EURL-PROFICIENCY TEST-FV-22

Pesticide Residues in Onion Homogenate

Final Report - December 2020

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ENAC INTERCOMPARACIONES N° 7/PPI013

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EURL-EUROPEAN UNION PROFICIENCY TEST 22
FOR THE DETERMINATION OF PESTICIDES IN FRUITS AND VEGETABLES USING MULTIRESIDUE METHODS
2020

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 origin[1], 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) 2017/625[2] 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-22 has been organised by the EURL in Fruits and Vegetables at the University of Almería, Spain[4].

Participation in European Proficiency Test FV-22 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 China, Colombia, Kenya, Peru, Serbia, Singapore, Thailand, Turkey 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 OfLs 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-six laboratories agreed to participate in EUPT-FV22.

The proficiency test was performed in 2020 using onion homogenate. The onions were cultivated in a greenhouse in Almería, Spain, and were treated before harvest using commercial formulations applied by spraying with conventional diffusors. After harvest, they were also treated with analytical standards. Seventeen mandatory pesticides and two voluntary ones were used for the treatment. In EUPT-FV22, participating laboratories were not provided with a 'blank' sample.

The test item, 200 g of onion homogenate containing pesticide residues, was shipped to participants on 2nd March 2020. The deadline for results submission to the Organiser was 30th March 2020, but due to the pandemic and the temporary closure of many of the participant laboratories, the deadline was extended to 29th June 2020. 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 208 target pesticides. The pesticide target list is detailed in Annex A together with the voluntary target list, which contained 36 pesticides. The lists of target pesticides also contained the MRRL for each pesticide fixed at 0.01 mg/kg, except for the following pesticides which have lower MRRLs 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), cadusafos (0.005 mg/kg), carbofuran (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), fipronil (0.004 mg/kg), fipronil sulfone (0.004 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 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-22.

2. TEST ITEMS

2.1 Preparation of the treated test item

The onions were cultivated in a greenhouse in Almería, Spain, and were treated before harvest using commercial formulations applied by spraying with conventional diffusors. Additionally, they were post-harvest treated using analytical standards. The pesticides used as commercial formulations were cyprodinil, fenhexamid, fludioxonil, fluopyram, oxamyl, tebuconazole, triadimenol and penthiopyrad. The pesticides spiked as analytical standards were ametoctradin, azoxystrobin, chlorpropham, diazinon, dicloran, dimethomorph, fenamidone, fenpicoxamid, fluopicolide, fluxapyroxad and tefluthrin.
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-22. Approximately 300 m^2 of onion plants were treated with commercial formulations, which were dissolved in water. Three days after the application, a representative sample of the treated onion was collected and analysed to check if the residue levels present were close to the target levels. As the residue levels in the onions were too high for seven pesticides, the onions were kept in the field, and a new sample was collected three days later. As the levels were close to the target levels, a week after the treatment, 125 kg of the treated onions were harvested and spiked post-harvest with analytical standards dissolved in ethyl acetate. Afterwards, the material was frozen and processed using liquid nitrogen and a mincer. The frozen minced onions were mixed in a constantly spinning container until a homogeneous material was obtained. 200 g portions of the well-mixed homogenate 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 performed by the EURL-FV laboratory at the University of Almería (accredited under ISO/IEC 17025 by the Spanish accreditation body, ENAC). 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 quantification by GC-MS/MS and LC-MS/MS was performed using matrix matched calibration curves prepared with blank onion.

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 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 $c = F_1\sigma^2_{all} + F_2S^2_{an}$; F_1 and F_2 being constant values of 1.88 and 1.01, respectively, from the ten samples taken, and σ^2_{all} = (0.3 x FFP-RSD(25 %) x 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
Ametoctradin	0.099	1.2E-07	1.1E-04	Pass
Azoxystrobin	1.230	0	2.0E-02	Pass
Chlorpropham*	0.230	4.7E-05	6.0E-04	Pass
Cyprodinil	0.272	0	9.5E-04	Pass
Diazinon	0.077	0	6.9E-05	Pass
Dicloran*	0.091	4.7E-06	9.9E-05	Pass
Dimethomorph	0.268	0	8.0E-04	Pass
Fenamidone	0.169	0	3.1E-04	Pass
Fenhexamid	0.474	0	2.5E-03	Pass
Fludioxonil	0.211	0	5.3E-04	Pass
Fluopicolide	0.533	6.9E-05	3.2E-03	Pass
Fluopyram	0.041	0	2.0E-05	Pass
Fluxapyroxad	0.060	2.2E-08	3.8E-05	Pass
Oxamyl ⓘ	0.021	0	6.6E-06	Pass
Tebuconazole	0.054	3.0E-07	3.2E-05	Pass
Tefluthrin*	0.051	1.8E-07	3.0E-05	Pass
Triadimenol	0.032	2.1E-06	1.4E-05	Pass
Voluntary Pesticides				
Fenpicoxamid	0.061	2.6E-06	4.7E-05	Pass
Penthiopyrad	0.063	4.1E-07	4.3E-05	Pass

S_s: Between-Sampling Standard Deviation
ⓘOnly for informative purposes
*Compound out of the accredited scope of the laboratory

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

2.3 Stability tests

The stability tests were also carried out by the EURL-FV laboratory at the University of Almería (accredited under ISO/IEC 17025 by the Spanish accreditation body, ENAC). 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, yi 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 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 ≤ 0.3*σ
	Sample 132_A	Sample 132_B	Sample 81_A	Sample 81_B	Sample 30_A	Sample 30_B	Mean 1	Sample 225_A	Sample 225_B	Sample 233_A	Sample 233_B	Sample 222_A	Sample 222_B	Mean2		
Ametoctradin	0.120	0.120	0.120	0.130	0.130	0.130	0.125	0.120	0.120	0.130	0.130	0.120	0.120	0.123	-0.002	Pass
Azoxystrobin	1.100	1.200	1.200	1.100	1.200	1.000	1.133	1.200	1.200	1.200	1.200	1.200	1.200	1.200	0.067	Pass
Chlorpropham*	0.230	0.240	0.230	0.230	0.240	0.230	0.233	0.230	0.240	0.230	0.240	0.240	0.240	0.237	0.003	Pass
Cyprodinil	0.280	0.290	0.290	0.290	0.300	0.290	0.290	0.290	0.290	0.300	0.300	0.290	0.290	0.293	0.003	Pass
Diazinon	0.079	0.079	0.080	0.082	0.081	0.081	0.080	0.080	0.079	0.082	0.081	0.082	0.079	0.081	0.000	Pass
Dicloran*	0.097	0.110	0.110	0.095	0.110	0.110	0.105	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.005	Pass
Dimethomorph	0.280	0.290	0.290	0.280	0.290	0.280	0.285	0.280	0.270	0.290	0.280	0.280	0.280	0.280	-0.005	Pass
Fenamidone	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.180	0.190	0.180	0.190	0.190	0.187	-0.003	Pass
Fenhexamid	0.520	0.510	0.510	0.510	0.530	0.440	0.503	0.510	0.540	0.510	0.510	0.520	0.530	0.520	0.017	Pass
Fludioxonil	0.220	0.210	0.220	0.220	0.220	0.220	0.218	0.220	0.210	0.220	0.230	0.220	0.220	0.220	0.002	Pass
Fluopicolide	0.570	0.570	0.570	0.570	0.590	0.510	0.563	0.560	0.570	0.570	0.580	0.580	0.570	0.572	0.008	Pass
Fluopyram	0.043	0.043	0.042	0.043	0.043	0.043	0.043	0.043	0.042	0.043	0.042	0.042	0.043	0.043	0.000	Pass
Fluxapyroxad	0.066	0.066	0.065	0.065	0.066	0.065	0.066	0.067	0.064	0.066	0.064	0.066	0.067	0.066	0.000	Pass
Oxamyl ⓘ	0.018	0.018	0.023	0.025	0.018	0.025	0.021	0.022	0.023	0.019	0.021	0.018	0.023	0.021	0.000	Pass
Tebuconazole	0.059	0.059	0.059	0.058	0.057	0.058	0.058	0.059	0.057	0.059	0.059	0.057	0.058	0.058	0.000	Pass
Tefluthrin*	0.049	0.049	0.050	0.049	0.050	0.050	0.050	0.050	0.049	0.051	0.051	0.050	0.051	0.050	0.001	Pass
Triadimenol	0.029	0.029	0.035	0.033	0.033	0.033	0.032	0.032	0.030	0.034	0.032	0.031	0.034	0.032	0.000	Pass
Voluntary Pesticides																
Fenpicoxamid	0.063	0.063	0.066	0.071	0.066	0.071	0.067	0.068	0.066	0.067	0.068	0.068	0.069	0.068	0.001	Pass
Penthiopyrad	0.067	0.067	0.067	0.068	0.067	0.068	0.067	0.069	0.068	0.068	0.067	0.069	0.068	0.068	0.001	Pass

ⓘOnly for informative purposes
*Compound out of the accredited scope of the laboratory

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**.

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 132_A	Sample 132_B	Sample 81_A	Sample 81_B	Sample 30_A	Sample 30_B	Mean 1	Sample 236_A	Sample 236_B	Sample 42_A	Sample 42_B	Sample 128_A	Sample 128_B	Mean3		
Ametoctradin	0.120	0.120	0.120	0.130	0.130	0.130	0.125	0.130	0.130	0.120	0.120	0.120	0.120	0.123	-0.002	Pass
Azoxystrobin	1.100	1.200	1.200	1.100	1.200	1.000	1.133	1.200	1.200	1.200	1.200	1.200	1.200	1.200	0.067	Pass
Chlorpropham*	0.230	0.240	0.230	0.230	0.240	0.230	0.233	0.240	0.240	0.240	0.250	0.250	0.220	0.240	0.007	Pass
Cyprodinil	0.280	0.290	0.290	0.290	0.300	0.290	0.290	0.290	0.290	0.290	0.290	0.280	0.290	0.288	-0.002	Pass
Diazinon	0.079	0.079	0.080	0.082	0.081	0.081	0.080	0.079	0.082	0.081	0.081	0.078	0.082	0.081	0.000	Pass
Dicloran*	0.097	0.110	0.110	0.095	0.110	0.110	0.105	0.110	0.110	0.110	0.110	0.110	0.100	0.108	0.003	Pass
Dimethomorph	0.280	0.290	0.290	0.280	0.290	0.280	0.285	0.280	0.280	0.280	0.280	0.280	0.280	0.280	-0.005	Pass
Fenamidone	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.180	0.180	0.180	0.185	-0.005	Pass
Fenhexamid	0.520	0.510	0.510	0.510	0.530	0.440	0.503	0.520	0.520	0.520	0.520	0.500	0.500	0.513	0.010	Pass
Fludioxonil	0.220	0.210	0.220	0.220	0.220	0.220	0.218	0.210	0.220	0.210	0.210	0.210	0.210	0.212	-0.007	Pass
Fluopicolide	0.570	0.570	0.570	0.570	0.590	0.510	0.563	0.560	0.560	0.580	0.580	0.550	0.550	0.563	0.000	Pass
Fluopyram	0.043	0.043	0.042	0.043	0.043	0.043	0.043	0.043	0.044	0.044	0.042	0.043	0.042	0.043	0.000	Pass
Fluxapyroxad	0.066	0.066	0.065	0.065	0.066	0.065	0.066	0.067	0.065	0.066	0.065	0.067	0.063	0.066	0.000	Pass
Oxamyl ⓘ	0.018	0.018	0.023	0.025	0.018	0.025	0.021	0.019	0.024	0.019	0.022	0.019	0.026	0.022	0.000	Pass
Tebuconazole	0.059	0.059	0.059	0.058	0.057	0.058	0.058	0.058	0.059	0.058	0.058	0.058	0.058	0.058	0.000	Pass
Tefluthrin*	0.049	0.049	0.050	0.049	0.050	0.050	0.050	0.051	0.050	0.052	0.052	0.053	0.047	0.051	0.001	Pass
Triadimenol	0.029	0.029	0.035	0.033	0.033	0.033	0.032	0.033	0.035	0.030	0.035	0.031	0.034	0.033	0.001	Pass
Voluntary Pesticides																
Fenpicoxamid	0.063	0.063	0.066	0.071	0.066	0.071	0.067	0.066	0.068	0.066	0.068	0.066	0.070	0.067	0.001	Pass
Penthiopyrad	0.067	0.067	0.067	0.068	0.067	0.068	0.067	0.067	0.070	0.069	0.070	0.068	0.069	0.069	0.002	Pass

ⓘOnly for informative purposes
*Compound out of the accredited scope of the laboratory

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 2nd March 2020. All the shipments to EU/EFTA countries arrived within the first 48 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 22. 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-six laboratories agreed to participate in this proficiency test. One cancelled its participation and five did not report results, so the total number of laboratories submitting results was 170. 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 China, Colombia, Kenya, Peru, Serbia, Singapore, Thailand, Turkey and Uruguay have not been included. This last group totals 15 laboratories that reported results.

Seventeen pesticides from the compulsory pesticide target list and two voluntary pesticides were used to treat the sample. The assigned value for oxamyl was 0.021 mg/kg, which is below three times oxamyl´s MRRL (0.01 mg/kg). The SC agreed that it should not be considered for the evaluation of the participants. Information for oxamyl will be displayed only for informative purposes.

A summary of the reported results for the pesticides evaluated can be seen below in **Table 4**.

Table 4. 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)
Ametoctradin	107	3	45	69
Azoxystrobin	151	2	2	97
Chlorpropham	143	3	9	92
Cyprodinil	151	1	3	97
Diazinon	150	2	3	97
Dicloran	135	6	14	87
Dimethomorph	145	2	8	94
Fenamidone	144	3	8	93
Fenhexamid	143	2	10	92
Fludioxonil	145	4	6	94
Fluopicolide	125	4	26	81
Fluopyram	135	5	15	87
Fluxapyroxad	111	6	38	72
Oxamyl ⓘ	131	3 Not reported	21	85

Pesticides	No. of Reported Results	No. of False Negative Results	No. of Not Analysed Results	Percentage of Reported Results[a] (out of 155)
Tebuconazole	151	4	0	97
Tefluthrin	142	2	11	92
Triadimenol	134	14	7	86
Voluntary Pesticides				
Fenpicoxamid	19	10	126	12
Penthiopyrad	80	9	66	52

[a] The percentage of Reported Results comes from 155 laboratories. It does not take into account the fifteen laboratories from China, Colombia, Kenya, Peru, Serbia, Singapore, Thailand, Turkey and Uruguay.
ⓘ Only for informative purposes.

4.1.1 False positives

Six laboratories (including non-EU countries) reported results for additional pesticides that were not present in the test item. These pesticides and the residue levels reported are presented in **Table 5**, 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. Two laboratories reported false positive results of voluntary pesticides: tritosulfuron and quintozene. However, following the general protocol, those false positives will not be considered for categorisation into Category A/B.

Table 5. 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)
41	Spirotetramat	1.1	LC - MS/MS	0.01	0.01
42	Parathion-ethyl	0.045	GC-MS	0.01	0.01
58	Malathion	0.037	GC-MS/MS (QQQ)	0.01	0.01
140[§]	Phenthoate	0.017	LC-MS/MS QQQ	0.005	0.01
157	Diethofencarb	0.073	LC-Orbitrap	0.01	0.01
172	Oxadixyl	0.021	GC-MS/MS (QQQ)	0.01	0.01
Voluntary Pesticides					
4	Tritosulfuron	0.0103	LC-MS/MS QQQ	0.01	0.01
96	Quintozene	0.156	GC- (μ) ECD	0.01	0.01

[§] Non-EU/EFTA laboratories

4.1.2 False negatives

Tables 6 a and b summarise the results from laboratories (including non-EU laboratories, indicated with §) that reported false negatives, presented as 'Not Detected' (ND).

Table 6.a Laboratories that failed to report pesticides that were present in the treated test item.

Laboratory Code	Ametoctradin	Azoxystrobin	Chlorpropham	Cyprodinil	Diazinon	Dicloran	Dimethomorph	Fenamidone	Fenhexamid	Fludioxonil	Fluopicolide	Fluopyram	Fluxapyroxad	Tebuconazole	Tefluthrin	Triadimenol
12		ND					ND							ND		
15																ND
19																ND
24	ND												ND			
35													ND			
44																ND
58																ND
59										ND						
67									ND							ND
77												ND				
81																ND
85													ND			
96§						ND										ND
97§			ND												ND	
99																ND
105			ND													
119																ND
141						ND										
143						ND										
151											ND	ND				
153																ND
154			ND													
156																ND
157																ND
158				ND	ND	ND		ND		ND		ND	ND	ND		ND
159											ND					
165						ND										
167														ND		ND
168§				ND		ND	ND	ND								
169§																ND
173	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
182	ND					ND		ND		ND	ND	ND	ND		ND	

Table 6.b
Laboratories that failed to report voluntary pesticides that were present in the treated test item.

Voluntary Pesticides		
Lab Code	**Fenpicoxamid**	**Penthiopyrad**
24	ND	ND
57		ND
71	ND	
80	ND	
90	ND	
99	ND	ND
111		ND
115		ND
129§		ND

Voluntary Pesticides		
Lab Code	Fenpicoxamid	Penthiopyrad
159		ND
166		ND
172	ND	
173	ND	ND
179	ND	
182	ND	ND
183	ND	

§ Non-EU/EFTA laboratories
ND: Not detected

Due to the high number of false negative results for triadimenol, an internal stability test was performed: a bottle of test item was mantained at room temperature for 72 hours. That sample was extracted and analysed four times: just after extraction from the freezer, after 24 hours, after 48 hours and after 72 hours. The results did not show any degradation of triadimenol.

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) after removing results reported in the wrong units. 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). The assigned values for the seventeen compulsory and the two voluntary pesticides and their uncertainties are presented in **Table 7**. The comparison of the robust mean before and after removing gross errors is shown in **Table 8**.

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, employing also this value for the calculation of the uncertainty. These RSDs can be seen in **Table 7**.

The assigned value for oxamyl was was 0.021 mg/kg, which is below three times oxamyl´s MRRL (0.01 mg/kg). For this reason, the SC agreed that it should not be considered for the evaluation of the participants. Information for oxamyl is displayed only for informative purposes.

Table 7. 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* (%)
Ametoctradin	0.01	0.082	0.0019	104	25.0	18.7
Azoxystrobin	0.01	1.156	0.0244	150	25.0	20.7
Chlorpropham	0.01	0.229	0.0043	142	25.0	18.0
Cyprodinil	0.01	0.289	0.0043	149	25.0	14.5
Diazinon	0.005	0.079	0.0014	149	25.0	17.5
Dicloran	0.01	0.104	0.0021	134	25.0	18.4
Dimethomorph	0.01	0.275	0.0052	144	25.0	18.0
Fenamidone	0.01	0.185	0.0032	143	25.0	16.5
Fenhexamid	0.01	0.568	0.0118	142	25.0	19.8
Fludioxonil	0.01	0.199	0.0041	144	25.0	19.5
Fluopicolide	0.01	0.605	0.0122	125	25.0	18.0
Fluopyram	0.01	0.044	0.0009	134	25.0	19.6
Fluxapyroxad	0.01	0.069	0.0019	110	25.0	23.3
Oxamyl ⓘ	0.01	0.021	0.0004	130	25.0	15.0
Tebuconazole	0.01	0.051	0.0008	150	25.0	15.8
Tefluthrin	0.01	0.047	0.0010	140	25.0	19.8
Triadimenol	0.01	0.032	0.0007	133	25.0	19.9
Voluntary Pesticides						
Fenpicoxamid	0.01	0.067	0.0041	19	25.0	21.5
Penthiopyrad	0.01	0.067	0.0019	80	25.0	20.7

ⓘ Only for informative purposes

Table 8. Comparison of Robust mean values before and after removing gross errors.

Pesticides	Robust Mean before removing gross errors (mg/kg)	Robust Mean (Assigned Value, mg/kg)
Ametoctradin	0.083	0.082
Azoxystrobin	1.159	1.156
Chlorpropham	0.230	0.229
Cyprodinil	0.289	0.289
Diazinon	0.079	0.079
Dicloran	0.105	0.104
Dimethomorph	0.275	0.275
Fenamidone	0.185	0.185
Fenhexamid	0.570	0.568
Fludioxonil	0.200	0.199
Fluopicolide	0.605	0.605
Fluopyram	0.045	0.044
Fluxapyroxad	0.069	0.069
Oxamyl ⓘ	0.021	0.021
Tebuconazole	0.051	0.051
Tefluthrin	0.047	0.047
Triadimenol	0.033	0.032
Voluntary Pesticides		
Fenpicoxamid	0.067	0.067
Penthiopyrad	0.067	0.067

ⓘ Only 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 (%)
Ametoctradin	87.3	4.5	8.2
Azoxystrobin	92.8	3.3	3.9
Chlorpropham	93.8	3.4	2.7
Cyprodinil	97.4	0.0	2.6
Diazinon	95.4	1.3	3.3
Dicloran	90.8	2.1	7.1
Dimethomorph	94.6	2.0	3.4
Fenamidone	93.9	2.0	4.1
Fenhexamid	93.1	0.7	6.2
Fludioxonil	93.3	2.0	4.7
Fluopicolide	95.3	1.6	3.1
Fluopyram	92.1	3.6	4.3
Fluxapyroxad	90.6	2.6	6.8
Tebuconazole	94.2	2.6	3.2
Tefluthrin	95.1	2.1	2.8
Triadimenol	87.2	2.0	10.8
Ametoctradin	87.3	4.5	8.2
Azoxystrobin	92.8	3.3	3.9
Voluntary Pesticides			
Fenpicoxamid	62.1	3.4	34.5
Penthiopyrad	86.5	2.2	11.2

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. The charts have been constructed using different colour bars according to the determination technique used for each pesticide.

4.3.2 Combined z scores

As previously mentioned in Section 3.5., the AZ^2 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' (AZ^2) 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 (187), 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 four of the 155 EU and EFTA laboratories that submitted results were classified into Category A (67 %).

From the AZ^2, 90.4 % were classed as 'good', 5.8 % as 'satisfactory' and 3.8 % as 'unsatisfactory' (Only considering EU and EFTA laboratories).

Of the 51 EU and EFTA laboratories in Category B, five had reported a false positive result. Three 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, the number of pesticides reported, the percentage of pesticides analysed from the compulsory target list, the AZ^2 values and their subclassifications. Laboratories that reported false negative results in Category A are marked with the symbol Θ.

Table 10. Performance and Classification of laboratories in Category A using the AZ^2 formula

Lab Code	No. of pesticides detected (max.16)	% of pesticides analysed from target list	AZ^2	Classification
1	16	208	0.6	Good
2	16	204	0.3	Good
3	16	206	1.2	Good
4	16	204	2.1	Satisfactory
5	16	208	0.4	Good
7	16	201	0.2	Good
8	16	208	0.1	Good
10	16	208	1.2	Good
11	16	205	0.9	Good
14	16	208	0.4	Good
15Θ	15	208	1.4	Good
16	16	208	0.3	Good
18	16	201	0.7	Good
20	16	192	0.7	Good
21	16	208	0.2	Good
22	16	207	0.4	Good

Lab Code	No. of pesticides detected (max.16)	% of pesticides analysed from target list	AZ[2]	Classification
24Θ	14	208	1.7	Good
25	16	200	1.2	Good
26	16	208	0.6	Good
27	16	208	0.3	Good
28	16	193	0.5	Good
29	15	198	0.5	Good
30	16	206	0.3	Good
31	16	202	0.4	Good
32	16	207	0.2	Good
33	16	207	0.3	Good
34	16	207	1.3	Good
35Θ	14	194	2.2	Satisfactory
36	16	204	0.4	Good
37	16	204	0.8	Good
39	16	189	0.5	Good
40	16	208	0.5	Good
47	16	206	1.0	Good
50	16	201	1.8	Good
52	16	202	0.2	Good
54	16	199	0.1	Good
55	16	196	1.3	Good
57	16	202	0.1	Good
59Θ	15	203	3.3	Unsatisfactory
60	16	205	0.3	Good
61	16	199	0.4	Good
62	14	194	0.5	Good
63	16	208	0.9	Good
64	16	207	0.3	Good
65	16	208	0.5	Good
66	16	208	0.4	Good
68	16	205	1.0	Good
69	16	208	1.9	Good
71	16	207	0.2	Good
74	16	208	0.2	Good
76	16	196	1.0	Good
79	16	208	0.9	Good
80	16	208	0.5	Good
82	16	208	0.6	Good
83	16	208	0.1	Good
84	16	201	0.7	Good
85Θ	15	205	1.1	Good
87	16	193	0.7	Good
88	16	196	0.3	Good
89	16	208	1.0	Good
90	16	208	0.5	Good
91	16	208	0.2	Good
92	16	208	4.8	Unsatisfactory
93	16	207	0.2	Good
94	16	208	0.3	Good

Lab Code	No. of pesticides detected (max.16)	% of pesticides analysed from target list	AZ[2]	Classification
95	16	204	0.4	Good
98	16	201	0.7	Good
99Θ	15	189	2.5	Satisfactory
101	16	204	0.4	Good
102	16	194	0.4	Good
103	16	208	0.4	Good
107	16	208	0.3	Good
109	16	205	0.5	Good
110	16	208	1.1	Good
111	16	207	0.4	Good
114	16	208	0.3	Good
115	16	203	1.7	Good
116	15	201	1.2	Good
117	16	207	0.1	Good
118	16	207	0.8	Good
121	16	202	0.4	Good
122	16	207	0.8	Good
123	16	208	0.5	Good
124	14	198	0.6	Good
126	16	208	0.8	Good
129	16	188	2.1	Satisfactory
131	16	207	0.2	Good
133	15	188	0.5	Good
134	16	208	0.6	Good
137	16	208	1.5	Good
139	16	199	1.2	Good
142	16	208	0.4	Good
143Θ	15	208	1.2	Good
147	16	208	0.3	Good
148	16	193	0.6	Good
150	16	208	0.8	Good
152	15	204	2.2	Satisfactory
155	16	200	0.1	Good
156Θ	15	207	1.5	Good
159	15	195	24.4	Unsatisfactory
160	16	191	2.3	Satisfactory
161	16	200	0.5	Good
162	16	206	0.1	Good
163	16	202	3.2	Unsatisfactory
164	16	208	1.0	Good
165Θ	15	206	2.5	Satisfactory
166	16	208	0.3	Good
170	16	208	0.1	Good
177	16	208	0.3	Good
179	16	208	0.4	Good
183	16	208	0.1	Good

Θ Laboratories reporting a false negative result.

Table 11 shows all the laboratories in Category B, 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 Θ 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 ≤ 2.0)
9	15	94	164	15	15
12Θ	4	25	88	7	4
17	13	81	168	13	13
19Θ	11	69	151	12	6
23	11	69	134	11	11
38	16	100	169	16	15
41+	16	100	203	16	16
42+	7	44	114	7	7
43	8	50	130	8	8
44Θ	8	50	131	9	7
45	14	88	181	14	14
46	9	56	128	9	8
48	15	94	173	15	15
49	11	69	148	11	10
51	13	81	136	13	13
53	13	81	135	13	13
56	14	88	162	14	14
58Θ+	14	88	182	15	14
67Θ	13	81	197	15	12
70	15	94	182	15	13
72	11	69	163	11	10
73	8	50	75	8	8
75	13	81	113	13	13
77Θ	10	63	129	11	10
78	13	81	105	13	13
81Θ	7	44	131	8	7
86	11	69	156	11	10
96Θ	12	75	192	14	11
97Θ	11	69	163	13	11
104	14	88	177	14	14
105Θ	8	50	119	9	8
108	12	75	115	12	12
112	13	81	115	13	12
113	15	94	168	15	14
119Θ	13	81	187	14	12
120	4	25	72	4	4
125	15	94	186	15	15
130	4	25	57	4	4
132	11	69	165	11	8
135	10	63	97	10	9

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)
136	15	94	181	15	14
138	12	75	160	12	11
140+	16	100	207	16	16
141Θ	12	75	172	13	10
144	15	94	158	15	12
145	11	69	120	11	11
146	13	81	180	13	10
149	5	31	46	5	5
151Θ	12	75	170	14	10
153Θ	11	69	146	12	11
154Θ	13	81	183	14	13
157Θ+	15	94	198	16	15
158Θ	5	31	168	14	3
167Θ	5	31	63	7	4
168Θ	8	50	131	12	4
169Θ	12	75	146	13	12
172+	16	100	208	16	16
173Θ	10	63	208	16	1
182Θ	8	50	208	16	8

Θ Laboratories reporting a false negative result.
+ Laboratories reporting a false positive result.

The AZ^2 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.

Laboratory performance over the last three EUPTs using the AZ^2 formula has been summarized as follows:

- For EUPT-FV-21, out of 172 laboratories (EU and EFTA), 112 were in Category A with the following classes: 0 'unsatisfactory', 4 'satisfactory' and 108 'good'.
- For EUPT-FV-20, out of 167 laboratories (EU and EFTA), 111 were in Category A with the following classes: 1 'unsatisfactory', 6 'satisfactory' and 104 'good'.
- For EUPT-FV-19, out of 153 laboratories (EU and EFTA), 101 were in Category A with the following classes: 3 'unsatisfactory', 5 'satisfactory' and 93 'good'.

5. CONCLUSIONS

One hundred and seventy-six laboratories agreed to participate in EUPT-FV-22. One of them cancelled its participation and five did not submit results. From the remaining 170 laboratories that submitted results, 15 did not belong to EU nor EFTA countries, so their results were not considered for the estimation of the assigned value.

From the total 19 pesticides used to treat the test item, 16 mandatory and two voluntary pesticides were evaluated in EUPT-FV-22, based on the analysis of onion homogenate. Oxamyl was present in the test item, but with an assigned value (0.021 mg/kg) below three times its MRRL (0.01 mg/kg), and for that reason it was excluded from the evaluation of the labs.

Of a total number of 2480 possible determinations from EU/EFTA laboratories (155 laboratories by 16 evaluated pesticides), 89.2 % were reported, 8.3 % were not analysed and 2.5 % were not detected (false negative results).

The total number of z scores of laboratories from EU/EFTA countries was 2275, with 90.9 % of them acceptable, 2.3 % questionable and 6.8 % unacceptable.

67 % of the EU and EFTA laboratories that submitted results were classified into Category A. Of them, 90.4 % were classed as 'good', 5.8 % as 'satisfactory' and 3.8 % as 'unsatisfactory'.

The robust standard deviation (CV*) was in all cases below 25 %, with an average value of 18.7 % for the 16 pesticides evaluated.

Participation in this year's European Proficiency Test 22 involved at least one laboratory from each Member State. Additionally, laboratories from Iceland, 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 China, Colombia, Kenya, Peru, Serbia, Singapore, Thailand, Turkey and Uruguay participated in EUPT-FV-22.

6. REFERENCES

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4. P. Medina Pastor, A. Valverde, T. Pihlström, S. Masselter, M. Gamón, M. Mezcua, C. Rodríguez Torreblanca, A. R. Fernández-Alba. 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.

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7. ACKNOWLEDGEMENTS

The Organiser is most grateful to the European Commission for funding this European Proficiency Test FV-22.

The Organiser wishes to thank the members of the Quality Control Group and the Scientific Committee for their invaluable expert advice.

The Organiser wishes to give a special thank-you to the University of Almeria for the use of their facilities.

Ametoctradin (mg/kg)		Azoxystrobin (mg/kg)		Chlorpropham* (mg/kg)		Cyprodinil (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.100	0.098	1.200	1.300	0.230	0.230	0.280	0.260
0.100	0.100	1.200	1.300	0.230	0.220	0.280	0.280
0.100	0.100	1.200	1.300	0.210	0.220	0.280	0.280
0.098	0.100	1.200	1.300	0.240	0.240	0.270	0.270
0.096	0.100	1.100	1.200	0.230	0.240	0.260	0.280
0.099	0.100	1.200	1.200	0.230	0.230	0.270	0.270
0.099	0.090	1.200	1.200	0.230	0.210	0.280	0.230
0.098	0.098	1.300	1.200	0.230	0.220	0.270	0.270
0.100	0.100	1.300	1.200	0.240	0.240	0.280	0.280
0.099	0.100	1.200	1.300	0.230	0.240	0.270	0.280

Diazinon (mg/kg)		Dicloran* (mg/kg)		Difmethomorph (mg/kg)		Fenamidone (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.078	0.077	0.091	0.097	0.280	0.260	0.170	0.170
0.081	0.078	0.084	0.091	0.270	0.270	0.170	0.170
0.079	0.077	0.085	0.087	0.270	0.260	0.170	0.170
0.076	0.077	0.095	0.095	0.270	0.270	0.170	0.170
0.074	0.078	0.091	0.094	0.260	0.270	0.170	0.170
0.078	0.078	0.087	0.096	0.260	0.270	0.170	0.170
0.079	0.070	0.089	0.085	0.270	0.260	0.170	0.160
0.076	0.075	0.090	0.093	0.270	0.270	0.170	0.170
0.078	0.078	0.092	0.095	0.270	0.270	0.170	0.170
0.078	0.077	0.092	0.094	0.270	0.270	0.170	0.160

Fenhexamid (mg/kg)		Fludioxonil (mg/kg)		Fluopicolide (mg/kg)		Fluopyram (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.490	0.470	0.220	0.200	0.540	0.530	0.043	0.040
0.490	0.480	0.220	0.210	0.520	0.500	0.043	0.041
0.480	0.460	0.210	0.210	0.490	0.540	0.041	0.040
0.470	0.480	0.220	0.210	0.540	0.530	0.041	0.042
0.460	0.480	0.210	0.210	0.530	0.530	0.040	0.041
0.490	0.480	0.220	0.210	0.570	0.540	0.041	0.041
0.480	0.440	0.220	0.200	0.560	0.540	0.043	0.039
0.460	0.470	0.210	0.200	0.540	0.530	0.040	0.039
0.480	0.470	0.210	0.200	0.530	0.530	0.042	0.040
0.480	0.470	0.210	0.210	0.530	0.540	0.041	0.041

*Compound out of the accredited scope of the laboratory

The sample numbers used for this test were: 2, 29, 43, 45, 93, 122, 126, 134, 184 and 234.

APPENDIX 1. Homogeneity data.

Fluxapyroxad (mg/kg)		Oxamyl ⓘ (mg/kg)		Tebuconazole (mg/kg)		Tefluthrin* (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.060	0.059	0.024	0.020	0.055	0.053	0.051	0.052
0.061	0.060	0.022	0.020	0.055	0.054	0.054	0.050
0.059	0.059	0.022	0.020	0.056	0.056	0.049	0.050
0.060	0.059	0.022	0.020	0.054	0.053	0.052	0.052
0.059	0.059	0.020	0.020	0.052	0.056	0.051	0.053
0.062	0.060	0.021	0.020	0.055	0.055	0.050	0.053
0.061	0.058	0.022	0.021	0.053	0.052	0.050	0.049
0.059	0.059	0.021	0.020	0.055	0.054	0.052	0.051
0.060	0.059	0.022	0.020	0.054	0.054	0.051	0.052
0.060	0.060	0.022	0.020	0.055	0.055	0.052	0.053

ⓘFor informative purposes only
*Compound out of the accredited scope of the laboratory

Triadimenol (mg/kg)	
Replicate 1	Replicate 2
0.032	0.026
0.035	0.034
0.031	0.030
0.033	0.034
0.033	0.032
0.031	0.031
0.033	0.030
0.030	0.032
0.037	0.033
0.029	0.031

Voluntary Pesticides

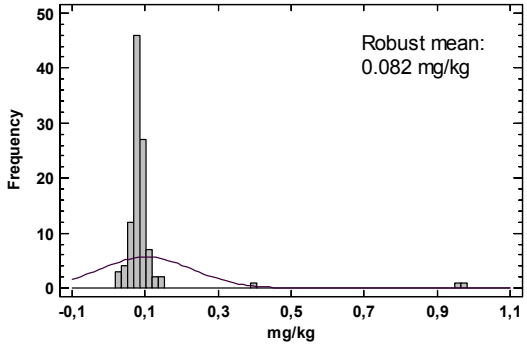
Fenpicoxamid (mg/kg)		Penthiopyrad (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.064	0.058	0.064	0.062
0.064	0.065	0.065	0.063
0.062	0.064	0.063	0.063
0.060	0.061	0.061	0.063
0.058	0.062	0.061	0.063
0.061	0.062	0.065	0.063
0.060	0.050	0.062	0.062
0.058	0.059	0.061	0.061
0.061	0.059	0.062	0.063
0.062	0.062	0.063	0.064

The sample numbers used for this test were: 2, 29, 43, 45, 93, 122, 126, 134, 184 and 234.

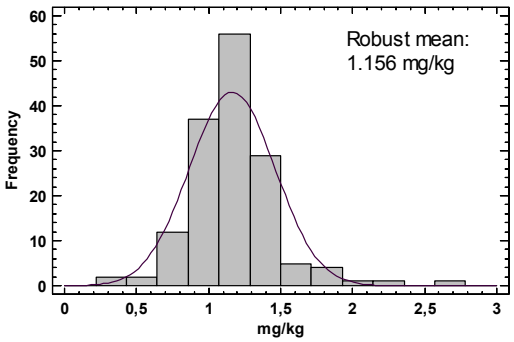
APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

EU/EFTA results presented as histograms. Results reported in the wrong units were removed.

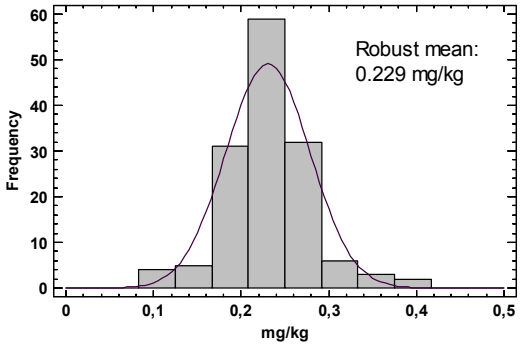
Ametoctradin



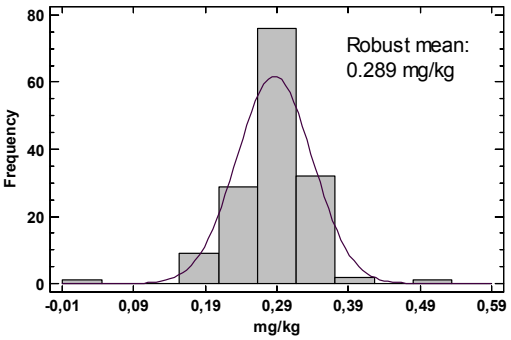
Azoxystrobin



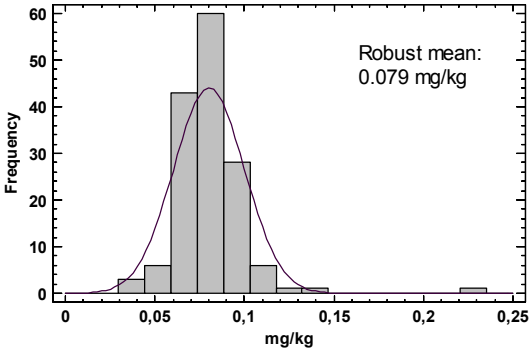
Chlorpropham



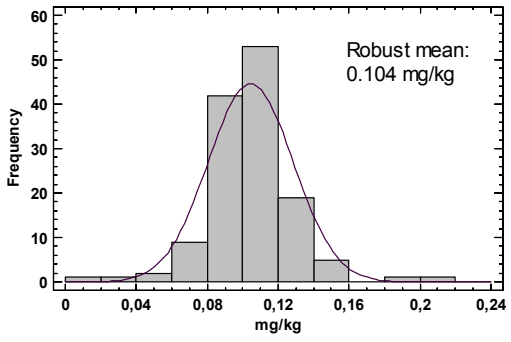
Cyprodinil



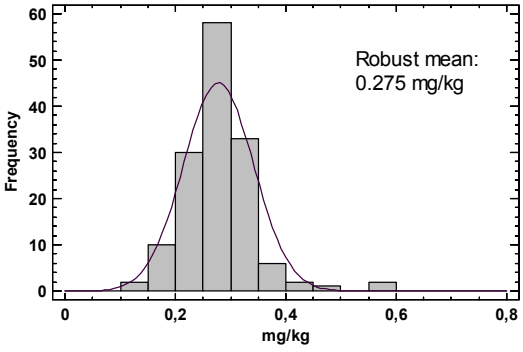
Diazinon



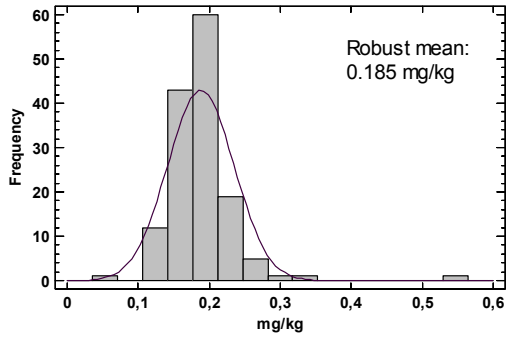
Dicloran



Dimethomorph

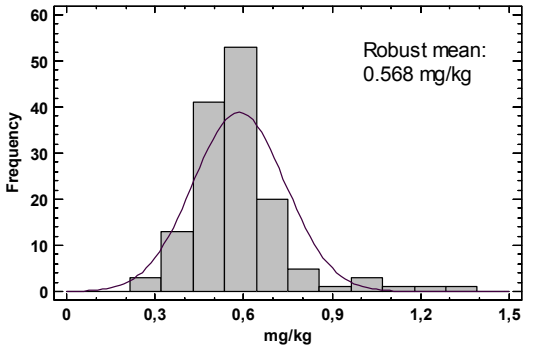


Fenamidone

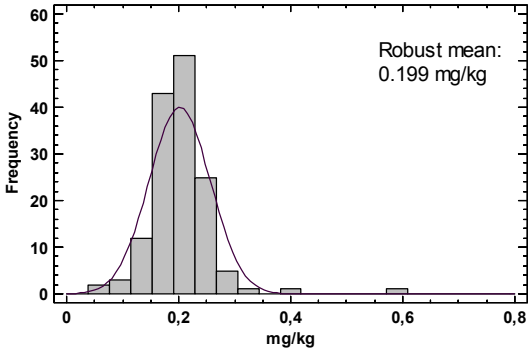


APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

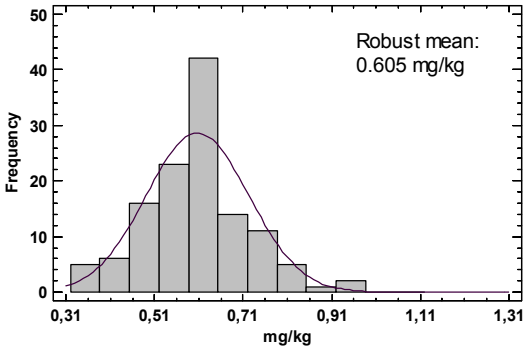
Fenhexamid



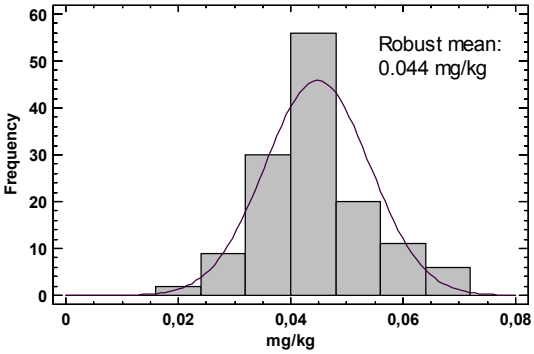
Fludioxonil



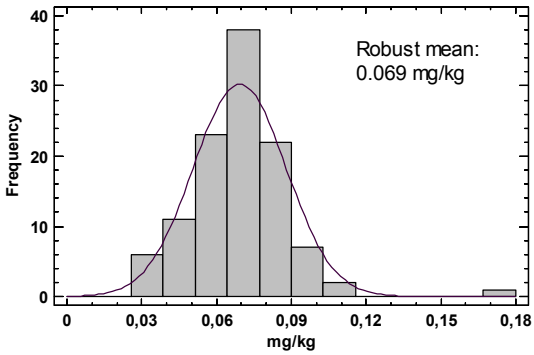
Fluopicolide



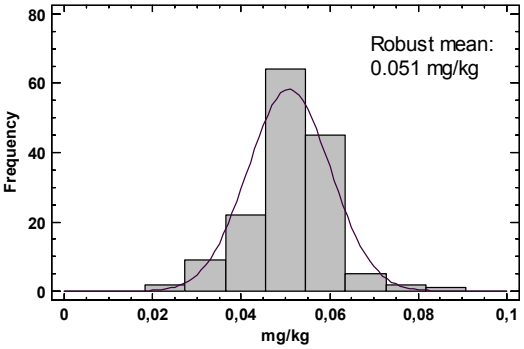
Fluopyram



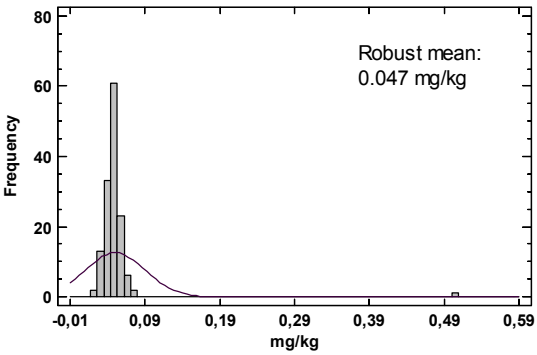
Fluxapyroxad



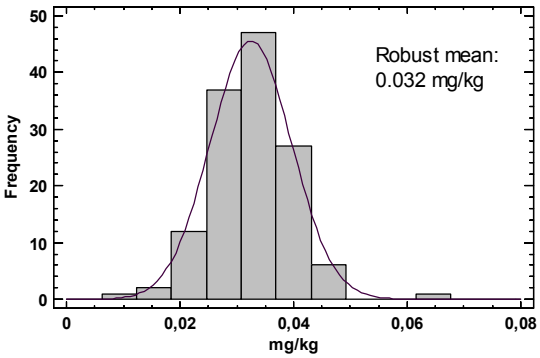
Tebuconazole



Tefluthrin



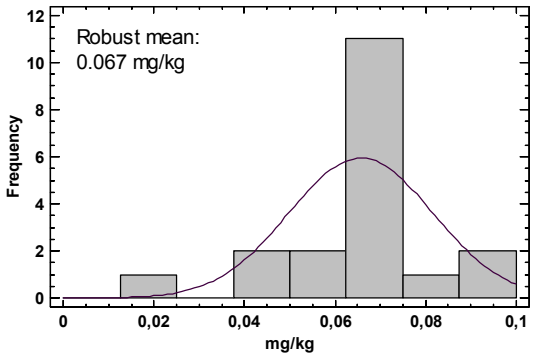
Triadimenol



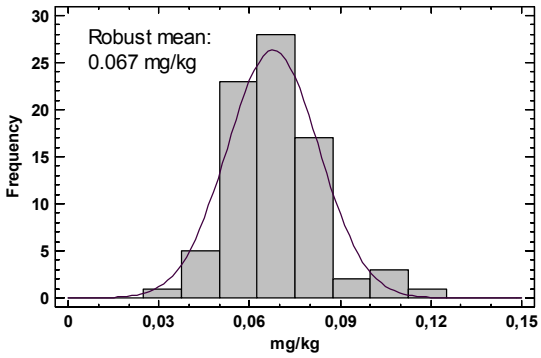
APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

Voluntary pesticides

Fenpicoxamid



Penthiopyrad



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

Results reported by the laboratories for the mandatory pesticides ametoctradin, azoxystrobin, chlorpropham, cyprodinil, diazinon, dicloran, dimethomorph, fenamidone, fenhexamid, fludioxonil, fluopicolide, fluopyram, fluxapyroxad, tebuconazole, tefluthrin and triadimenol (mg/kg) and their calculated z score value using FFP-RSD 25 %

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Chlorpropham	z score (FFP-RSD 25 %)	Cyprodinil	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Dicloran	z score (FFP-RSD 25 %)	Dimethomorph	z score (FFP-RSD 25 %)	Fenamidone	z score (FFP-RSD 25 %)	Fenhexamid	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**		**0.010**		**0.010**		**0.005**		**0.01**		**0.010**		**0.003**		**0.010**	
Robust mean (mg/kg)	**0.082**		**1.156**		**0.229**		**0.289**		**0.079**		**0.104**		**0.275**		**0.185**		**0.568**	
1	0.087	0.2	1.774	2.1	0.2	-0.5	0.298	0.1	0.07	-0.5	0.085	-0.7	0.283	0.1	0.177	-0.2	0.752	1.3
2	0.074	-0.4	1.131	-0.1	0.209	-0.4	0.277	-0.2	0.068	-0.6	0.087	-0.7	0.246	-0.4	0.202	0.4	0.623	0.4
3	0.025	-2.8	1.8	2.2	0.2	-0.5	0.26	-0.4	0.068	-0.6	0.089	-0.6	0.33	0.8	0.18	-0.1	0.6	0.2
4	0.128	2.2	2.64	5.0	0.234	0.1	0.27	-0.3	0.0655	-0.7	0.077	-1.0	0.283	0.1	0.167	-0.4	0.617	0.3
5	0.0775	-0.2	1.12	-0.1	0.234	0.1	0.253	-0.5	0.0683	-0.5	0.0907	-0.5	0.307	0.5	0.201	0.4	0.697	0.9
7	0.0738	-0.4	1.06	-0.3	0.249	0.3	0.283	-0.1	0.0929	0.7	0.0833	-0.8	0.259	-0.2	0.157	-0.6	0.479	-0.6
8	0.0773	-0.2	1.13	-0.1	0.274	0.8	0.298	0.1	0.0734	-0.3	0.0996	-0.2	0.253	-0.3	0.171	-0.3	0.482	-0.6
9	NA		0.95	-0.7	0.235	0.1	0.35	0.8	0.084	0.3	0.097	-0.3	0.219	-0.8	0.182	-0.1	0.51	-0.4
10	0.093	0.5	1.47	1.1	0.23	0.0	0.32	0.4	0.088	0.5	0.2	3.7	0.28	0.1	0.2	0.3	0.73	1.1
11	0.062	-1.0	1.14	-0.1	0.17	-1.0	0.27	-0.3	0.065	-0.7	0.087	-0.7	0.28	0.1	0.17	-0.3	0.56	-0.1
12	NA		ND	-4.0	NA		0.358	1.0	0.087	0.4	0.122	0.7	ND	-3.9	NA		NA	
14	0.106	1.2	1.454	1.0	0.253	0.4	0.317	0.4	0.091	0.6	0.103	-0.1	0.315	0.6	0.208	0.5	0.535	-0.2
15	0.069	-0.6	0.95	-0.7	0.18	-0.9	0.23	-0.8	0.056	-1.2	0.088	-0.6	0.26	-0.2	0.15	-0.8	0.57	0.0
16	0.088	0.3	1.303	0.5	0.26	0.5	0.32	0.4	0.09	0.6	0.105	0.0	0.31	0.5	0.19	0.1	0.696	0.9
17	NA		1.091	-0.2	0.245	0.3	0.313	0.3	0.072	-0.4	0.114	0.4	0.291	0.2	0.192	0.2	0.57	0.0
18	0.0776	-0.2	1.19	0.1	0.253	0.4	0.305	0.2	0.0706	-0.4	0.105	0.0	0.301	0.4	0.203	0.4	0.522	-0.3
19	NA		0.235	-3.2	0.183	-0.8	0.521	3.2	0.051	-1.4	0.151	1.8	0.37	1.4	0.273	1.9	0.996	3.0
20	0.076	-0.3	1.31	0.5	0.388	2.8	0.274	-0.2	0.084	0.3	0.123	0.7	0.316	0.6	0.201	0.4	0.645	0.5
21	0.076	-0.3	1.102	-0.2	0.232	0.1	0.338	0.7	0.078	-0.1	0.096	-0.3	0.251	-0.3	0.18	-0.1	0.614	0.3
22	0.077	-0.3	1.079	-0.3	0.19	-0.7	0.293	0.1	0.067	-0.6	0.09	-0.6	0.214	-0.9	0.196	0.2	0.487	-0.6
23	NA		0.87	-1.0	NA		0.191	-1.4	0.104	1.3	0.127	0.9	0.194	-1.2	0.139	-1.0	NA	
24	ND	-3.5	1.2	0.2	0.22	-0.2	0.3	0.2	0.075	-0.2	0.1	-0.2	0.27	-0.1	0.26	1.6	0.54	-0.2
25	0.0756	-0.3	0.956	-0.7	0.228	0.0	0.276	-0.2	0.0855	0.3	0.125	0.8	0.194	-1.2	0.119	-1.4	0.409	-1.1
26	0.099	0.8	1.477	1.1	0.266	0.6	0.259	-0.4	0.085	0.3	0.127	0.9	0.309	0.5	0.228	0.9	0.522	-0.3
27	0.074	-0.4	0.964	-0.7	0.259	0.5	0.318	0.4	0.095	0.8	0.107	0.1	0.34	1.0	0.183	0.0	0.505	-0.4
28	0.089	0.3	1	-0.5	0.17	-1.0	0.25	-0.5	0.063	-0.8	0.096	-0.3	0.22	-0.8	0.12	-1.4	0.54	-0.2
29	NA		1.496	1.2	0.26	0.5	0.318	0.4	0.088	0.5	0.111	0.3	0.321	0.7	0.242	1.2	0.681	0.8

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

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Chlorpropham	z score (FFP-RSD 25 %)	Cyprodinil	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Dicloran	z score (FFP-RSD 25 %)	Dimethomorph	z score (FFP-RSD 25 %)	Fenamidone	z score (FFP-RSD 25 %)	Fenhexamid	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**		**0.010**		**0.010**		**0.005**		**0.01**		**0.010**		**0.003**		**0.010**	
Robust mean (mg/kg)	**0.082**		**1.156**		**0.229**		**0.289**		**0.079**		**0.104**		**0.275**		**0.185**		**0.568**	
30	0.076	-0.3	1.15	0.0	0.238	0.2	0.287	0.0	0.08	0.0	0.128	0.9	0.209	-1.0	0.171	-0.3	0.562	0.0
31	0.085	0.1	0.975	-0.6	0.23	0.0	0.237	-0.7	0.082	0.1	0.106	0.1	0.194	-1.2	0.145	-0.9	0.381	-1.3
32	0.0952	0.6	1.2388	0.3	0.2087	-0.4	0.2994	0.1	0.0786	0.0	0.0945	-0.4	0.2597	-0.2	0.1905	0.1	0.5087	-0.4
33	0.0811	-0.1	1.2183	0.2	0.1893	-0.7	0.2699	-0.3	0.0766	-0.1	0.0812	-0.9	0.265	-0.1	0.1927	0.2	0.5569	-0.1
34	0.115	1.6	1	-0.5	0.207	-0.4	0.0226	-3.7	0.073	-0.3	0.097	-0.3	0.302	0.4	0.192	0.2	0.497	-0.5
35	NA		0.65	-1.8	0.18	-0.9	0.282	-0.1	0.073	-0.3	0.085	-0.7	0.105	-2.5	0.15	-0.8	0.48	-0.6
36	0.067	-0.7	1.27	0.4	0.23	0.0	0.261	-0.4	0.075	-0.2	0.101	-0.1	0.306	0.5	0.196	0.2	0.622	0.4
37	0.059	-1.1	0.88	-1.0	0.3	1.2	0.27	-0.3	0.06	-1.0	0.12	0.6	0.22	-0.8	0.14	-1.0	0.46	-0.8
38	0.094	0.6	1.26	0.4	0.226	-0.1	0.201	-1.2	0.075	-0.2	0.047	-2.2	0.288	0.2	0.169	-0.3	0.416	-1.1
39	0.109	1.3	1.141	-0.1	0.25	0.4	0.3	0.2	0.09	0.6	0.11	0.2	0.268	-0.1	0.216	0.7	0.479	-0.6
40	0.1	0.9	1.36	0.7	0.26	0.5	0.33	0.6	0.089	0.5	0.11	0.2	0.32	0.7	0.23	1.0	0.65	0.6
41	0.083	0.0	1.6	1.5	0.2	-0.5	0.3	0.2	0.085	0.3	0.092	-0.5	0.29	0.2	0.19	0.1	0.57	0.0
42	NA		0.947	-0.7	NA		0.287	0.0	0.085	0.3	NA		0.413	2.0	0.158	-0.6	NA	
43	NA		1.1	-0.2	NA		0.3	0.2	0.1	1.1	NA		0.29	0.2	0.2	0.3	0.55	-0.1
44	NA		1.21	0.2	NA		0.29	0.0	0.069	-0.5	NA		0.24	-0.5	0.06	-2.7	0.68	0.8
45	NA		1	-0.5	0.23	0.0	0.36	1.0	0.068	-0.6	0.12	0.6	0.25	-0.4	0.15	-0.8	0.42	-1.0
46	NA		0.933	-0.8	NA		0.237	-0.7	0.058	-1.1	NA		0.17	-1.5	0.158	-0.6	0.463	-0.7
47	0.034	-2.3	1.41	0.9	0.16	-1.2	0.201	-1.2	0.063	-0.8	0.084	-0.8	0.28	0.1	0.167	-0.4	0.616	0.3
48	0.0761	-0.3	1	-0.5	0.225	-0.1	0.339	0.7	NA		0.108	0.1	0.257	-0.3	0.189	0.1	0.589	0.1
49	NA		0.895	-0.9	0.12	-1.9	0.266	-0.3	0.034	-2.3	0.064	-1.5	NA		0.17	-0.3	0.48	-0.6
50	0.084	0.1	1.5	1.2	0.22	-0.2	0.36	1.0	0.11	1.6	0.077	-1.0	0.37	1.4	0.19	0.1	0.64	0.5
51	NA		1.052	-0.4	0.237	0.1	0.293	0.1	0.082	0.1	0.104	0.0	NA		0.196	0.2	0.396	-1.2
52	0.078	-0.2	1.09	-0.2	0.213	-0.3	0.296	0.1	0.0756	-0.2	0.093	-0.4	0.274	0.0	0.179	-0.1	0.623	0.4
53	NA		1.16	0.0	0.228	0.0	0.301	0.2	0.0766	-0.1	0.0973	-0.3	NA		0.195	0.2	0.519	-0.3
54	0.081	-0.1	1.09	-0.2	0.23	0.0	0.289	0.0	0.074	-0.3	0.104	0.0	0.269	-0.1	0.175	-0.2	0.6	0.2
55	0.098	0.8	1.043	-0.4	0.108	-2.1	0.281	-0.1	0.039	-2.0	0.067	-1.4	0.268	-0.1	0.155	-0.6	0.436	-0.9
56	0.09	0.4	1.32	0.6	0.29	1.1	0.27	-0.3	0.09	0.6	NA		0.31	0.5	0.19	0.1	0.65	0.6
57	0.073	-0.4	1.118	-0.1	0.224	-0.1	0.311	0.3	0.079	0.0	0.1	-0.2	0.264	-0.2	0.179	-0.1	0.554	-0.1
58	0.046	-1.8	1.18	0.1	NA		0.186	-1.4	0.09	0.6	0.123	0.7	0.168	-1.6	0.108	-1.7	0.309	-1.8
59	0.055	-1.3	0.722	-1.5	0.116	-2.0	0.162	-1.8	0.043	-1.8	0.034	-2.7	0.136	-2.0	0.142	-0.9	0.656	0.6
60	0.072	-0.5	0.81	-1.2	0.29	1.1	0.25	-0.5	0.079	0.0	0.12	0.6	0.27	-0.1	0.16	-0.5	0.55	-0.1

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

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Chlorpropham	z score (FFP-RSD 25 %)	Cyprodinil	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Dicloran	z score (FFP-RSD 25 %)	Dimethomorph	z score (FFP-RSD 25 %)	Fenamidone	z score (FFP-RSD 25 %)	Fenhexamid	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**		**0.010**		**0.010**		**0.005**		**0.01**		**0.010**		**0.003**		**0.010**	
Robust mean (mg/kg)	**0.082**		**1.156**		**0.229**		**0.289**		**0.079**		**0.104**		**0.275**		**0.185**		**0.568**	
61	0.068	-0.7	1.35	0.7	0.215	-0.2	0.29	0.0	0.076	-0.2	0.114	0.4	0.287	0.2	0.162	-0.5	0.629	0.4
62	NA		1.037	-0.4	0.277	0.8	0.314	0.3	0.096	0.9	0.119	0.6	0.26	-0.2	0.15	-0.8	0.366	-1.4
63	0.103	1.0	1.14	-0.1	0.252	0.4	0.357	0.9	0.095	0.8	0.096	-0.3	0.332	0.8	0.221	0.8	0.885	2.2
64	0.0854	0.2	1.04	-0.4	0.22	-0.2	0.268	-0.3	0.071	-0.4	0.106	0.1	0.266	-0.1	0.178	-0.1	0.487	-0.6
65	0.085	0.1	1.23	0.3	0.264	0.6	0.316	0.4	0.104	1.3	0.128	0.9	0.317	0.6	0.19	0.1	0.719	1.1
66	0.064	-0.9	1.04	-0.4	0.21	-0.3	0.26	-0.4	0.073	-0.3	0.095	-0.4	0.21	-0.9	0.175	-0.2	0.556	-0.1
67	NA		0.927	-0.8	0.185	-0.8	0.33	0.6	0.0761	-0.1	0.0568	-1.8	0.581	4.5	0.235	1.1	ND	-3.9
68	0.0729	-0.5	1.29	0.5	0.212	-0.3	0.318	0.4	0.0739	-0.3	0.104	0.0	0.2	-1.1	0.201	0.4	0.405	-1.1
69	0.0483	-1.6	0.785	-1.3	0.158	-1.2	0.203	-1.2	0.0506	-1.4	0.0835	-0.8	0.19	-1.2	0.116	-1.5	0.413	-1.1
70	NA		1.12	-0.1	0.39	2.8	0.312	0.3	0.1	1.1	0.1	-0.2	0.27	-0.1	0.174	-0.2	1.08	3.6
71	0.084	0.1	1.2	0.2	0.26	0.5	0.31	0.3	0.09	0.6	0.11	0.2	0.32	0.7	0.22	0.8	0.51	-0.4
72	NA		1.23	0.3	0.25	0.4	0.33	0.6	0.08	0.0	0.16	2.1	0.29	0.2	NA		0.76	1.4
73	NA		1.51	1.2	0.279	0.9	0.318	0.4	0.092	0.7	0.153	1.9	NA		NA		NA	
74	0.0822	0.0	1.22	0.2	0.175	-0.9	0.292	0.0	0.0762	-0.1	0.0904	-0.5	0.265	-0.1	0.199	0.3	0.492	-0.5
75	NA		0.707	-1.6	0.2	-0.5	0.204	-1.2	0.07	-0.5	0.089	-0.6	0.183	-1.3	0.159	-0.6	0.425	-1.0
76	0.126	2.1	1.016	-0.5	0.166	-1.1	0.235	-0.7	0.06	-1.0	0.086	-0.7	0.284	0.1	0.173	-0.3	0.574	0.0
77	NA		0.75	-1.4	0.22	-0.2	0.29	0.0	0.063	-0.8	NA		0.24	-0.5	0.16	-0.5	0.5	-0.5
78	NA		0.936	-0.8	0.296	1.2	0.323	0.5	0.079	0.0	0.083	-0.8	0.263	-0.2	0.163	-0.5	0.487	-0.6
79	0.086	0.2	1.215	0.2	0.211	-0.3	0.267	-0.3	0.087	0.4	0.122	0.7	0.26	-0.2	0.208	0.5	0.614	0.3
80	0.078	-0.2	1.42	0.9	0.21	-0.3	0.41	1.7	0.07	-0.5	0.1	-0.2	0.28	0.1	0.23	1.0	0.59	0.2
81	NA		1.4	0.8	0.246	0.3	0.341	0.7	NA		NA		0.291	0.2	NA		0.85	2.0
82	0.0956	0.7	1.369	0.7	0.283	0.9	0.333	0.6	0.0971	0.9	0.118	0.5	0.332	0.8	0.219	0.7	0.692	0.9
83	0.087	0.2	1.15	0.0	0.258	0.5	0.296	0.1	0.088	0.5	0.092	-0.5	0.258	-0.2	0.17	-0.3	0.553	-0.1
84	0.0814	0.0	1.18	0.1	0.312	1.4	0.239	-0.7	0.0645	-0.7	0.135	1.2	0.271	-0.1	0.173	-0.3	0.489	-0.6
85	0.074	-0.4	0.84	-1.1	0.244	0.3	0.268	-0.3	0.077	-0.1	0.111	0.3	0.234	-0.6	0.137	-1.0	0.483	-0.6
86	NA		1.99	2.9	0.223	-0.1	0.27	-0.3	0.0726	-0.3	NA		0.18	-1.4	0.141	-0.9	0.591	0.2
87	0.076	-0.3	1.65	1.7	0.223	-0.1	0.227	-0.9	0.084	0.3	0.068	-1.4	0.298	0.3	0.206	0.5	0.519	-0.3
88	0.085	0.1	1.146	0.0	0.218	-0.2	0.308	0.3	0.082	0.1	0.129	0.9	0.249	-0.4	0.175	-0.2	0.605	0.3
89	0.0865	0.2	1.0202	-0.5	0.201	-0.5	0.237	-0.7	0.0795	0.0	0.095	-0.4	0.2718	0.0	0.2542	1.5	0.543	-0.2
90	0.11	1.4	1.3	0.5	0.28	0.9	0.34	0.7	0.078	-0.1	0.12	0.6	0.27	-0.1	0.19	0.1	0.7	0.9
91	0.0978	0.8	0.991	-0.6	0.261	0.6	0.315	0.4	0.0895	0.5	0.112	0.3	0.233	-0.6	0.166	-0.4	0.534	-0.2

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

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Chlorpropham	z score (FFP-RSD 25 %)	Cyprodinil	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Dicloran	z score (FFP-RSD 25 %)	Dimethomorph	z score (FFP-RSD 25 %)	Fenamidone	z score (FFP-RSD 25 %)	Fenhexamid	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**		**0.010**		**0.010**		**0.005**		**0.01**		**0.010**		**0.003**		**0.010**	
Robust mean (mg/kg)	**0.082**		**1.156**		**0.229**		**0.289**		**0.079**		**0.104**		**0.275**		**0.185**		**0.568**	
92	0.1085	1.3	1.5337	1.3	0.1801	-0.9	0.2192	-1.0	0.0607	-0.9	0.0865	-0.7	0.5588	4.1	0.3409	3.4	1.0526	3.4
93	0.079	-0.2	1.2	0.2	0.23	0.0	0.27	-0.3	0.081	0.1	0.13	1.0	0.24	-0.5	0.18	-0.1	0.64	0.5
94	0.083	0.0	1.323	0.6	0.227	0.0	0.31	0.3	0.086	0.4	0.14	1.4	0.284	0.1	0.191	0.1	0.667	0.7
95	0.093	0.5	1.116	-0.1	0.228	0.0	0.279	-0.1	0.066	-0.7	0.095	-0.4	0.289	0.2	0.151	-0.7	0.53	-0.3
96	0.0815	0.0	1.03	-0.4	NA		0.319	0.4	0.101	1.1	ND	-3.6	0.315	0.6	0.17	-0.3	0.586	0.1
97	NA		1.227	0.2	ND	-3.8	0.275	-0.2	0.111	1.6	0.086	-0.7	0.19	-1.2	0.102	-1.8	0.565	0.0
98	0.097	0.7	1.234	0.3	0.244	0.3	0.317	0.4	0.082	0.1	0.089	-0.6	0.28	0.1	0.171	-0.3	0.519	-0.3
99	0.042	-2.0	0.811	-1.2	0.23	0.0	0.156	-1.8	0.093	0.7	0.128	0.9	0.215	-0.9	0.114	-1.5	0.303	-1.9
101	0.088	0.3	1.199	0.1	0.256	0.5	0.349	0.8	0.088	0.5	0.113	0.3	0.297	0.3	0.214	0.6	0.632	0.4
102	0.0715	-0.5	0.941	-0.7	0.177	-0.9	0.235	-0.7	0.0812	0.1	0.0992	-0.2	0.227	-0.7	0.165	-0.4	0.524	-0.3
103	0.088	0.3	0.747	-1.4	0.25	0.4	0.31	0.3	0.107	1.4	0.09	-0.6	0.296	0.3	0.216	0.7	0.499	-0.5
104	0.082	0.0	1.1	-0.2	0.21	-0.3	0.36	1.0	0.066	-0.7	NA		0.27	-0.1	0.18	-0.1	0.62	0.4
105	NA		1.136	-0.1	ND	-3.8	NA		0.1	1.1	NA		0.24	-0.5	0.18	-0.1	0.345	-1.6
107	0.103	1.0	1.257	0.3	0.246	0.3	0.263	-0.4	0.08	0.0	0.127	0.9	0.302	0.4	0.185	0.0	0.591	0.2
108	NA		0.657	-1.7	0.173	-1.0	0.224	-0.9	0.059	-1.0	0.094	-0.4	0.161	-1.7	0.122	-1.4	NA	
109	0.101	0.9	1.39	0.8	0.276	0.8	0.304	0.2	0.079	0.0	0.108	0.1	0.337	0.9	0.198	0.3	0.657	0.6
110	0.074	-0.4	1.02	-0.5	0.233	0.1	0.276	-0.2	0.084	0.3	0.0135	-3.5	0.229	-0.7	0.212	0.6	0.582	0.1
111	0.063	-0.9	1.15	0.0	0.205	-0.4	0.253	-0.5	0.074	-0.3	0.123	0.7	0.25	-0.4	0.17	-0.3	0.479	-0.6
112	NA		1.1	-0.2	0.37	2.5	0.41	1.7	0.09	0.6	0.12	0.6	0.21	-0.9	0.17	-0.3	NA	
113	0.154	3.5	1.133	-0.1	0.265	0.6	0.303	0.2	0.1	1.1	0.102	-0.1	0.262	-0.2	0.203	0.4	0.496	-0.5
114	0.065	-0.8	1.254	0.3	0.199	-0.5	0.246	-0.6	0.071	-0.4	0.127	0.9	0.276	0.0	0.14	-1.0	0.594	0.2
115	0.15	3.3	1.4	0.8	0.26	0.5	0.33	0.6	0.091	0.6	0.14	1.4	0.47	2.8	0.2	0.3	0.59	0.2
116	0.0648	-0.8	1.07	-0.3	NA		0.313	0.3	0.0718	-0.4	0.123	0.7	0.223	-0.8	0.206	0.5	1.05	3.4
117	0.085	0.1	1.159	0.0	0.195	-0.6	0.27	-0.3	0.07	-0.5	0.11	0.2	0.27	-0.1	0.18	-0.1	0.525	-0.3
118	0.097	0.7	1.22	0.2	0.239	0.2	0.31	0.3	0.089	0.5	0.12	0.6	0.264	-0.2	0.28	2.1	0.638	0.5
119	NA		1.416	0.9	0.277	0.8	0.353	0.9	0.083	0.2	0.107	0.1	0.305	0.4	0.202	0.4	0.552	-0.1
120	NA		NA		0.118	-1.9	NA		NA		0.078	-1.0	NA		NA		NA	
121	0.067	-0.7	0.97	-0.6	0.23	0.0	0.27	-0.3	0.068	-0.6	0.11	0.2	0.3	0.4	0.14	-1.0	0.47	-0.7
122	0.078	-0.2	1.059	-0.3	0.278	0.9	0.33	0.6	0.053	-1.3	0.093	-0.4	0.234	-0.6	0.226	0.9	0.442	-0.9
123	0.0768	-0.3	0.96	-0.7	0.229	0.0	0.252	-0.5	0.0777	-0.1	0.101	-0.1	0.231	-0.6	0.158	-0.6	0.638	0.5
124	NA		1.1	-0.2	0.2	-0.5	0.34	0.7	0.073	-0.3	0.085	-0.7	0.28	0.1	0.19	0.1	0.46	-0.8

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

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Chlorpropham	z score (FFP-RSD 25 %)	Cyprodinil	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Dicloran	z score (FFP-RSD 25 %)	Dimethomorph	z score (FFP-RSD 25 %)	Fenamidone	z score (FFP-RSD 25 %)	Fenhexamid	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**		**0.010**		**0.010**		**0.005**		**0.01**		**0.010**		**0.003**		**0.010**	
Robust mean (mg/kg)	**0.082**		**1.156**		**0.229**		**0.289**		**0.079**		**0.104**		**0.275**		**0.185**		**0.568**	
125	NA		1.51	1.2	0.321	1.6	0.361	1.0	0.084	0.3	0.115	0.4	0.301	0.4	0.197	0.3	0.39	-1.3
126	0.098	0.8	1.74	2.0	0.206	-0.4	0.306	0.2	0.102	1.2	0.098	-0.2	0.37	1.4	0.218	0.7	0.704	1.0
129	0.113	1.5	1.265	0.4	0.263	0.6	0.276	-0.2	0.093	0.7	0.095	-0.4	0.224	-0.7	0.197	0.3	0.461	-0.8
130	NA		1.739	2.0	NA		0.278	-0.2	0.075	-0.2	NA		NA		NA		NA	
131	0.097	0.7	0.96	-0.7	0.2	-0.5	0.26	-0.4	0.068	-0.6	0.095	-0.4	0.27	-0.1	0.19	0.1	0.55	-0.1
132	NA		0.618	-1.9	0.172	-1.0	0.303	0.2	0.104	1.3	NA		0.423	2.2	0.542	5.0	1.33	5.0
133	NA		1.206	0.2	0.216	-0.2	0.261	-0.4	0.065	-0.7	0.124	0.8	0.262	-0.2	0.164	-0.4	0.681	0.8
134	0.05	-1.6	0.92	-0.8	0.21	-0.3	0.26	-0.4	0.08	0.0	0.11	0.2	0.22	-0.8	0.15	-0.8	0.49	-0.5
135	NA		NA		0.213	-0.3	0.289	0.0	0.068	-0.6	NA		NA		NA		0.484	-0.6
136	NA		1.35	0.7	0.35	2.1	0.304	0.2	0.096	0.9	0.101	-0.1	0.32	0.7	0.219	0.7	0.57	0.0
137	0.146	3.1	1.33	0.6	0.304	1.3	0.276	-0.2	0.094	0.8	0.116	0.4	0.365	1.3	0.247	1.3	0.494	-0.5
138	NA		1.434	1.0	0.208	-0.4	0.29	0.0	0.128	2.5	NA		0.225	-0.7	0.213	0.6	0.761	1.4
139	0.028	-2.6	1.1	-0.2	0.17	-1.0	0.23	-0.8	0.059	-1.0	0.079	-1.0	0.22	-0.8	0.15	-0.8	0.53	-0.3
140	0.065	-0.8	1.1	-0.2	0.21	-0.3	0.24	-0.7	0.067	-0.6	0.09	-0.6	0.24	-0.5	0.16	-0.5	0.5	-0.5
141	NA		1.147	0.0	0.202	-0.5	0.215	-1.0	0.235	5.0	ND	-3.6	0.336	0.9	0.215	0.7	0.855	2.0
142	0.11	1.4	1.4	0.8	0.26	0.5	0.29	0.0	0.076	-0.2	0.12	0.6	0.31	0.5	0.19	0.1	0.71	1.0
143	0.067	-0.7	1.2	0.2	0.21	-0.3	0.27	-0.3	0.064	-0.8	ND	-3.6	0.334	0.9	0.213	0.6	0.39	-1.3
144	0.096	0.7	1.228	0.2	0.182	-0.8	0.26	-0.4	0.079	0.0	0.073	-1.2	0.33	0.8	0.295	2.4	0.502	-0.5
145	NA		1.35	0.7	0.261	0.6	0.271	-0.2	0.091	0.6	0.117	0.5	0.293	0.3	0.201	0.4	NA	
146	NA		0.88	-1.0	NA		0.22	-1.0	0.038	-2.1	0.05	-2.1	0.17	-1.5	0.13	-1.2	0.38	-1.3
147	0.073	-0.4	1.26	0.4	0.258	0.5	0.267	-0.3	0.077	-0.1	0.093	-0.4	0.307	0.5	0.208	0.5	0.577	0.1
148	0.089	0.3	1.33	0.6	0.26	0.5	0.323	0.5	0.097	0.9	0.127	0.9	0.312	0.5	0.171	-0.3	0.738	1.2
149	NA		1.1	-0.2	NA		NA		0.093	0.7	NA		0.34	1.0	0.143	-0.9	NA	
150	0.081	-0.1	0.897	-0.9	0.193	-0.6	0.254	-0.5	0.0775	-0.1	0.0915	-0.5	0.228	-0.7	0.174	-0.2	0.768	1.4
151	NA		1.773	2.1	0.198	-0.5	0.316	0.4	0.084	0.3	0.187	3.2	0.275	0.0	0.171	-0.3	0.64	0.5
152	0.399	5.0	1.25	0.3	0.317	1.5	0.333	0.6	0.112	1.7	0.11	0.2	0.298	0.3	0.202	0.4	0.558	-0.1
153	NA		1.14	-0.1	0.275	0.8	NA		0.087	0.4	0.119	0.6	0.294	0.3	0.228	0.9	0.628	0.4
154	NA		1.092	-0.2	ND	-3.8	0.3	0.2	0.099	1.0	0.081	-0.9	0.28	0.1	0.189	0.1	0.626	0.4
155	0.088	0.3	0.991	-0.6	0.231	0.0	0.302	0.2	0.083	0.2	0.12	0.6	0.232	-0.6	0.175	-0.2	0.601	0.2
156	0.07	-0.6	0.835	-1.1	0.154	-1.3	0.279	-0.1	0.081	0.1	0.097	-0.3	0.362	1.3	0.152	-0.7	0.468	-0.7
157	0.079	-0.2	0.8	-1.2	0.21	-0.3	0.17	-1.6	0.07	-0.5	0.12	0.6	0.22	-0.8	0.18	-0.1	0.56	-0.1

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

Lab Code	Ametoctradin	z score (FFP-RSD 25 %)	Azoxystrobin	z score (FFP-RSD 25 %)	Chlorpropham	z score (FFP-RSD 25 %)	Cyprodinil	z score (FFP-RSD 25 %)	Diazinon	z score (FFP-RSD 25 %)	Dicloran	z score (FFP-RSD 25 %)	Dimethomorph	z score (FFP-RSD 25 %)	Fenamidone	z score (FFP-RSD 25 %)	Fenhexamid	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**		**0.010**		**0.010**		**0.005**		**0.01**		**0.010**		**0.003**		**0.010**	
Robust mean (mg/kg)	**0.082**		**1.156**		**0.229**		**0.289**		**0.079**		**0.104**		**0.275**		**0.185**		**0.568**	
158	NA		0.537	-2.1	0.338	1.9	ND	-3.9	ND	-3.7	ND	-3.6	0.203	-1.0	ND	-3.8	0.296	-1.9
159	97	5.0	1015	5.0	223	5.0	253	5.0	88	5.0	128	5.0	176	5.0	186	5.0	778	5.0
160	0.98	5.0	1.152	0.0	0.259	0.5	0.276	-0.2	0.062	-0.9	0.11	0.2	0.303	0.4	0.179	-0.1	0.574	0.0
161	0.087	0.2	1.275	0.4	0.233	0.1	0.293	0.1	0.071	-0.4	0.101	-0.1	0.295	0.3	0.255	1.5	0.723	1.1
162	0.0809	-0.1	1.21	0.2	0.211	-0.3	0.312	0.3	0.0797	0.0	0.0928	-0.4	0.284	0.1	0.177	-0.2	0.577	0.1
163	0.0954	0.6	2.165	3.5	0.193	-0.6	0.217	-1.0	0.078	-0.1	0.114	0.4	0.365	1.3	0.19	0.1	1.192	4.4
164	0.08	-0.1	1.434	1.0	0.237	0.1	0.327	0.5	0.142	3.2	0.114	0.4	0.331	0.8	0.211	0.6	0.734	1.2
165	0.959	5.0	1	-0.5	0.255	0.5	0.302	0.2	0.0839	0.2	ND	-3.6	0.276	0.0	0.179	-0.1	0.525	-0.3
166	0.0726	-0.5	0.992	-0.6	0.227	0.0	0.295	0.1	0.063	-0.8	0.106	0.1	0.257	-0.3	0.171	-0.3	0.428	-1.0
167	NA		0.405	-2.6	0.128	-1.8	0.232	-0.8	0.055	-1.2	0.068	-1.4	NA		NA		NA	
168	NA		1.65	1.7	NA		ND	-3.9	0.09	0.6	ND	-3.6	ND	-3.9	ND	-3.8	1.3	5.0
169	0.09	0.4	0.764	-1.4	NA		0.282	-0.1	0.079	0.0	0.092	-0.5	0.319	0.6	NA		0.565	0.0
170	0.092	0.5	1.295	0.5	0.245	0.3	0.279	-0.1	0.09	0.6	0.115	0.4	0.31	0.5	0.208	0.5	0.56	-0.1
172	0.09	0.4	1.185	0.1	0.205	-0.4	0.257	-0.4	0.07	-0.5	0.097	-0.3	0.344	1.0	0.187	0.0	0.583	0.1
173	ND	-3.5	ND	-4.0	ND	-3.8	0.301	0.2	ND	-3.7	ND	-3.6	ND	-3.9	ND	-3.8	ND	-3.9
177	0.076	-0.3	1.018	-0.5	0.211	-0.3	0.336	0.7	0.086	0.4	0.1	-0.2	0.261	-0.2	0.178	-0.1	0.513	-0.4
179	0.077	-0.3	1.142	0.0	0.167	-1.1	0.302	0.2	0.059	-1.0	0.088	-0.6	0.243	-0.5	0.193	0.2	0.525	-0.3
182	ND	-3.5	1.367	0.7	0.269	0.7	0.328	0.5	0.092	0.7	ND	-3.6	0.301	0.4	ND	-3.8	0.55	-0.1
183	0.076	-0.3	1.2	0.2	0.24	0.2	0.29	0.0	0.081	0.1	0.085	-0.7	0.26	-0.2	0.18	-0.1	0.51	-0.4

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

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

Lab Code	Fludioxonil	z score (FFP-RSD 25 %)	Fluopicolide	z score (FFP-RSD 25 %)	Fluopyram	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)	Tebuconazole	z score (FFP-RSD 25 %)	Tefluthrin	z score (FFP-RSD 25 %)	Triadimenol	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.01**		**0.01**		**0.010**		**0.010**		**0.010**		**0.010**		**0.010**	
Robust mean (mg/kg)	**0.199**		**0.605**		**0.044**		**0.069**		**0.051**		**0.047**		**0.032**	
1	0.228	0.6	0.699	0.6	0.039	-0.5	0.065	-0.2	0.059	0.6	0.039	-0.7	0.035	0.3
2	0.175	-0.5	0.625	0.1	0.055	1.0	0.083	0.8	0.058	0.6	0.038	-0.7	0.036	0.4
3	0.17	-0.6	0.54	-0.4	0.035	-0.8	0.056	-0.7	0.035	-1.2	0.039	-0.7	0.025	-0.9
4	0.243	0.9	0.621	0.1	0.0456	0.1	0.0668	-0.1	0.0505	0.0	0.047	0.0	0.0367	0.5
5	0.259	1.2	0.553	-0.3	0.0496	0.5	0.0966	1.6	0.0485	-0.2	0.044	-0.2	0.0358	0.4
7	0.23	0.6	0.594	-0.1	0.0429	-0.1	0.0592	-0.6	0.0515	0.1	0.0437	-0.3	0.0331	0.1
8	0.203	0.1	0.603	0.0	0.0488	0.4	0.0682	0.0	0.0569	0.5	0.0503	0.3	0.0347	0.3
9	0.127	-1.5	0.527	-0.5	0.047	0.2	0.061	-0.5	0.054	0.3	0.035	-1.0	0.022	-1.3
10	0.26	1.2	0.64	0.2	0.046	0.1	0.079	0.6	0.061	0.8	0.052	0.5	0.038	0.7
11	0.19	-0.2	0.58	-0.2	0.027	-1.6	0.039	-1.7	0.034	-1.3	0.031	-1.3	0.022	-1.3
12	0.268	1.4	NA		NA		NA		ND	-3.2	NA		NA	
14	0.222	0.5	0.771	1.1	0.054	0.9	0.082	0.8	0.058	0.6	0.046	-0.1	0.034	0.2
15	0.15	-1.0	0.47	-0.9	0.035	-0.8	0.051	-1.0	0.042	-0.7	0.033	-1.2	ND	-3.5
16	0.24	0.8	0.68	0.5	0.051	0.6	0.071	0.1	0.056	0.4	0.052	0.5	0.037	0.6
17	0.216	0.3	NA		0.045	0.1	NA		0.051	0.0	0.05	0.3	0.035	0.3
18	0.198	0.0	0.645	0.3	0.0677	2.1	0.0659	-0.2	0.0219	-2.3	0.0466	0.0	0.0302	-0.3
19	0.588	5.0	NA		NA		NA		0.077	2.1	0.029	-1.5	ND	-3.5
20	0.237	0.8	0.652	0.3	0.045	0.1	0.076	0.4	0.051	0.0	0.051	0.4	0.029	-0.4
21	0.215	0.3	0.384	-1.5	0.043	-0.1	0.065	-0.2	0.056	0.4	0.041	-0.5	0.028	-0.6
22	0.163	-0.7	0.597	-0.1	0.039	-0.5	0.067	-0.1	0.054	0.3	0.035	-1.0	0.022	-1.3
23	0.231	0.6	NA		0.048	0.3	NA		0.072	1.7	0.065	1.6	0.037	0.6
24	0.19	-0.2	0.65	0.3	0.042	-0.2	ND	-3.4	0.05	-0.1	0.046	-0.1	0.028	-0.6
25	0.105	-1.9	0.408	-1.3	0.0337	-1.0	0.0356	-1.9	0.0385	-1.0	0.048	0.1	0.0211	-1.4
26	0.162	-0.8	0.66	0.4	0.044	0.0	0.071	0.1	0.049	-0.1	0.06	1.1	0.046	1.7
27	0.218	0.4	0.636	0.2	0.057	1.1	0.069	0.0	0.044	-0.5	0.056	0.8	0.03	-0.3
28	0.18	-0.4	0.45	-1.0	0.031	-1.2	0.064	-0.3	0.044	-0.5	0.043	-0.3	0.034	0.2
29	0.194	-0.1	0.821	1.4	0.048	0.3	0.076	0.4	0.058	0.6	0.052	0.5	0.038	0.7
30	0.231	0.6	0.495	-0.7	0.037	-0.7	0.051	-1.0	0.05	-0.1	0.05	0.3	0.026	-0.8
31	0.178	-0.4	0.573	-0.2	0.042	-0.2	0.075	0.4	0.053	0.2	0.048	0.1	0.038	0.7
32	0.1843	-0.3	0.7045	0.7	0.0484	0.4	0.0772	0.5	0.0571	0.5	0.05	0.3	0.0407	1.0
33	0.1862	-0.3	0.6968	0.6	0.0508	0.6	0.081	0.7	0.0604	0.8	0.0421	-0.4	0.0441	1.4
34	0.143	-1.1	0.648	0.3	0.047	0.2	0.071	0.1	0.04	-0.8	0.042	-0.4	0.026	-0.8

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

Lab Code	Fludioxonil	z score (FFP-RSD 25 %)	Fluopicolide	z score (FFP-RSD 25 %)	Fluopyram	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)	Tebuconazole	z score (FFP-RSD 25 %)	Tefluthrin	z score (FFP-RSD 25 %)	Triadimenol	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.01**		**0.01**		**0.010**		**0.010**		**0.010**		**0.010**		**0.010**	
Robust mean (mg/kg)	**0.199**		**0.605**		**0.044**		**0.069**		**0.051**		**0.047**		**0.032**	
35	0.06	-2.8	0.576	-0.2	0.048	0.3	ND	-3.4	0.049	-0.1	0.03	-1.4	0.036	0.4
36	0.216	0.3	0.598	0.0	0.054	0.9	0.038	-1.8	0.047	-0.3	0.042	-0.4	0.03	-0.3
37	0.18	-0.4	0.48	-0.8	0.033	-1.0	0.054	-0.9	0.057	0.5	0.048	0.1	0.021	-1.4
38	0.208	0.2	0.571	-0.2	0.057	1.1	0.064	-0.3	0.057	0.5	0.05	0.3	0.036	0.4
39	0.198	0.0	0.48	-0.8	0.059	1.3	0.069	0.0	0.059	0.6	0.06	1.1	0.04	0.9
40	0.21	0.2	0.71	0.7	0.052	0.7	0.086	1.0	0.059	0.6	0.053	0.5	0.041	1.1
41	0.19	-0.2	0.69	0.6	0.041	-0.3	0.071	0.1	0.058	0.6	0.048	0.1	0.041	1.1
42	0.147	-1.1	NA		NA		NA		0.047	-0.3	NA		NA	
43	NA		NA		NA		NA		0.06	0.7	NA		0.035	0.3
44	0.18	-0.4	NA		NA		NA		0.046	-0.4	NA		ND	-3.5
45	0.24	0.8	0.54	-0.4	0.037	-0.7	NA		0.047	-0.3	0.053	0.5	0.027	-0.7
46	0.135	-1.3	NA		NA		NA		0.039	-0.9	NA		0.015	-2.2
47	0.141	-1.2	0.452	-1.0	0.031	-1.2	0.056	-0.7	0.039	-0.9	0.039	-0.7	0.029	-0.4
48	0.242	0.9	0.565	-0.3	0.043	-0.1	0.0489	-1.2	0.0471	-0.3	0.0551	0.7	0.0265	-0.7
49	0.156	-0.9	NA		NA		NA		0.034	-1.3	0.029	-1.5	0.032	-0.1
50	0.4	4.0	0.76	1.0	0.048	0.3	0.09	1.2	0.06	0.7	0.052	0.5	0.038	0.7
51	0.185	-0.3	0.592	-0.1	0.042	-0.2	NA		0.049	-0.1	0.048	0.1	0.029	-0.4
52	0.197	0.0	0.611	0.0	0.059	1.3	0.0715	0.2	0.059	0.6	0.045	-0.1	0.0306	-0.2
53	0.205	0.1	0.661	0.4	0.043	-0.1	NA		0.0477	-0.2	0.0409	-0.5	0.0271	-0.7
54	0.17	-0.6	0.494	-0.7	0.04	-0.4	0.063	-0.3	0.049	-0.1	0.047	0.0	0.031	-0.2
55	0.113	-1.7	0.529	-0.5	0.036	-0.8	0.05	-1.1	0.046	-0.4	0.027	-1.7	0.029	-0.4
56	0.21	0.2	0.77	1.1	0.05	0.5	NA		0.05	-0.1	0.06	1.1	0.04	0.9
57	0.202	0.1	0.611	0.0	0.053	0.8	0.071	0.1	0.056	0.4	0.046	-0.1	0.034	0.2
58	0.238	0.8	0.376	-1.5	0.024	-1.8	0.05	-1.1	0.055	0.3	0.051	0.4	ND	-3.5
59	ND	-3.8	0.5	-0.7	0.034	-0.9	0.065	-0.2	0.028	-1.8	0.019	-2.4	0.027	-0.7
60	0.22	0.4	0.61	0.0	0.041	-0.3	0.067	-0.1	0.052	0.1	0.048	0.1	0.035	0.3
61	0.192	-0.1	0.625	0.1	0.028	-1.5	0.053	-0.9	0.04	-0.8	0.041	-0.5	0.031	-0.2
62	0.22	0.4	0.788	1.2	0.051	0.6	NA		0.055	0.3	0.057	0.9	0.033	0.1
63	0.254	1.1	0.797	1.3	0.041	-0.3	0.083	0.8	0.055	0.3	0.063	1.4	0.037	0.6
64	0.193	-0.1	0.618	0.1	0.0378	-0.6	0.0534	-0.9	0.0431	-0.6	0.045	-0.1	0.0201	-1.5
65	0.243	0.9	0.729	0.8	0.042	-0.2	0.073	0.2	0.048	-0.2	0.064	1.5	0.029	-0.4
66	0.17	-0.6	0.54	-0.4	0.039	-0.5	0.047	-1.3	0.036	-1.2	0.051	0.4	0.029	-0.4
67	0.168	-0.6	0.542	-0.4	0.0423	-0.2	0.0595	-0.5	0.0515	0.1	0.0484	0.1	ND	-3.5

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

Lab Code	Fludioxonil	z score (FFP-RSD 25 %)	Fluopicolide	z score (FFP-RSD 25 %)	Fluopyram	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)	Tebuconazole	z score (FFP-RSD 25 %)	Tefluthrin	z score (FFP-RSD 25 %)	Triadimenol	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.01**		**0.01**		**0.010**		**0.010**		**0.010**		**0.010**		**0.010**	
Robust mean (mg/kg)	**0.199**		**0.605**		**0.044**		**0.069**		**0.051**		**0.047**		**0.032**	
68	0.237	0.8	0.61	0.0	0.0491	0.4	0.0911	1.3	0.0706	1.6	0.0385	-0.7	0.0105	-2.7
69	0.115	-1.7	0.354	-1.7	0.0301	-1.3	0.0351	-2.0	0.0347	-1.3	0.03	-1.4	0.0272	-0.6
70	0.168	-0.6	0.638	0.2	0.047	0.2	0.075	0.4	0.056	0.4	0.051	0.4	0.04	0.9
71	0.2	0.0	0.69	0.6	0.043	-0.1	0.079	0.6	0.048	-0.2	0.049	0.2	0.039	0.8
72	0.24	0.8	NA		NA		NA		0.06	0.7	0.06	1.1	0.03	-0.3
73	0.168	-0.6	NA		NA		NA		0.054	0.3	NA		0.034	0.2
74	0.148	-1.0	0.592	-0.1	0.0456	0.1	0.0608	-0.5	0.0538	0.2	0.0419	-0.4	0.0309	-0.2
75	0.162	-0.8	NA		0.033	-1.0	NA		0.036	-1.2	0.039	-0.7	0.026	-0.8
76	0.17	-0.6	0.714	0.7	0.068	2.1	0.094	1.5	0.045	-0.5	0.044	-0.2	0.031	-0.2
77	0.17	-0.6	NA		ND	-3.1	NA		0.049	-0.1	NA		0.044	1.4
78	NA		0.547	-0.4	0.045	0.1	NA		0.048	-0.2	0.044	-0.2	0.027	-0.7
79	0.189	-0.2	0.677	0.5	0.066	1.9	0.058	-0.6	0.081	2.4	0.041	-0.5	0.044	1.4
80	0.26	1.2	0.73	0.8	0.04	-0.4	0.06	-0.5	0.04	-0.8	0.05	0.3	0.03	-0.3
81	NA		NA		NA		NA		0.062	0.9	0.048	0.1	ND	-3.5
82	0.252	1.1	0.77	1.1	0.0473	0.3	0.0783	0.5	0.0534	0.2	0.0573	0.9	0.0377	0.6
83	0.194	-0.1	0.604	0.0	0.047	0.2	0.067	-0.1	0.046	-0.4	0.045	-0.1	0.032	-0.1
84	0.165	-0.7	0.599	0.0	0.0365	-0.7	0.0328	-2.1	0.0429	-0.6	0.0463	0.0	0.0323	0.0
85	0.194	-0.1	0.487	-0.8	0.036	-0.8	ND	-3.4	0.046	-0.4	0.055	0.7	0.025	-0.9
86	0.193	-0.1	NA		0.0406	-0.3	NA		0.0511	0.0	NA		0.035	0.3
87	0.174	-0.5	0.654	0.3	0.042	-0.2	0.073	0.2	0.045	-0.5	0.049	0.2	0.015	-2.2
88	0.221	0.4	0.602	0.0	0.047	0.2	0.079	0.6	0.057	0.5	0.031	-1.3	0.037	0.6
89	0.271	1.4	0.526	-0.5	0.0595	1.4	0.1098	2.4	0.0475	-0.3	0.0405	-0.5	0.0455	1.6
90	0.21	0.2	0.54	-0.4	0.053	0.8	0.073	0.2	0.05	-0.1	0.06	1.1	0.042	1.2
91	0.224	0.5	0.482	-0.8	0.0438	-0.1	0.0691	0.0	0.0554	0.4	0.0509	0.4	0.0343	0.2
92	0.2779	1.6	0.4896	-0.8	0.0344	-0.9	0.1679	5.0	0.0429	-0.6	0.0354	-1.0	0.0332	0.1
93	0.19	-0.2	0.61	0.0	0.052	0.7	0.069	0.0	0.056	0.4	0.052	0.5	0.036	0.4
94	0.215	0.3	0.593	-0.1	0.043	-0.1	0.051	-1.0	0.052	0.1	0.054	0.6	0.034	0.2
95	0.161	-0.8	0.8	1.3	0.059	1.3	0.08	0.6	0.055	0.3	0.053	0.5	0.037	0.6
96	0.247	1.0	NA		0.0327	-1.1	0.0541	-0.9	0.0408	-0.8	0.0868	3.4	ND	-3.5
97	0.12	-1.6	0.461	-1.0	NA		NA		0.053	0.2	ND	-3.1	0.029	-0.4
98	0.212	0.3	0.58	-0.2	0.071	2.4	0.078	0.5	0.06	0.7	0.049	0.2	0.047	1.8
99	0.212	0.3	0.369	-1.6	0.032	-1.1	0.028	-2.4	0.035	-1.2	0.056	0.8	ND	-3.5
101	0.25	1.0	0.705	0.7	0.047	0.2	0.093	1.4	0.048	-0.2	0.055	0.7	0.031	-0.2

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

Lab Code	Fludioxonil	z score (FFP-RSD 25 %)	Fluopicolide	z score (FFP-RSD 25 %)	Fluopyram	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)	Tebuconazole	z score (FFP-RSD 25 %)	Tefluthrin	z score (FFP-RSD 25 %)	Triadimenol	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.01**		**0.01**		**0.010**		**0.010**		**0.010**		**0.010**		**0.010**	
Robust mean (mg/kg)	**0.199**		**0.605**		**0.044**		**0.069**		**0.051**		**0.047**		**0.032**	
102	0.157	-0.9	0.534	-0.5	0.0401	-0.4	0.0541	-0.9	0.0373	-1.1	0.0388	-0.7	0.0367	0.5
103	0.207	0.2	0.66	0.4	0.043	-0.1	0.067	-0.1	0.06	0.7	0.049	0.2	0.04	0.9
104	0.25	1.0	0.62	0.1	0.051	0.6	NA		0.057	0.5	0.045	-0.1	0.034	0.2
105	0.214	0.3	NA		0.044	0.0	NA		0.056	0.4	NA		NA	
107	0.239	0.8	0.616	0.1	0.044	0.0	0.088	1.1	0.055	0.3	0.047	0.0	0.031	-0.2
108	0.154	-0.9	NA		0.03	-1.3	NA		0.037	-1.1	0.037	-0.8	0.024	-1.0
109	0.204	0.1	0.779	1.2	0.048	0.3	0.087	1.1	0.06	0.7	0.051	0.4	0.039	0.8
110	0.205	0.1	0.421	-1.2	0.0444	0.0	0.084	0.9	0.0504	0.0	0.0605	1.2	0.033	0.1
111	0.19	-0.2	0.51	-0.6	0.034	-0.9	0.058	-0.6	0.04	-0.8	0.039	-0.7	0.022	-1.3
112	0.17	-0.6	0.65	0.3	0.054	0.9	0.068	-0.1	0.056	0.4	0.056	0.8	NA	
113	0.212	0.3	0.61	0.0	0.056	1.0	0.083	0.8	0.062	0.9	0.064	1.5	NA	
114	0.239	0.8	0.629	0.2	0.035	-0.8	0.068	-0.1	0.049	-0.1	0.05	0.3	0.033	0.1
115	0.21	0.2	0.73	0.8	0.06	1.4	0.06	-0.5	0.055	0.3	0.056	0.8	0.035	0.3
116	0.201	0.0	0.713	0.7	0.0373	-0.6	0.0542	-0.9	0.0578	0.6	0.0389	-0.7	0.0204	-1.5
117	0.2	0.0	0.57	-0.2	0.043	-0.1	0.055	-0.8	0.052	0.1	0.045	-0.1	0.033	0.1
118	0.185	-0.3	0.374	-1.5	0.058	1.2	0.09	1.2	0.066	1.2	0.046	-0.1	0.039	0.8
119	0.218	0.4	0.959	2.3	0.049	0.4	NA		0.055	0.3	0.056	0.8	ND	-3.5
120	NA		NA		NA		NA		0.027	-1.9	0.024	-1.9	NA	
121	0.19	-0.2	0.57	-0.2	0.031	-1.2	0.056	-0.7	0.043	-0.6	0.052	0.5	0.029	-0.4
122	0.22	0.4	0.4	-1.4	0.047	0.2	0.04	-1.7	0.04	-0.8	0.059	1.1	0.038	0.7
123	0.187	-0.2	0.528	-0.5	0.0399	-0.4	0.0644	-0.3	0.0464	-0.3	0.0722	2.2	0.0269	-0.7
124	0.11	-1.8	0.47	-0.9	0.038	-0.6	NA		0.054	0.3	0.032	-1.3	0.03	-0.3
125	0.171	-0.6	0.51	-0.6	0.039	-0.5	0.091	1.3	0.05	-0.1	0.056	0.8	0.035	0.3
126	0.231	0.6	0.782	1.2	0.047	0.2	0.088	1.1	0.058	0.6	0.039	-0.7	0.03	-0.3
129	0.21	0.2	0.675	0.5	0.53	5.0	0.083	0.8	0.067	1.3	0.059	1.1	0.038	0.7
130	NA		NA		NA		NA		0.053	0.2	NA		NA	
131	0.17	-0.6	0.62	0.1	0.038	-0.6	0.059	-0.6	0.048	-0.2	0.044	-0.2	0.027	-0.7
132	0.288	1.8	NA		NA		NA		0.048	-0.2	0.036	-0.9	0.04	0.9
133	0.183	-0.3	0.631	0.2	0.021	-2.1	0.082	0.8	0.047	-0.3	0.05	0.3	0.028	-0.6
134	0.16	-0.8	0.51	-0.6	0.04	-0.4	0.07	0.1	0.04	-0.8	0.04	-0.6	0.02	-1.5
135	0.065	-2.7	0.482	-0.8	0.047	0.2	NA		0.05	-0.1	0.029	-1.5	0.023	-1.2
136	0.191	-0.2	0.65	0.3	0.048	0.3	0.098	1.7	0.048	-0.2	0.066	1.7	0.04	0.9
137	0.188	-0.2	0.844	1.6	0.045	0.1	0.089	1.2	0.058	0.6	0.063	1.4	0.041	1.1

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

Lab Code	Fludioxonil	z score (FFP-RSD 25 %)	Fluopicolide	z score (FFP-RSD 25 %)	Fluopyram	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)	Tebuconazole	z score (FFP-RSD 25 %)	Tefluthrin	z score (FFP-RSD 25 %)	Triadimenol	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.01**		**0.01**		**0.010**		**0.010**		**0.010**		**0.010**		**0.010**	
Robust mean (mg/kg)	**0.199**		**0.605**		**0.044**		**0.069**		**0.051**		**0.047**		**0.032**	
138	0.256	1.1	NA		0.057	1.1	NA		0.057	0.5	0.045	-0.1	0.045	1.5
139	0.14	-1.2	0.48	-0.8	0.039	-0.5	0.047	-1.3	0.035	-1.2	0.036	-0.9	0.024	-1.0
140	0.18	-0.4	0.51	-0.6	0.04	-0.4	0.05	-1.1	0.047	-0.3	0.042	-0.4	0.035	0.3
141	0.212	0.3	NA		0.066	1.9	NA		0.086	2.8	0.035	-1.0	0.043	1.3
142	0.22	0.4	0.58	-0.2	0.057	1.1	0.08	0.6	0.05	-0.1	0.049	0.2	0.038	0.7
143	0.19	-0.2	0.56	-0.3	0.039	-0.5	0.068	-0.1	0.038	-1.0	0.041	-0.5	0.032	-0.1
144	0.157	-0.9	0.968	2.4	NA		0.098	1.7	0.06	0.7	0.046	-0.1	0.065	4.0
145	0.199	0.0	NA		0.04	-0.4	NA		0.049	-0.1	0.06	1.1	NA	
146	0.093	-2.1	0.53	-0.5	0.045	0.1	NA		0.04	-0.8	0.028	-1.6	0.02	-1.5
147	0.148	-1.0	0.714	0.7	0.044	0.0	0.074	0.3	0.055	0.3	0.043	-0.3	0.042	1.2
148	0.244	0.9	0.732	0.8	0.049	0.4	0.086	1.0	0.054	0.3	0.066	1.7	0.031	-0.2
149	NA		NA		NA		NA		0.042	-0.7	NA		NA	
150	0.176	-0.5	0.503	-0.7	0.0607	1.5	0.0676	-0.1	0.0483	-0.2	0.0737	2.3	0.0278	-0.6
151	0.218	0.4	ND	-3.9	ND	-3.1	NA		0.054	0.3	0.042	-0.4	0.034	0.2
152	0.235	0.7	0.633	0.2	0.051	0.6	NA		0.05	-0.1	0.056	0.8	0.032	-0.1
153	0.28	1.6	NA		0.049	0.4	NA		0.065	1.1	0.055	0.7	ND	-3.4
154	0.206	0.1	0.653	0.3	0.047	0.2	NA		0.055	0.3	0.048	0.1	0.031	-0.2
155	0.22	0.4	0.627	0.1	0.042	-0.2	0.066	-0.2	0.055	0.3	0.05	0.3	0.034	0.2
156	0.168	-0.6	0.547	-0.4	0.034	-0.9	0.035	-2.0	0.048	-0.2	0.041	-0.5	ND	-3.5
157	0.21	0.2	0.89	1.9	0.047	0.2	0.074	0.3	0.04	-0.8	0.041	-0.5	ND	-3.5
158	ND	-3.8	NA		ND	-3.1	ND	-3.4	ND	-3.2	0.507	5.0	ND	-3.5
159	187	5.0	ND	-3.9	36	5.0	53	5.0	52	5.0	65	5.0	68	5.0
160	0.317	2.4	0.413	-1.3	0.03	-1.3	0.086	1.0	0.054	0.3	0.051	0.4	0.033	0.1
161	0.201	0.0	0.635	0.2	0.06	1.4	0.08	0.6	0.06	0.7	0.041	-0.5	0.04	0.9
162	0.203	0.1	0.585	-0.1	0.0464	0.2	0.067	-0.1	0.0585	0.6	0.0467	0.0	0.0287	-0.5
163	0.214	0.3	0.806	1.3	0.0703	2.3	0.103	2.0	0.0638	1.0	0.026	-1.8	0.036	0.4
164	0.215	0.3	0.712	0.7	0.049	0.4	0.078	0.5	0.042	-0.7	0.051	0.4	0.03	-0.3
165	0.201	0.0	0.722	0.8	0.0394	-0.5	0.0745	0.3	0.0531	0.2	0.0523	0.5	0.0335	0.1
166	0.175	-0.5	0.486	-0.8	0.043	-0.1	0.059	-0.6	0.052	0.1	0.031	-1.3	0.029	-0.4
167	NA		NA		NA		NA		ND	-3.2	NA		ND	-3.5
168	0.4	4.0	1.7	5.0	NA		NA		0.09	3.1	0.05	0.3	0.04	0.9
169	0.202	0.1	0.59	-0.1	0.048	0.3	NA		0.052	0.1	0.051	0.4	ND	-3.5
170	0.201	0.0	0.649	0.3	0.044	0.0	0.075	0.4	0.05	-0.1	0.049	0.2	0.03	-0.3

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

Lab Code	Fludioxonil	z score (FFP-RSD 25 %)	Fluopicolide	z score (FFP-RSD 25 %)	Fluopyram	z score (FFP-RSD 25 %)	Fluxapyroxad	z score (FFP-RSD 25 %)	Tebuconazole	z score (FFP-RSD 25 %)	Tefluthrin	z score (FFP-RSD 25 %)	Triadimenol	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.01**		**0.01**		**0.010**		**0.010**		**0.010**		**0.010**		**0.010**	
Robust mean (mg/kg)	**0.199**		**0.605**		**0.044**		**0.069**		**0.051**		**0.047**		**0.032**	
172	0.184	-0.3	0.635	0.2	0.042	-0.2	0.072	0.2	0.055	0.3	0.045	-0.1	0.034	0.2
173	ND	-3.8	ND	-3.9	ND	-3.1	ND	-3.4	ND	-3.2	ND	-3.1	ND	-3.5
177	0.144	-1.1	0.592	-0.1	0.058	1.2	0.061	-0.5	0.047	-0.3	0.041	-0.5	0.032	-0.1
179	0.134	-1.3	0.591	-0.1	0.042	-0.2	0.063	-0.3	0.053	0.2	0.034	-1.1	0.026	-0.8
182	ND	-3.8	ND	-3.9	ND	-3.1	ND	-3.4	0.062	0.9	ND	-3.1	0.039	0.8
183	0.18	-0.4	0.61	0.0	0.045	0.1	0.051	-1.0	0.051	0.0	0.049	0.2	0.035	0.3

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 fenpicoxamid and penthiopyrad (mg/kg) and their calculated z score value using FFP-RSD 25 %.

Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Penthiopyrad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010	
Robust mean (mg/kg)	0.067		0.067	
1	NA		NA	
2	NA		0.081	0.8
3	NA		0.051	-0.9
4	NA		0.065	-0.1
5	NA		0.073	0.4
7	NA		0.0512	-0.9
8	NA		0.0755	0.5
9	NA		NA	
10	NA		0.068	0.1
11	NA		0.043	-1.4
12	NA		NA	
14	NA		0.079	0.7
15	0.046	-1.2	0.046	-1.2
16	0.068	0.1	0.085	1.1
17	NA		0.06	-0.4
18	NA		NA	
19	NA		NA	
20	NA		NA	
21	NA		0.053	-0.8
22	NA		0.05	-1.0
23	NA		NA	
24	ND	-3.4	ND	-3.4
25	NA		0.049	-1.1
26	NA		0.053	-0.8
27	0.068	0.1	0.072	0.3
28	NA		NA	
29	NA		NA	
30	NA		0.074	0.4
31	NA		0.052	-0.9
32	0.0594	-0.4	0.0878	1.3
33	0.0654	-0.1	0.081	0.8
34	0.062	-0.3	0.08	0.8

Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Penthiopyrad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010	
Robust mean (mg/kg)	0.067		0.067	
35	NA		NA	
36	NA		0.064	-0.2
37	NA		NA	
38	NA		NA	
39	NA		NA	
40	NA		0.084	1.0
41	NA		NA	
42	NA		NA	
43	NA		NA	
44	NA		NA	
45	NA		NA	
46	NA		NA	
47	NA		0.055	-0.7
48	NA		NA	
49	NA		NA	
50	NA		0.08	0.8
51	NA		0.064	-0.2
52	0.053	-0.8	0.083	1.0
53	NA		0.0616	-0.3
54	NA		0.071	0.2
55	NA		NA	
56	NA		NA	
57	NA		ND	-3.4
58	NA		NA	
59	0.043	-1.4	0.044	-1.4
60	NA		0.065	-0.1
61	NA		0.051	-0.9
62	NA		NA	
63	NA		0.077	0.6
64	NA		0.0649	-0.1
65	0.074	0.4	0.073	0.4
66	0.064	-0.2	0.054	-0.8

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

Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Penthiopyrad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010	
Robust mean (mg/kg)	0.067		0.067	
67	NA		NA	
68	NA		0.0683	0.1
69	NA		NA	
70	NA		NA	
71	ND	-3.4	0.076	0.5
72	NA		NA	
73	NA		NA	
74	NA		0.0688	0.1
75	NA		NA	
76	NA		0.102	2.1
77	NA		NA	
78	NA		NA	
79	NA		NA	
80	ND	-3.4	0.12	3.2
81	NA		NA	
82	NA		NA	
83	0.07	0.2	0.065	-0.1
84	NA		0.081	0.8
85	NA		NA	
86	NA		NA	
87	NA		NA	
88	NA		NA	
89	0.0658	-0.1	0.0788	0.7
90	ND	-3.4	0.076	0.5
91	NA		0.0726	0.3
92	NA		0.103	2.2
93	NA		0.078	0.7
94	0.066	0.0	0.057	-0.6
95	NA		0.083	1.0
96	NA		0.0491	-1.1
97	NA		NA	
98	0.075	0.5	0.098	1.9
99	ND	-3.4	ND	-3.4
101	NA		NA	

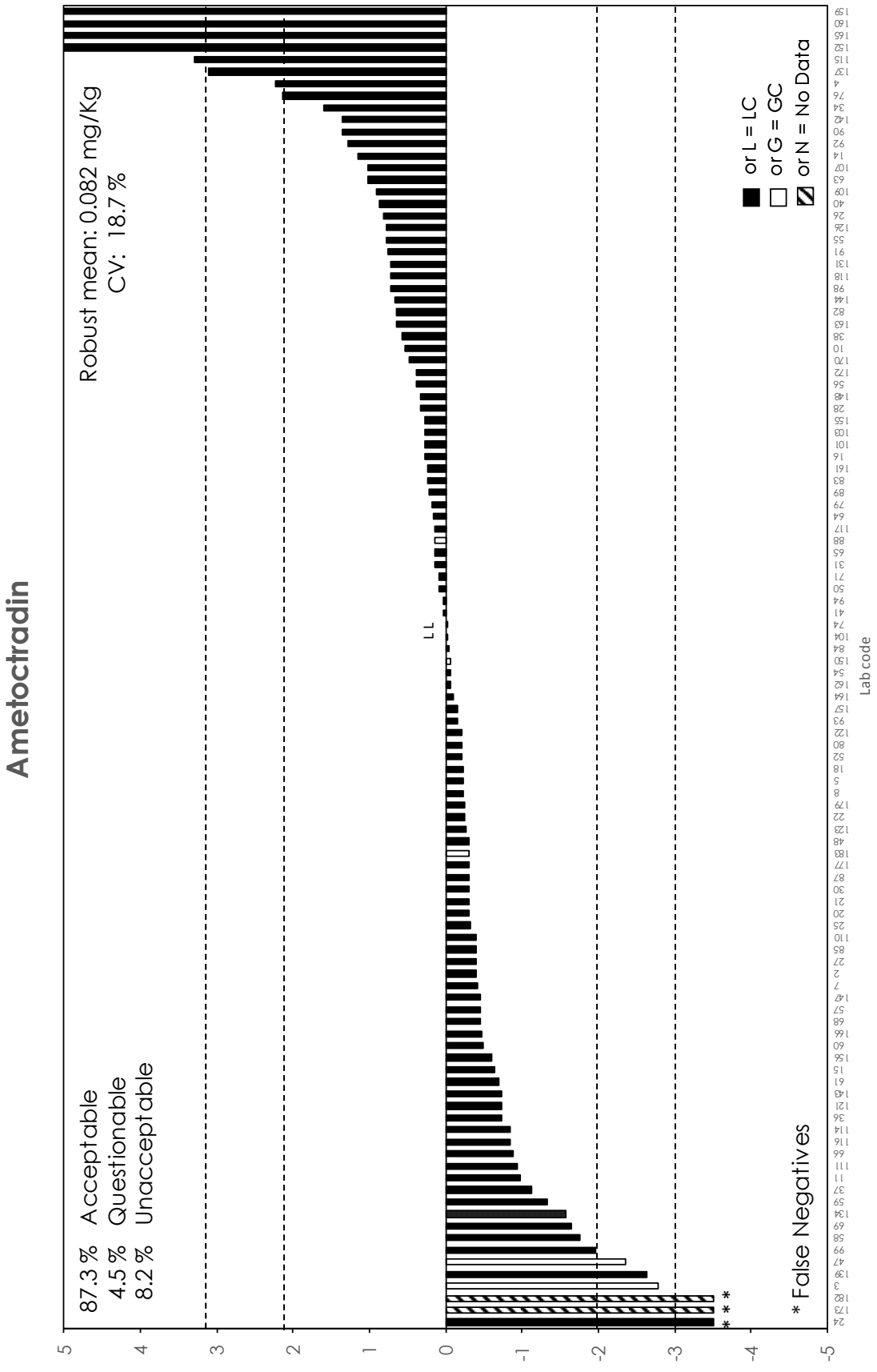
Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Penthiopyrad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	0.010		0.010	
Robust mean (mg/kg)	0.067		0.067	
102	NA		0.0592	-0.5
103	NA		0.069	0.1
104	NA		NA	
105	NA		NA	
107	NA		0.046	-1.2
108	NA		NA	
109	NA		0.066	-0.1
110	NA		0.067	0.0
111	NA		ND	-3.4
112	NA		NA	
113	NA		NA	
114	NA		0.06	-0.4
115	NA		ND	-3.4
116	NA		NA	
117	NA		NA	
118	NA		0.069	0.1
119	NA		NA	
120	NA		NA	
121	NA		0.054	-0.8
122	0.09	1.4	0.058	-0.5
123	NA		0.0583	-0.5
124	NA		NA	
125	NA		NA	
126	NA		0.06	-0.4
129	NA		ND	-3.4
130	NA		NA	
131	0.067	0.0	NA	
132	NA		NA	
133	NA		NA	
134	NA		0.06	-0.4
135	NA		NA	
136	NA		0.1	2.0
137	0.09	1.4	0.072	0.3
138	NA		NA	

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

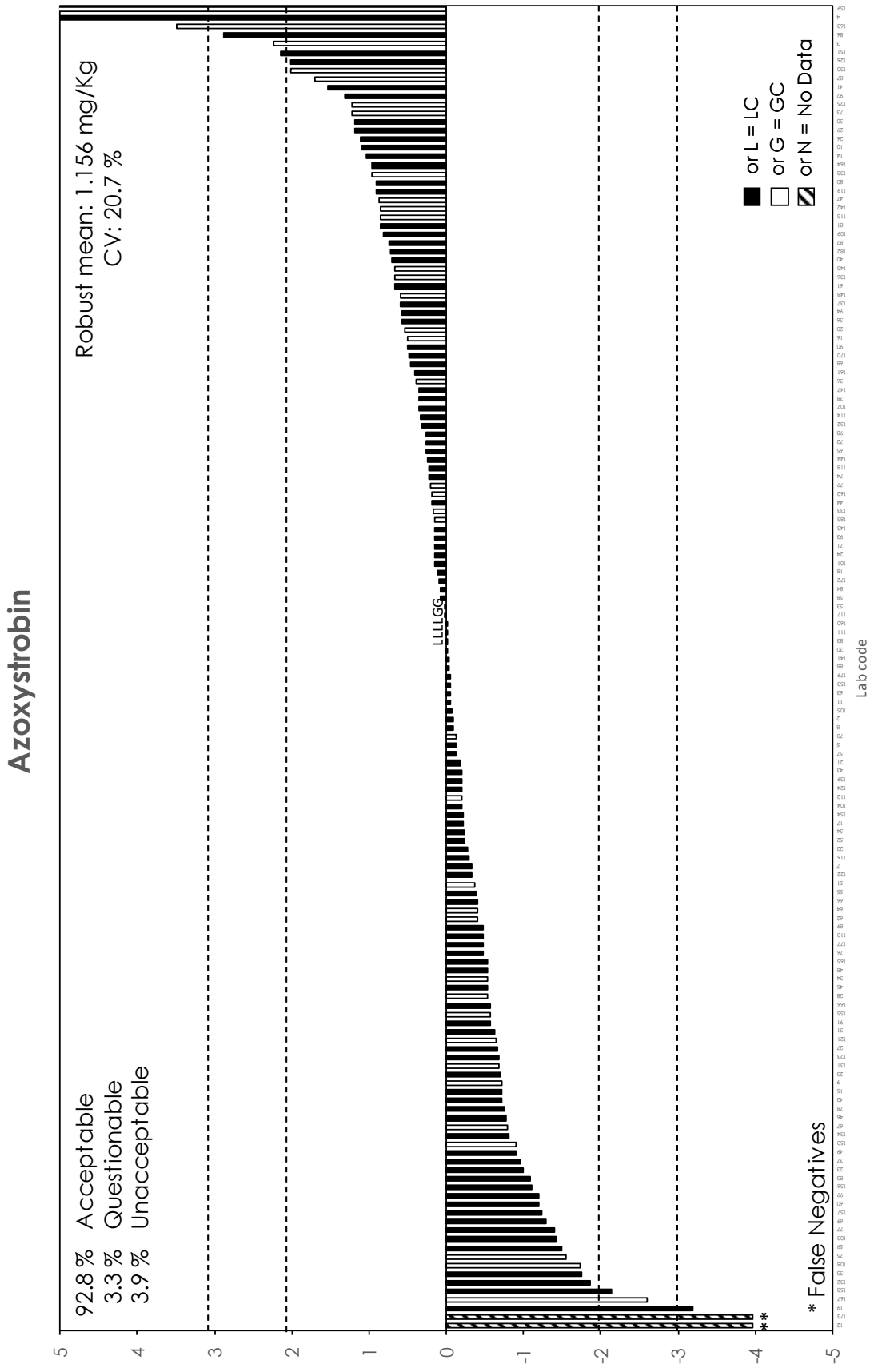
Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Penthiopyrad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**	
Robust mean (mg/kg)	**0.067**		**0.067**	
139	NA		0.05	-1.0
140	NA		0.055	-0.7
141	NA		NA	
142	NA		0.078	0.7
143	NA		0.062	-0.3
144	NA		NA	
145	NA		NA	
146	NA		NA	
147	0.073	0.4	0.066	-0.1
148	NA		0.066	-0.1
149	NA		NA	
150	NA		0.0676	0.0
151	NA		NA	
152	NA		NA	
153	NA		NA	
154	NA		NA	
155	0.081	0.9	0.059	-0.5
156	NA		0.063	-0.2
157	NA		NA	

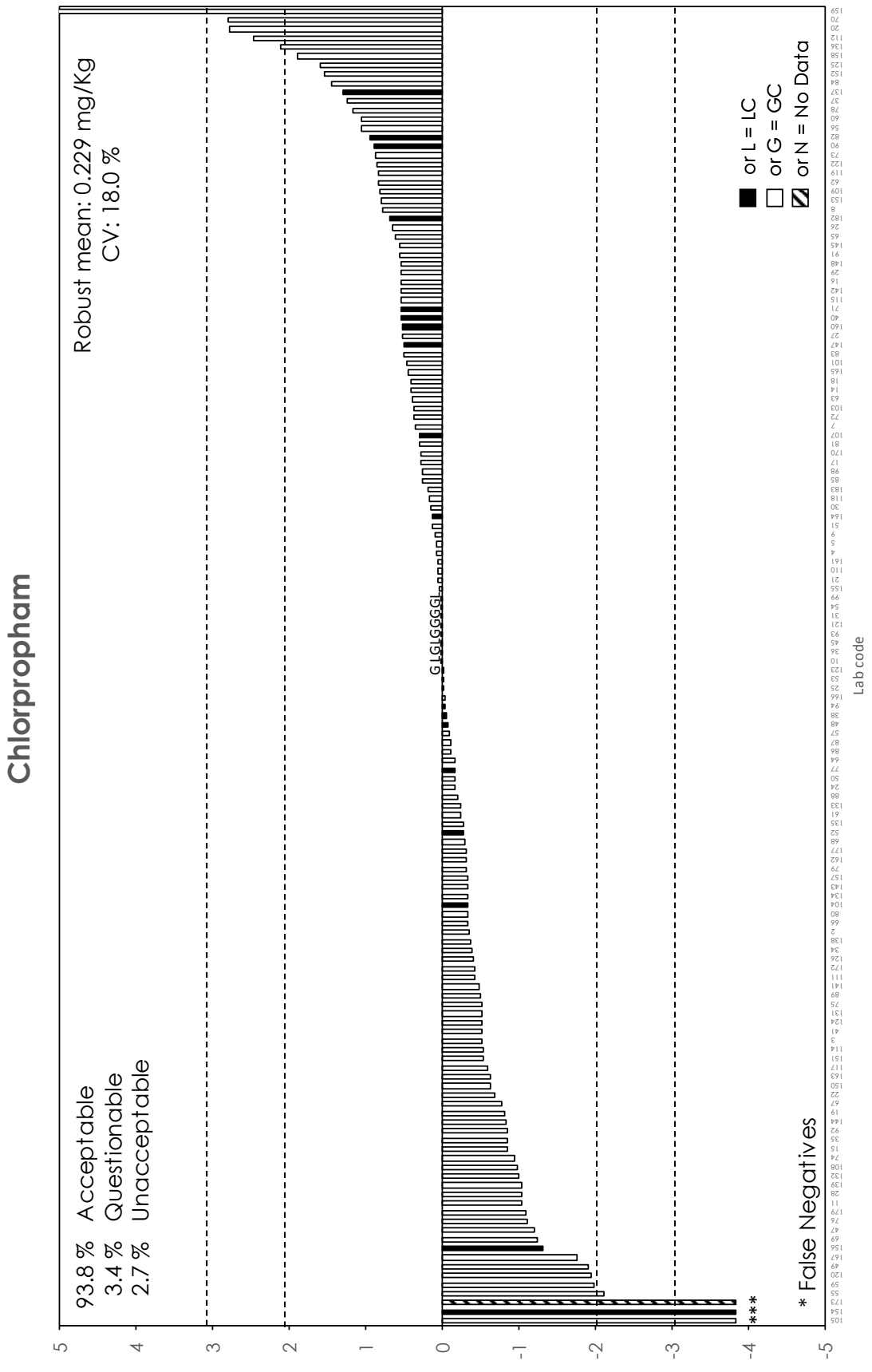
Lab Code	Fenpicoxamid	z score (FFP-RSD 25 %)	Penthiopyrad	z score (FFP-RSD 25 %)
MRRL (mg/kg)	**0.010**		**0.010**	
Robust mean (mg/kg)	**0.067**		**0.067**	
158	NA		NA	
159	NA		ND	-3.4
160	NA		0.07	0.2
161	NA		0.085	1.1
162	NA		NA	
163	NA		0.0934	1.6
164	NA		0.079	0.7
165	NA		0.0692	0.1
166	NA		ND	-3.4
167	NA		NA	
168	NA		NA	
169	NA		NA	
170	0.069	0.1	0.063	-0.2
172	ND	-3.4	0.075	0.5
173	ND	-3.4	ND	-3.4
177	0.023	-2.6	0.053	-0.8
179	ND	-3.4	0.034	-2.0
182	ND	-3.4	ND	-3.4
183	ND	-3.4	0.053	-0.8

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

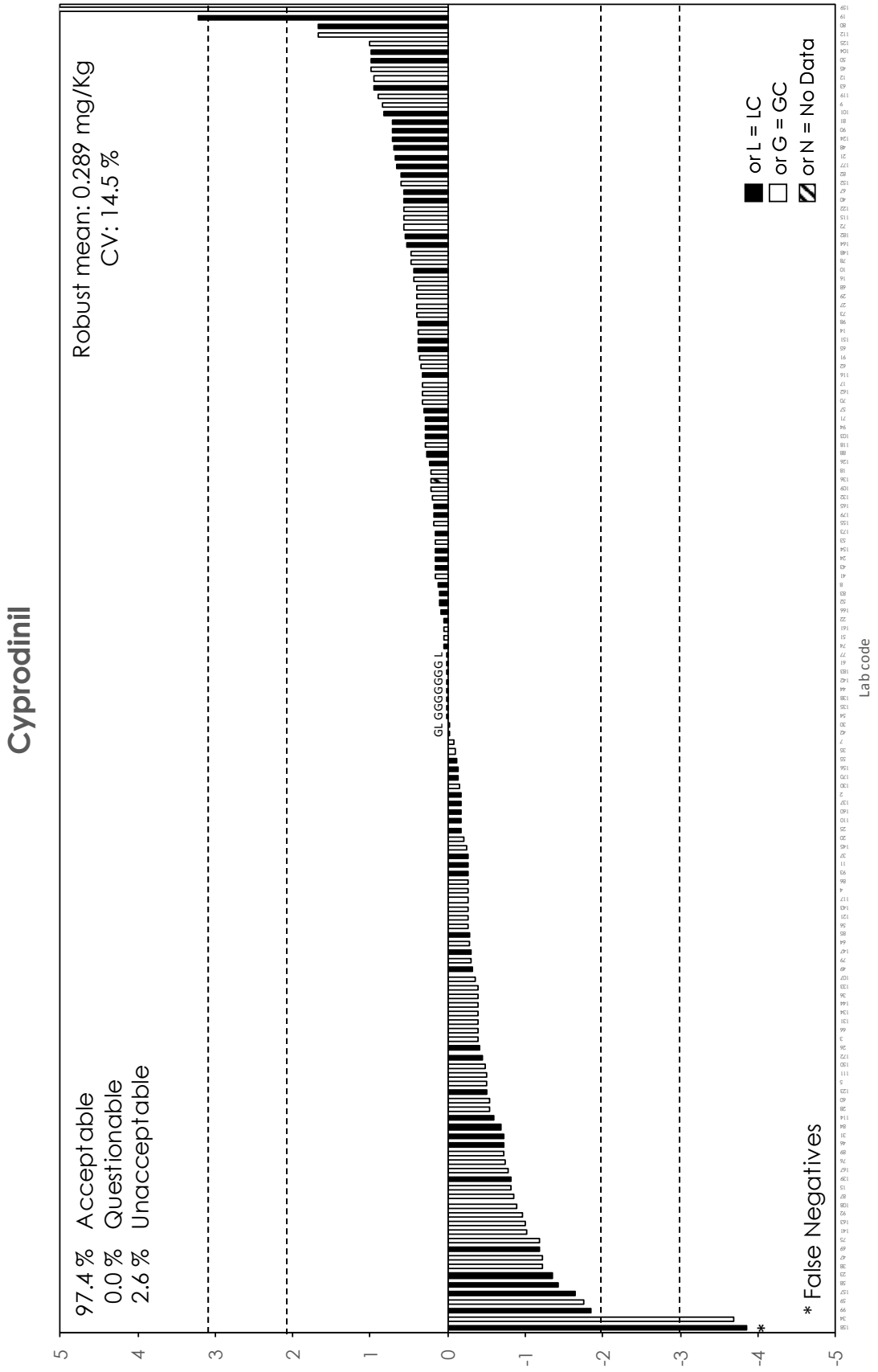

Ametoctradin
Robust mean: 0.082 mg/Kg
CV: 18.7 %
87.3 % Acceptable
4.5 % Questionable
8.2 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
Lab code
5
4
3
2
1
0
-1
-2
-3
-4
-5

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

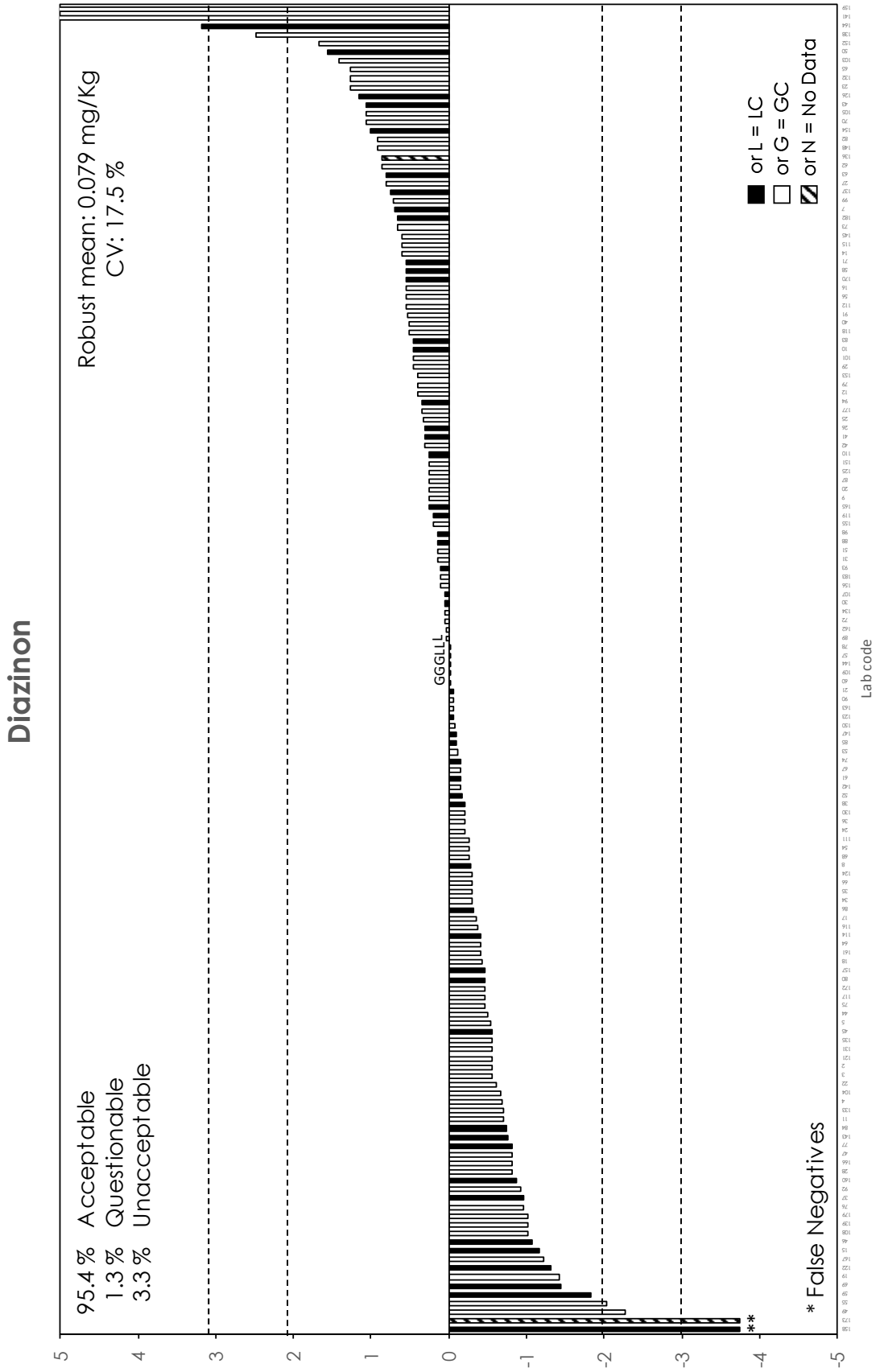



Chlorpropham
Robust mean: 0.229 mg/Kg
CV: 18.0 %
93.8 % Acceptable
3.4 % Questionable
2.7 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
Lab code
5
4
3
2
1
0
-1
-2
-3
-4
-5

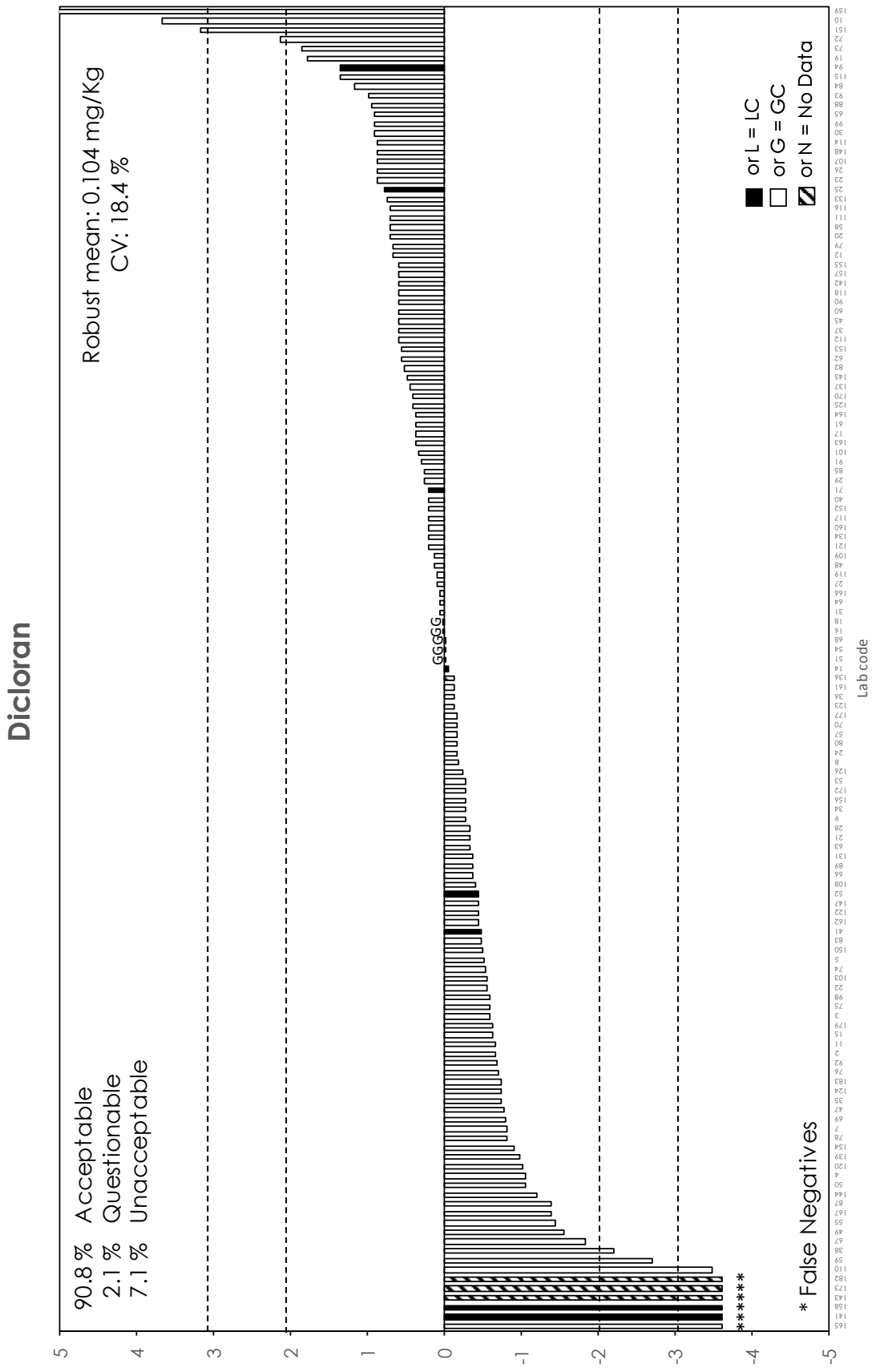
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

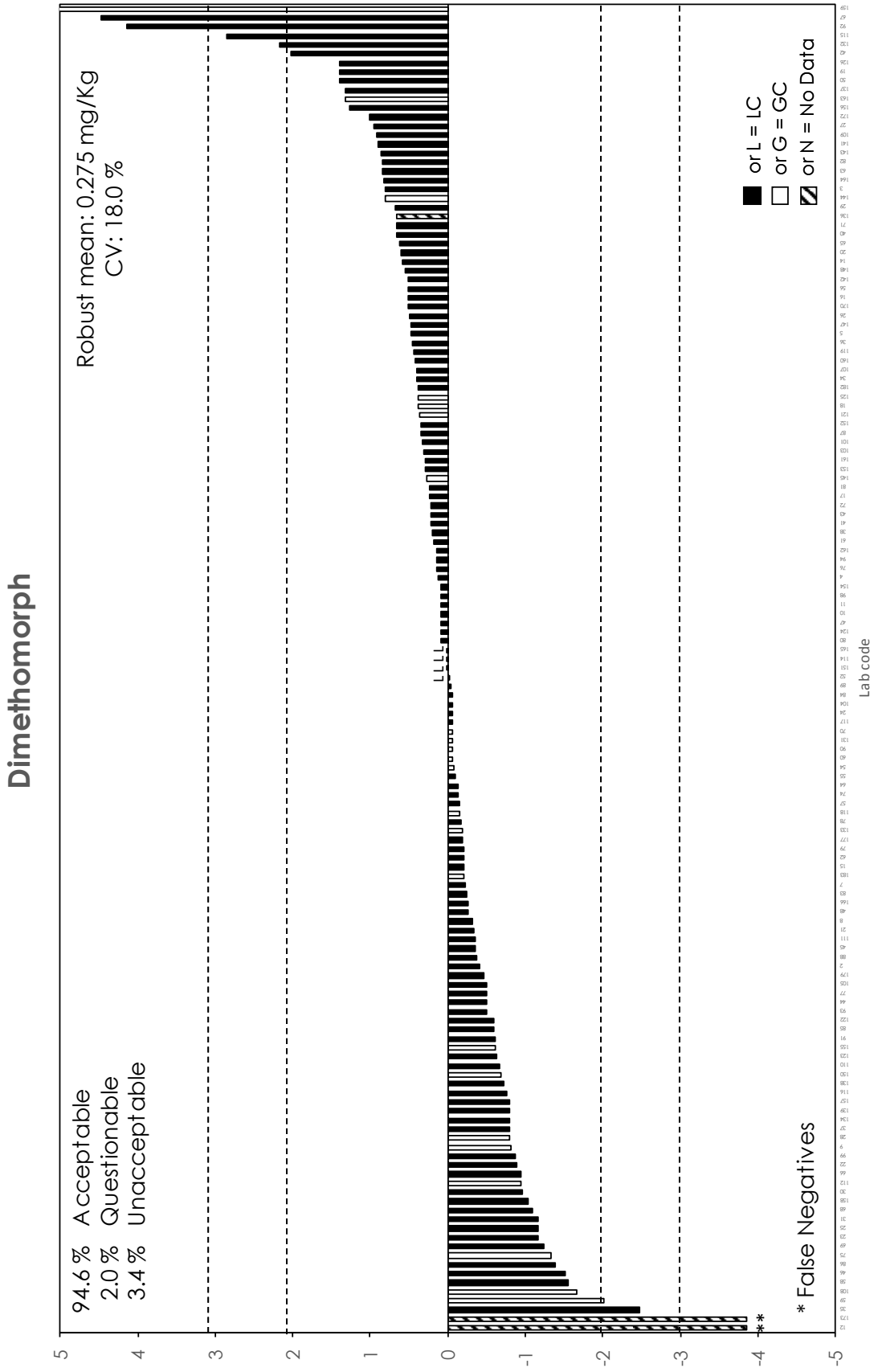


APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

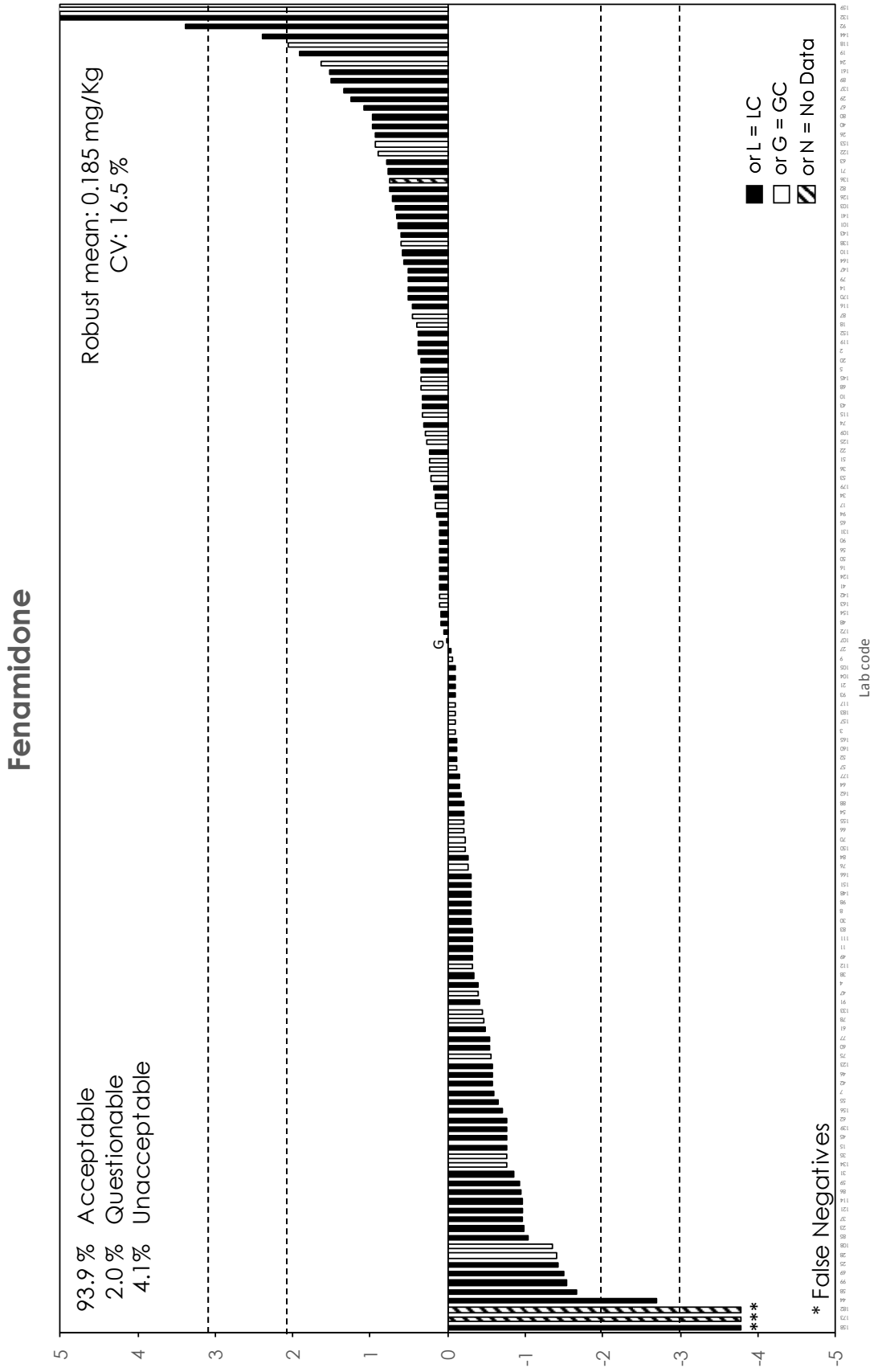


APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

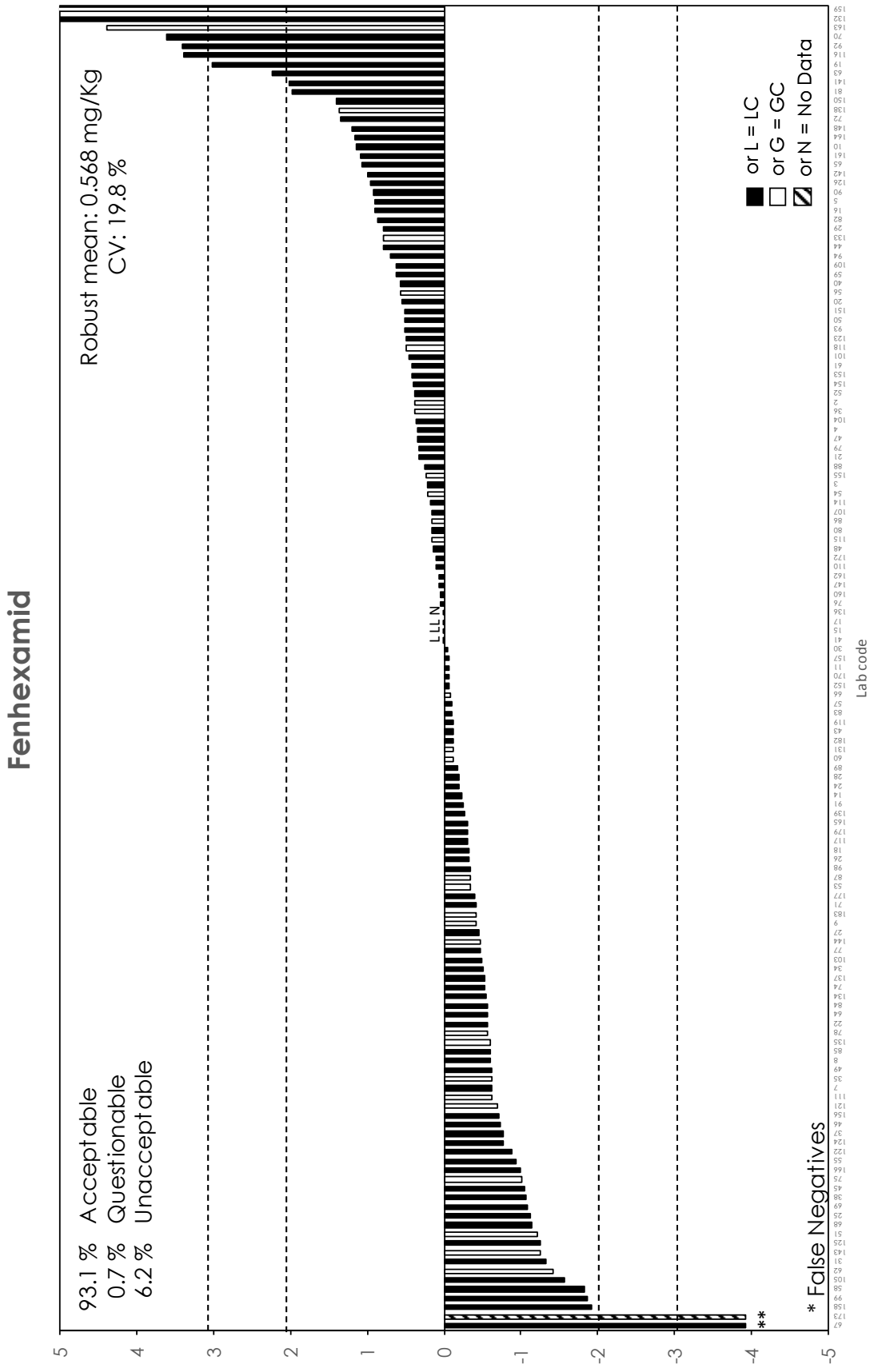



Dimethomorph
Robust mean: 0.275 mg/Kg
CV: 18.0 %
94.6 % Acceptable
2.0 % Questionable
3.4 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
Lab code
5
4
3
2
1
0
-1
-2
-3
-4
-5

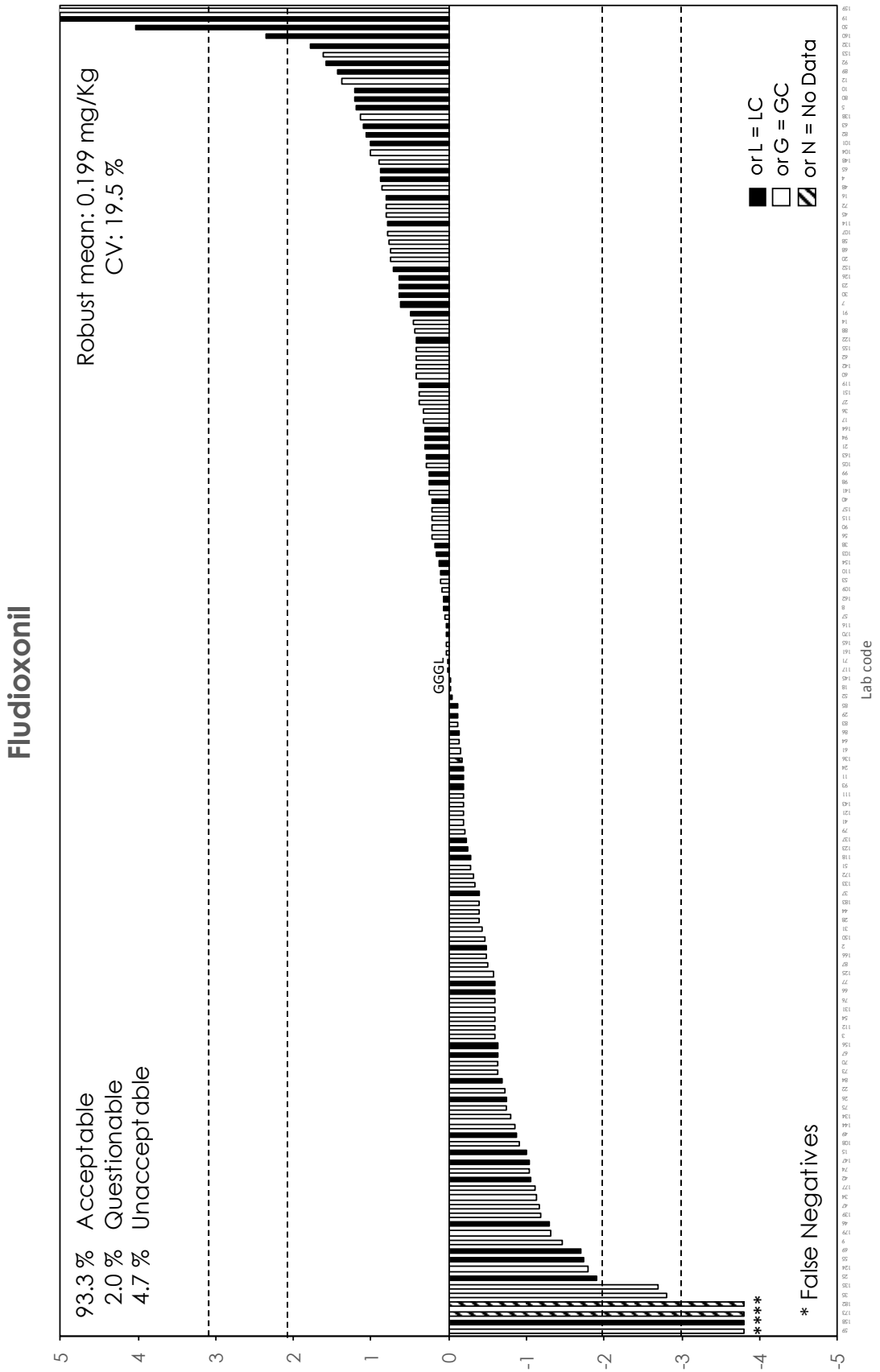
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

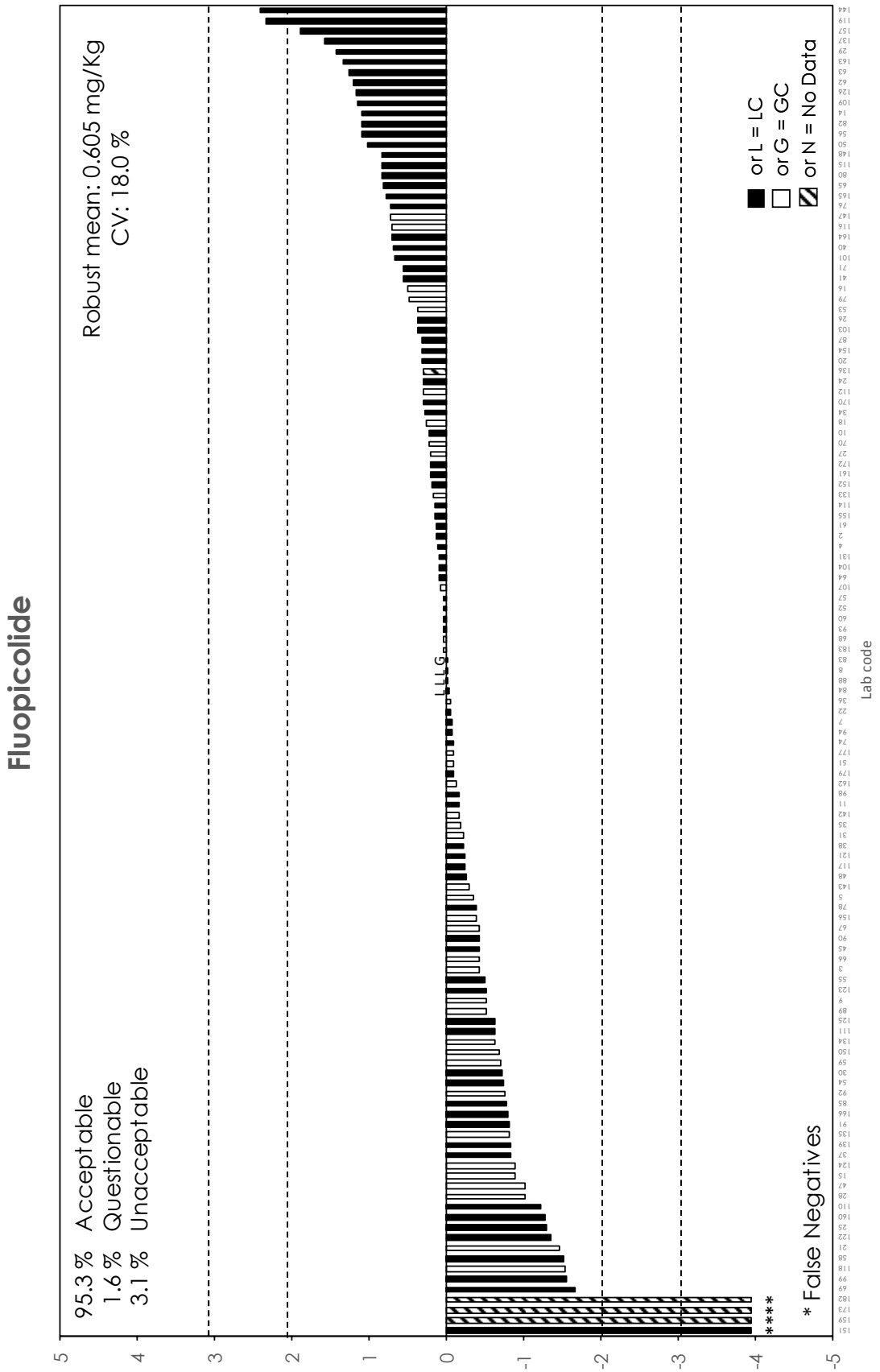


APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).

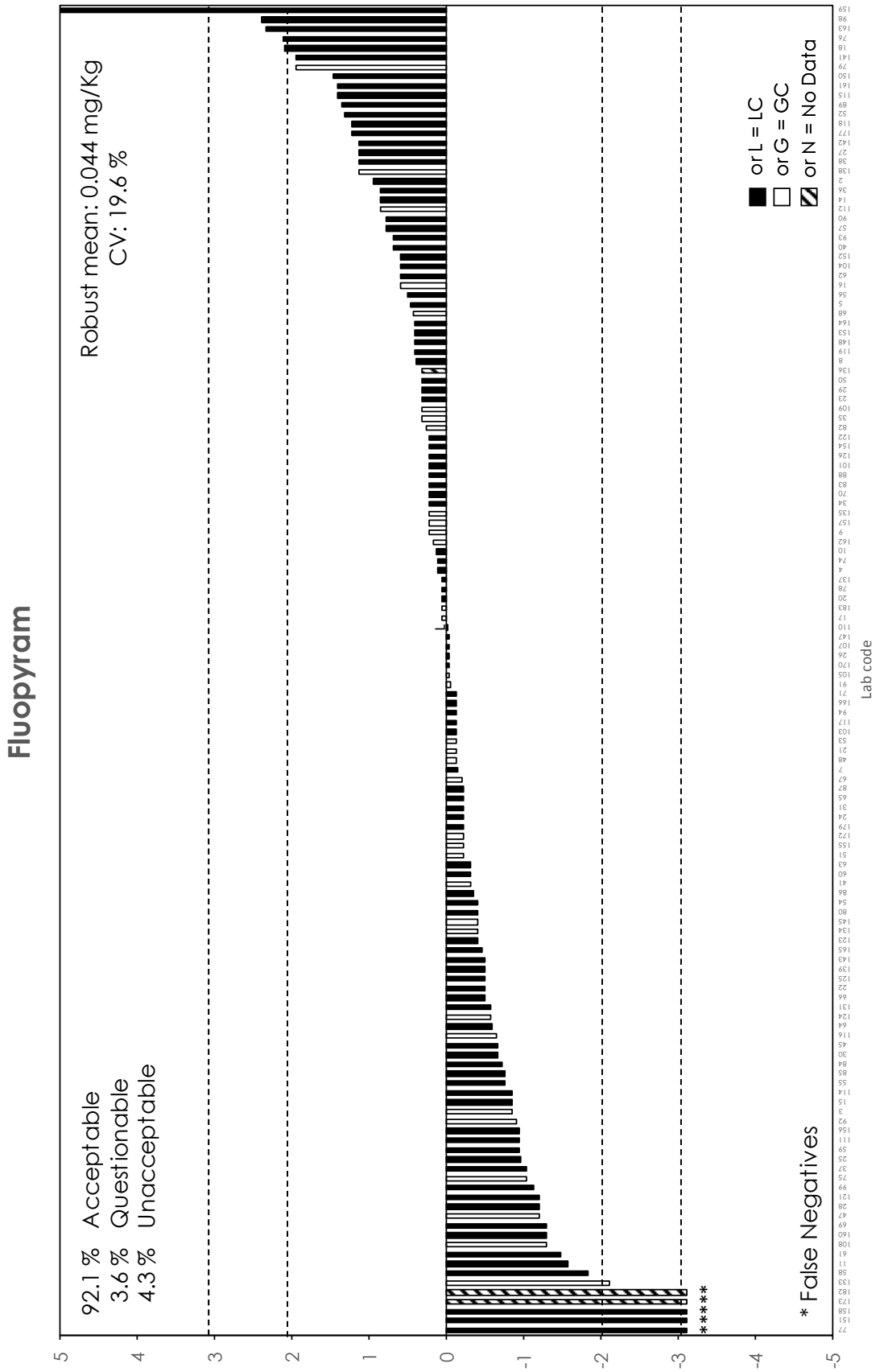


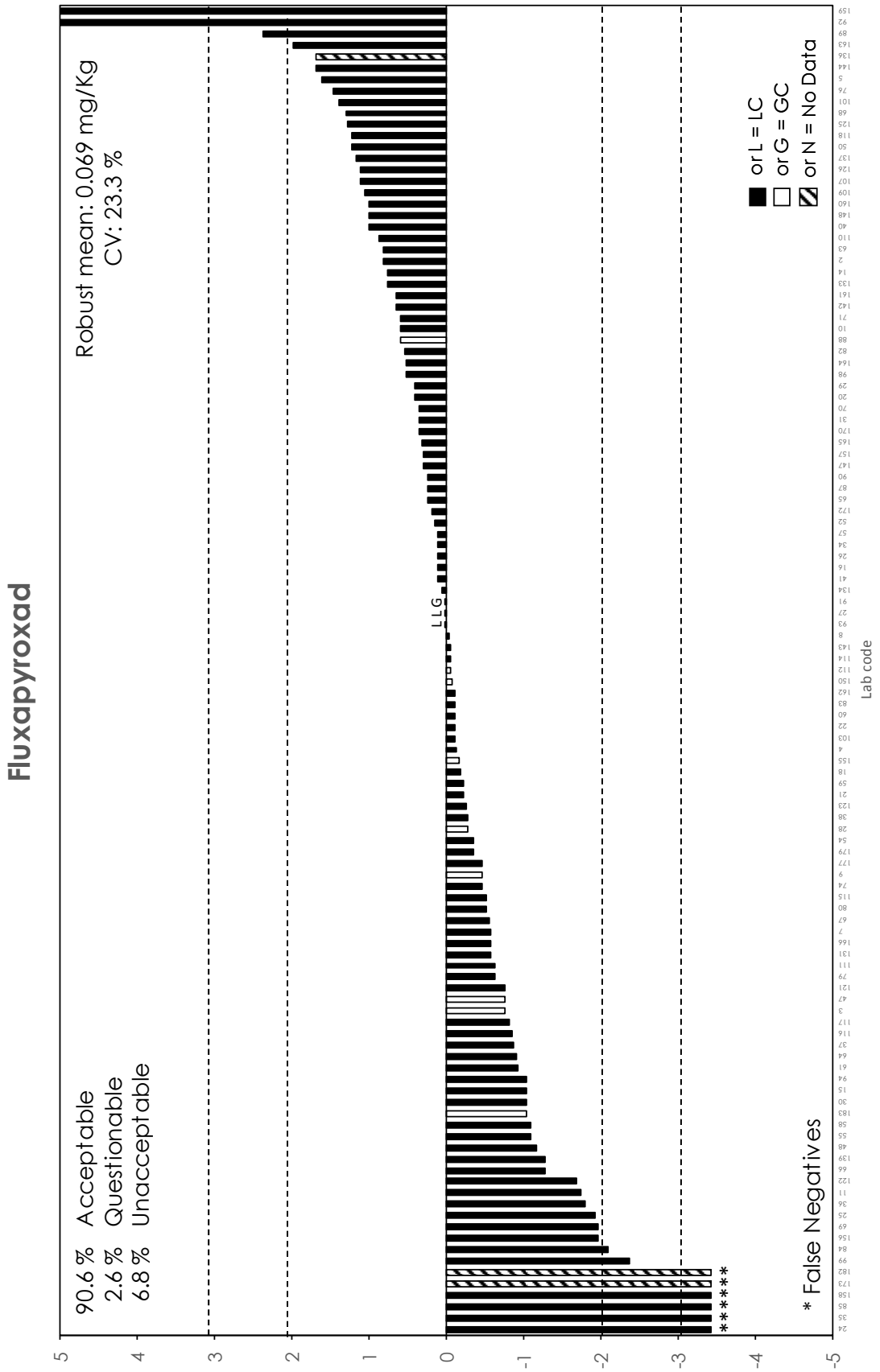
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



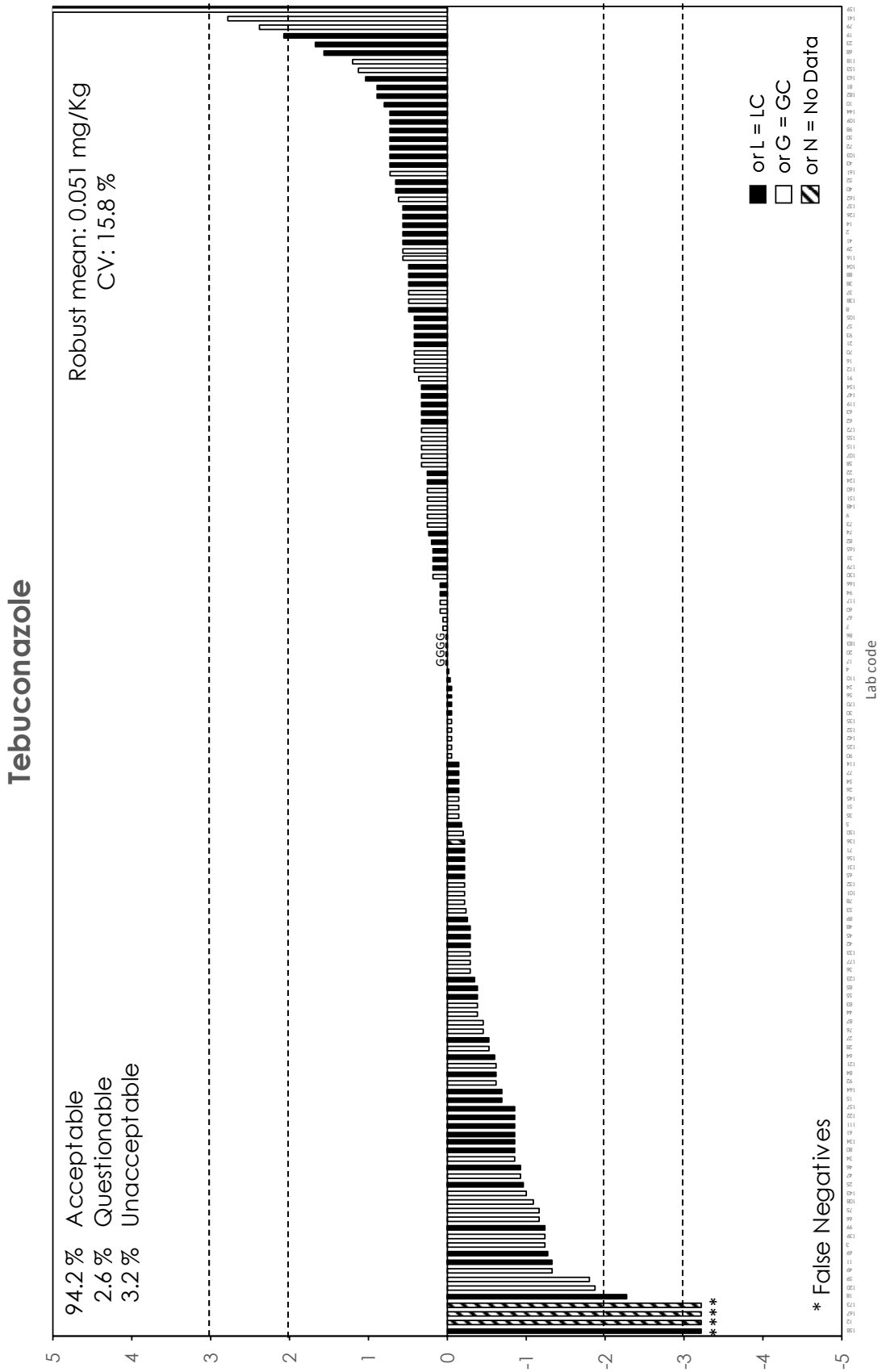

Fluopicolide
Robust mean: 0.605 mg/Kg
CV: 18.0 %
95.3 % Acceptable
1.6 % Questionable
3.1 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
Lab code
5
4
3
2
1
0
-1
-2
-3
-4
-5

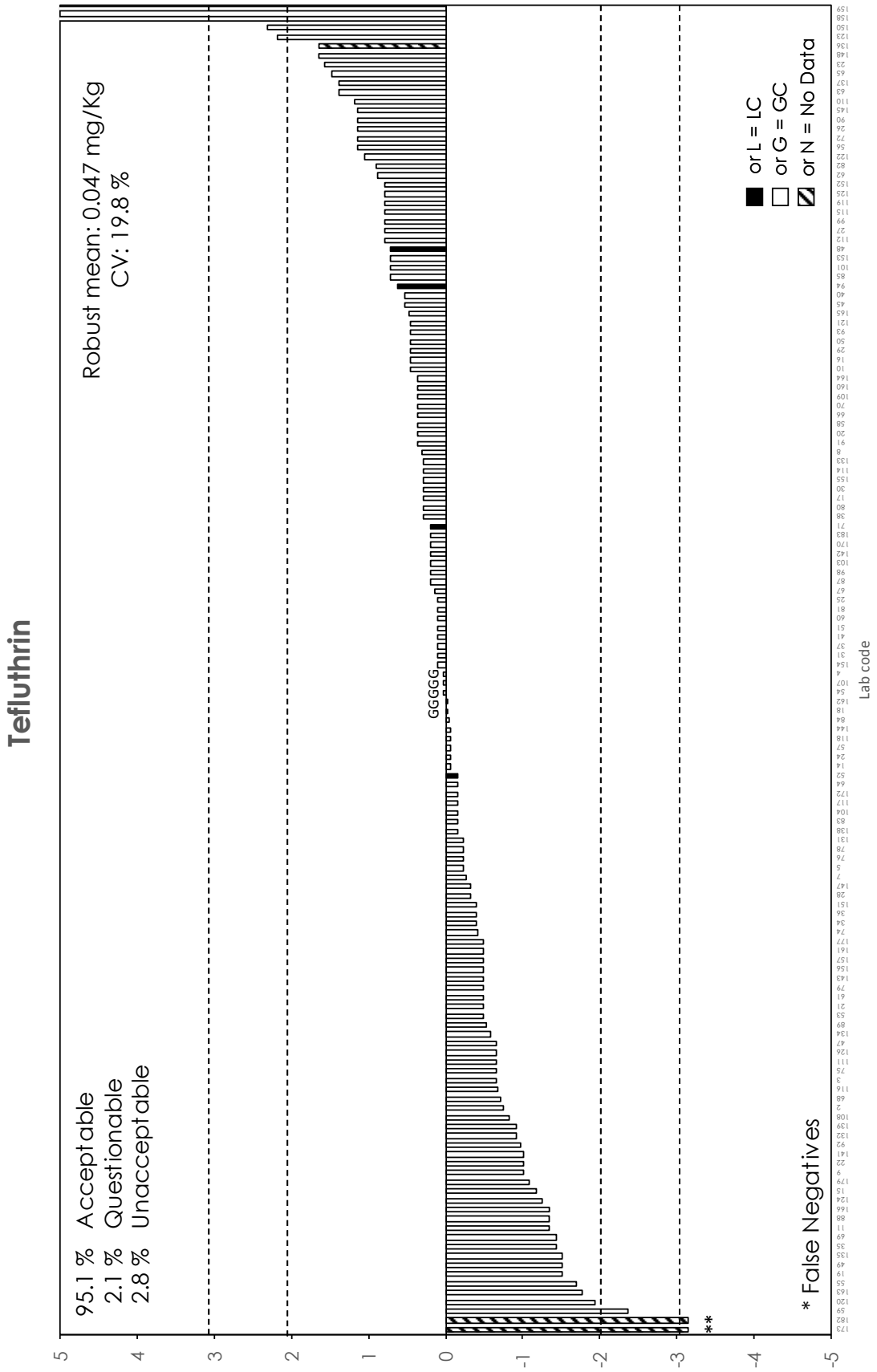
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



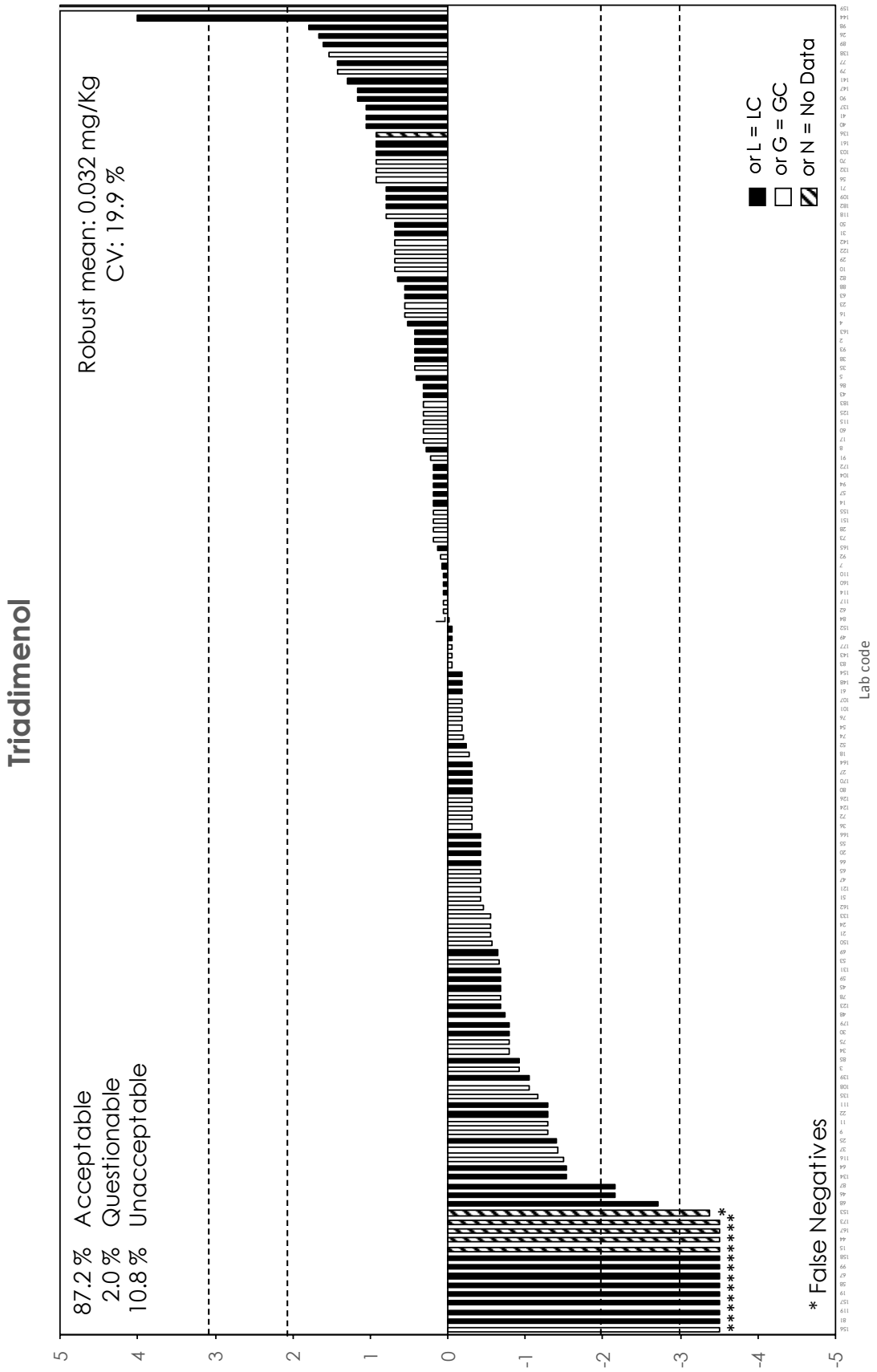

Fluxapyroxad
Robust mean: 0.069 mg/Kg
CV: 23.3 %
90.6 % Acceptable
2.6 % Questionable
6.8 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
Lab code
LLG
5
4
3
2
1
0
-1
-2
-3
-4
-5

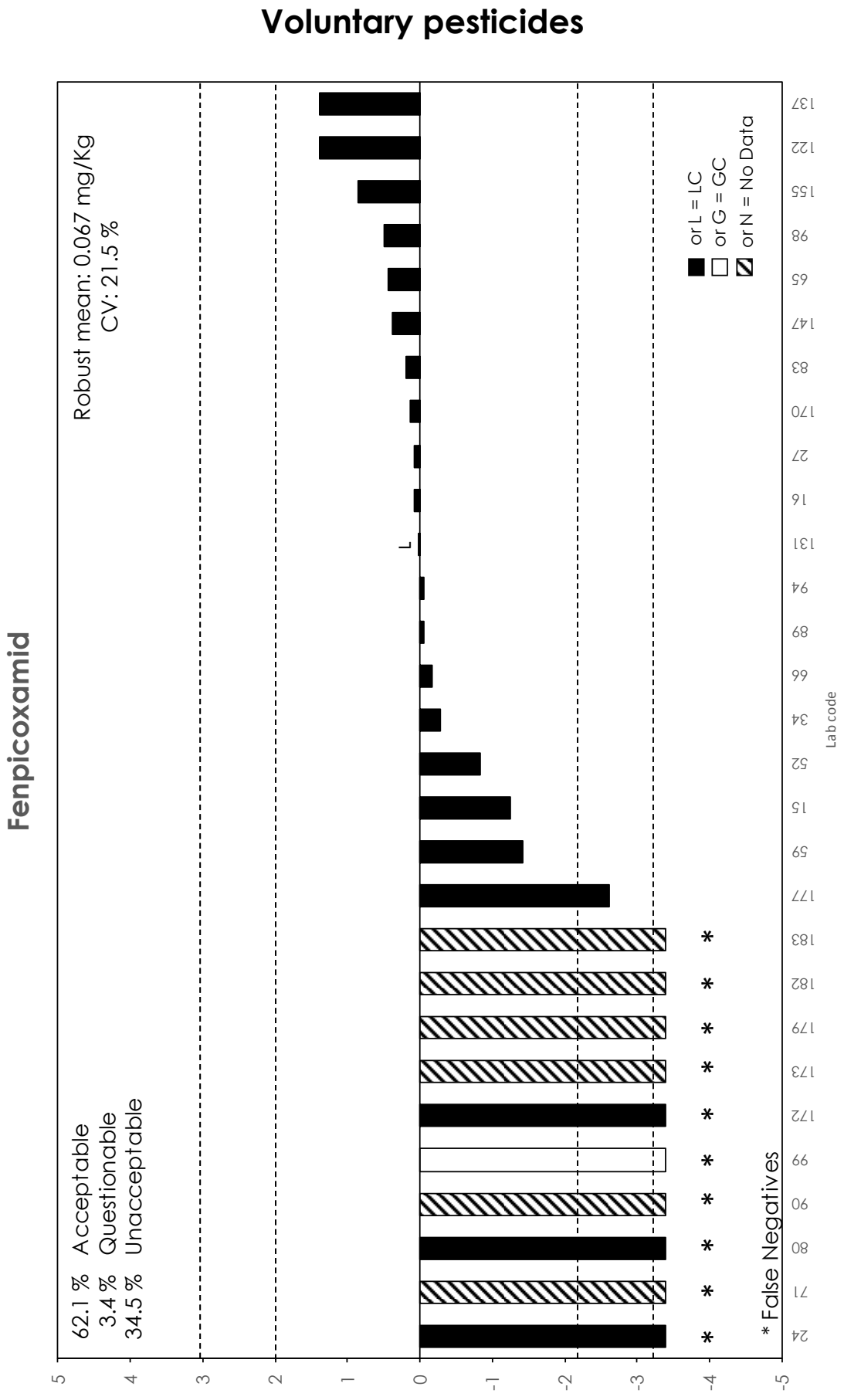
APPENDIX 4. Graphical representation of z scores for FFP-RSD (25 %).



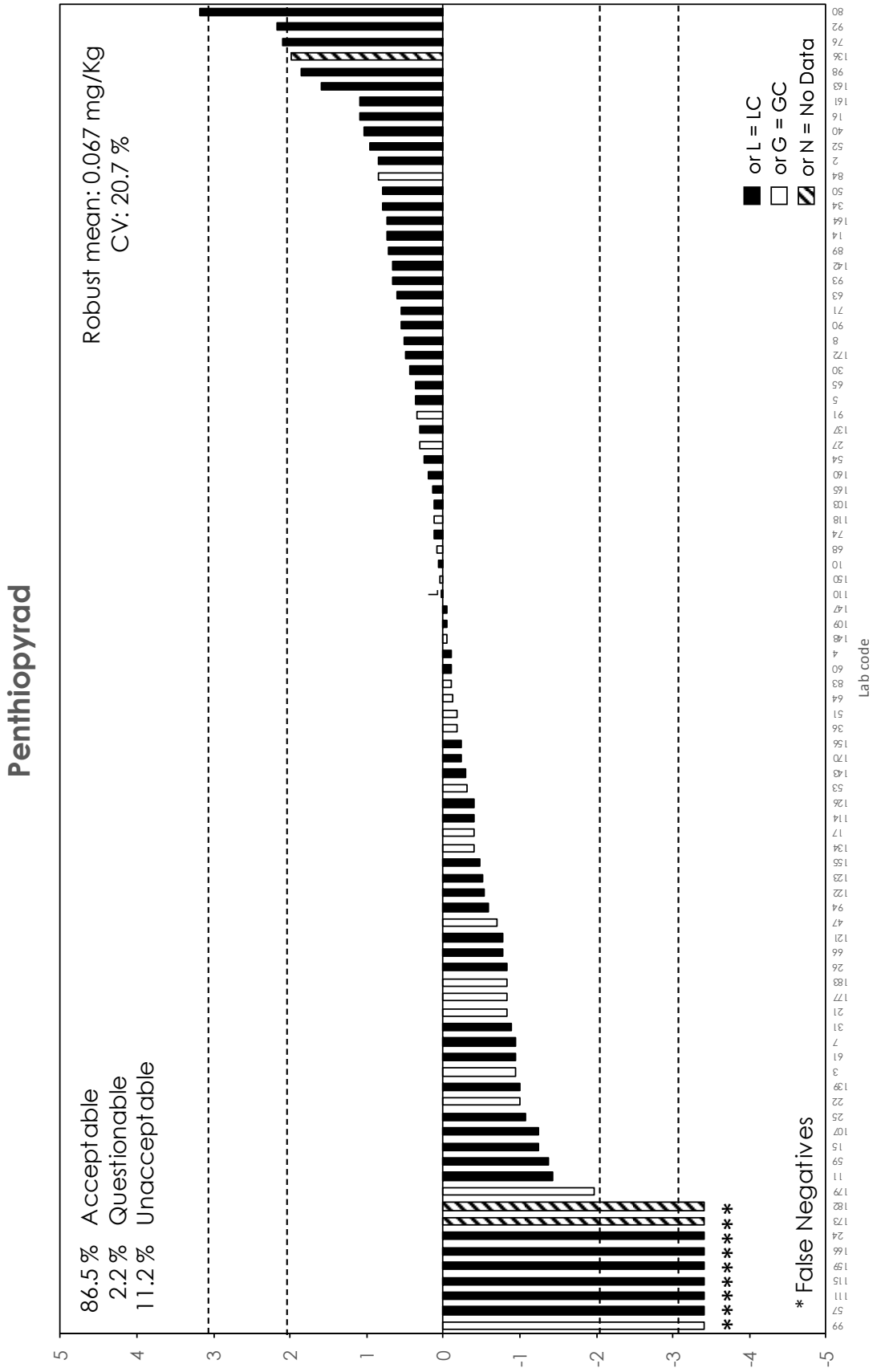

Tefluthrin
Robust mean: 0.047 mg/Kg
CV: 19.8 %
95.1 % Acceptable
2.1 % Questionable
2.8 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
GGGGG
**
Lab code
5
4
3
2
1
0
-1
-2
-3
-4
-5

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




Voluntary pesticides
Fenpicoxamid
Robust mean: 0.067 mg/Kg
CV: 21.5 %
62.1 % Acceptable
3.4 % Questionable
34.5 % Unacceptable
or L = LC
or G = GC
or N = No Data
* False Negatives
Lab code
5
4
3
2
1
0
-1
-2
-3
-4
-5
137
122
155
98
65
147
83
170
27
16
131
94
89
66
34
52
15
59
177
183
182
179
173
172
99
90
80
71
24

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



APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.

Lab Code	Ametoctradin	Azoxystrobin	Chlorpropham	Cyprodinil	Diazinon	Dicloran	Dimethomorph	Fenamidone	Fenhexamid	Fludioxonil	Fluopicolide	Fluopyram	Fluxapyroxad	Tebuconazole	Tefluthrin	Triadimenol	No. of z scores	AZ^2
	z score																	
1	0.2	2.1	-0.5	0.1	-0.5	-0.7	0.1	-0.2	1.3	0.6	0.6	-0.5	-0.2	0.6	-0.7	0.3	16	0.6
2	-0.4	-0.1	-0.4	-0.2	-0.6	-0.7	-0.4	0.4	0.4	-0.5	0.1	1.0	0.8	0.6	-0.7	0.4	16	0.3
3	-2.8	2.2	-0.5	-0.4	-0.6	-0.6	0.8	-0.1	0.2	-0.6	-0.4	-0.8	-0.7	-1.2	-0.7	-0.9	16	1.2
4	2.2	5.0	0.1	-0.3	-0.7	-1.0	0.1	-0.4	0.3	0.9	0.1	0.1	-0.1	0.0	0.0	0.5	16	2.1
5	-0.2	-0.1	0.1	-0.5	-0.5	-0.5	0.5	0.4	0.9	1.2	-0.3	0.5	1.6	-0.2	-0.2	0.4	16	0.4
7	-0.4	-0.3	0.3	-0.1	0.7	-0.8	-0.2	-0.6	-0.6	0.6	-0.1	-0.1	-0.6	0.1	-0.3	0.1	16	0.2
8	-0.2	-0.1	0.8	0.1	-0.3	-0.2	-0.3	-0.3	-0.6	0.1	0.0	0.4	0.0	0.5	0.3	0.3	16	0.1
10	0.5	1.1	0.0	0.4	0.5	3.7	0.1	0.3	1.1	1.2	0.2	0.1	0.6	0.8	0.5	0.7	16	1.2
11	-1.0	-0.1	-1.0	-0.3	-0.7	-0.7	0.1	-0.3	-0.1	-0.2	-0.2	-1.6	-1.7	-1.3	-1.3	-1.3	16	0.9
14	1.2	1.0	0.4	0.4	0.6	-0.1	0.6	0.5	-0.2	0.5	1.1	0.9	0.8	0.6	-0.1	0.2	16	0.4
15	-0.6	-0.7	-0.9	-0.8	-1.2	-0.6	-0.2	-0.8	0.0	-1.0	-0.9	-0.8	-1.0	-0.7	-1.2	-3.5	16	1.4
16	0.3	0.5	0.5	0.4	0.6	0.0	0.5	0.1	0.9	0.8	0.5	0.6	0.1	0.4	0.5	0.6	16	0.3
18	-0.2	0.1	0.4	0.2	-0.4	0.0	0.4	0.4	-0.3	0.0	0.3	2.1	-0.2	-2.3	0.0	-0.3	16	0.7
20	-0.3	0.5	2.8	-0.2	0.3	0.7	0.6	0.4	0.5	0.8	0.3	0.1	0.4	0.0	0.4	-0.4	16	0.7
21	-0.3	-0.2	0.1	0.7	-0.1	-0.3	-0.3	-0.1	0.3	0.3	-1.5	-0.1	-0.2	0.4	-0.5	-0.6	16	0.2
22	-0.3	-0.3	-0.7	0.1	-0.6	-0.6	-0.9	0.2	-0.6	-0.7	-0.1	-0.5	-0.1	0.3	-1.0	-1.3	16	0.4
24	-3.5	0.2	-0.2	0.2	-0.2	-0.2	-0.1	1.6	-0.2	-0.2	0.3	-0.2	-3.4	-0.1	-0.1	-0.6	16	1.7
25	-0.3	-0.7	0.0	-0.2	0.3	0.8	-1.2	-1.4	-1.1	-1.9	-1.3	-1.0	-1.9	-1.0	0.1	-1.4	16	1.2
26	0.8	1.1	0.6	-0.4	0.3	0.9	0.5	0.9	-0.3	-0.8	0.4	0.0	0.1	-0.1	1.1	1.7	16	0.6
27	-0.4	-0.7	0.5	0.4	0.8	0.1	1.0	0.0	-0.4	0.4	0.2	1.1	0.0	-0.5	0.8	-0.3	16	0.3
28	0.3	-0.5	-1.0	-0.5	-0.8	-0.3	-0.8	-1.4	-0.2	-0.4	-1.0	-1.2	-0.3	-0.5	-0.3	0.2	16	0.5
29		1.2	0.5	0.4	0.5	0.3	0.7	1.2	0.8	-0.1	1.4	0.3	0.4	0.6	0.5	0.7	15	0.5
30	-0.3	0.0	0.2	0.0	0.0	0.9	-1.0	-0.3	0.0	0.6	-0.7	-0.7	-1.0	-0.1	0.3	-0.8	16	0.3
31	0.1	-0.6	0.0	-0.7	0.1	0.1	-1.2	-0.9	-1.3	-0.4	-0.2	-0.2	0.4	0.2	0.1	0.7	16	0.4
32	0.6	0.3	-0.4	0.1	0.0	-0.4	-0.2	0.1	-0.4	-0.3	0.7	0.4	0.5	0.5	0.3	1.0	16	0.2
33	-0.1	0.2	-0.7	-0.3	-0.1	-0.9	-0.1	0.2	-0.1	-0.3	0.6	0.6	0.7	0.8	-0.4	1.4	16	0.3
34	1.6	-0.5	-0.4	-3.7	-0.3	-0.3	0.4	0.2	-0.5	-1.1	0.3	0.2	0.1	-0.8	-0.4	-0.8	16	1.3
35		-1.8	-0.9	-0.1	-0.3	-0.7	-2.5	-0.8	-0.6	-2.8	-0.2	0.3	-3.4	-0.1	-1.4	0.4	15	2.2
36	-0.7	0.4	0.0	-0.4	-0.2	-0.1	0.5	0.2	0.4	0.3	0.0	0.9	-1.8	-0.3	-0.4	-0.3	16	0.4
37	-1.1	-1.0	1.2	-0.3	-1.0	0.6	-0.8	-1.0	-0.8	-0.4	-0.8	-1.0	-0.9	0.5	0.1	-1.4	16	0.8
39	1.3	-0.1	0.4	0.2	0.6	0.2	-0.1	0.7	-0.6	0.0	-0.8	1.3	0.0	0.6	1.1	0.9	16	0.5
40	0.9	0.7	0.5	0.6	0.5	0.2	0.7	1.0	0.6	0.2	0.7	0.7	1.0	0.6	0.5	1.1	16	0.5
47	-2.3	0.9	-1.2	-1.2	-0.8	-0.8	0.1	-0.4	0.3	-1.2	-1.0	-1.2	-0.7	-0.9	-0.7	-0.4	16	1.0
50	0.1	1.2	-0.2	1.0	1.6	-1.0	1.4	0.1	0.5	4.0	1.0	0.3	1.2	0.7	0.5	0.7	16	1.8
52	-0.2	-0.2	-0.3	0.1	-0.2	-0.4	0.0	-0.1	0.4	0.0	0.0	1.3	0.2	0.6	-0.1	-0.2	16	0.2
54	-0.1	-0.2	0.0	0.0	-0.3	0.0	-0.1	-0.2	0.2	-0.6	-0.7	-0.4	-0.3	-0.1	0.0	-0.2	16	0.1
55	0.8	-0.4	-2.1	-0.1	-2.0	-1.4	-0.1	-0.6	-0.9	-1.7	-0.5	-0.8	-1.1	-0.4	-1.7	-0.4	16	1.3
57	-0.4	-0.1	-0.1	0.3	0.0	-0.2	-0.2	-0.1	-0.1	0.1	0.0	0.8	0.1	0.4	-0.1	0.2	16	0.1
59	-1.3	-1.5	-2.0	-1.8	-1.8	-2.7	-2.0	-0.9	0.6	-3.8	-0.7	-0.9	-0.2	-1.8	-2.4	-0.7	16	3.3

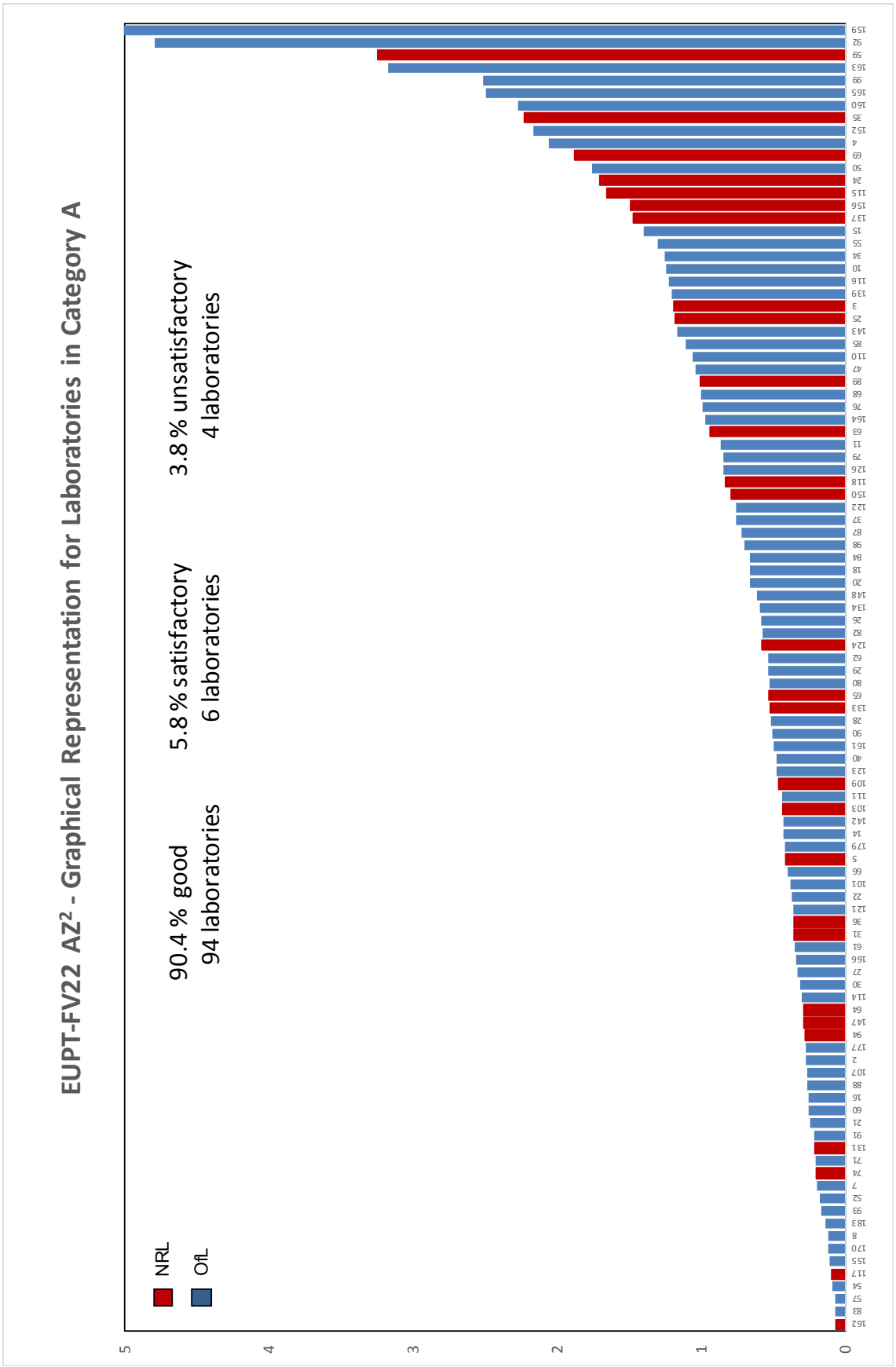
APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.

Lab Code	Ametoctradin	Azoxystrobin	Chlorpropham	Cyprodinil	Diazinon	Dicloran	Dimethomorph	Fenamidone	Fenhexamid	Fludioxonil	Fluopicolide	Fluopyram	Fluxapyroxad	Tebuconazole	Tefluthrin	Triadimenol	No. of z scores	AZ^2
	z score																	
60	-0.5	-1.2	1.1	-0.5	0.0	0.6	-0.1	-0.5	-0.1	0.4	0.0	-0.3	-0.1	0.1	0.1	0.3	16	0.3
61	-0.7	0.7	-0.2	0.0	-0.2	0.4	0.2	-0.5	0.4	-0.1	0.1	-1.5	-0.9	-0.8	-0.5	-0.2	16	0.4
62		-0.4	0.8	0.3	0.9	0.6	-0.2	-0.8	-1.4	0.4	1.2	0.6		0.3	0.9	0.1	14	0.5
63	1.0	-0.1	0.4	0.9	0.8	-0.3	0.8	0.8	2.2	1.1	1.3	-0.3	0.8	0.3	1.4	0.6	16	0.9
64	0.2	-0.4	-0.2	-0.3	-0.4	0.1	-0.1	-0.1	-0.6	-0.1	0.1	-0.6	-0.9	-0.6	-0.1	-1.5	16	0.3
65	0.1	0.3	0.6	0.4	1.3	0.9	0.6	0.1	1.1	0.9	0.8	-0.2	0.2	-0.2	1.5	-0.4	16	0.5
66	-0.9	-0.4	-0.3	-0.4	-0.3	-0.4	-0.9	-0.2	-0.1	-0.6	-0.4	-0.5	-1.3	-1.2	0.4	-0.4	16	0.4
68	-0.5	0.5	-0.3	0.4	-0.3	0.0	-1.1	0.4	-1.1	0.8	0.0	0.4	1.3	1.6	-0.7	-2.7	16	1.0
69	-1.6	-1.3	-1.2	-1.2	-1.4	-0.8	-1.2	-1.5	-1.1	-1.7	-1.7	-1.3	-2.0	-1.3	-1.4	-0.6	16	1.9
71	0.1	0.2	0.5	0.3	0.6	0.2	0.7	0.8	-0.4	0.0	0.6	-0.1	0.6	-0.2	0.2	0.8	16	0.2
74	0.0	0.2	-0.9	0.0	-0.1	-0.5	-0.1	0.3	-0.5	-1.0	-0.1	0.1	-0.5	0.2	-0.4	-0.2	16	0.2
76	2.1	-0.5	-1.1	-0.7	-1.0	-0.7	0.1	-0.3	0.0	-0.6	0.7	2.1	1.5	-0.5	-0.2	-0.2	16	1.0
79	0.2	0.2	-0.3	-0.3	0.4	0.7	-0.2	0.5	0.3	-0.2	0.5	1.9	-0.6	2.4	-0.5	1.4	16	0.9
80	-0.2	0.9	-0.3	1.7	-0.5	-0.2	0.1	1.0	0.2	1.2	0.8	-0.4	-0.5	-0.8	0.3	-0.3	16	0.5
82	0.7	0.7	0.9	0.6	0.9	0.5	0.8	0.7	0.9	1.1	1.1	0.3	0.5	0.2	0.9	0.6	16	0.6
83	0.2	0.0	0.5	0.1	0.5	-0.5	-0.2	-0.3	-0.1	-0.1	0.0	0.2	-0.1	-0.4	-0.1	-0.1	16	0.1
84	0.0	0.1	1.4	-0.7	-0.7	1.2	-0.1	-0.3	-0.6	-0.7	0.0	-0.7	-2.1	-0.6	0.0	0.0	16	0.7
85	-0.4	-1.1	0.3	-0.3	-0.1	0.3	-0.6	-1.0	-0.6	-0.1	-0.8	-0.8	-3.4	-0.4	0.7	-0.9	16	1.1
87	-0.3	1.7	-0.1	-0.9	0.3	-1.4	0.3	0.5	-0.3	-0.5	0.3	-0.2	0.2	-0.5	0.2	-2.2	16	0.7
88	0.1	0.0	-0.2	0.3	0.1	0.9	-0.4	-0.2	0.3	0.4	0.0	0.2	0.6	0.5	-1.3	0.6	16	0.3
89	0.2	-0.5	-0.5	-0.7	0.0	-0.4	0.0	1.5	-0.2	1.4	-0.5	1.4	2.4	-0.3	-0.5	1.6	16	1.0
90	1.4	0.5	0.9	0.7	-0.1	0.6	-0.1	0.1	0.9	0.2	-0.4	0.8	0.2	-0.1	1.1	1.2	16	0.5
91	0.8	-0.6	0.6	0.4	0.5	0.3	-0.6	-0.4	-0.2	0.5	-0.8	-0.1	0.0	0.4	0.4	0.2	16	0.2
92	1.3	1.3	-0.9	-1.0	-0.9	-0.7	4.1	3.4	3.4	1.6	-0.8	-0.9	5.0	-0.6	-1.0	0.1	16	4.8
93	-0.2	0.2	0.0	-0.3	0.1	1.0	-0.5	-0.1	0.5	-0.2	0.0	0.7	0.0	0.4	0.5	0.4	16	0.2
94	0.0	0.6	0.0	0.3	0.4	1.4	0.1	0.1	0.7	0.3	-0.1	-0.1	-1.0	0.1	0.6	0.2	16	0.3
95	0.5	-0.1	0.0	-0.1	-0.7	-0.4	0.2	-0.7	-0.3	-0.8	1.3	1.3	0.6	0.3	0.5	0.6	16	0.4
98	0.7	0.3	0.3	0.4	0.1	-0.6	0.1	-0.3	-0.3	0.3	-0.2	2.4	0.5	0.7	0.2	1.8	16	0.7
99	-2.0	-1.2	0.0	-1.8	0.7	0.9	-0.9	-1.5	-1.9	0.3	-1.6	-1.1	-2.4	-1.2	0.8	-3.5	16	2.5
101	0.3	0.1	0.5	0.8	0.5	0.3	0.3	0.6	0.4	1.0	0.7	0.2	1.4	-0.2	0.7	-0.2	16	0.4
102	-0.5	-0.7	-0.9	-0.7	0.1	-0.2	-0.7	-0.4	-0.3	-0.9	-0.5	-0.4	-0.9	-1.1	-0.7	0.5	16	0.4
103	0.3	-1.4	0.4	0.3	1.4	-0.6	0.3	0.7	-0.5	0.2	0.4	-0.1	-0.1	0.7	0.2	0.9	16	0.4
107	1.0	0.3	0.3	-0.4	0.0	0.9	0.4	0.0	0.2	0.8	0.1	0.0	1.1	0.3	0.0	-0.2	16	0.3
109	0.9	0.8	0.8	0.2	0.0	0.1	0.9	0.3	0.6	0.1	1.2	0.3	1.1	0.7	0.4	0.8	16	0.5
110	-0.4	-0.5	0.1	-0.2	0.3	-3.5	-0.7	0.6	0.1	0.1	-1.2	0.0	0.9	0.0	1.2	0.1	16	1.1
111	-0.9	0.0	-0.4	-0.5	-0.3	0.7	-0.4	-0.3	-0.6	-0.2	-0.6	-0.9	-0.6	-0.8	-0.7	-1.3	16	0.4
114	-0.8	0.3	-0.5	-0.6	-0.4	0.9	0.0	-1.0	0.2	0.8	0.2	-0.8	-0.1	-0.1	0.3	0.1	16	0.3
115	3.3	0.8	0.5	0.6	0.6	1.4	2.8	0.3	0.2	0.2	0.8	1.4	-0.5	0.3	0.8	0.3	16	1.7
116	-0.8	-0.3		0.3	-0.4	0.7	-0.8	0.5	3.4	0.0	0.7	-0.6	-0.9	0.6	-0.7	-1.5	15	1.2
117	0.1	0.0	-0.6	-0.3	-0.5	0.2	-0.1	-0.1	-0.3	0.0	-0.2	-0.1	-0.8	0.1	-0.1	0.1	16	0.1

APPENDIX 5. Average of the Squared z scores (AZ^2) for laboratories in Category A.

Lab Code	Ametoctradin	Azoxystrobin	Chlorpropham	Cyprodinil	Diazinon	Dicloran	Dimethomorph	Fenamidone	Fenhexamid	Fludioxonil	Fluopicolide	Fluopyram	Fluxapyroxad	Tebuconazole	Tefluthrin	Triadimenol	No. of z scores	AZ^2
	z score																	
118	0.7	0.2	0.2	0.3	0.5	0.6	-0.2	2.1	0.5	-0.3	-1.5	1.2	1.2	1.2	-0.1	0.8	16	0.8
121	-0.7	-0.6	0.0	-0.3	-0.6	0.2	0.4	-1.0	-0.7	-0.2	-0.2	-1.2	-0.7	-0.6	0.5	-0.4	16	0.4
122	-0.2	-0.3	0.9	0.6	-1.3	-0.4	-0.6	0.9	-0.9	0.4	-1.4	0.2	-1.7	-0.8	1.1	0.7	16	0.8
123	-0.3	-0.7	0.0	-0.5	-0.1	-0.1	-0.6	-0.6	0.5	-0.2	-0.5	-0.4	-0.3	-0.3	2.2	-0.7	16	0.5
124		-0.2	-0.5	0.7	-0.3	-0.7	0.1	0.1	-0.8	-1.8	-0.9	-0.6		0.3	-1.3	-0.3	14	0.6
126	0.8	2.0	-0.4	0.2	1.2	-0.2	1.4	0.7	1.0	0.6	1.2	0.2	1.1	0.6	-0.7	-0.3	16	0.8
129	1.5	0.4	0.6	-0.2	0.7	-0.4	-0.7	0.3	-0.8	0.2	0.5	5.0	0.8	1.3	1.1	0.7	16	2.1
131	0.7	-0.7	-0.5	-0.4	-0.6	-0.4	-0.1	0.1	-0.1	-0.6	0.1	-0.6	-0.6	-0.2	-0.2	-0.7	16	0.2
133		0.2	-0.2	-0.4	-0.7	0.8	-0.2	-0.4	0.8	-0.3	0.2	-2.1	0.8	-0.3	0.3	-0.6	15	0.5
134	-1.6	-0.8	-0.3	-0.4	0.0	0.2	-0.8	-0.8	-0.5	-0.8	-0.6	-0.4	0.1	-0.8	-0.6	-1.5	16	0.6
137	3.1	0.6	1.3	-0.2	0.8	0.4	1.3	1.3	-0.5	-0.2	1.6	0.1	1.2	0.6	1.4	1.1	16	1.5
139	-2.6	-0.2	-1.0	-0.8	-1.0	-1.0	-0.8	-0.8	-0.3	-1.2	-0.8	-0.5	-1.3	-1.2	-0.9	-1.0	16	1.2
142	1.4	0.8	0.5	0.0	-0.2	0.6	0.5	0.1	1.0	0.4	-0.2	1.1	0.6	-0.1	0.2	0.7	16	0.4
143	-0.7	0.2	-0.3	-0.3	-0.8	-3.6	0.9	0.6	-1.3	-0.2	-0.3	-0.5	-0.1	-1.0	-0.5	-0.1	16	1.2
147	-0.4	0.4	0.5	-0.3	-0.1	-0.4	0.5	0.5	0.1	-1.0	0.7	0.0	0.3	0.3	-0.3	1.2	16	0.3
148	0.3	0.6	0.5	0.5	0.9	0.9	0.5	-0.3	1.2	0.9	0.8	0.4	1.0	0.3	1.7	-0.2	16	0.6
150	-0.1	-0.9	-0.6	-0.5	-0.1	-0.5	-0.7	-0.2	1.4	-0.5	-0.7	1.5	-0.1	-0.2	2.3	-0.6	16	0.8
152	5.0	0.3	1.5	0.6	1.7	0.2	0.3	0.4	-0.1	0.7	0.2	0.6		-0.1	0.8	-0.1	15	2.2
155	0.3	-0.6	0.0	0.2	0.2	0.6	-0.6	-0.2	0.2	0.4	0.1	-0.2	-0.2	0.3	0.3	0.2	16	0.1
156	-0.6	-1.1	-1.3	-0.1	0.1	-0.3	1.3	-0.7	-0.7	-0.6	-0.4	-0.9	-2.0	-0.2	-0.5	-3.5	16	1.5
159	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-3.9	5.0	5.0	5.0	5.0	5.0	16	24.4
160	5.0	0.0	0.5	-0.2	-0.9	0.2	0.4	-0.1	0.0	2.4	-1.3	-1.3	1.0	0.3	0.4	0.1	16	2.3
161	0.2	0.4	0.1	0.1	-0.4	-0.1	0.3	1.5	1.1	0.0	0.2	1.4	0.6	0.7	-0.5	0.9	16	0.5
162	-0.1	0.2	-0.3	0.3	0.0	-0.4	0.1	-0.2	0.1	0.1	-0.1	0.2	-0.1	0.6	0.0	-0.5	16	0.1
163	0.6	3.5	-0.6	-1.0	-0.1	0.4	1.3	0.1	4.4	0.3	1.3	2.3	2.0	1.0	-1.8	0.4	16	3.2
164	-0.1	1.0	0.1	0.5	3.2	0.4	0.8	0.6	1.2	0.3	0.7	0.4	0.5	-0.7	0.4	-0.3	16	1.0
165	5.0	-0.5	0.5	0.2	0.2	-3.6	0.0	-0.1	-0.3	0.0	0.8	-0.5	0.3	0.2	0.5	0.1	16	2.5
166	-0.5	-0.6	0.0	0.1	-0.8	0.1	-0.3	-0.3	-1.0	-0.5	-0.8	-0.1	-0.6	0.1	-1.3	-0.4	16	0.3
170	0.5	0.5	0.3	-0.1	0.6	0.4	0.5	0.5	-0.1	0.0	0.3	0.0	0.4	-0.1	0.2	-0.3	16	0.1
177	-0.3	-0.5	-0.3	0.7	0.4	-0.2	-0.2	-0.1	-0.4	-1.1	-0.1	1.2	-0.5	-0.3	-0.5	-0.1	16	0.3
179	-0.3	0.0	-1.1	0.2	-1.0	-0.6	-0.5	0.2	-0.3	-1.3	-0.1	-0.2	-0.3	0.2	-1.1	-0.8	16	0.4
183	-0.3	0.2	0.2	0.0	0.1	-0.7	-0.2	-0.1	-0.4	-0.4	0.0	0.1	-1.0	0.0	0.2	0.3	16	0.1

APPENDIX 6. EUPT-FV-22 AZ² graphical representation for EU/EFTA laboratories in Category A.



9th Edition
Revised:15th November 2019

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-SANTE[5] 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 Network[6] 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/EC[7]:

- 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 programme[8]. 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.

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[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"

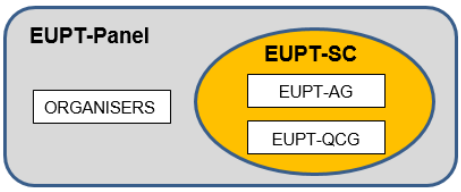
[7] Regulation (EU) 2017/625 of the European Parliament and of the Council on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products. Published at OJ of the EU L95 of 07.04.2017

[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/EC[10] (for all OfLs analysing for pesticide residues within the framework of official controls[11] 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.

[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.

Target Pesticide List
This list contains all analytes (pesticides and metabolites) to be sought for, along with the Minimum Required Reporting Levels (MRRLs) valid for the specific EUPT. The MRRLs are typically based upon the lowest MRLs found either in Regulation 396/2005/EC or Commission Directive 2006/125/EC (Baby Food Directive).
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 $|y_i - y| \leq 0.3 \times \sigma_{pt}$, 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_{pt} 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.

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

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.

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 13528:2015[12], 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

[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).

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 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:

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

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-σ_{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:

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

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:

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

where x_i is the value reported by the laboratory, x_{pt} is the assigned value, and FFP-σ_{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 17043:2010[14]:

$\lvert z\rvert \leq 2.0$	Acceptable
$2.0 < \lvert z\rvert < 3.0$	Questionable
$\lvert z\rvert \geq 3.0$	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

[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

(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. 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 (AZ^2)[15,16] (see below) will be used. The AZ^2 is calculated as follows:

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

[15] Formerly named "Sum of squared z scores (SZ^2)"

[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.

Where n is the number of z scores to be considered in the calculation. In the calculation of the AZ^2, z scores higher than 5 will be set as 5. Based on the AZ^2 achieved, the laboratories are classified as follows:

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

Combined z scores are considered to be of lesser importance than individual z scores. The EUPT-Panel retains the right not to calculate AZ^2 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 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 AZ^2 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 detected[17]:

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.
- 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.

[17] Article 101 of Regulation (EC) 625/2017

EUPT-FV22 SPECIFIC PROTOCOL

European Union Proficiency Test for Pesticide Residues in Fruits and Vegetables (2020)

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 (0.005 - 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 **onion**. The onions were grown in a greenhouse in Almería. The pesticide treatments carried out were pre-harvest using commercial formulations and post-harvest using analytical standards. The test item was frozen (using liquid nitrogen), chopped, homogenised 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 (–20ºC) prior to shipment to participants.

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. 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 onion 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 2nd March 2020. 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 (-18ºC 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

In addition to the pesticide target list of mandatory compounds, a "voluntary target list" containing pesticides which might be present in the test item will be published. 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.

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

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 List from this web site. Laboratories should carefully read the Target Pesticide List, where the Minimum Required Reporting Limits (MRRLs) are given. The MRRLs do not always correspond with the EU MRLs set for onion.

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 confirmation, or similar, may be requested at any time by the Organiser. **Payments without the <u>invoice number</u> 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 17th February – 28th February 2020, 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 10th March 2020, 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 – 30th March 2020- 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/11813/2017. 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 30th March 2020.

I**MPORTANT: 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 onion 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. It will be available from 31st March – 6th April 2020. 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 (updated on 27th March 2020)

EUPT-FV22 CALENDAR	
Activity	**Date**
Registration period at www.eupt-registration.eu	16th December 2019 -24th January 2020
Specific Protocol published on the Web site	17th February 2020 at the latest
Selection of the scope	17th – 28th February 2020
Sample distribution	2nd March 2020
Deadline for receiving sample acceptance	10th March 2020
Deadline for receiving results	29th June 2020
Filling in additional information, if necessary	30th June – 7th July 2020
Preliminary Report: (containing preliminary assigned values and z scores)	July 2020
Final Report distributed to the Laboratories	December 2020

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 Almeria
BANK ADDRESS: Office Number 990. Universidad de Almeria. 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:
Universidad de Almería. Edificio Químicas CITE I
Ctra. Sacramento s/n
04120, La Cañada de San Urbano Almería - Spain
Fax No.: +34 950015008

Organising team (e-mail and phone no.):

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Quality Control Group

Dr. Antonio Valverde, University of Almería, Spain
Dr. Paula Medina, European Food Safety Authority, Italy.

Advisory Group

Dr. Michelangelo Anastassiades, CVUA, Stuttgart, Germany.
Dr. Miguel Gamón, Laboratorio Agroalimentario, Valencia, Spain.
Dr. Magnus Jezussek, Bavarian Health and Food Safety Authority, Erlangen, Germany.
Dr. André de Kok, Wageningen Food Safety Research, Wageningen, The Netherlands.
Mr. Ralf Lippold, CVUA, Freiburg, Germany.
Dr. Sonja Masselter, AGES GmbH Institute for Food Safety, Innsbruck, Austria.
Dr. Hans Mol, Wageningen Food Safety Research, Wageningen, The Netherlands.
Mr. Finbarr O'Regan, Pesticide Control Laboratory, Celbridge, Ireland.
Ms. Patrizia Pelosi, Istituto Superiore di Sanità, Roma, Italy.
Dr. Tuija Pihlström, National Food Agency, Uppsala, Sweden.
Dr. Mette Erecius Poulsen, DTU, Copenhagen, Denmark.

TARGET PESTICIDE LIST FOR EUPT-FV-22

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

Pesticide	MRRL (mg/Kg)
Acephate	0.01
Acetamiprid	0.01
Acrinathrin	0.01
Aldicarb	0.01
Aldicarb Sulfone	0.01
Aldicarb Sulfoxide	0.01
Aldrin	**0.005**
Ametoctradin	0.01
Azinphos-methyl	0.01
Azoxystrobin	0.01
Bifenthrin (sum of isomers)	0.01
Biphenyl	0.01
Bitertanol (sum of isomers)	0.01
Boscalid	0.01
Bromopropylate	0.01
Bromuconazole (sum of diastereoisomers)	0.01
Bupirimate	0.01
Buprofezin	0.01
Cadusafos	**0.005**
Carbaryl	0.01
Carbendazim	0.01
Carbofuran	**0.005**
Carbofuran-3-hydroxy	0.01
Chlorantraniliprole	0.01
Chlorfenapyr	0.01
Chlorfenvinphos	0.01
Chlorobenzilate	0.01
Chlorothalonil	0.01
Chlorpropham	0.01
Chlorpyrifos	**0.005**
Chlorpyrifos-methyl	0.01
Clofentezine	0.01
Clothianidin	0.01
Cyazofamid	0.01
Cyfluthrin (cyfluthrin incl. other mixtures of constituent isomers (sum of isomers))	0.01
Cyflufenamid: sum of cyflufenamid (Z-isomer) and its E-isomer	**0.01**
Cymoxanil	0.01
Cypermethrin (cypermethrin incl. other mixtures of constituent isomers (sum of isomers))	0.01
Cyproconazole	0.01
Cyprodinil	0.01
Deltamethrin (cis-deltamethrin)	0.01
Demeton-S-methylsulfone	**0.005**
Diazinon	**0.005**
Dichlofluanid	0.01
Dichlorvos	**0.005**
Dicloran	0.01
Dicofol (sum of p, p´ and o,p´ isomers)	0.01
Dieldrin	**0.005**
Diethofencarb	0.01
Difenoconazole	0.01
Diflubenzuron	0.01
Dimethoate	**0.003**
Dimethomorph (sum of isomers)	0.01
Dimethylaminosulfotoluidide (DMST)	0.01
Diniconazole (sum of isomers)	0.01

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

Pesticide	MRRL (mg/Kg)
Diphenylamine	0.01
Endosulfan alpha	0.01
Endosulfan beta	0.01
Endosulfan sulfate	0.01
EPN	0.01
Epoxiconazole	0.01
Ethion	0.01
Ethirimol	0.01
Ethoprophos	**0.005**
Etofenprox	0.01
Etoxazole	0.01
Famoxadone	0.01
Fenamidone	0.01
Fenamiphos	0.01
Fenamiphos sulfone	0.01
Fenamiphos sulfoxide	0.01
Fenarimol	0.01
Fenazaquin	0.01
Fenbuconazole	0.01
Fenhexamid	0.01
Fenitrothion	0.01
Fenoxycarb	0.01
Fenpropathrin	0.01
Fenpropidin	0.01
Fenpropimorph (sum of isomers)	0.01
Fenpyrazamine	**0.01**
Fenpyroximate	0.01
Fenthion	0.01
Fenthion oxon	0.01
Fenthion oxon sulfone	0.01
Fenthion oxon sulfoxide	0.01
Fenthion sulfone	0.01
Fenthion sulfoxide	0.01
Fenvalerate (any ratio of constituent isomers (RR, SS, RS & SR) including esfenvalerate)	0.01
Fipronil	**0.004**
Fipronil sulfone	**0.004**
Flonicamid	0.01
Flubendiamide	0.01
Fludioxonil	0.01
Flufenoxuron	0.01
Fluopicolide	0.01
Fluopyram	0.01
Fluquinconazole	0.01
Flusilazole	0.01
Flutolanil	0.01
Flutriafol	0.01
Fluxapyroxad	0.01
Formetanate (expressed as formetanate (hydrochloride))	0.01
Fosthiazate	0.01
Hexaconazole	0.01
Hexythiazox	0.01
Imazalil	0.01
Imidacloprid	0.01
Indoxacarb (sum of indoxacarb and its R enantiomer)	0.01
Iprodione	0.01
Iprovalicarb	0.01
Isocarbophos	0.01
Isofenphos-methyl	0.01

Pesticide	MRRL (mg/Kg)
Isoprothiolane	0.01
Kresoxim-methyl	0.01
Lambda-Cyhalothrin	0.01
Linuron	0.01
Lufenuron (any proportion of constituent isomers)	0.01
Malaoxon	0.01
Malathion	0.01
Mandipropamid	0.01
Mepanipyrim	0.01
Metaflumizone (sum of E- and Z- isomers)	0.01
Metalaxyl and metalaxyl-M	0.01
Methamidophos	0.01
Methidathion	0.01
Methiocarb	0.01
Methiocarb sulfone	0.01
Methiocarb sulfoxide	0.01
Methomyl	0.01
Methoxyfenozide	0.01
Metrafenone	0.01
Monocrotophos	**0.005**
Myclobutanyl	0.01
Omethoate	**0.003**
Orthophenylphenol (Free compound only)	0.01
Oxadixyl	0.01
Oxamyl	0.01
Oxydemeton-methyl	**0.005**
Paclobutrazole	0.01
Paraoxon-methyl	0.01
Parathion-ethyl	0.01
Parathion-methyl	0.01
Penconazole	0.01
Pencycuron	0.01
Pendimethalin	0.01
Permethrin (sum of isomers)	0.01
Phenthoate	0.01
Phosalone	0.01
Phosmet	0.01
Phosmet oxon	0.01
Phoxim	0.01
Pirimicarb	0.01
Pirimicarb-desmethyl	0.01
Pirimiphos-methyl	0.01
Prochloraz (only parent compound)	0.01
Procymidone	0.01
Profenofos	0.01
Propamocarb (only parent compound)	0.01
Propargite	0.01
Propiconazole (sum of isomers)	0.01
Propyzamide	0.01
Proquinazid	**0.01**
Prosulfocarb	0.01
Prothioconazole (Prothioconazole-desthio) (sum of isomers)	0.01
Prothiofos	0.01
Pymetrozine	**0.01**
Pyraclostrobin	0.01
Pyridaben	0.01
Pyrimethanil	0.01
Pyriproxyfen	0.01

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

Pesticide	MRRL (mg/Kg)
Quinoxyfen	0.01
Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)	0.01
Spirodiclofen	0.01
Spiromesifen	0.01
Spirotetramat	0.01
Spirotetramat metabolite BYI08330-enol	0.01
Spirotetramat metabolite BYI08330-ketohydroxy	0.01
Spirotetramat metabolite BYI08330-monohydroxy	0.01
Spirotetramat metabolite BYI08330 enol-glucoside	0.01
Spiroxamine (sum of isomers)	0.01
Tau-Fluvalinate	0.01
Tebuconazole	0.01
Tebufenozide	0.01
Tebufenpyrad	0.01
Teflubenzuron	0.01
Tefluthrin	0.01
Terbuthylazine	0.01
Tetraconazole	0.01
Tetradifon	0.01
Thiabendazole	0.01
Thiacloprid	0.01
Thiamethoxam	0.01
Thiodicarb	0.01
Thiophanate-methyl	0.01
Tolclofos-methyl	0.01
Tolylfluanid	0.01
Triadimefon	0.01
Triadimenol (any proportion of constituent isomers)	0.01
Triazophos	**0.005**
Trichlorfon	0.01
Tricyclazole	**0.01**
Trifloxystrobin	0.01
Triflumuron	0.01
Trifluralin	0.01
Triticonazole	0.01
Vinclozolin (only parent compound)	0.01
Zoxamide	0.01

In red: new pesticides this year

This list is based on Commission Implementing Regulation (EU) 2019/533 of 28 March 2019
The MRRLs are based on Regulation (EC) No. 396/2005 and Commission Directive 2006/125/EC.

VOLUNTARY PESTICIDE LIST FOR EUPT-FV-22

Voluntary Compounds (will NOT be considered in Category A/B classification)

Pesticide	MRRL (mg/Kg)
Benalaxyl and benalaxyl-M	0.01
Benzovindiflupyr	0.01
Chlorfluazuron	0.01
Clomazone	0.01
Dinotefuran	**0.01**
Fenobucarb	**0.01**
Fenpicoxamid	**0.01**
Fluensulfone	**0.01**
Flufenacet (only parent compound)	0.01
Heptachlor	0.01
Heptachlor epoxide	0.01
Isoxaflutole	0.01
Isoxaflutole diketonitrile degradate	0.01
Isopyrazam	0.01
Metconazole (sum of isomers)	0.01
Molinate	0.01
Novaluron	0.01
Oxathiapiprolin	**0.01**
Penflufen	0.01
Penthiopyrad	0.01
Picolinafen	0.01
Propaquizafop	0.01
Pyrethrins	0.01
Quinalphos	**0.01**
Quintozene	0.01
Pentachloro-aniline	0.01
Pyridalil	0.01
Pyriofenone	0.01
Quinoclamine	0.01
Rotenone	0.01
Spinetoram	0.01
Sulfoxaflor (sum of isomers)	0.01
Tetramethrin	0.01
Tolfenpyrad	**0.01**
Tri-allate	**0.01**
Tritosulfuron	0.01

In red: new pesticides this year

This list is based on the working document SANCO/12745/2013 of 21–22 November 2017 rev. 9(1)

ANNEX B. List of laboratories that agreed to participate in EUPT-FV22

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Austria	Department for Pesticide and Food Analytics (PLMA)	Innsbruck	Austria	Yes
Belgium	Primoris Belgium	Gent - Zwijnaarde	Belgium	Yes
Belgium	Sciensano	Brussels	Belgium	Yes
Belgium	LOVAP NV	Geel	Belgium	Yes
Belgium	Phytocontrol (Nimes) Pesticide Lab	Nimes	France	Yes
Belgium	LUFA Kiel - Pesticide Lab	Kiel	Germany	Yes
Belgium	Eurofins Lab Zeeuws-Vlaanderen B.V.	Graauw	The Netherlands	Yes
Belgium	Groen Agro Control Netherlands	Delfgauw	The Netherlands	Yes
Bulgaria	Primoris Belgium	Gent - Zwijnaarde	Belgium	Yes
Bulgaria	Euro Lab/ Interpred Eurologistic Ltd.	Svilengrad	Bulgaria	Yes
Bulgaria	CLCTC – Sofia Pesticide Lab	Sofia	Bulgaria	Yes
Bulgaria	Primoris - Bulgaria, Plovdiv	Plovdiv	Bulgaria	Yes
China	SCDC - Pesticide Lab (Shanghai)	Shanghai	China	Yes
China	Beijing Uni-Star Inspection Co., Ltd.	Beijing	China	Yes
China	Agro-product Safety Research Center - Guofang Pang	Beijing	China	Yes
China	Chinese Academy of Agricultural Sciences Beijing	Beijing	China	Yes
Colombia	Agropecuar Colombian Inst. Pesticide Lab	Mosquera, Cundinamarca	Colombia	Yes
Croatia	Sample Control	Lučko	Croatia	Yes
Croatia	Bioinstitut d.o.o., Cakovec	Cakovec	Croatia	Yes
Croatia	Croatian National Institute of Public Health-HZJZ	Zagreb	Croatia	Yes
Croatia	Croatiakontrola - Pesticide Lab	Zagreb	Croatia	Yes
Croatia	INSPECTO d.o.o. Laboratorij (Osijek)	Osijek	Croatia	Yes
Croatia	Nastavni Zavod za Javno Zdravstvo Primorsko-goranske Županije	Kotar County, Rijeka	Croatia	Yes
Croatia	Center for Food Control PBF, Zagreb	Zagreb	Croatia	Yes

ANNEX B. List of laboratories that agreed to participate in EUPT-FV-22.

ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Croatia	Dr. Andrija Štampar Pesticide Lab	Zagreb	Croatia	Yes
Cyprus	SGL - Pesticide Lab (Nicosia)	Nicosia	Cyprus	Yes
Czech Republic	Pesticide Lab (Brno)	Brno	Czech Republic	Yes
Czech Republic	Czech Agriculture and Food Inspection Authority (CAFIA)	Praha	Czech Republic	Yes
Czech Republic	Metrological and Testing laboratory, University of Chemistry and Technology Prague	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	Tartu Laboratory of Health Board	Tartu	Estonia	Yes
Finland	Finnish Customs Laboratory	Espoo	Finland	Yes
Finland	Finnish Food Authority	Helsinki	Finland	Yes
Finland	MetropoliLab Oy	Helsinki	Finland	Yes
France	Primoris Belgium	Gent - Zwijnaarde	Belgium	Yes
France	CAMP Méditerrannée (Perpignan)	PERPIGNAN	France	Yes
France	INOVALYS - Le Mans	Le Mans	France	Yes
France	SCL Montpellier	Montpellier	France	Yes
France	Laboratoire du SCL Paris	Massy Cedex	France	Yes
France	CAPINOV	Landerneau	France	Yes
France	CERECO (GARONS)	GARONS	France	Yes
France	GIRPA-POLLENIZ - Pesticide Lab	Beaucouzé	France	Yes
Germany	Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, LVI Oldenburg	Oldenburg	Germany	Yes
Germany	Landesuntersuchungsanstalt für das Gesundheits- und Veterinärwesen	Dresden	Germany	Yes
Germany	Pesticide Lab (Bremen)	Bremen	Germany	Yes
Germany	Thüringer Landesamt für Verbraucherschutz	Bad Langensalza	Germany	Yes
Germany	Landeslabor Schleswig-Holstein	Neumünster	Germany	Yes

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ON BEHALF OF	LABORATORY NAME	CITY	COUNTRY	REPORTED RESULTS
Germany	LGL Erlangen - Pesticide Lab	Erlangen	Germany	Yes
Germany	CVUA-MEL - Pesticide Lab (Münster)	Münster	Germany	Yes
Germany	Chemisches und Veterinäruntersuchungsamt Rhein Ruhr Wupper	Krefeld	Germany	Yes
Germany	Landeslabor Berlin-Brandenburg	Frankfurt (Oder)	Germany	Yes
Germany	Federal Office of consumer protection and Food Safety, NRL for Pesticide Residues	Berlin	Germany	Yes
Germany	IHU - Pesticide Lab (Hamburg)	Hamburg	Germany	Yes
Germany	Labor Friedle - Germany, Tegernheim	Tegernheim	Germany	Yes
Germany	LAV Sachsen-Anhalt Fachbereich 3	Halle/Saale	Germany	Yes
Germany	LUA Saarbrücken	Saarbrücken	Germany	Yes
Germany	Landesamt für Landwirtschaft, Lebensmittelsicherheit und Fischerei	Rostock	Germany	Yes
Germany	LUA Rheinland-Pfalz, Institut für LM-Chemie Speyer	Speyer	Germany	Yes
Germany	Landwirtschaftliches Technologiezentrum Augustenberg (LTZ)	Karlsruhe	Germany	Yes
Germany	Labor Mang - Pesticide Lab	Frankfurt	Germany	Yes
Germany	Central Institute of the Bundeswehr Medical Service Munich	Garching-Hochbrück	Germany	Yes
Germany	ZInstSanBw Kiel - Pesticide Lab	Kronshagen	Germany	Yes
Greece	General Chemical State Laboratory	Athens	Greece	Yes
Greece	Pesticide Residues Lab of Regional Centre of Plant Protection, Quality and Physosanitary Control of Thessaloniki	Thessaloniki	Greece	Yes
Greece	Benaki Phytopathological Institute, Kifissia	Kifissia	Greece	Yes
Hungary	FCSCN Ltd. Pesticide Residue Analytical Laboratory, Miskolc	Miskolc	Hungary	Yes
Hungary	National Food Chain Safety Office Pesticide Analytical National Reference Laboratory, Velence	Velence	Hungary	Yes

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Hungary	Food Chain Safety Centre Non-profit Ltd., Pesticide Residue Analytical Laboratory, Szolnok	Szolnok	Hungary	Yes
Hungary	Food Chain Safety Centre Non-profit Ltd. Pesticide Residue Analytical Laboratory, Hódmezővásárhely	Hódmezovásárhely	Hungary	Yes
Iceland	Matís - Iceland, Reykjavík	Reykjavík	Iceland	Yes
Ireland	Pesticide Residue Laboratory	Co. Kildare	Ireland	Yes
Italy	ARPA-ER - Pesticide Lab	Ferrara	Italy	Yes
Italy	ARPAM - Pesticide Lab	Macerata	Italy	Yes
Italy	ARPA Campania	Napoli	Italy	Yes
Italy	Laboratorio Chimico Cuneo - IZS PLVA	CUNEO	Italy	Yes
Italy	ARPA FVG - Pesticide Lab (Udine)	Udine	Italy	Yes
Italy	ISS - Pesticide Lab	Roma	Italy	Yes
Italy	APPA-SL Trento - Pesticide Lab	Trento	Italy	No
Italy	APPA-Puglia | Polo Alimenti Bari - Pesticide Lab	Bari	Italy	Yes
Italy	ARPA Veneto (Laboratorio di Verona)	Verona	Italy	Yes
Italy	IZS Sardegna - Pesticide Lab	Sassari	Italy	Yes
Italy	Istituto Zooprofilattico Delle Regioni Lazio e Toscana Direzione Operativa Chimica Sede Di Firenze	San Martino alla Palma Scandicci (FI)	Italy	Yes
Italy	Laboratorio Di Prevenzione Ats Bergamo	Bergamo	Italy	Yes
Italy	Laboratorio Sanità Pubblica Firenze	Firenze	Italy	Yes
Italy	APPA Bolzano	Bolzano	Italy	Yes
Italy	ARPAL Sez. di La Spezia	La Spezia	Italy	Yes
Italy	ARPA Lazio (sez. Latina) - Pesticide Lab	Latina	Italy	Yes
Italy	IZS LT - Italy, Rome	Roma	Italy	Yes
Italy	Istituto Zooprofilattico Sperimentale Lombardia Emilia Romagna (IZSLER) - Laboratorio Pesticidi	Brescia	Italy	Yes
Italy	IZS PB - Pesticide Lab	Foggia	Italy	Yes
Italy	IZS Sicilia - Pesticide Lab	Palermo	Italy	Yes

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Italy	IZSUM - Italy, Perugia	Perugia	Italy	Yes
Italy	ATS Milano - Laboratorio di Prevenzione	Milano	Italy	Yes
Italy	IZSAM - Pesticide Lab	Teramo	Italy	Yes
Italy	ARPA VDA - Pesticide Lab	Saint Christophe	Italy	Yes
Kenya	SGS Kenya Limited	Mombasa	Kenya	Yes
Latvia	Institute of Food Safety Animal Health and Environment BIOR	Riga	Latvia	Yes
Lithuania	GALAB Laboratories GmbH	Hamburg	Germany	Yes
Lithuania	NMVRVI - Pesticide Lab (Vilnius)	Vilnius	Lithuania	Yes
Luxembourg	Primoris Belgium	Gent - Zwijnaarde	Belgium	Yes
Luxembourg	LNS Food lab	Dudelange	Luxembourg	Yes
Malta	Eurofins Dr. Specht Laboratorien GmbH	Hamburg	Germany	Yes
Malta	Fera Science Ltd	York	United Kingdom	Yes
Norway	NIBIO - Department of Pesticide Chemistry	ÅS	Norway	Yes
Peru	Servicio Nacional de Sanidad Agraria /Centro de Control de Insumos Y Residuos Toxicos	Lima	Peru	Yes
Peru	Bureau Veritas - Lab Lima	LIMA - CALLAO	Peru	Yes
Poland	Fertico Sp. z o. o. / Laboratorium - Instytut Agronomiczny Fertico (LIAF)	Grójec	Poland	Yes
Poland	UO-Technologia (Grojec) - Pesticide Lab	Grojec	Poland	Yes
Poland	InHort (Skierniewice) - Pesticide Lab	Skierniewice	Poland	Yes
Poland	AGROLAB Polska - Pesticide Lab	Deblin	Poland	Yes
Poland	Laboratory of Food & Feed Safety in Bialystok	Bialystok	Poland	Yes
Poland	IPP-NRI - Pesticide Lab (Sosnicowice)	Sosnicowice	Poland	Yes
Poland	PIORiN, Central Laboratory (TORUN)	Torun	Poland	Yes
Poland	WSSE w Łodzi, Dział Laboratoryjny, Oddział Laboratoryjny Badania Żywności i Produktów Kosmetycznych	Lodz	Poland	Yes
Poland	VSES Opole - Pesticide Lab	Opole	Poland	Yes

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Poland	IPP-NRI - Pesticide Lab (Poznan)	Poznan	Poland	Yes
Poland	VSES Warszawa - Pesticide Lab	Warszaw	Poland	Yes
Poland	WSSE we Wroclawiu DZIAL LABORATORYJNY	Wroclaw	Poland	Yes
Portugal	INIAV Pesticide Lab Oeiras (LRP-Oeiras + LCCP-Vairao)	Oeiras	Portugal	Yes
Portugal	Laboratório Regional de Veterinária e Segurança Alimentar	Funchal - Madeira Island	Portugal	Yes
Portugal	Labiagro – Laboratório Químico	Oeiras - Lisboa	Portugal	Yes
Portugal	Labs and Technological services AGQ	Burguillos	Spain	Yes
Romania	DSVSA OLT - Lab	Slatina	Romania	Yes
Romania	DSVSA Ialomita - Lab	Slobozia	Romania	Yes
Romania	Regional Laboratory for Pesticide Residues Control in Plant and Plant Products Mures	Tirgu Mures	Romania	Yes
Romania	Laboratory for Pesticides Residues Control in Plants and Vegetable Products - Bucharest	Bucharest	Romania	Yes
Romania	DSVSA Bucuresti - Pesticide Lab	Bucharest	Romania	Yes
Serbia	Inst. of Public Health of Belgrade - Pesticide Lab	Belgrade	Serbia	Yes
Serbia	SP Laboratorija - Pesticide Lab	BECEJ	Serbia	Yes
Serbia	Ministry of Agriculture, Forestry and Water Management - Directorate for National Reference Laboratories	Belgrade	Serbia	Yes
Singapore	SFA NCFS	Singapore	Singapore	Yes
Slovakia	Veterinary and Food Institute in Bratislava	Bratislava	Slovakia	Yes
Slovenia	NLZOH-MB-location Ljubljana	Ljubljana	Slovenia	Yes
Slovenia	Pesticide Lab - Maribor	Maribor	Slovenia	Yes
Spain	Ainia (Valencia)	Valencia	Spain	Yes
Spain	Laboratorio Agroalimentario - Spain, Valencia	Valencia	Spain	Yes
Spain	LAC - Generalitat de Catalunya	Cabrils	Spain	Yes
Spain	Lab. Agrario Regional - Junta de Castilla y Leon	Burgos	Spain	Yes

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Spain	Laboratorio Agroalimentario de Granada	Granada	Spain	Yes
Spain	Laboratorio Agroambiental de Zaragoza	Zaragoza	Spain	Yes
Spain	Laboratorio Agroalimentario de Extremadura	Cáceres	Spain	Yes
Spain	EUROFINS ECOSUR, S.A.	Lorquí	Spain	No
Spain	Laboratori Agència de Salut Pública de Barcelona	Barcelona	Spain	Yes
Spain	CNA (AESAN)	Majadahonda	Spain	Yes
Spain	National Center for Technology and Food Safety	San Adrián (Navarra)	Spain	Yes
Spain	Soivre Tenerife - Pesticide Lab	Santa Cruz de Tenerife	Spain	No
Spain	Soivre Valencia - Pesticide Lab	Valencia	Spain	No
Spain	Nasertic - Spain, Villava	Villava	Spain	Yes
Spain	Laboratorio de Produccion y Sanidad Vegetal	La Mojonera (Almeria)	Spain	Yes
Spain	Laboratorio de Producción y Sanidad Vegetal (Jaén)	Mengibar (Jaén)	Spain	Yes
Spain	Salud Pública (Almería) - Pesticide Lab	Almería	Spain	No
Spain	Laboratorio de Salud Pública de Badajoz -Gerencia Área Badajoz-SES	Badajoz	Spain	Yes
Spain	Salud Pública (LSP - MADRID SALUD)	Madrid	Spain	Yes
Spain	Analytica Alimentaria GmbH - Almeria, Spain	Almeria	Spain	Yes
Spain	Laboratorio Agroalimentario y de Sanidad Animal	Murcia	Spain	Yes
Spain	Laboratorio Arbitral Agroalimentario	Madrid	Spain	Yes
Spain	Laboratorio de Salud Pública de Galicia, Lugo	Lugo	Spain	Yes
Spain	Laboratorio de Salud Pública de Cuenca	Cuenca	Spain	Yes
Spain	Laboratorio Agroalimentario y Ambiental de Castilla la Mancha (LARAGA)	Toledo	Spain	Yes
Spain	Agricultural and Phytopathological Lab. of Galicia	Abegondo. A Coruña	Spain	Yes
Spain	LABCOLOR-COEXPHAL	La Mojonera, Almeria	Spain	Yes

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Spain	Eurofins SiCA AgriQ - Almeria, Vícar	Almeria	Spain	Yes
Spain	Laboratorio Analítico Bioclínico	Almeria	Spain	Yes
Spain	Laboratorio Regional de la CCAA de La Rioja	Logroño	Spain	Yes
Spain	Instituto Tecnológico de Canarias, S. A.-Laboratorio de Residuos-Departamento de Análisis Ambiental	Agüimes, Gran Canaria	Spain	Yes
Spain	LABORATORIO KUDAM, S.L.	Pilar de la Horadada (Alicante)	Spain	Yes
Sweden	Eurofins Food and Feed Testing Sweden	Lidköping	Sweden	Yes
Sweden	Swedish Food Agency, Division of Science, Department of Chemistry	Uppsala	Sweden	Yes
Switzerland	Amt für Verbraucherschutz Aargau (Cantonal Office of Consumer Protection Aargau)	Aargau	Switzerland	Yes
Switzerland	SCAV Genève	GENEVE	Switzerland	Yes
Thailand	Central Laboratory - Pesticide Lab (Bangkok)	Bangkok	Thailand	Yes
The Netherlands	WFSR - NRL for Pesticide Residues in Food and Feed	Wageningen	The Netherlands	Yes
The Netherlands	Eurofins Lab Zeeuws-Vlaanderen B.V.	Graauw	The Netherlands	Yes
Turkey	Özel MSM Gıda Kontrol Laboratuvarı ve Danışmanlık Hizmetleri Tic. A.Ş.	Ticaret Borsasi Kompleksi, Mersin	Turkey	Yes
United Kingdom	Concept Life Sciences	Bar Hill	United Kingdom	Yes
United Kingdom	Fera Science Ltd	York	United Kingdom	Yes
United Kingdom	Eurofins Food Testing UK	Wolverhampton	United Kingdom	No
United Kingdom	SASA	Edinburgh	United Kingdom	Yes
Uruguay	UdelaR - Faculty of Chemistry (Montevideo)	Montevideo	Uruguay	Yes