



# EURL-PROFICIENCY TEST-FV-27

## Pesticide Residues in Kiwi Homogenate

### Final Report - January 2026

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**EURL-EUROPEAN UNION PROFICIENCY TEST 27**  
**FOR THE DETERMINATION OF PESTICIDES IN FRUITS AND VEGETABLES USING**  
**MULTIRESIDUE METHODS**  
**2025**

According to Article 28 of Regulation 396/2005/EC (23<sup>rd</sup> 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<sup>1</sup>, 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<sup>2</sup> lays down the general tasks, duties and requirements for European Union Reference Laboratories (EURLs)<sup>3</sup> for Food, Feed and Animal Health. Among these tasks is the provision for independently organised comparative tests. European Proficiency Test FV-27 has been organised by the EURL in Fruits and Vegetables at the University of Almería, Spain<sup>4</sup>.

Participation in European Proficiency Test FV-27 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 Albania, Australia, China, Costa Rica, Cote D'Ivoire, Kenya, Peru, Serbia, Singapore, Thailand, Tunisia and United Kingdom 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).

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<sup>1</sup> 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.

<sup>2</sup> 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.

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

<sup>4</sup> Commission Regulation (EC) No 776/2006 of 23<sup>rd</sup> 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 eighty laboratories agreed to participate in EUPT-FV27.

The proficiency test was performed in 2025 using kiwi homogenate. Kiwis were purchased at the local organic market in Almería, Spain, and were spiked with analytical standards. In EUPT-FV27, participating laboratories were not provided with a 'blank' sample.

The test item, 200 g of kiwi homogenate containing pesticide residues, was shipped to participants on 12<sup>th</sup> May 2025. The deadline for results submission to the Organiser was 9<sup>th</sup> June 2025. 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 217 target pesticides. The pesticide target list is detailed in Annex A together with the voluntary target list, which contained 52 pesticides. The lists of target pesticides also contained the Minimum Required Reporting Levels (MRRL) for each pesticide fixed at 0.005 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: dimethoate (0.003 mg/kg), fipronil (0.004 mg/kg), fipronil sulfone (0.004 mg/kg) and omethoate (0.003 mg/kg).

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

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

## 2. TEST ITEMS

### 2.1 Preparation of the treated test item

Kiwis were purchased at the local organic market in Almería, Spain, and they were spiked using analytical standards of bifenthrin, cypermethrin, dicofol, fenhexamid, fenpyrazamine, flonicamid, flubendiamide, fludioxonil, forchlorfenuron, formetanate, isofetamid, orthophenylphenol, parathion ethyl, pencycuron, phosmet, propamocarb, pyridalyl, spirotetramat, sulfoxaflor, tebufenozide and tritosulfuron.

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-27. Approximately 100 kg of kiwis were ground and homogenised in a large stainless-steel container. Subsequently, they were spiked with the analytical standards dissolved in acetonitrile. Once homogenized, the material was packed in zip bags and frozen at -18° C. Seventeen days later, the resulting ice blocks were crushed with ice crushers, and 200 g portions of the material were weighed out into screw-capped polyethylene plastic bottles, sealed and stored in a freezer at about -20 °C prior to distribution to participants.

### 2.2 Homogeneity test

Homogeneity and stability tests were performed by the EURL-FV laboratory at the University of Almería. All analytes, with the exception of p,p'-dicofol, were covered under ISO/IEC 17025:2017 accreditation (granted by the Spanish national accreditation body, ENAC). Although p,p'-dicofol was analysed following the same ISO/IEC 17025-validated methods and procedures, it was not under accreditation due to the use of an analytical standard prepared by the EURL-FV. This deviation was necessary because the commercial certified standard solution proved unstable due to degradation.

Ten bottles of the treated test item were randomly chosen from those stored in the freezer and analyses were performed on duplicate portions taken from each bottle. The injection sequence of the 20 extracts that were analysed by GC and LC was also randomly chosen.

The statistical evaluation was performed according to the International Harmonized Protocol published by IUPAC, ISO and AOAC [1]. The individual residues data from the homogeneity tests are given in **Appendix 1**. The results of the statistical analyses (for the evaluated compounds) are given in **Table 1**. The acceptance criteria for the test item to be sufficiently homogenous for the proficiency test were that:  $S_s^2 < c$ , where  $S_s$  is the between-bottle sampling standard deviation and  $c = F_1\sigma_{all}^2 + F_2S_{an}^2$ ;  $F_1$  and  $F_2$  being constant values of 1.88 and 1.01, respectively, from the ten samples taken, and  $\sigma_{all}^2 = (0.3 \times \text{FFP-RSD}(25\%) \times \text{mean concentration})^2$ . This was used to demonstrate that the between-bottle variance was not higher than the within-bottle variance.

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

Pesticide	Mean Conc. (mg/kg)	S <sub>s</sub> <sup>2</sup>	c	S <sub>s</sub> <sup>2</sup> < c Pass/Fail
Bifenthrin	0.049	5.93E-06	3.00E-05	Pass
Cypermethrin	0.095	2.42E-05	1.30E-04	Pass
p,p'-Dicofol	0.173	5.33E-05	6.60E-04	Pass
Fenhexamid	2.481	0.00E+00	9.23E-02	Pass
Fenpyrazamine	0.079	5.23E-06	8.00E-05	Pass
Flonicamid	0.113	2.22E-06	1.60E-04	Pass
Flubendiamide	0.131	3.89E-06	2.70E-04	Pass
Fludioxonil	1.767	3.04E-03	4.83E-02	Pass
Formetanate	0.115	0.00E+00	1.80E-04	Pass
Isfetamid	0.049	4.98E-06	3.00E-05	Pass
Orthophenylphenol	0.110	1.44E-05	1.90E-04	Pass
Parathion ethyl	0.069	8.40E-06	7.00E-05	Pass
Pencycuron	0.102	6.02E-06	1.50E-04	Pass
Phosmet	0.132	7.78E-06	2.00E-04	Pass
Propamocarb	0.043	0.00E+00	2.00E-05	Pass
Pyridalyl	0.095	0.00E+00	1.50E-04	Pass
Spirotetramat	0.185	5.16E-05	5.00E-04	Pass
Sulfoxaflor	0.065	0.00E+00	5.00E-05	Pass
Tebufenozide	0.442	0.00E+00	5.43E-03	Pass
<b>Voluntary Pesticides</b>				
Forchlorfenuron	0.053	1.50E-06	3.00E-05	Pass
Tritosulfuron	0.254	0.00E+00	1.48E-03	Pass

S<sub>s</sub>: Between-Sampling Standard Deviation

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

### 2.3 Stability tests

Stability tests were also performed by the EURL-FV laboratory at the University of Almería. All analytes, with the exception of p,p'-dicofol, were covered under ISO/IEC 17025:2017 accreditation (granted by the Spanish national accreditation body, ENAC). Although p,p'-dicofol was analysed following the same ISO/IEC 17025-validated methods and procedures, it was not under accreditation due to the use of an analytical standard prepared by the EURL-FV. This deviation was necessary because the commercial certified standard solution proved unstable due to degradation.

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  $|x_1 - y_1| \leq 0.3 \times \sigma$ , where  $x_1$  is the mean value of the Day 1 stability test,  $y_1$  the mean value of the Day 2 stability test and  $\sigma$  the standard deviation used for proficiency assessment (typically 25 % of the assigned value).

The individual results for the evaluated compounds are given in **Table 2**. This test did not show any significant decrease in the pesticide concentrations with time. This demonstrates that, for the duration of the proficiency test, and provided that the storage conditions prescribed were followed, the time elapsed until the participants performed the analysis would not have influenced their results.

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

(mg/kg)	Day 1							Day 2							(M2 - M1)	M2-M1 ≤ 0.3*σ
	Sample 32_A	Sample 32_B	Sample 63_A	Sample 63_B	Sample 84_A	Sample 84_B	Mean 1	Sample 93_A	Sample 93_B	Sample 122_A	Sample 122_B	Sample 139_A	Sample 139_B	Mean 2		
Bifenthrin	0.053	0.054	0.053	0.048	0.042	0.050	0.050	0.051	0.047	0.050	0.050	0.050	0.051	0.050	0.000	Pass
Cypermethrin	0.098	0.100	0.097	0.093	0.076	0.093	0.093	0.091	0.089	0.090	0.091	0.093	0.091	0.091	-0.002	Pass
p,p'-Dicofol*	0.207	0.200	0.188	0.199	0.202	0.204	0.200	0.197	0.197	0.201	0.197	0.195	0.197	0.197	-0.003	Pass
Fenhexamid	2.462	2.721	2.354	2.315	2.440	2.271	2.427	2.507	2.771	2.473	2.549	2.201	2.575	2.513	0.086	Pass
Fenpyrazamine	0.080	0.079	0.085	0.079	0.079	0.080	0.080	0.082	0.080	0.073	0.081	0.082	0.086	0.081	0.000	Pass
Flonicamid	0.111	0.112	0.107	0.108	0.112	0.119	0.112	0.117	0.123	0.115	0.113	0.117	0.113	0.116	0.005	Pass
Flubendiamide	0.138	0.131	0.141	0.144	0.131	0.123	0.135	0.141	0.134	0.124	0.150	0.134	0.122	0.134	0.000	Pass
Fludioxonil	1.742	1.790	1.801	1.836	1.800	1.832	1.800	1.796	1.787	1.780	1.801	1.757	1.846	1.794	-0.006	Pass
Formetanate	0.119	0.111	0.115	0.114	0.111	0.114	0.114	0.117	0.116	0.111	0.111	0.117	0.109	0.114	0.000	Pass
Isofetamid	0.052	0.052	0.050	0.049	0.040	0.050	0.049	0.047	0.045	0.048	0.048	0.048	0.048	0.047	-0.001	Pass
Orthophenylphenol	0.111	0.111	0.112	0.104	0.088	0.105	0.105	0.101	0.097	0.101	0.103	0.108	0.112	0.104	-0.002	Pass
Parathion ethyl	0.070	0.072	0.076	0.071	0.060	0.070	0.070	0.072	0.067	0.068	0.068	0.068	0.066	0.068	-0.002	Pass
Pencycuron	0.102	0.094	0.113	0.101	0.087	0.100	0.100	0.103	0.108	0.098	0.107	0.108	0.108	0.105	0.005	Pass
Phosmet	0.140	0.134	0.143	0.135	0.134	0.134	0.137	0.138	0.131	0.129	0.140	0.132	0.132	0.134	-0.003	Pass
Propamocarb	0.045	0.041	0.045	0.043	0.041	0.043	0.043	0.042	0.044	0.043	0.043	0.045	0.043	0.043	0.000	Pass
Pyridalyl	0.101	0.086	0.092	0.110	0.086	0.099	0.096	0.100	0.095	0.094	0.096	0.094	0.098	0.096	0.000	Pass
Spirotetramat	0.172	0.177	0.171	0.164	0.126	0.163	0.162	0.155	0.152	0.155	0.158	0.165	0.153	0.157	-0.006	Pass
Sulfoxaflor	0.069	0.064	0.067	0.065	0.064	0.067	0.066	0.068	0.064	0.064	0.064	0.066	0.064	0.065	-0.001	Pass
Tebufenozide	0.508	0.439	0.484	0.469	0.439	0.452	0.465	0.468	0.446	0.427	0.476	0.473	0.506	0.466	0.001	Pass
<b>Voluntary Pesticides</b>																
Forchlorfenuron	0.055	0.049	0.056	0.057	0.049	0.056	0.054	0.055	0.053	0.054	0.053	0.056	0.053	0.054	0.000	Pass
Tritosulfuron	0.308	0.235	0.305	0.247	0.228	0.242	0.261	0.246	0.222	0.278	0.260	0.261	0.257	0.254	-0.007	Pass

\* p,p'-Dicofol had to be reanalysed using the following PT bottles: Day 1: 218, 115, 210; Day 2: 46, 78, 106)

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							(M2 – M1)	M3-M1 ≤ 0.3*σ
	Sample 32_A	Sample 32_B	Sample 63_A	Sample 63_B	Sample 84_A	Sample 84_B	Mean 1	Sample 172_A	Sample 172_B	Sample 185_A	Sample 185_B	Sample 213_A	Sample 213_B	Mean 2		
Bifenthrin	0.053	0.054	0.053	0.048	0.042	0.050	0.050	0.045	0.044	0.048	0.050	0.051	0.049	0.048	-0.002	Pass
Cypermethrin	0.098	0.100	0.097	0.093	0.076	0.093	0.093	0.085	0.079	0.091	0.093	0.095	0.092	0.089	-0.004	Pass
p,p'-Dicofol*	0.207	0.200	0.188	0.199	0.202	0.204	0.200	0.196	0.198	0.200	0.175	0.190	0.203	0.193	-0.006	Pass
Fenhexamid	2.462	2.721	2.354	2.315	2.440	2.271	2.427	2.354	2.598	2.567	2.610	2.572	2.268	2.495	0.067	Pass
Fenpyrazamine	0.080	0.079	0.085	0.079	0.079	0.080	0.080	0.076	0.076	0.076	0.074	0.077	0.071	0.075	-0.005	Pass
Flonicamid	0.111	0.112	0.107	0.108	0.112	0.119	0.112	0.111	0.111	0.111	0.117	0.112	0.107	0.111	0.000	Pass
Flubendiamide	0.138	0.131	0.141	0.144	0.131	0.123	0.135	0.127	0.115	0.127	0.130	0.143	0.139	0.130	-0.004	Pass
Fludioxonil	1.742	1.790	1.839	1.878	1.800	1.832	1.814	1.731	1.831	1.806	1.795	1.801	1.910	1.812	-0.001	Pass
Formetanate	0.119	0.111	0.115	0.114	0.111	0.114	0.114	0.115	0.105	0.115	0.111	0.119	0.108	0.112	-0.002	Pass
Isofetamid	0.052	0.052	0.050	0.049	0.040	0.050	0.049	0.044	0.041	0.047	0.048	0.049	0.047	0.046	-0.003	Pass
Orthophenylphenol	0.111	0.111	0.112	0.104	0.088	0.105	0.105	0.097	0.088	0.101	0.107	0.109	0.097	0.100	-0.006	Pass
Parathion ethyl	0.070	0.072	0.076	0.071	0.060	0.070	0.070	0.062	0.058	0.066	0.067	0.067	0.067	0.065	-0.005	Pass
Pencycuron	0.102	0.094	0.113	0.101	0.087	0.100	0.100	0.106	0.101	0.106	0.102	0.104	0.098	0.103	0.003	Pass
Phosmet	0.140	0.134	0.143	0.135	0.134	0.134	0.137	0.129	0.125	0.129	0.126	0.130	0.128	0.128	-0.009	Pass
Propamocarb	0.045	0.041	0.045	0.043	0.041	0.043	0.043	0.042	0.042	0.042	0.043	0.045	0.041	0.043	0.000	Pass
Pyridalyl	0.101	0.086	0.092	0.110	0.086	0.099	0.096	0.091	0.092	0.091	0.091	0.092	0.092	0.092	-0.004	Pass
Spirotetramat	0.172	0.177	0.171	0.164	0.126	0.163	0.162	0.148	0.127	0.156	0.161	0.174	0.164	0.155	-0.007	Pass
Sulfoxaflor	0.069	0.064	0.067	0.065	0.064	0.067	0.066	0.064	0.061	0.064	0.062	0.066	0.062	0.063	-0.003	Pass
Tebufenozide	0.508	0.439	0.484	0.469	0.439	0.452	0.465	0.523	0.455	0.523	0.509	0.418	0.450	0.480	0.015	Pass
<b>Voluntary Pesticides</b>																
Forchlorfenuron	0.055	0.049	0.056	0.057	0.049	0.056	0.054	0.050	0.050	0.050	0.050	0.053	0.051	0.051	-0.003	Pass
Tritosulfuron	0.308	0.235	0.305	0.247	0.228	0.242	0.261	0.250	0.217	0.262	0.219	0.280	0.260	0.248	-0.013	Pass

\* p,p'-Dicofol had to be reanalysed using the following PT bottles: Day 1: 218, 115, 210; Day 3: 72, 53, 99)

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

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

(mg/kg)	Day 1							Day 4							(M2 – M1)	M4-M1 ≤ 0.3*σ
	Sample 32_A	Sample 32_B	Sample 63_A	Sample 63_B	Sample 84_A	Sample 84_B	Mean 1	Sample 236_A	Sample 236_B	Sample 259_A	Sample 259_B	Sample 265_A	Sample 265_B	Mean 2		
Bifenthrin	0.053	0.054	0.053	0.048	0.042	0.050	0.050	0.051	0.049	0.051	0.054	0.042	0.048	0.049	-0.001	Pass
Cypermethrin	0.098	0.100	0.097	0.093	0.076	0.093	0.093	0.093	0.091	0.094	0.096	0.081	0.088	0.090	-0.002	Pass
p,p'-Dicofol*	0.207	0.200	0.188	0.199	0.202	0.204	0.200	0.188	0.194	0.187	0.186	0.187	0.181	0.187	-0.013	Pass
Fenhexamid	2.462	2.721	2.354	2.315	2.440	2.271	2.427	2.641	2.374	2.440	2.563	2.512	2.481	2.502	0.075	Pass
Fenpyrazamine	0.080	0.079	0.085	0.079	0.079	0.080	0.080	0.076	0.082	0.088	0.085	0.086	0.080	0.083	0.002	Pass
Flonicamid	0.111	0.112	0.107	0.108	0.112	0.119	0.112	0.112	0.113	0.108	0.107	0.110	0.118	0.111	0.000	Pass
Flubendiamide	0.138	0.131	0.141	0.144	0.131	0.123	0.135	0.124	0.126	0.146	0.141	0.163	0.132	0.139	0.004	Pass
Fludioxonil	1.742	1.790	1.839	1.878	1.800	1.832	1.814	1.812	1.868	1.827	1.728	1.810	1.846	1.815	0.002	Pass
Formetanate	0.119	0.111	0.115	0.114	0.111	0.114	0.114	0.116	0.118	0.122	0.115	0.119	0.116	0.118	0.004	Pass
Isofetamid	0.052	0.052	0.050	0.049	0.040	0.050	0.049	0.049	0.047	0.051	0.051	0.043	0.045	0.048	-0.001	Pass

(mg/kg)	Day 1							Day 4							(M2 - M1)	M4-M1 ≤ 0.3*σ
	Sample 32_A	Sample 32_B	Sample 63_A	Sample 63_B	Sample 84_A	Sample 84_B	Mean 1	Sample 236_A	Sample 236_B	Sample 259_A	Sample 259_B	Sample 265_A	Sample 265_B	Mean 2		
Orthophenylphenol	0.111	0.111	0.112	0.104	0.088	0.105	0.105	0.106	0.102	0.110	0.114	0.095	0.092	0.103	-0.002	Pass
Parathion ethyl	0.070	0.072	0.076	0.071	0.060	0.070	0.070	0.067	0.065	0.069	0.071	0.059	0.063	0.066	-0.004	Pass
Pencycuron	0.102	0.094	0.113	0.101	0.087	0.100	0.100	0.105	0.103	0.109	0.101	0.110	0.103	0.105	0.006	Pass
Phosmet	0.140	0.134	0.143	0.135	0.134	0.134	0.137	0.133	0.134	0.142	0.143	0.137	0.135	0.137	0.001	Pass
Propamocarb	0.045	0.041	0.045	0.043	0.041	0.043	0.043	0.044	0.047	0.045	0.045	0.044	0.044	0.045	0.002	Pass
Pyridalyl	0.101	0.086	0.092	0.110	0.086	0.099	0.096	0.091	0.093	0.093	0.092	0.091	0.089	0.091	-0.004	Pass
Spirotetramat	0.172	0.177	0.171	0.164	0.126	0.163	0.162	0.157	0.158	0.171	0.161	0.138	0.146	0.155	-0.007	Pass
Sulfoxaflor	0.069	0.064	0.067	0.065	0.064	0.067	0.066	0.066	0.064	0.069	0.067	0.067	0.066	0.066	0.000	Pass
Tebufenozide	0.508	0.439	0.484	0.469	0.439	0.452	0.465	0.465	0.487	0.516	0.484	0.505	0.482	0.490	0.025	Pass
<b>Voluntary Pesticides</b>																
Forchlorfenuron	0.055	0.049	0.056	0.057	0.049	0.056	0.054	0.054	0.054	0.057	0.056	0.056	0.056	0.056	0.002	Pass
Tritosulfuron	0.308	0.235	0.305	0.247	0.228	0.242	0.261	0.260	0.217	0.251	0.260	0.247	0.232	0.244	-0.017	Pass

\* p,p'-Dicofol had to be reanalysed using the following PT bottles: Day 1: 218, 115, 210; Day 4: 267, 208, 82)

## 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 12<sup>th</sup> May 2025. All the shipments to EU/EFTA countries arrived within the first 72 hours.

Before sample shipment, the laboratories received full instructions (Annex A) for the receipt and storage of the test item, and they were encouraged to use their normal sample receipt procedure and method(s) of analysis. These instructions were uploaded onto the open site of the EURL-FV webpage as part of the Specific Protocol. The Application Form was also available as an on-line form. After applying for the test, each participant laboratory received their Lab Code and password, thus allowing them to participate. This ensured that confidentiality was maintained throughout the duration of Proficiency Test 27. 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.

All false negatives have been assigned a z score of -4.0. However, these z scores have not been 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  $\geq 10$  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 8**.

### 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.
- $x_{pt}$  is the assigned value.
- $\sigma_{pt}$  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, a z score of -4.0 will be assigned. 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<sup>2</sup>)

The 'Average of the Squared z scores' was introduced for the first time in EUPT-FV12. The AZ<sup>2</sup> 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'.

$$\begin{aligned} |AZ^2| \leq 2.0 & \quad \text{Good} \\ 2.0 < |AZ^2| < 3.0 & \quad \text{Satisfactory} \\ |AZ^2| \geq 3.0 & \quad \text{Unsatisfactory} \end{aligned}$$

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

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 eighty laboratories agreed to participate in this proficiency test. Two of them did not report results, so only results of 178 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 Albania, Australia, China, Costa Rica, Cote D'Ivoire, Kenya, Peru, Serbia, Singapore, Thailand, Tunisia and United Kingdom have not been included. This last group totals 17 laboratories that reported results. For data protection this report will not provide the list of participants.

Nineteen pesticides from the compulsory pesticide target list and two voluntary compounds were used to treat the sample and were present in the test item at concentrations above the MRRL. Additionally, from the use of spirotetramat, one of its metabolites, spirotetramat-enol, was also

present in the PT material above the MRRL, but at a concentration (0.013 mg/kg) below three times the MRRL. For that reason, the Scientific Committee decided that it would only be shown in the report for information purposes. As cypermethrin (all isomers) was present in the sample, participants should have also reported alpha-cypermethrin. However, many participants did not analyse for it, and many others did not report it. Given the low quality of the results for alpha-cypermethrin, the Scientific Committee decided that it would not be used for the evaluation of the participants, and it would be shown in the report as informative.

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

**Table 5.** Summary of Reported Results

Pesticides	No. of Reported Results	No. of False Negative Results	No. of Not Analysed Results	Percentage of Reported Results <sup>a</sup> (out of 161)
Bifenthrin	154	2	5	96
Cypermethrin	150	4	7	93
Dicofol	104	22	35	65
Fenhexamid	149	2	10	93
Fenpyrazamine	130	5	26	81
Flonicamid	140	4	17	87
Flubendiamide	131	5	25	81
Fludioxonil	152	2	7	94
Formetanate	121	13	27	75
Isofetamid	102	2	57	63
Orthophenylphenol	120	8	33	75
Parathion ethyl	145	5	11	90
Pencycuron	151	2	8	94
Phosmet	148	2	11	92
Propamocarb	143	3	15	89
Pyridalyl	120	8	33	75
Spirotetramat	140	1	20	87
Spirotetramat, BYI 03380-enol <sup>Ⓢ</sup>	60	54 Not reported	47	37
Sulfoxaflor	127	3	31	79
Tebufozozide	149	2	10	93
<b>Voluntary Pesticides</b>				
Alpha-cypermethrin <sup>Ⓢ</sup>	45	22 Not reported	94	28
Forchlorfenuron	85	1	75	53
Tritosulfuron	65	2	94	40

<sup>a</sup> The percentage of Reported Results comes from 161 laboratories. It does not take into account the seventeen laboratories from Albania, Australia, China, Costa Rica, Cote D'Ivoire, Kenya, Peru, Serbia, Singapore, Thailand, Tunisia and United Kingdom that submitted results.

<sup>Ⓢ</sup> For information purposes only

#### 4.1.1 False positives

Nineteen laboratories reported results for additional mandatory pesticides that were not present in the test item. These pesticides and the residue levels reported are presented in **Table 6**, together with the MRRLs and reporting limits (RLs). Where the reported concentrations of the erroneously detected pesticide were higher than the assigned MRRL value in the Target Pesticide List (Annex A), the result has been considered as a false positive. If the concentrations reported were below

the MRRLs, or if the pesticides did not appear in the pesticide list included in Annex A, then they were not considered to be false positives.

Lab103 analysed the wrong PT sample and reported eight pesticides as false positives (aldicarb-sulfone, chlorpyrifos-methyl, dinotefuran, endosulfan sulfate, lambda-cyhalothrin (sum), mefentrifluconazole, quinoxifen, triflumizole). Those compounds have been considered as false positives, but as they are not "analytical false positives", they were not included in **Table 6**.

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

Laboratory Code	Pesticide	Concentration (mg/kg)	Determination Technique	RL (mg/kg)	MRRL (mg/kg)
4	Chlorobenzilate	0.012	GC-MS/MS (QQQ)	0.01	0.005
33	Chlorobenzilate	0.00657	GC-Ion Trap	0.005	0.005
34	Cyfluthrin (sum)	0.133	GC-MS/MS (QQQ)	0.005	0.005
36 <sup>§</sup>	Chlorobenzilate	0.01	GC-MS/MS (QQQ)	0.01	0.005
36 <sup>§</sup>	Deltamethrin (cis-deltamethrin)	0.04	GC-MS/MS (QQQ)	0.01	0.005
37	Parathion-methyl	0.067	GC-(HR)-TOF-MS	0.005	0.005
72	Chlorobenzilate	0.0196	GC-MS/MS (QQQ)	0.01	0.005
80	Chlorobenzilate	0.042	GC-MS/MS (QQQ)	0.01	0.005
98	Fenoxycarb	0.152	LC-MS/MS QQQ	0.005	0.005
119	Chlorobenzilate	0.02	GC-MS/MS (QQQ)	0.01	0.005
121	Phosmet oxon	0.173	GC-MS/MS (QQQ)	0.005	0.005
130	Trichlorfon	0.025	LC-MS/MS QQQ	0.005	0.005
137	Trichlorfon	0.0099	LC-MS/MS QQQ	0.005	0.005
144	Chlorobenzilate	0.242	GC-MS/MS (QQQ)	0.01	0.005
146	Chlorobenzilate	0.0134	GC-MS/MS (QQQ)	0.01	0.005
150	Azinphos-Methyl	0.107	LC-MS/MS QQQ	0.005	0.005
152	Carbendazim (sum)	0.055	LC-MS/MS QQQ	0.005	0.005
159	Isocarbophos	0.066	LC-MS/MS QQQ	0.005	0.005
165	Isofenphos-Methyl	0.081	LC-MS/MS QQQ	0.01	0.005
166	Carbendazim (sum)	0.054	LC-MS/MS QQQ	0.005	0.005

<sup>§</sup> Non-EU/EFTA laboratories

Eight laboratories had a false positive result of chlorobenzilate. That compound was not present in the PT sample, but the reason for so many false positives is that it has common transitions (same ion ratio) and very similar retention time with an impurity of dicofol, which was present in the sample. Labs who can detect the interference at the same retention time of chlorobenzilate should be aware that the interference appears when other pesticides with similar structures are present (e.g. DDT, DDE, dicofol).

#### 4.1.2 False negatives

**Tables 7a and b** summarise the results from laboratories (including non-EU laboratories, indicated with §) that reported false negatives, presented as 'Not Detected' (ND). Lab103 is the participant that analysed the wrong PT sample, and for that reason, all its results are false negatives.

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

LabCode	Bifenthrin	Cypermethrin (sum)	Dicofof (sum)	Fenhexamid	Fenpyrazamine	Flonicamid	Flubendiamide	Fludioxonil	Formetanate	Isofetamid	Orthophenylphenol	Parathion ethyl	Pencycuron	Phosmet	Propamocarb	Pyridalyf	Spirotetramat	Sulfoxaflor	Tebufoenozide
5									ND										
12									ND										
16			ND												ND				
17			ND																
24									ND										
26					ND				ND										
28 <sup>s</sup>										ND	ND							ND	
32									ND										
34		ND																	
36 <sup>s</sup>			ND																
37												ND							
41					ND				ND										
45							ND												
48			ND																
54			ND																
75									ND									ND	
78												ND				ND			
80			ND																
83				ND															
90									ND										
98	ND		ND		ND	ND	ND							ND		ND		ND	ND
103	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
104		ND																	
107											ND								
108 <sup>s</sup>					ND		ND												
111							ND												
115									ND										
118			ND			ND	ND			ND	ND					ND			
119									ND										
120								ND											
123			ND								ND								
127																ND			
128											ND								
130			ND																
132			ND		ND							ND							
134									ND										
137																ND			ND
140			ND																
147			ND									ND							
151		ND	ND																
152			ND																
157						ND										ND			
158			ND																
160			ND																
161			ND																

LabCode	Bifenthrin	Cypermethrin (sum)	Dicofol (sum)	Fenhexamid	Fenpyrazamine	Flonicamid	Flubendiamide	Fludioxonil	Formetanate	Isofetamid	Orthophenylphenol	Parathion ethyl	Pencycuron	Phosmet	Propamocarb	Pyridalyl	Spirotetramat	Sulfoxaflor	Tebufenozide	
163			ND																	
165									ND											
166			ND																	
171 <sup>§</sup>				ND																
173											ND									
177			ND												ND					
179 <sup>§</sup>										ND						ND		ND		
182											ND									
183			ND								ND		ND			ND				

<sup>§</sup> Non-EU/EFTA laboratories

ND: Not detected

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

LabCode	Forchlorfenuron	Tritosulfuron
22	ND	
67		ND
100 <sup>§</sup>	ND	
146		ND

<sup>§</sup> Non-EU/EFTA laboratories ND: Not detected

#### 4.1.3 Distribution of data

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

#### 4.2 Assigned values and target standard deviations

The assigned values are based on the robust mean values calculated using all the results reported by laboratories from EU and EFTA countries, after exclusion of gross errors (those results  $\geq 10$  times above or below the assigned value). In total, seven outliers were removed for the calculation of the robust mean of the evaluated compounds: one for cypermethrin, five for formetanate and one for parathion ethyl.

The assigned values for the nineteen compulsory and two voluntary pesticides and their uncertainties are presented in **Table 8**. Informative compounds have also been included in the table.

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

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

Pesticides	MRL (mg/kg)	Robust mean (mg/kg)	Uncertainty (mg/kg)	Number of results (n)	FFP-RSD (%)	CV* (%)
Bifenthrin	0.005	0.0493	0.001	154	25	15.6
Cypermethrin	0.005	0.0903	0.002	150	25	20.8
Dicofol	0.005	0.183	0.009	104	25	41.5
Fenhexamid	0.005	1.92	0.038	149	25	19.6
Fenpyrazamine	0.005	0.0845	0.001	130	25	15.7
Flonicamid	0.005	0.105	0.001	140	25	13.5
Flubendiamide	0.005	0.146	0.003	131	25	16.5
Fludioxonil	0.005	1.86	0.036	152	25	19.2
Formetanate	0.005	0.155	0.005	121	25	26.8
Isofetamid	0.005	0.0507	0.001	102	25	15.9
Orthophenylphenol	0.005	0.110	0.002	120	25	16.8
Parathion ethyl	0.005	0.0707	0.002	145	25	20.6
Pencycuron	0.005	0.0883	0.002	151	25	16.9
Phosmet	0.005	0.140	0.003	148	25	19.3
Propamocarb	0.005	0.0459	0.001	143	25	19.4
Pyridalyl	0.005	0.0721	0.002	120	25	19.7
Spirotetramat	0.005	0.197	0.004	140	25	16.9
Spirotetramat, BYI 03380-enol <sup>Ⓢ</sup>	0.005	0.013	0.001	60	25	70.8
Sulfoxaflor	0.005	0.0672	0.001	127	25	16.2
Tebufenozide	0.005	0.489	0.008	149	25	16.6
<b>Voluntary Pesticides</b>						
Alpha-Cypermethrin <sup>Ⓢ</sup>	0.005	0.0244	0.002	45	25	49.9
Forchlorfenuron	0.005	0.0483	0.001	85	25	16.7
Tritosulfuron	0.005	0.311	0.011	65	25	22.7

<sup>Ⓢ</sup> For information purposes only

### 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 (%)
Bifenthrin	96	2	2
Cypermethrin	91	4	5
Dicofol	64	8	28
Fenhexamid	95	2	3
Fenpyrazamine	95	1	4
Flonicamid	94	1	4
Flubendiamide	93	2	4
Fludioxonil	93	5	3
Formetanate	76	4	19
Isofetamid	95	1	4
Orthophenylphenol	92	2	6
Parathion ethyl	91	5	4
Pencycuron	98	0	2
Phosmet	93	3	4
Propamocarb	95	2	3
Pyridalyl	93	1	6
Spirotetramat	93	4	4
Spirotetramat, BYI 03380-enol <sup>Ⓣ</sup>	47	33	20
Sulfoxaflor	92	5	4
Tebufozozide	96	1	3
<b>Voluntary Pesticides</b>			
Alpha-Cypermethrin <sup>Ⓣ</sup>	76	9	16
Forchlorfenuron	95	2	2
Tritosulfuron	94	1	4

<sup>Ⓣ</sup> For information purposes only

z scores for false negative results have been assigned the fixed value of -4.0.

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.

#### 4.3.2 Combined z scores

As previously mentioned in Section 3.5., the AZ<sup>2</sup> 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<sup>2</sup>) 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 (195), to detect and quantify at least 90 % of the pesticides present in the Test Item (17), 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**.

Ninety-six of the 161 EU and EFTA laboratories that submitted results were classified into Category A (60 %).

From the AZ<sup>2</sup>, 91 % were classed as 'good', 5 % as 'satisfactory' and 4 % as 'unsatisfactory' (Only considering EU and EFTA laboratories).

Of the 65 EU and EFTA laboratories in Category B, 18 had reported a false positive result. Ten of them would have been classified into Category A had it not been for this false positive result.

**Table 10** shows all the laboratories in Category A (including non-EU laboratories, indicated with §), the number of pesticides reported, the percentage of pesticides analysed from the compulsory target list, the AZ<sup>2</sup> values and their sub classifications. Laboratories that reported false negative results in Category A are marked with the symbol ⊖.

**Table 10.** Performance and Classification of laboratories in Category A using the AZ<sup>2</sup> formula

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ <sup>2</sup>	Classification
1	19	99	0.1	Good
2	18	98	0.2	Good
5 <sup>⊖</sup>	17	96	3.1	Unsatisfactory
6	19	99	1.3	Good
7	19	100	0.5	Good
8	19	99	0.1	Good
9	19	100	0.4	Good
10	19	100	0.2	Good
11	19	99	1.5	Good
13	19	99	0.4	Good
14	19	99	0.8	Good
15 <sup>§</sup>	19	99	0.6	Good
16 <sup>⊖</sup>	17	100	1.8	Good
17 <sup>⊖</sup>	18	99	1.8	Good
18	19	100	0.2	Good
19	19	100	0.4	Good
20	19	100	1.0	Good
22	19	100	1.7	Good
23	18	98	1.1	Good
25	19	100	0.5	Good
26 <sup>⊖</sup>	17	97	4.6	Unsatisfactory

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ <sup>2</sup>	Classification
27	19	100	0.7	Good
29	19	98	0.1	Good
30	19	100	0.2	Good
35	19	100	1.3	Good
39	17	95	0.1	Good
42	19	98	0.7	Good
46	19	94	0.4	Good
47	19	100	1.9	Good
48 <sup>o</sup>	18	97	1.1	Good
49	19	100	3.3	Unsatisfactory
51	19	99	1.0	Good
52 <sup>s</sup>	19	100	0.3	Good
53	19	100	0.3	Good
55	19	100	1.3	Good
56	19	95	1.1	Good
57	18	90	1.0	Good
58	19	99	0.7	Good
59	19	95	0.8	Good
60	19	99	2.1	Satisfactory
61	19	100	0.2	Good
62	19	100	0.6	Good
66	19	97	0.9	Good
67	17	94	0.1	Good
69	18	96	1.3	Good
71	19	99	0.9	Good
73	19	95	1.8	Good
74	17	92	1.2	Good
76	19	100	0.4	Good
77	19	100	0.6	Good
79 <sup>s</sup>	19	96	0.3	Good
81	19	99	0.4	Good
84 <sup>s</sup>	18	94	0.4	Good
85	19	100	0.4	Good
86	19	100	1.6	Good
87	17	95	0.6	Good
88	18	95	0.3	Good
89	19	100	0.4	Good
92	17	92	1.5	Good
93 <sup>s</sup>	19	100	0.4	Good
94	19	100	0.1	Good
96 <sup>s</sup>	18	97	0.7	Good
97	19	100	0.6	Good
99	18	90	1.6	Good
100 <sup>s</sup>	19	100	0.6	Good

Lab Code	No. of pesticides detected (max.15)	% of pesticides analysed from target list	AZ <sup>2</sup>	Classification
105	19	97	0.3	Good
109§	18	97	0.5	Good
110	18	96	1.6	Good
111 <sup>⊖</sup>	17	98	1.3	Good
114	18	96	1.3	Good
115 <sup>⊖</sup>	18	99	2.3	Satisfactory
116	19	100	0.3	Good
117	18	90	0.3	Good
123 <sup>⊖</sup>	17	100	2.5	Satisfactory
124	19	98	0.8	Good
125	18	97	0.1	Good
126	17	98	2.1	Satisfactory
127 <sup>⊖</sup>	18	100	1.9	Good
128 <sup>⊖</sup>	18	95	1.0	Good
129	19	99	1.0	Good
131	17	91	0.9	Good
133	19	100	1.5	Good
136	19	99	1.1	Good
138	18	97	1.7	Good
139	19	100	0.4	Good
140 <sup>⊖</sup>	18	100	1.1	Good
142	19	100	0.1	Good
145	18	95	0.7	Good
148	19	99	0.5	Good
149	19	100	0.3	Good
153	19	100	0.4	Good
154	19	99	2.7	Satisfactory
155	17	95	1.9	Good
156	19	100	4.0	Unsatisfactory
158 <sup>⊖</sup>	18	100	1.3	Good
160 <sup>⊖</sup>	17	96	1.3	Good
161 <sup>⊖</sup>	17	98	1.2	Good
163 <sup>⊖</sup>	18	100	1.0	Good
167	19	100	0.2	Good
168	19	100	0.3	Good
170§	19	100	0.4	Good
173 <sup>⊖</sup>	18	100	1.9	Good
175	19	100	0.7	Good
180	19	99	0.5	Good
182 <sup>⊖</sup>	18	100	1.9	Good

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

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

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

**Table 11.** Performance of laboratories in Category B

Lab Code	No. of pesticides detected	% of pesticides detected	% of pesticides analysed from target list	No. of total z scores	No. of acceptable z scores (z score $\leq$ 2.0)
3	14	74	93	14	14
4 <sup>+</sup>	10	53	65	10	10
12 $\ominus$	16	84	90	17	13
21	16	84	95	16	16
24 $\ominus$	16	84	86	17	12
28 <sup>§</sup> $\ominus$	16	84	100	19	13
31	4	21	51	4	4
32 $\ominus$	15	79	91	16	15
33 <sup>+</sup>	15	79	85	15	14
34 <sup>+</sup> $\ominus$	17	89	99	18	14
36 <sup>§</sup> <sup>+</sup> $\ominus$	8	42	65	9	5
37 <sup>+</sup> $\ominus$	8	42	57	9	7
38	16	84	80	16	16
40	16	84	91	16	16
41 $\ominus$	13	68	83	15	10
43	15	79	92	15	14
44 <sup>§</sup>	11	58	65	11	11
45 $\ominus$	14	74	83	15	14
50	17	89	87	17	16
54 $\ominus$	12	63	85	13	12
63	9	47	59	9	7
64	7	37	60	7	7
68	6	32	56	6	5
70	6	32	32	6	5
72 <sup>+</sup>	19	100	100	19	18
75 $\ominus$	16	84	99	18	16
78 $\ominus$	5	26	59	7	3
80 <sup>+</sup> $\ominus$	13	68	81	14	12
82	16	84	92	16	16
83 $\ominus$	10	53	77	11	10
90 $\ominus$	14	74	96	15	11
91	12	63	78	12	12
95 <sup>§</sup>	13	68	81	13	12
98 <sup>+</sup> $\ominus$	7	37	82	15	5
101	16	84	95	16	16
103 $\ominus$	0	0	100	19	0
104 $\ominus$	15	79	94	16	15
106	10	53	67	10	9
107 $\ominus$	15	79	92	16	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)
108§ ⊖	15	79	91	17	15
112	11	58	70	11	11
113	16	84	93	16	14
118 ⊖	13	68	100	19	12
119 + ⊖	12	63	90	13	11
120 ⊖	7	37	57	8	6
121 +	19	100	98	19	18
122	16	84	91	16	16
130 + ⊖	18	95	100	19	17
132 ⊖	11	58	82	14	8
134 ⊖	7	37	68	8	6
135	15	79	88	15	13
137 + ⊖	5	26	65	7	3
141	18	95	89	18	17
143	9	47	61	9	9
144 +	19	100	100	19	19
146 +	19	100	100	19	19
147 ⊖	3	16	54	5	3
150 +	19	100	100	19	18
151 ⊖	16	84	97	18	16
152 + ⊖	17	89	97	18	16
157 ⊖	15	79	94	17	14
159 +	17	89	96	17	17
162	0	0	7	0	0
164	5	26	39	5	5
165 + ⊖	12	63	74	13	12
166 + ⊖	17	89	97	18	16
169§	0	0	97	0	0
171§ ⊖	15	79	85	16	14
174	7	37	55	7	5
176	0	0	5	0	0
177 ⊖	13	68	90	15	4
178§	14	74	84	14	14
179§ ⊖	16	84	100	19	14
181	3	16	26	3	3
183 ⊖	15	79	100	19	14

⊖ Laboratories reporting a false negative result

+ Laboratories reporting a false positive result

§ Non-EU/EFTA laboratories

The AZ<sup>2</sup> graphical representation for EU/EFTA laboratories classified into Category A can be seen in **Appendix 6**. The EU National Reference Laboratories (NRLs) for Fruits and Vegetables have been plotted using a different colour.

## 5. CONCLUSIONS

One hundred and eighty laboratories agreed to participate in EUPT-FV-27. Two of them did not submit results. Eighteen did not belong to EU nor EFTA countries, so their results were not considered for the estimation of the assigned value. The total number of EU and EFTA laboratories that reported results was 161.

Nineteen mandatory and two voluntary pesticides were evaluated in EUPT-FV-27, based on the analysis of kiwi homogenate.

Of a total number of 3059 possible determinations from EU/EFTA laboratories (161 laboratories by 19 evaluated pesticides), 84 % were reported, 13 % were not analysed and 3 % were not detected (false negative results).

The total number of evaluated z scores for mandatory compounds of laboratories from EU/EFTA countries was 2671, with 91.5 % of them acceptable, 2.7 % questionable and 5.7 % unacceptable.

Sixty per cent of the EU and EFTA laboratories that submitted results were classified into Category A. Of them, 91 % were classed as 'good', 5 % as 'satisfactory' and 4 % as 'unsatisfactory'.

The robust standard deviation (CV\*) was below 41.5 % for all the evaluated compounds, with an average value of 19.4 % for the 19 mandatory pesticides evaluated and the two voluntary ones.

Participation in this year's European Proficiency Test 27 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 Albania, Australia, China, Costa Rica, Cote D'Ivoire, Kenya, Peru, Serbia, Singapore, Thailand, Tunisia and United Kingdom participated in EUPT-FV-27.

## 6. REFERENCES

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## APPENDIX 1. Homogeneity results

Bifenthrin (mg/kg)		Cypermethrin (mg/kg)		p,p'-Dicofof (mg/kg)		Fenhexamid (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.048	0.049	0.090	0.095	0.19	0.20	2.72	2.46
0.044	0.048	0.083	0.091	0.14	0.16	2.32	2.35
0.052	0.044	0.099	0.084	0.17	0.18	2.27	2.44
0.052	0.055	0.100	0.106	0.15	0.20	2.77	2.51
0.047	0.044	0.094	0.085	0.20	0.17	2.55	2.47
0.050	0.053	0.098	0.104	0.14	0.17	2.58	2.20
0.054	0.054	0.104	0.105	0.18	0.18	2.60	2.35
0.053	0.050	0.100	0.098	0.14	0.17	2.61	2.57
0.046	0.051	0.091	0.100	0.19	0.16	2.27	2.57
0.047	0.046	0.091	0.087	0.19	0.18	2.37	2.64

Fenpyrazamine (mg/kg)		Fonicamid (mg/kg)		Flubendiamide (mg/kg)		Fludioxonil (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.079	0.080	0.11	0.11	0.13	0.14	1.73	1.71
0.079	0.085	0.11	0.11	0.14	0.14	1.62	1.77
0.080	0.079	0.12	0.11	0.12	0.13	1.87	1.60
0.080	0.082	0.12	0.12	0.13	0.14	2.02	2.01
0.081	0.073	0.11	0.12	0.15	0.12	1.83	1.62
0.086	0.082	0.11	0.12	0.12	0.13	1.61	1.82
0.076	0.076	0.11	0.11	0.12	0.13	1.81	1.90
0.074	0.076	0.12	0.11	0.13	0.13	1.79	1.73
0.071	0.077	0.11	0.11	0.14	0.14	1.74	1.84
0.082	0.076	0.11	0.11	0.13	0.12	1.50	1.81

Formetanate (mg/kg)		Isofetamid (mg/kg)		Orthophenylphenol (mg/kg)		Parathion ethyl (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.11	0.12	0.047	0.049	0.110	0.110	0.068	0.071
0.11	0.12	0.044	0.048	0.096	0.110	0.062	0.068
0.11	0.11	0.051	0.043	0.120	0.100	0.074	0.062
0.12	0.12	0.052	0.056	0.110	0.120	0.071	0.079
0.11	0.11	0.047	0.044	0.110	0.093	0.070	0.061
0.11	0.12	0.049	0.054	0.110	0.120	0.070	0.076
0.10	0.12	0.052	0.055	0.120	0.120	0.076	0.076
0.11	0.12	0.051	0.050	0.120	0.110	0.073	0.069
0.11	0.12	0.045	0.051	0.110	0.110	0.064	0.069
0.12	0.12	0.048	0.045	0.100	0.100	0.065	0.062

The sample numbers used for this test were: 2, 42, 83, 91, 107, 128, 149, 180, 194, 234.

APPENDIX 1. Homogeneity results.

Pencycuron (mg/kg)		Phosmet (mg/kg)		Propamocarb (mg/kg)		Pyridalyl (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.087	0.10	0.13	0.14	0.041	0.045	0.086	0.10
0.10	0.11	0.14	0.14	0.043	0.045	0.11	0.092
0.10	0.090	0.13	0.13	0.043	0.041	0.11	0.086
0.11	0.10	0.13	0.14	0.044	0.042	0.095	0.10
0.11	0.098	0.14	0.13	0.043	0.043	0.096	0.094
0.11	0.11	0.13	0.13	0.043	0.045	0.098	0.094
0.10	0.11	0.12	0.13	0.042	0.042	0.092	0.091
0.10	0.11	0.13	0.13	0.043	0.042	0.091	0.091
0.098	0.10	0.13	0.13	0.041	0.045	0.092	0.092
0.10	0.10	0.13	0.13	0.047	0.044	0.093	0.091

Spirotetramat (mg/kg)		Sulfoxaflor (mg/kg)		Tebufenozide (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.18	0.20	0.064	0.069	0.42	0.51
0.17	0.18	0.065	0.067	0.41	0.54
0.20	0.18	0.067	0.064	0.38	0.45
0.20	0.21	0.064	0.068	0.40	0.40
0.19	0.17	0.064	0.064	0.46	0.47
0.20	0.18	0.064	0.066	0.50	0.42
0.19	0.19	0.061	0.064	0.38	0.43
0.19	0.17	0.062	0.064	0.42	0.45
0.17	0.19	0.062	0.066	0.40	0.53
0.17	0.16	0.064	0.066	0.38	0.48

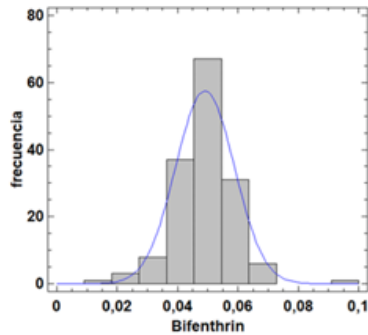
Voluntary Pesticides

Forchlorfenuron (mg/kg)		Tritosulfuron (mg/kg)	
Replicate 1	Replicate 2	Replicate 1	Replicate 2
0.049	0.055	0.23	0.31
0.057	0.056	0.25	0.31
0.056	0.049	0.24	0.23
0.053	0.055	0.22	0.25
0.053	0.054	0.26	0.28
0.053	0.056	0.26	0.26
0.050	0.050	0.22	0.25
0.050	0.050	0.22	0.26
0.051	0.053	0.26	0.28
0.054	0.054	0.22	0.26

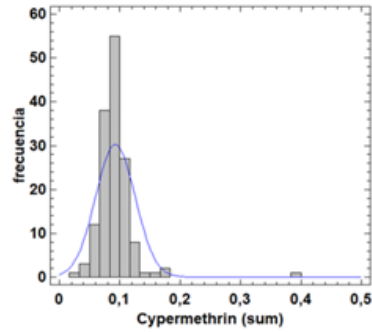
The sample numbers used for this test were: 2, 42, 83, 91, 107, 128, 149, 180, 194, 234.

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

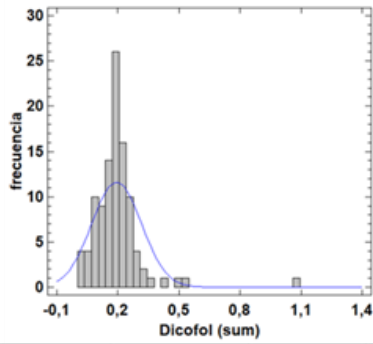
Compound	Assigned value (mg/kg)	CV* (%)	n
Bifenthrin	0,049	15,6	154



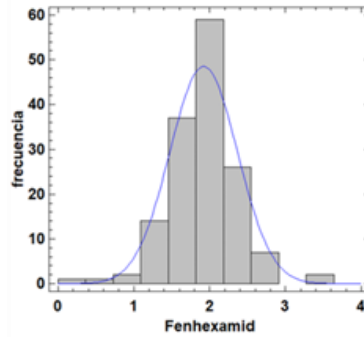
Compound	Assigned value (mg/kg)	CV* (%)	n
Cypermethrin	0,090	20,8	150



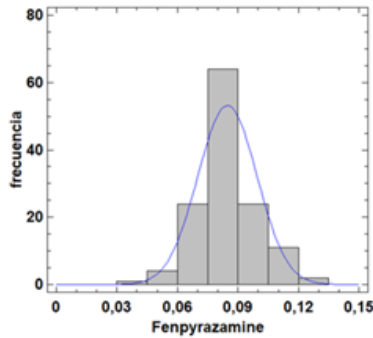
Compound	Assigned value (mg/kg)	CV* (%)	n
Dicofol	0,183	41,5	104



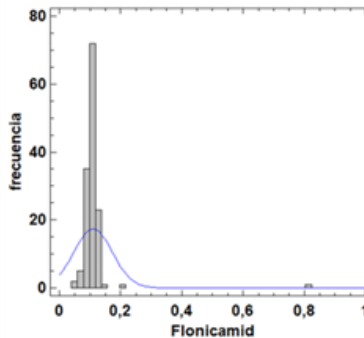
Compound	Assigned value (mg/kg)	CV* (%)	n
Fenhexamid	1,917	19,6	149



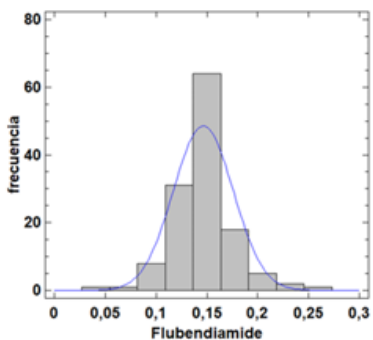
Compound	Assigned value (mg/kg)	CV* (%)	n
Fenpyrazamine	0,084	15,7	130



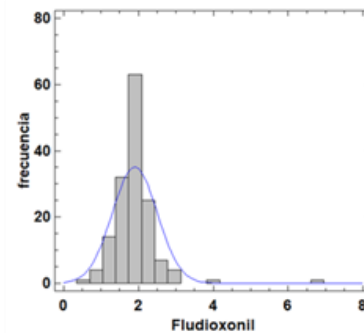
Compound	Assigned value (mg/kg)	CV* (%)	n
Fonicamid	0,105	13,5	140



Compound	Assigned value (mg/kg)	CV* (%)	n
Flubendiamide	0,146	16,5	131

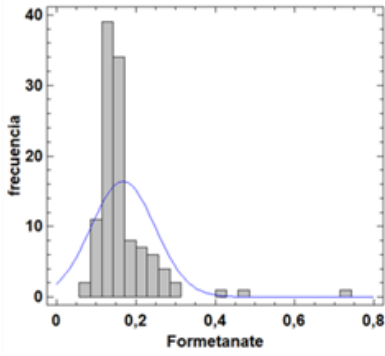


Compound	Assigned value (mg/kg)	CV* (%)	n
Fludioxonil	1,862	19,2	152

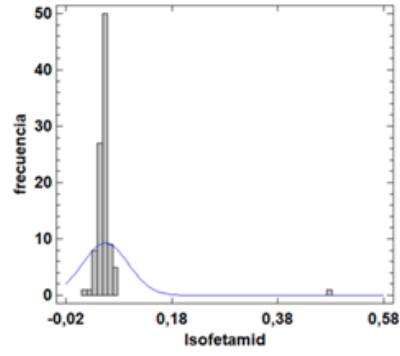


APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

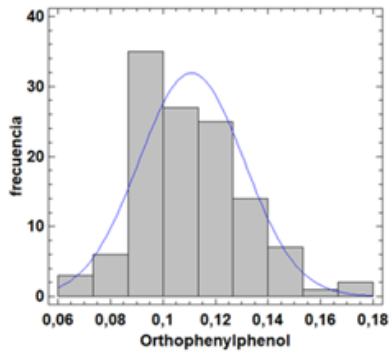
Compound	Assigned value (mg/kg)	CV* (%)	n
Formetanate	0,155	26,8	121



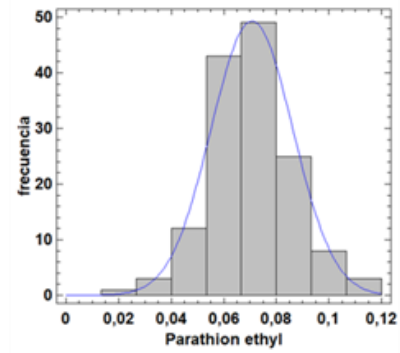
Compound	Assigned value (mg/kg)	CV* (%)	n
Isofetamid	0,051	15,9	102



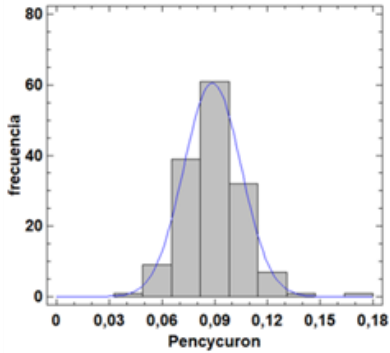
Compound	Assigned value (mg/kg)	CV* (%)	n
Orthophenylphenol	0,110	16,8	120



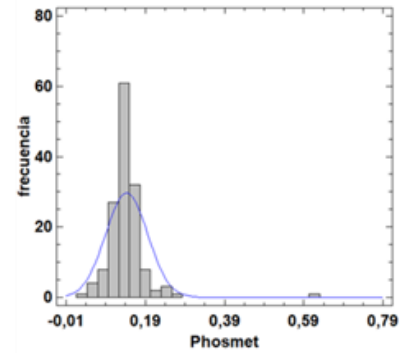
Compound	Assigned value (mg/kg)	CV* (%)	n
Parathion ethyl	0,071	20,6	145



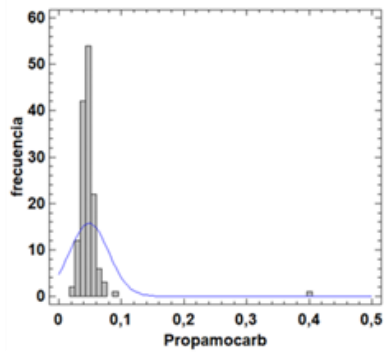
Compound	Assigned value (mg/kg)	CV* (%)	n
Pencycuron	0,088	16,9	151



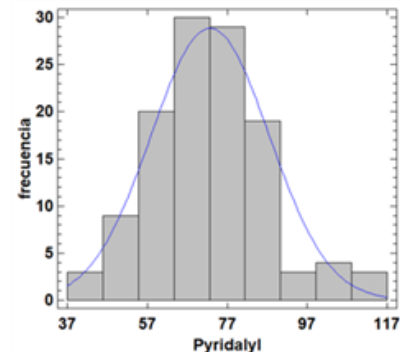
Compound	Assigned value (mg/kg)	CV* (%)	n
Phosmet	0,140	19,3	148



Compound	Assigned value (mg/kg)	CV* (%)	n
Propamocarb	0,046	19,4	143

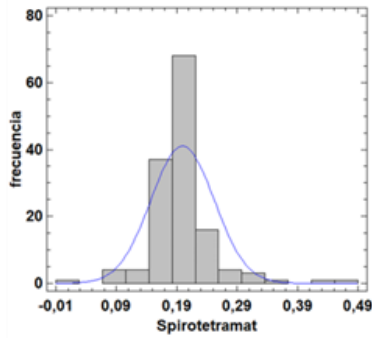


Compound	Assigned value (mg/kg)	CV* (%)	n
Pyridalyl	0,072	19,7	120

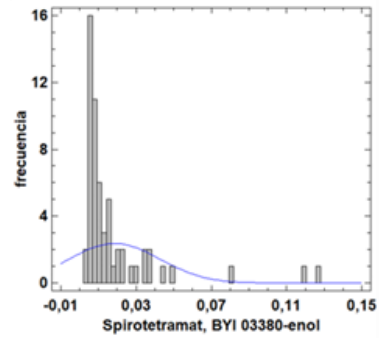


APPENDIX 2. Histograms of residue data for each pesticide from EU/EFTA laboratories.

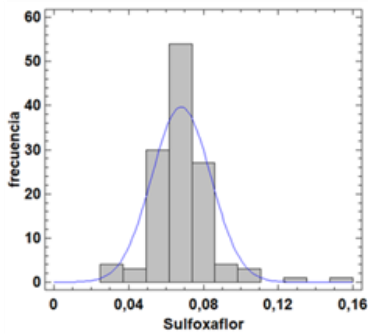
Compound	Assigned value (mg/kg)	CV* (%)	n
Spirotetramat	0,197	16,9	140



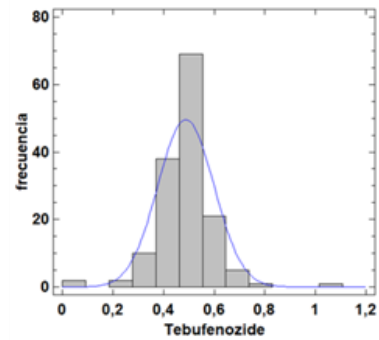
Compound	Assigned value (mg/kg)	CV* (%)	N
Spirotetramat, BYI 03380-enol	0,013	70,8	60



Compound	Assigned value (mg/kg)	CV* (%)	n
Sulfoxaflor	0,067	16,2	127

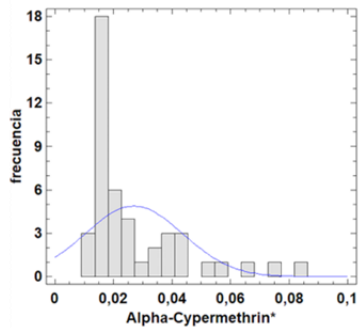


Compound	Assigned value (mg/kg)	CV* (%)	n
Tebufenozide	0,489	16,6	149

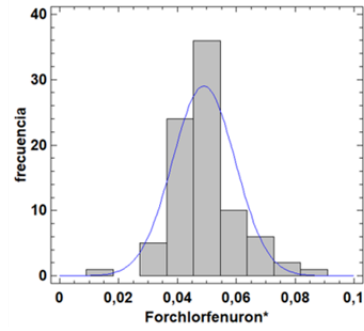


### Voluntary compounds

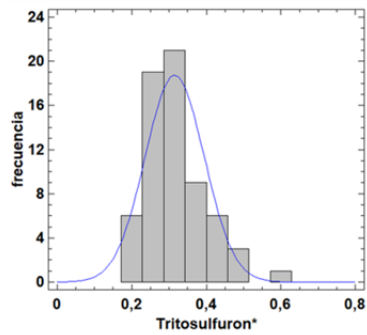
Compound	Assigned value (mg/kg)	CV* (%)	n
Alpha-Cypermethrin	0,024	49,9	45



Compound	Assigned value (mg/kg)	CV* (%)	n
Forchlorfenuron	0,048	16,7	85



Compound	Assigned value (mg/kg)	CV* (%)	n
Tritosulfuron	0,311	22,7	65



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

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

Lab Code	Bifenthrin	Cypermethrin (sum)		Dicofol (sum)		Fenhexamid		Fenpyrazamine		Flonicamid		Flubendamide		Fludioxonil		Formetanate		Isotefamid		
MRRL (mg/kg)	0.005	z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		
Robust mean (mg/kg)	0.0493	0.0903		0.183		1.92		0.0845		0.105		0.146		1.86		0.155		0.0507		
1	0.048	-0.1	0.087	-0.1	0.187	0.1	2.020	0.2	0.089	0.2	0.109	0.2	0.135	-0.3	1.860	0.0	0.140	-0.4	0.056	0.4
2	0.052	0.2	0.091	0.0	NA		2.230	0.7	0.089	0.2	0.104	0.0	0.150	0.1	2.150	0.6	0.150	-0.1	0.056	0.4
3	0.057	0.6	0.097	0.3	0.217	0.8	2.650	1.5	NA		NA		0.133	-0.3	1.800	-0.1	0.140	-0.4	NA	
4	0.052	0.2	0.099	0.4	NA		1.415	-1.0	NA		0.119	0.5	NA		NA		NA		NA	
5	0.054	0.4	0.083	-0.3	0.264	1.8	1.980	0.1	0.079	-0.3	0.110	0.2	0.150	0.1	6.870	10.8	ND	-4.0	NA	
6	0.046	-0.3	0.099	0.4	0.116	-1.5	3.510	3.3	0.077	-0.4	0.108	0.1	0.137	-0.2	1.150	-1.5	0.246	2.4	0.045	-0.5
7	0.047	-0.2	0.087	-0.1	0.09	-2.0	1.700	-0.5	0.067	-0.8	0.097	-0.3	0.116	-0.8	1.700	-0.3	0.150	-0.1	0.037	-1.1
8	0.056	0.5	0.081	-0.4	0.171	-0.3	2.100	0.4	0.079	-0.3	0.100	-0.2	0.150	0.1	1.950	0.2	0.145	-0.3	0.052	0.1
9	0.061	1.0	0.116	1.1	0.210	0.6	2.300	0.8	0.084	0.0	0.099	-0.2	0.119	-0.7	2.160	0.6	0.129	-0.7	0.052	0.1
10	0.047	-0.2	0.102	0.5	0.215	0.7	2.100	0.4	0.095	0.5	0.120	0.6	0.145	0.0	1.950	0.2	0.165	0.3	0.055	0.3
11	0.060	0.9	0.087	-0.1	0.336	3.4	2.260	0.7	0.089	-0.2	0.092	-0.5	0.153	0.2	2.160	0.6	0.114	-1.1	0.039	-1.0
12	0.041	-0.7	0.080	-0.5	0.074	-2.4	1.400	-1.1	0.055	-1.4	0.043	-2.4	NA		0.900	-2.1	ND	-4.0	0.040	-0.8
13	0.052	0.2	0.104	0.6	0.238	1.2	1.920	0.0	0.079	-0.3	0.100	-0.2	0.137	-0.2	2.290	0.9	0.136	-0.5	0.050	-0.1
14	0.034	-1.3	0.069	-0.9	0.195	0.3	1.780	-0.3	0.069	-0.7	0.097	-0.3	0.136	-0.3	1.900	0.1	0.249	2.4	0.037	-1.1
15	0.048	-0.1	0.092	0.1	0.206	0.5	1.500	-0.9	0.071	-0.7	0.083	-0.8	0.101	-1.2	1.400	-1.0	0.167	0.3	0.040	-0.8
16	0.047	-0.2	0.082	-0.4	ND	-4.0	1.820	-0.2	0.081	-0.2	0.092	-0.5	0.147	0.0	1.940	0.2	0.152	-0.1	0.045	-0.5
17	0.050	0.1	0.105	0.7	ND	-4.0	2.110	0.4	0.050	-1.6	0.112	0.3	0.127	-0.5	1.530	-0.7	0.285	3.4	0.053	0.2
18	0.044	-0.4	0.065	-1.1	0.205	0.5	1.840	-0.2	0.077	-0.4	0.099	-0.2	0.143	-0.1	1.890	0.1	0.126	-0.7	0.045	-0.5
19	0.048	-0.1	0.103	0.6	0.18	-0.1	1.870	-0.1	0.085	0.0	0.102	-0.1	0.159	0.4	2.290	0.9	0.111	-1.1	0.046	-0.4
20	0.054	0.4	0.082	-0.4	0.147	-0.8	0.883	-2.2	0.070	-0.7	0.097	-0.3	0.101	-1.2	1.782	-0.2	0.113	-1.1	0.078	2.2
21	0.042	-0.6	0.075	-0.7	NA		2.113	0.4	0.067	-0.8	0.094	-0.4	0.112	-0.9	1.546	-0.7	NA		0.040	-0.8
22	0.049	0.0	0.082	-0.4	1.060	19.2	1.730	-0.4	0.088	0.2	0.098	-0.3	0.151	0.2	2.050	0.4	0.132	-0.6	0.061	0.8
23	0.057	0.6	0.120	1.3	0.240	1.3	2.060	0.3	0.096	0.5	0.100	-0.2	0.190	1.2	1.990	0.3	0.250	2.5	NA	
24	0.049	0.0	0.099	0.4	0.180	-0.1	0.220	-3.5	0.100	0.7	0.105	0.0	NA		2.020	0.3	ND	-4.0	NA	
25	0.058	0.7	0.102	0.5	0.282	2.2	2.140	0.5	0.089	0.2	0.102	-0.1	0.142	-0.1	2.040	0.4	0.128	-0.7	0.051	0.0
26	0.058	0.7	0.174	3.7	0.158	-0.5	1.870	-0.1	ND	-4.0	0.080	-0.9	0.139	-0.2	1.080	-1.7	ND	-4.0	0.476	33.5
27	0.062	1.0	0.095	0.2	0.241	1.3	2.387	1.0	0.065	-0.9	0.085	-0.8	0.157	0.3	2.582	1.5	0.091	-1.6	0.049	-0.1
28	0.048	-0.1	0.069	-0.9	0.195	0.3	1.905	0.0	0.078	-0.3	0.094	-0.4	0.173	0.8	1.946	0.2	0.126	-0.7	ND	-4.0
29	0.044	-0.4	0.082	-0.4	0.176	-0.1	1.860	-0.1	0.077	-0.3	0.109	0.2	0.145	0.0	1.770	-0.2	0.151	-0.1	0.050	-0.1
30	0.054	0.3	0.098	0.3	0.175	-0.2	2.030	0.2	0.082	-0.1	0.108	0.1	0.118	-0.8	1.820	-0.1	0.137	-0.5	0.035	-1.2
31	0.044	-0.4	NA		NA		NA		NA		0.111	0.2	NA		NA		NA		NA	
32	0.056	0.5	0.096	0.3	0.201	0.4	2.303	0.8	0.111	1.3	0.121	0.6	0.177	0.9	2.016	0.3	ND	-4.0	NA	
33	0.047	-0.2	0.114	1.0	NA		2.380	1.0	0.121	1.7	0.136	1.2	NA		2.500	1.4	2.080	49.8	NA	
34	0.095	3.7	ND	-4.0	0.285	2.2	1.745	-0.4	0.076	-0.4	0.097	-0.3	0.143	-0.1	1.502	-0.8	0.110	-1.2	NA	
35	0.042	-0.6	0.072	-0.8	0.150	-0.7	2.082	0.3	0.109	1.2	0.125	0.8	0.138	-0.2	1.981	0.3	0.284	3.3	0.05	-0.1
36	0.040	-0.8	0.350	11.5	ND	-4.0	NA		NA		NA		NA		1.320	-1.2	NA		NA	
37	0.047	-0.2	NA		NA		2.270	0.7	NA		0.120	0.6	NA		1.900	0.1	NA		NA	
38	0.044	-0.4	0.079	-0.5	0.110	-1.6	1.800	-0.2	0.076	-0.4	0.100	-0.2	0.150	0.1	1.900	0.1	0.130	-0.6	NA	
39	0.056	0.5	0.106	0.7	0.204	0.5	2.140	0.5	0.084	0.0	0.104	0.0	0.155	0.3	1.820	-0.1	0.146	-0.2	NA	
40	0.043	-0.5	0.078	-0.5	0.1	-1.8	1.500	-0.9	0.072	-0.6	0.084	-0.8	0.119	-0.7	1.650	-0.5	0.131	-0.6	NA	
41	0.039	-0.8	0.070	-0.9	NA		1.440	-1.0	ND	-4.0	0.078	-1.0	0.079	-1.3	1.059	-1.7	ND	-4.0	NA	
42	0.030	-1.6	0.073	-0.8	0.284	2.2	1.880	-0.1	0.087	0.1	0.112	0.3	0.151	0.2	2.070	0.4	0.135	-0.5	0.041	-0.7
43	0.052	0.2	0.065	-1.1	NA		1.570	-0.7	0.084	0.0	0.101	-0.1	0.170	0.7	2.260	0.9	1.640	38.4	NA	
44	0.045	-0.3	NA		NA		1.783	-0.3	NA		0.091	-0.5	NA		1.354	-1.1	0.168	0.3	NA	
45	0.045	-0.3	0.084	-0.3	0.122	-1.3	1.525	-0.8	NA		0.097	-0.3	ND	-4.0	1.320	-1.2	0.129	-0.7	NA	
46	0.048	-0.1	0.085	-0.2	0.093	-2.0	2.080	0.3	0.086	0.1	0.103	-0.1	0.144	0.0	2.110	0.5	0.140	-0.4	0.049	-0.1
47	0.048	-0.1	0.087	-0.1	0.098	-1.9	1.450	-1.0	0.071	-0.6	0.106	0.0	0.146	0.0	2.320	1.0	0.139	-0.4	0.069	1.4
48	0.048	-0.1	0.090	0.0	ND	-4.0	1.479	-0.9	0.090	0.3	0.121	0.6	0.150	0.1	2.191	0.7	0.151	-0.1	0.051	0.0
49	0.054	0.4	0.096	0.3	0.530	7.6	2.200	0.6	0.111	1.3	0.133	1.1	0.142	-0.1	2.100	0.5	0.106	-1.3	0.072	1.7
50	0.042	-0.6	0.095	0.2	0.209	0.6	2.217	0.6	0.080	-0.2	NA		0.200	1.5	2.195	0.7	0.176	0.5	NA	
51	0.053	0.3	0.100	0.4	0.271	1.9	1.880	-0.1	0.094	0.4	0.107	0.1	0.163	0.5	2.780	2.0	0.116	-1.0	0.061	0.8
52	0.043	-0.5	0.080	-0.5	0.239	1.2	1.930	0.0	0.074	-0.5	0.109	0.2	0.138	-0.2	1.780	-0.2	0.145	-0.3	0.043	-0.6
53	0.043	-0.5	0.103	0.6	0.262	1.7	1.403	-1.1	0.084	0.0	0.098	-0.2	0.129	-0.5	1.850	0.0	0.143	-0.3	0.051	0.0
54	0.050	0.1	0.082	-0.4	ND	-4.0	1.593	-0.7	NA		0.120	0.6	NA		1.680	-0.4	0.190	0.9	NA	
55	0.042	-0.6	0.099	0.4	0.349	3.6	2.070	0.3	0.086	0.0	0.106	0.0	0.136	-0.3	1.960	0.2	0.118	-1.0	0.050	0.0
56	0.059	0.8	0.133	1.9	0.251	1.5	2.100	0.4	0.085	0.0	0.117	0.5	0.150	0.1	3.100	2.7	0.153	0.0	0.056	0.4
57	0.071	1.8	0.110	0.9	0.250	1.5	2.300	0.8	0.095	0.5	0.130	1.0	0.170	0.7	2.200	0.7	0.077	-2.0	0.056	0.4
58	0.059	0.8	0.117	1.2	0.188	0.1	1.890	-0.1	0.096	0.5	0.104	0.0	0.237	2.5	1.750	-0.2	0.148	-0.2	0.061	0.8
59	0.045	-0.3	0.060	-1.3	0.162	-0.5	1.986	0.1	0.100	0.7	0.109	0.2	0.157	0.3	1.419	-1.0	0.163	0.2	0.05	-0.1
60	0.067	1.4	0.112	1.0	0.488	6.7	2.060	0.3	0.104	0.9	0.102	-0.1	0.185	1.1	2.320	1.0	0.215	1.6	0.067	1.3
61	0.045	-0.3	0.093	0.1	0.172	-0.2	1.760	-0.3	0.080	-0.2	0.094	-0.4	0.159	0.4	1.750	-0.2	0.134	-0.5	0.047	-0.3
62	0.064	1.2	0.104	0.6	0.202	0.4	2.040	0.3	0.090	0.3	0.112	0.3	0.152	0.2	1.560	-0.6	0.115	-1.0	0.073	1.8
63	0.058	0.7	0.101	0.5	NA		2.550	1.3	NA		NA		NA		2.240	0.8	NA		NA	
64	0.056	0.6	0.099	0.4	NA		2.010	0.2	NA		NA		NA		NA		NA		NA	
66	0.059	0.8	0.108	0.8	0.082	-2.2														

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

Lab Code	Bifenthrin		Cypermethrin (sum)		Dicofol (sum)		Fenhexamid		Fenpyrazamine		Flonicamid		Flubendiamide		Fludoxonil		Formetanate		Isofetamid		
	MRRL (mg/kg)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)		
Robust mean (mg/kg)	0.0493		0.0903		0.183		1.92		0.0845		0.105		0.146		1.86		0.155		0.0507		
70	0.045	-0.3	0.059	-1.4	0.171	-0.3	NA		NA		NA		NA		0.856	-2.2	NA		NA		
71	0.052	0.2	0.065	-1.1	0.035	-3.2	2.410	1.0	0.072	-0.6	0.074	-1.2	0.158	0.3	1.830	-0.1	0.139	-0.4	0.039	-0.9	
72	0.043	-0.5	0.071	-0.8	0.315	2.9	1.499	-0.9	0.080	-0.2	0.114	0.3	0.097	-1.3	1.007	-1.8	0.183	0.7	0.046	-0.4	
73	0.043	-0.5	0.100	0.4	0.031	-3.3	2.800	1.8	0.099	0.7	0.100	-0.2	0.180	0.9	3.000	2.4	0.087	-1.8	0.046	-0.4	
74	0.071	1.8	0.150	2.6	0.190	0.2	2.000	0.2	0.130	2.2	0.110	0.2	0.140	-0.2	1.800	-0.1	0.150	-0.1	NA		
75	0.047	-0.2	0.095	0.2	NA		1.600	-0.7	0.080	-0.2	0.100	-0.2	0.130	-0.4	2.100	0.5	NA	-4.0	0.047	-0.3	
76	0.054	0.4	0.091	0.0	0.233	1.1	1.911	0.0	0.080	-0.2	0.100	-0.2	0.143	-0.1	2.068	0.4	0.204	1.3	0.046	-0.4	
77	0.056	0.5	0.086	-0.2	0.287	2.3	2.070	0.3	0.091	0.3	0.107	0.1	0.124	-0.6	1.910	0.1	0.193	1.0	0.056	0.4	
78	NA	NA	NA	NA	NA	NA	NA	0.094	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
79	0.057	0.6	0.099	0.4	0.130	-1.2	1.844	-0.2	0.094	0.5	0.094	-0.4	0.143	-0.1	1.870	0.0	0.151	-0.1	0.056	0.4	
80	0.062	1.0	0.11	0.9	ND	-4.0	1.7	-0.5	NA		0.110	0.2	0.150	0.1	2.100	0.5	0.240	2.2	NA		
81	0.036	-1.1	0.083	-0.3	0.182	0.0	1.990	0.2	0.080	-0.2	0.096	-0.4	0.138	-0.2	1.810	-0.1	0.122	-0.8	0.055	0.4	
82	0.044	-0.4	0.087	-0.2	0.197	0.3	2.130	0.4	0.070	-0.7	0.110	0.2	NA		2.230	0.8	0.145	-0.3	NA		
83	0.043	-0.5	0.086	-0.2	NA		ND	-4.0	NA		0.131	1.0	NA		2.030	0.4	NA	NA	NA		
84	0.055	0.5	0.093	0.1	0.095	-1.9	2.050	0.3	0.095	0.5	0.110	0.2	NA		2.100	0.5	0.156	0.0	0.052	0.1	
85	0.060	0.9	0.092	0.1	0.204	0.5	1.931	0.0	0.120	1.7	0.100	-0.2	0.162	0.5	2.116	0.5	0.168	0.3	0.057	0.5	
86	0.039	-0.8	0.024	-2.9	0.230	1.0	1.770	-0.3	0.036	-2.3	0.110	0.2	0.130	-0.4	2.560	1.5	0.210	1.4	0.034	-1.3	
87	0.053	0.3	0.126	1.6	NA		1.840	-0.2	0.087	0.1	0.074	-1.2	NA		1.860	0.0	0.119	-0.9	0.051	0.0	
88	0.052	0.2	0.104	0.6	0.154	-0.6	1.708	-0.4	0.113	1.3	0.111	0.2	0.148	0.1	1.954	0.2	NA		0.041	-0.8	
89	0.044	-0.4	0.104	0.6	0.266	1.8	2.070	0.3	0.083	-0.1	0.102	-0.1	0.136	-0.3	1.890	0.1	0.137	-0.5	0.048	-0.2	
90	0.033	-1.3	0.056	-1.5	NA		1.640	-0.6	0.087	0.1	0.090	-0.6	0.188	1.2	2.500	1.4	ND	-4.0	0.010	-3.2	
91	0.059	0.8	0.112	1.0	0.214	0.7	NA		NA		NA		0.142	-0.1	2.076	0.5	0.126	-0.7	NA		
92	0.043	-0.5	0.085	-0.2	0.043	-3.1	1.640	-0.6	0.053	-1.5	0.094	-0.4	0.101	-1.2	1.700	-0.3	0.107	-1.2	NA		
93	0.057	0.6	0.105	0.7	0.125	-1.3	1.350	-1.2	0.084	0.0	0.095	-0.4	0.149	0.1	1.920	0.1	0.145	-0.3	0.051	0.0	
94	0.047	-0.2	0.086	-0.2	0.192	0.2	2.090	0.4	0.091	0.3	0.118	0.5	0.103	-1.2	1.820	-0.1	0.160	0.1	0.051	0.0	
95	0.059	0.8	0.117	1.2	NA		2.215	0.6	NA		0.119	0.5	0.160	0.4	NA		0.141	-0.3	NA		
96	0.055	0.4	0.113	1.0	0.301	2.6	1.777	-0.3	0.092	0.4	0.094	-0.4	0.156	0.3	2.107	0.5	0.126	-0.7	NA		
97	0.055	0.5	0.082	-0.4	0.226	1.0	2.038	0.3	0.092	0.4	0.120	0.6	0.166	0.6	2.035	0.4	0.207	1.3	0.056	0.4	
98	ND	-4.0	1.06	43.0	ND	-4.0	1.628	-0.6	ND	-4.0	ND	-4.0	ND	-4.0	1.363	-1.1	NA	NA	NA		
99	0.050	0.1	0.07	-0.9	0.140	-0.9	1.750	-0.3	0.080	-0.2	0.087	-0.7	0.138	-0.2	1.295	-1.2	0.185	0.8	0.042	-0.7	
100	0.050	0.1	0.071	-0.8	0.191	0.2	1.856	-0.1	0.088	0.1	0.103	-0.1	0.155	0.2	1.764	-0.2	0.104	-1.3	0.060	0.8	
101	0.054	0.3	0.116	1.1	NA		1.100	-1.7	0.108	1.1	0.135	1.2	0.141	-0.1	1.766	-0.2	0.165	0.3	NA		
103	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	
104	0.033	-1.3	ND	-4.0	NA		1.452	-1.0	0.059	-1.2	0.094	-0.4	0.110	-1.0	1.176	-1.5	0.080	-1.9	NA		
105	0.048	-0.1	0.1	0.4	0.109	-1.6	1.830	-0.2	0.086	0.1	0.095	-0.4	0.113	-0.9	1.870	0.0	0.146	-0.2	0.049	-0.1	
106	NA	NA	NA	NA	NA		2.350	0.9	NA		0.114	0.3	0.128	-0.5	1.971	0.2	0.150	-0.1	NA		
107	0.047	-0.2	0.154	2.8	NA		2.375	1.0	0.084	0.0	0.139	1.3	0.146	0.0	2.446	1.3	NA	NA	NA		
108	0.058	0.7	0.105	0.7	0.183	0.0	1.979	0.1	0.094	-4.0	0.089	-0.6	ND	-4.0	1.776	-0.2	0.221	1.7	NA		
109	0.060	0.9	0.109	0.8	0.19	0.2	1.860	-0.1	0.094	0.5	0.120	0.6	0.174	0.8	2.100	0.5	0.143	-0.3	NA		
110	0.048	-0.1	0.082	-0.4	NA		1.860	-0.1	0.080	-0.2	0.113	0.3	0.168	0.6	1.900	0.1	1.700	435.3	0.053	0.2	
111	0.046	-0.3	0.077	-0.6	NA		2.000	0.2	0.062	-1.1	0.10	-0.2	ND	-4.0	1.700	-0.3	0.200	1.2	0.045	-0.5	
112	0.034	-1.2	0.061	-1.3	NA		1.390	-1.1	0.067	-0.8	0.103	-0.1	NA		1.460	-0.9	NA	NA	NA		
113	0.027	-1.8	0.092	0.1	0.072	-2.4	2.010	0.2	0.108	1.1	0.120	0.6	0.159	0.4	1.680	-0.4	NA	NA	NA		
114	0.042	-0.6	0.042	-2.1	0.024	-3.5	1.805	-0.2	0.072	-0.6	0.105	0.0	0.121	-0.7	1.683	-0.4	0.119	-0.9	0.046	-0.4	
115	0.046	-0.3	0.103	0.6	0.096	-1.9	2.160	0.5	0.080	-0.2	0.102	-0.1	0.157	0.3	3.980	4.5	ND	-4.0	0.046	-0.4	
116	0.055	0.5	0.091	0.0	0.199	0.4	2.046	0.3	0.095	0.5	0.125	0.8	0.173	0.8	1.931	0.1	0.142	-0.3	0.053	0.2	
117	0.049	0.0	0.090	0.0	0.253	1.5	2.200	0.6	0.070	-0.7	0.098	-0.3	0.141	-0.1	2.010	0.3	0.160	0.1	NA		
118	0.056	0.5	0.040	-2.2	ND	-4.0	2.224	0.6	0.086	0.1	ND	-4.0	ND	-4.0	1.778	-0.2	0.123	-0.8	ND	-4.0	
119	0.060	0.9	0.070	-0.9	0.050	-2.9	1.630	-0.6	NA		0.060	-1.7	0.130	-0.4	1.570	-0.6	ND	-4.0	NA		
120	0.041	-0.7	0.056	-1.5	NA		NA	NA	NA		NA		0.109	-1.0	ND	-4.0	ND	NA	NA		
121	0.043	-0.5	0.089	0.0	0.118	-1.4	2.270	0.7	0.086	0.1	0.088	-0.7	0.137	-0.2	1.660	-0.4	0.224	1.8	0.052	0.1	
122	0.041	-0.7	0.114	1.0	0.135	-1.0	1.670	-0.5	0.065	-0.9	0.106	0.0	0.098	-1.3	1.290	-1.2	0.138	-0.4	NA		
123	0.051	0.1	0.130	1.8	ND	-4.0	2.350	0.9	0.080	-0.2	0.116	0.4	0.178	0.9	1.980	0.3	0.110	-1.2	0.054	0.2	
124	0.043	-0.5	0.079	-0.5	0.172	-0.2	1.330	-1.2	0.084	0.0	0.108	0.1	0.140	-0.2	1.640	-0.5	0.280	3.2	0.055	0.3	
125	0.050	0.1	0.092	0.1	NA		2.070	0.3	0.085	0.0	0.111	0.2	0.150	0.1	1.730	-0.3	0.150	-0.1	0.050	-0.1	
126	0.045	-0.3	0.070	-0.9	0.098	-1.9	2.300	0.8	0.097	0.6	0.082	-0.9	0.190	1.2	1.800	-0.1	0.170	0.4	0.053	0.2	
127	0.043	-0.5	0.057	-1.5	0.113	-1.5	0.672	-2.6	0.072	-0.6	0.087	-0.7	0.140	-0.2	1.137	-1.6	0.147	-0.2	0.028	-1.8	
128	0.048	-0.1	0.079	-0.5	0.178	-0.1	1.599	-0.7	0.074	-0.5	0.106	0.0	0.133	-0.3	1.966	0.2	0.150	-0.1	0.047	-0.3	
129	0.049	0.0	0.065	-1.1	0.035	-3.2	1.474	-0.9	0.097	0.6	0.133	1.1	0.176	0.8	1.737	-0.3	0.163	0.2	0.061	0.8	
130	0.050	0.1	0.076	-0.6	ND	-4.0	2.760	1.8	0.096	0.5	0.091	-0.5	0.197	1.4	1.870	0.0	1.290	329.4	0.052	0.1	
131	0.048	-0.1	0.080	-0.5	0.190	0.2	2.800	1.8	0.086	0.1	0.110	0.2	NA		1.600	-0.6	0.250	2.5	0.052	0.1	
132	0.040	-0.8	0.088	-0.1	ND	-4.0	0.874	-2.2	ND	-4.0	0.212	4.1	0.164	0.5	2.735	1.9	NA	NA	NA		
133	0.067	1.4	0.083	-0.3	0.140	-0.9	1.410	-1.1	0.110	1.2	0.093	-0.5	0.039	-2.9	1.640	-0.5	0.171	0.4	0.061	0.8	
134	0.030	-1.6	0.113	1.0	NA		2.387	1.0	NA		NA		NA		2.985	2.4	ND	-4.0	NA		
135	0.054	0.4	0.094	0.2	NA		1.860	-0.1	NA		0.094	-0.4	0.160	0.							

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

Lab Code	Bifenthrin		Cypermethrin (sum)		Dicofof (sum)		Fenhexamid		Fenpyrazamine		Flonicamid		Flubendiamide		Fludoxonil		Formetanate		Isotelamid	
	MRRL (mg/kg)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)	z score (FFP-RSD 25 %)
Robust mean (mg/kg)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	0.0493	0.0903	0.183	1.92	0.0845	0.105	0.146	1.86	0.155	0.0507										
143	0.054	0.4	0.084	-0.3	0.210	0.6	2.000	0.2	NA	NA	NA	NA	1.900	0.1	NA	NA	NA	NA	NA	NA
144	0.046	-0.3	0.087	-0.2	0.204	0.5	1.930	0.0	0.074	-0.5	0.113	0.3	0.119	-0.7	1.910	0.1	0.145	-0.3	0.047	-0.3
145	0.062	1.0	0.126	1.6	0.186	0.1	2.030	0.2	0.104	0.9	0.117	0.5	0.201	1.5	2.180	0.7	NA	NA	0.056	0.4
146	0.046	-0.3	0.075	-0.7	0.159	-0.5	2.25	0.7	0.105	1.0	0.067	-1.5	0.149	0.1	1.000	-1.9	0.130	-0.6	0.052	0.1
147	0.060	0.9	0.123	1.4	ND	-4.0	NA	NA	NA	NA	NA	NA	2.100	0.5	NA	NA	NA	NA	NA	NA
148	0.055	0.5	0.094	0.2	0.230	1.0	1.880	-0.1	0.087	0.1	0.117	0.5	0.150	0.1	2.040	0.4	0.153	0.0	0.052	0.1
149	0.040	-0.8	0.08	-0.5	0.140	-0.9	1.500	-0.9	0.072	-0.6	0.097	-0.3	0.162	0.5	1.534	-0.7	0.142	-0.3	0.048	-0.2
150	0.021	-2.3	0.095	0.2	0.207	0.5	1.900	0.0	0.082	-0.1	0.100	-0.2	0.200	1.5	1.400	-1.0	0.110	-1.2	0.047	-0.3
151	0.050	0.1	ND	-4.0	ND	-4.0	1.520	-0.8	0.070	-0.7	0.120	0.6	0.120	-0.7	1.200	-1.4	0.170	0.4	NA	NA
152	0.056	0.5	0.075	-0.7	ND	-4.0	1.670	-0.5	0.081	-0.2	0.136	1.2	0.144	0.0	1.710	-0.3	0.290	3.5	NA	NA
153	0.055	0.5	0.084	-0.3	0.190	0.2	1.560	-0.7	0.069	-0.7	0.089	-0.6	0.123	-0.6	2.211	0.7	0.136	-0.5	0.037	-1.1
154	0.047	-0.2	0.112	1.0	0.044	-3.0	2.788	1.8	0.109	1.2	0.116	0.4	0.119	-0.7	1.693	-0.4	0.481	8.4	0.063	1.0
155	0.045	-0.4	0.069	-1.0	0.218	0.8	1.730	-0.4	0.070	-0.7	0.819	27.2	0.121	-0.7	1.640	-0.5	NA	NA	0.046	-0.4
156	0.050	0.1	0.085	-0.2	0.422	5.2	2.440	1.1	0.094	0.5	0.109	0.2	0.233	2.4	2.330	1.0	3.090	75.9	0.054	0.3
157	0.054	0.4	0.176	3.8	NA	NA	1.890	-0.1	0.105	1.0	ND	-4.0	0.155	0.3	1.480	-0.8	NA	NA	0.064	1.1
158	0.054	0.4	0.094	0.2	ND	-4.0	2.700	1.6	0.093	0.4	0.110	0.2	0.140	-0.2	1.800	-0.1	0.220	1.7	0.058	0.6
159	0.051	0.1	0.096	0.3	0.135	-1.0	2.480	1.2	0.071	-0.6	0.096	-0.3	0.130	-0.4	1.650	-0.5	0.161	0.2	NA	NA
160	0.048	-0.1	0.114	1.0	ND	-4.0	1.250	-1.4	0.092	0.3	0.134	1.1	0.140	-0.2	1.300	-1.2	0.168	0.3	0.056	0.4
161	0.033	-1.3	0.059	-1.4	ND	-4.0	1.990	0.2	0.078	-0.3	0.103	-0.1	0.184	1.1	1.750	-0.2	0.139	-0.4	0.053	0.2
162	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
163	0.050	0.1	0.088	-0.1	ND	-4.0	2	0.2	0.080	-0.2	0.100	-0.2	0.140	-0.2	2.000	0.3	0.120	-0.9	0.044	-0.5
164	0.055	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.950	0.2	NA	NA	NA	NA	NA
165	0.050	0.1	NA	NA	NA	2.181	0.5	0.083	-0.1	0.095	-0.4	0.155	0.3	1.680	-0.4	ND	-4.0	NA	NA	NA
166	0.051	0.1	0.075	-0.7	ND	-4.0	1.607	-0.6	0.084	0.0	0.130	1.0	0.130	-0.4	1.718	-0.3	0.260	2.7	NA	NA
167	0.053	0.3	0.096	0.3	0.150	-0.7	1.618	-0.6	0.081	-0.2	0.111	0.2	0.150	0.1	1.789	-0.2	0.129	-0.7	0.052	0.1
168	0.048	-0.1	0.107	0.7	0.241	1.3	1.600	-0.7	0.071	-0.6	0.104	0.0	0.160	0.4	1.675	-0.4	0.117	-1.0	0.050	-0.1
169	No results reported																			
170	0.048	-0.1	0.090	0.0	0.160	-0.5	1.700	-0.5	0.081	-0.2	0.106	0.0	0.155	0.3	1.600	-0.6	0.188	0.9	0.049	-0.1
171	0.041	-0.7	0.085	-0.2	0.056	-2.8	ND	-4.0	0.075	-0.4	0.090	-0.6	0.160	0.4	1.600	-0.6	NA	NA	0.051	0.0
173	0.042	-0.6	0.092	0.1	0.215	0.7	2.110	0.4	0.106	1.0	0.129	0.9	0.152	0.2	1.930	0.1	0.294	3.6	0.063	1.0
174	NA	NA	0.077	-0.6	NA	NA	3.580	3.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
175	0.052	0.2	0.122	1.4	0.273	2.0	1.445	-1.0	0.074	-0.5	0.120	0.6	0.157	0.3	1.368	-1.1	0.103	-1.3	0.051	0.0
176	No results reported																			
177	0.020	-2.4	0.041	-2.2	ND	-4.0	1.15	-1.6	NA	NA	0.047	-2.2	0.076	-1.9	0.656	-2.6	0.420	6.9	NA	NA
178	0.045 (FR)	-0.3	0.079	-0.5	0.123	-1.3	1.571	-0.7	NA	NA	0.106	0.0	0.123	-0.6	1.543	-0.7	0.128	-0.7	NA	NA
179	0.034	-1.2	0.071	-0.9	0.054	-2.8	1.350	-1.2	0.056	-1.3	0.084	-0.8	0.195	1.4	1.310	-1.2	0.119	-0.9	ND	-4.0
180	0.043	-0.5	0.074	-0.7	0.111	-1.6	1.646	-0.6	0.077	-0.4	0.082	-0.9	0.142	-0.1	1.768	-0.2	0.156	0.0	0.038	-1.0
181	0.043	-0.5	0.058	-1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
182	0.069	1.6	0.072	-0.8	0.042	-3.1	2.261	0.7	0.103	0.9	0.099	-0.2	0.168	0.6	2.146	0.6	0.212	1.5	0.057	0.5
183	0.014	-2.8	0.113	1.0	ND	-4.0	2.186	0.6	0.084	0.0	0.102	-0.1	0.128	-0.5	1.788	-0.2	0.151	-0.1	0.072	1.7

NA: Not analysed

ND: Not detected (False negative)

FR: False Reporting (below the lab's Reporting Limit)

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

Lab Code	Orthophenylphenol		Parathion ethyl		Pencycuron		Phosmet		Propamocarb		Pyridalyl		Spirotetramat		Sulfoxafflor		Tebufenozide	
	MRRL (mg/kg)	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)
1	0.103	-0.3	0.075	0.2	0.093	0.2	0.139	0.0	0.050	0.4	0.076	0.2	0.214	0.4	0.068	0.0	0.531	0.3
2	0.120	0.4	0.093	1.3	0.091	0.1	0.120	-0.6	0.048	0.2	0.081	0.5	0.203	0.1	0.074	0.4	0.530	0.3
3	0.118	0.3	0.083	0.7	0.087	-0.1	0.135	-0.1	0.046	0.0	NA	NA	NA	0.064	-0.2	0.427	-0.5	
4	0.112	0.1	0.072	0.1	0.055	-1.5	0.169	0.8	NA	NA	NA	NA	0.169	-0.6	NA	0.326	-1.3	
5	0.100	-0.4	0.074	0.2	0.080	-0.4	0.069	-2.0	0.072	2.3	0.084	0.7	0.200	0.1	0.076	0.5	0.530	0.3
6	0.140	1.1	0.069	-0.1	0.082	-0.3	0.146	0.2	0.033	-1.1	0.054	-1.0	0.184	-0.3	0.068	0.0	0.449	-0.3
7	0.110	0.0	0.068	-0.2	0.076	-0.6	0.114	-0.7	0.048	0.2	0.056	-0.9	0.190	-0.1	0.060	-0.4	0.360	-1.1
8	0.118	0.3	0.072	0.1	0.092	0.2	0.152	0.3	0.047	0.1	0.060	-0.7	0.198	0.0	0.067	0.0	0.480	-0.1
9	0.130	0.7	0.082	0.6	0.070	-0.8	0.164	0.7	0.042	-0.3	0.069	-0.2	0.169	-0.6	0.060	-0.4	0.422	-0.6
10	0.115	0.2	0.067	-0.2	0.085	-0.1	0.155	0.4	0.050	0.4	0.050	-1.2	0.205	0.2	0.070	0.2	0.535	0.4
11	0.127	0.6	0.085	0.8	0.083	-0.2	0.074	-1.9	0.036	-0.8	0.060	-0.6	0.271	1.5	0.031	-2.2	0.538	0.4
12	NA	NA	0.053	-1.0	0.080	-0.4	0.079	-1.7	0.030	-1.4	0.045	-1.5	0.150	-0.9	0.085	1.1	0.250	-2.0
13	0.111	0.0	0.067	-0.2	0.092	0.2	0.139	0.0	0.026	-1.7	0.089	0.9	0.203	0.1	0.068	0.0	0.497	0.1
14	0.093	-0.6	0.056	-0.9	0.070	-0.8	0.136	-0.1	0.050	0.3	0.046	-1.5	0.210	0.3	0.064	-0.2	0.543	0.4
15	0.099	-0.4	0.068	-0.2	0.048	-1.8	0.129	-0.3	0.041	-0.4	0.054	-1.0	0.168	-0.6	0.065	-0.2	0.410	-0.6
16	0.122	0.4	0.063	-0.4	0.092	0.2	0.121	-0.5	ND	-4.0	0.095	1.2	0.189	-0.2	0.069	0.1	0.480	-0.1
17	0.098	-0.4	0.077	0.4	0.086	-0.1	0.150	0.3	0.064	1.5	0.073	0.1	0.211	0.3	0.068	0.0	0.493	0.0
18	0.101	-0.3	0.065	-0.3	0.081	-0.3	0.120	-0.6	0.047	0.1	0.063	-0.5	0.180	-0.3	0.061	-0.4	0.470	-0.2
19	0.111	0.0	0.108	2.1	0.091	0.1	0.159	0.5	0.053	0.6	0.074	0.1	0.228	0.6	0.063	-0.3	0.478	-0.1
20	0.135	0.9	0.054	-0.9	0.082	-0.3	0.122	-0.5	0.042	-0.3	0.082	0.5	0.123	-1.5	0.063	-0.2	0.453	-0.3
21	0.072	-1.4	0.052	-1.1	0.076	-0.6	0.088	-1.5	0.051	0.4	NA	NA	0.166	-0.6	0.054	-0.8	0.394	-0.8
22	0.110	0.0	0.065	-0.3	0.098	0.5	0.153	0.4	0.065	1.7	0.064	-0.5	0.228	0.6	0.066	-0.1	0.631	1.2
23	0.150	1.5	0.110	2.2	0.100	0.5	0.150	0.3	0.040	-0.5	0.077	0.3	0.210	0.3	0.077	0.6	0.580	0.7
24	0.130	0.7	0.067	-0.2	0.100	0.5	0.140	0.0	0.048	0.2	0.090	1.0	0.021	-3.6	0.068	0.0	0.054	-3.6
25	0.141	1.1	0.094	1.3	0.089	0.0	0.161	0.6	0.052	0.5	0.073	0.1	0.209	0.3	0.068	0.0	0.509	0.2
26	0.112	0.1	0.057	-0.8	0.102	0.6	0.158	0.5	0.045	-0.1	0.046	-1.4	0.098	-2.0	0.104	2.2	0.458	-0.3
27	0.108	-0.1	0.077	0.4	0.098	0.4	0.151	0.3	0.049	0.3	0.093	1.2	0.188	-0.2	0.074	0.4	0.555	0.5
28	ND	-4.0	0.060	-0.6	0.089	0.0	0.153	0.4	0.041	-0.4	0.056	-0.9	0.181	-0.3	ND	-4.0	0.789	2.4
29	0.101	-0.3	0.073	0.1	0.077	-0.5	0.134	-0.2	0.041	-0.4	0.079	0.4	0.216	0.4	0.068	0.0	0.443	-0.4
30	0.099	-0.4	0.080	0.5	0.082	-0.3	0.155	0.4	0.048	0.1	0.065	-0.4	0.175	-0.4	0.054	-0.8	0.478	-0.1
31	NA	NA	NA	0.086	-0.1	NA	NA	NA	NA	0.068	-0.2	NA	NA	NA	NA	NA	NA	NA
32	0.150	1.5	0.097	1.5	0.101	0.6	0.150	0.3	0.045	-0.1	NA	NA	0.253	1.1	NA	NA	0.633	1.2
33	NA	NA	0.077	0.4	0.117	1.3	0.197	1.6	0.051	0.5	0.080	0.4	0.244	1.0	0.060	-0.4	0.541	0.4
34	0.099	-0.4	0.062	-0.5	0.073	-0.7	0.104	-1.0	0.040	-0.5	0.052	-1.1	0.218	0.4	0.057	-0.6	0.420	-0.6
35	0.108	-0.1	0.057	-0.8	0.096	0.3	0.191	1.5	0.051	0.4	0.106	1.9	0.192	-0.1	0.076	0.5	0.707	1.8
36	NA	NA	NA	0.070	-0.8	0.070	-2.0	NA	NA	NA	NA	0.230	0.7	0.140	4.3	0.430	-0.5	
37	0.105	-0.2	ND	-4.0	0.084	-0.2	NA	NA	0.040	-0.5	NA	NA	NA	NA	NA	NA	0.500	0.1
38	NA	NA	0.069	-0.1	0.072	-0.7	0.140	0.0	0.049	0.3	0.057	-0.8	0.200	0.1	NA	NA	0.520	0.3
39	NA	NA	0.079	0.5	0.090	0.1	0.140	0.0	0.048	0.2	0.061	-0.6	0.197	0.0	0.061	-0.4	0.486	0.0
40	0.092	-0.6	0.054	-0.9	0.070	-0.8	NA	NA	0.046	0.0	NA	NA	0.191	-0.1	0.061	-0.4	0.400	-0.7
41	0.113	0.1	0.065	-0.3	0.064	-1.1	0.115	-0.7	0.401	30.9	NA	NA	0.098	-2.0	NA	NA	0.286	-1.7
42	0.094	-0.6	0.046	-1.4	0.070	-0.8	0.121	-0.5	0.045	-0.1	0.065	-0.4	0.209	0.3	0.078	0.6	0.491	0.0
43	NA	NA	0.068	-0.2	0.089	0.0	0.160	0.6	0.057	1.0	0.069	-0.2	0.220	0.5	NA	NA	0.520	0.3
44	NA	NA	0.059	-0.7	0.098	0.4	0.113	-0.8	0.033	-1.1	NA	NA	0.214	0.4	NA	NA	0.482	-0.1
45	0.097	-0.5	NA	NA	NA	0.125	-0.4	0.047	0.1	0.083	0.6	0.211	0.3	0.064	-0.2	0.643	1.3	
46	0.087	-0.8	0.064	-0.4	0.088	0.0	0.132	-0.2	0.047	0.1	0.084	0.7	0.233	0.7	0.067	0.0	0.632	1.2
47	0.118	0.3	0.066	-0.3	0.091	0.1	0.165	0.7	0.050	0.4	0.056	-0.9	0.457	5.3	0.056	-0.7	0.450	-0.3
48	0.110	0.0	0.075	0.2	0.088	0.0	0.154	0.4	0.056	0.9	0.084	0.7	0.172	-0.5	0.076	0.5	0.560	0.6
49	0.109	0.0	0.089	1.0	0.119	1.4	0.138	-0.1	0.027	-1.6	0.087	0.8	0.434	4.8	0.074	0.4	0.479	-0.1
50	0.121	0.4	0.060	-0.6	0.111	1.0	0.118	-0.6	0.060	1.2	0.054	-1.0	0.170	-0.5	0.128	3.6	0.461	-0.2
51	0.131	0.8	0.083	0.7	0.109	0.9	0.160	0.6	0.035	-1.0	0.109	2.0	0.214	0.4	0.092	1.5	0.477	-0.1
52	0.084	-0.9	0.064	-0.4	0.081	-0.4	0.131	-0.3	0.042	-0.3	0.056	-0.9	0.213	0.3	0.066	-0.1	0.450	-0.3
53	0.094	-0.6	0.075	0.2	0.085	-0.1	0.148	0.2	0.046	0.0	0.062	-0.6	0.180	-0.3	0.063	-0.3	0.451	-0.3
54	NA	NA	0.070	0.0	0.100	0.5	0.110	-0.9	0.040	-0.5	NA	NA	0.200	0.1	NA	NA	0.550	0.5
55	0.131	0.8	0.072	0.0	0.089	0.0	0.233	2.7	0.055	0.8	0.059	-0.7	0.196	0.0	0.062	-0.3	0.531	0.3
56	0.150	1.5	0.081	0.6	0.091	0.1	0.178	1.1	0.067	1.8	0.074	0.1	0.206	0.2	0.069	0.1	0.552	0.5
57	0.100	-0.4	0.085	0.8	0.100	0.5	0.170	0.9	0.049	0.3	0.088	0.9	NA	NA	0.085	1.1	0.420	-0.6
58	0.110	0.0	0.082	0.6	0.103	0.7	0.150	0.3	0.040	-0.5	0.087	0.8	0.177	-0.4	0.080	0.7	0.572	0.7
59	0.140	1.1	0.065	-0.3	0.094	0.3	0.167	0.8	0.063	1.5	0.078	0.3	0.214	0.4	0.110	2.5	0.520	0.3
60	0.135	0.9	0.087	0.9	0.117	1.3	0.121	-0.5	0.041	-0.4	0.083	0.6	0.192	-0.1	0.071	0.2	0.581	0.7
61	0.094	-0.6	0.095	1.4	0.087	-0.1	0.138	-0.1	0.048	0.2	0.072	0.0	0.192	-0.1	0.057	-0.6	0.507	0.1
62	0.124	0.5	0.103	1.8	0.091	0.1	0.144	0.1	0.043	-0.3	0.088	0.9	0.239	0.9	0.070	0.2	0.490	0.0
63	0.136	1.0	0.033	-2.1	0.133	2.0	0.210	2.0	NA	NA	NA	NA	0.312	2.3	NA	NA	NA	NA
64	NA	NA	0.088	1.0	0.101	0.6	NA	NA	0.048	0.2	NA	NA	NA	NA	NA	NA	0.471	-0.2
66	0.088	-0.8	0.079	0.5	0.078	-0.5	0.099	-1.2	0.070	2.1	0.062	-0.6	0.139	-1.2	0.066	0.0	0.493	0.0
67	0.107	-0.1	0.069	-0.1	0.093	0.2	0.167	0.8	0.052	0.5	0.070	-0.1	0.200	0.1	0.063	-0.2	0.494	0.0
68	NA	NA	0.060	-0.6	NA	0.104	-1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
69	0.084	-0.9	0.057	-0.8	0.086	-0.1	0.123	-0.5	0.039	-0.6	0.074	0.1	0.268	1.5	0.069	0.1	0.681	1.6
70	NA	NA	0.078	0.4	NA	0.181	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
71	0.088	-0.8	0.074	0.2	0.075	-0.6	0.146	0.2	0.039	-0.6	0.065	-0.4	0.187	-0.2	0.0			

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

Lab Code	Orthophenylphenol	Parathion ethyl		Pencycuron		Phosmet		Propamocarb		Pyridalyl		Spirotetramat		Sulfocafllor		Tebufenozide		
		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		z score (FFP-RSD 25 %)		
		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
Robust mean (mg/kg)	0.110	0.0707	0.0883	0.140	0.0459	0.0721	0.197	0.0672	0.489									
74	NA		0.100	1.7	0.100	0.5	0.140	0.0	0.047	0.1	0.065	-0.4	0.210	0.3	0.089	1.3	0.580	0.7
75	0.080	-1.1	0.064	-0.4	0.093	0.2	0.130	-0.3	0.043	-0.3	0.059	-0.7	0.120	-1.6	ND	-4.0	0.490	0.0
76	0.100	-0.4	0.071	0.0	0.087	-0.1	0.140	0.0	0.052	0.5	0.109	2.0	0.204	0.2	0.061	-0.4	0.448	-0.3
77	0.128	0.7	0.072	0.1	0.098	0.4	0.156	0.5	0.049	0.3	0.106	1.9	0.205	0.2	0.064	-0.2	0.467	-0.2
78	NA		ND	-4.0	0.121	1.5	NA		NA		ND	-4.0	0.311	2.3	0.050	-1.0	1.047	4.6
79	0.120	0.4	0.072	0.1	0.107	0.8	0.174	1.0	0.040	-0.5	0.083	0.6	0.205	0.2	0.069	0.1	0.548	0.5
80	NA		0.071	0.0	0.093	0.2	NA		0.039	-0.6	0.078	0.3	0.190	-0.1	NA		0.480	-0.1
81	0.085	-0.9	0.065	-0.3	0.054	-1.6	0.165	0.7	0.044	-0.1	0.056	-0.9	0.164	-0.7	0.073	0.3	0.551	0.5
82	0.100	-0.4	0.055	-0.9	0.098	0.4	0.094	-1.3	0.030	-1.4	NA		0.187	-0.2	0.059	-0.5	0.418	-0.6
83	0.099	-0.4	0.051	-1.1	0.063	-1.1	0.205	1.9	0.062	1.4	NA		NA		NA		0.447	-0.3
84	0.128	0.7	0.075	0.2	0.096	0.3	0.165	0.7	0.052	0.5	0.078	0.3	0.208	0.2	0.088	1.2	0.543	0.4
85	0.120	0.4	0.084	0.8	0.096	0.3	0.168	0.8	0.050	0.4	0.088	0.9	0.228	0.6	0.077	0.6	0.496	0.1
86	0.120	0.4	0.057	-0.8	0.069	-0.9	0.081	-1.7	0.031	-1.3	0.052	-1.1	0.180	-0.3	0.086	1.1	0.400	-0.7
87	0.092	-0.7	0.061	-0.5	0.084	-0.2	0.183	1.2	0.055	0.8	0.058	-0.8	0.165	-0.6	0.054	-0.8	0.405	-0.7
88	0.117	0.3	0.085	0.8	0.087	-0.1	0.146	0.2	0.045	-0.1	0.075	0.2	0.213	0.3	0.066	-0.1	0.570	0.7
89	0.103	-0.3	0.082	0.7	0.086	-0.1	0.131	-0.3	0.033	-1.1	0.086	0.8	0.185	-0.2	0.067	0.0	0.508	0.2
90	NA		0.024	-2.6	0.107	0.8	0.057	-2.4	0.041	-0.4	NA		0.254	1.2	NA		0.312	-1.4
91	0.111	0.0	0.095	1.4	0.076	-0.6	0.138	-0.1	0.046	0.0	NA		NA		NA		0.475	-0.1
92	0.074	-1.3	0.061	-0.6	0.065	-1.1	0.108	-0.9	0.049	0.3	NA		0.124	-1.5	0.053	-0.8	0.295	-1.6
93	0.144	1.2	0.081	0.6	0.088	0.0	0.167	0.8	0.043	-0.3	0.090	1.0	0.185	-0.2	0.071	0.2	0.533	0.4
94	0.117	0.3	0.067	-0.2	0.088	0.0	0.141	0.0	0.053	0.6	0.072	0.0	0.195	0.0	0.064	-0.2	0.442	-0.4
95	NA		0.108	2.1	0.116	1.2	0.163	0.7	0.050	0.4	NA		0.205	0.2	0.096	1.7	0.539	0.4
96	0.122	0.4	0.084	0.8	0.066	-1.0	0.128	-0.3	0.048	0.2	0.082	0.6	0.175	-0.4	0.071	0.2	0.544	0.4
97	0.119	0.3	0.086	0.9	0.106	0.8	0.157	0.5	0.053	0.6	0.104	1.8	0.177	-0.4	0.059	-0.5	0.335	-1.3
98	NA		0.780	40.1	0.092	0.2	ND	-4.0	0.047	0.1	ND	-4.0	NA		ND	-4.0	0.384	-0.9
99	NA		0.060	-0.6	0.090	0.1	0.165	0.7	0.052	0.5	0.072	0.0	0.220	0.5	0.148	4.8	0.465	-0.2
100	0.076	-1.2	0.061	-0.5	0.058	-1.4	0.119	-0.6	0.053	0.6	0.064	-0.5	0.103	-1.9	0.072	0.3	0.592	0.8
101	NA		0.079	0.4	0.070	-0.8	0.111	-0.8	0.048	0.1	0.072	0.0	0.194	-0.1	0.064	-0.2	0.455	-0.3
103	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0	ND	-4.0
104	0.091	-0.7	0.042	-1.7	0.057	-1.4	0.073	-1.9	0.027	-1.6	NA		0.150	-1.0	0.048	-1.1	0.353	-1.1
105	0.125	0.6	0.066	-0.3	0.078	-0.5	0.146	0.2	0.045	-0.1	0.066	-0.3	0.177	-0.4	0.063	-0.3	0.505	0.1
106	NA		NA		0.094	0.3	0.025	-3.3	0.055	0.8	NA		0.208	0.2	NA		0.520	0.3
107	ND	-4.0	0.114	2.5	0.110	1.0	0.236	2.7	0.087	3.6	0.066	-0.3	0.345	3.0	0.094	1.6	0.763	2.2
108	0.119	0.3	0.073	0.1	0.097	0.4	0.153	0.4	0.038	-0.7	0.103	1.7	0.169	-0.6	NA		0.261	-1.9
109	0.153	1.6	0.088	1.0	0.099	0.5	0.150	0.3	0.051	0.4	0.086	0.8	0.199	0.0	0.085	1.1	0.494	0.0
110	0.096	-0.5	0.074	0.2	0.079	-0.4	0.123	-0.5	0.061	1.3	0.081	0.5	0.229	0.7	0.072	0.3	0.390	-0.8
111	0.100	-0.4	0.051	-1.1	0.088	0.0	0.160	0.6	0.051	0.4	0.055	-0.9	0.200	0.1	0.055	-0.7	0.450	-0.3
112	0.098	-0.4	0.059	-0.6	0.083	-0.2	0.164	0.7	NA	NA	NA		0.186	-0.2	NA		NA	
113	0.116	0.2	0.052	-1.1	0.101	0.6	0.052	-2.5	0.049	0.3	0.066	-0.3	0.239	0.9	NA		0.579	0.7
114	NA		0.065	-0.3	0.072	-0.8	0.104	-1.0	0.040	-0.5	0.056	-0.9	0.164	-0.7	0.059	-0.5	0.460	-0.2
115	0.104	-0.2	0.072	0.1	0.080	-0.4	0.138	-0.1	0.039	-0.6	0.070	-0.1	0.179	-0.4	0.064	-0.2	0.596	0.9
116	0.105	-0.2	0.063	-0.4	0.089	0.0	0.128	-0.3	0.058	1.1	0.072	0.0	0.240	0.9	0.081	0.8	0.580	0.7
117	0.114	0.2	0.083	0.7	0.073	-0.7	0.124	-0.5	0.040	-0.5	0.077	0.3	0.161	-0.7	0.065	-0.1	0.537	0.4
118	ND	-4.0	0.091	1.2	0.100	0.5	0.161	0.6	0.038	-0.7	ND	-4.0	0.147	-1.0	0.083	0.9	0.483	-0.1
119	NA		NA		0.090	0.1	0.140	0.0	0.030	-1.4	NA		0.150	-0.9	NA		0.510	0.2
120	NA		0.028	-2.4	0.072	-0.7	NA		0.025	-1.8	NA		NA		NA		0.341	-1.2
121	0.115	0.2	0.061	-0.6	0.093	0.2	0.167	0.8	0.038	-0.7	0.070	-0.1	0.202	0.1	0.033	-2.1	0.518	0.2
122	0.085	-0.9	0.051	-1.1	0.070	-0.8	0.130	-0.3	0.045	-0.1	NA		0.165	-0.6	NA		0.485	0.0
123	ND	-4.0	0.098	1.6	0.103	0.7	0.180	1.1	0.040	-0.6	0.084	0.7	0.217	0.4	0.086	1.1	0.660	1.4
124	0.100	-0.4	0.057	-0.8	0.091	0.1	0.123	-0.5	0.040	-0.5	0.085	0.7	0.159	-0.8	0.066	-0.1	0.488	0.0
125	0.100	-0.4	0.072	0.1	0.099	0.5	0.148	0.2	0.059	1.1	0.071	-0.1	0.218	0.4	0.072	0.3	0.514	0.2
126	NA		0.048	-1.3	0.100	0.5	0.280	4.0	0.037	-0.8	NA		0.330	2.7	0.093	1.5	0.520	0.3
127	0.102	-0.3	0.065	-0.3	0.079	-0.4	0.128	-0.3	0.043	-0.3	ND	-4.0	0.161	-0.7	0.057	-0.6	0.338	-1.2
128	ND	-4.0	0.052	-1.1	0.071	-0.8	0.122	-0.5	0.051	0.4	0.070	-0.1	0.186	-0.2	0.061	-0.4	0.464	-0.2
129	0.066	-1.6	0.071	0.0	0.099	0.5	0.128	-0.3	0.047	0.1	0.066	-0.3	0.218	0.4	0.076	0.5	0.552	0.5
130	0.114	0.2	0.077	0.4	0.108	0.9	0.129	-0.3	0.041	-0.4	0.097	1.4	0.269	1.5	0.071	0.2	0.637	1.2
131	0.160	1.8	0.066	-0.3	0.110	1.0	0.130	-0.3	0.052	0.5	0.081	0.5	NA		0.083	0.9	0.540	0.4
132	NA		ND	-4.0	0.081	-0.3	0.103	-1.1	0.060	1.2	NA		0.090	-2.2	NA		0.476	-0.1
133	0.151	1.5	0.085	0.8	0.127	1.8	0.159	0.5	0.035	-1.0	0.076	0.2	0.297	2.0	0.077	0.6	0.663	1.4
134	NA		0.066	-0.3	0.104	0.7	0.138	-0.1	NA	NA	NA		NA		NA		NA	
135	0.170	2.2	0.066	-0.3	0.072	-0.7	0.150	0.3	0.050	0.4	0.110	2.1	NA		0.062	-0.3	0.490	0.0
136	0.093	-0.6	0.073	0.1	0.165	3.5	0.082	-1.7	0.035	-1.0	0.058	-0.8	0.160	-0.7	0.074	0.4	0.480	-0.1
137	NA		NA		NA		0.625	13.9	NA	NA	ND	-4.0	NA		NA		ND	-4.0
138	0.115	0.2	0.086	0.9	0.100	0.5	0.126	-0.4	0.035	-0.9	0.058	-0.8	0.231	0.7	0.067	0.0	0.539	0.4
139	0.090	-0.7	0.059	-0.7	0.090	0.1	0.116	-0.7	0.042	-0.4	0.107	1.9	0.177	-0.4	0.066	-0.1	0.491	0.0
140	0.134	0.9	0.069	-0.1	0.084	-0.2	0.141	0.0	0.044	-0.2	0.052	-1.1	0.168	-0.6	0.067	0.0	0.441	-0.4
141	0.100	-0.4	NA		0.108	0.9	0.175	1.0	0.041	-0.4	0.081	0.5	0.216	0.4	0.065	-0.1	0.559	0.6
142	0.107	-0.1	0.086	0.9	0.079	-0.4	0.143	0.1	0.044	-0.2	0.077	0.3	0.207	0.2	0.071	0.2	0.550	0.5
143	NA		0.073	0.1	0.082	-0.3	NA		0.036	-0.9	NA		NA		NA		0.410	-0.6
144	0.098	-0.4	0.075	0.2	0.081	-0.3	0.135	-0.1	0.056	0.9	0.071	-0.1	0.196	0.0	0.062	-0.3	0.443	-0.4
145	0.144	1.2	0.092	1.2	0.098	0.4												

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

Lab Code	Orthophenylphenol	z score (FFP-RSD 25 %)		Parathion ethyl	z score (FFP-RSD 25 %)		Pencycuron	z score (FFP-RSD 25 %)		Phosmet	z score (FFP-RSD 25 %)		Propamocarb	z score (FFP-RSD 25 %)		Pyridalyl	z score (FFP-RSD 25 %)		Spitotetamat	z score (FFP-RSD 25 %)		Sulfoxafior	z score (FFP-RSD 25 %)		Tebufenozide	z score (FFP-RSD 25 %)		
MRRL (mg/kg)	0.005			0.005			0.005			0.005			0.005			0.005			0.005			0.005			0.005			
Robust mean (mg/kg)	0.110			0.0707			0.0883			0.140			0.0459			0.0721			0.197			0.0672			0.489			
147	NA			ND	-4.0		NA			NA			NA			NA			NA			NA			NA			
148	0.171	2.2	0.078	0.4	0.091	0.1	0.127	-0.4	0.057	1.0	0.079	0.4	0.180	-0.3	0.063	-0.2	0.563	0.6										
149	0.093	-0.6	0.055	-0.9	0.083	-0.2	0.149	0.3	0.040	-0.5	0.064	-0.5	0.183	-0.3	0.061	-0.4	0.519	0.2										
150	0.115	0.2	0.063	-0.4	0.116	1.3	0.148	0.2	0.045	-0.1	0.061	-0.6	0.165	-0.6	0.048	-1.1	0.610	1.0										
151	0.070	-1.5	0.063	-0.4	0.068	-0.9	0.120	-0.6	0.030	-1.4	0.046	-1.4	0.160	-0.7	0.051	-1.0	0.410	-0.6										
152	0.108	-0.1	0.046	-1.4	0.062	-1.2	0.119	-0.6	0.034	-1.0	0.069	-0.2	0.183	-0.3	0.066	-0.1	0.378	-0.9										
153	0.107	-0.1	0.070	0.0	0.065	-1.1	0.144	0.1	0.048	0.2	0.064	-0.5	0.176	-0.4	0.051	-1.0	0.420	-0.6										
154	0.114	0.2	0.077	0.4	0.073	-0.7	0.202	1.8	0.074	2.4	0.066	-0.3	0.206	0.2	0.070	0.2	0.476	-0.1										
155	0.139	1.1	0.064	-0.4	0.069	-0.9	0.141	0.0	NA		0.064	-0.4	0.171	-0.5	0.063	-0.3	0.377	-0.9										
156	0.093	-0.6	0.098	1.5	0.098	0.4	0.095	-1.3	0.056	0.9	0.067	-0.3	0.223	0.5	0.071	0.2	0.060	-3.5										
157	0.096	-0.5	0.060	-0.6	0.104	0.7	0.169	0.8	0.056	0.9	ND	-4.0	0.188	-0.2	0.075	0.4	0.539	0.4										
158	0.110	0.0	0.063	-0.4	0.110	1.0	0.120	-0.6	0.048	0.2	0.090	1.0	0.220	0.5	0.059	-0.5	0.540	0.4										
159	NA		0.080	0.5	0.107	0.8	0.141	0.0	0.048	0.2	0.074	0.1	0.174	-0.5	0.057	-0.6	0.529	0.3										
160	0.128	0.7	0.074	0.2	0.080	-0.4	0.136	-0.1	0.044	-0.1	NA	0.0	0.213	0.3	0.065	-0.1	0.488	0.0										
161	NA	0.0	0.080	0.5	0.079	-0.4	0.132	-0.2	0.043	-0.3	0.081	0.5	0.187	-0.2	0.059	-0.5	0.442	-0.4										
162	NA		NA		NA		NA		NA		NA		NA		NA		NA											
163	0.120	0.4	0.080	0.5	0.091	0.1	0.150	0.3	0.039	-0.6	0.067	-0.3	0.160	-0.7	0.060	-0.4	0.440	-0.4										
164	0.098	-0.4	NA		NA		0.180	1.1	NA		0.075	0.2	NA		NA		NA											
165	NA		NA		0.079	-0.4	0.136	-0.1	NA		0.070	-0.1	0.195	0.0	0.100	2.0	0.519	0.2										
166	0.119	0.3	0.050	-1.2	0.072	-0.7	0.110	-0.9	0.039	-0.6	0.074	0.1	0.220	0.5	0.071	0.2	0.430	-0.5										
167	0.115	0.2	0.082	0.6	0.077	-0.5	0.144	0.1	0.041	-0.4	0.079	0.4	0.204	0.2	0.076	0.5	0.568	0.6										
168	0.094	-0.6	0.076	0.3	0.091	0.1	0.126	-0.4	0.050	0.4	0.080	0.4	0.181	-0.3	0.064	-0.2	0.440	-0.4										
169																												
170	0.100	-0.4	0.064	-0.4	0.077	-0.5	0.144	0.1	0.066	1.7	0.056	-0.9	0.166	-0.6	0.059	-0.5	0.377	-0.9										
171	NA		0.050	-1.2	0.078	-0.5	0.130	-0.3	0.032	-1.2	NA		0.170	-0.5	0.090	1.4	0.460	-0.2										
173	ND	-4.0	0.066	-0.3	0.094	0.3	0.128	-0.3	0.058	1.1	0.074	0.1	0.219	0.5	0.081	0.8	0.551	0.5										
174	NA		NA		0.063	-1.1	0.247	3.1	0.029	-1.5	NA		0.246	1.0	NA		0.718	1.9										
175	0.119	0.3	0.070	0.0	0.100	0.5	0.143	0.1	0.047	0.1	0.058	-0.8	0.161	-0.7	0.054	-0.8	0.394	-0.8										
176																												
177	NA		0.034	-2.1	0.044	-2.0	0.056	-2.4	ND	-4.0	NA		0.091	-2.1	0.028	-2.3	0.262	-1.9										
178	NA		NA		0.055	-1.5	0.122	-0.5	NA		0.089	0.9	0.198	0.0	0.060	-0.4	0.433	-0.5										
179	0.067	-1.6	0.066	-0.3	0.094	0.3	0.057	-2.4	0.036	-0.9	ND	-4.0	0.181	-0.3	ND	-4.0	0.315	-1.4										
180	0.107	-0.1	0.070	0.0	0.085	-0.1	0.121	-0.5	0.038	-0.7	0.051	-1.2	0.203	0.1	0.075	0.5	0.352	-1.1										
181	0.097	-0.5	NA		NA		NA		NA		NA		NA		NA		NA											
182	ND	-4.0	0.081	0.6	0.104	0.7	0.127	-0.4	0.050	0.4	0.079	0.4	0.241	0.9	0.079	0.7	0.578	0.7										
183	ND	-4.0	0.086	0.8	ND	-4.0	0.157	0.5	0.050	0.4	ND	-4.0	0.239	0.9	0.047	-1.2	0.615	1.0										

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 Forchlorfenuron and Tritosulfuron (mg/kg) and its calculated z score values using FFP-RSD 25 %.

Lab Code	Forchlorfenuron		Tritosulfuron	
	MRRL (mg/kg)	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)
Robust mean (mg/kg)	0.005	0.0483	0.311	
1	0.054	0.5	0.295	-0.2
2	0.055	0.6	0.300	-0.1
3	NA		NA	
4	NA		NA	
5	NA		NA	
6	0.043	-0.4	0.264	-0.6
7	0.050	0.1	0.300	-0.1
8	0.043	-0.4	NA	
9	0.065	1.4	0.185	-1.6
10	0.055	0.6	0.410	1.3
11	0.045	-0.3	NA	
12	0.045	-0.3	0.400	1.2
13	0.047	-0.1	NA	
14	0.042	-0.5	0.291	-0.3
15	NA		0.244	-0.9
16	0.045	-0.3	0.358	0.6
17	0.046	-0.2	0.339	0.4
18	0.050	0.1	0.290	-0.3
19	0.052	0.3	0.318	0.1
20	0.033	-1.3	0.203	-1.4
21	0.045	-0.3	NA	
22	ND	-4.0	0.268	-0.5
23	NA		NA	
24	NA		NA	
25	0.050	0.1	0.244	-0.9
26	NA		NA	
27	0.049	0.1	0.291	-0.3
28	NA		NA	
29	NA		0.390	1.0
30	0.043	-0.4	0.261	-0.6
31	NA		NA	
32	NA		NA	
33	NA		NA	
34	NA		NA	
35	0.066	1.5	0.363	0.7
36	NA		NA	
37	NA		NA	
38	NA		NA	
39	NA		NA	
40	0.034	-1.2	NA	
41	0.033	-1.2	NA	
42	NA		NA	
43	NA		NA	
44	0.052	0.3	NA	
45	NA		NA	
46	NA		NA	
47	0.045	-0.3	0.408	1.3
48	0.048	0.0	NA	
49	0.071	1.9	0.217	-1.2
50	NA		NA	
51	0.040	-0.7	0.262	-0.6
52	NA		0.280	-0.4
53	0.046	-0.2	NA	
54	NA		NA	
55	0.052	0.3	0.291	-0.3
56	NA		NA	
57	0.065	1.4	NA	
58	NA		0.284	-0.3
59	NA		NA	
60	0.069	1.7	0.412	1.3
61	0.055	0.6	0.344	0.4
62	NA		NA	
63	0.014	-2.8	NA	
64	NA		NA	
66	NA		0.245	-0.8

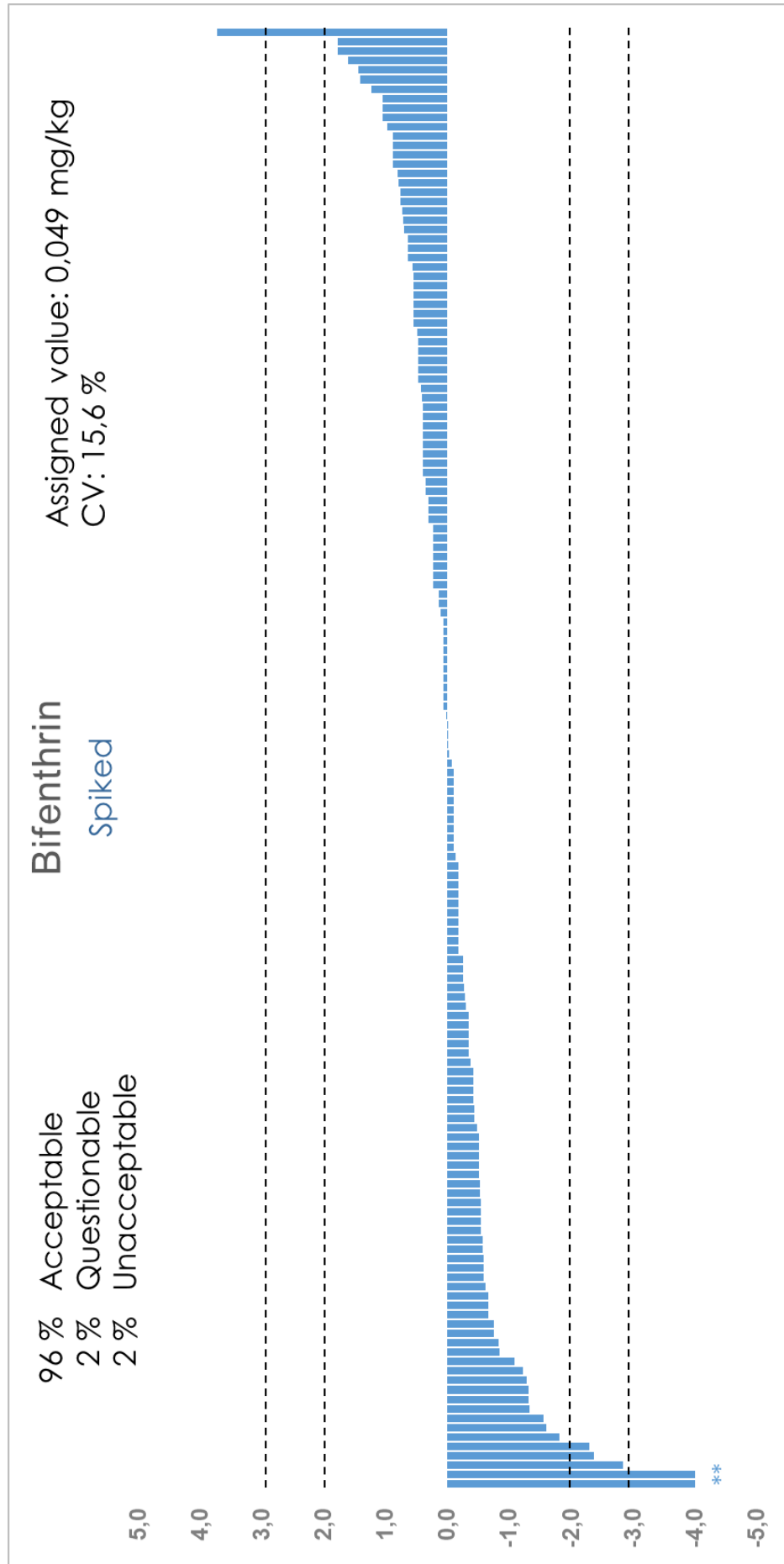
Lab Code	Forchlorfenuron		Tritosulfuron	
	MRRL (mg/kg)	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)
Robust mean (mg/kg)	0.0483		0.311	
67	NA		ND	-4.0
68	NA		NA	
69	NA		NA	
70	NA		NA	
71	NA		NA	
72	0.047	-0.1	NA	
73	0.054	0.5	0.310	0.0
74	NA		NA	
75	NA		NA	
76	0.051	0.2	0.269	-0.5
77	0.052	0.3	0.306	-0.1
78	NA		NA	
79	0.060	1.0	0.281	-0.4
80	NA		NA	
81	0.046	-0.2	NA	
82	0.046	-0.2	0.273	-0.5
83	NA		NA	
84	0.053	0.4	0.337	0.3
85	0.056	0.6	0.420	1.4
86	0.041	-0.6	NA	
87	NA		NA	
88	0.050	0.1	NA	
89	0.048	0.0	0.283	-0.4
90	NA		0.356	0.6
91	NA		NA	
92	NA		NA	
93	0.049	0.1	0.220	-1.2
94	0.051	0.2	0.314	0.0
95	NA		NA	
96	NA		0.193	-1.5
97	0.052	0.3	0.294	-0.2
98	NA		NA	
99	NA		NA	
100	ND	-4.0	0.090	-2.8
101	NA		0.172	-1.8
103	NA		NA	
104	0.038	-0.9	0.253	-0.7
105	0.035	-1.1	0.261	-0.6
106	NA		NA	
107	NA		NA	
108	0.051	0.2	0.358	0.6
109	NA		NA	
110	0.050	0.1	0.463	2.0
111	NA		0.260	-0.7
112	NA		NA	
113	0.050	0.1	NA	
114	0.039	-0.8	0.224	-1.1
115	0.043	-0.4	0.301	-0.1
116	0.059	0.9	0.460	1.9
117	NA		NA	
118	NA		NA	
119	0.050	0.1	NA	
120	0.037	-0.9	NA	
121	0.045	-0.3	NA	
122	NA		NA	
123	0.028	-1.7	0.437	1.6
124	NA		0.179	-1.7
125	NA		NA	
126	NA		NA	
127	0.042	-0.5	NA	
128	NA		NA	
129	NA		NA	
130	0.046	-0.2	0.401	1.2
131	NA		NA	
132	0.048	0.0	NA	

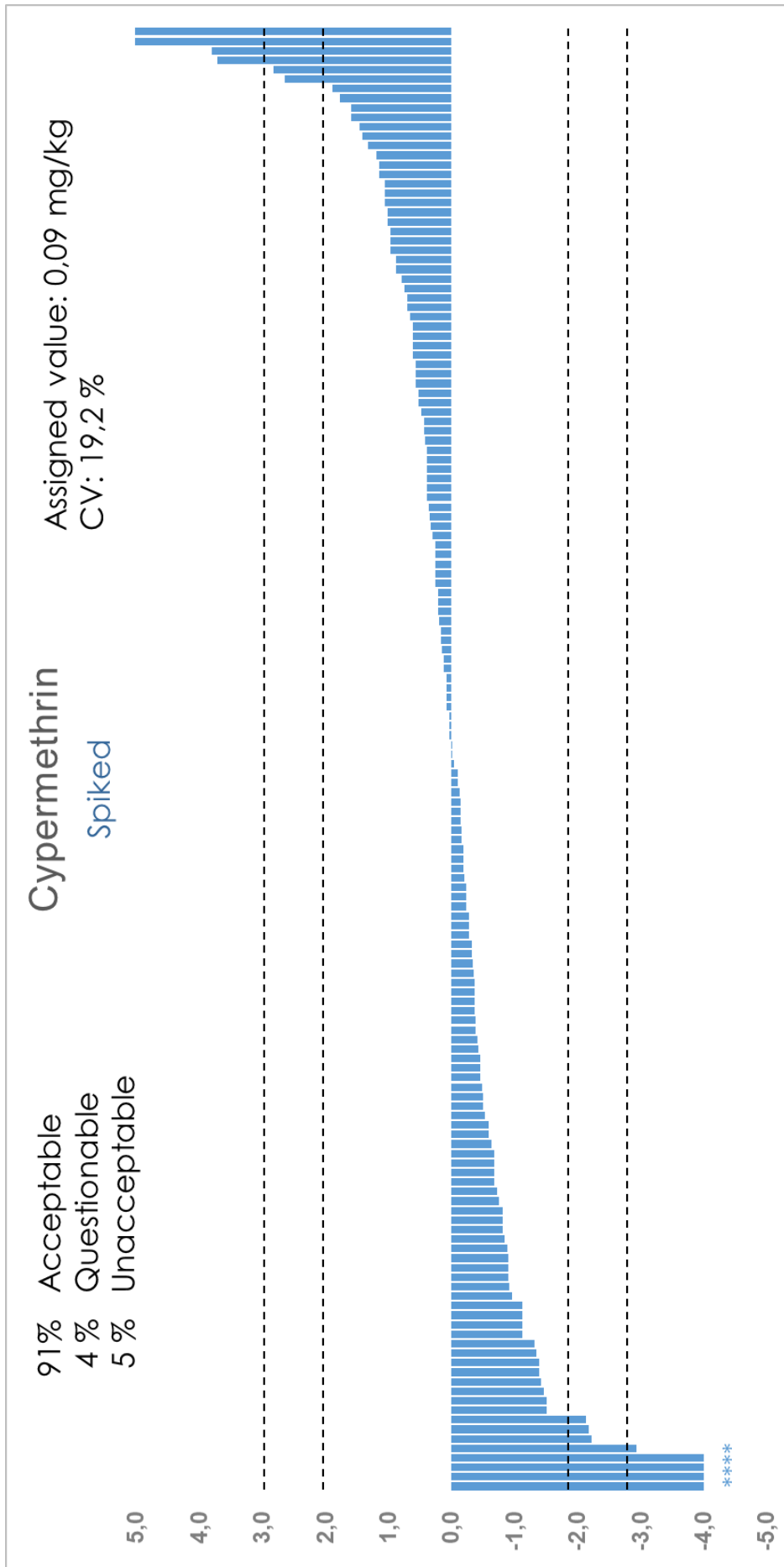
Lab Code	Forchlorfenuron		Tritosulfuron	
	MRRL (mg/kg)	z score (FFP-RSD 25 %)	0.005	z score (FFP-RSD 25 %)
Robust mean (mg/kg)	0.0483		0.311	
133	0.087	3.2	0.267	-0.6
134	NA		NA	
135	0.041	-0.6	NA	
136	0.060	1.0	0.480	2.2
137	0.046	-0.2	NA	
138	NA		NA	
139	0.049	0.1	0.308	0.0
140	0.049	0.1	NA	
141	NA		NA	
142	0.055	0.6	0.384	0.9
143	NA		NA	
144	0.050	0.1	NA	
145	NA		NA	
146	0.050	0.1	ND	-4.0
147	NA		NA	
148	NA		0.268	-0.5
149	0.056	0.6	0.263	-0.6
150	0.040	-0.7	0.290	-0.3
151	0.045	-0.3	NA	
152	0.040	-0.7	NA	
153	0.042	-0.5	0.284	-0.3
154	0.055	0.6	0.378	0.9
155	0.040	-0.7	NA	
156	0.067	1.5	0.333	0.3
157	NA		NA	
158	0.073	2.0	0.350	0.5
159	NA		NA	
160	NA		NA	
161	0.046	-0.2	0.294	-0.2
162	NA		NA	
163	0.046	-0.2	0.250	-0.8
164	NA		NA	
165	NA		NA	
166	0.048	0.0	0.330	0.3
167	NA		NA	
168	0.054	0.5	0.276	-0.4
169	No results reported			
170	0.045	-0.3	0.301	-0.1
171	0.048	0.0	NA	
173	0.061	1.0	0.627	4.1
174	0.076	2.3	NA	
175	0.042	-0.5	0.304	-0.1
176	No results reported			
177	NA		NA	
178	0.043 (FR)	-0.4	NA	
179	0.037	-0.9	NA	
180	0.049	0.1	0.339	0.4
181	NA		NA	
182	NA		NA	
183	NA		NA	

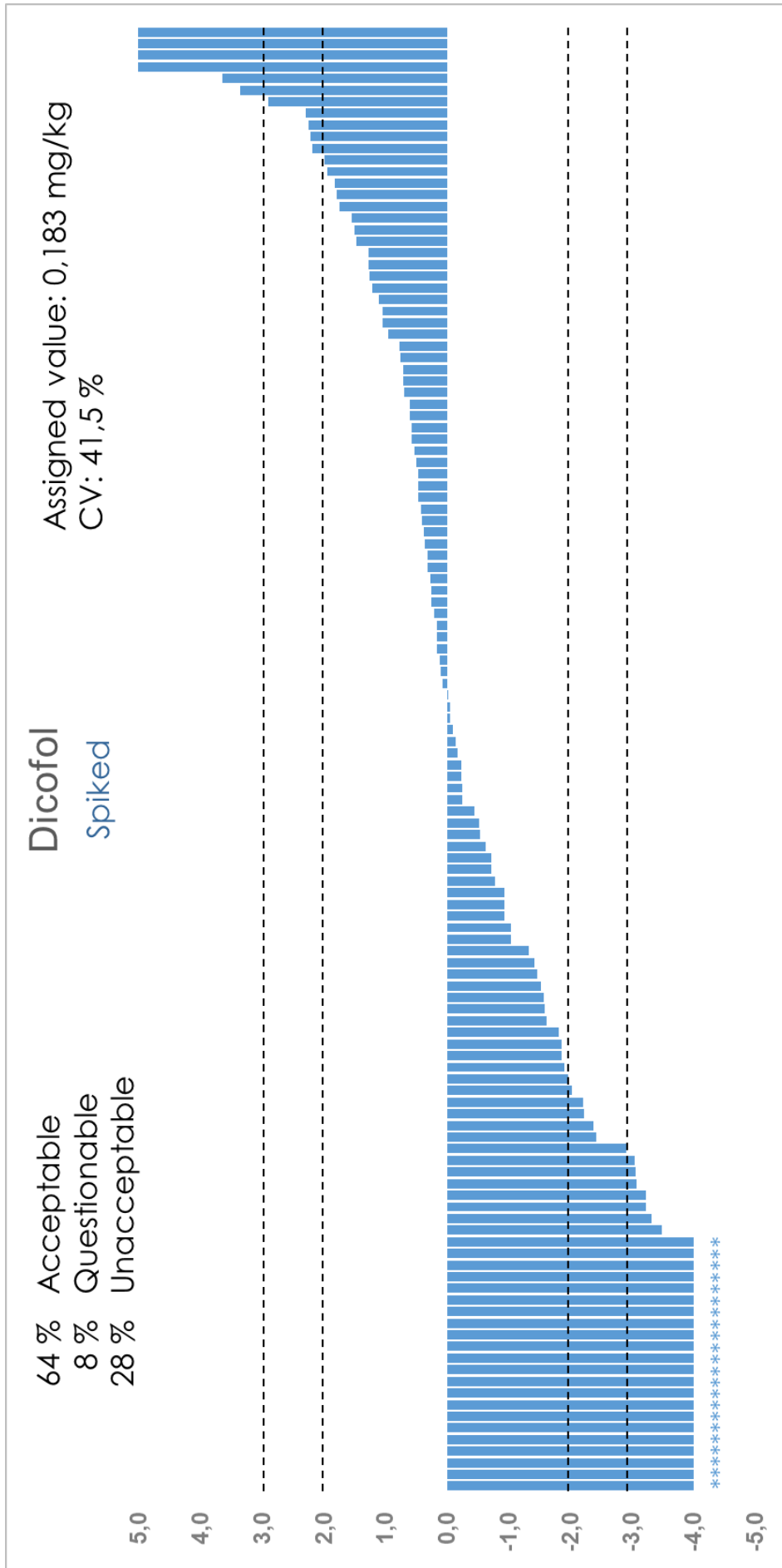
NA: Not analysed

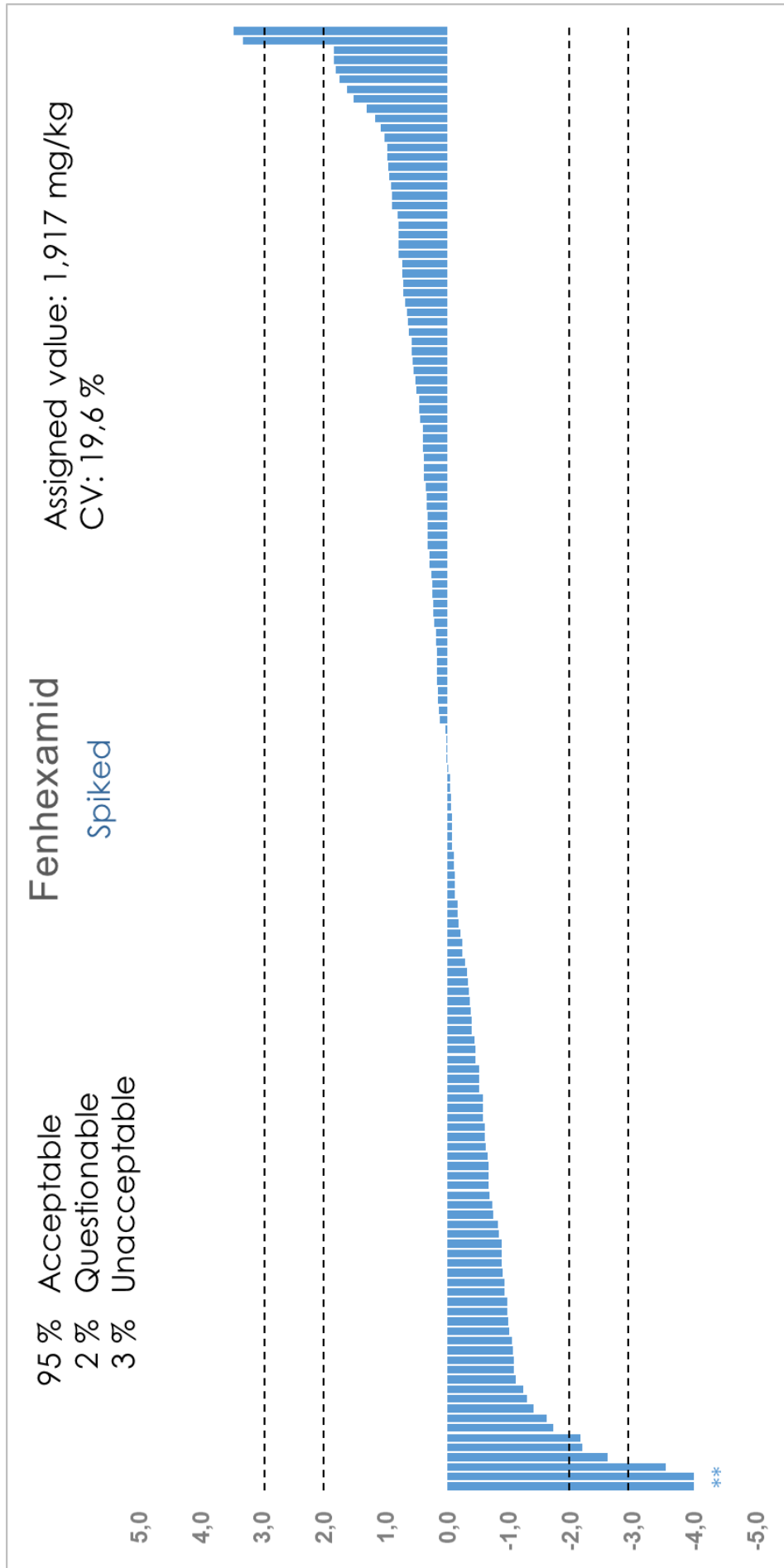
ND: Not detected (False negative)

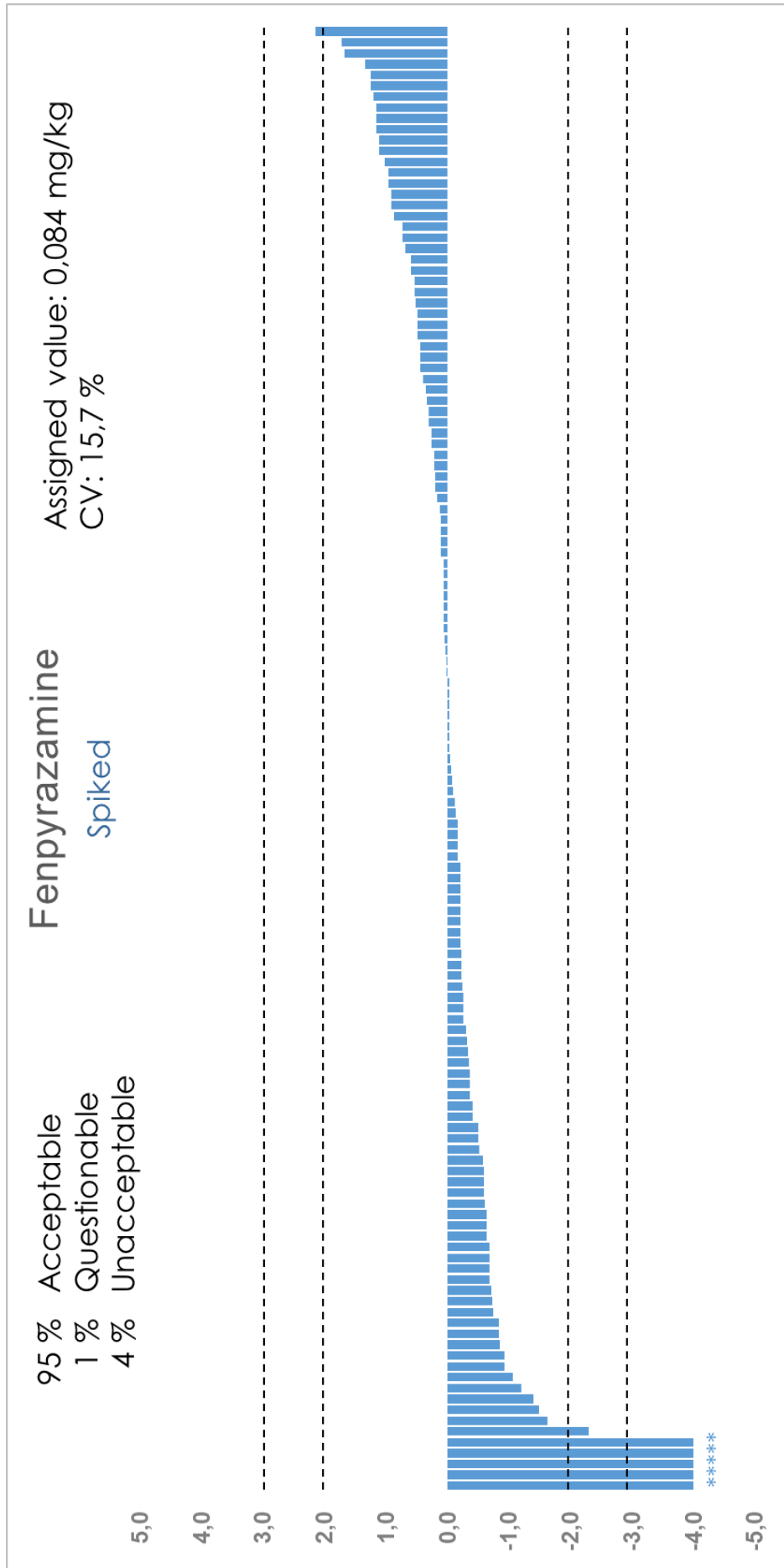
FR: False Reporting (below the lab's Reporting Limit)

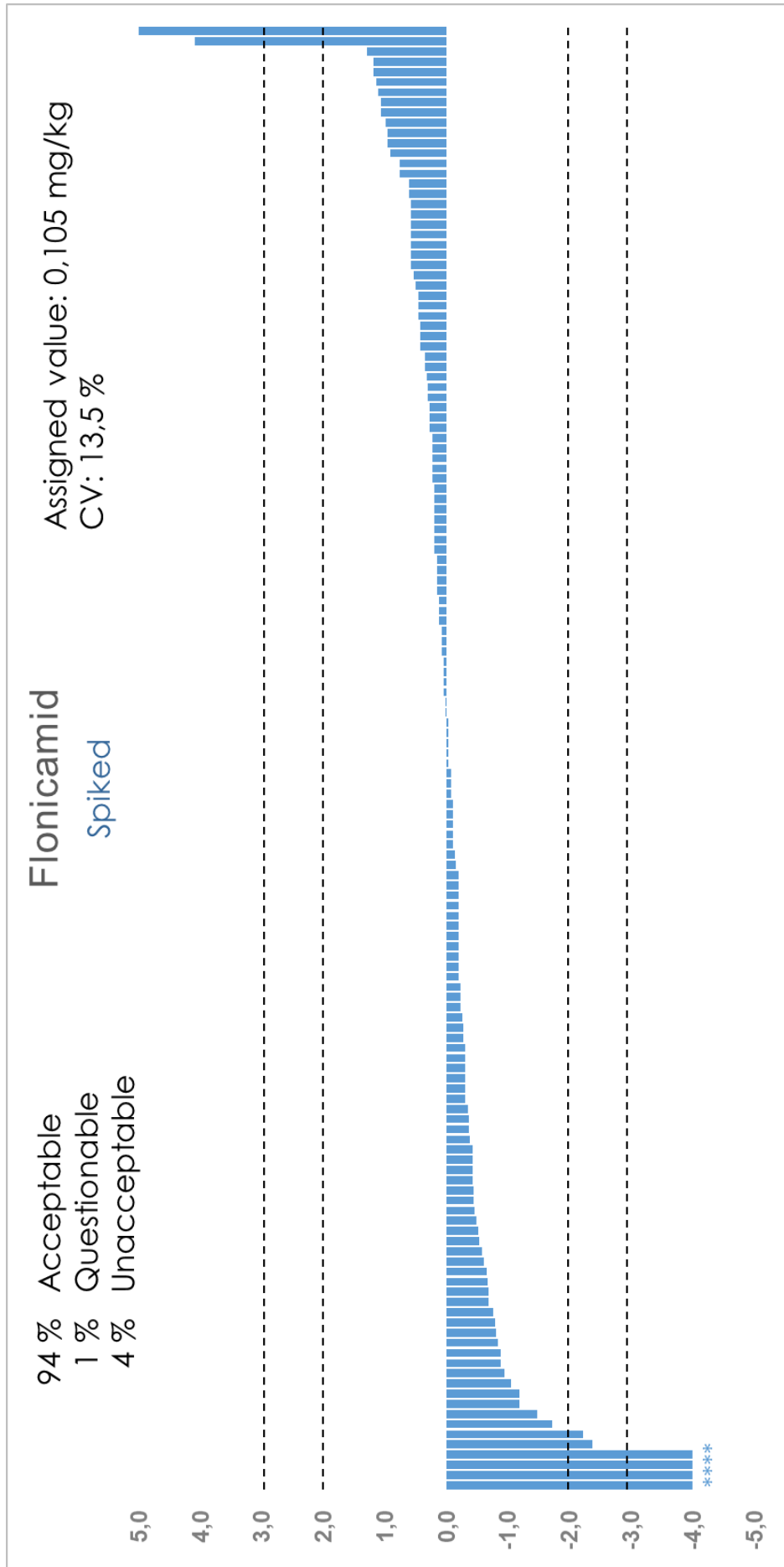


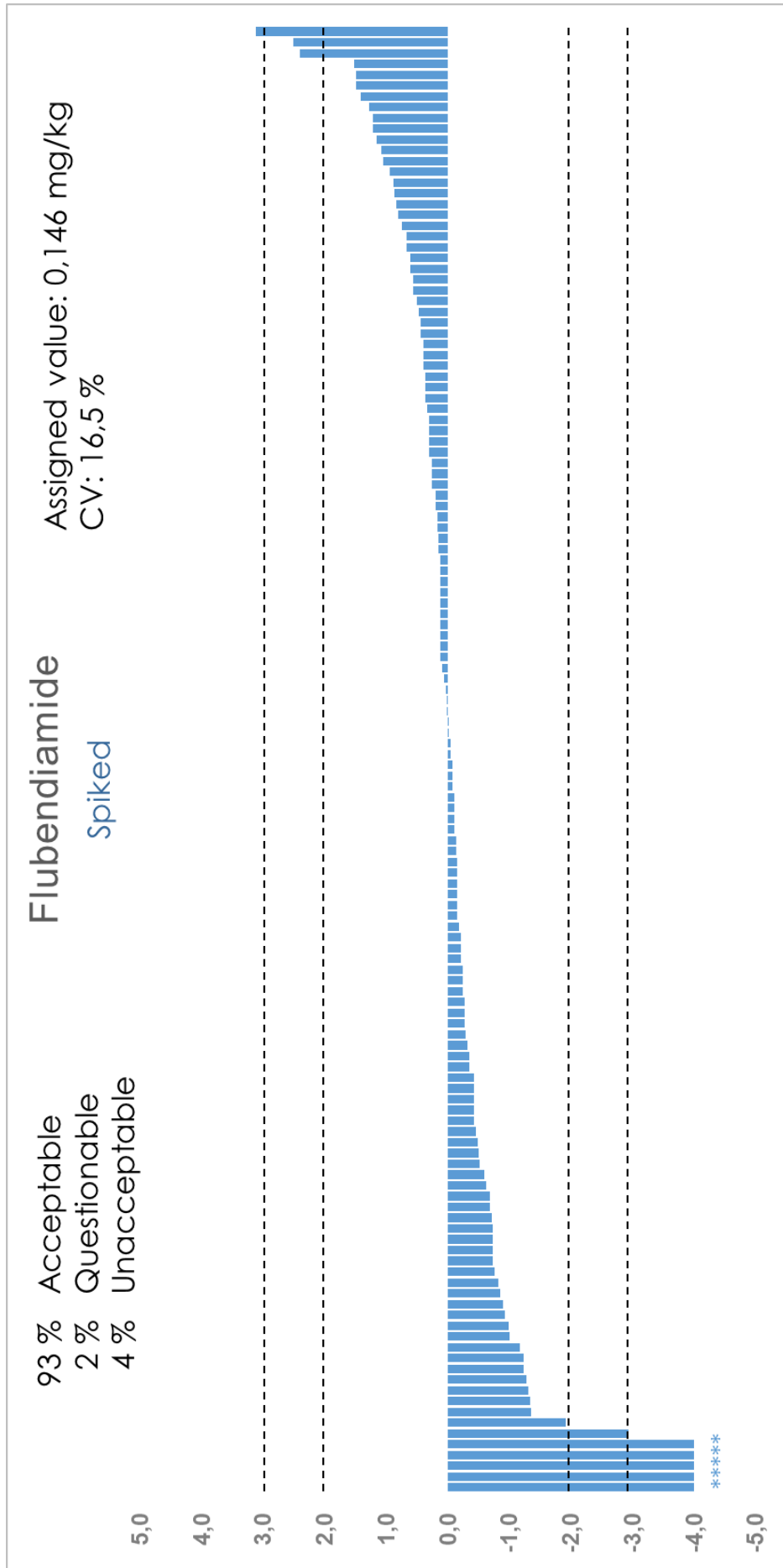


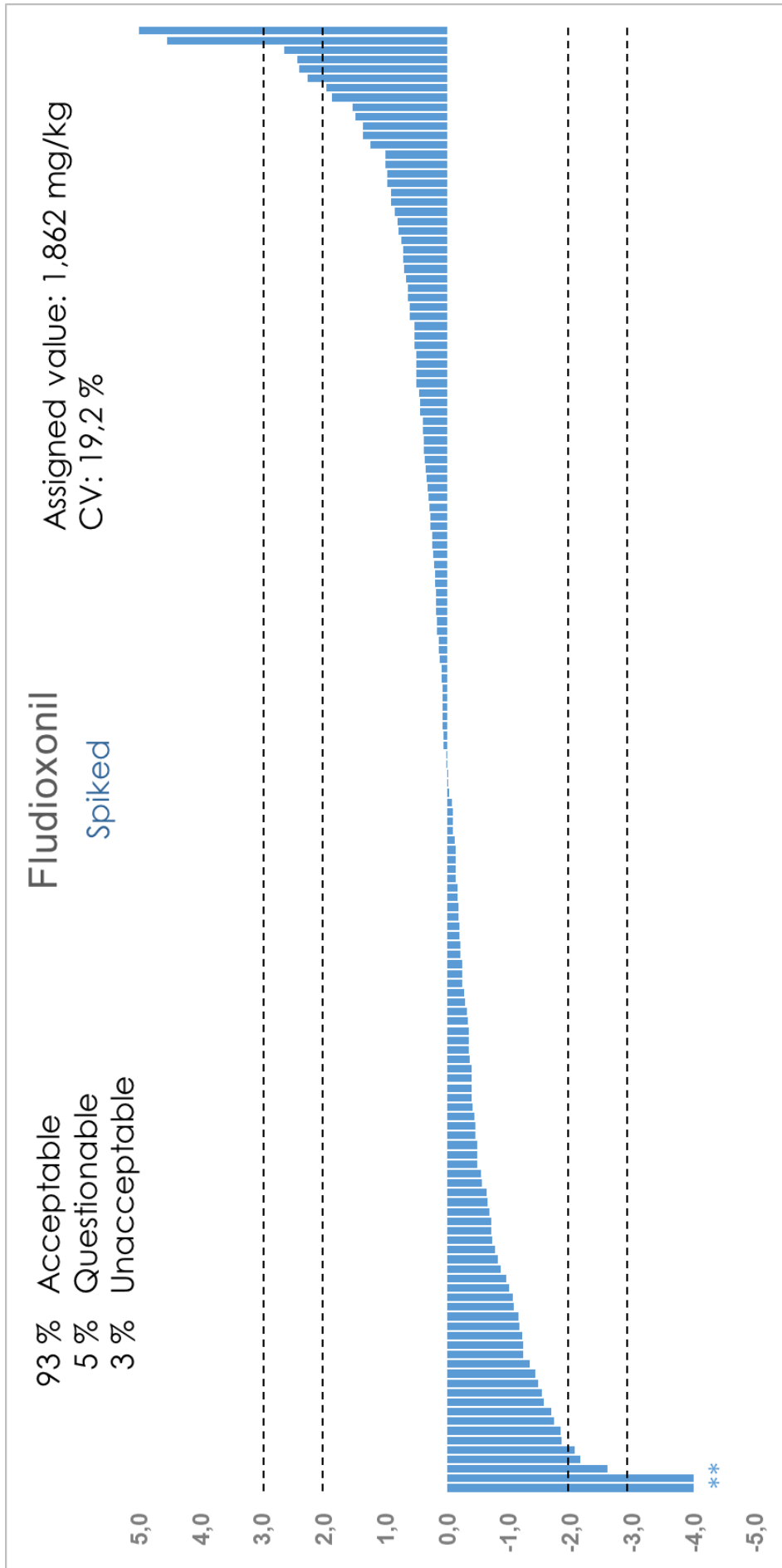




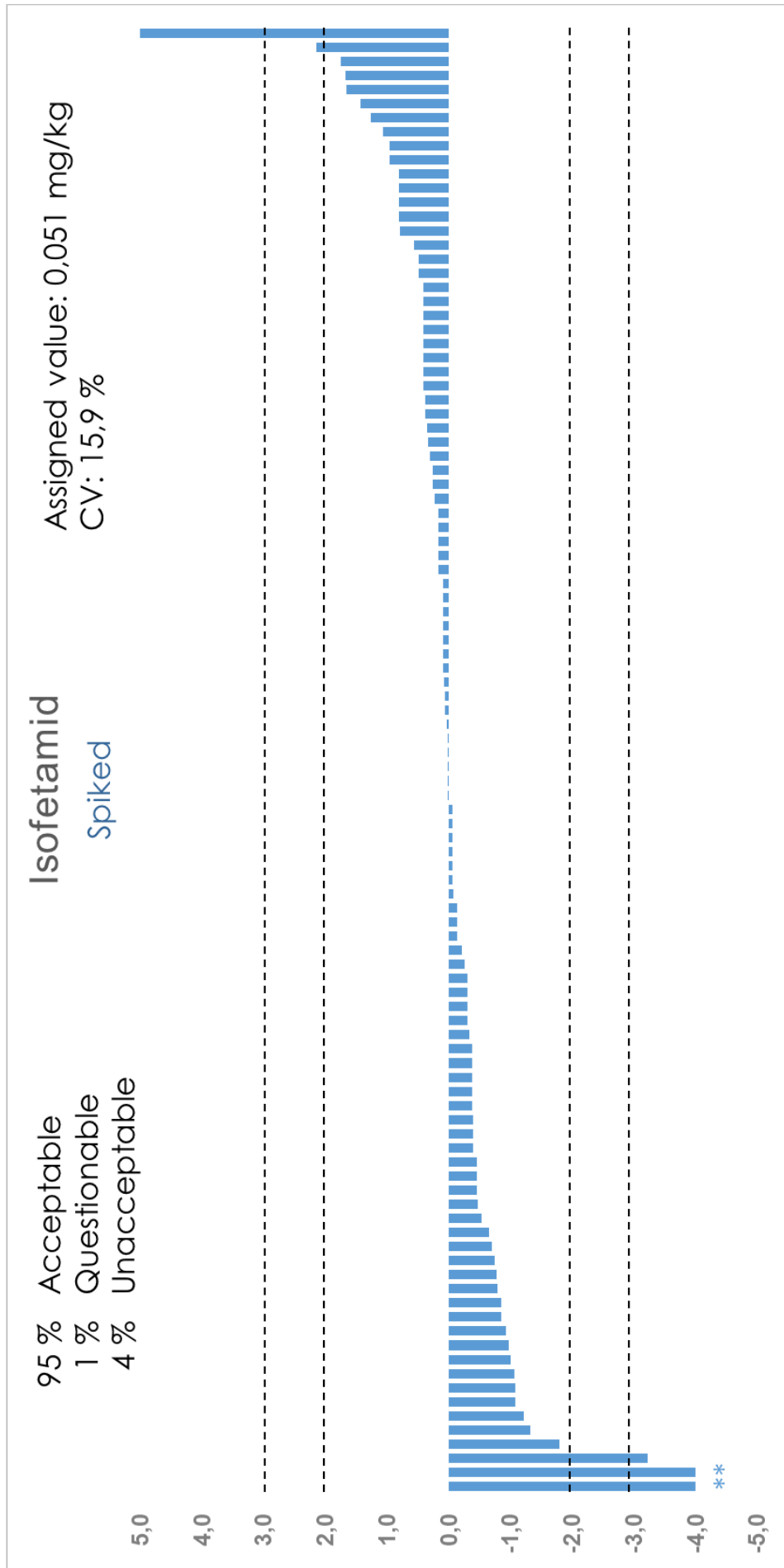


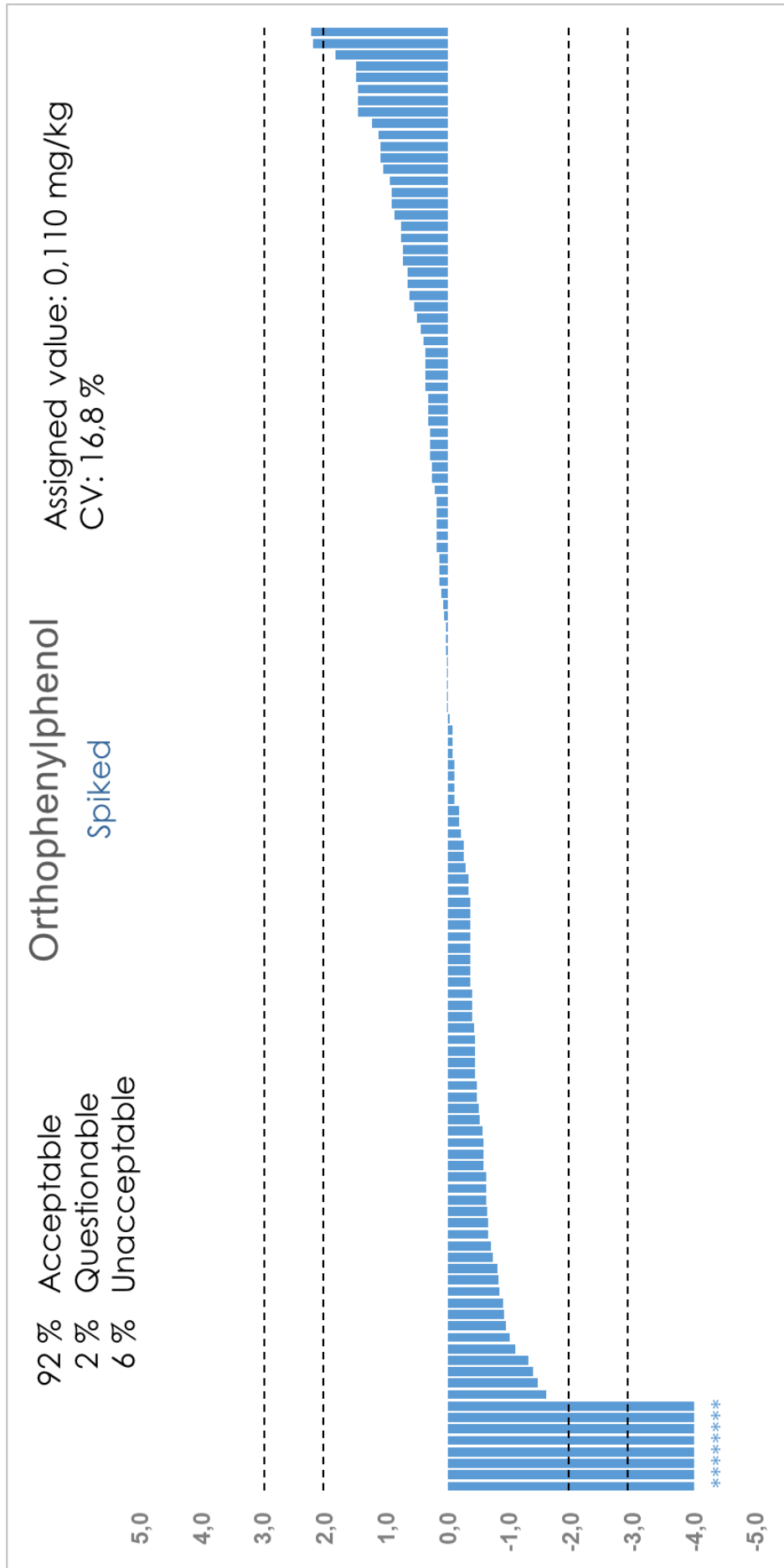


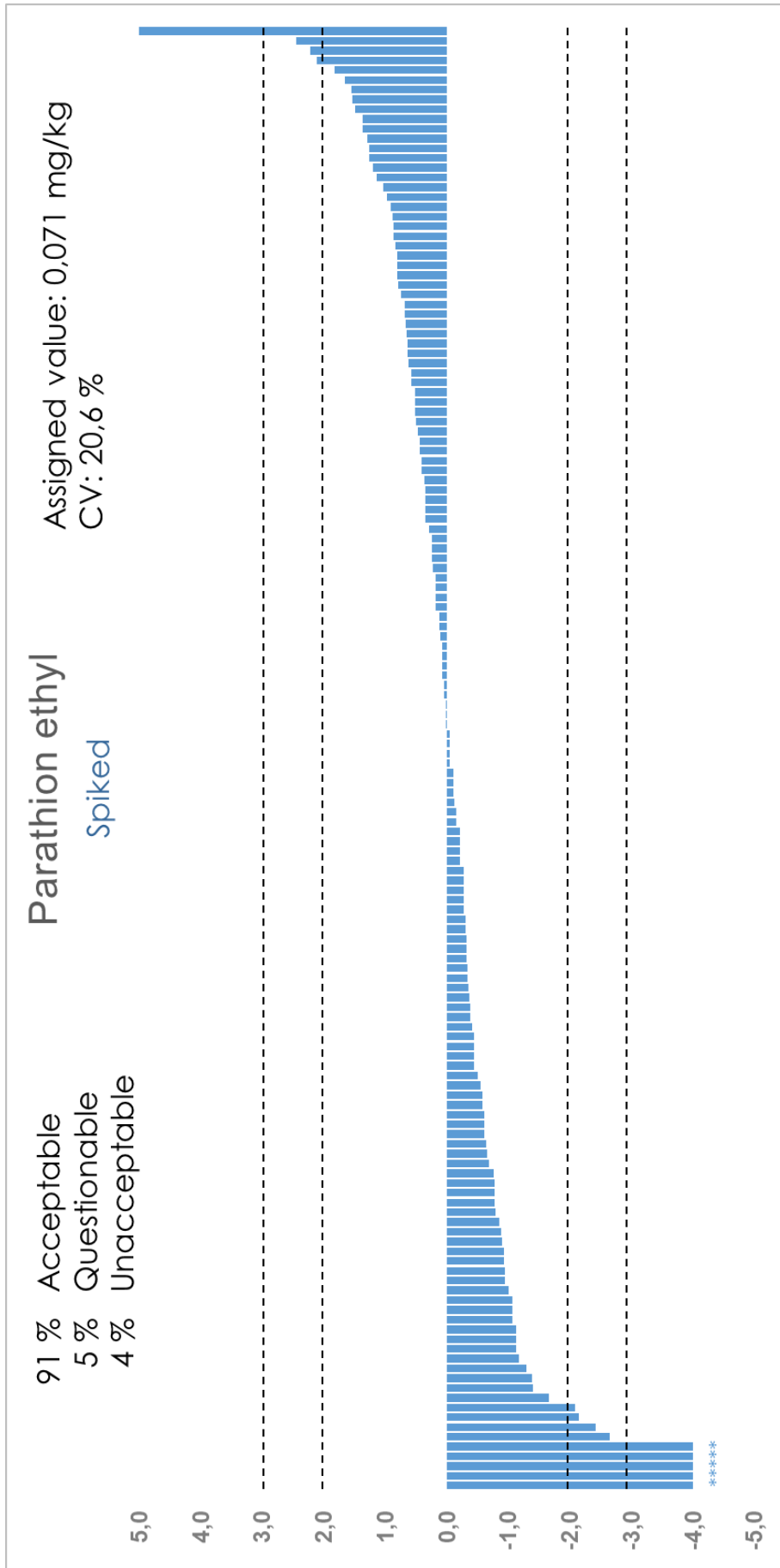


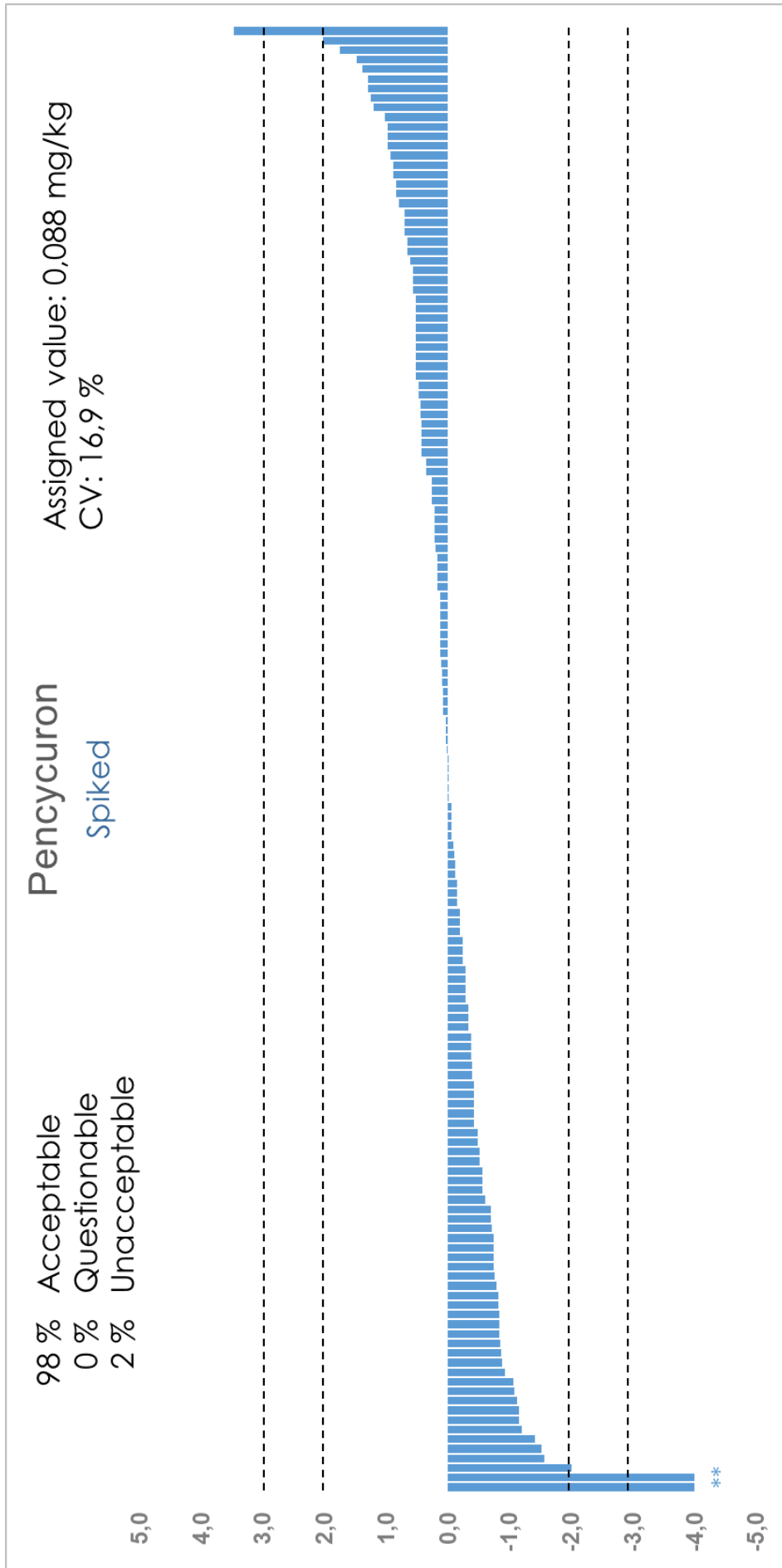


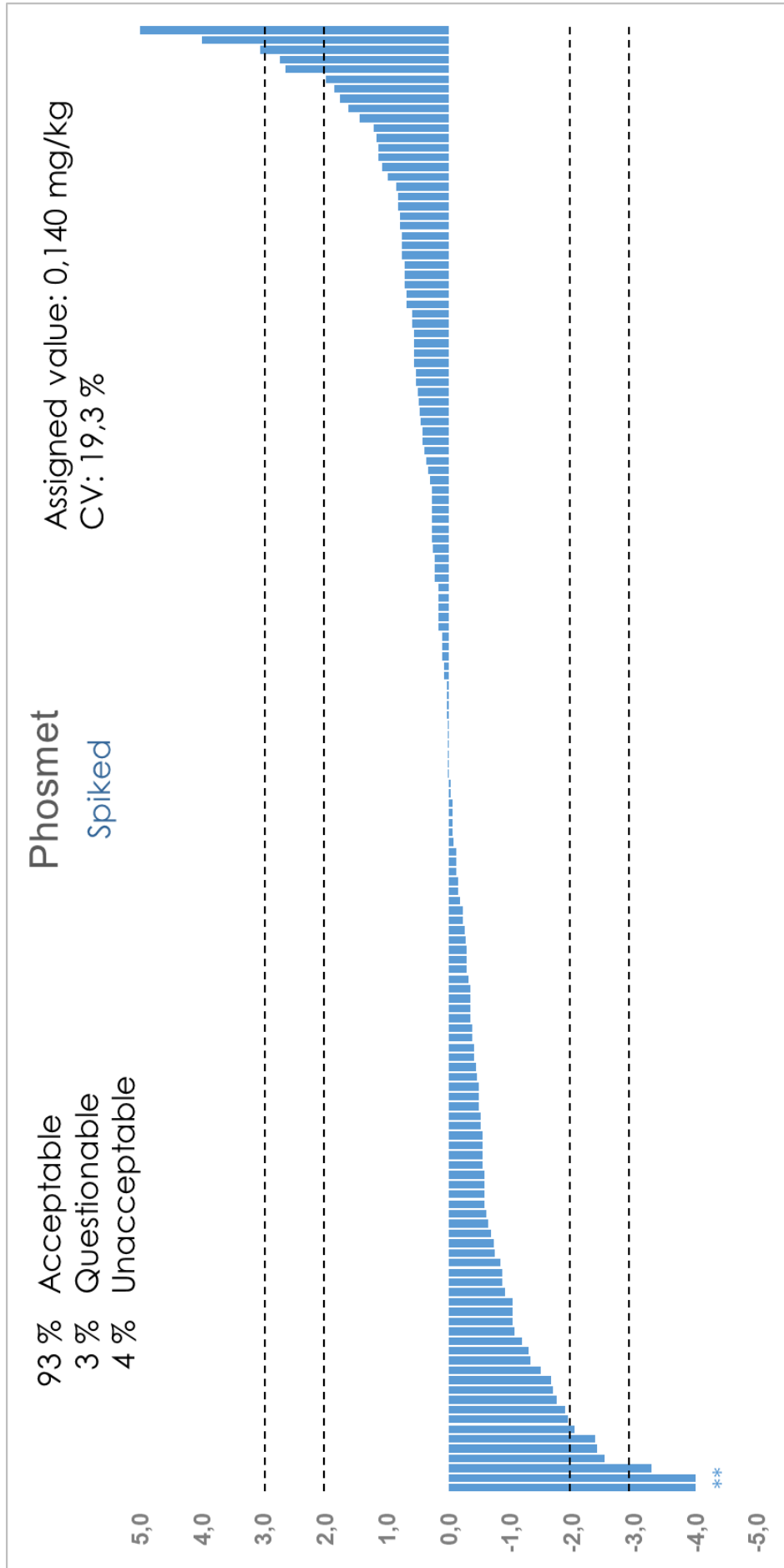


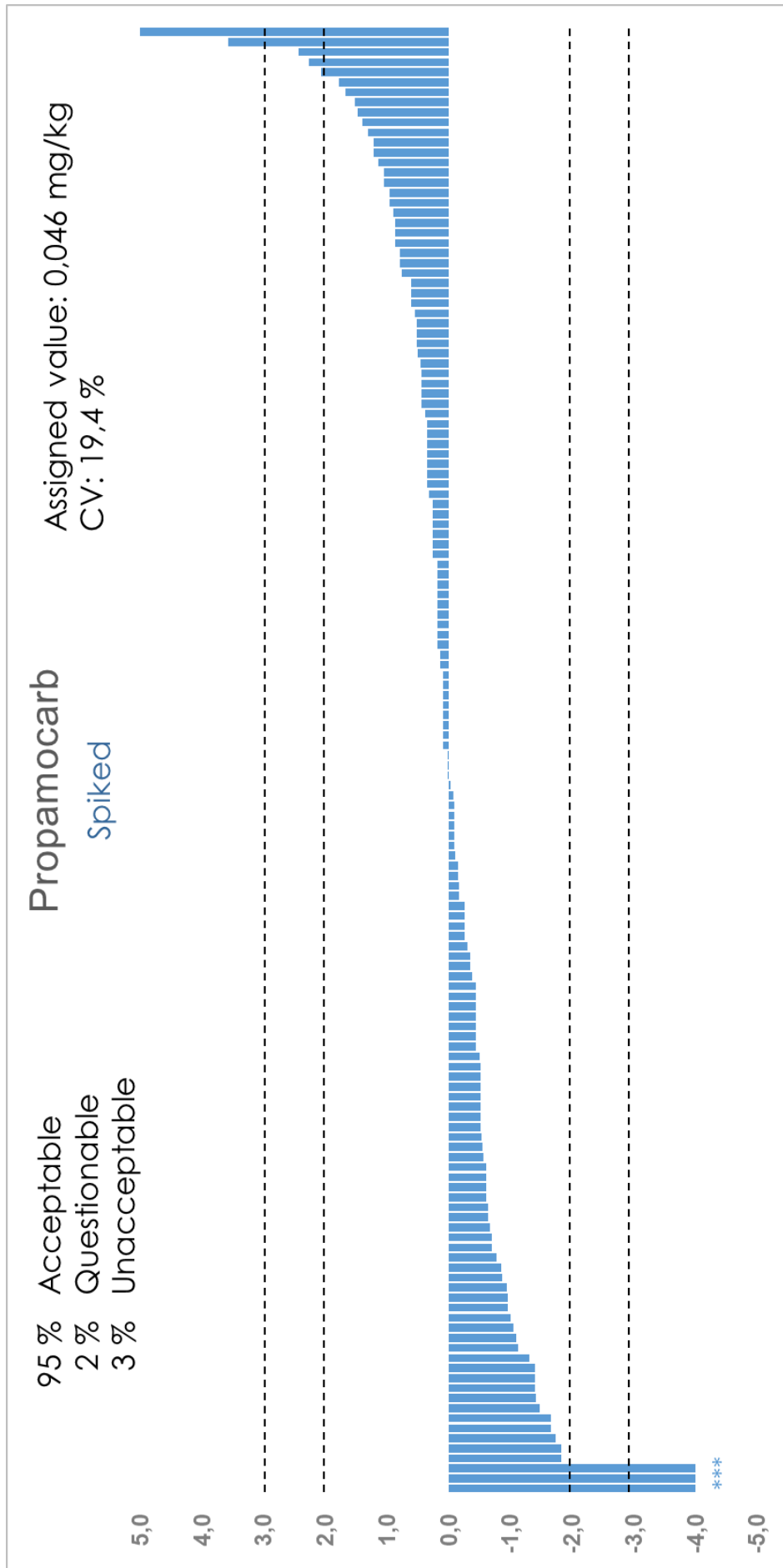


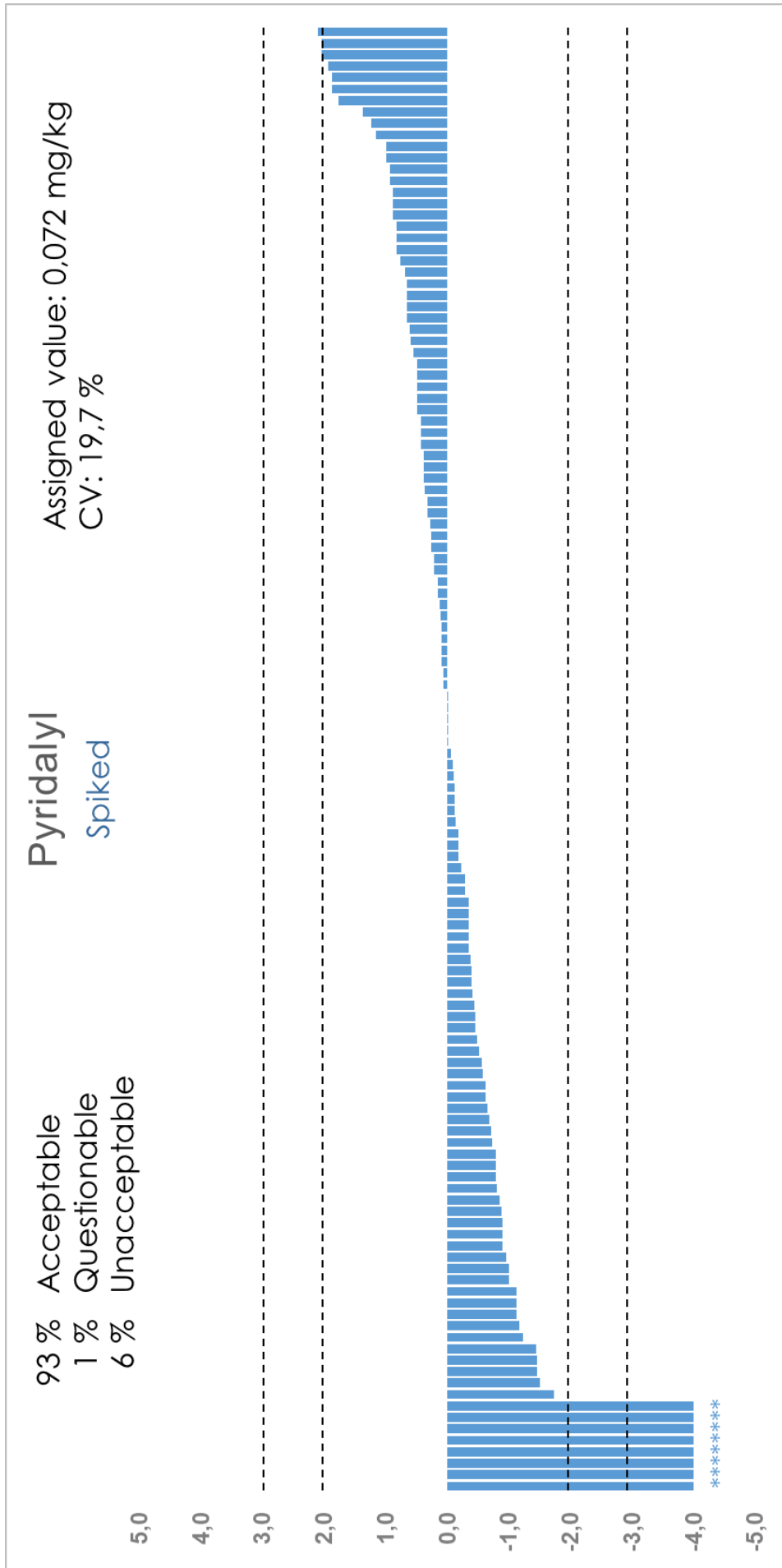


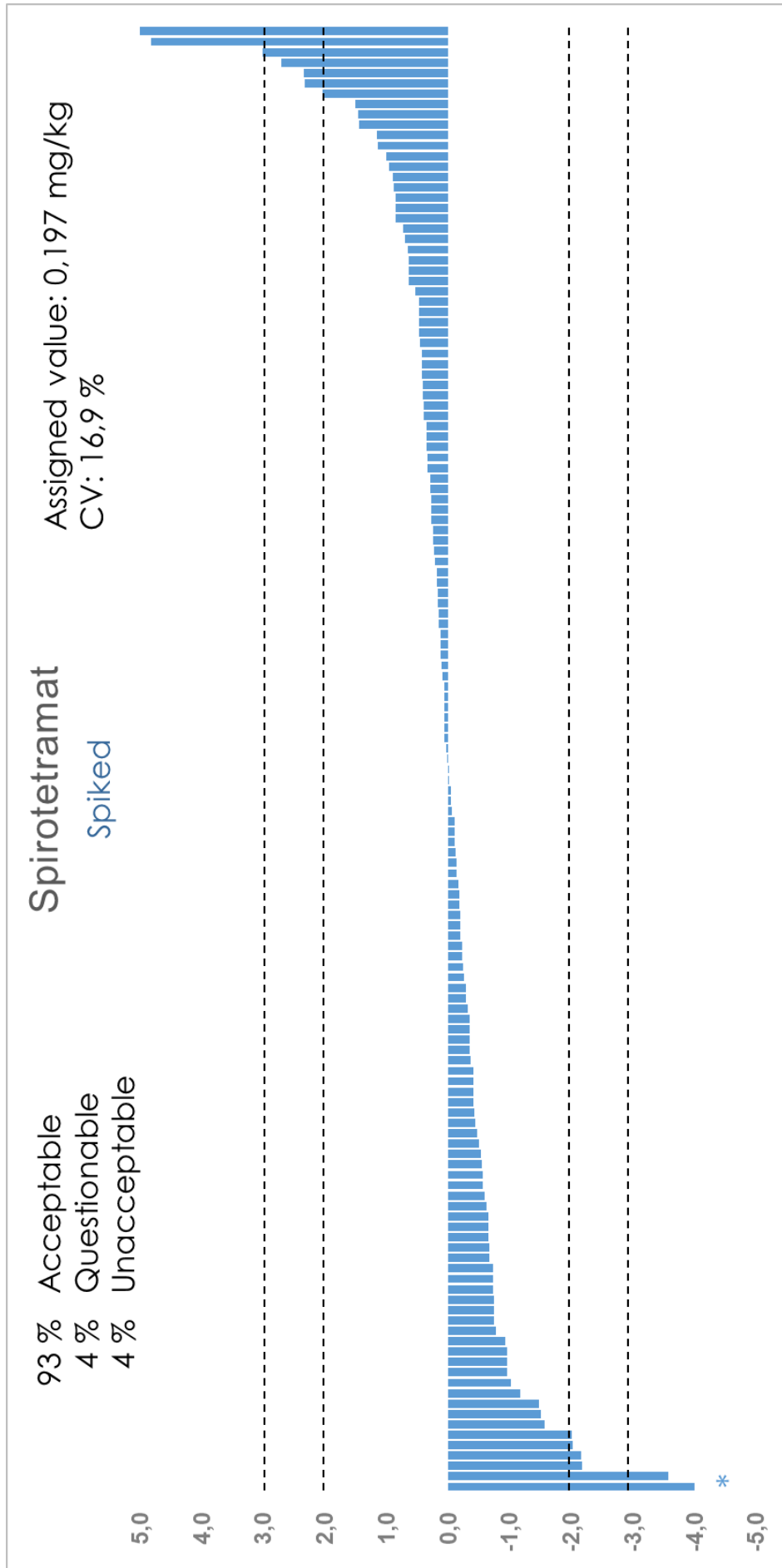


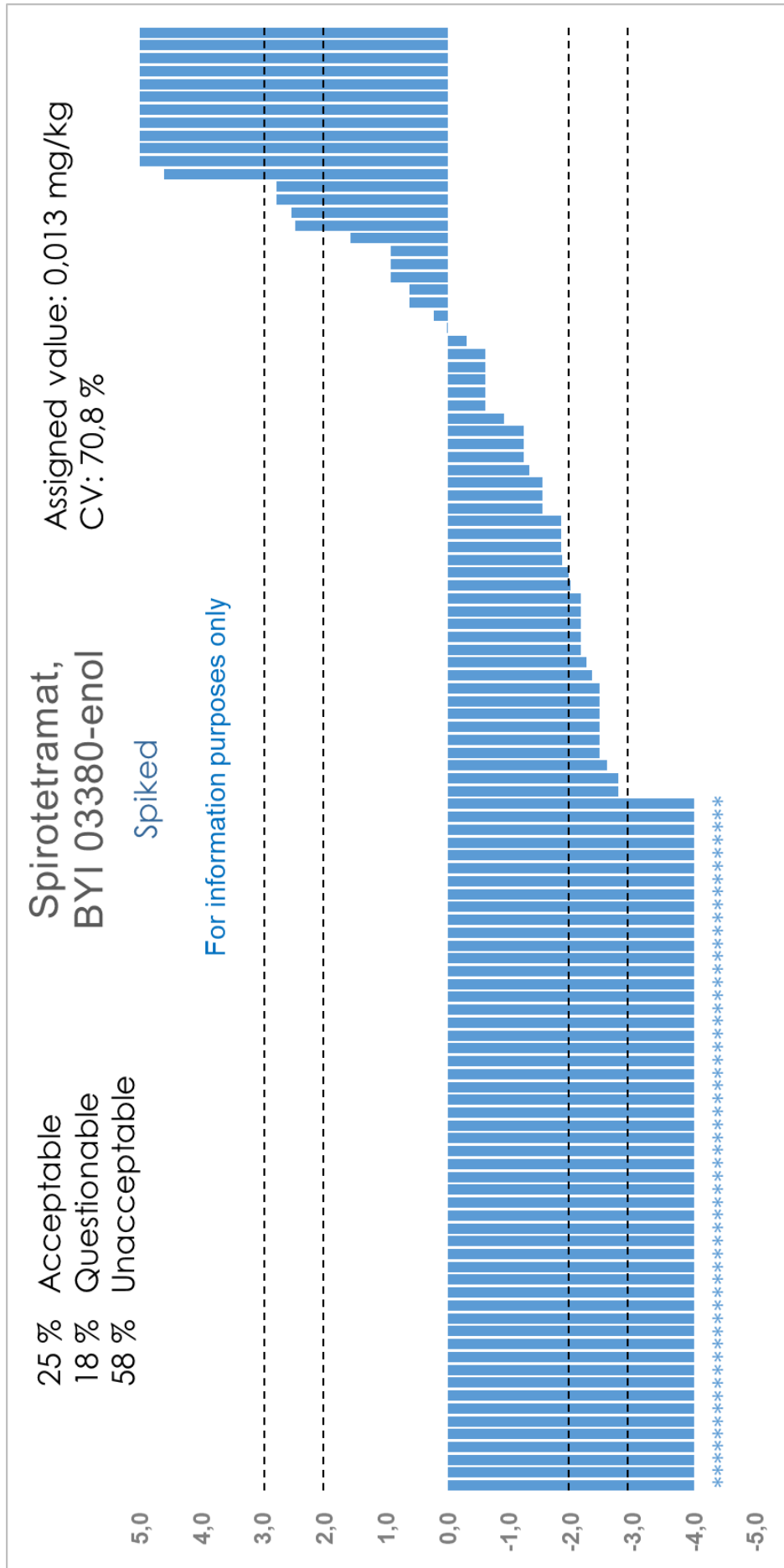


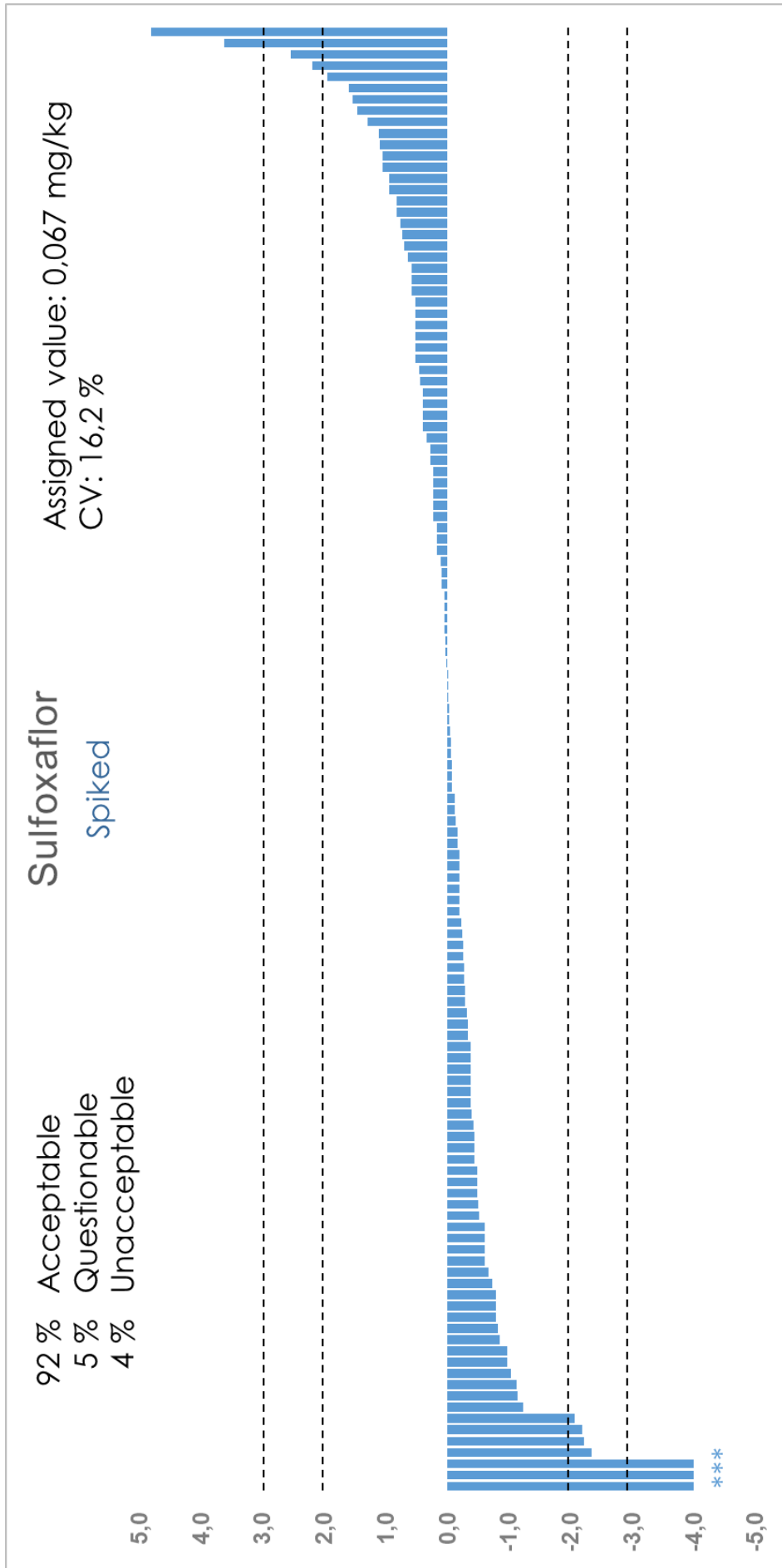


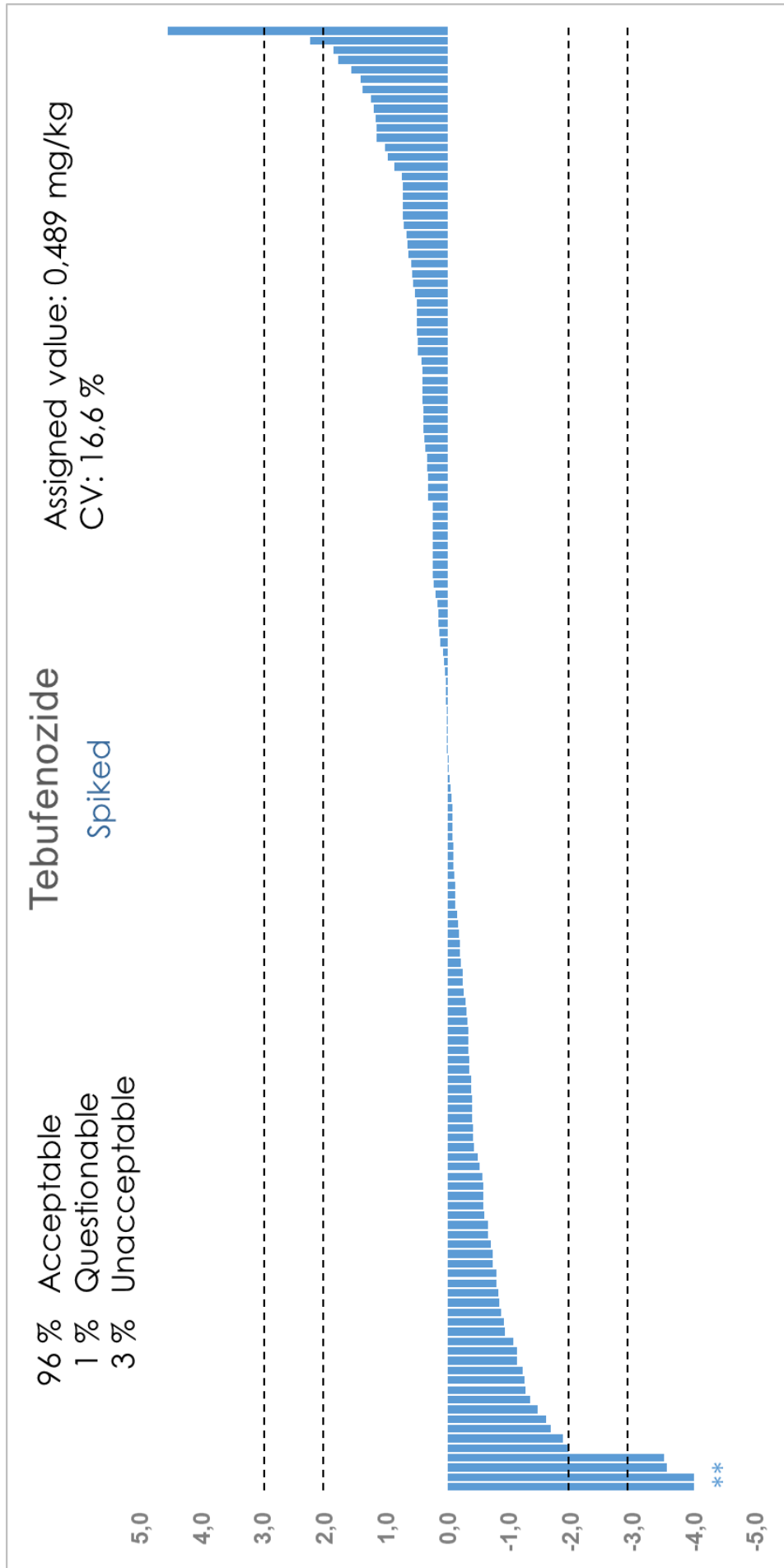


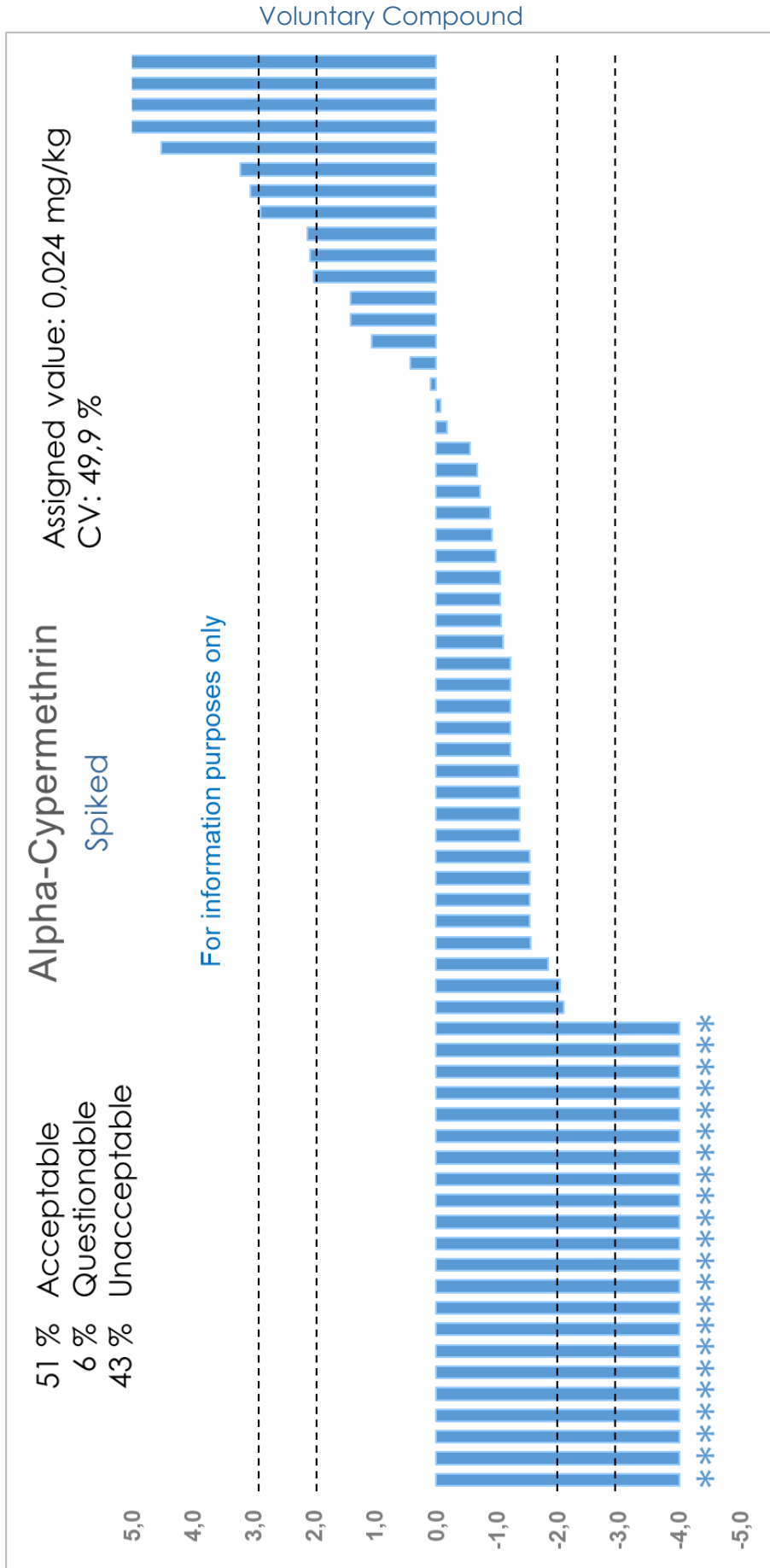


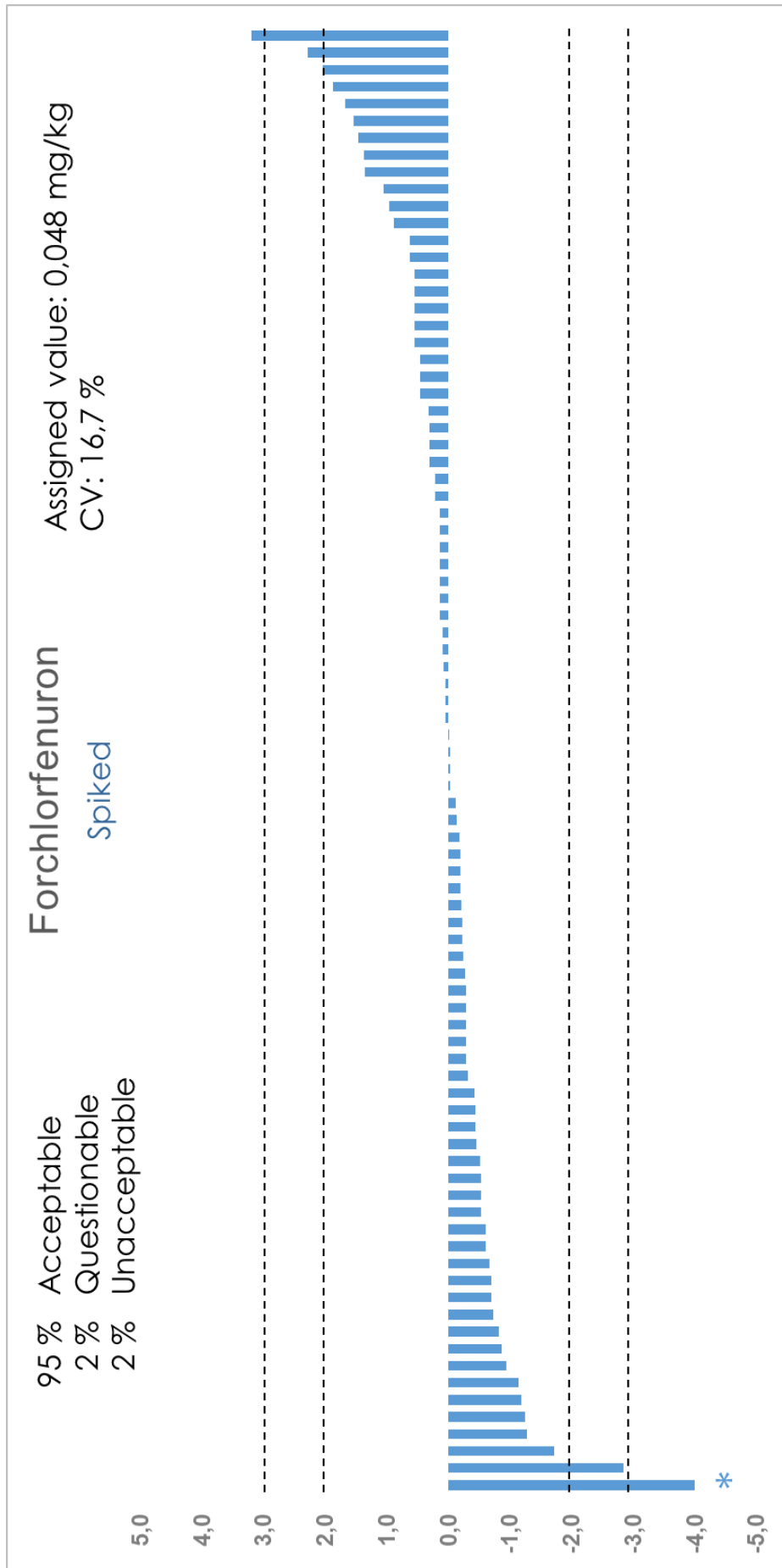


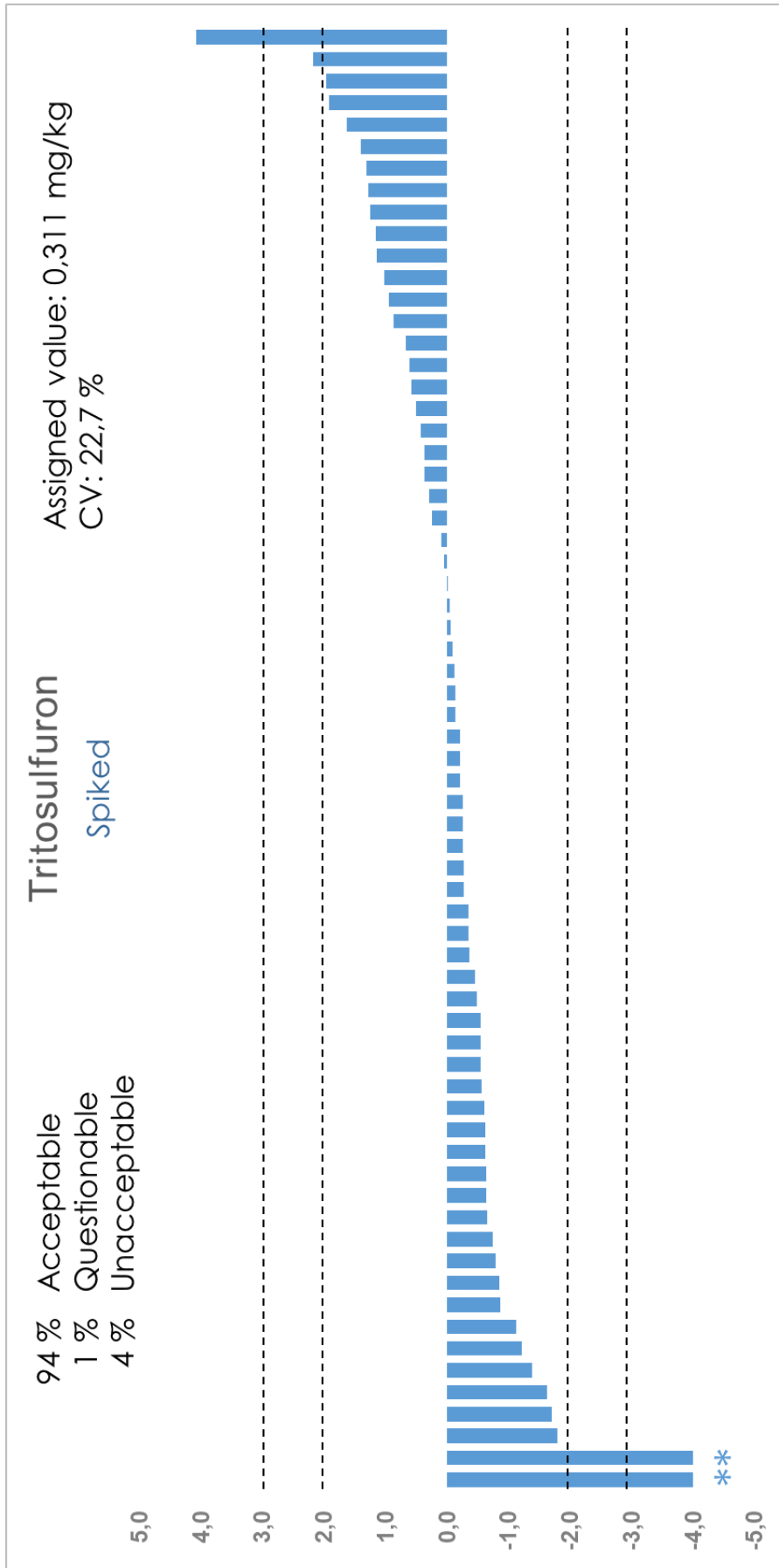












APPENDIX 5. Average of the Squared z scores (AZ<sup>2</sup>) for laboratories in Category A.

APPENDIX 5. Average of the Squared z scores (AZ<sup>2</sup>) for laboratories in Category A.

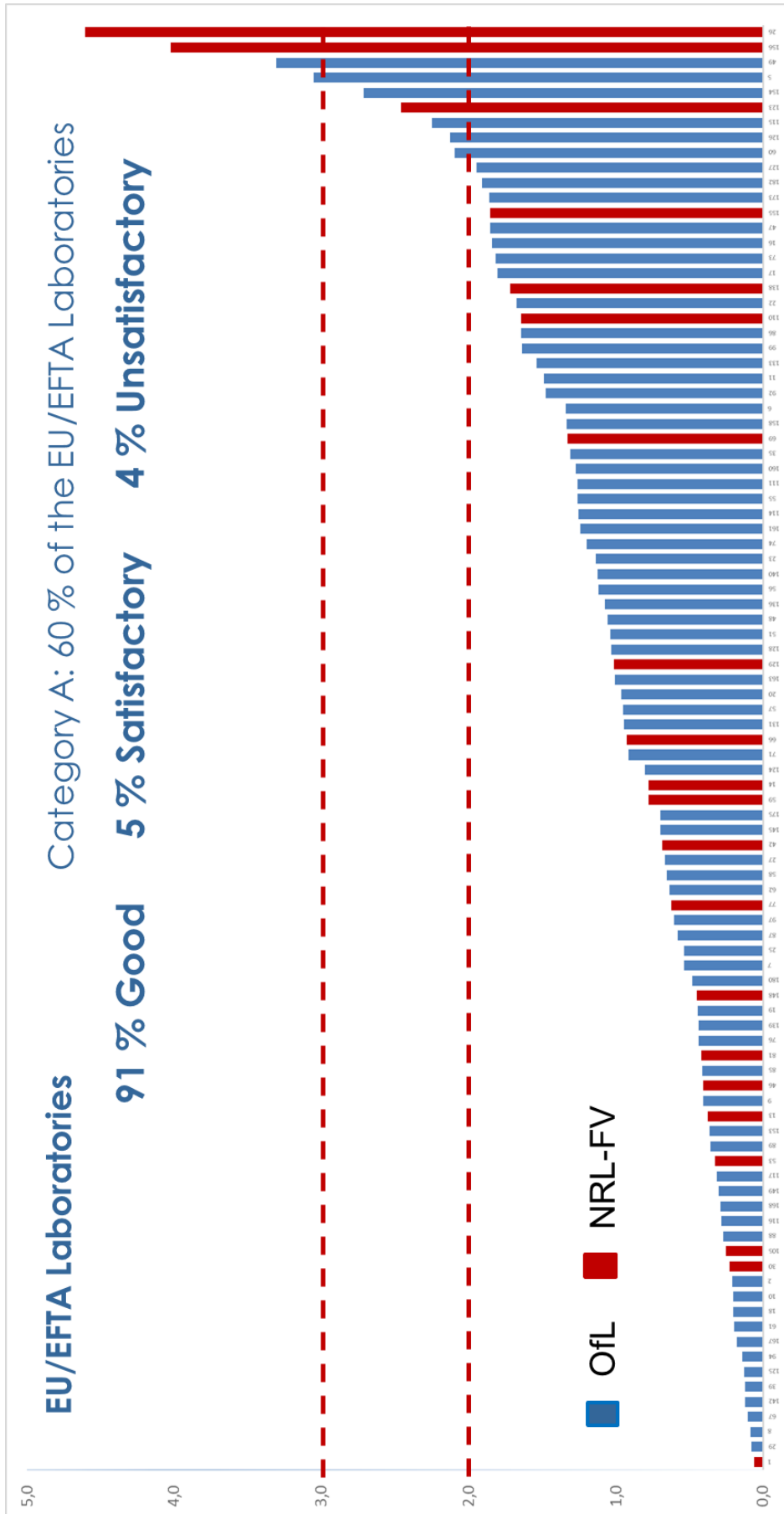
Laboratory Code	Bifenthrin	Cypermethrin (sum)	Dicofof (sum)	Fenhexamid	Fenpyrazamine	Flonicamid	Flubendiamide	Fludioxonil	Formetanate	Isofetamid	Orthophenylphenol	Parathion ethyl	Pencycuron	Phosmet	Propamocarb	Pyridalyl	Spirotetramat	Sulfoxaflor	Tebufenozide	No. of detected pesticides	AZ <sup>2</sup>
	z score																				
1	-0.1	-0.1	0.1	0.2	0.2	0.2	-0.3	0.0	-0.4	0.4	-0.3	0.2	0.2	0.0	0.4	0.2	0.4	0.0	0.3	19	0.1
2	0.2	0.0		0.7	0.2	0.0	0.1	0.6	-0.1	0.4	0.4	1.3	0.1	-0.6	0.2	0.5	0.1	0.4	0.3	18	0.2
5	0.4	-0.3	1.8	0.1	-0.3	0.2	0.1	5.0	-4.0		-0.4	0.2	-0.4	-2.0	2.3	0.7	0.1	0.5	0.3	18	3.1
6	-0.3	0.4	-1.5	3.3	-0.4	0.1	-0.2	-1.5	2.4	-0.5	1.1	-0.1	-0.3	0.2	-1.1	-1.0	-0.3	0.0	-0.3	19	1.3
7	-0.2	-0.1	-2.0	-0.5	-0.8	-0.3	-0.8	-0.3	-0.1	-1.1	0.0	-0.2	-0.6	-0.7	0.2	-0.9	-0.1	-0.4	-1.1	19	0.5
8	0.5	-0.4	-0.3	0.4	-0.3	-0.2	0.1	0.2	-0.3	0.1	0.3	0.1	0.2	0.3	0.1	-0.7	0.0	0.0	-0.1	19	0.1
9	1.0	1.1	0.6	0.8	0.0	-0.2	-0.7	0.6	-0.7	0.1	0.7	0.6	-0.8	0.7	-0.3	-0.2	-0.6	-0.4	-0.6	19	0.4
10	-0.2	0.5	0.7	0.4	0.5	0.6	0.0	0.2	0.3	0.3	0.2	-0.2	-0.1	0.4	0.4	-1.2	0.2	0.2	0.4	19	0.2
11	0.9	-0.1	3.4	0.7	0.2	-0.5	0.2	0.6	-1.1	-1.0	0.6	0.8	-0.2	-1.9	-0.8	-0.6	1.5	-2.2	0.4	19	1.5
13	0.2	0.6	1.2	0.0	-0.3	-0.2	-0.2	0.9	-0.5	-0.1	0.0	-0.2	0.2	0.0	-1.7	0.9	0.1	0.0	0.1	19	0.4
14	-1.3	-0.9	0.3	-0.3	-0.7	-0.3	-0.3	0.1	2.4	-1.1	-0.6	-0.9	-0.8	-0.1	0.3	-1.5	0.3	-0.2	0.4	19	0.8
15	-0.1	0.1	0.5	-0.9	-0.7	-0.8	-1.2	-1.0	0.3	-0.8	-0.4	-0.2	-1.8	-0.3	-0.4	-1.0	-0.6	-0.2	-0.6	19	0.6
16	-0.2	-0.4	-4.0	-0.2	-0.2	-0.5	0.0	0.2	-0.1	-0.5	0.4	-0.4	0.2	-0.5	-4.0	1.2	-0.2	0.1	-0.1	19	1.8
17	0.1	0.7	-4.0	0.4	-1.6	0.3	-0.5	-0.7	3.4	0.2	-0.4	0.4	-0.1	0.3	1.5	0.1	0.3	0.0	0.0	19	1.8
18	-0.4	-1.1	0.5	-0.2	-0.4	-0.2	-0.1	0.1	-0.7	-0.5	-0.3	-0.3	-0.3	-0.6	0.1	-0.5	-0.3	-0.4	-0.2	19	0.2
19	-0.1	0.6	-0.1	-0.1	0.0	-0.1	0.4	0.9	-1.1	-0.4	0.0	2.1	0.1	0.5	0.6	0.1	0.6	-0.3	-0.1	19	0.4
20	0.4	-0.4	-0.8	-2.2	-0.7	-0.3	-1.2	-0.2	-1.1	2.2	0.9	-0.9	-0.3	-0.5	-0.3	0.5	-1.5	-0.2	-0.3	19	1.0
22	0.0	-0.4	5.0	-0.4	0.2	-0.3	0.2	0.4	-0.6	0.8	0.0	-0.3	0.5	0.4	1.7	-0.5	0.6	-0.1	1.2	19	1.7
23	0.6	1.3	1.3	0.3	0.5	-0.2	1.2	0.3	2.5		1.5	2.2	0.5	0.3	-0.5	0.3	0.3	0.6	0.7	18	1.1
25	0.7	0.5	2.2	0.5	0.2	-0.1	-0.1	0.4	-0.7	0.0	1.1	1.3	0.0	0.6	0.5	0.1	0.3	0.0	0.2	19	0.5
26	0.7	3.7	-0.5	-0.1	-4.0	-0.9	-0.2	-1.7	-4.0	5.0	0.1	-0.8	0.6	0.5	-0.1	-1.4	-2.0	2.2	-0.3	19	4.6
27	1.0	0.2	1.3	1.0	-0.9	-0.8	0.3	1.5	-1.6	-0.1	-0.1	0.4	0.4	0.3	0.3	1.2	-0.2	0.4	0.5	19	0.7
29	-0.4	-0.4	-0.1	-0.1	-0.3	0.2	0.0	-0.2	-0.1	-0.1	-0.3	0.1	-0.5	-0.2	-0.4	0.4	0.4	0.0	-0.4	19	0.1
30	0.3	0.3	-0.2	0.2	-0.1	0.1	-0.8	-0.1	-0.5	-1.2	-0.4	0.5	-0.3	0.4	0.1	-0.4	-0.4	-0.8	-0.1	19	0.2
35	-0.6	-0.8	-0.7	0.3	1.2	0.8	-0.2	0.3	3.3	-0.1	-0.1	-0.8	0.3	1.5	0.4	1.9	-0.1	0.5	1.8	19	1.3
39	0.5	0.7	0.5	0.5	0.0	0.0	0.3	-0.1	-0.2			0.5	0.1	0.0	0.2	-0.6	0.0	-0.4	0.0	17	0.1
42	-1.6	-0.8	2.2	-0.1	0.1	0.3	0.2	0.4	-0.5	-0.7	-0.6	-1.4	-0.8	-0.5	-0.1	-0.4	0.3	0.6	0.0	19	0.7
46	-0.1	-0.2	-2.0	0.3	0.1	-0.1	0.0	0.5	-0.4	-0.1	-0.8	-0.4	0.0	-0.2	0.1	0.7	0.7	0.0	1.2	19	0.4
47	-0.1	-0.1	-1.9	-1.0	-0.6	0.0	0.0	1.0	-0.4	1.4	0.3	-0.3	0.1	0.7	0.4	-0.9	5.0	-0.7	-0.3	19	1.9
48	-0.1	0.0	-4.0	-0.9	0.3	0.6	0.1	0.7	-0.1	0.0	0.0	0.2	0.0	0.4	0.9	0.7	-0.5	0.5	0.6	19	1.1
49	0.4	0.3	5.0	0.6	1.3	1.1	-0.1	0.5	-1.3	1.7	0.0	1.0	1.4	-0.1	-1.6	0.8	4.8	0.4	-0.1	19	3.3
51	0.3	0.4	1.9	-0.1	0.4	0.1	0.5	2.0	-1.0	0.8	0.8	0.7	0.9	0.6	-1.0	2.0	0.4	1.5	-0.1	19	1.0
52	-0.5	-0.5	1.2	0.0	-0.5	0.2	-0.2	-0.2	-0.3	-0.6	-0.9	-0.4	-0.4	-0.3	-0.3	-0.9	0.3	-0.1	-0.3	19	0.3
53	-0.5	0.6	1.7	-1.1	0.0	-0.2	-0.5	0.0	-0.3	0.0	-0.6	0.2	-0.1	0.2	0.0	-0.6	-0.3	-0.3	-0.3	19	0.3
55	-0.6	0.4	3.6	0.3	0.0	0.0	-0.3	0.2	-1.0	0.0	0.8	0.0	0.0	2.7	0.8	-0.7	0.0	-0.3	0.3	19	1.3
56	0.8	1.9	1.5	0.4	0.0	0.5	0.1	2.7	0.0	0.4	1.5	0.6	0.1	1.1	1.8	0.1	0.2	0.1	0.5	19	1.1
57	1.8	0.9	1.5	0.8	0.5	1.0	0.7	0.7	-2.0	0.4	-0.4	0.8	0.5	0.9	0.3	0.9		1.1	-0.6	18	1.0
58	0.8	1.2	0.1	-0.1	0.5	0.0	2.5	-0.2	-0.2	0.8	0.0	0.6	0.7	0.3	-0.5	0.8	-0.4	0.7	0.7	19	0.7
59	-0.3	-1.3	-0.5	0.1	0.7	0.2	0.3	-1.0	0.2	-0.1	1.1	-0.3	0.3	0.8	1.5	0.3	0.4	2.5	0.3	19	0.8
60	1.4	1.0	5.0	0.3	0.9	-0.1	1.1	1.0	1.6	1.3	0.9	0.9	1.3	-0.5	-0.4	0.6	-0.1	0.2	0.7	19	2.1
61	-0.3	0.1	-0.2	-0.3	-0.2	-0.4	0.4	-0.2	-0.5	-0.3	-0.6	1.4	-0.1	-0.1	0.2	0.0	-0.1	-0.6	0.1	19	0.2
62	1.2	0.6	0.4	0.3	0.3	0.3	0.2	-0.6	-1.0	1.8	0.5	1.8	0.1	0.1	-0.3	0.9	0.9	0.2	0.0	19	0.6
66	0.8	0.8	-2.2	-0.9	-0.2	-0.8	-0.3	-0.5	0.9	-0.4	-0.8	0.5	-0.5	-1.2	2.1	-0.6	-1.2	0.0	0.0	19	0.9
67	0.1	0.4	0.3	-0.1	-0.3	-0.4		0.2	-0.5		-0.1	-0.1	0.2	0.8	0.5	-0.1	0.1	-0.2	0.0	17	0.1
69	-0.3	-0.4		-1.3	-0.1	0.4	3.1	-1.1	1.9	-0.7	-0.9	-0.8	-0.1	-0.5	-0.6	0.1	1.5	0.1	1.6	18	1.3
71	0.2	-1.1	-3.2	1.0	-0.6	-1.2	0.3	-0.1	-0.4	-0.9	-0.8	0.2	-0.6	0.2	-0.6	-0.4	-0.2	-0.2	-0.2	19	0.9
73	-0.5	0.4	-3.3	1.8	0.7	-0.2	0.9	2.4	-1.8	-0.4	-0.4	1.3	0.0	0.6	-1.8	-1.7	0.1	0.8	0.3	19	1.8
74	1.8	2.6	0.2	0.2	2.2	0.2	-0.2	-0.1	-0.1			1.7	0.5	0.0	0.1	-0.4	0.3	1.3	0.7	17	1.2
76	0.4	0.0	1.1	0.0	-0.2	-0.2	-0.1	0.4	1.3	-0.4	-0.4	0.0	-0.1	0.0	0.5	2.0	0.2	-0.4	-0.3	19	0.4

APPENDIX 5. Average of the Squared z scores (AZ<sup>2</sup>) for laboratories in Category A.

Laboratory Code	Bifenthrin	Cypermethrin (sum)	Dicofol (sum)	Fenhexamid	Fenpyrazamine	Flonicamid	Flubendiamide	Fludioxonil	Formetanate	Isoletamid	Orthophenylphenol	Parathion ethyl	Pencycuron	Phosmet	Propamocarb	Pyridalyl	Spirotetramat	Sulfoxaflor	Tebufozozide	No. of detected pesticides	AZ <sup>2</sup>
	z score																				
77	0.5	-0.2	2.3	0.3	0.3	0.1	-0.6	0.1	1.0	0.4	0.7	0.1	0.4	0.5	0.3	1.9	0.2	-0.2	-0.2	19	0.6
79	0.6	0.4	-1.2	-0.2	0.5	-0.4	-0.1	0.0	-0.1	0.4	0.4	0.1	0.8	1.0	-0.5	0.6	0.2	0.1	0.5	19	0.3
81	-1.1	-0.3	0.0	0.2	-0.2	-0.4	-0.2	-0.1	-0.8	0.4	-0.9	-0.3	-1.6	0.7	-0.1	-0.9	-0.7	0.3	0.5	19	0.4
84	0.5	0.1	-1.9	0.3	0.5	0.2		0.5	0.0	0.1	0.7	0.2	0.3	0.7	0.5	0.3	0.2	1.2	0.4	18	0.4
85	0.9	0.1	0.5	0.0	1.7	-0.2	0.5	0.5	0.3	0.5	0.4	0.8	0.3	0.8	0.4	0.9	0.6	0.6	0.1	19	0.4
86	-0.8	-2.9	1.0	-0.3	-2.3	0.2	-0.4	1.5	1.4	-1.3	0.4	-0.8	-0.9	-1.7	-1.3	-1.1	-0.3	1.1	-0.7	19	1.6
87	0.3	1.6		-0.2	0.1	-1.2		0.0	-0.9	0.0	-0.7	-0.5	-0.2	1.2	0.8	-0.8	-0.6	-0.8	-0.7	17	0.6
88	0.2	0.6	-0.6	-0.4	1.3	0.2	0.1	0.2		-0.8	0.3	0.8	-0.1	0.2	-0.1	0.2	0.3	-0.1	0.7	18	0.3
89	-0.4	0.6	1.8	0.3	-0.1	-0.1	-0.3	0.1	-0.5	-0.2	-0.3	0.7	-0.1	-0.3	-1.1	0.8	-0.2	0.0	0.2	19	0.4
92	-0.5	-0.2	-3.1	-0.6	-1.5	-0.4	-1.2	-0.3	-1.2		-1.3	-0.6	-1.1	-0.9	0.3		-1.5	-0.8	-1.6	17	1.5
93	0.6	0.7	-1.3	-1.2	0.0	-0.4	0.1	0.1	-0.3	0.0	1.2	0.6	0.0	0.8	-0.3	1.0	-0.2	0.2	0.4	19	0.4
94	-0.2	-0.2	0.2	0.4	0.3	0.5	-1.2	-0.1	0.1	0.0	0.3	-0.2	0.0	0.0	0.6	0.0	0.0	-0.2	-0.4	19	0.1
96	0.4	1.0	2.6	-0.3	0.4	-0.4	0.3	0.5	-0.7		0.4	0.8	-1.0	-0.3	0.2	0.6	-0.4	0.2	0.4	18	0.7
97	0.5	-0.4	1.0	0.3	0.4	0.6	0.6	0.4	1.3	0.4	0.3	0.9	0.8	0.5	0.6	1.8	-0.4	-0.5	-1.3	19	0.6
99	0.1	-0.9	-0.9	-0.3	-0.2	-0.7	-0.2	-1.2	0.8	-0.7		-0.6	0.1	0.7	0.5	0.0	0.5	4.8	-0.2	18	1.6
100	0.1	-0.8	0.2	-0.1	0.1	-0.1	0.2	-0.2	-1.3	0.8	-1.2	-0.5	-1.4	-0.6	0.6	-0.5	-1.9	0.3	0.8	19	0.6
105	-0.1	0.4	-1.6	-0.2	0.1	-0.4	-0.9	0.0	-0.2	-0.1	0.6	-0.3	-0.5	0.2	-0.1	-0.3	-0.4	-0.3	0.1	19	0.3
109	0.9	0.8	0.2	-0.1	0.5	0.6	0.8	0.5	-0.3		1.6	1.0	0.5	0.3	0.4	0.8	0.0	1.1	0.0	18	0.5
110	-0.1	-0.4		-0.1	-0.2	0.3	0.6	0.1	5.0	0.2	-0.5	0.2	-0.4	-0.5	1.3	0.5	0.7	0.3	-0.8	18	1.6
111	-0.3	-0.6		0.2	-1.1	-0.2	-4.0	-0.3	1.2	-0.5	-0.4	-1.1	0.0	0.6	0.4	-0.9	0.1	-0.7	-0.3	18	1.3
114	-0.6	-2.1	-3.5	-0.2	-0.6	0.0	-0.7	-0.4	-0.9	-0.4		-0.3	-0.8	-1.0	-0.5	-0.9	-0.7	-0.5	-0.2	18	1.3
115	-0.3	0.6	-1.9	0.5	-0.2	-0.1	0.3	4.5	-4.0	-0.4	-0.2	0.1	-0.4	-0.1	-0.6	-0.1	-0.4	-0.2	0.9	19	2.3
116	0.5	0.0	0.4	0.3	0.5	0.8	0.8	0.1	-0.3	0.2	-0.2	-0.4	0.0	-0.3	1.1	0.0	0.9	0.8	0.7	19	0.3
117	0.0	0.0	1.5	0.6	-0.7	-0.3	-0.1	0.3	0.1		0.2	0.7	-0.7	-0.5	-0.5	0.3	-0.7	-0.1	0.4	18	0.3
123	0.1	1.8	-4.0	0.9	-0.2	0.4	0.9	0.3	-1.2	0.2	-4.0	1.6	0.7	1.1	-0.6	0.7	0.4	1.1	1.4	19	2.5
124	-0.5	-0.5	-0.2	-1.2	0.0	0.1	-0.2	-0.5	3.2	0.3	-0.4	-0.8	0.1	-0.5	-0.5	0.7	-0.8	-0.1	0.0	19	0.8
125	0.1	0.1		0.3	0.0	0.2	0.1	-0.3	-0.1	-0.1	-0.4	0.1	0.5	0.2	1.1	-0.1	0.4	0.3	0.2	18	0.1
126	-0.3	-0.9	-1.9	0.8	0.6	-0.9	1.2	-0.1	0.4	0.2		-1.3	0.5	4.0	-0.8		2.7	1.5	0.3	17	2.1
127	-0.5	-1.5	-1.5	-2.6	-0.6	-0.7	-0.2	-1.6	-0.2	-1.8	-0.3	-0.3	-0.4	-0.3	-0.3	-4.0	-0.7	-0.6	-1.2	19	1.9
128	-0.1	-0.5	-0.1	-0.7	-0.5	0.0	-0.3	0.2	-0.1	-0.3	-4.0	-1.1	-0.8	-0.5	0.4	-0.1	-0.2	-0.4	-0.2	19	1.0
129	0.0	-1.1	-3.2	-0.9	0.6	1.1	0.8	-0.3	0.2	0.8	-1.6	0.0	0.5	-0.3	0.1	-0.3	0.4	0.5	0.5	19	1.0
131	-0.1	-0.5	0.2	1.8	0.1	0.2		-0.6	2.5	0.1	1.8	-0.3	1.0	-0.3	0.5	0.5		0.9	0.4	17	0.9
133	1.4	-0.3	-0.9	-1.1	1.2	-0.5	-2.9	-0.5	0.4	0.8	1.5	0.8	1.8	0.5	-1.0	0.2	2.0	0.6	1.4	19	1.5
136	0.4	0.1	0.3	0.8	0.1	-0.6	0.4	0.1	1.2	0.4	-0.6	0.1	3.5	-1.7	-1.0	-0.8	-0.7	0.4	-0.1	19	1.1
138	0.4	0.4		0.5	-0.2	0.2	0.8	1.0	5.0	0.3	0.2	0.9	0.5	-0.4	-0.9	-0.8	0.7	0.0	0.4	18	1.7
139	-0.5	-0.2	0.4	-0.4	-0.3	-0.8	0.6	0.5	-0.6	-0.8	-0.7	-0.7	0.1	-0.7	-0.4	1.9	-0.4	-0.1	0.0	19	0.4
140	0.5	0.3	-4.0	0.9	0.1	0.1	-0.8	0.4	-0.9	0.1	0.9	-0.1	-0.2	0.0	-0.2	-1.1	-0.6	0.0	-0.4	19	1.1
142	0.0	0.3	0.3	0.0	0.1	0.0	0.2	-0.2	-0.8	0.1	-0.1	0.9	-0.4	0.1	-0.2	0.3	0.2	0.2	0.5	19	0.1
145	1.0	1.6	0.1	0.2	0.9	0.5	1.5	0.7		0.4	1.2	1.2	0.4	0.8	-0.5	0.4	0.4	0.5	0.4	18	0.7
148	0.5	0.2	1.0	-0.1	0.1	0.5	0.1	0.4	0.0	0.1	2.2	0.4	0.1	-0.4	1.0	0.4	-0.3	-0.2	0.6	19	0.5
149	-0.8	-0.5	-0.9	-0.9	-0.6	-0.3	0.5	-0.7	-0.3	-0.2	-0.6	-0.9	-0.2	0.3	-0.5	-0.5	-0.3	-0.4	0.2	19	0.3
153	0.5	-0.3	0.2	-0.7	-0.7	-0.6	-0.6	0.7	-0.5	-1.1	-0.1	0.0	-1.1	0.1	0.2	-0.5	-0.4	-1.0	-0.6	19	0.4
154	-0.2	1.0	-3.0	1.8	1.2	0.4	-0.7	-0.4	5.0	1.0	0.2	0.4	-0.7	1.8	2.4	-0.3	0.2	0.2	-0.1	19	2.7
155	-0.4	-1.0	0.8	-0.4	-0.7	5.0	-0.7	-0.5		-0.4	1.1	-0.4	-0.9	0.0		-0.4	-0.5	-0.3	-0.9	17	1.9
156	0.1	-0.2	5.0	1.1	0.5	0.2	2.4	1.0	5.0	0.3	-0.6	1.5	0.4	-1.3	0.9	-0.3	0.5	0.2	-3.5	19	4.0
158	0.4	0.2	-4.0	1.6	0.4	0.2	-0.2	-0.1	1.7	0.6	0.0	-0.4	1.0	-0.6	0.2	1.0	0.5	-0.5	0.4	19	1.3
160	-0.1	1.0	-4.0	-1.4	0.3	1.1	-0.2	-1.2	0.3	0.4	0.7	0.2	-0.4	-0.1	-0.1		0.3	-0.1	0.0	18	1.3
161	-1.3	-1.4	-4.0	0.2	-0.3	-0.1	1.1	-0.2	-0.4	0.2		0.5	-0.4	-0.2	-0.3	0.5	-0.2	-0.5	-0.4	18	1.2
163	0.1	-0.1	-4.0	0.2	-0.2	-0.2	-0.2	0.3	-0.9	-0.5	0.4	0.5	0.1	0.3	-0.6	-0.3	-0.7	-0.4	-0.4	19	1.0
167	0.3	0.3	-0.7	-0.6	-0.2	0.2	0.1	-0.2	-0.7	0.1	0.2	0.6	-0.5	0.1	-0.4	0.4	0.2	0.5	0.6	19	0.2

APPENDIX 5. Average of the Squared z scores (AZ<sup>2</sup>) for laboratories in Category A.

Laboratory Code	Bifenthrin	Cypermethrin (sum)	Dicofol (sum)	Fenhexamid	Fenpyrazamine	Flonicamid	Flubendiamide	Fludoxonil	Formetanate	Isofetamid	Orthophenylphenol	Parathion ethyl	Pencycuron	Phosmet	Propamocarb	Pyridalyl	Spirotetramat	Sulfoxaflor	Tebufozide	No. of detected pesticides	AZ <sup>2</sup>
	z score																				
168	-0.1	0.7	1.3	-0.7	-0.6	0.0	0.4	-0.4	-1.0	-0.1	-0.6	0.3	0.1	-0.4	0.4	0.4	-0.3	-0.2	-0.4	19	0.3
170	-0.1	0.0	-0.5	-0.5	-0.2	0.0	0.3	-0.6	0.9	-0.1	-0.4	-0.4	-0.5	0.1	1.7	-0.9	-0.6	-0.5	-0.9	19	0.4
173	-0.6	0.1	0.7	0.4	1.0	0.9	0.2	0.1	3.6	1.0	-4.0	-0.3	0.3	-0.3	1.1	0.1	0.5	0.8	0.5	19	1.9
175	0.2	1.4	2.0	-1.0	-0.5	0.6	0.3	-1.1	-1.3	0.0	0.3	0.0	0.5	0.1	0.1	-0.8	-0.7	-0.8	-0.8	19	0.7
180	-0.5	-0.7	-1.6	-0.6	-0.4	-0.9	-0.1	-0.2	0.0	-1.0	-0.1	0.0	-0.1	-0.5	-0.7	-1.2	0.1	0.5	-1.1	19	0.5
182	1.6	-0.8	-3.1	0.7	0.9	-0.2	0.6	0.6	1.5	0.5	-4.0	0.6	0.7	-0.4	0.4	0.4	0.9	0.7	0.7	19	1.9



## GENERAL PROTOCOL

### for EU Proficiency Tests on Pesticide Residues in Food and Feed

12<sup>th</sup> Edition: Released on 13 January 2025

#### Introduction

This protocol contains general procedures valid for all European Union Proficiency Testings (EUPTs) organised on behalf of the European Commission, DG-SANTE<sup>1</sup> by the four European Union Reference Laboratories (EURLs) responsible for the area of pesticide residues analysis in food and feed. These EUPTs are organised for 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 the official controls Regulation (EU) No. 2017/625<sup>2</sup>:

- EURL for Fruits and Vegetables (EURL-FV),
- EURL for Cereals and Feedingstuff (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 EUPTs allow the individual laboratory to evaluate if its performance is satisfactory. Additionally, the aim 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<sup>3</sup>. Participating laboratories will be provided with an assessment of their analytical performance that they can use to demonstrate their (ongoing) analytical proficiency and compare themselves with other participating laboratories.

#### Significant changes in new edition to previous edition

Some parts of the old version have been removed, so this edition includes only the information necessary for the participants. There have been no changes to the evaluation process. Apart from that, only editorial changes have been made.

#### EUPT- Organisers and Scientific Committee

EUPTs are organised either by single EURLs, or collaboratively by more than one EURL.

An organising team (in the following named organisers<sup>4</sup>) is appointed by the EURL(s) in charge of a given PT. The organisers are in charge of all administrative and technical PT activities of a proficiency testing (PT) round, which include e.g., the PT-announcement, the production of the proficiency testing item (PT-item), the undertaking of homogeneity and stability assessments, the packing and shipment of the PT-items, 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 the 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)<sup>5</sup> has been established in agreement with DG-SANTE. The EUPT-SC consists of expert scientists with many years of experience in PTs and/or pesticide residue analysis. The latest **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's role is to assist the organisers during the planning and the data evaluation phase of a PT-round. Input from the EUPT-SC is for example requested, when it comes to selecting the commodity, selecting the analytes to be included in the Target Pesticides List (p. 6), establishing the Minimum Required Reporting Levels (MRRRLs) for each of the analytes, statistically evaluating the participants' results (in anonymous form), as well as for 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 analytes to be present in the PT item and the approximate concentrations at which they should be present.

The EUPT-SC typically meets once a year, after all EUPTs of the season have been conducted and preliminarily evaluated by the four pesticide EURLs. The aim of these meetings is to discuss the preliminary evaluation of the EUPT-results, especially where case-by-case decisions are needed. PT plans for the next EUPT season are also discussed during these meetings.

#### EUPT Participants – Eligibility and Obligation for Participation

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 (2) of Regulation (EU) No. 2017/625<sup>6</sup>

<sup>1</sup> DG-SANTE = European Commission, Health and Food Safety Directorate-General

<sup>2</sup> 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

<sup>3</sup> [https://food.ec.europa.eu/plants/pesticides/maximum-residue-levels/enforcement/eu-multi-annual-control-programmes\\_en](https://food.ec.europa.eu/plants/pesticides/maximum-residue-levels/enforcement/eu-multi-annual-control-programmes_en)

<sup>4</sup> The term organisers is to be considered equivalent to the term PT-provider in ISO 17043:2023

<sup>5</sup> Link to the List of current members of the EUPT Scientific Committee: <http://www.eurl-pesticides.eu/library/docs/allcrl/EUPT-SC.pdf>

<sup>6</sup> Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities. <https://eur-lex.europa.eu/eli/reg/2017/625/oj>

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

- Art. 28 (3) of Reg. (EC) No. 2005/396 (for all OfLs analysing for pesticide residues within the framework of official controls of food or feed<sup>7</sup>), and
- Art. 101 (1)(a) of Regulation (EU) No. 2017/625<sup>2</sup> (for all NRLs).

Every year, shortly before launching the registration period of the first of the four EUPTs in a given EUPT-Season, all OfLs and NRLs are asked to update their routine scope of commodities as well their contact information within the EURL-DataPool. Based on this information the OfLs are classified into those that are obliged and those that are eligible to participate in each of the EUPTs to be conducted within a given year.

NRLs are responsible for checking whether all relevant OfLs within their network are included in the list of obliged laboratories with their current 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, but are not able to participate, must provide the reasons for their non-participation. This also applies to any participating laboratories failing to report results. EUPTs are furthermore open to the following laboratories as long as sufficient material is available:

- a) any other OfLs from EU countries that are not covered by the above obligations to participate
- b) NRLs and OfLs from EFTA countries
- c) NRLs and OfLs from EU-candidate countries and
- d) other laboratories from EU or EFTA countries analysing official organic samples within the frame of Reg. 889/2008/EC
- e) governmental laboratories from Third Countries (countries outside EU)
- f) other laboratories from Third Countries as long as they are involved in controls of products destined for export to the EU.

Laboratories of groups d) and f) will be requested to provide a proof of their function (e.g. scan copy of a document stating official appointment).

In exceptional justified cases (e.g. where the number of OfLs/NRLs analysing a specific compound is small) additional commercial labs from the EU and beyond may be invited to participate in an EUPT). In a given EUPT, each laboratory/institution is allowed to submit only one single set of results. Any subcontracting of analyses to another institution must be communicated to the organisers, preferably prior to the start of the EUPT.

### Participation fee and Invoicing

By completing the registration for participation in a given EUPT, the laboratory agrees to proceed with a timely payment of the participation fee. The invoice fee covers the costs of production, handling and delivery of the PT Test Items. The organisers will issue digital invoices in PDF format only, and without any electronic signature. The EURLs retain the right to decline any request for supplementary forms or additional paperwork in connection with the payment. The laboratories should note that additional costs will incur if such extra services are requested, depending on the incurring extra workload. Extra costs may also be incurred if a new modified invoice is requested, e.g. because of missing or erroneous information caused by errors or omissions by the registered laboratory during registration. OfLs not paying the EUPT participation fee will be initially reminded, and then warned that information concerning their lab may be blocked out in the final report of the concerned EUPT, that the certificate of participation may not be issued to them, and that their participation in subsequent EUPTs could be denied. In case of a repetitive non-payment, the EUPT organisers may inform the corresponding NRL and/or the competent authority responsible for the OfL.

### Confidentiality and Communication

The owner of all EUPT data is DG-SANTE and as such they have access to all information.

For each EUPT, the laboratories are given a unique code (lab code), initially only known to themselves and the organisers. Furthermore, the EURLs reserve the right to share EUPT results and codes among themselves: for example, for the purpose of evaluating overall lab or country performance as requested by DG-SANTE.

As laid down in Regulation (EU) No. 2017/625<sup>2</sup>, 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 preliminary report distribution.

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 of any of these documents, the participating laboratories will be informed via e-mail. In any case, as soon as the PTperiod 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

Approximately 3 months before the distribution of the PT items to the participants 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 for preparing the PT item, as well as links to the EUPT-Target Pesticides List and the EUPT-Calendar.

<sup>7</sup> Official controls in the sense of Regulation (EU) 2017/625. This includes labs involved in controls within the framework of national and/or EU programs, as well as labs involved in import controls according to Regulation (EU) 2019/1793 (which repealed Regulation (EC) No. 2009/669).

### Target Pesticides List and PT-Residue Definitions

The Target Pesticides 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 set at 50% of the lowest MRLs found either in Regulation (EC) No. 2005/396 or in Regulation (EU) No. 2016/128 (Baby Food Directive).

The residue definition in an EUPT may differ from the legal one if this is deemed necessary by the organisers for ensuring a better evaluation of the results. Participants must express their results as defined in the Target Pesticides List of the respective EUPT. Separately quantifiable analytes are typically listed separately unless stated otherwise.

### Specific Protocol

The organising EURL will publish a Specific Protocol at least 2 weeks before the PT testing item is shipped to the participants. 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 PT item upon receipt and on how to submit results, as well as other relevant information.

### Homogeneity of the PT Item

The Homogeneity of the PT test Item evaluated according to ISO 13528:2022, Annex B<sup>8</sup>.

### Stability of the Analytes Contained in the PT Item

The PT item will be tested for stability according to ISO 13528:2022, Annex B<sup>8</sup>.

### 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. This can be done via the EURL data submission tool (in the following named Webtool) by answering the question whether the concerned analyte is included within the routine scope of the laboratory and the question about the analytical experience with the compound.

### General Procedures for Reporting Results

Participating laboratories are responsible for reporting their own quantitative results to the organisers within the stipulated deadline. Each laboratory will be able to report only one result for each analyte detected in the PT item. The concentrations of the analytes detected should be expressed in 'mg/kg' unless indicated otherwise in the specific protocol of the respective EUPT.

When reporting, the following number of significant figures should be given:

Concentration values  $\leq 0.01$  mg/kg - two significant figures (e.g. 0.0078; 0.010)

Concentration values  $> 0.01$  mg/kg to three significant figures (e.g. 0.0123; 0.123; 1.23; 12.3 mg/kg).

No penalties will apply where a laboratory reports deviating numbers of significant figures. For the calculation of z scores, the values will be used as reported.

Laboratories should not report results below their own reporting limits (RLs). Any reported numerical result that is lower than the RL will be marked as a 'False Reporting' (FR), see False Reporting on page 9.

### Correction of Results for Bias

According to the DG-SANTE Guidelines, the result of an analyte needs to be adjusted for method bias if the bias exceeds 20%. Unless the method used inherently accounts for method bias (see cases a-c below), laboratories are required to report the recovery (in percent), and whether their results was corrected mathematically using a recovery factor reflecting the reported recovery.

Results with bias above 20% (apparent recovery not within the range of 80-120%), for which no correction for bias was undertaken, might be omitted from the population used for calculating the assigned value.

When the laboratory uses any of the following approaches inherently accounting for method bias, this needs to be indicated in the appropriate fields within the Webtool. In such cases, reporting of the recovery rate is not mandatory.

- a) use of stable isotope labelled analogues of the target analytes as Internal Standard (ILISs), added to the analytical portion at an early stage of the procedure
- b) 'procedural calibration' approach
- c) 'standard addition' approach with additions of analyte(s) to the analytical portions before extraction.

### Methodology Information

All laboratories are obliged to provide information on the analytical method(s) they have used. This must be done via the Webtool, which serves for submitting analytical results.

### Results Evaluation

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

#### - False Positive (FP) Results

These are results of analytes from the Target Pesticides List, that are reported, at or above, their respective MRRL although they were: (i) "not detected"<sup>9</sup> by the organiser, and/or (ii) "not detected" by the overwhelming majority (e.g.  $> 95\%$ ) of the participating laboratories that had targeted the specific analytes.

<sup>8</sup> ISO 13528:2022: 'Statistical methods for use in proficiency testing by interlaboratory comparisons', International Organization for Standardization.

<sup>9</sup> The term "not detected" is also used in the Webtool. In this context this term entails also cases where no numerical result was reported (e.g. because the level determined was  $< \text{MRRL}$  and/or  $< \text{RL}$ )

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

Any results reported lower than the MRRL will not be considered as false positives, even though these results should not have been reported. If these results are additionally lower than the lab's reporting limit, they will be attributed with FR ('False Reporting').

### - False Negative (FN) Results

These are results for analytes reported by the laboratories as 'analysed' but without reporting numerical values although they were: a) used by the organisers to treat the PT item and b) detected by the organisers as well as the majority of the participants that had targeted these specific analytes at or above the respective MRRLs. Such results will also be regarded as "not correctly found" when it comes to categorization in A and B based on scope. Where for a compound present in the PT item a laboratory reports "not detected" and a RL exceeding the assigned value, the result will still be judged as a false negative, despite this practice being consistent and adequate within a routine working environment. The FN judgement should in this case penalize the laboratory for not being able to achieve sufficient sensitivity for the analyte in question.

### - False reporting (FR)

A result reported below the laboratories own reporting limit (RL) will be evaluated as a 'False Reporting' (FR). If the analytes concerned are present in the test material, z scores will be calculated as for any other numerical results. Furthermore, these results will be included in the population of results for the determination of the assigned value, unless they are excluded for other reasons (e.g. reported by laboratories of non-EU or EFTA countries, generated using biased methods, etc.).

### - Estimation of the Assigned Value ( $x_{pt}$ )

The Assigned Values (consensus concentration) will typically be estimated using the robust mean estimate of the participant results ( $xx^*$ ) as described in ISO 13528:2022<sup>10</sup>, taking into account the results reported by EU and EFTA countries laboratories only.

In reports, assigned values will be rounded to 3 significant figures if  $\geq 0.01$  mg/kg and to 2 significant figures if  $< 0.01$  mg/kg (i.e. 0.0078; 0.123; 1.23; 12.3 mg/kg). For the calculation of z scores, the organisers may opt to use assigned values rounded to more significant figures than those stated above.

### - Omission or Exclusion of Results

Results reported by laboratories from non-EU/EFTA member states are excluded from the population used to derive the assigned value.

Despite the use of robust statistics, all results 10 times higher than the assigned values will be omitted and the assigned values will be recalculated.

### - Uncertainty of the Assigned Value ( $u(x_{pt})$ )

The uncertainty of the robust mean values ( $x_{pt}$ ) is calculated according to ISO 13528:2022 as:

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

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

### - Standard Deviation for Proficiency Assessment (Target Standard Deviation)

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

Based on experience from previous EUPTs<sup>11</sup>, a percentage FFP-RSD of 25 % is currently used for all analyte-matrix combination, with the target standard deviation being calculated as follows:

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

For informative purposes the robust relative standard deviation ( $CV^*$ ) of the participants results is calculated according to ISO 13528:2022; Chapter 7.7 following Algorithm A in Annex C (so called "consensus approach from participant results").

### - z Scores

This parameter is calculated using the following formula:

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

where  $x_i$  is the value reported by the laboratory,  $x_{pt}$  is the assigned value, and  $FFP-\sigma_{pt}$  is the standard deviation using the FFP approach. Z scores shown in the preliminary and Final EUPT-Report 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.

Following ISO 17043:2010<sup>12</sup>, z scores will be classified as follows:

<sup>10</sup> ISO 13528:2022 "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).

<sup>11</sup> 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. DOI:10.1021/jf104060h

<sup>12</sup> ISO/IEC 17043:2010. Conformity assessment – General requirements for proficiency testing

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

Z scores higher than 5 will be reported as >5 in the reports and in certificates.  
All false negatives will be assigned a z score of -4.

### - Collection of Measurement Uncertainty (MU) Figures

For each EUPT the participating labs are asked to voluntarily report the MU figure they would report in routine analyses.

### - Categorization of Laboratories

A scope-based classification into Category A and Category B will be employed. Laboratories that

- a) have analysed at least 90% of the compulsory analytes in the target pesticides list
- b) have correctly detected and quantified at least 90 % of the analytes present in the PT item
- c) reported no false positives

will be considered to have demonstrated 'sufficient scope' and will therefore be classified into Category A. The criterion of analytes present in the PT item, will be calculated as 90 % of the number of analytes needed to be correctly detected and quantified (no obtained FN for any of the compounds) rounding down to the nearest full number (see Table 1).

**Table 1: Number of analytes from the Target Pesticides List needed to be targeted or analytes present in the PT item that need to be correctly detected and quantified to have sufficient scope.**

No. of compulsory analytes present in the PT item / target pesticides list (N)	90 %	No. of compulsory analytes 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	
6	5.4	5	N - 1
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	N - 2
15	13.5	13	
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	N - 3
25	22.5	22	
26	23.4	23	

### - Overall Performance of Laboratories - Combined z Scores

For evaluation of the overall performance of laboratories the average of the squared z scores ( $AZ^2$ )<sup>13</sup> are calculated. To minimize the influence of outlying results, the calculation of  $AZ^2$  will not be conducted in the case of < 6 results. Z scores higher than 5 will be set as 5 and false negative z scores (-4.0) will be included. Combined z scores will only be calculated for laboratories within Category A and considering results of compulsory analytes only.

Considering the cut-off of high z scores at 5, the  $AZ^2$  is calculated as follows:

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

Where  $n$  is the number of z scores to be considered in the calculation. 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

<sup>13</sup> 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. DOI:10.1007/s00216-010-3877-3

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Laboratories within Category B will be typically ranked according to the total number of analytes they correctly reported to be present in the PT item. The number of acceptable z scores achieved may be presented, too. Combined z scores are considered to be of lesser importance than individual z scores. The EUPTSC 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 being too low.

Where only a few results per lab are available (mostly the case in EUPT-SRMs), the average of the absolute z scores ( $AZ$ ) 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  $AZ$ , z scores higher than 5 will also be set as 5. The z scores appointed to false negatives will be also included in the combined z score calculations.

### Publication of Results

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

The Final EUPT-Report will be published after the EUPT-SC has discussed the results. Taking into account that the EUPT-SC 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 12 months after the deadline for results submission. Results submitted by non-EU/EFTA laboratories might not always be included in all tables or figures in the Final EUPT-Report.

### Certificates of Participation

The EUPT organisers will deliver a Certificate of Participation to each participating laboratory showing the z scores achieved for each individual analyte, and if available the classification into Categories, and  $AZ^2$  scores. The certificates will be sent by email and in some cases also be uploaded onto the EURL-DataPool and thereby be accessible to the concerned laboratories only.

### Feedback and Complaints

Complaints and appeals on aspect concerning the PT are welcome. Complaints about a non-arrival of a PT item or about the bad condition of the PT item upon arrival should be done through the Webtool shortly as indicated in the specific protocols. The EURLs will track complaints about the evaluation of the participants results and follow up within due time. After the publication of the final EUPT report, the organizers reserve the right not to consider any complaints arriving more than two months after its publication.

Appeals and complaints concerning the principles of organisation and statistical analysis of the results according to the General Protocol should be made prior to the start of a PT. By signing up to an EUPT, the participant agrees with the provisions of the General Protocol valid for the PT-season in question.

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

### 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 and carefully study the latest version of these documents.**

If substantial errors are discovered in the Preliminary EUPT-Report the organisers will distribute a new corrected version, therein it will be stated that the previous version is no longer valid. The online version on the PT website will be replaced.

Where substantial errors are discovered in the Final EUPT-Report 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 revised certificates will be issued.

### Follow-up Activities on Behalf of Participants

According to ISO 17025, 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.

Upon request, the laboratory's corresponding NRL and/or EURL is to be informed about the outcome of any investigative activities for false positives, false negatives and for results with  $|z| \geq 3.0$ .

### Follow-up Activities on Behalf of Organizers and Underperformance Rules

In accordance with the 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 analytes in the target lists (80% for SRM-compounds), or c) detected less than 90% of the compulsory compounds present in the PT items (80% for SRM-compounds). Additionally, NRLs that obtained  $AZ^2$  higher than 3 ( $AZ$  higher than 1.3 for SRM-compounds) in two consecutive EUPTs of the last four EUPTs, will be considered as **underperforming in accuracy**.

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As soon as underperformance of an NRL is detected, a two-step protocol established by DG-SANTE will be applied<sup>14</sup>:

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 appropriate actions to be taken.

### **Disclaimer**

The EURLs retain 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.

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<sup>14</sup> Article 101 of Regulation (EU) 2017/625

## **EUPT-FV27 SPECIFIC PROTOCOL**

### **European Union Proficiency Test for Pesticide Residues in Fruits and Vegetables (2025)**

#### **Introduction**

This protocol is complementary to the General Protocol of EU Proficiency Tests (EUP) for Pesticide Residues in Food and Feed (12<sup>th</sup> 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 (23<sup>rd</sup> 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 (EUPs) for pesticide residues organised by the European Union.

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

#### **Proficiency testing Item**

This proficiency test is based on the analysis of pesticide residues in **Kiwi**. Organic Kiwis were purchased from a specialised organic market in Almería. Kiwis were milled and spiked with the analytical standards of the pesticides. All the material was homogenised and packed in plastic bags. Once frozen, the material was milled again, and subsampled into polyethylene bottles that had previously been coded.

Ten of these bottles containing the test item were chosen randomly and analysed to check for homogeneity. The test item was stored frozen (-20°C) prior to shipment to participants.

A minimum of six bottles, again chosen randomly, will be analysed over a period of time to confirm the stability of the pesticides in the test item (three when the test items are shipped, then other three bottles 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 PT item. If the sample shipment of EU/EFTA labs takes more than 48 hours, three extra bottles will be analysed each day of delay, studying this way the stability of the samples that took longer to arrive to an EU/EFTA laboratory. All analytical determinations concerning the PT item treatment analysis will be performed in a laboratory which is ISO 17025 accredited, in this case, the EURL-FV laboratory.

Blank material will not be distributed to the participants.

#### **Amount of Test Item**

Participants will receive:

- Approximately 200 g of kiwi test item spiked with pesticides.

#### **Shipment of PT Item**

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

The shipment of the PT items will be carried out over a one-week period from the 12<sup>th</sup> May 2025. 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 PT Item Handling**

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

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

#### **Target List**

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

#### **Assigned value and robust relative standard deviation**

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

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

### Laboratory assessment

For the assessment of the overall laboratory performance, the Average of the Squared z-Score (AZ<sup>2</sup>) will be used, 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, which can be found on the EURL-FV Web page, before the deadline stipulated on the Calendar. It is recommended that laboratories download the Target Pesticide Lists from this web site. Laboratories should carefully read the Target Pesticide Lists, where the Minimum Required Reporting Limits (MRRs) are given. The MRRs do not always correspond with the EU MRLs set for kiwi.
2. The participation fee will be **350 euros** for EU/EFTA participants and **450 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 invoice number identifying them will not be considered as paid.**
3. Any communication with the Organisation should be made using a **Contact Form** placed in the restricted area, or by e-mail (cferrer@ual.es).
4. Laboratories will be assigned a user name and password for the restricted area of submission of results.
5. **Scope Form** will be placed in the restricted area and will be open to participants from the 28<sup>th</sup> April – 12<sup>th</sup> May 2025, prior to PT 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 mandatory target list are selected and all compounds of the voluntary target list are deselected, and the MRR is listed in the scope. Laboratories will be asked to indicate the compounds they have 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.
6. When the participant laboratories receive the PT item (and not before), they must enter the restricted area again and submit the **PT Item Receipt Form** to inform the Organiser that they have accepted the test item. If no PT item has been received by 16<sup>th</sup> May 2025, the laboratories should contact the Organiser. If the test item receipt form is not filled in, the Organiser will consider that the participant has accepted the PT 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 EUPT webtool. The participant laboratories must respect the deadline for submitting their results – 9<sup>th</sup> June 2025 (23:30 pm at the latest) - 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. 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:

- Two, for residue levels <0.010 mg/kg (e.g. 0.0086 mg/kg, 0.010 mg/kg).

- Three, for residue levels ≥ 0.010 mg/kg (e.g. 0.0673, 0.245, 1.32, 10.1 mg/kg).

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, their results will be: "No results reported".**

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 9<sup>th</sup> June 2025 (23:30 pm at the latest).

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

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

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

8. One final tab, **Additional Info**, will be accessible after the deadline for submission of results has passed. In this Form it will be possible to submit the method information of false negative results. The deadline for this form will be 10<sup>th</sup> June 2025. 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

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well as graphical displays of the results and any conclusions. Results submitted by non-EU/EFTA laboratories might not always be used in the tables or figures in the final report. Further relevant information considered to be of value may also be included.

### Calendar

ACTIVITY	DATE
Registration period	17 <sup>th</sup> December 2024 - 8 <sup>th</sup> April 2025
Specific Protocol published on the Web site.	28 <sup>th</sup> April 2025 at the latest
Selection of the scope	28 <sup>th</sup> April – 12 <sup>th</sup> May 2025
Sample distribution.	12 <sup>th</sup> May 2025
Deadline for receiving sample acceptance	16 <sup>th</sup> May 2025
Deadline for receiving results	9 <sup>th</sup> June 2025 23:30 pm CEST
Filling in additional information, if necessary.	10 <sup>th</sup> – 18 <sup>th</sup> June 2025
Preliminary Report: (containing preliminary assigned values and z scores)	July 2025
Final Report distributed to the Laboratories.	October 2025

### Cost of PT item shipment.

EU/EFTA laboratories will be charged **350 €** for the shipment cost, for **non-EU/EFTA** laboratories the amount will be **450 €**. Regarding payment procedures - each laboratory can specify their details and invoice requests when applying for the test.

**Please, do not pay for this EUPT until you receive the invoice.  
Remember to include your invoice number in the subject of the bank transfer.**

Payment details are as follows:

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

### 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

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

- |                            |                              |               |
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### Quality Control Group

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

### Advisory Group

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**TARGET PESTICIDE LIST FOR EUPF-FV-27****Compulsory Compounds (will be considered in Category A/B classification)**

Pesticide No.	Pesticides	MRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
1	Acephate	0.005		Acephate
2	Acetamiprid	0.005		Acetamiprid
3	Aclonifen	0.005		Aclonifen
4	Acrinathrin	0.005		Acrinathrin
5	Aldicarb	0.005		Aldicarb
6	Aldicarb Sulfone	0.005		Aldicarb sulfone
7	Aldicarb Sulfoxide	0.005		Aldicarb sulfoxide
8	Aldrin	0.005		Aldrin
9	Ametoctradin	0.005		Ametoctradin
10	Azadirachtin	0.005		Azadirachtin
11	Azinphos-methyl	0.005		Azinphos-methyl
12	Azoxystrobin	0.005		Azoxystrobin
13	Bifenthrin	0.005	Bifenthrin (sum of isomers)	Bifenthrin
14	Biphenyl	0.005		Biphenyl
15	Bitertanol	0.005	Bitertanol (sum of isomers)	Bitertanol
16	Boscalid	0.005		Boscalid
17	Bromopropylate	0.005		Bromopropylate
18	Bromuconazole	0.005	Bromuconazole (sum of diastereoisomers)	Bromuconazole
19	Bupirimate	0.005		Bupirimate
20	Buprofezin	0.005		Buprofezin
21	Cadusafos	0.005		Cadusafos
22	Carbaryl	0.005		Carbaryl
23	Carbendazim	0.005	Carbendazim and benomyl (sum of benomyl and carbendazim expressed as carbendazim)	Carbendazim (sum)
24	Carbofuran	0.005		Carbofuran
25	Carbofuran-3-hydroxy	0.005		Carbofuran-3-hydroxy
26	Chlorantraniliprole	0.005		Chlorantraniliprole
27	Chlorfenapyr	0.005		Chlorfenapyr
28	Chlorfenvinphos	0.005		Chlorfenvinphos
29	Chlorobenzilate	0.005		Chlorobenzilate
30	Chlorothalonil	0.005		Chlorothalonil
31	Chlorpropham	0.005		Chlorpropham
32	Chlorpyrifos	0.005		Chlorpyrifos
33	Chlorpyrifos-methyl	0.005		Chlorpyrifos-methyl
34	Clofentezine	0.005		Clofentezine
35	Clothianidin	0.005		Clothianidin
36	Cyantraniliprole	0.005		Cyantraniliprole
37	Cyazofamid	0.005		Cyazofamid
38	Cyflufenamid	0.005	Cyflufenamid: sum of cyflufenamid (Z-isomer) and its E-isomer	Cyflufenamid
39	Cyflumetofen	0.005	Cyflumetofen (sum of isomers)	Cyflumetofen
40	Cyfluthrin	0.005	Cyfluthrin (cyfluthrin incl. other mixtures of constituent isomers (sum of isomers))	Cyfluthrin (sum of isomers)
41	Cymoxanil	0.005		Cymoxanil
42	Cypermethrin	0.005	Cypermethrin (cypermethrin incl. other mixtures of constituent isomers (sum of isomers))	Cypermethrin (sum of isomers)
43	Cyproconazole	0.005		Cyproconazole
44	Cyprodinil	0.005		Cyprodinil
45	Deltamethrin	0.005	Deltamethrin (cis-deltamethrin)	Deltamethrin (cis-deltamethrin)
46	Demeton-S-methylsulfone	0.005		Demeton-S-methylsulfone
47	Diazinon	0.005		Diazinon
48	Dichlofluanid	0.005		Dichlofluanid
49	Dichlorvos	0.005		Dichlorvos
50	Dicloran	0.005		Dicloran
51	Dicofol	0.005	Dicofol (sum of p, p' and o,p' isomers)	Dicofol (sum of p, p' and o,p' isomers)
52	Dieldrin	0.005		Dieldrin
53	Diethofencarb	0.005		Diethofencarb
54	Difenoconazole	0.005		Difenoconazole
55	Diflubenzuron	0.005		Diflubenzuron
56	Dimethoate	0.003		Dimethoate
57	Dimethomorph	0.005	Dimethomorph (sum of isomers)	Dimethomorph
58	Dimethylaminosulfotoluidide (DMST)	0.005		Dimethylaminosulfotoluidide (DMST)
59	Diniconazole	0.005	Diniconazole (sum of isomers)	Diniconazole
60	Diphenylamine	0.005		Diphenylamine
61	Endosulfan alpha	0.005		Endosulfan alpha

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

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
62	Endosulfan beta	0.005		Endosulfan beta
63	Endosulfan sulfate	0.005		Endosulfan sulfate
64	EPN	0.005		EPN
65	Epoxiconazole	0.005		Epoxiconazole
66	Ethion	0.005		Ethion
67	Ethirimol	0.005		Ethirimol
68	Ethoprophos	0.005		Ethoprophos
69	Etofenprox	0.005		Etofenprox
70	Etoazole	0.005		Etoazole
71	Famoxadone	0.005		Famoxadone
72	Fenamidone	0.005		Fenamidone
73	Fenamiphos	0.005		Fenamiphos
74	Fenamiphos sulfone	0.005		Fenamiphos sulfone
75	Fenamiphos sulfoxide	0.005		Fenamiphos sulfoxide
76	Fenarimol	0.005		Fenarimol
77	Fenazaquin	0.005		Fenazaquin
78	Fenbuconazole	0.005		Fenbuconazole
79	Fenhexamid	0.005		Fenhexamid
80	Fenitrothion	0.005		Fenitrothion
81	Fenoxycarb	0.005		Fenoxycarb
82	Fenpropathrin	0.005		Fenpropathrin
83	Fenpropidin	0.005		Fenpropidin
84	Fenpropimorph	0.005	Fenpropimorph (sum of isomers)	Fenpropimorph
85	Fenpyrazamine	0.005		Fenpyrazamine
86	Fenpyroximate	0.005		Fenpyroximate
87	Fenthion	0.005		Fenthion
88	Fenthion oxon	0.005		Fenthion oxon
89	Fenthion oxon sulfone	0.005		Fenthion oxon sulfone
90	Fenthion oxon sulfoxide	0.005		Fenthion oxon sulfoxide
91	Fenthion sulfone	0.005		Fenthion sulfone
92	Fenthion sulfoxide	0.005		Fenthion sulfoxide
93	Fenvalerate	0.005	Fenvalerate (any ratio of constituent isomers (RR, SS, RS & SR) including esfenvalerate)	Fenvalerate and Esfenvalerate (Sum of RR/SS and RS/SR isomers)
94	Fipronil	0.004		Fipronil
95	Fipronil sulfone	0.004		Fipronil-Sulfone
96	Flonicamid	0.005		Flonicamid
97	Flubendiamide	0.005		Flubendiamide
98	Fludioxonil	0.005		Fludioxonil
99	Flufenoxuron	0.005		Flufenoxuron
100	Fluopicolide	0.005		Fluopicolide
101	Fluopyram	0.005		Fluopyram
102	Flupyradifurone	0.005		Flupyradifurone
103	Fluquinconazole	0.005		Fluquinconazole
104	Flusilazole	0.005		Flusilazole
105	Flutolanil	0.005		Flutolanil
106	Flutriafol	0.005		Flutriafol
107	Fluxapyroxad	0.005		Fluxapyroxad
108	Formetanate	0.005	Formetanate (Sum of formetanate and its salts expressed as formetanate (hydrochloride))	Formetanate
109	Fosthiazate	0.005		Fosthiazate
110	Hexaconazole	0.005		Hexaconazole
111	Hexythiazox	0.005		Hexythiazox
112	Imazalil	0.005		Imazalil
113	Imidacloprid	0.005		Imidacloprid
114	Indoxacarb	0.005	Indoxacarb (sum of indoxacarb and its R enantiomer)	Indoxacarb (sum of isomers)
115	Iprodione	0.005		Iprodione
116	Iprovalicarb	0.005		Iprovalicarb
117	Isocarbophos	0.005		Isocarbophos
118	Isufenphos-methyl	0.005		Isufenphos-methyl
119	Isfetamid	0.005		Isfetamid
120	Isoprothiolane	0.005		Isoprothiolane
121	Kresoxim-methyl	0.005		Kresoxim-methyl
122	Lambda-Cyhalothrin	0.005	Lambda-cyhalothrin (sum of isomers)	Lambda-cyhalothrin (sum of isomers)
123	Linuron	0.005		Linuron
124	Lufenuron	0.005		Lufenuron
125	Malaoxon	0.005		Malaoxon
126	Malathion	0.005		Malathion
127	Mandipropamid	0.005		Mandipropamid
128	Mefentrifluconazole	0.005		Mefentrifluconazole

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

Pesticide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
129	Mepanipyrim	0.005		Mepanipyrim
130	Metaflumizone	0.005	Metaflumizone (sum of E- and Z- isomers)	Metaflumizone (sum of E- and Z- isomers)
131	Metalaxyl	0.005	Metalaxyl and metalaxyl-M	Metalaxyl
132	Metamifron	0.005		Metamifron
133	Methamidophos	0.005		Methamidophos
134	Methidathion	0.005		Methidathion
135	Methiocarb	0.005		Methiocarb
136	Methiocarb sulfone	0.005		Methiocarb sulfone
137	Methiocarb sulfoxide	0.005		Methiocarb sulfoxide
138	Methomyl	0.005		Methomyl
139	Methoxyfenozide	0.005		Methoxyfenozide
140	Metrafenone	0.005		Metrafenone
141	Monocrotophos	0.005		Monocrotophos
142	Myclobutanil	0.005		Myclobutanil
143	Omethoate	0.003		Omethoate
144	Orthophenylphenol	0.005	Orthophenylphenol (Free compound only), 2-phenylphenol	Orthophenylphenol
145	Oxadixyl	0.005		Oxadixyl
146	Oxamyl	0.005		Oxamyl
147	Oxydemeton-methyl	0.005	Demeton-S-Methylsulfoxide	Oxydemeton-methyl
148	Paclobutrazol	0.005		Paclobutrazol
149	Paraoxon-methyl	0.005		Paraoxon-methyl
150	Parathion	0.005	Parathion-ethyl	Parathion-ethyl
151	Parathion-methyl	0.005		Parathion-methyl
152	Penconazole	0.005		Penconazole
153	Pencycuron	0.005		Pencycuron
154	Pendimethalin	0.005		Pendimethalin
155	Permethrin	0.005	Permethrin (sum of isomers)	Permethrin (sum of isomers)
156	Phenthoate	0.005		Phenthoate
157	Phosalone	0.005		Phosalone
158	Phosmet	0.005		Phosmet
159	Phosmet oxon	0.005		Phosmet oxon
160	Phoxim	0.005		Phoxim
161	Pirimicarb	0.005		Pirimicarb
162	Pirimiphos-methyl	0.005		Pirimiphos-methyl
163	Prochloraz	0.005	Prochloraz (only parent compound)	Prochloraz
164	Procymidone	0.005		Procymidone
165	Profenofos	0.005		Profenofos
166	Propamocarb	0.005	Propamocarb (only parent compound)	Propamocarb
167	Propargite	0.005		Propargite
168	Propiconazole	0.005	Propiconazole (sum of isomers)	Propiconazole
169	Propyzamide	0.005		Propyzamide
170	Proquinazid	0.005		Proquinazid
171	Prosulfocarb	0.005		Prosulfocarb
172	Prothioconazole	0.005	Prothioconazole (Prothioconazole-desthio) (sum of isomers)	Prothioconazole-desthio
173	Prothiofos	0.005		Prothiofos
174	Pymetrozine	0.005		Pymetrozine
175	Pyraclostrobin	0.005		Pyraclostrobin
176	Pyridaben	0.005		Pyridaben
177	Pyridalyl	0.005		Pyridalyl
178	Pyrimethanil	0.005		Pyrimethanil
179	Pyriproxyfen	0.005		Pyriproxyfen
180	Quinoxyfen	0.005		Quinoxyfen
181	Spinetoram	0.005	Spinetoram (sum of spinetoram-J and spinetoram-L)	Spinetoram
182	Spinosad	0.005	Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)	Spinosad (sum of spinosyn A and spinosyn D, expr. as spinosad)
183	Spirodiclofen	0.005		Spirodiclofen
184	Spiromesifen	0.005		Spiromesifen
185	Spirotetramat	0.005		Spirotetramat
186	Spirotetramat-enol	0.005		Spirotetramat, BYI 03380-enol
187	Spiroxamine	0.005	Spiroxamine (sum of isomers)	Spiroxamine
188	Sulfoxaflor	0.005	Sulfoxaflor (sum of isomers)	Sulfoxaflor
189	Tau-Fluvalinate	0.005		Tau-Fluvalinate
190	Tebuconazole	0.005		Tebuconazole
191	Tebufenozide	0.005		Tebufenozide
192	Tebufenpyrad	0.005		Tebufenpyrad
193	Teflubenzuron	0.005		Teflubenzuron
194	Tefluthrin	0.005		Tefluthrin

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

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
195	Terbutylazine	0.005		Terbutylazine
196	Tetraconazole	0.005		Tetraconazole
197	Tetradifon	0.005		Tetradifon
198	Thiabendazole	0.005		Thiabendazole
199	Thiacloprid	0.005		Thiacloprid
200	Thiamethoxam	0.005		Thiamethoxam
201	Thiodicarb	0.005		Thiodicarb
202	Thiophanate-methyl	0.005		Thiophanate-methyl
203	Tolclofos-methyl	0.005		Tolclofos-methyl
204	Tolyfluanid	0.005		Tolyfluanid
205	Triadimefon	0.005		Triadimefon
206	Triadimenol	0.005	Triadimenol (any proportion of constituent isomers)	Triadimenol
207	Triazophos	0.005		Triazophos
208	Trichlorfon	0.005		Trichlorfon
209	Tricyclazole	0.005		Tricyclazole
210	Trifloxystrobin	0.005		Trifloxystrobin
211	Triflumizole	0.005		Triflumizole
212	Triflumizole metabolite (FM-6-1)	0.005	N-(4-chloro-2-trifluoromethylphenyl)-n-propoxyacetamide	Triflumizole, FM-6-1
213	Triflumuron	0.005		Triflumuron
214	Trifluralin	0.005		Trifluralin
215	Triticonazole	0.005		Triticonazole
216	Vinclozolin	0.005	Vinclozolin	Vinclozolin
217	Zoxamide	0.005		Zoxamide

### New pesticides in the Mandatory Target list

#### MRRL: Minimum Required Reporting Level

This list is based on Commission Implementing Regulation (EU) 2024/989 of 2 April 2024  
MRRLs are based on Regulation (EC) No. 396/2005, Regulation (EU) 2016/127 and on toxicity data of each compound.

Low MRRLs allow evaluation of pesticides at low concentration levels.

**VOLUNTARY PESTICIDE LIST FOR EUPT-FV-27**Voluntary Compounds (will **NOT** be considered in Category A/B classification)

Pestide No.	Pesticides	MRRL (mg/kg)	Additional information: Residue definitions or isomers to analyse	Webtool name
1	1,4-Dimethylnaphthalene	0.005		1,4-Dimethylnaphthalene
2	4-bromophenylurea	0.005	Metabolite of metabromuron	4-bromophenylurea
3	Alpha-cypermethrin	0.005		Alpha-Cypermethrin (aka alphamethrin)
4	Benalaxyl	0.005	Benalaxyl including other mixtures of constituent isomers including benalaxyl-M (sum of isomers)	Benalaxyl
5	Benzovindiflupyr	0.005		Benzovindiflupyr
6	Bifenazate	0.005	Bifenazate (sum of bifenazate plus bifenazate-diazene expressed as bifenazate) (F)	Bifenazate
7	Bifenazate-Diazene	0.005		Bifenazate-Diazene
8	Chlorfluazuron	0.005		Chlorfluazuron
9	Clomazone	0.005		Clomazone
10	Cyhalofop-butyl	0.005		Cyhalofop-Butyl
11	Dinotefuran	0.005		Dinotefuran
12	Diuron	0.005		Diuron
13	Fenobucarb	0.005		Fenobucarb
14	Fenpicoxamid	0.005		Fenpicoxamid
15	Florpyrauxifen-benzyl	0.005		Florpyrauxifen-benzyl
16	Fluazinam	0.005		Fluazinam
17	Fluensulfone	0.005		Fluensulfone
18	Flufenacet	0.005	Flufenacet (only parent compound)	Flufenacet
19	Flutianil	0.005		Flutianil
20	Forchlorfenuron	0.005		Forchlorfenuron
21	Heptachlor	0.005		Heptachlor
22	Heptachlor epoxide, cis-	0.005	cis-Heptachlor epoxide	Heptachlorepoxyd-cis
23	Heptachlor epoxide, trans-	0.005	trans-Heptachlor epoxide	Heptachlorepoxyd-trans
24	Isopyrazam	0.005		Isopyrazam
25	Isoxaflutole	0.005		Isoxaflutole
26	Isoxaflutole diketonitrile degradate	0.005		Isoxaflutole, RPA 202248
27	Metaldehyde	0.005		Metaldehyde
28	Metconazole	0.005	Metconazole (sum of isomers)	Metconazole (sum of isomers)
29	Metobromuron	0.005		Metobromuron
30	Molinate	0.005		Molinate
31	Novaluron	0.005		Novaluron
32	Oxadiazyl	0.005		Oxadiazyl
33	Oxathiapiprolin	0.005		Oxathiapiprolin
34	Oxyfluorfen	0.005		Oxyfluorfen
35	Penflufen	0.005		Penflufen
36	Pentachloro-aniline	0.005		Pentachloroaniline
37	Penthiopyrad	0.005		Penthiopyrad
38	Phenmedipham	0.005		Phenmedipham
39	Picolinafen	0.005		Picolinafen
40	Propaquizafop	0.005		Propaquizafop
41	Pyrethrins	0.005	Pyrethrin (sum)	Pyrethrin (sum)
42	Pyridate	0.005	Pyridate (only parent compound)	Pyridate
43	Pyriofenone	0.005		Pyriofenone
44	Quinalphos	0.005		Quinalphos
45	Quinoclamine	0.005		Quinoclamine
46	Quintozene	0.005		Quintozene
47	Rotenone	0.005		Rotenone
48	Tetramethrin	0.005		Tetramethrin
49	Tolfenpyrad	0.005		Tolfenpyrad
50	Tri-allate	0.005		Tri-Allate
51	Trinexapac (free acid)	0.005	Trinexapac (sum of trinexapac (acid) and its salts, expressed as trinexapac)	Trinexapac (free acid)
52	Tritosulfuron	0.005		Tritosulfuron

New pesticides this year

This list is based on the working document SANCO/12745/2013 rev. 16 (3)