

# ***4<sup>th</sup> QS Laboratory Performance Assessment***

performed by

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on behalf of

QS Fachgesellschaft Obst-Gemüse-Kartoffeln GmbH

## ***Report***

**Laborcode:42**

Pesticide Residues in Fruit Purée (Strawberries)

April / May 2008

## Summary

The test material for the 4<sup>th</sup> Performance Assessment of QS GmbH was made by FAPAS<sup>®</sup> in April 2008 to provide individual test material tailored to QS needs. The material was distributed to sixty two (62) participants across nine (9) countries. Each laboratory received a fruit purée (strawberries) sample spiked with pesticides. All participants kept the term for the submission of results.

The laboratories were requested to identify and quantify seven from a list of 185 possible pesticides. These were Clofentezine, Cyproconazole, Hexythiazox, lambda-Cyhalothrin, Mepanipyrim, Pyraclostrobin and Tebufenpyrad.

The z-scores were determined applying FAPAS<sup>®</sup> method<sup>1, 2, 3)</sup>. The assigned values ( $\hat{X}$ ) for the pesticide concentrations were calculated using Huber's algorithm. The target standard deviation ( $\sigma_p$ ) was calculated using the appropriate form of Horwitz equation<sup>4)</sup>. Results with  $z \leq |2|$  are regarded as satisfactory.

The performance assessment results are summarised in the following table:

analyte	assigned value, $\hat{X}$ , $\mu\text{g/kg}$	number of satisfactory z-scores $z \leq  2 $	total number of scores	satisfactory %
Clofentezine	411	54	62	87
Cyproconazole	74	56	62	90
Hexythiazox	97	51	62	82
lambda-Cyhalothrin	139	51	62	82
Mepanipyrim	66	58	62	94
Pyraclostrobin	102	54	62	87
Tebufenpyrad	50	56	62	90

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## 1. Test Material

The material for this Performance Assessment was supplied by FAPAS<sup>®</sup>. Each laboratory received a frozen fruit purée (strawberries) sample spiked with pesticides. The homogeneity tests results are given in Table 1<sup>5)</sup>.

## 2. Results

The participants were requested to report which pesticides the fruit purée (Strawberries) had been analysed for. The results had to be reported without consideration of the recovery. The limit of quantification (LOQ) had to be specified for all pesticides. Each laboratory was given a number (laboratory code). The results of all participants are presented in Tables 5 to 11.

## 3. Statistical Evaluation of Results

The statistical procedure applied for this performance assessment is internationally accepted and used in inter-laboratory test series to achieve transparent and fair results. The method used follows recommendations given in the IUPAC/ISO/AOAC International Harmonised Protocol for the Proficiency Testing of Chemical Analytical Laboratories<sup>6)</sup>.

### 3.1. Calculation of the Assigned Value, $\hat{X}$

The assigned value,  $\hat{X}$ , is derived as a robust mean from the results of all participants and presents the best estimate of the true concentration of the analyte.

The influence of outliers is minimised via Huber's method.

The uncertainty ( $u$ ) of the robust mean is given by

$$u = \frac{\hat{\sigma}}{\sqrt{n}}$$

$\hat{\sigma}$  = the standard deviation of the robust mean (assigned value  $\hat{X}$ ),

$n$  = the number of data points used for calculation of  $\hat{X}$

The values for  $\hat{X}$ ,  $\hat{\sigma}$ ,  $u$  and  $n$  are presented in Table 2.

### 3.2. Target Standard Deviation for the Performance Assessment, $\sigma_p$

The target standard deviation for this laboratory test was derived from the appropriate form of the Horwitz equation. It predicts a standard deviation from a given concentration  $c$ , here is  $c$  the assigned value  $\hat{X}$ .

There are three forms of the Horwitz equation for different analyte concentrations:

- i) for analyte concentrations <120 ppb

$$\sigma_p = \frac{0.22c}{mr}$$

- ii) for analyte concentrations  $\geq 120$  ppb and  $\leq 13,8\%$

$$\sigma_p = \frac{0.02c^{0.8495}}{mr}$$

- iii) for analyte concentrations >13,8%

$$\sigma_p = \frac{0.01c^{0.5}}{mr}$$

$c = \hat{X}$ , expressed as a dimensionless mass ratio, e. g. 1 ppm  $\equiv 10^{-6}$  or %  $\equiv 10^{-2}$   
 $mr =$  expressed as a dimensionless mass ratio, e. g. 1 ppm  $\equiv 10^{-6}$  or %  $\equiv 10^{-2}$

### 3.3. Calculation of the Individual z-Scores

The z-scores for each participant and each analyte were calculated as:

$$z = \frac{x - \hat{X}}{\sigma_p}$$

where  $x$  = the reported result  
 $\hat{X}$  = the assigned value  
 $\sigma_p$  = the target value of the standard deviation

If a participant did not identify one or more residues, these results were set equal to zero and the z-scores were calculated accordingly.

The z-scores are given in Tables 5 to 11.

Further statistical approaches are presented in Table 2, Table 3 and Table 4.

## 4. References

- 1) FAPAS<sup>®</sup>, 2002, *Protocol for the Food Analysis Performance Assessment Scheme Organisation and Analysis of Data*, 6<sup>th</sup> edition.
- 2) Lowthian, P.J. and Thompson, M., 2002, Bump-hunting for the proficiency tester-searching for multimodality, *Analyst*, **127**, 1359-1364.
- 3) Analytical Methods Committee, 1989, Robust statistics – How not to reject outliers Part 1. Basic concepts, *Analyst*, **114**, 1693-1697.
- 4) Thompson, M., 2000, Recent trends in inter-laboratory precision at ppb and sub-ppb concentrations in relation to fitness for purpose criteria in proficiency testing, *Analyst*, **125**, 385-386.
- 5) Fearn, T. and Thompson, M., 2001, A new test for sufficient homogeneity, *Analyst*, **126**, 1414-1417.
- 6) Thompson, M., Ellison, S.L.R. and Wood, R., 2006, The International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories, *Pure Appl. Chem.*, **78**, No. 1, 145-196.

Analyte

sample id	cyproconazole mg/kg			tebufenpyrad mg/kg			cyhalothrin-l mg/kg			mepanipyrim mg/kg	
	replicate 1	replicate 2		replicate 1	replicate 2		replicate 1	replicate 2		replicate 1	replicate 2
1	0.06	0.0543		0.0361	0.0383		0.114	0.123		0.0395	0.04
2	0.0636	0.062		0.0492	0.0422		0.128	0.121		0.045	0.042
3	0.0623	0.0689		0.0472	0.0469		0.128	0.14		0.046	0.0425
4	0.062	0.0677		0.0407	0.0418		0.126	0.119		0.0395	0.047
5	0.068	0.064		0.0482	0.0432		0.137	0.124		0.0435	0.0425
6	0.0683	0.0659		0.039	0.0431		0.122	0.126		0.044	0.0425
7	0.0677	0.0578		0.0487	0.0464		0.139	0.123		0.0445	0.0415
8	0.0669	0.0681		0.0438	0.0454		0.133	0.133		0.0465	0.046
9	0.0728	0.0682		0.0465	0.0402		0.125	0.114		0.047	0.044
10	0.0634	0.076		0.0421	0.0424		0.128	0.134		0.046	0.0415
<i>mean, n</i>	0.065395	20		0.04357	20		0.12685	20		0.04355	20
origin of target sd (sp)	Horwitz	<120ppb		Horwitz	<120ppb		Horwitz	original		Horwitz	<120ppb
abs. target sd (sp) & as RSD%	0.014387	22		0.009585	22		0.027687	2.182.653		0.009581	22
$s_{an}$	0.00454			0.002689			0.006786			0.002444	
$s_{am}^2$	4.62E-06			6.63E-06			9.53E-06			0	
$\chi_{all}^2$	1.86E-05			8.27E-06			6.9E-05			8.26E-06	
<i>critical</i>	5.58E-05			2.28E-05			0.000176			2.16E-05	
$s_{am}^2 < critical?$	<b>ACCEPT</b>			<b>ACCEPT</b>			<b>ACCEPT</b>			<b>ACCEPT</b>	

**Table 1a: Results of Homogeneity Tests by FAPAS®**

Analyte

sample id	clofentezine mg/kg		hexathiazox mg/kg		pyraclostrobin mg/kg	
	replicate 1	replicate 2	replicate 1	replicate 2	replicate 1	replicate 2
1	0.4455	0.4865	0.0835	0.0805	0.1175	0.115
2	0.489	0.47	0.0875	0.086	0.119	0.122
3	0.5205	0.498	0.0765	0.105	0.1195	0.1145
4	0.443	0.515	0.079	0.0705	0.108	0.118
5	0.5195	0.536	0.082	0.0745	0.12	0.1265
6	0.531	0.498	0.0765	0.0885	0.1275	0.12
7	0.5315	0.6095	0.0935	0.097	0.127	0.121
8	0.5575	0.525	0.0785	0.0815	0.1235	0.124
9	0.5825	0.5865	0.0845	0.096	0.138	0.127
10	0.4985	0.5355	0.1015	0.098	0.133	0.1125
<i>mean, n</i>	0.518925	20	0.086025	20	0.121675	20
origin of target sd (sp)	Horwitz	original	Horwitz	<120ppb	Horwitz	original
abs. target sd (sp) & as RSD%	0.091624	1.765.659	0.018926	22	0.026724	2.196.379
$s_{an}$	0.029681		0.007943		0.006388	
$s_{am}^2$	0.001071		3.14E-05		8.79E-06	
$\square_{all}^2$	0.000756		3.22E-05		6.43E-05	
<i>critical</i>	0.00231		0.000124		0.000162	
$s_{am}^2 < critical?$	<b>ACCEPT</b>		<b>ACCEPT</b>		<b>ACCEPT</b>	

**Table 1b: Results of Homogeneity Tests by FAPAS®**

analyte	assigned value				target standard deviation	
	data points, $n$	robust mean, $X$ , $\mu\text{g/kg}$	robust standard deviation, $\sigma$	uncertainty, $u$	derived from	$\sigma_p$ , $\mu\text{g/kg}$
Clofentezine	60	411	81	10,46	Horwitz	75
Cyproconazole	58	74	9	1,18	Horwitz	16
Hexythiazox	61	97	18	2,30	Horwitz	21
lambda-Cyhalothrin	62	139	39	4,95	Horwitz	30
Mepanipyrim	61	66	10	1,28	Horwitz	15
Pyraclostrobin	62	102	16	2,03	Horwitz	22
Tebufenpyrad	61	50	6	0,77	Horwitz	11

**Table 2: Assigned Values and Target Standard Deviations**

laboratory code	pesticide residue	result ( $\mu\text{g/kg}$ )	recovery (%)	LoQ ( $\mu\text{g/kg}$ )
23	Acephate	170	95	10
59	Captan/Folpet	102	80-120	10
59	Myclobutanil	22	80-120	10

**Table 3: Additional Pesticide Residues Reported**

criteria	number of satisfactory participants	total number participants	satisfactory %
correctly identified all seven pesticides	57	62	<b>92</b>
correctly identified <b>AND</b> obtained satisfactory z-scores for all seven pesticides	38	62	<b>61</b>

**Table 4: Number and Percentage of Participants Correctly Identifying and Obtaining Satisfactory z-Scores for all Pesticides Present**

	<b>Clofentazine</b> assigned value 411 µg/kg / spiked level: 500 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	306	82	10	-1,4
2	404	85	10	-0,1
3	457	99	10	0,6
4	380		10	-0,4
5	465	118	10	0,7
6	444	97	10	0,4
7	467	117	10	0,7
8	459	90	10	0,6
9	380	80	10	-0,4
10	562	96	10	2,0
11	509	108	10	1,3
12	302	86	10	-1,4
13	490	103	20	1,1
14	405	95	5	-0,1
15	452	98	10	0,5
16	475	82	10	0,9
17	490	90	<10	1,1
18	376,7	72	10	-0,5
19	365	88	10	-0,6
20	261	83	10	-2,0
21	445	90	30	0,5
22	449	98	10	0,5
23	n.d.			-4,5
24	483	98,6	10	1,0
25	428	>90	10	0,2
26	445	84	10	0,5
27	415	85	10	0,1
28	297	82	10	-1,5
29	420	88	10	0,1
30	n.d.			-4,5
31	420	70	5	0,1

**Table 5: Results and z-Scores for Clofentazine in Fruit Purée (Strawberries)  
Test Material**

	<b>Clofentizine</b> assigned value 411 µg/kg / spiked level: 500 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	392	96	10	-0,3
33	410	94,1	10	0,0
34	347	103	10	-0,9
35	492	91	10	1,1
36	440	90	10	0,4
37	300	99,2	10	-1,5
38	221	80	10	<b>-2,5</b>
39	537	90	10	1,7
40	270	81	5	-1,9
41	451	90	10	0,5
42	355	103	5	-0,7
43	268	101	10	-1,9
44	275	92,9	10	-1,8
45	456	85	10	0,6
46	472	90	10	0,8
47	590	95	20	<b>2,4</b>
48	469	80	10	0,8
49	798	72	10	<b>5,2</b>
50	345	100	5	-0,9
51	350	80	10	-0,8
52	425	74	10	0,2
53	420	82	5	0,1
54	410	96	10	0,0
55	153	110	10	<b>-3,4</b>
56	420	80	5	0,1
57	290	95	5	-1,6
58	501	98	10	1,2
59	410	80-120	10	0,0
60	326	91	10	-1,1
61	226	95 - 102	5	<b>-2,5</b>
62	860	68	9	<b>6,0</b>

**Table 5: Results and z-Scores for Clofentizine in Fruit Purée (Strawberries)  
Test Material**

	<b>Cyproconazole</b> assigned value 74 µg/kg / spiked level 70 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	62	85	10	-0,7
2	69	105	10	-0,3
3	83	122	10	0,6
4	64		10	-0,6
5	83	100	10	0,6
6	74	98	10	0,0
7	76	89	10	0,1
8	81	90	10	0,4
9	63	96	10	-0,7
10	159	98	10	<b>5,2</b>
11	79	103	15	0,3
12	83	91	10	0,6
13	n.d.		20	<b>-4,5</b>
14	64	111	5	-0,6
15	83	103	10	0,6
16	75	87	10	0,1
17	74	115	<10	0,0
18	65,2	81	5	-0,5
19	87,5	97	10	0,8
20	66	90	5	-0,5
21	77	106	10	0,2
22	76,5	103	10/10	0,2
23	n.d.			<b>-4,5</b>
24	74	100,9	10	0,0
25	87	>90	10	0,8
26	67	85	10	-0,4
27	57	107	10	-1,0
28	79	83	10	0,3
29	70	95	10	-0,2
30	n.d.			<b>-4,5</b>
31	80	100	5	0,4

**Table 6: Results and z-Scores for Cyproconazole in Fruit Purée (Strawberries)  
Test Material**

	<b>Cyproconazole</b> assigned value 74 µg/kg / spiked level 70 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	80	111	10	0,4
33	71	93,5	10	-0,2
34	75	104	10	0,1
35	70	98	10	-0,2
36	68	108	10	-0,4
37	75	100	10	0,1
38	66	85	10	-0,5
39	82	90	10	0,5
40	64	92	5	-0,6
41	72	90	10	-0,1
42	76	94	5	0,1
43	77	82,3	10	0,2
44	58	101,1	10	-1,0
45	76	91	10	0,1
46	80	100	10	0,4
47	75	75	10	0,1
48	98	85	10	1,5
49	61	79	10	-0,8
50	74	100	5	0,0
51	n.d.			<b>-4,5</b>
52	13	77	10	<b>-3,7</b>
53	64	75	10	-0,6
54	92	107	10	1,1
55	45	117	10	-1,8
56	81	90	5	0,4
57	75	95	10	0,1
58	81	105	10	0,4
59	71	80-120	10	-0,2
60	76	86	10	0,1
61	47	95 - 103	10	-1,7
62	95	87,8	9	1,3

**Table 6: Results and z-Scores for Cyproconazole in Fruit Purée (Strawberries)  
Test Material**

	<b>Hexythiazox</b> assigned value 97 µg/kg / spiked level 100 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	81	90	10	-0,8
2	108	98	10	0,5
3	109	102	10	0,5
4	36		10	<b>-2,9</b>
5	108	102	10	0,5
6	115	99	20	0,8
7	162,5	97	10	<b>3,0</b>
8	115	90	10	0,8
9	95	99	10	-0,1
10	118	94	10	1,0
11	102	102	10	0,2
12	114	96	10	0,8
13	153	100	10	<b>2,6</b>
14	95	95	5	-0,1
15	113	90	10	0,7
16	99	85	10	0,1
17	115	106	<10	0,8
18	102	77	5	0,2
19	111	88	10	0,6
20	90	88	5	-0,3
21	91	90	10	-0,3
22	104	104	20/10	0,3
23	40	86	10	<b>-2,7</b>
24	128	97,2	10	1,4
25	105	>90	10	0,4
26	110	86	10	0,6
27	109	91	10	0,5
28	50	87	10	<b>-2,2</b>
29	106	88	10	0,4
30	n.d.			<b>-4,5</b>
31	87	52	5	-0,5

**Table 7: Results and z-Scores for Hexythiazox in Fruit Purée (Strawberries)  
Test Material**

	<b>Hexythiazox</b> assigned value 97 µg/kg / spiked level 100 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	98	91	10	0,0
33	58	88,6	10	-1,8
34	113	105	10	0,7
35	94	79	10	-0,2
36	96	90	10	-0,1
37	65	101,82	10	-1,5
38	85	90	10	-0,6
39	111	105	10	0,6
40	46	88	5	<b>-2,4</b>
41	111	90	10	0,6
42	86	88	5	-0,5
43	83	78	10	-0,7
44	80	90,5	10	-0,8
45	95	86	10	-0,1
46	95	95	10	-0,1
47	70	85	20	-1,3
48	105	91	10	0,4
49	76	72	10	-1,0
50	75	100	5	-1,0
51	90	90	10	-0,3
52	241	84	10	<b>6,7</b>
53	82	75	5	-0,7
54	110	103	10	0,6
55	51	101	10	<b>-2,2</b>
56	102	90	5	0,2
57	90	95	10	-0,3
58	103	90	10	0,3
59	35	80-120	10	<b>-2,9</b>
60	95	90	10	-0,1
61	49	97 - 104	10	<b>-2,3</b>
62	107	65	9	0,5

**Table 7: Results and z-Scores for Hexythiazox in Fruit Purée (Strawberries)  
Test Material**

	<b>lambda-Cyhalothrine</b> assigned value 139 µg/kg / spiked level 150 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	163	86	10	0,8
2	116	93	10	-0,8
3	162	88	10	0,8
4	84		10	-1,8
5	68	90	10	<b>-2,4</b>
6	143	95	10	0,1
7	83,6	70-110	10	-1,8
8	176	90	10	1,2
9	163	88	10	0,8
10	120	88	10	-0,6
11	171	108	10	1,1
12	133	87	10	-0,2
13	157	77	5	0,6
14	135	107	5	-0,1
15	179	104	10	1,3
16	200	66	10	2,0
17	4870	81	<10	<b>158,3</b>
18	134,6	100	10	-0,1
19	186	97	10	1,6
20	174	70	10	1,2
21	146	108	10	0,2
22	130	98	20	-0,3
23	350	109	10	<b>7,1</b>
24	89	96,6	10	-1,7
25	192	>90	10	1,8
26	159	85	10	0,7
27	133	85	10	-0,2
28	113	82	10	-0,9
29	180	102	10	1,4
30	168	> 80	10	1,0
31	78	85	5	-2,0

**Table 8: Results and z-Scores for lambda-Cyhalothrin in Fruit Purée (Strawberries) Test Material**

	<b>lambda-Cyhalothrine</b> assigned value 139 µg/kg / spiked level 150 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	69,0	90,5	10	<b>-2,3</b>
33	108	91	10	-1,0
34	140	113	10	0,0
35	149	84	10	0,3
36	161	110	10	0,7
37	48	110,1	10	<b>-3,0</b>
38	176	90	10	1,2
39	150	110	10	0,4
40	76	99	5	<b>-2,1</b>
41	142	90	10	0,1
42	138	98	5	0,0
43	150	78,9	10	0,4
44	94	97,0	10	-1,5
45	130	98	10	-0,3
46	128	90	10	-0,4
47	65	75	10	<b>-2,5</b>
48	272	85	10	<b>4,5</b>
49	142	82	10	0,1
50	410	78,6	5	<b>9,1</b>
51	160	100	10	0,7
52	190	96	10	1,7
53	100	70	10	-1,3
54	160	102	10	0,7
55	121	102	10	-0,6
56	143	85	10	0,1
57	140	95	10	0,0
58	145	95	10	0,2
59	44	80-120	10	<b>-3,2</b>
60	159	85	10	0,7
61	59	95 - 99	5	<b>-2,7</b>
62	90	83	5	-1,6

**Table 8: Results and z-Scores for lambda-Cyhalothrin in Fruit Purée (Strawberries) Test Material**

	<b>Mepanipirim</b> assigned value 66 µg/kg / spiked level 70 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	62	92	10	-0,3
2	68	110	10	0,2
3	82	109	10	1,1
4	36		10	<b>-2,1</b>
5	88	102	10	1,5
6	71	98	10	0,4
7	62,4	101	10	-0,2
8	78	90	10	0,8
9	51	89	10	-1,0
10	64	94	10	-0,1
11	77	103	10	0,8
12	67	83	10	0,1
13	59	100	10	-0,5
14	57	96	5	-0,6
15	65	111	10	-0,1
16	65	87	10	-0,1
17	79	125	<10	0,9
18	69,1	83	5	0,2
19	68,3	95	10	0,2
20	64	87	5	-0,1
21	88	74	10	1,5
22	72	96	10	0,4
23	n.d.			<b>-4,5</b>
24	76	98,8	10	0,7
25	75	>90	10	0,6
26	76	86	10	0,7
27	59	82	10	-0,5
28	56	95	10	-0,7
29	70	92	10	0,3
30	42	> 80	10	-1,6
31	64	90	5	-0,1

**Table 9: Results and z-Scores for Mepanipirim in Fruit Purée (Strawberries)  
Test Material**

	<b>Mepanipyrim</b> assigned value 66 µg/kg / spiked level 70 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	68,1	110,2	10	0,2
33	57	97,8	10	-0,6
34	76	105	10	0,7
35	85	106	10	1,3
36	65	105	10	-0,1
37	50	100	10	-1,1
38	55	100	10	-0,7
39	67	85	10	0,1
40	52	79	5	-1,0
41	60	90	10	-0,4
42	67	83	5	0,1
43	48	89	10	-1,2
44	53	85,1	10	-0,9
45	65	87	20	-0,1
46	63	90	10	-0,2
47	60	75	10	-0,4
48	73	85	10	0,5
49	62	81	10	-0,3
50	52	100	5	-1,0
51	70	80	10	0,3
52	112	95	10	<b>3,2</b>
53	76	87	10	0,7
54	64	90	10	-0,1
55	53	106	10	-0,9
56	70	90	5	0,3
57	70	95	5	0,3
58	70	90	10	0,3
59	211	80-120	10	<b>10,0</b>
60	67	84	10	0,1
61	47	93 - 97	10	-1,3
62	62	92	8	-0,3

**Table 9: Results and z-Scores for Mepanipyrim in Fruit Purée (Strawberries)  
Test Material**

	<b>Pyraclostrobin</b> assigned value 102 µg/kg / spiked level 100 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	86	92	10	-0,7
2	94	97	10	-0,3
3	109	120	10	0,3
4	40		10	<b>-2,8</b>
5	115	104	10	0,6
6	116	95	10	0,6
7	143	70-110	10	1,8
8	120	90	10	0,8
9	93	100	10	-0,4
10	86	98	10	-0,7
11	118	106	10	0,7
12	105	99	10	0,1
13	46	90	20	<b>-2,5</b>
14	112	118	5	0,5
15	89	109	10	-0,6
16	100	94	10	-0,1
17	144	122	<10	1,9
18	120,3	84	10	0,8
19	102	93	10	0,0
20	89	100	10	-0,6
21	102	94	10	0,0
22	104	105	10	0,1
23	78	87	10	-1,1
24	94	99,4	10	-0,3
25	116	>90	10	0,6
26	108	85	10	0,3
27	105	90	10	0,1
28	51	89	10	<b>-2,3</b>
29	130	97	10	1,3
30	124	> 80	10	1,0
31	108	55	5	0,3

**Table 10: Results and z-Scores for Pyraclostrobin in Fruit Purée (Strawberries)  
Test Material**

	<b>Pyraclostrobin</b> assigned value 102 µg/kg / spiked level 100 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	127	118	10	1,1
33	54	93,2	10	<b>-2,1</b>
34	108	112	20	0,3
35	114	95	10	0,5
36	91	107	10	-0,5
37	53	98,9	10	<b>-2,2</b>
38	83	85	10	-0,8
39	110	100	10	0,4
40	57	68	5	-2,0
41	113	90	10	0,5
42	98	91	5	-0,2
43	108	99,7	10	0,3
44	68	92,3	10	-1,5
45	95	94	10	-0,3
46	98	100	10	-0,2
47	100	85	20	-0,1
48	116	85	10	0,6
49	102	87	10	0,0
50	80	100	5	-1,0
51	110	90	10	0,4
52	163	85	10	<b>2,7</b>
53	95	82	10	-0,3
54	110	97	10	0,4
55	83	108	10	-0,8
56	108	90	10	0,3
57	90	95	10	-0,5
58	109	95	10	0,3
59	243	80-120	10	<b>6,3</b>
60	98	98	10	-0,2
61	48	95 - 102	5	<b>-2,4</b>
62	120	77	5	0,8

**Table 10: Results and z-Scores for Pyraclostrobin in Fruit Purée (Strawberries)  
Test Material**

	<b>Tebufenpyrad</b> assigned value 50 µg/kg / spiked level 50 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
1	43	87	10	-0,6
2	51	107	10	0,1
3	55	123	10	0,4
4	20		10	<b>-2,7</b>
5	112	105	10	<b>5,6</b>
6	53	98	10	0,3
7	44,5	102	10	-0,5
8	57	90	10	0,6
9	49	90	10	-0,1
10	61	92	10	1,0
11	53	102	10	0,3
12	42	95	10	-0,7
13	57	89	10	0,6
14	50	119	5	0,0
15	56	106	10	0,5
16	50	84	10	0,0
17	57	107	<10	0,6
18	56,9	87	5	0,6
19	50,5	95	10	0,0
20	45	79	5	-0,5
21	58	91	10	0,7
22	49	99	10	-0,1
23	28	98	10	-2,0
24	55	100	10	0,4
25	51	>90	10	0,1
26	54	86	10	0,3
27	52	90	10	0,2
28	29	83	10	-1,9
29	55	99	10	0,4
30	51	> 80%	10	0,1
31	48	85	5	-0,2

**Table 11: Results and z-Scores for Tebufenpyrad in Fruit Purée (Strawberries)  
Test Material**

	<b>Tebufenpyrad</b> assigned value 50 µg/kg / spiked level 50 µg/kg			
laboratory code	result (µg/kg)	recovery (%)	LoQ (µg/kg)	z-score
32	55	104	10	0,4
33	29	98,8	10	-1,9
34	50	108	10	0,0
35	57	104	10	0,6
36	49	100	10	-0,1
37	25	100,1	10	<b>-2,3</b>
38	46	95	10	-0,4
39	53	96	10	0,3
40	28	73	10	-2,0
41	55	90	10	0,4
42	46	87	5	-0,4
43	45	92,8%	10	-0,5
44	44	92,5	10	-0,6
45	44	102	10	-0,6
46	45	95	10	-0,5
47	45	75	10	-0,5
48	54	85	10	0,3
49	46	73	10	-0,4
50	45	100	5	-0,5
51	50	90	10	0,0
52	98	103	10	<b>4,3</b>
53	63	77	10	1,2
54	52	97	10	0,2
55	62	106	10	1,1
56	54	85	5	0,3
57	45	95	10	-0,5
58	51	100	10	0,1
59	n.d.			<b>-4,5</b>
60	51	85	10	0,1
61	25	95 - 103	10	<b>-2,3</b>
62	50	74	6	0,0

**Table 11: Results and z-Scores for Tebufenpyrad in Fruit Purée (Strawberries)  
Test Material**

# Clofentezine

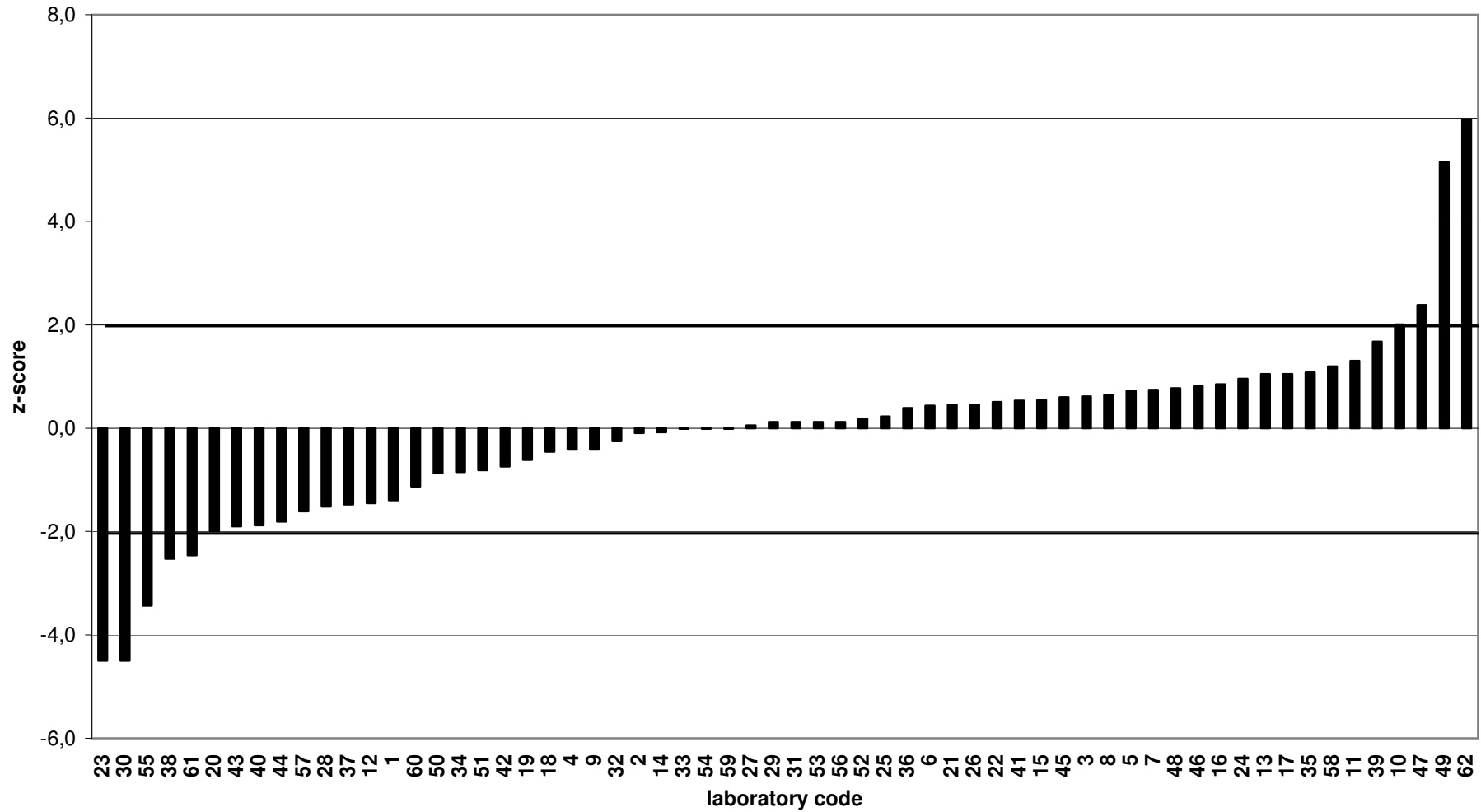


Figure 1: z-Scores for Clofentezine (411 µg/kg) in Fruit Purée (Strawberry) Test Material

# Cyproconazole

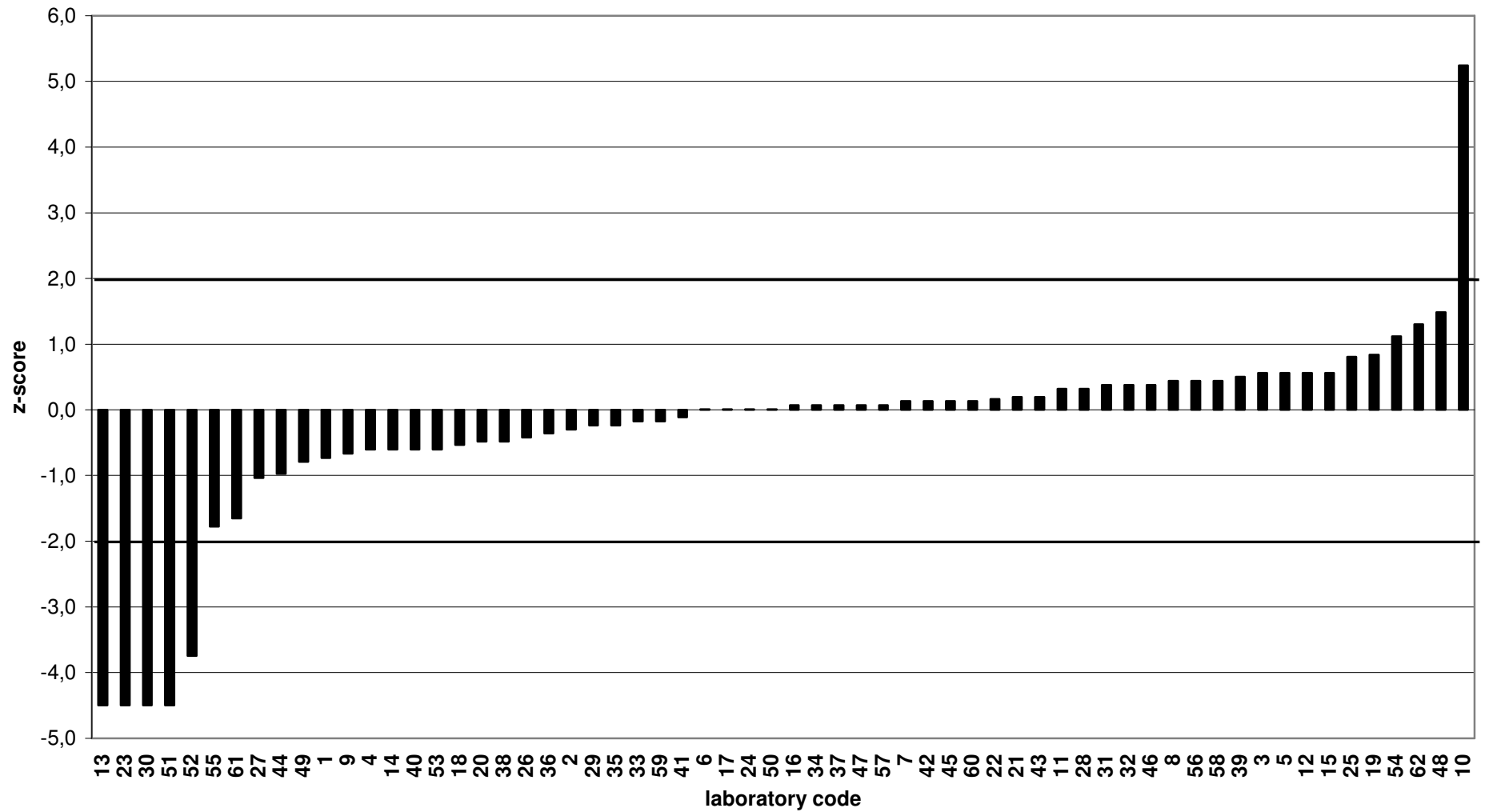


Figure 2: z-Scores for Cyproconazole (74 µg/kg) in Fruit Purée (Strawberry) Test Material

# Hexythiazox

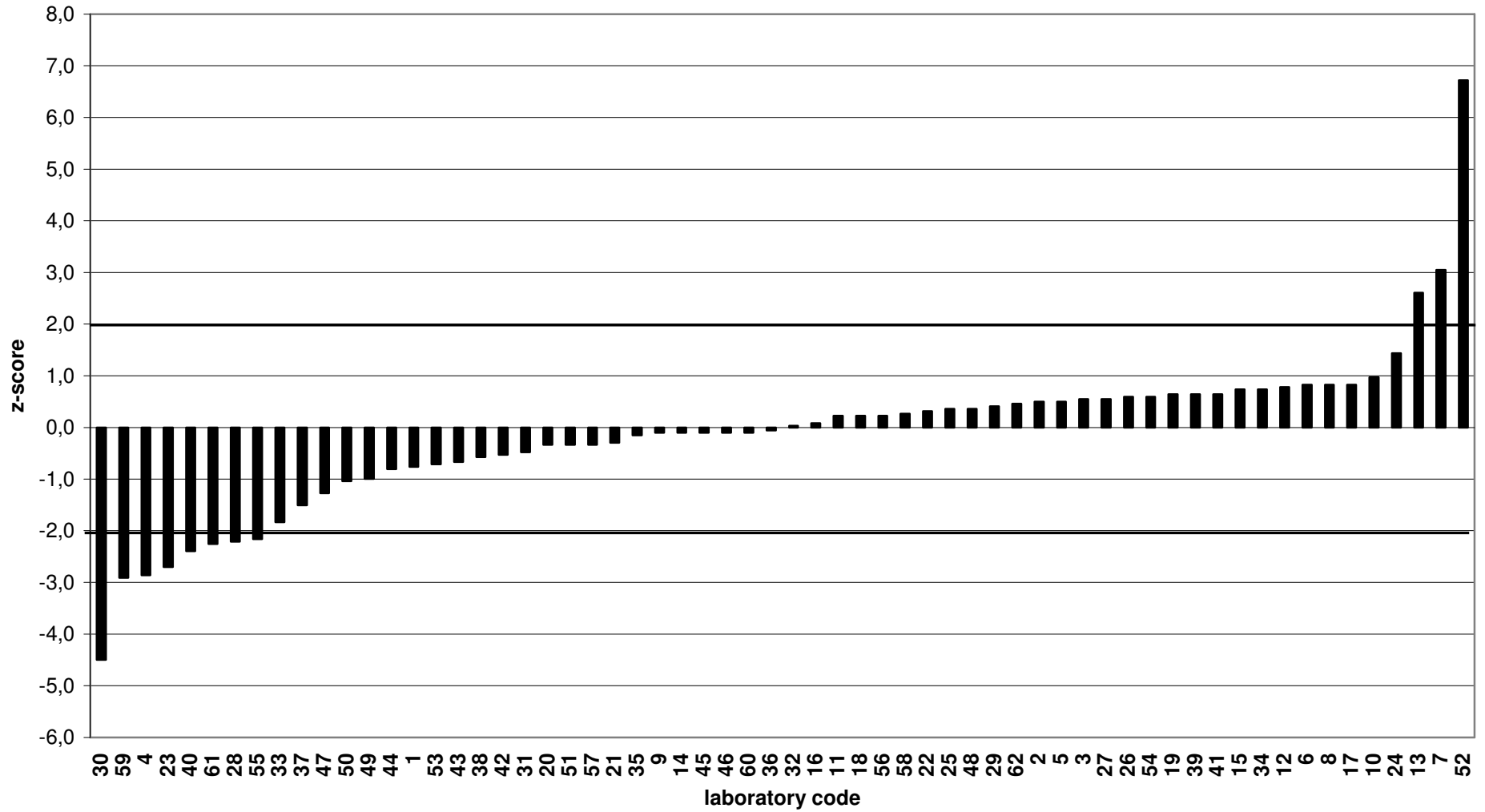


Figure 3: z-Scores for Hexythiazox (97 µg/kg) in Fruit Purée (Strawberry) Test Material

### lambda-Cyhalothrin

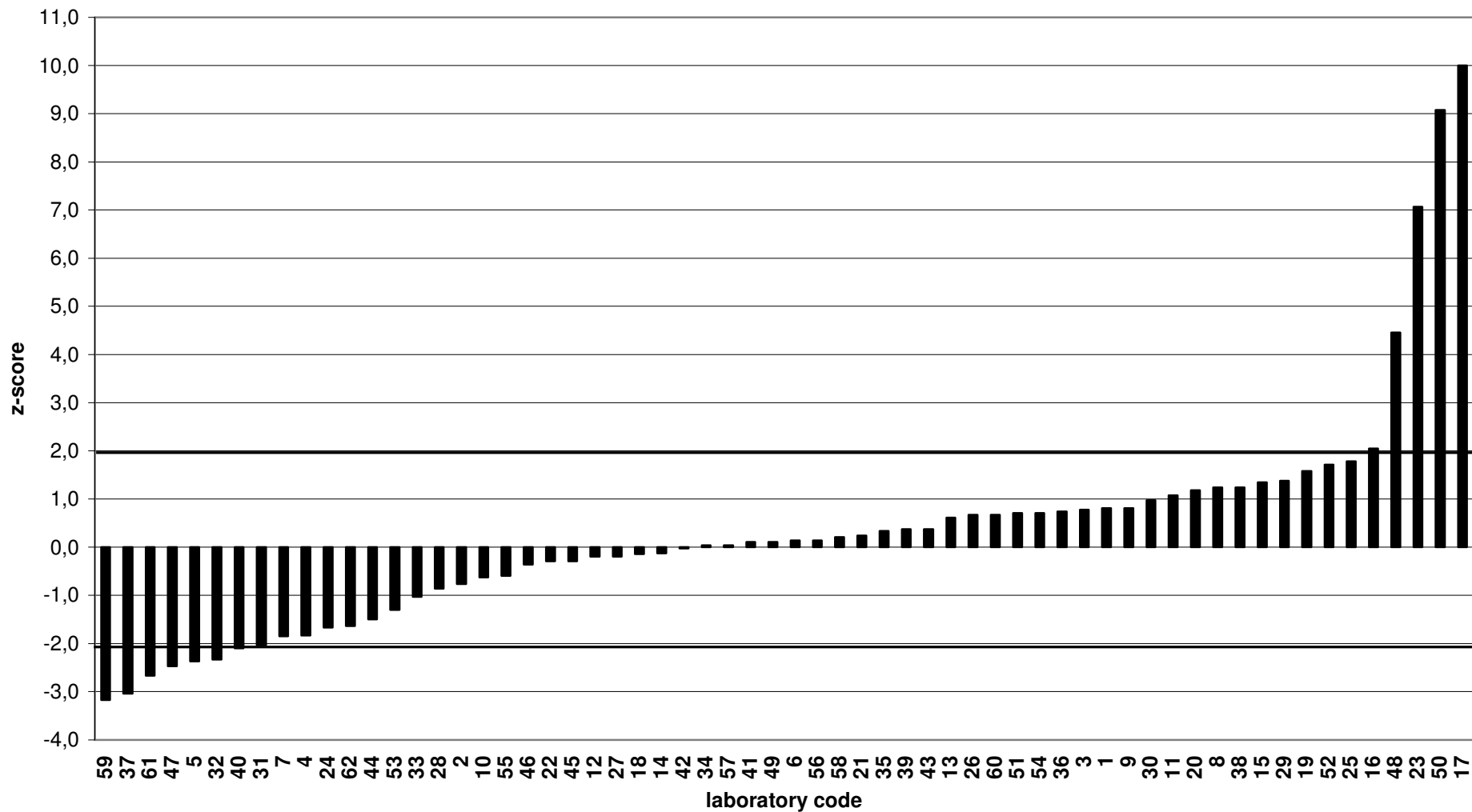


Figure 4: z-Scores for lambda-Cyhalothrin (139 µg/kg) in Fruit Purée (Strawberry) Test Material

# Mepanipirim

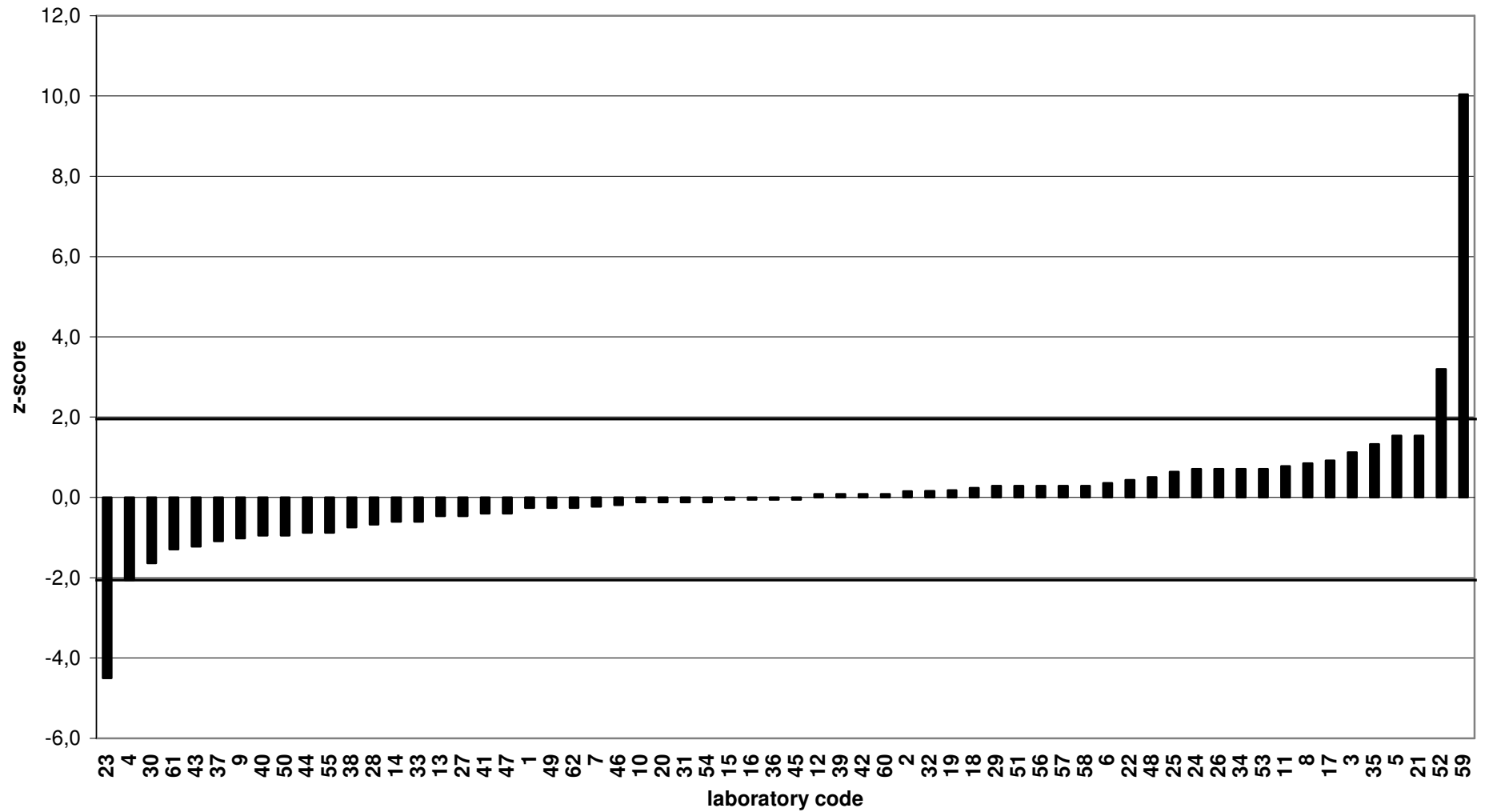


Figure 5: z-Scores for Mepanipirim (66 µg/kg) in Fruit Purée (Strawberry) Test Material

# Pyraclostrobin

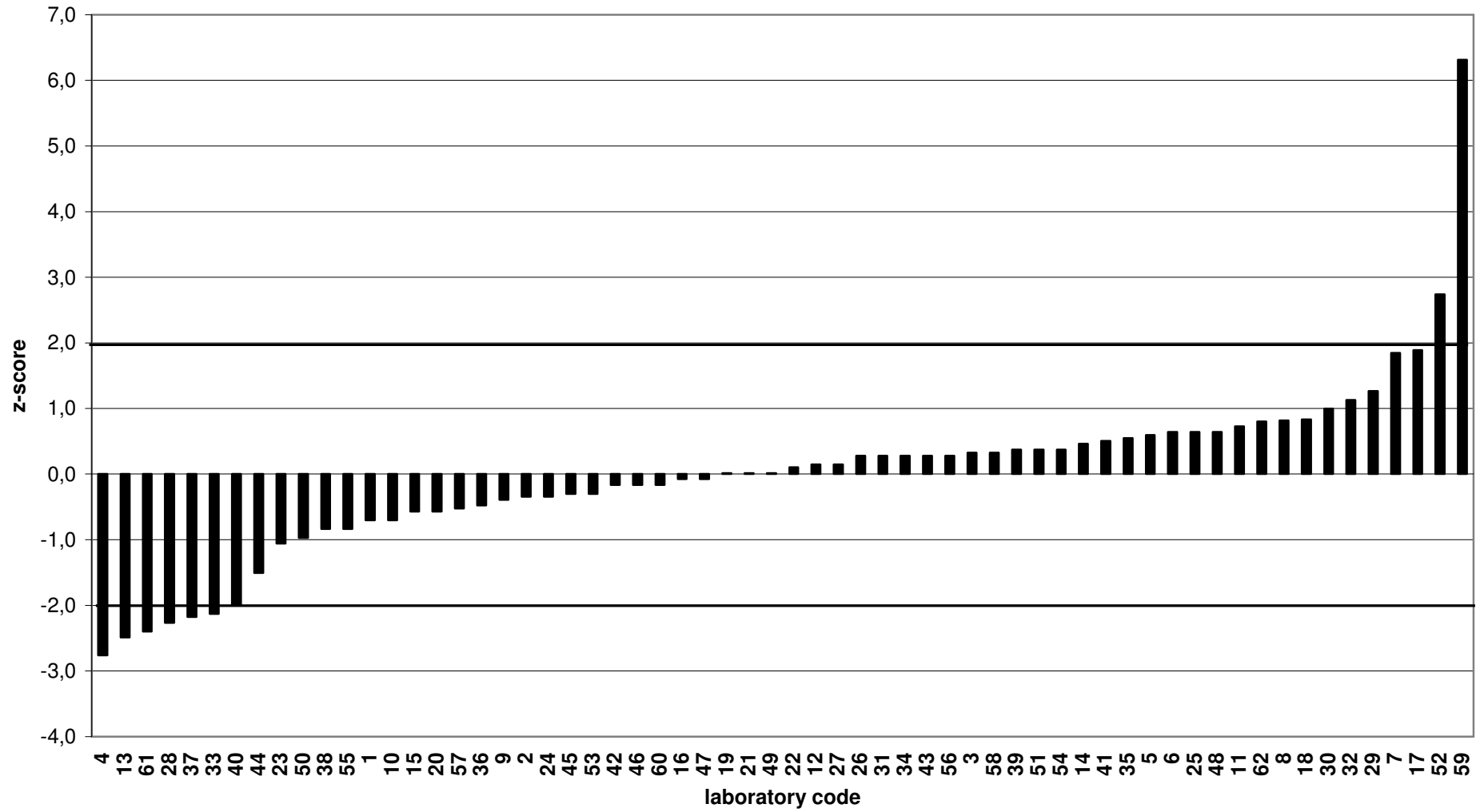


Figure 6: z-Scores for Pyraclostrobin (102 µg/kg) in Fruit Purée (Strawberry) Test Material

# Tebufenpyrad

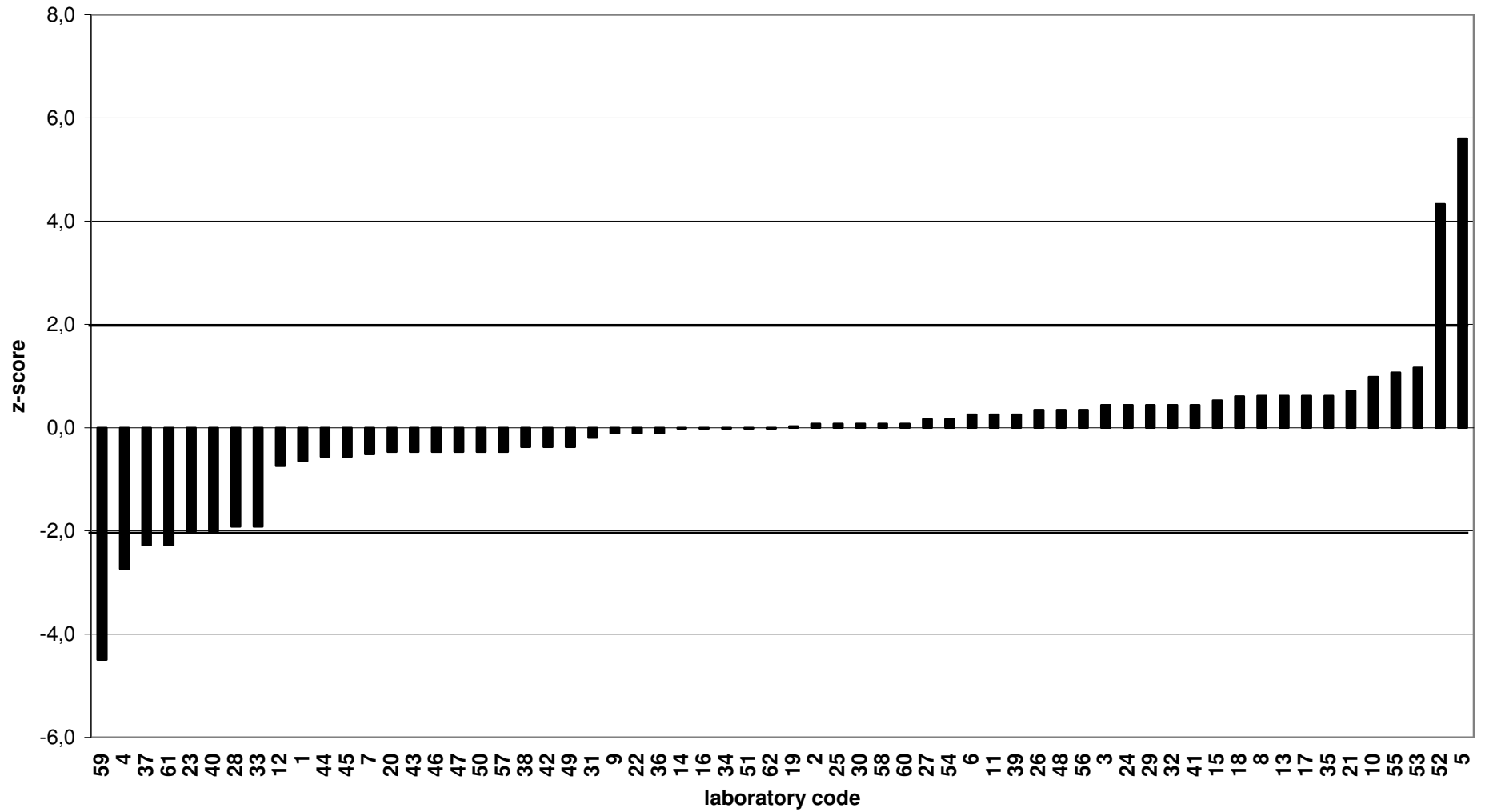


Figure 7: z-Scores for Tebufenpyrad (50 µg/kg) in Fruit Purée (Strawberry) Test Material