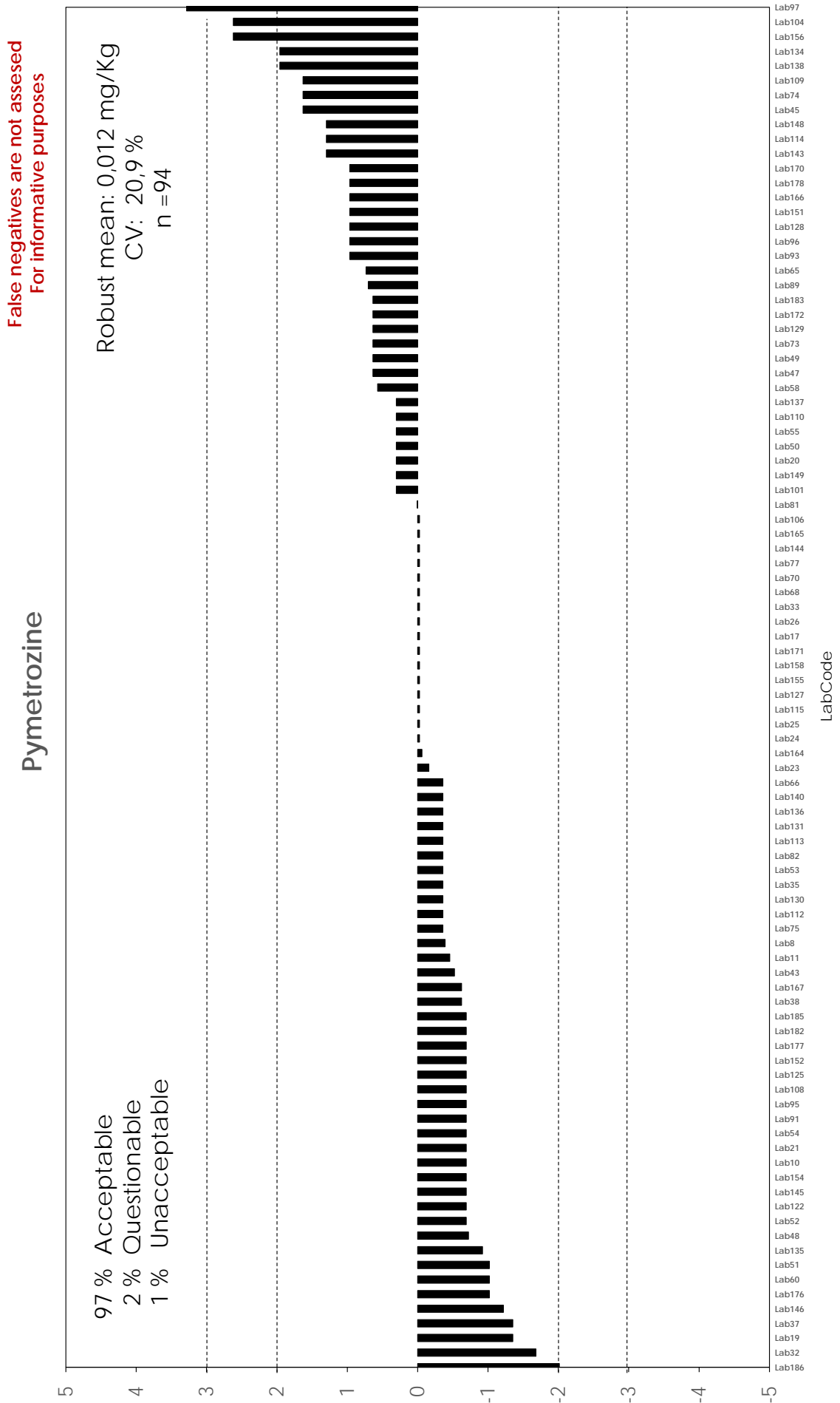


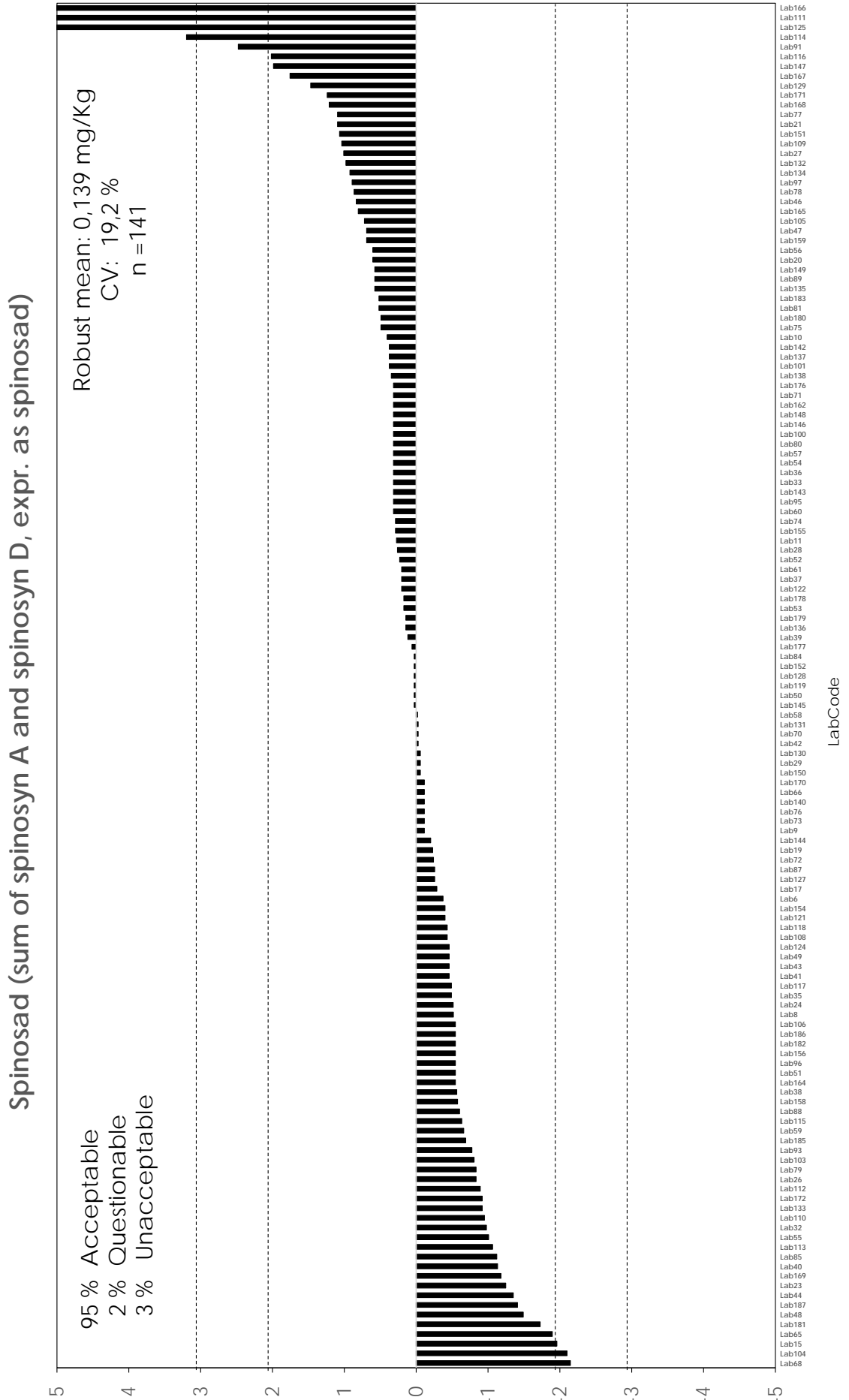
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



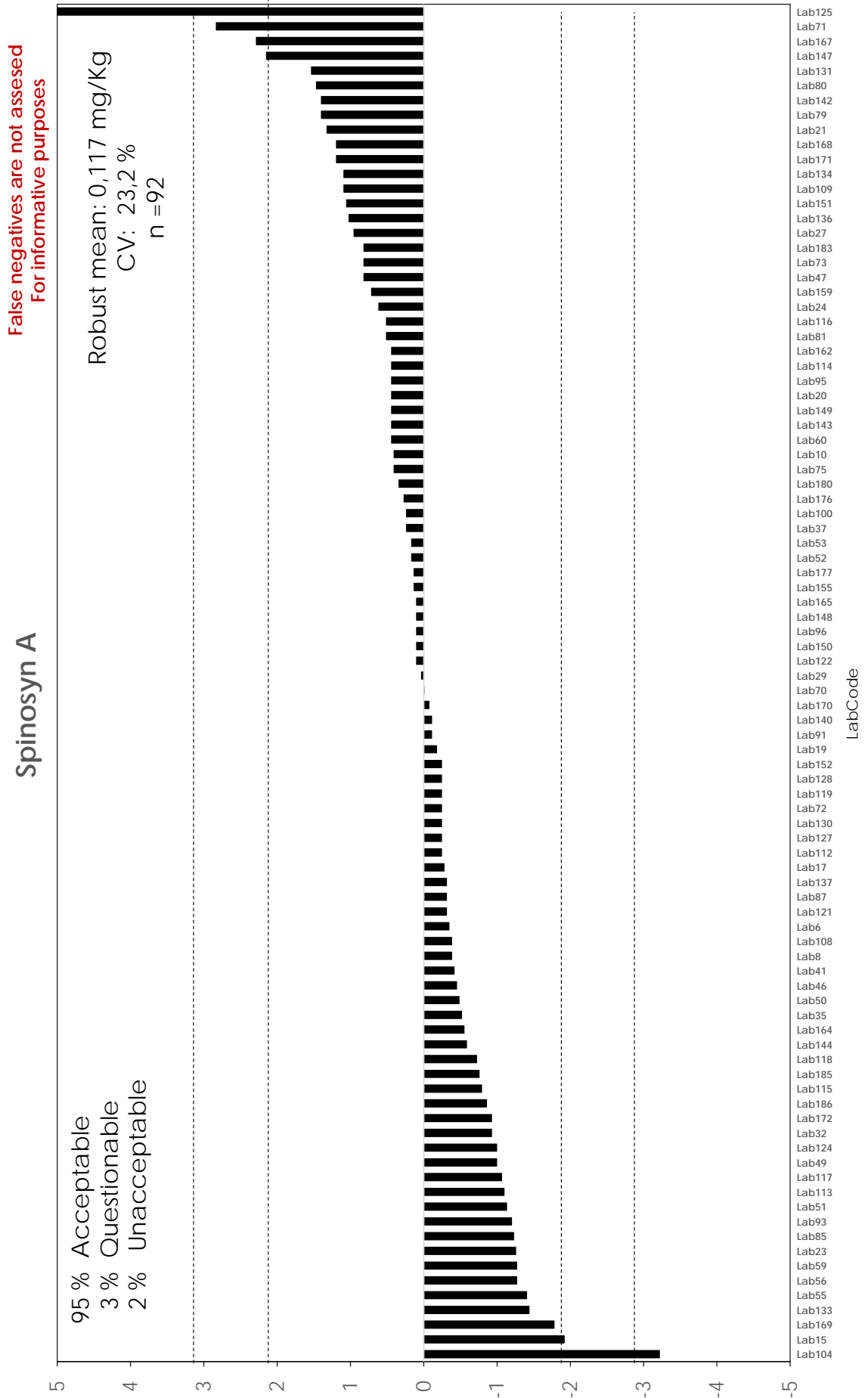


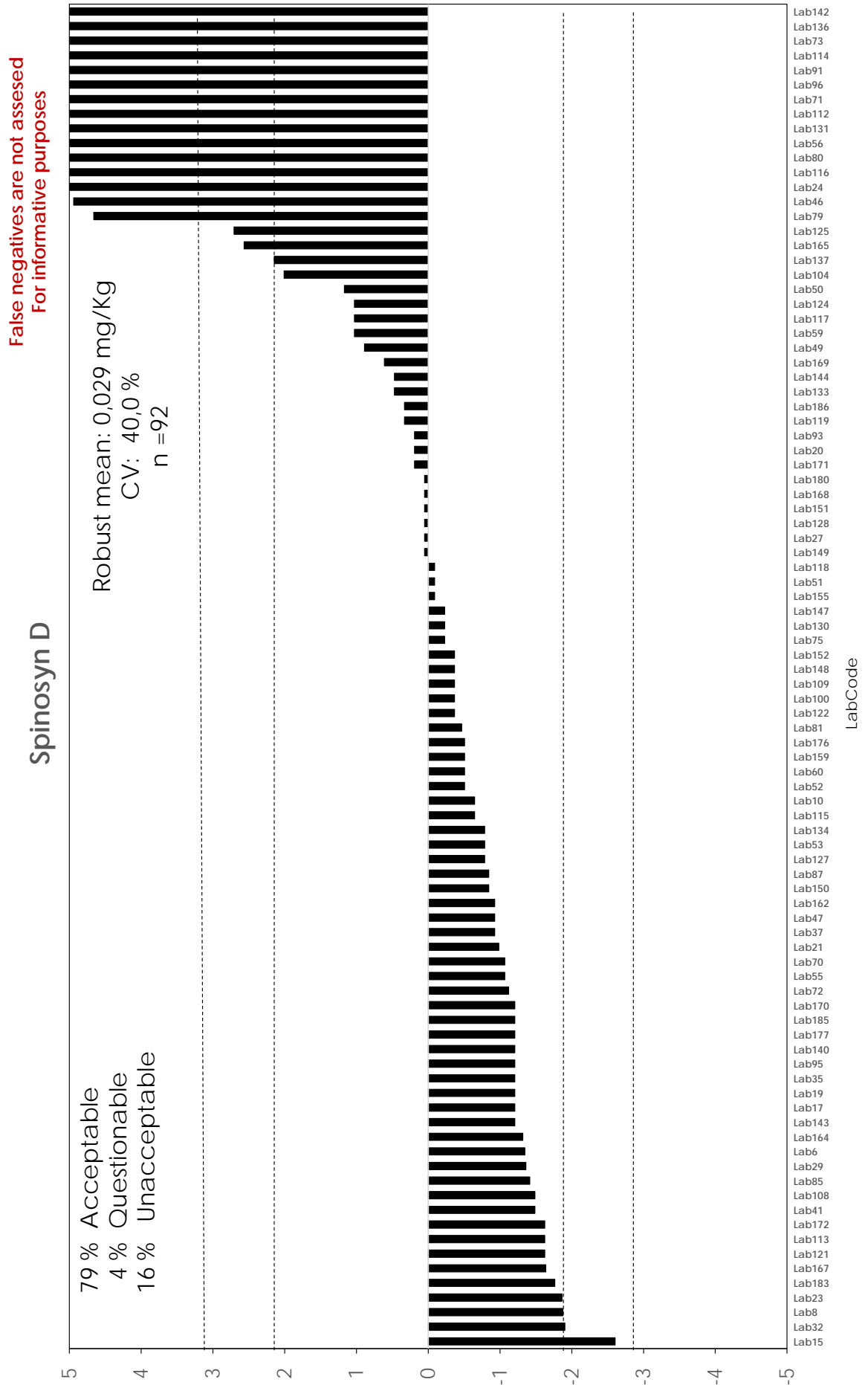
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



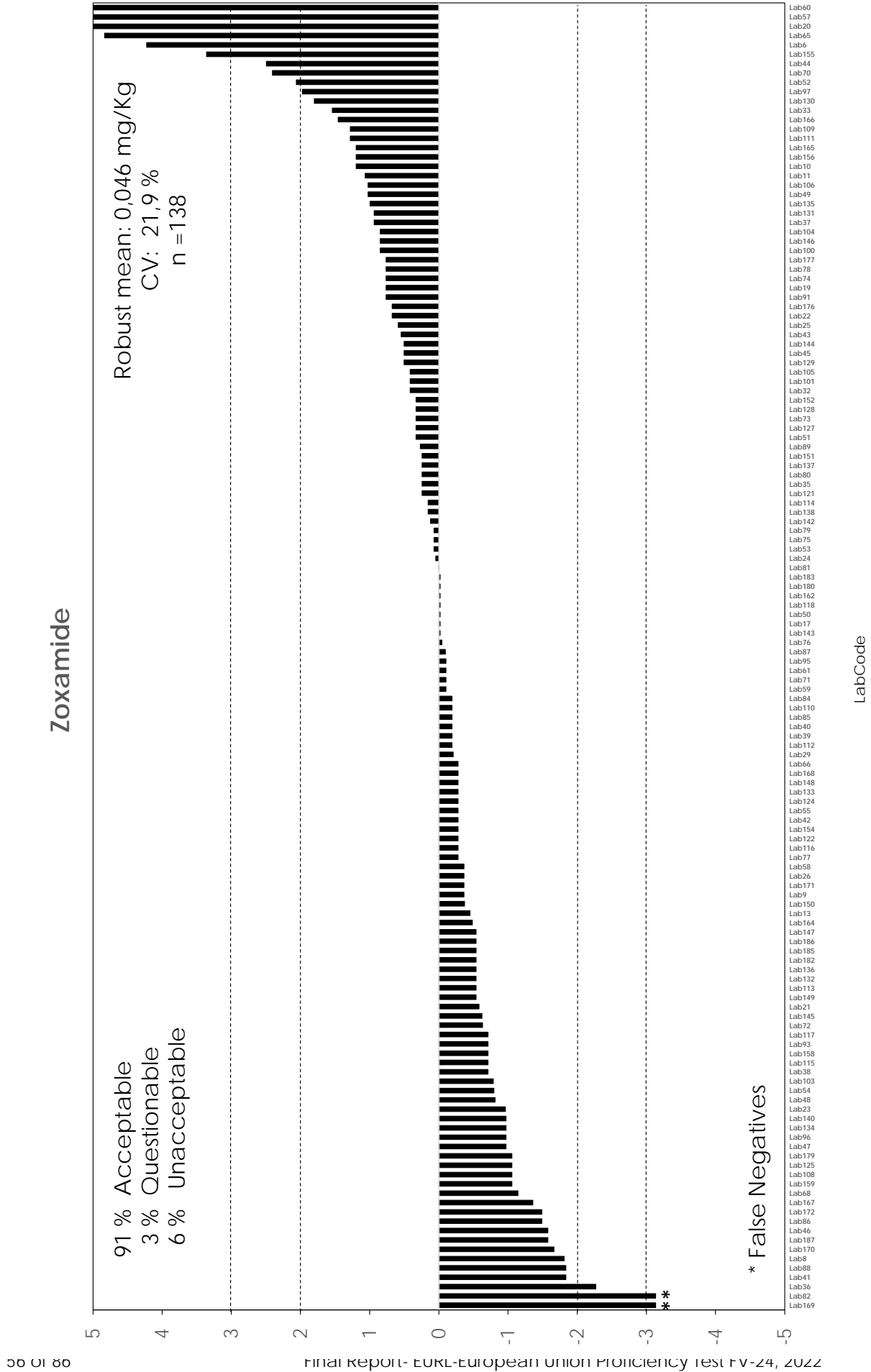


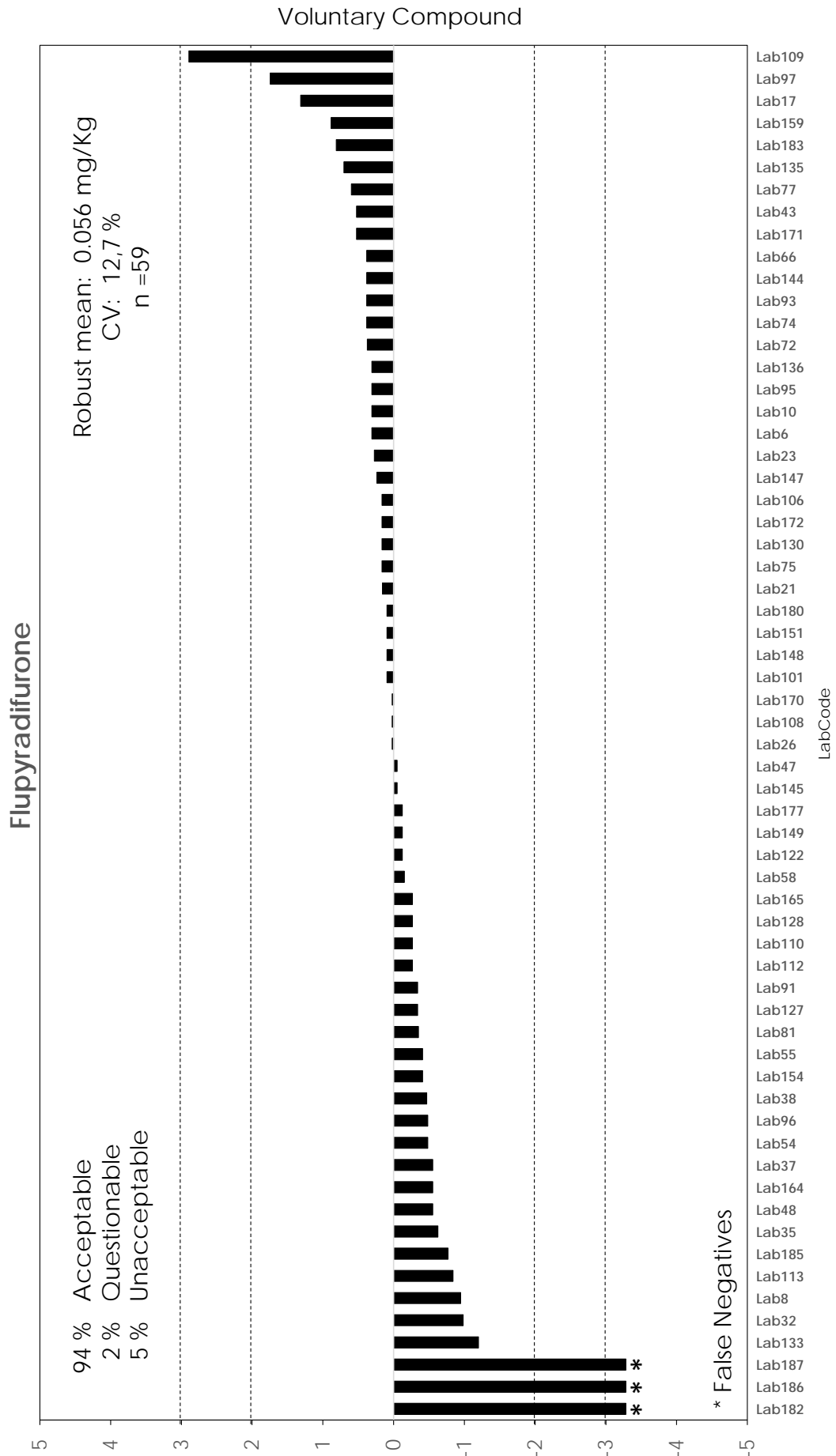
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



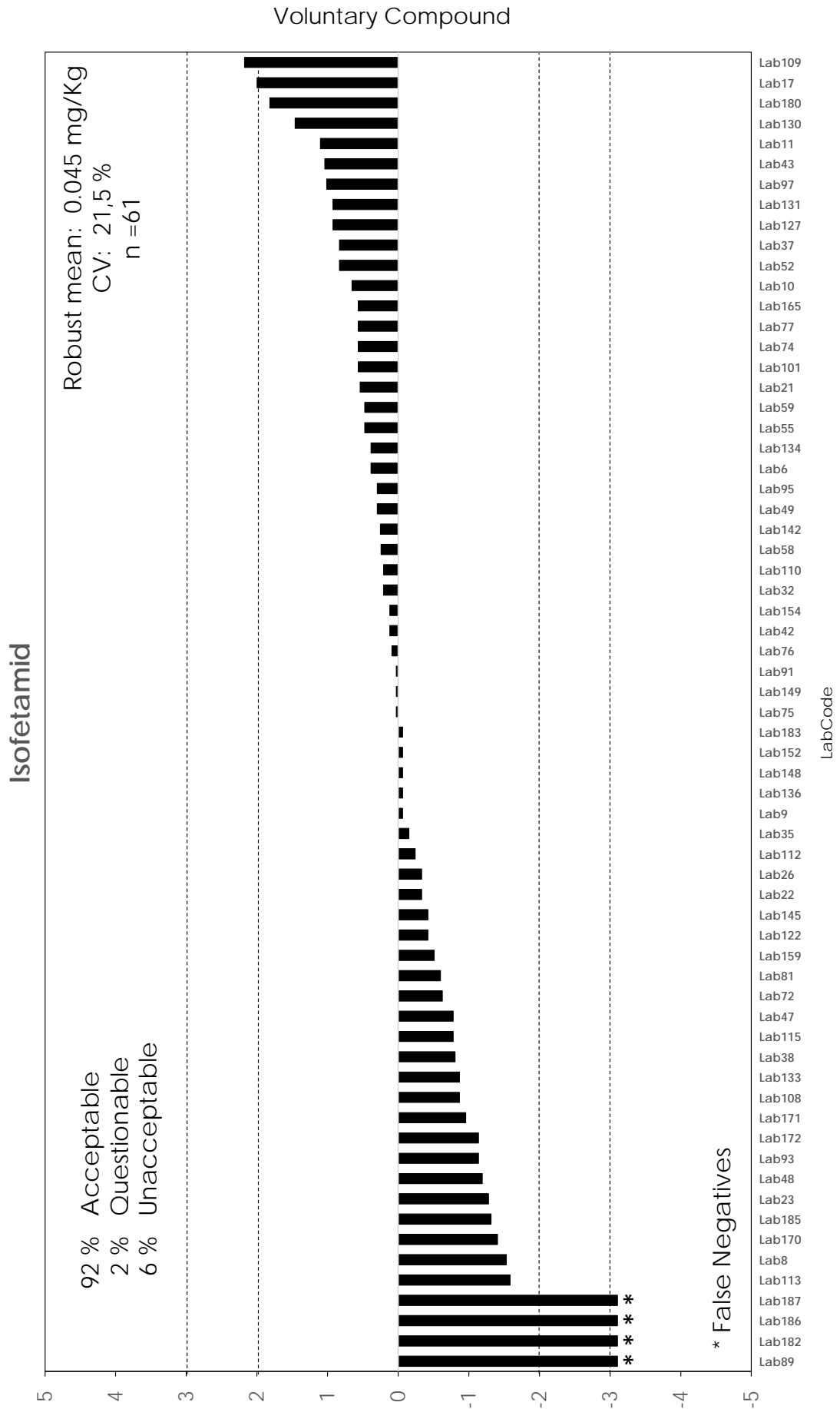


APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).





APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



APPENDIX 5. Average of the Squared z scores (AZ2) for laboratories in Category A.

Lab Code	Acetamiprid	Azoxystrobin	Buprofezin	Chlorfenvinphos	Chlorpyrifos	Deltamethrin (cis-deltamethrin)	Diazinon	Fenamiphos	Flonicamid	Fluopyram	Oxamyl	Oxydemeton- methyl	Procymidone	Propamocarb	Spinosad	Zoxamide	No. of detected pesticides	AZ ²
	z score																	
4	-1.1	3.5	4.7	5.0	3.8	5.0	1.7	1.5	-2.0	2.8	-3.6	-1.1	4.8	-0.4	0.5	5.0	16	11.3
5	-0.3	1.1	1.7	1.0	0.5	0.7	0.0	-0.7	-1.1	0.6	-0.4	-0.6	1.8	-0.2	-0.7	0.6	16	0.8
6	0.0	0.2	0.4	-3.5	0.0	1.3	0.5	0.3	-0.1	1.2	0.3	-0.2	-0.1	0.4	-0.4	4.2	15	2.1
8	-0.5	-1.0	-0.8	-1.3	-0.9	-1.3	-1.0	-1.2	-0.9	-1.1	-0.5	-0.7	-1.1	-0.6	-0.5	-1.8	16	1.0
9	-0.5	-0.1	-0.6	-0.3	-0.1	-0.2	-0.3	-0.2	-0.4	0.3	-0.5	-0.4	-0.2	-0.2	-0.1	-0.4	16	0.1
10	-0.1	1.1	0.8	1.2	0.4	1.8	1.0	0.9	-0.2	0.4	0.3	0.1	0.6	0.3	0.4	1.2	16	0.7
11	0.0	0.5	0.8	0.5	0.3	0.5	1.3	0.6	-0.1	1.2	0.0	-0.1	1.0	0.3	0.3	1.1	16	0.5
12	-0.3	-0.3	-0.7	-0.1	-0.4	-1.3	-0.3	-0.1	-0.2	-0.4	-0.3	0.0	-0.4	-0.3	0.0	-1.2	16	0.3
14	-0.8	5.0	4.7	5.0	5.0	5.0	5.0	1.2	-0.2	4.6	-2.4	-2.3	5.0	-0.4	3.3	5.0	16	15.2
17	-0.2	-0.3	0.4	0.1	0.1	-1.7	0.3	-0.3	2.1	2.0	-0.1	0.2	-0.1	0.7	-0.3	0.0	16	0.8
19	-0.2	0.4	0.6	1.9	2.7	-0.7	1.1	-0.5	0.3	0.0	0.2	0.1	1.4	-0.8	-0.2	0.8	16	1.1
21	-0.1	-1.4	-0.4	-0.3	-0.4	-0.9	-0.3	-0.2	0.6	-0.4	-1.4	-1.2	-0.6	-0.3	1.1	-0.6	16	0.6
23	0.2	-0.9	-0.7	-0.3	-0.8	-0.2	-0.8	-1.1	0.6	-0.8	0.6	0.1	-0.8	0.7	-1.2	-1.0	16	0.6
24	0.3	-0.5	0.6	0.0	0.2	-0.7	-0.3	0.2	0.3	0.3	-0.6	0.8	-0.3		-0.5	0.0	15	0.2
26	-0.3	-0.2	-0.9	-0.1	0.0	0.0	0.2	-0.4	-0.3	0.7	-0.1	0.0	-0.1	0.3	-0.8	-0.4	16	0.2
29	0.5	0.4	-0.1	-0.2	-0.3	1.0	0.0	0.7	0.6	0.1	0.1	0.0	-0.3	0.4	-0.1	-0.2	16	0.2
32	-1.2	-1.7	-1.4	0.1	-1.2	-0.6	-0.6	-1.3	-0.2	-2.1	-1.2	-1.8	-0.8	-1.4	-1.0	0.4	16	1.4
35	0.2	0.1	0.3	0.2	-0.6	-0.3	-0.7	1.2	0.3	-0.1	0.0	0.4	-0.6	-0.5	-0.5	0.2	16	0.2
36	-0.3	-0.1	-0.2	-0.6	-0.5	-1.4	-0.3	-0.4	-0.8	-0.5	-0.4	-0.2	-0.6	0.9	0.3	-2.3	16	0.7
37	-0.5	0.4	0.1	-0.8	0.1	0.3	-0.9	0.3	1.1	-0.8	0.0	-0.7	0.3	0.2	0.2	0.9	16	0.3
38	0.0	-0.7	-0.4	-0.3	-0.5	0.7	-0.4	0.0	0.4	-0.5	1.5	0.0	-1.0	-1.7	-0.6	-0.7	16	0.6
39	-0.1	1.1	0.7	0.4	1.4	4.6	2.1	0.1	0.4	-0.1	0.2	0.7	2.4	0.1	0.1	-0.2	16	2.2
40	0.2	-0.6	-0.1	-3.5	-0.4	-0.1	-0.5	-0.5	-0.1	0.3	1.4	0.0	-1.0	-2.1	-1.1	-0.2	15	1.4
41	0.2	-0.8	-0.8	-2.0	-1.1	-1.0	-1.5	-0.9	-1.0	-1.0	-0.3	-1.0	-1.4	-0.2	-0.5	-1.8	16	1.2
42	-0.7	-0.2	0.3	0.7	0.5	0.0	0.0	0.7	0.1	-0.3	-0.1	0.6	1.0	0.6	0.0	-0.3	16	0.2
43	0.7	-0.2	-0.3	0.4	0.6	0.5	0.1	1.0	0.5	1.4	1.0	0.8	-0.2	-0.1	-0.5	0.5	16	0.4
44	1.1	-0.5	1.1	-0.6	1.6	-3.5	3.6	2.6	-1.9	-2.1	-1.6	-1.8	-3.8	-0.4	-1.4	2.5	14	4.6
47	-0.5	-0.1	-0.5	0.1	-0.4	-1.2	1.4	-1.2	-0.6	0.5	-0.7	-0.8	0.2	-0.4	0.7	-1.0	16	0.6
48	-0.6	-1.4	-0.9	-1.3	-0.9	-0.9	-1.2	-1.1	-0.4	-0.7	-0.3	-0.3	-0.9	0.6	-1.5	-0.8	16	0.9
49	-0.7	0.3	0.4	0.6	0.1	0.5	0.7	0.7	0.0	0.2	-0.8	-0.6	0.2	-1.0	-0.5	1.0	16	0.4
50	0.1	0.3	0.4	0.1	0.5		0.2	-0.4	0.2	0.1	0.0	0.9	-0.3	0.5	0.0	0.0	15	0.1
51	-0.2	-0.4	-0.2	-0.2	0.2	0.4	-0.4	0.1	-0.5	-0.6	-0.3		-0.4	-0.8	-0.5	0.3	15	0.2
52	0.3	1.0	1.3	1.8	0.8	2.4	1.0	1.0	0.1	0.8	-0.1	0.1	1.5	0.4	0.2	2.1	16	1.4
54	0.1	-0.2	-0.7	-0.4	-0.3	0.3	-0.6	0.1	0.5	-0.8	-0.1	-0.3	-0.1	-0.4	0.3	-0.8	16	0.2
55	-0.5	-0.3	-0.2	0.3	0.4	-0.2	0.4	0.0	0.1	0.0	0.5	0.0	0.9	-0.5	-1.0	-0.3	16	0.2
58	0.3	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.2	-0.2	-0.5	0.2	0.1	-0.2	0.0	-0.4	16	0.0
59	-0.2	-0.3	0.1	0.3	0.4	0.8	0.0	-0.1	-0.2	-0.2	0.1	-0.3		-0.2	-0.7	-0.1	15	0.1
60	0.2	0.5	0.6	0.0	0.6	1.0	0.7	0.6	0.1	0.6	0.1	0.5	0.8	4.5	0.3	5.0	16	3.1
63	0.1	0.1	-1.1	-0.7	-0.9	-1.6	-0.4	-1.1	0.5	1.0	0.5	2.3	-0.6	0.2	0.8	-0.2	16	0.9
66	0.7	-0.2	-0.2	0.2	-0.3	0.9	-0.1	0.0	-1.2	0.3	1.7	-0.2	0.0	1.3	-0.1	-0.3	16	0.5
68	-0.3	-0.7	-0.7	-0.9	-0.8	-1.4	-0.7	-0.9	-0.4	-0.9	-0.7	-0.2	-1.5	-0.4	-2.1	-1.1	16	1.0
69	0.4	0.2	1.4	0.4	0.0	-0.2	0.2	0.4	-1.0	-0.4	0.3	-0.1	0.5	0.2	0.5	0.1	16	0.3
70	0.0	0.6	0.2	0.5	0.5	0.4	0.5	0.5	-0.3	0.8	0.2	0.1	0.6	0.1	0.0	2.4	16	0.5
71	-0.2	-0.4	-1.3	-0.9	-0.6	-1.3	-0.8	-0.5	-0.3	-0.9	-1.2	-0.7	-1.4	-1.6	0.3	-0.1	16	0.8
72	-0.6	-0.1	-0.3	-0.3	-0.2	-0.1	-0.5	-0.2	0.2	-0.3	0.0	-0.7	-1.6	-0.1	-0.2	-0.6	16	0.3
73	0.3	0.1	-0.8	-0.9	-0.4	0.7	-0.7	-0.2	0.2	-0.1	0.4	-1.1	-0.8	0.4	-0.1	0.3	16	0.3
74	0.8	0.5	0.5	0.0	0.0	-0.2	0.1	0.1	0.6	0.3	5.0	0.4	-0.1	0.8	0.3	0.8	16	1.8
75	0.2	0.3	0.2	0.6	0.4	1.5	0.3	0.2	0.5	0.1	0.2	0.1	0.1	0.8	0.5	0.1	16	0.3
76	-0.8	0.8	0.0	0.4	0.6	3.0	-0.2	-0.2	-0.7	-0.6	-0.2	-0.1	-0.1	-1.7	-0.1	0.0	16	0.9

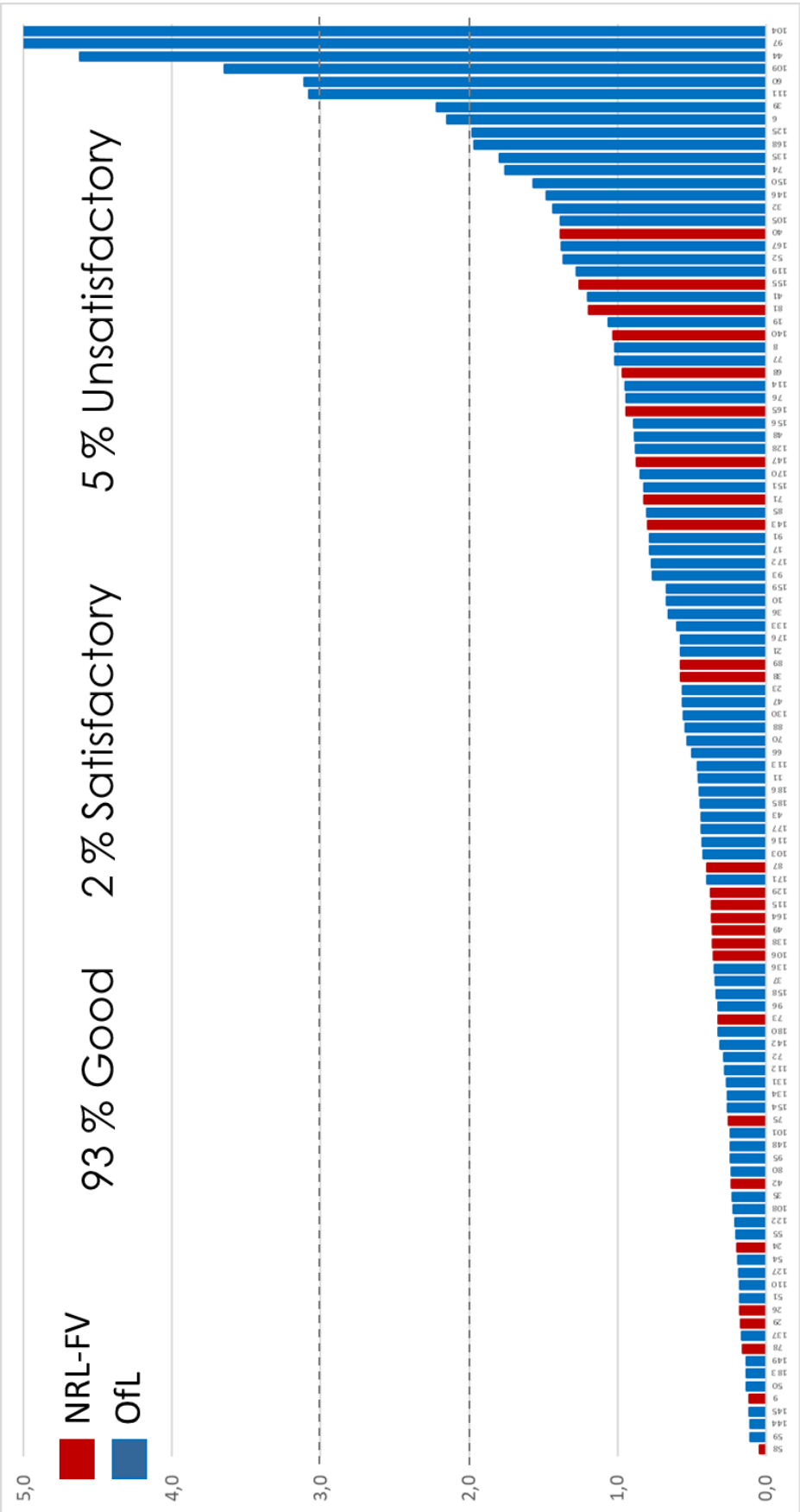
APPENDIX 5. Average of the Squared z scores (AZ²) for laboratories in Category A.

Lab Code	Acetamiprid	Azoxystrobin	Buprofezin	Chlorfenvinphos	Chlorpyrifos	Deltamethrin (cis-deltamethrin)	Diazinon	Fenamiphos	Fonicamid	Fluopyram	Oxamyl	Oxydemeton- methyl	Procymidone	Propamocarb	Spinosad	Zoxamide	No. of detected pesticides	AZ ²
	z score																	
77	0.4	0.2	0.2	-0.3	0.0	0.2	0.9	1.1	0.6	1.3	-0.4	0.2	-0.5	3.2	1.1	-0.3	16	1.0
78	0.8	0.1	0.3	-0.1	0.1	-0.1	-0.1	0.1	-0.1	0.4	0.2	0.4	0.0	-0.2	0.9	0.8	16	0.2
80	0.3	0.2	-0.8	0.2	0.6	-0.8	0.2	0.1	0.5	0.2	-0.1	0.1	-0.6	1.0	0.3	0.2	16	0.2
81	-0.2	2.8	-0.2	2.7	-0.2	1.4	0.8	-0.6	-0.6	-0.5	0.1	-0.5	-0.1	0.3	0.5	0.0	16	1.2
83	-1.1	-0.7	-0.2	0.0	-0.3	-0.6	-0.4	0.0	-1.0	0.2	0.0	0.6	0.1	-0.6	-0.1	-0.7	16	0.3
85	0.5	-0.5	-0.2	0.0	0.1	-0.6	-0.1	-1.0	0.3	-0.2	-0.6	-1.2	0.0	-2.8	-1.1	-0.2	16	0.8
87	-0.1	-0.1	-0.3	-0.3	0.5	0.5	-0.2	-0.3	0.3	-0.2	-0.4	0.0	-2.2	0.4	-0.3	-0.1	16	0.4
88	-0.4	-0.4	-1.0	-0.4	-0.2	-0.7	-0.2	0.0	-0.5	-0.3	-0.1	0.7	0.0	1.4	-0.6	-1.8	16	0.5
89	0.5	0.6	0.5	0.4	1.0	1.5	0.7	1.6	0.3	1.0	-0.1	0.1	0.7	0.0	0.6	0.3	16	0.6
91	-0.4	-0.2	0.7	1.0	1.0	0.1	0.9	-0.2	0.0	0.7	-0.6	-0.3	1.1	0.1	2.5	0.8	16	0.8
93	0.2	0.4	0.0	-0.1	-0.5	0.6	-0.2	0.0	-0.2	0.6	2.5	1.8	-0.3	-0.4	-0.8	-0.7	16	0.8
94	-0.4	0.1	-0.1	0.1	0.7	-0.2	-0.5	-0.6	-1.0	0.8	-0.6	0.4	-0.3	0.4	0.3	0.0	16	0.2
95	0.8	-0.8	0.5	-0.5	0.2	0.4	0.0	0.2	0.9	0.0	0.1	-0.4	-0.1	0.9	0.3	-0.1	16	0.2
96	-0.8	0.5	-0.5	-0.1	0.0	-0.8	0.0	-0.6	-0.5	-0.9	-0.1	0.1	-0.1	-0.7	-0.5	-1.0	16	0.3
97	0.8	2.3	0.9	2.2	0.3	3.3	1.0	3.7	0.5	1.7	1.2	5.0	5.0	0.2	0.9	2.0	16	6.0
98	0.3	0.8	1.1	0.8	0.7	-0.8	0.5	1.0	-0.6	0.7	0.5	-0.1	0.2			1.5	14	0.6
101	-0.1	0.6	0.5	0.5	0.6	0.7	0.6	0.6	-0.2	0.4	-0.2	-0.4	0.9	0.2	0.4	0.4	16	0.2
103	-0.9	0.1	-0.3	-0.3	0.1	0.4	-0.2	-1.0	-0.7	-0.8	-0.6	-1.1	-0.4	-0.8	-0.8	-0.8	16	0.4
104	5.0	0.4	1.3	0.5	-0.8	-3.2	0.6	0.3	2.4	0.8	5.0	3.2	-2.3	5.0	-2.1	0.8	16	7.2
105	1.7	2.2	-0.2	-1.2	2.0	1.5	-0.4	0.7	0.3	-0.3	1.5	1.7	-0.1	0.1	0.7	0.4	16	1.4
106	-0.1	-0.1	0.2	0.6	0.3	1.0	0.6	1.1	-0.2	0.2	-0.4	0.5	0.8	-0.4	-0.5	1.0	16	0.4
108	-0.3	-0.3	-0.1	-0.4	0.4	-0.8	0.7	0.0	0.5	-0.2	0.0	-0.3	0.1	-0.4	1.0	-1.1	16	0.2
109	-0.3	0.5	-0.2	-1.7	-1.9	-1.3	-1.5	-1.5	4.0	2.0	3.1	3.5	0.3	0.2	1.0	1.3	16	3.6
110	-0.2	-0.6	0.1	-0.2	0.1	-0.5	0.3	0.0	-0.1	-0.3	-0.7	0.5	-0.1	0.5	-0.9	-0.2	16	0.2
111	1.2	0.3	0.6	0.5	0.5	0.4	0.4	0.3	-0.5	0.0	1.8	0.8	0.4	-3.9	5.0	1.3	15	3.1
112	-0.2	-0.2	0.4	0.7	0.5	0.3	0.6	-0.5	-0.3	0.3	-0.3	0.3	1.2	0.0	-0.9	-0.2	16	0.3
113	-0.5	-0.5	0.1	-0.3	-0.1	0.2	-0.4	-0.8	-0.9	-1.7	-0.3	0.1	0.2	-0.8	-1.1	-0.5	16	0.5
114	-0.3	-0.4	-0.5	-0.5	-0.7	0.4	-0.5	-0.2	0.3	-0.8	0.6		0.8	-0.8	3.2	0.2	15	0.9
115	-0.6	-0.8	-0.6	-0.2	-0.6	-0.5	-0.2	-0.4	-1.0	-0.8	-0.6	0.6	-0.5	0.1	-0.6	-0.7	16	0.4
116	-0.3	-0.2	-0.2	-0.2	0.4	0.6	-0.6	0.0	-0.8	-0.3	-0.4	-0.7	0.1	-0.7	2.0	-0.3	16	0.4
119	0.4	-0.3	-0.4	-0.4	-0.4	2.9	-1.1	1.2	0.9	1.6	0.5	1.7	-0.1	1.0	0.0		15	1.3
122	0.8	0.4	-0.1	-0.2	0.1	0.2	-0.1	-1.1	0.5	0.4	0.3	0.1	-0.1	0.8	0.2	-0.3	16	0.2
125	0.1	-0.6	-0.3	-0.7	-1.1	0.1	-0.4	-0.6	-0.4	-0.9	-0.6	-0.6	-0.9	-0.2	5.0	-1.1	16	2.0
126	0.0	-0.8	-0.8	-1.6	-1.5	-1.4	-1.1	-1.2		-3.9	-1.0	-0.6	-1.3	-0.3	-0.6	-1.7	14	2.1
127	0.1	0.0	0.6	0.3	0.1	-0.1	0.4	0.5	0.0	0.6	-0.2	0.0	1.2	-0.2	-0.3	0.3	16	0.2
128	-0.2	-0.2	0.0	0.0	0.5	-0.6	0.2	0.5	0.0	-3.6	-0.2	0.5	0.1	0.0	0.0	0.3	16	0.9
129	-0.2	-0.5	-0.5	-0.2	0.0	-0.2	0.4	-0.3	-0.1	-0.5	-1.2	-0.5	-0.4	-0.7	1.5	0.5	16	0.4
130	0.2	0.5	0.4	0.8	-0.1	0.8	-0.1	0.6	-0.1	0.8	-0.2	-0.5	1.2	-1.1	-0.1	1.8	16	0.6
131	0.5	0.0	0.6	0.3	-0.1	0.2	0.4	1.2	-0.1	0.3	0.0	0.6	0.6	0.6	0.0	0.9	16	0.3
133	-1.0	-0.9	0.1	0.7	-0.4	-0.6	-0.8	0.0	-0.7	0.0	-1.3	-1.2	0.4	1.1	-0.9	-0.3	16	0.6
134	0.2	0.2	0.2	-0.3	0.0	-0.3	0.5	0.3	0.1	0.8	0.6	0.4	0.7	0.1	0.9	-1.0	16	0.3
135	1.0	0.8	1.5	-0.1	-1.8	-1.7	-1.3	0.2	0.5	0.3	1.6	3.5	0.0	0.3	0.6	1.0	16	1.8
136	0.2	0.0	-0.2	-0.7	-0.7	-1.6	-1.0	0.2	-0.3	-0.4	0.2	0.4	-0.4	-0.2	0.1	-0.5	16	0.3
137	0.3	0.1	0.0	0.7	0.2	1.0	0.3	0.4		0.0	0.2	-0.1	0.6	-0.1	0.4	0.2	15	0.2
138	1.1	0.5	0.5	0.3	0.7	0.1	0.1	0.8	-0.9	0.9	0.4	-0.7	0.6	0.5	0.3	0.2	16	0.4
140	0.2	-0.3	-0.3	0.0	-0.3	2.3	-0.6	-0.7	0.1	-0.6	2.8	-0.1	-0.8	0.2	-0.1	-1.0	16	1.0
142	0.0	0.0	0.3	-0.1	0.0	0.3	0.0	0.0	0.3	2.1	0.3	0.3	-0.1	0.1	0.4	0.1	16	0.3
143	1.5	0.2	-0.2	0.0	0.0	-1.8	0.2	0.2	1.7	-0.1	0.4	0.9	-1.1	1.4	0.3	0.0	16	0.8
144	0.1	0.2	0.3	0.5	0.1	-0.2	0.4	0.5	-0.2	0.1	0.0	0.2	0.7	0.1	-0.2	0.5	16	0.1
145	0.1	0.1	0.4	0.0	0.6	0.0	0.6	0.2	0.3	0.1	0.2	0.3	0.3	-0.3	0.0	-0.6	16	0.1
146	-0.1	0.0	0.6	0.7	0.6	-0.4	-0.8	0.5	-3.2	-0.1	1.2	0.1	0.5	-2.9	0.3	0.8	16	1.5
147	0.2	0.3	0.4	0.7	1.5	2.1	0.9	0.1	0.5	0.2	0.6	0.0	0.0	0.9	2.0	-0.5	16	0.9

APPENDIX 5. Average of the Squared z scores (AZ2) for laboratories in Category A.

Lab Code	Acetamiprid	Azoxystrobin	Buprofezin	Chlorfenvinphos	Chlorpyrifos	Deltamethrin (cis-deltamethrin)	Diazinon	Fenamiphos	Fonicamid	Fluopyram	Oxamyl	Oxydemeton- methyl	Procymidone	Propamocarb	Spinosad	Zoxamide	No. of detected pesticides	AZ ²
	z score																	
148	0.2	0.1	-0.3	-0.4	-0.8	-1.0	0.0	-0.2	0.5	-0.3	-1.1	-0.1	-0.4	-0.3	0.3	-0.3	16	0.2
149	0.0	-0.2	0.0	0.0	-0.5	-0.4	-0.1	-0.8	-0.3	0.4	-0.1	0.1	0.4	0.2	0.6	-0.5	16	0.1
150	-3.2	-0.2	0.0	-0.2	0.0	-0.2	-0.3	-0.1	0.6	-0.3	-3.5	0.8	0.7	0.5	-0.1	-0.4	14	1.6
151	-0.6	1.1	0.9	1.3	0.1	1.0	0.6	1.3	-0.2	0.5	0.4	-1.6	1.3	0.5	1.1	0.2	16	0.8
154	-0.9	-0.3	-0.2	0.1	0.6	0.0	-0.2	-0.1	0.4	-0.3	-1.0		0.6	0.8	-0.4	-0.3	15	0.3
155	0.7	0.7	1.5	1.0	-0.1	0.3	0.1	0.7	-0.5	0.5	0.3	0.4	1.8	0.4	0.3	3.4	16	1.3
156	-0.2	0.1	0.3	0.3	-0.6	2.9	0.6	0.2	1.3	0.5	-0.2	-0.3	0.3	-1.1	-0.5	1.2	16	0.9
158	0.5	-0.1	-0.3	-0.9	-0.7	-1.1	0.0	-0.3	0.3	-0.1	0.5	0.2	-0.8	0.8	-0.6	-0.7	16	0.3
159	0.0	-0.3	-0.3	0.0	-0.3	-1.6	-0.1	-2.0	0.5	-0.1	0.9	-0.8	-0.6	0.6	0.7	-1.1	16	0.7
164	-0.3	-0.3	0.0	-0.3	0.2	2.0	-0.6	-0.6	-0.2	-0.4	-0.1	0.1	-0.6	-0.1	-0.5	-0.5	16	0.4
165	-0.2	2.3	0.9	0.5	0.8	1.5	-0.4	0.7	0.0	0.5	0.6	0.7	0.5	1.3	0.8	1.2	16	0.9
167	-0.3	-0.1	-0.7	0.0	0.2	0.5	0.8	-0.2	0.1	0.0	-1.0	0.2	-3.8	-0.5	1.8	-1.4	15	1.4
168	-0.4	-0.4	-1.7	-1.6	-2.5	-2.7	-1.4	0.0	0.1	-2.3	0.9	0.4	-1.3	0.8	1.2	-0.3	16	2.0
170	-0.5	-0.7	-1.2	-1.2	-0.9	-0.9	-1.1	-1.2	-0.1	-0.9	-0.2	0.0	-1.3	-0.4	-0.1	-1.7	16	0.8
171	0.3	-0.4	-0.4	0.7	0.4	0.4	-0.1	0.2	0.0	-0.1	0.5	1.6	-0.2	0.8	1.2	-0.4	16	0.4
172	-0.2	-0.9	-1.0	-1.1	-1.1	-1.0	0.7	-0.9	0.5	-1.0	-0.3	0.2	-1.2	-0.2	-0.9	-1.5	16	0.8
173	0.5	0.0	0.0	-0.9	-0.9	-0.1	-0.8	-0.9	3.7	-0.6	-0.2	0.7	-1.5	0.9	-0.1	-0.9	16	1.4
176	0.2	0.6	0.8	1.2	0.7	1.0	0.9	0.9	0.0	0.0	0.1	-0.2	1.7	-0.3	0.3	0.7	16	0.6
177	0.3	0.2	0.3	0.6	-0.5	-0.7	0.1	0.0	2.1	0.6	0.3	0.1	-0.1	-0.5	0.1	0.8	16	0.4
180	-0.3	0.3	0.0	-0.2	-0.3	0.4	-0.2	0.0	-0.8	0.0	0.0	0.2	-0.1	1.9	0.5	0.0	16	0.3
183	-0.1	0.3	0.4	0.4	0.5	0.5	-0.1	0.2	0.0	0.3	0.2	0.7	-0.3	0.3	0.5	0.0	16	0.1
184	0.5	1.0	0.7	-0.1	-0.3	0.3	-0.2	-3.3	0.1	1.2	-0.1	0.0	1.7	-3.9	2.8	0.8	14	2.6
185	0.5	-0.6	-0.8	-0.9	-0.6	0.3	-0.8	-0.2	-0.8	-0.9	-0.8	-0.3	-0.1	-1.0	-0.7	-0.5	16	0.4
186	0.5	-0.4	0.2	-0.2	0.2	0.6	-1.4	-1.4	-1.2	-0.5	0.1	0.1	0.1	-0.2	-0.5	-0.5	16	0.4

APPENDIX 6. EUPT-FV-23 AZ² graphical representation for EU/EFTA laboratories in Category A.



GENERAL PROTOCOL

for EU Proficiency Tests on Pesticide Residues in Food and Feed

Introduction

This protocol contains general procedures valid for all European Union Proficiency Tests (EUPTs) organised on behalf of the European Commission, DG-SANTE⁵ by the four European Union Reference Laboratories (EURLs) responsible for pesticide residues in food and feed. These EUPTs are directed at laboratories belonging to the Network⁶ of National Reference Laboratories (NRLs) and Official Laboratories (OfLs) of the EU Member States. OfLs from EFTA countries and EU-Candidate countries are also welcome to participate in the EUPTs. OfLs from Third countries may be permitted to participate on a case-by-case basis.

The following four EURLs for pesticide residues were appointed by DG-SANTE based on regulation 882/2004/EC that was repealed by regulation 625/2017/EC⁷:

- EURL for Fruits and Vegetables (EURL-FV),
- EURL for Cereals and Feedingstuffs (EURL-CF),
- EURL for Food of Animal Origin and Commodities with High Fat Content (EURL-AO) and
- EURL for pesticides requiring Single Residue Methods (EURL-SRM).

The aim of these EUPTs is to obtain information regarding the quality, accuracy and comparability of pesticide residue data in food and feed reported to the European Union within the framework of the national control programmes and the EU multiannual co-ordinated control programme⁸. Participating laboratories will be provided with an assessment of their analytical performance that they can use to demonstrate their analytical performance and compare themselves with other participating laboratories.

EUPT-Organisers and Scientific Committee

EUPTs are organised by individual EURLs, or by more than one EURL, in collaboration.

An **Organising Team** (in the following named Organisers) is appointed by the EURL(s) in charge. This team is responsible for all administrative and technical matters concerning the organisation of the PT, e.g. the PT-announcement, the production of the PT-material (Test Item), the undertaking of homogeneity and stability tests, the packing and shipment of the PT-materials, the handling and evaluation of the results and method information submitted by the participants, the drafting of the preliminary and final reports as well as generation and distribution of EUPT-participation certificates.

To complement the internal expertise of the EURLs, a group of external consultants forming the **EUPT-Scientific Committee** (EUPT-SC)⁹ has been established and approved by DG-SANTE. The EUPT-SC consists of expert scientists with many years of experience in PTs and/or pesticide residue analysis. The actual composition of the EUPT-SC and the affiliation of each of its members is shown on the EURL-Website. The members of the EUPT-SC are also listed in the Specific Protocol and the Final Report of each EUPT.

The EUPT-SC is made up of the following two subgroups:

- a) An independent **Quality Control Group** (EUPT-QCG) and
- b) An **Advisory Group** (EUPT-AG).

The EUPT-SC's role is to help the Organisers make decisions regarding the EUPT design: the selection of the commodity, the selection of pesticides to be included in the Target Pesticide List (see below), the establishment of the Minimum Required Reporting Levels (MRRLs), the statistical treatment and evaluation of the participants' results (in anonymous form), and the drafting and updating of documents, such as the General and Specific PT Protocols and the Final EUPT-Reports.

The EUPT-QCG has the additional function of supervising the quality of EUPTs and of assisting the EURLs in confidential aspects such as the choice of the pesticides to be present in the Test Item and the approximate concentrations at which they should be present.

The EUPT-SC typically meets once a year, after the EUPTs of all four pesticide EURLs have been conducted, to discuss the evaluation of the EUPT-results and to assist the EURLs in their decision making. Upcoming EUPTs are also planned during these meetings.

⁵ DG-SANTE = European Commission, Health and Food Safety Directorate-General

⁶ For more information about the EURL/NRL/OfL-Network please refer to the EURL-Web-portal under: "<http://www.eurl-pesticides.eu>"

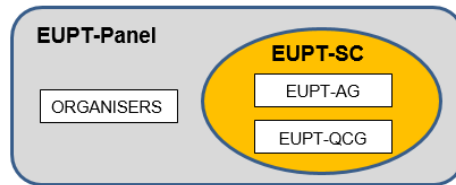
⁷ Regulation (EU) 2017/625 of the European Parliament and of the Council on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products. Published at OJ of the EU L95 of 07.04.2017

⁸ European Commission Proficiency Tests for Pesticide Residues in Fruits and Vegetables, Trends in Analytical Chemistry, 2010, 29 (1), 70 – 83.

⁹ Link to the List of current members of the EUPT Scientific Committee:
<http://www.eurl-pesticides.eu/library/docs/allcrl/EUPT-SC.pdf>

ANNEX A. Protocols and Target lists of pesticides to be sought.

The EUPT-Organising Team and the EUPT-SC together form the **EUPT-Panel**.



The decisions of the EUPT-Panel will be documented.

This present EUPT General Protocol was jointly drafted by the EUPT-SC and the EURLs.

EUPT Participants

Within the European Union all NRLs operating in the same area as the organising EURL, as well as all OfLs whose scope overlaps with that of the EUPT, are legally obliged to participate in EUPTs. The legal obligation of NRLs and OfLs to participate in EUPTs arises from:

- Art 38 (b) of Reg. 625/2017/EC and Art. 28 of Reg. 396/2005/EC¹⁰ (for all OfLs analysing for pesticide residues within the framework of official controls¹¹ of food or feed)
- Art. 101 (1)(a) of Reg. 625/2017/EC (for all NRLs)

The four EURLs will annually issue and distribute, via the EURL-website, a joint list of all OfLs that must participate in each of the EUPTs to be conducted within a given year. The list of obliged labs will be updated every year to take account of any changes in the lab profiles. Interim updates will be issued to eliminate any possible errors. NRLs are responsible for checking whether all relevant OfLs within their network are included in the list of obligated laboratories with their actual commodity-scopes and contact information.

OfLs are furthermore urged to keep their own profiles within the EURL-DataPool up-to-date, especially their commodity and pesticide scopes and their contact information.

Labs that are obliged to participate in a given EUPT, and that are not able to participate, must provide the reasons for their non-participation. This also applies to any participating laboratories that fail to report results.

OfLs not paying the EUPT sample delivery fee will be initially warned that their participation in subsequent EUPTs could be denied. In case of a repetitive non-payment, the EUPT organisers will inform the corresponding NRL to take action.

Confidentiality and Communication

The proprietor of all EUPT data is DG-SANTE and as such has access to all information.

For each EUPT, the laboratories are given a unique code (lab code), initially only known to themselves and the Organisers. In the final EUPT-Report, the names of participating laboratories will not be linked to their laboratory codes. It should be noted, however, that the Organisers, at the request by DG-SANTE, may present the EUPT-results on a country-by-country basis. It may therefore be possible that a link between codes and laboratories could be made, especially for those countries where only one laboratory has participated. Furthermore, the EURLs reserve the right to share EUPT results and codes amongst themselves: for example, for the purpose of evaluating overall lab or country performance as requested by DG-SANTE.

As laid down in Regulation 625/2017/EC, NRLs are responsible for evaluating and improving their own OfL-Network. On request from the NRLs, the EURLs will provide them with the PT-codes of the participating OfLs belonging to their OfL-Network. This will allow NRLs to follow the participation and performance of the laboratories within their network.

Communication between participating laboratories during the test, on matters concerning a PT exercise, is not permitted from the start of the PT exercise until the distribution of the preliminary report.

For each EUPT the organising EURL prepares a specific EUPT-Website where all PT-relevant documents in their latest version are linked. In case of important modifications on any of these documents, the participating laboratories will be informed via e-mail. In any case, as soon as the PT-period starts the participants are encouraged to visit the particular EUPT-Website, to make sure that they are using the latest versions of all PT-relevant documents.

The official language used in all EUPTs is English.

Announcement / Invitation Letter

At least 3 months before the distribution of the Test Item the EURLs will publish an Announcement/Invitation letter on the EURL-web-portal and distribute it via e-mail to the NRL/OfL mailing list available to the EURLs. This letter will inform about the commodity to be used as Test Item, as well as links to the tentative EUPT-Target Pesticide List and the tentative EUPT-Calendar.

Target Pesticide List

This list contains all analytes (pesticides and metabolites) to be sought for, along with the Minimum Required Reporting Levels (MRRs) valid for the specific EUPT. The MRRs are typically based upon the lowest MRLs found either in Regulation 396/2005/EC or Commission Directive 2006/125/EC (Baby Food Directive).

¹⁰ Regulation (EC) No 396/2005, published at OJ of the EU L70 of 16.03.2005, as last amended by Regulation 839/2008 published at OJ of the EU L234 of 30.08.2008.

¹¹ Official controls in the sense of Reg. 625/2017/EC. This includes labs involved in controls within the framework of national and/or EU-controlled programmes as well as labs involved in import controls according to Regulation 669/2009/EC.

ANNEX A. Protocols and Target lists of pesticides to be sought.

Labs must express their results as stated in the Target Pesticides List.

Specific Protocol

For each EUPT the organizing EURL will publish a Specific Protocol at least 2 weeks before the Test Item is distributed to the participating laboratories. The Specific Protocol will contain all the information previously included in the Invitation Letter but in its final version, information on payment and delivery, instructions on how to handle the Test Item upon receipt and on how to submit results, as well as any other relevant information.

Homogeneity of the Test Item

The Test Item will be tested for homogeneity typically before distribution to participants. The homogeneity tests usually involve the analysis of two replicate analytical portions, taken from at least ten randomly chosen units of treated Test Item. Both, sample preparation and measurements should be conducted in random order. The homogeneity test data are statistically evaluated according to ISO 13528, Annex B or to the International Harmonized Protocols jointly published by ISO, AOAC and IUPAC. The results of all homogeneity tests are presented to the EUPT-SC. In special cases, where the above homogeneity test criteria are not met, the EUPT-Panel, considering all relevant aspects (e.g. the homogeneity results of other pesticides spiked at the same time, the overall distribution of the participants' results (CV*), the analytical difficulties faced during the test, knowledge of the analytical behaviour of the pesticide question), may decide to overrule the test. The reasons of this overruling have to be transparently explained in the Final EUPT-Report. For certain analytes with comparable properties, an equivalent distribution within the sample can be expected if they were spiked/used at simultaneously. The homogeneity test, of one or more of these analytes, may thus be skipped or simplified. If, however, the distribution of participants' results for an analyte that was not or not fully tested for homogeneity, is found to be atypically broad, compared to the tested analytes, the EUPT-SC may decide that a homogeneity test should be performed *a posteriori* by the EURL.

Stability of the analytes contained in the Test Item

The Test Items will also be tested for stability - according to ISO 13528, Annex B. The time delay between the first and the last stability test must exceed the period of the EUPT-exercise. Typically the first analysis is carried out shortly before the shipment of the Test Items and the last one shortly after the deadline for submission of results. To better recognise trends and gain additional certainty one or more additional tests may be conducted by the Organisers. At least 6 sub-samples (analytical portions) should be analysed on each test day (e.g. 2 analytical portions withdrawn from three randomly chosen containers OR 6 portions withdrawn from a single container). In principle all pesticides contained in the Test Item should be checked for stability. However, in individual cases, where sufficient knowledge exists that the stability of a certain analyte is very unlikely to be significantly affected during storage (e.g. based on experience from past stability tests or knowledge of its physicochemical properties), the Organisers, after consultation with the EUPT-QCG, may decide to omit a specific stability test. The EUPT-Panel will finally decide whether analytes for which the stability test was not undertaken will be included in the Final EUPT-Report, considering all relevant aspects such as the distribution of the participant's results (CV*).

A pesticide is considered to be adequately stable if $|y_i - y| \leq 0.3 \times \sigma_{pi}$, with y_i being the mean value of the results of the last phase of the stability test, y being the mean value of the results of the first phase of the stability test and σ_{pi} being the standard deviation used for proficiency assessment (typically 25 % of the assigned value).

The results of all stability tests are presented to the EUPT-SC. In special cases where the above stability test criteria are not met, the EUPT-SC considering all relevant aspects (e.g. the past experience with the stability of the compound, the overall distribution the participants' results, the measurement variability, analytical difficulties faced during the test and knowledge about the analytical behaviour of the pesticide question) may decide to overrule the test. The reasons of this overruling will be transparently explained in the Final EUPT-Report.

The Organisers may also decide to conduct additional stability tests at different storage conditions than those recommended to the participants e.g. at ambient temperature.

Stability during shipment: Considering knowledge about the expected susceptibility of pesticides in the Test Item to possible losses, the Organisers will choose the shipment conditions to be such that pesticide losses are minimised (e.g. shipment of frozen samples, addition of dry ice). As shipment time can differ between labs/countries it is recommended that the Organisers keep track of the shipment duration and then decide whether it is reasonable to conduct additional stability tests at conditions simulating shipment. Should critical losses be detected for certain pesticides, the EUPT-SC will be informed (or the EUPT-QCG before or during the test). Case-by-case decisions may be taken by the EUPT-Panel considering all relevant aspects including the duration and conditions of the shipment to the laboratory as well as the feedback by the laboratory.

Methodologies to be used by the participants

Participating laboratories are instructed to use the analytical procedure(s) that they would routinely employ in official control activities (monitoring etc.). Where an analytical method has not yet been established routinely this should be stated.

General procedures for reporting results

Participating laboratories are responsible for reporting their own quantitative results to the Organiser within the stipulated deadline. Any pesticide that was targeted by a participating laboratory should be reported as "analysed". Each laboratory will be able to report only one result for each analyte detected in the Test Item. The concentrations of the pesticides detected should be expressed in 'mg/kg' unless indicated otherwise in the specific protocol. Laboratories should not report results below their reporting limits.

ANNEX A. Protocols and Target lists of pesticides to be sought.

Correction of results for recovery

Correction of results for recovery is recommended if the average recovery rate significantly deviates from 100 % (typically if outside the 80–120% range). Approaches for recovery correction explicitly stated in the DG-SANTE document are

- a) the use of recovery correction factors,
- b) the use of stable isotope labelled analogues of the target analytes as Internal Standards (ILISs),
- c) the 'procedural calibration' approach as well as
- d) the approach of 'standard addition' with additions of analyte(s) being made to analytical portions.

Results may be corrected for recovery only in cases where this correction is applied in routine practice (including cases of MRL-violations). Laboratories are required to report whether their results were adjusted for recovery and, if a recovery factor was used, the recovery rate (in percentage) must also be reported. If one or more of the approaches b), c) and d) were employed, in which correction for recovery is inherent to the procedures, the apparent recovery figures obtained during validation experiments are not mandatory, and the approached followed are to be reported in the appropriate fields within the data submission tool.

Methodology information

All laboratories are requested to provide information on the analytical method(s) they have used. A compilation of the methodology information submitted by all participants is presented in an Annex of the Final EUPT-Report or in a separate report. Where necessary the methods are evaluated and discussed, especially in those cases where the result distribution is not unimodal or very broad (e.g. $CV^* > 35\%$). If no sufficient information on the methodology used is provided, the Organisers reserve the right not to accept the analytical results reported by the participants concerned or even refuse participation in the following PT.

Results evaluation

The procedures used for the treatment and assessment of results are described below.

– False Positive results

These are results of pesticides from the Target Pesticides List, that are reported, at or above, their respective MRRL although they were: (i) not detected by the Organiser, even after repeated analyses, and/or (ii) not detected by the overwhelming majority (e.g. $> 95\%$) of the participating laboratories that had targeted the specific pesticides. In certain instances, case-by-case decisions by the EUPT-Panel may be necessary.

Any results reported lower than the MRRL will not be considered as false positives, even though these results should not have been reported.

– False Negative results

These are results for pesticides reported by the laboratories as 'analysed' but without reporting numerical values although they were: a) used by the Organiser to treat the Test Item and b) detected by the Organiser as well as the majority of the participants that had targeted these specific pesticides at or above the respective MRRLs. Results reported as ' $< RL$ ' ($RL =$ Reporting Limit of the laboratory) will be considered as not detected and will be judged as false negatives. In certain instances, case-by-case decisions by the EUPT-Panel may be necessary. In cases of the assigned value being less than a factor of 3 times the MRRL, false negatives will typically not be assigned. The EUPT-Panel may decide to take case-by-case decisions in this respect after considering all relevant factors such as the result distribution and the reporting limits of the affected labs.

– Estimation of the assigned value (x_{pt})

In order to minimise the influence of out-lying results on the statistical evaluation, the assigned value x_{pt} (= consensus concentration) will typically be estimated using the robust estimate of the participant's mean (x^*) as described in ISO 13528:2015¹², taking into account the results reported by EU and EFTA countries laboratories only. In special justifiable cases, the EUPT-Panel may decide to eliminate certain results traceably associated with gross errors (see "Omission or Exclusion of results" below) or to use only the results of a subgroup consisting of laboratories that have repeatedly demonstrated good performance for the specific or similar compounds in the past.

– Omission or Exclusion of results

Before estimating the assigned value, results associated with obvious mistakes have to be examined to decide whether they should be removed from the population. Such gross errors may include incorrect recording (e.g. due to transcription errors by the participant, decimal point faults or transposed digits, incorrect unit), calculation errors (e.g. missing factors), analysis of a wrong sample/extract (e.g. a spiked blank), use of wrong concentrations of standard solutions, incorrect data processing (e.g. integration of wrong peak), inappropriate storage or transport conditions (in case of susceptible compounds), and the use of inappropriate analytical steps or procedures that demonstrably lead to significantly biased results (e.g. employing inappropriate internal standards or analytical steps or conditions leading to considerable losses, due to degradations, adsorptions, incomplete extractions, partitioning etc.). Where the Organisers (e.g. after the publication of the preliminary report) receive information of such gross errors, having a significant impact on a generated result, the affected results will be examined on a case-by-case basis to decide whether, or not, they should be excluded from the

¹² DIN ISO 13528:2015, Statistical methods for use in proficiency testing by interlaboratory comparisons, International Organization for Standardization. Therein a specific robust method for determination of the consensus mean and standard deviation without the need for removal of deviating results is described (Algorithm A in Annex C).

ANNEX A. Protocols and Target lists of pesticides to be sought.

population used for robust statistics. Results may also be omitted e.g. if an inappropriate method has been used even if they are not outliers. All decisions to omit/exclude results will be discussed with the EUPT-SC and the reasoning for the omission of each result clearly stated in the Final EUPT-Report. However, z scores will be calculated for all results irrespective of the fact that they were omitted from the calculation of the assigned value.

Omitted results might be interesting as they might give indications about possible source(s) of errors. The Organisers will thus ask the relevant lab(s) to provide feedback on possible sources of errors (see also "follow-up activities").

Results reported by laboratories from non EU member states are typically excluded from the population that is used to derive the assigned value (see also "Estimation of the assigned value").

Uncertainty of the assigned value

The uncertainty of the assigned values $u(x_{pt})$ is calculated according to ISO 13528:2015 as:

$$u(x_{pt}) = 1,25 \times \frac{s^*}{\sqrt{p}}$$

where s^* is the robust standard deviation and p is the number of results.

In certain cases, and considering all relevant factors (e.g. the result distribution, multimodality, the number of submitted results, information regarding analyte homogeneity/stability, information regarding the use of methodologies that might produce a bias that were used by the participants), the EUPT-Panel may consider the assigned value of a specific analyte to be too uncertain and decide that the results should not be evaluated, or only evaluated for informative purposes. The provisions of ISO 13528:2015 concerning the uncertainty of the assigned value will be taken into account.

– Standard deviation of the assigned value (target standard deviation)

The target standard deviation of the assigned value ($FFP-\sigma_{pt}$) will be calculated using a Fit-For-Purpose approach with a fixed Relative Standard Deviation (FFP-RSD).

Based on experience from previous EUPTs¹³, a percentage FFP-RSD of 25 % is currently used for all analyte-matrix combination, with the target standard deviation being calculated as follows:

$$FFP-\sigma_{pt} = 0.25 \times x_{pt}$$

The EUPT-Panel reserves the right to also employ other FFP-RSDs or other approaches for setting the assigned value on a case-by-case basis, considering analytical difficulties and experience gained from previous proficiency tests.

For informative purposes the robust relative standard deviation (CV^*) of the participants results is calculated according to ISO 13528:2015; Chapter 7.7 following Algorithm A in Annex C (so called "consensus approach").

– z scores

This parameter is calculated using the following formula:

$$z_i = \frac{(x_i - x_{pt})}{FFP-\sigma_{pt}}$$

where x_i is the value reported by the laboratory, x_{pt} is the assigned value, and $FFP-\sigma_{pt}$ is the standard deviation using the FFP approach. Z scores will be rounded to one decimal place. For the calculation of combined z scores (see below) the original z scores will be used and the combined z-scores will be rounded to one decimal place after calculation.

Any z scores > 5 will be typically reported as '> 5' and a value of '5' will be used to calculate combined z scores (see below).

Z scores will be interpreted in the following way, as is set in the ISO 17043:2010¹⁴:

$ z \leq 2.0$	Acceptable
$2.0 < z < 3.0$	Questionable
$ z \geq 3.0$	Unacceptable

For results considered as false negatives, z scores will be calculated using the MRRL or RL (the laboratory's Reporting Limit) if $RL < MRRL$. Where, using this approach, the calculated z scores for false negatives are > -3 (still questionable), they will be fixed at -3.5 to underline that these are unacceptable results. These z-scores will typically appear in the z-score histograms and used in the calculation of combined z-scores.

– Collection of measurement uncertainty (MU) figures

The participating labs will be asked to report the MU figure they would routinely report with each EUPT result. The EUPT-Panel will decide whether and how to evaluate these figures and whether indications will be made to the laboratories in this respect.

– Category classification

The EUPT-Panel will decide if and how to classify the laboratories into categories based on their scope and/or performance. Currently a scope-based classification into Category A and Category B is employed.

¹³ Comparative Study of the Main Top-down Approaches for the Estimation of Measurement Uncertainty in Multiresidue Analysis of Pesticides in Fruits and Vegetables. J. Agric. Food Chem., 2011, 59(14), 7609-7619.

¹⁴ ISO/IEC 17043:2010. Conformity assessment – General requirements for proficiency testing

ANNEX A. Protocols and Target lists of pesticides to be sought.

Laboratories that a) are able to analyse at least 90% of the compulsory pesticides in the target pesticides list, b) have correctly detected and quantified a sufficiently high percentage of the pesticides present in the Test Item (at least 90 %) and c) reported no false positives, will have demonstrated 'sufficient scope' and will be therefore classified into Category A. For the 90% criterion the number of pesticides needed to be correctly analysed to have sufficient scope will be calculated by multiplying the number of compulsory pesticides from the Target Pesticides List by 0.9 and rounding to the nearest full number with 0.5 decimals being rounded downwards (see some examples in Table 1).

Table 1. No. of pesticides from the Target Pesticides List needed to be targeted or pesticides present in the Test Item that need to be correctly detected and quantified to have sufficient scope.

No. of compulsory pesticides present in the Test Item / Target Pesticides List (N)	90 %	No. of pesticides needed to be correctly detected and quantified / targeted to have sufficient scope (n)	n
3	2.7	3	N
4	3.6	4	
5	4.5	4	N - 1
6	5.4	5	
7	6.3	6	
8	7.2	7	
9	8.1	8	
10	9.0	9	
11	9.9	10	
12	10.8	11	
13	11.7	12	
14	12.6	13	
15	13.5	13	N - 2
16	14.4	14	
17	15.3	15	
18	16.2	16	
19	17.1	17	
20	18	18	
21	18.9	19	
22	19.8	20	
23	20.7	21	
24	21.6	22	
25	22.5	22	N - 3
26	23.4	23	

The EUPT-Panel reserves the right to develop and apply alternative classification rules.

– Overall performance of laboratories - combined z scores

For evaluation of the overall performance of laboratories within Category A, the Average of the Squared z score (AZ²)^{15,16} (see below) will be used. The AZ² is calculated as follows:

$$AZ^2 = \frac{\sum_{i=1}^n z_i^2}{n}$$

Where n is the number of z scores to be considered in the calculation. In the calculation of the AZ², z scores higher than 5 will be set as 5. Based on the AZ² achieved, the laboratories are classified as follows:

AZ ² ≤ 2.0	Good
2.0 < AZ ² < 3.0	Satisfactory
AZ ² ≥ 3.0	Unsatisfactory

Combined z scores are considered to be of lesser importance than individual z scores. The EUPT-Panel retains the right not to calculate AZ² if it is considered as not being useful or if the number of results reported by any participant is considered to be too low.

In the case of EUPT-SRMs, where only a few results per lab may be available, the Average of the Absolute z scores (AAZ) may be calculated for informative purposes, but only for labs that have reported enough results

¹⁵ Formerly named "Sum of squared z scores (SZ²)"

¹⁶ Laboratory assessment by combined z score values in proficiency tests: experience gained through the EUPT for pesticide residues in fruits and vegetables. Anal. Bioanal. Chem., 2010, 397, 3061–3070.

ANNEX A. Protocols and Target lists of pesticides to be sought.

to obtain 5 or more z scores. For the calculation of the AAZ, z scores higher than 5 will also be set as 5. The z-scores appointed to false negatives will be also included in the calculation of the combined z-scores. Laboratories within Category B will be typically ranked according to the total number of pesticides they correctly reported to be present in the Test Item. The number of acceptable z scores achieved will be presented, too. The EURL-Panel retains the right to calculate combined z scores (see above) also for labs within Category B, e.g. for informative purposes, provided that a minimum number of results (z scores) have been reported.

Publication of results

The EURLs will publish a preliminary report, containing tentative assigned values and z score values for all pesticides present in the Test Item, within 2 months of the deadline for result submission.

The Final EUPT-Report will be published after the EUPT-Panel has discussed the results. Taking into account that the EUPT-Panel meets normally only once a year (typically in late summer or autumn) to discuss the results of all EUPTs organised by the EURLs earlier in the year, the Final EUPT-Report may be published up to 10 months after the deadline for results submission. Results submitted by non-EU/EFTA laboratories might not always be used in the tables or figures in the Final EUPT-Report.

Certificates of participation

Together with the Final EUPT-Report, the EURL Organiser will deliver a Certificate of Participation to each participating laboratory showing the z scores achieved for each individual pesticide, the combined z scores calculated (if any), and the classification into Categories.

Feedback

At any time before, during or after the PT participants have the possibility to contact the Organisers and make suggestions or indicate errors. After the distribution of the Final EUPT-Report, participating laboratories will be given the opportunity to give their feedback to the Organisers and make suggestions for future improvements.

Correction of errors

Should errors be discovered in any of the documents issued prior to the EUPT (Calendar, Target Pesticides List, Specific Protocol, General Protocol) the corrected documents will be uploaded onto the website and in the case of substantial errors the participants will be informed. **Before starting the exercise, participants should make sure to download the latest version of these documents.**

If substantial errors are discovered in the Preliminary EUPT-Report the Organisers will distribute a new corrected version, where it will be stated that the previous version is no longer valid.

Where substantial errors are discovered in the Final EUPT-Report the EUPT-Panel will decide whether a corrigendum will be issued and how this should look like. The online version of the Final EUPT report will be replaced by the new one and all affected labs will be contacted.

Where errors are discovered in EUPT-Certificates the relevant laboratories will be sent new corrected ones. Where necessary the laboratories will be asked to return the old ones.

Follow-up activities

Laboratories are expected to undertake follow-up activities to trace back the sources of erroneous or strongly deviating results (typically those with $|z| > 2.0$) - including all false positives. In exceptional cases, follow-up activities may even be indicated for results within $|z| \leq 2.0$ (e.g. where two errors with opposed tendency cancel each other leading to acceptable results).

Upon request, the laboratory's corresponding NRL and EURL are to be informed of the outcome of any investigative activities for false positives, false negatives and for results with $|z| \geq 3.0$. Concerning z scores between 2.0 and 3.0 the communication of the outcome of follow-up activities is optional but highly encouraged where the source of deviation could be identified and could be of interest to other labs.

According to instructions from DG-SANTE, the "Protocol for management of underperformance in comparative testing and/or lack of collaboration of National Reference Laboratories (NRLs) with EU Reference Laboratories (EURLs) activities" is to be followed.

NRLs will be considered as **underperforming in relation to scope** if in at least two of the last four EUPTs falling within their responsibility area they: a) haven't participated, or b) targeted less than 90% of the compulsory pesticides in the target lists (80% for SRM-compounds), or c) detected less than 90% of the compulsory compounds present in the test items (80% for SRM-compounds). Additionally, NRLs that obtained AZ² higher than 3 (AAZ higher than 1.3 for SRM-compounds) in two consecutive EUPTs of the last four EUPTs, will be considered as **underperforming in accuracy**. A two-step protocol established by DG-SANTE will be applied as soon as underperformance of an NRL is detected¹⁷:

Phase 1:

- Identifying the origin of the bad results (failure in EUPTs).
- Actions: On the spot visits and training if necessary and repetition of the comparative test if feasible and close the assessment of results by the EURL.

Phase 2:

- If the results still reveal underperformance the Commission shall be informed officially by the EURL including a report of the main findings and corrective actions.

¹⁷ Article 101 of Regulation (EC) 625/2017

ANNEX A. Protocols and Target lists of pesticides to be sought.

- The Commission shall inform the Competent Authority and require that appropriate actions are taken. Underperformance rules for the OfLs will be established at a later stage.

Disclaimer

The EUPT-Panel retains the right to change any parts of this EUPT – General Protocol based on new scientific or technical information. Any changes will be communicated in due course.

EUPT-FV24 SPECIFIC PROTOCOL

European Union Proficiency Test for Pesticide Residues in Fruits and Vegetables (2022)

Introduction

This protocol is complementary to the General Protocol of EU Proficiency Tests (EUPT) for Pesticide Residues in Food and Feed (9th Edition). This Proficiency Test is organised by the EURL for Pesticide Residues in Fruits and Vegetables covering Multiresidue Methods (MRM) of analysis.

According to Article 28 of Regulation 396/2005/EC (23rd February 2005) of the European Parliament and of the Council, all laboratories analysing samples for the official control of pesticide residues shall participate in the European Union Proficiency Tests (EUPTs) for pesticide residues organised by the European Union.

These proficiency tests are carried out in order to improve the quality, accuracy and comparability of the residue data and to evaluate the laboratory capacity to report results that covers the entire range of maximum residue limits (0.001 - 15 mg/kg) in all groups of fruit and vegetable matrices (high water, acid and fat content). Bearing that in mind, a wide concentration range should be covered with the different analytes present in the test item.

Test Item

This proficiency test is based on the analysis of pesticide residues in **tomato**. The tomatoes were grown in a greenhouse in Almeria. The pesticide treatments carried out were pre-harvest using commercial formulations and post-harvest using analytical standards. The test item was milled, homogenised and packed in plastic bags. The material was frozen and it was milled again, and sub-sampled into polyethylene bottles that had previously been coded.

Ten of these bottles containing the test item were chosen randomly and analysed to check for homogeneity.

The test item was stored frozen (-20°C) prior to shipment to participants.

A minimum of six bottles, again chosen randomly, will be analysed over a period of time to confirm the stability of the pesticides in the test item (three when the test items are shipped, then other three bottles a few days after the deadline for submitting results). There will be one further analysis during this period using three bottles more and reproducing the sample shipment to see if there is any degradation of any of the pesticides present in the test item. If the sample shipment of EU/EFTA labs takes more than 48 hours, three extra bottles will be analysed each day of delay, studying this way the stability of the samples that took longer to arrive to an EU/EFTA laboratory.

All analytical determinations concerning the test item treatment analysis will be performed in a laboratory which is ISO 17025 accredited, and which has been previously evaluated by the Organisers.

Blank material will not be distributed to the participants.

Amount of Test Item

Participants will receive:

- Approximately 200 g of tomato test item treated with pesticides.

Shipment of Test Item

All Test Items will be frozen and packed in polystyrene boxes surrounded in dry ice and packed into cardboard boxes.

The shipment of the test items will be carried out over a one-week period from the 7th March 2022. The Organiser will try to ensure that all the packages arrive on the same day to each laboratory. An information message will be sent out by e-mail before shipment. Laboratories must make their own arrangements for the receipt of the package. They must inform the Organiser of any public holidays in their country/city during the delivery period given in the calendar, as well as making the necessary arrangements for receiving the shipment, even if the laboratory is closed.

The Organisers will not take the responsibility for a parcel if it is retained at customs.

Advice on Test Item Handling

Once received, the test item should be stored deeply frozen (-18°C or less) prior to analysis thus avoiding any possible deterioration/spoilage. The test item should be mixed thoroughly before taking the analytical portion(s).

All participants should use their own routine standard operating procedures for extraction, clean-up and analytical measurement and their own reference standards for identification and quantification.

Target List

Participants will be provided with two target pesticide lists, one with pesticides that have to be analysed on a compulsory basis, and a second one with pesticides to be analysed voluntarily. Those voluntary pesticides will not be used for the evaluation of the laboratories into Category A or B, and a separate statistical evaluation will be made for them.

Assigned value and robust relative standard deviation

In order to minimise the influence of out-lying results on the statistical evaluation, the assigned value will be estimated using the robust statistics as described in ANNEX C of ISO 13258:2015, where the robust mean (x^*) according algorithm A is defined. For the calculation of the assigned value only results reported by EU and EFTA countries laboratories will be taken into account.

Also, the robust relative standard deviation (CVs^*) will be calculated for each analyte.

Laboratory assessment

For the assessment of the overall laboratory performance, the Average of the Squared z-Score (AZ^2) will be used as in the last Proficiency Test, but only for those laboratories in Category A, which will be those laboratories that are able to analyse at least 90% of the pesticides in the target list, that are able to detect at least 90% of the pesticides evaluated in the test material and that report no false positives. Within Category A, the laboratories will be sub-classified as "good", "satisfactory" or "unsatisfactory". All the other laboratories will be classified in Category B. This information will be available in the General Protocol.

Steps to follow

This Proficiency Test will be made up of the following nine essential steps:

1.To participate, each laboratory must complete the Application Form on-line, whose link is available on the EURL-FV Web page, before the deadline stipulated on the Calendar. It is recommended that laboratories download the Target Pesticide Lists from this web site. Laboratories should carefully read the Target Pesticide Lists, where the Minimum Required Reporting Limits (MRRLs) are given. The MRRLs do not always correspond with the EU MRLs set for tomato.

2.The participation fee will be **250 euros** for EU/EFTA participants and **350 euros** for participants from other countries. The laboratories will receive an invoice and after that they can start the payment procedure. An e-mail showing the bank transfer

ANNEX A. Protocols and Target lists of pesticides to be sought.

confirmation, or similar, may be requested at any time by the Organiser. **Payments without the invoice number identifying them will not be considered as paid.**

3. Any communication with the Organisation should be made using a **Contact Form** placed in the restricted area.

4. **Scope Form** will be placed in the restricted area and will be open to participants from the 24th February – 7th March 2022, prior to test item shipment. The aim is that laboratories provide information regarding their scope of analysis before receipt of the test item. As default, all compounds of the target lists are selected and the MRRL is listed in the scope. Laboratories will be asked to deselect the compounds they will not include in their PT scope and insert their Reporting Limits for each pesticide. If a laboratory does not select their scope, the default values will be considered for its evaluation.

5. When the scope is completed, laboratories will receive an e-mail with their user name and password for the restricted area of submission of results.

6. When the participant laboratories receive the test item (and not before), they must enter the restricted area again and submit the **Test Item Receipt Form** to inform the Organiser that they have accepted the test item. If no test item has been received by 11th March 2022, the laboratories should contact the Organiser using the Contact Form of the restricted area. If the test item receipt form is not filled in, the Organiser will consider that the participant has accepted the test item.

7. Once the laboratory has analysed the test item and is ready to submit their data, they must enter their results at various steps by accessing the restricted area in the EURL-FV web site. The participant laboratories must respect the deadline for submitting their results – 4th April 2022- using the tabs **Detected, Edit results and Edit Methods** on-line.

For each pesticide included in the laboratory scope, the Reporting Limit (RL) will be requested. The MRRL and the participant's own RL will be used to help identify and calculate z scores for false negative results. This form will also request information on which of the pesticides sought by the laboratory is within the laboratory's routine scope and whether it is accredited.

All concentrations must be expressed in mg/kg together with the recovery as a percentage. The actual results/residue levels measured must be reported as numbers. **Symbols (>, <, ±, ≤, ...) will not be accepted. IMPORTANT: If your result is not correctly expressed it will be considered as 'ND' (Not Detected).**

The number of significant figures should be based on the procedures provided in SANTE/12682/2019. Additional significant figures may be recorded for the purpose of statistical analysis.

Results should not be reported where a pesticide was not detected or was detected below the laboratory LOQ. In both cases, this will be recorded as 'ND'. If a pesticide was not sought, it will be recorded as 'NA' (Not Analysed). **If a laboratory fills in the scope form, but it does not report results neither fills in the methods form, all the pesticides will be considered as NA.**

The laboratory will also be asked to report the details of the analytical methods they used. A list including all the pesticides detected in the sample will be shown along with a pesticide reference number. Laboratories may describe a method for the first pesticide and use this pesticide reference number to refer to other pesticides determined using the same method.

When all fields are filled out, laboratories must accept and submit their final results by clicking the check box and then click on Final submission, before 4th April 2022.

IMPORTANT: After the final submission it will NOT be possible to edit the results.

Participants will receive an email confirming the submission of their results, and with an attached excel file with their submitted data.

It should **not** be assumed that only pesticides registered for use on tomato are present in the test item.

8. One final tab, **Additional Info**, will be accessible after the deadline for submission of results has passed. In this Form it will be possible to submit the method information of false negative results. The deadline for this form will be 8th April 2022. Not all laboratories may need to fill this in. It will depend upon information reported on previous Forms.

9. The Organiser will evaluate the results at the end of the proficiency test, once the deadline for receipt of results has passed. When necessary, the Organiser will ask the participants by e-mail specific details about the methods of analysis used. A preliminary report containing the preliminary assigned values and z scores will be sent to the participants. Finally, after evaluation by the Scientific Committee, the Final Report will be published online, and a copy will be sent to each participant laboratory. This report will include information regarding the design of the test, the homogeneity and stability results, a statistical evaluation of the participant's results as well as graphical displays of the results and any conclusions. Results submitted by non-EU/EFTA laboratories might not always be used in the tables or figures in the final report. Further relevant information considered to be of value may also be included.

Calendar

ACTIVITY	DATE
Registration period	6 th December 2021-
Specific Protocol published on the Web site	11 th February 2022
Selection of the scope	21 st February 2022 at the latest
Sample distribution	24 th February – 7 th March 2022
Deadline for receiving sample acceptance	7 th March 2022
Deadline for receiving results	11 th March 2022
Deadline Filling in additional information, if necessary (false negatives)	4 th April 2022
Preliminary Report: (containing preliminary assigned values and z scores)	5 th - 8 th April 2022
Final Report distributed to the Laboratories	April 2022

Cost of test item shipment.

EU/EFTA laboratories will be charged 250 € for the shipment cost, for non-EU/EFTA laboratories the amount will be 350 €. Regarding payment procedures - each laboratory can specify their details and invoice requests when applying for the test.

Please, do not pay for this EUPT until you receive the invoice.

Remember to include your Invoice number in the subject of the bank transfer.

Payment details are as follows:

BANK NAME: CAJAMAR - Caja Rural Sociedad Corporativa de Crédito
 BANK ACCOUNT HOLDER: Universidad de Almería
 BANK ADDRESS: Office Number 990. Universidad de Almería. Spain
 ACCOUNT NUMBER: ES0730580130172731005000
 SWIFT: CCRIES2A

ANNEX A. Protocols and Target lists of pesticides to be sought.

Contact information

The official organising group details are as follows:
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Advisory Group

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Björn Hardebusch, Head of EURL-AO, CVUA Freiburg, Germany.
Magnus Jezussek, Bavarian Health and Food Safety Authority, Erlangen, Germany.
André de Kok, Wageningen Food Safety Research, Wageningen, The Netherlands.
Ralf Lippold, CVUA Freiburg, Germany.
Hans Mol, Wageningen Food Safety Research, Wageningen, The Netherlands.
Finbarr O'Regan, Pesticide Control Laboratory, Department of Agriculture, Fisheries and Food, Kildare, Ireland.
Patrizia Pelosi, Istituto Superiore di Sanità, Roma, Italy.
Tuija Pihlström, National Food Agency, Uppsala, Sweden.
Mette Erecius Poulsen, Head of EURL-CF, DTU, Copenhagen, Denmark.
Stephan Radim, Czech Agriculture and Food Inspection Authority, Prague, Czech Republic
Hermann Unterluggauer, Austrian Agency for Health and Food Safety (AGES), Innsbruck, Austria.

ANNEX A. Protocols and Target lists of pesticides to be sought.

TARGET PESTICIDE LIST FOR EUPT-FV-24

Compulsory Compounds (will be considered in Category A/B classification)

Pestide No.	Pesticides	MRRL (mg/kg)
1	Acephate	0.01
2	Acetamiprid	0.01
3	Aclonifen	0.01
4	Acrinathrin	0.01
5	Aldicarb	0.01
6	Aldicarb Sulfone	0.01
7	Aldicarb Sulfoxide	0.01
8	Aldrin	0.005
9	Ametoctradin	0.01
10	Azinphos-methyl	0.005
11	Azoxystrobin	0.01
12	Bifenthrin (sum of isomers)	0.01
13	Biphenyl	0.01
14	Bitertanol (sum of isomers)	0.01
15	Boscalid	0.01
16	Bromopropylate	0.01
17	Bromuconazole (sum of diastereoisomers)	0.01
18	Bupirimate	0.01
19	Buprofezin	0.01
20	Cadusafos	0.005
21	Carbaryl	0.005
22	Carbendazim	0.01
23	Carbofuran	0.005
24	Carbofuran-3-hydroxy	0.005
25	Chlorantranilprole	0.01
26	Chlorfenapyr	0.01
27	Chlorfenvinphos	0.01
28	Chlorobenzilate	0.01
29	Chlorothalonil	0.01
30	Chlorpropham	0.01
31	Chlorpyrifos	0.005
32	Chlorpyrifos-methyl	0.01
33	Clofentezine	0.01
34	Clothianidin	0.01
35	Cyantranilprole	0.01
36	Cyazofamid	0.01
37	Cyflufenamid: sum of cyflufenamid (Z-isomer) and its E-isomer	0.01
38	Cyfluthrin (cyfluthrin incl. other mixtures of constituent isomers (sum of isomers))	0.01
39	Cymoxanil	0.01
40	Cypermethrin (cypermethrin incl. other mixtures of constituent isomers (sum of isomers))	0.01
41	Cyproconazole	0.01
42	Cyprodinil	0.01

ANNEX A. Protocols and Target lists of pesticides to be sought.

Pestide No.	Pesticides	MRRL (mg/kg)
43	Deltamethrin (cis-deltamethrin)	0.01
44	Demeton-S-methylsulfone	0.005
45	Diazinon	0.005
46	Dichlofluanid	0.01
47	Dichlorvos	0.005
48	Dicloran	0.01
49	Dicofol (sum of p, p' and o,p' isomers)	0.01
50	Dieldrin	0.005
51	Diethofencarb	0.01
52	Difenoconazole	0.01
53	Diflubenzuron	0.01
54	Dimethoate	0.003
55	Dimethomorph (sum of isomers)	0.01
56	Dimethylaminosulfotoluidide (DMST)	0.01
57	Diniconazole (sum of isomers)	0.01
58	Diphenylamine	0.01
59	Endosulfan alpha	0.01
60	Endosulfan beta	0.01
61	Endosulfan sulfate	0.01
62	EPN	0.01
63	Epoxiconazole	0.01
64	Ethion	0.01
65	Ethirimol	0.01
66	Ethoprophos	0.005
67	Etofenprox	0.01
68	Etoxazole	0.01
69	Famoxadone	0.01
70	Fenamidone	0.01
71	Fenamiphos	0.01
72	Fenamiphos sulfone	0.01
73	Fenamiphos sulfoxide	0.01
74	Fenarimol	0.01
75	Fenazaquin	0.01
76	Fenbuconazole	0.005
77	Fenhexamid	0.01
78	Fenitrothion	0.01
79	Fenoxycarb	0.01
80	Fenpropathrin	0.01
81	Fenpropidin	0.01
82	Fenpropimorph (sum of isomers)	0.01
83	Fenpyrazamine	0.01
84	Fenpyroximate	0.01
85	Fenthion	0.01
86	Fenthion oxon	0.01
87	Fenthion oxon sulfone	0.01

ANNEX A. Protocols and Target lists of pesticides to be sought.

Pestide No.	Pesticides	MRRL (mg/kg)
88	Fenthion oxon sulfoxide	0.01
89	Fenthion sulfone	0.01
90	Fenthion sulfoxide	0.01
91	Fenvalerate (any ratio of constituent isomers (RR, SS, RS & SR) including esfenvalerate)	0.01
92	Fipronil	0.004
93	Fipronil sulfone	0.004
94	Flonicamid	0.01
95	Flubendiamide	0.01
96	Fludioxonil	0.01
97	Flufenoxuron	0.01
98	Fluopicolide	0.01
99	Fluopyram	0.01
100	Fluquinconazole	0.01
101	Flusilazole	0.01
102	Flutolanil	0.01
103	Flutriafol	0.01
104	Fluxapyroxad	0.01
105	Fosthiazate	0.01
106	Hexaconazole	0.01
107	Hexythiazox	0.01
108	Imazalil	0.005
109	Imidacloprid	0.01
110	Indoxacarb (sum of indoxacarb and its R enantiomer)	0.01
111	Iprodione	0.01
112	Iprovalicarb	0.01
113	Isocarbophos	0.01
114	Isofenphos-methyl	0.01
115	Isoprothiolane	0.01
116	Kresoxim-methyl	0.01
117	Lambda-Cyhalothrin	0.01
118	Linuron	0.01
119	Lufenuron (any proportion of constituent isomers)	0.01
120	Malaoxon	0.01
121	Malathion	0.01
122	Mandipropamid	0.01
123	Mepanipyrim	0.01
124	Metaflumizone (sum of E- and Z- isomers)	0.01
125	Metalaxyl and metalaxyl-M	0.01
126	Methamidophos	0.01
127	Methidathion	0.01
128	Methiocarb	0.01
129	Methiocarb sulfone	0.01
130	Methiocarb sulfoxide	0.01
131	Methomyl	0.01

ANNEX A. Protocols and Target lists of pesticides to be sought.

Pestide No.	Pesticides	MRRL (mg/kg)
132	Methoxyfenozide	0.01
133	Metrafenone	0.01
134	Monocrotophos	0.005
135	Myclobutanyl	0.01
136	Omethoate	0.003
137	Orthophenylphenol (Free compound only)	0.01
138	Oxadixyl	0.01
139	Oxamyl	0.01
140	Oxydemeton-methyl	0.005
141	Paclobutrazole	0.01
142	Paraoxon-methyl	0.01
143	Parathion-ethyl	0.01
144	Parathion-methyl	0.01
145	Penconazole	0.01
146	Pencycuron	0.01
147	Pendimethalin	0.01
148	Permethrin (sum of isomers)	0.01
149	Phenthoate	0.01
150	Phosalone	0.01
151	Phosmet	0.01
152	Phosmet oxon	0.01
153	Phoxim	0.01
154	Pirimicarb	0.01
155	Pirimicarb-desmethyl	0.01
156	Pirimiphos-methyl	0.01
157	Prochloraz (only parent compound)	0.01
158	Procymidone	0.01
159	Profenofos	0.01
160	Propamocarb (only parent compound)	0.01
161	Propargite	0.01
162	Propiconazole (sum of isomers)	0.01
163	Propyzamide	0.01
164	Proquinazid	0.01
165	Prosulfocarb	0.01
166	Prothioconazole (Prothioconazole-desthio) (sum of isomers)	0.01
167	Prothiofos	0.01
168	Pymetrozine	0.01
169	Pyraclostrobin	0.01
170	Pyridaben	0.01
171	Pyridalyl	0.01
172	Pyrimethanil	0.01
173	Pyriproxyfen	0.01
174	Quinoxyfen	0.01
175	Spinetoram (XDE-175)	0.01
176	Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)	0.01

ANNEX A. Protocols and Target lists of pesticides to be sought.

Pestide No.	Pesticides	MRRL (mg/kg)
177	Spirodiclofen	0.01
178	Spiromesifen	0.01
179	Spirotetramat	0.01
180	Spirotetramat metabolite BYI08330-enol	0.01
181	Spiroxamine (sum of isomers)	0.01
182	Sulfoxaflor (sum of isomers)	0.01
183	Tau-Fluvalinate	0.01
184	Tebuconazole	0.01
185	Tebufenozide	0.01
186	Tebufenpyrad	0.01
187	Teflubenzuron	0.01
188	Tefluthrin	0.01
189	Terbuthylazine	0.01
190	Tetraconazole	0.01
191	Tetradifon	0.01
192	Thiabendazole	0.01
193	Thiacloprid	0.01
194	Thiamethoxam	0.01
195	Thiodicarb	0.01
196	Thiophanate-methyl	0.01
197	Tolclofos-methyl	0.01
198	Tolyfluanid	0.01
199	Triadimefon	0.01
200	Triadimenol (any proportion of constituent isomers)	0.01
201	Triazophos	0.005
202	Trichlorfon	0.01
203	Tricyclazole	0.01
204	Trifloxystrobin	0.01
205	Triflumizole	0.01
206	Triflumizole metabolite (FM-6-1)	0.01
207	Triflumuron	0.01
208	Trifluralin	0.01
209	Triticonazole	0.01
210	Vinclozolin (only parent compound)	0.01
211	Zoxamide	0.01

MRRL: Minimum Required Reporting Level

This list is based on Commission Implementing Regulation (EU) EU 2021/601 of 13 April 2021

MRRLs are based on Regulation (EC) No. 396/2005, Regulation (EU) 2016/127 and on toxicity data of each compound.

Low MRRLs allow evaluation of pesticides at low concentration levels.

ANNEX A. Protocols and Target lists of pesticides to be sought.

VOLUNTARY PESTICIDE LIST FOR EUPT-FV-23Voluntary Compounds (will **NOT** be considered in Category A/B classification)

Pestide No.	Pesticides	MRRL (mg/kg)
1	Benalaxyl and benalaxyl-M	0.01
2	Benzovindiflupyr	0.01
3	Chlorfluazuron	0.01
4	Clomazone	0.01
5	Cyhalofop-butyl	0.01
6	Dinotefuran	0.01
7	Fenobucarb	0.01
8	Fenpicoxamid	0.01
9	Florpyrauxifen-benzyl	0.01
10	Fluensulfone	0.01
11	Flufenacet (only parent compound)	0.01
12	Flutianil	0.01
13	Flupyradifurone	0.01
14	Heptachlor	0.01
15	<i>cis</i> -Heptachlor epoxide	0.01
16	<i>trans</i> -Heptachlor epoxide	0.01
17	Isofetamid	0.01
18	Isopyrazam	0.01
19	Isoxaflutole	0.01
20	Isoxaflutole diketonitrile degradate	0.01
21	Mefentrifluconazole	0.01
22	Metconazole (sum of isomers)	0.01
23	Molinate	0.01
24	Novaluron	0.01
25	Oxadiazyl	0.01
26	Oxathiapiprolin	0.01
27	Oxyfluorfen	0.01
28	Penflufen	0.01
29	Pentachloro-aniline	0.01
30	Penthiopyrad	0.01
31	Picolinafen	0.01
32	Propaquizafop	0.01
33	Pyrethrins	0.01
34	Pyridate (only parent compound)	0.01
35	Pyriofenone	0.01
36	Quinalphos	0.01
37	Quinoclamine	0.01
38	Quintozene	0.01
39	Rotenone	0.01
40	Tetramethrin	0.01
41	Tolfenpyrad	0.01
42	Tri-allate	0.01
43	Tritosulfuron	0.01

In red: new pesticides this year

This list is based on the working document SANCO/12745/2013 rev. 11 (3)

ANNEX B. List of laboratories that agreed to participate in EUPT-FV24

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Argentina	Bolsa de Comercio de Rosario - Lab de ensayos	Rosario	Argentina	Yes
Austria	AGES Innsbruck - Institute for Food Safety (PLMA)	Innsbruck	Austria	Yes
Belgium	LOVAP NV - Belgium, Geel	Geel	Belgium	Yes
Belgium	Groen Agro Control	Delfgauw	The Netherlands	Yes
Belgium	Phytocontrol (Nimes) - Pesticide Lab	Nimes	France	Yes
Belgium	Sciensano - Pesticide Lab	Brussels	Belgium	Yes
Belgium Bulgaria France Luxembourg	Primoris Belgium	Gent - Zwijnaarde	Belgium	Yes
Belgium Germany	AGROLAB LUFA Kiel - Pesticide Lab	Kiel	Germany	Yes
Belgium The Netherlands	Eurofins Lab Zeeuws-Vlaanderen b.v.	Graauw	The Netherlands	Yes
Bulgaria	"EUROLAB 2011" Ltd	Svilengrad	Bulgaria	Yes
Bulgaria	CLCTC - Sofia Pesticide Lab	Sofia	Bulgaria	Yes
Bulgaria	Primoris - Bulgaria, Plovdiv	Plovdiv	Bulgaria	Yes
China	Beijing Uni-Star Inspection - Pesticide Lab	Beijing	China	Yes
China	Agro-product Safety Research Center - Guofang Pang	Beijing	China	Yes
China	Shanghai Municipal Center For Disease Control and Prevention	Shanghai	China	No
China	Lanzhou Institute, Food & Drug Control - China	Lanzhou	China	No
China	Shanghai Institute for Food and Drug Control	Shanghai	China	No
Colombia	Laboratorio Nacional de Insumos Agrícolas LANIA	Mosquera, Cundinamarca	Colombia	Yes
Costa Rica	Laboratorio de Analisis de Residuos de Agroquimicos del Servicio Fitosanitario del Estado	San José	Costa Rica	Yes
Croatia	Teaching Institute of Public Health of Primorsko-goranska county, Rijeka, Croatia	Kotar County, Rijeka	Croatia	Yes
Croatia	Sample Control d.o.o.	Lučko	Croatia	Yes
Croatia	INSPECTO d.o.o. Laboratorij (Osijek)	Osijek	Croatia	Yes
Croatia	Bioinstitut d.o.o., Cakovec	Cakovec	Croatia	Yes
Croatia	Eurofins Croatiakontrola	Zagreb	Croatia	Yes
Croatia	Dr. Andrija Stampar - Pesticide Lab	Zagreb	Croatia	Yes

ANNEX B. List of laboratories that agreed to participate in EUPT-FV-24.

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Croatia	Croatian National Institute of Public Health	Zagreb	Croatia	Yes
Croatia	E.C. Inspekt - Pesticide Lab	Zagreb	Croatia	Yes
Cyprus	SGL - Pesticide Lab (Nicosia)	Nicosia	Cyprus	Yes
Czech Republic	Czech Agriculture and Food Inspection Authority	Praha	Czech Republic	Yes
Czech Republic	Metrological and Testing Laboratory, UCT Prague, Dept. of Food Analysis and Nutrition	Praha	Czech Republic	Yes
Denmark	Laboratoriet Ringsted - Pesticide Lab	Ringsted	Denmark	Yes
Denmark	DTU National Food Institute	Lyngby	Denmark	Yes
Estonia	Agricultural Research Center - Estonia, Saku	Saku	Estonia	Yes
Estonia	Health and Safety Tartu Laboratory	Tartu	Estonia	Yes
Finland	Chemistry Unit / Finnish Food Authority	Helsinki	Finland	Yes
Finland	Finnish Customs Laboratory	Espoo	Finland	Yes
Finland	MetropoliLab - Pesticide Lab	Helsinki	Finland	Yes
France	GIRPA	Beaucouzé	France	Yes
France	CAMP Méditerranée (Perpignan)	Perpignan	France	Yes
France	Laboratoire SCL de PARIS	Massy Cedex	France	Yes
France	CAPINOV (Landerneau)	Landerneau	France	Yes
France	SCL (Montpellier)	Montpellier	France	Yes
France	CERECO (GARONS)	Garons	France	Yes
France	INOVALYS	Le Mans	France	Yes
Germany	Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Lebensmittel- und Veterinärinstitut Oldenburg	Oldenburg	Germany	Yes
Germany	Bavarian Health and Food Safety Authority	Erlangen	Germany	Yes
Germany	Landeslabor Schleswig-Holstein	Neumünster	Germany	Yes
Germany	Landeslabor Berlin-Brandenburg	Frankfurt (Oder)	Germany	Yes
Germany	Thueringer Landesamt fuer Verbraucherschutz	Bad Langensalza	Germany	Yes
Germany	Landesamt für Verbraucherschutz Sachsen-Anhalt FB Lebensmittelsicherheit	Halle/Saale	Germany	Yes
Germany	Chemisches und Veterinäruntersuchungsamt Rhein-Ruhr-Wupper	Krefeld	Germany	Yes
Germany	Chemisches Labor Dr. Mang	Frankfurt	Germany	Yes

ANNEX B. List of laboratories that agreed to participate in EUPT-FV24

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Germany	LUA Saarland - Pesticide Lab	Saarbrücken	Germany	Yes
Germany	Chemisches und Veterinaeruntersuchungsamt Muensterland-Emscher Lippe	Münster	Germany	Yes
Germany	Labor Friedle - Germany, Tegernheim	Tegernheim	Germany	Yes
Germany	Landesamt für Landwirtschaft, Lebensmittelsicherheit und Fischerei	Rostock	Germany	Yes
Germany	BVL Unit 504 NRL for Pesticide Residues	Berlin	Germany	Yes
Germany	Central Institute of Bundeswehr Medical Service Munich	Garching-Hochbrück	Germany	Yes
Germany	CVUA Stuttgart - Pesticide Lab	Fellbach	Germany	Yes
Germany	LUA Sachsen - Pesticide Lab, Dresden	Dresden	Germany	Yes
Germany	Zentrales Institut des Sanitätsdienstes der Bundeswehr Kiel	Kronshagen	Germany	Yes
Germany	LUA Rheinland-Pfalz, Institut für LM-Chemie Speyer	Speyer	Germany	Yes
Germany	IHU - Pesticide Lab (Hamburg)	Hamburg	Germany	Yes
Germany	Landwirtschaftliches Technologiezentrum Augustenberg (LTZ)	Karlsruhe	Germany	Yes
Germany	Landesuntersuchungsamt für Chemie, Hygiene und Veterinärmedizin Bremen	Bremen	Germany	Yes
Germany	Eurofins Dr.Specht Express GmbH - Hamburg	Hamburg	Germany	Yes
Germany	Analytica Alimentaria GmbH - Lab (Kleinmachnow)	Kleinmachnow	Germany	Yes
Germany	ILAU GmbH - Pesticide Lab	Anzing	Germany	Yes
Greece	General Chemical State Laboratory	Athens	Greece	Yes
Greece	Laboratory of pesticide residues	Kifissia	Greece	Yes
Greece	Pesticide Residue Laboratory of Regional Centre of Plant Protection, Quality and Phytosanitary Control of Thessaloniki	Thessaloniki	Greece	Yes
Greece	VELTIA Labs - Greece, Thessaloniki	Thessaloniki	Greece	Yes
Hungary	Food Chain Safety Centre Non-profit Ltd., Pesticide Residue Analytical Laboratory, Szolnok	Szolnok	Hungary	Yes
Hungary	NFCISO Pesticide Lab, Velence	Velence	Hungary	Yes
Hungary	FCSCN Ltd Pesticide Res. Anal. Lab. Miskolc	Miskolc	Hungary	Yes
India	Intertek - India, Gurgaon	Gurgaon	India	Yes

ANNEX B. List of laboratories that agreed to participate in EUPT-FV-24.

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Ireland	The Food Chemistry Laboratories - DAFM	Co. Kildare	Ireland	Yes
Italy	APPA Bolzano	Bolzano	Italy	Yes
Italy	ARPA VDA - Pesticide Lab	Saint Christophe	Italy	Yes
Italy	APPA Trento	Trento	Italy	Yes
Italy	IZS Sardegna - Pesticide Lab	Sassari	Italy	Yes
Italy	Polo di Specializzazione alimenti-DAP Bari-ARPA Puglia	Bari	Italy	No
Italy	IZS PB - Foggia	Foggia	Italy	Yes
Italy	ARPA Lazio (sez. Latina) - Pesticide Lab	Latina	Italy	Yes
Italy	IZS LT - Italy, Rome	Roma	Italy	Yes
Italy	Istituto Superiore di Sanità Dip. DAMSA Rep. ECASS/AN	Roma	Italy	Yes
Italy	Laboratorio di Prevenzione (Bergamo)	Bergamo	Italy	Yes
Italy	IZS Sicilia - Pesticide Lab	Palermo	Italy	Yes
Italy	Azienda Sanitaria Locale di Firenze	Firenze	Italy	Yes
Italy	Istituto Zooprofilattico Sperimentale Lombardia Emilia Romagna	Brescia	Italy	Yes
Italy	ARPA MARCHE Serv. Laboratorio Regionale Multisito Sede MACERATA	Macerata	Italy	Yes
Italy	ARPAL - Dipartimento Laboratorio - UO Analisi Chimiche e Fisiche - Sede La Spezia	La Spezia	Italy	Yes
Italy	Istituto Zooprofilattico del Piemonte, Liguria e Valle d'Aosta - S.C. Piemonte - S.S. Cuneo - U.O. Chimico	Cuneo	Italy	Yes
Italy	ATS Milano - Laboratorio di Prevenzione	Milano	Italy	Yes
Italy	ARPA FVG - Pesticide Lab (Udine)	Udine	Italy	Yes
Italy	IZSAM - Pesticide Lab	Teramo	Italy	Yes
Italy	ARPA-ER - Pesticide Lab	Ferrara	Italy	Yes
Italy	ARPAC-LAFIM-FI	Napoli	Italy	No
Italy	IZSM - Pesticide Lab	Portici (NA)	Italy	Yes
Kenya	KEPHIS - Kenya, Nairobi	Nairobi	Kenya	Yes
Latvia	BIOR (Riga) - Pesticide Lab	Riga	Latvia	Yes
Lithuania	National Food and Veterinary Risk Assessment Institute	Vilnius	Lithuania	Yes
Lithuania	GALAB Laboratories GmbH - Hamburg	Hamburg	Germany	Yes

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ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Luxembourg	LNS Food lab	Dudelange	Luxembourg	Yes
Malta	Eurofins Dr. Soecht Laboratorien GmbH	Hamburg	Germany	Yes
Norway	NIBIO, Pesticides and Natural Products Chemistry	Ås	Norway	Yes
Peru	Bureau Veritas - Peru, Lima	Lima - Callao	Peru	Yes
Poland	Wojewódzka Stacja Sanitarno-Epidemiologiczna, Dział Laboratoryjny, Oddział Laboratoryjny Badania Żywności i Produktów Kosmetycznych	Lodz	Poland	Yes
Poland	Wojewodzka Stacja Sanitarno-Epidemiologiczna we Wroclawiu -Dzial Laboratoryjny	Wroclaw	Poland	Yes
Poland	Wojewódzka Stacja Sanitarno-Epidemiologiczna w Warszawie	Warszaw	Poland	Yes
Poland	IPP-NRI - Pesticide Lab (Poznan)	Poznan	Poland	Yes
Poland	PIORIN - Central Laboratory (Torun)	Torun	Poland	Yes
Poland	InHort (Skierniewice) - Pesticide Lab	Skierniewice	Poland	Yes
Poland	Hamilton UO-Technologia	Grójec	Poland	Yes
Poland	Laboratory of Food & Feed Safety in Bialystok	Bialystok	Poland	Yes
Poland	IPP-NRI - Pesticide Lab (Sosnicowice)	Sosnicowice	Poland	Yes
Poland	VSES Opole - Pesticide Lab	Opole	Poland	Yes
Poland	AGROLAB Polska - Poland, Deblin	Deblin	Poland	Yes
Poland	Wojewódzka Stacja Sanitarno-Epidemiologiczna w Bydgoszczy	Bydgoszcz	Poland	Yes
Poland	University of Warsaw Biological and Chemical Research Centre (CNBCh UW)	Warsaw	Poland	Yes
Poland	JARS S.A. - Legionowo	Legionowo	Poland	Yes
Portugal	INIAV, I.P. - Instituto Nacional de Investigação Agrária e Veterinária	Vairão - Vila do Conde	Portugal	Yes
Portugal	Laboratório Regional de Veterinária e Segurança Alimentar	Funchal - Madeira Island	Portugal	Yes
Portugal Spain	Labs & Technological Services AGQ - Burguillos	Burguillos	Spain	Yes
Romania	Institutul de Igiena si Sanatate Publica Veterinara	Bucharest	Romania	Yes
Romania	LRCRPPPV (Tirgu Mures) - Pesticide Lab	Tirgu Mures	Romania	Yes
Romania	State Veterinary Directorate Constanta	Constanta	Romania	Yes

ANNEX B. List of laboratories that agreed to participate in EUPT-FV-24.

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Romania	National Phytosanitary Authority-Laboratory for Pesticide Residues Control in Plants and Vegetable Products	Bucharest	Romania	Yes
Romania	Sanitary Veterinary and Food Safety Directorate Bucharest	Bucharest	Romania	Yes
Romania	DSVSA OLT - Lab	Slatina	Romania	Yes
Serbia	SP Laboratorija - Pesticide Lab	Becej	Serbia	Yes
Serbia	Gradski zavod za javno zdravlje Beograd	Belgrade	Serbia	Yes
Serbia	Field Test - Serbia, Belgrade	Belgrade	Croatia	Yes
Serbia	Ministry of Agriculture, Forestry and Water Management - Directorate for national reference laboratories	Belgrade	Serbia	Yes
Singapore	Singapore Food Agency	Singapore	Singapore	Yes
Slovakia	Veterinary and Food Institute in Bratislava	Bratislava	Slovakia	Yes
Slovenia	Pesticide Lab - Maribor	Maribor	Slovenia	Yes
Spain	LAC - Generalitat de Catalunya	Cabrils	Spain	Yes
Spain	Laboratorio Agrario Regional de Castilla y León	Burgos	Spain	Yes
Spain	Laboratorio Regional de la CCAA de La Rioja	Logroño	Spain	Yes
Spain	Laboratorio Agroalimentario y de Sanidad Animal	Murcia	Spain	Yes
Spain	Laboratorio Agrario y Fitopatológico de Galicia	Abegondo. A Coruña	Spain	Yes
Spain	Laboratori Agència de Salut Pública de Barcelona	Barcelona	Spain	Yes
Spain	Laboratorio Agroambiental de Zaragoza	Zaragoza	Spain	Yes
Spain	EUROFINS ECOSUR, S.A.	Lorqui - Murcia	Spain	Yes
Spain	Laboratorio KUDAM, S.L.	Pilar de la Horadada (Alicante)	Spain	Yes
Spain	National Center for Technology and Food Safety (CNTA)	San Adrián (Navarra)	Spain	Yes
Spain	Laboratorio de Salud Pública de Cuenca	Cuenca	Spain	Yes
Spain	Laboratorio de Producción y Sanidad Vegetal (Jaén)	Mengibar (Jaén)	Spain	Yes
Spain	Eurofins SiCA AgriQ S.L.U.9505554	Almería	Spain	Yes
Spain	Analytica Alimentaria GmbH - Almería, Spain	Almería	Spain	Yes
Spain	Salud Pública (LSP - Madrid Salud)	Madrid	Spain	Yes
Spain	SOIVRE - Almería	Almería	Spain	Yes

ANNEX B. List of laboratories that agreed to participate in EUPT-FV24

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Spain	Laboratorio de Producción y Sanidad Vegetal de Almería	La Mojonera (Almería)	Spain	Yes
Spain	Laboratorio Analítico Bioclínico - Spain, Almería	Almería	Spain	Yes
Spain	Laboratorio Arbitral Agroalimentario (MAPA, Spain)	Madrid	Spain	Yes
Spain	Laboratori Agroalimentari - Generalitat Valenciana	Burjassot, Valencia	Spain	Yes
Spain	Laboratorio Agroalimentario de Extremadura	Cáceres	Spain	Yes
Spain	National Centre for Food (Majadahonda)	Majadahonda	Spain	Yes
Spain	Laboratorio de Salud Pública de Galicia, Lugo	Lugo	Spain	Yes
Spain	Ainia (Valencia)	Valencia	Spain	Yes
Spain	Instituto Tecnológico De Canarias, S. A.-Laboratorio de Residuos-Departamento de Análisis Ambiental	Agüimes, Gran Canaria	Spain	Yes
Spain	Laboratorio Químico Microbiológico, S.L.	San Ginés (Murcia)	Spain	Yes
Spain	Nasertic - Spain, Villava	Villava	Spain	Yes
Spain	Laboratorio Agroalimentario de Granada	Granada	Spain	Yes
Spain	Laboratorio Agrama (La Rinconada (Sevilla))	La Rinconada (Sevilla)	Spain	Yes
Spain	LABCOLOR-COEXPHAL	La Mojonera, Almería	Spain	Yes
Sweden	Eurofins Food and Feed Testing Sweden	Lidköping	Sweden	Yes
Sweden	National Food Agency	Uppsala	Sweden	Yes
Switzerland	SCAV - Pesticide Lab (GENEVE)	Geneve	Switzerland	Yes
Switzerland	Kantonales Labor Zürich	Zürich	Switzerland	Yes
Switzerland	Amt für Verbraucherschutz Aargau (Cantonal Office of Consumer Protection Aargau)	Aargau	Switzerland	Yes
Thailand	Central Laboratory - Pesticide Lab (Bangkok)	Bangkok	Thailand	Yes
The Netherlands	Wageningen Food Safety Research	Wageningen	The Netherlands	Yes
Turkey	Private MSM Food Control Laboratory	Ticaret Borsası Kompleksi, Mersin	Turkey	Yes
United Kingdom	SASA	Edinburgh	United Kingdom	Yes
United Kingdom	FERA - Pesticide Lab	York	United Kingdom	Yes
United Kingdom	Eurofins Food Testing UK Ltd	Wolverhampton	United Kingdom	Yes
Uruguay	UdelaR - Faculty of Chemistry (Montevideo)	Montevideo	Uruguay	Yes