AOF Test Check program

Test Report

Round 2 2021-2022.

Summary

1. The test materials for the AOF test check program Round 2 2021-2022 were dispatched in September 2021. Each participant received two canola seed test sample to be analysed for a selection of parameters.
2. An assigned value was determined for each analyte and in conjunction with the standard deviation was used to calculate the z-score for each result.
3. Results for this proficiency test are summarised as follows:

Table 1 Sample 3 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	64.16	1.16	(kg/hL)	15
Impurities	2.11	0.42	%	15
Oil NIR	45.31	0.23	% by weight	16
Oil solvent	45.12	0.47	% by weight	9
Moisture NIR	6.04	0.27	% by weight	16
Moisture oven	5.98	0.23	% by weight	12
Oleic acid	62.08	1.38	% total fatty acids	8
Linoleic acid	19.71	0.44	% total fatty acids	8
Linolenic acid	9.77	0.42	% total fatty acids	8
Free fatty acid	0.25	0.09	% (as oleic acid)	8

Table 2 Sample 4 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	67.75	0.63	(kg/hL)	15
Impurities	0.80	0.15	%	15
Oil NIR	45.45	0.24	% by weight	16
Oil solvent	45.10	0.48	% by weight	9
Moisture NIR	6.07	0.27	% by weight	16
Moisture oven	6.01	0.25	% by weight	12
Oleic acid	61.86	1.26	% total fatty acids	8
Linoleic acid	19.89	0.45	% total fatty acids	8
Linolenic acid	9.70	0.53	% total fatty acids	8
Free fatty acid	0.25	0.12	% (as oleic acid)	8

1. Test Material

Preparations for this test check program were sub-contracted to organisations for sample packing and distribution as well as data analysis and reporting.

2. Statistical evaluation of results

The results submitted by participants were statistically analysed in order to provide an assigned value for each analyte. The assigned values were then used in combination with the standard deviation to calculate a Z-score for each result.

Raw data was analysed using Grubbs' test to determine any outliers. Outliers (Z-score >2) were removed and the remaining samples were used to calculate the assigned value (mean) and standard deviation results.

Participants Z-scores were calculated as:

$$Z = \frac{(participants\ result - assigned\ value)}{standard\ deviation}$$

3. Results and Z-scores

Table 3 Results and Z-scores for test weight.

Test weight (kg/hL)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	65.00	0.72	67.70	-0.08
P04	65.00	0.72	67.70	-0.08
P05	61.98	-1.88	68.57	1.30
P06	63.25	-0.79	67.13	-1.00
P07	63.05	-0.96	67.04	-1.13
P08	64.75	0.50	66.95	-1.28
P09	67.08	2.51	69.60	2.95
P10	63.90	-0.23	67.85	0.16
P11	63.73	-0.38	67.57	-0.30
P12	64.95	0.68	67.95	0.32
P13				
P14	65.92	1.51	68.84	1.73
P15	65.48	1.13	68.73	1.56
P16	65.05	0.76	67.30	-0.72
P17	62.70	-1.26	66.10	-2.64
P18	63.55	-0.53	67.45	-0.48
Assigned value	64.16		67.75	
Standard Deviation	1.16		0.63	
Count	15		15	

Note - Laboratory number P09 Sample 3 was removed from the assigned value calculation as the results were outliers.
Note - Laboratory numbers P09 and P17 Sample 4 were removed from the assigned value calculation as the results were outliers.

Figure 1 Z-scores for test weight.

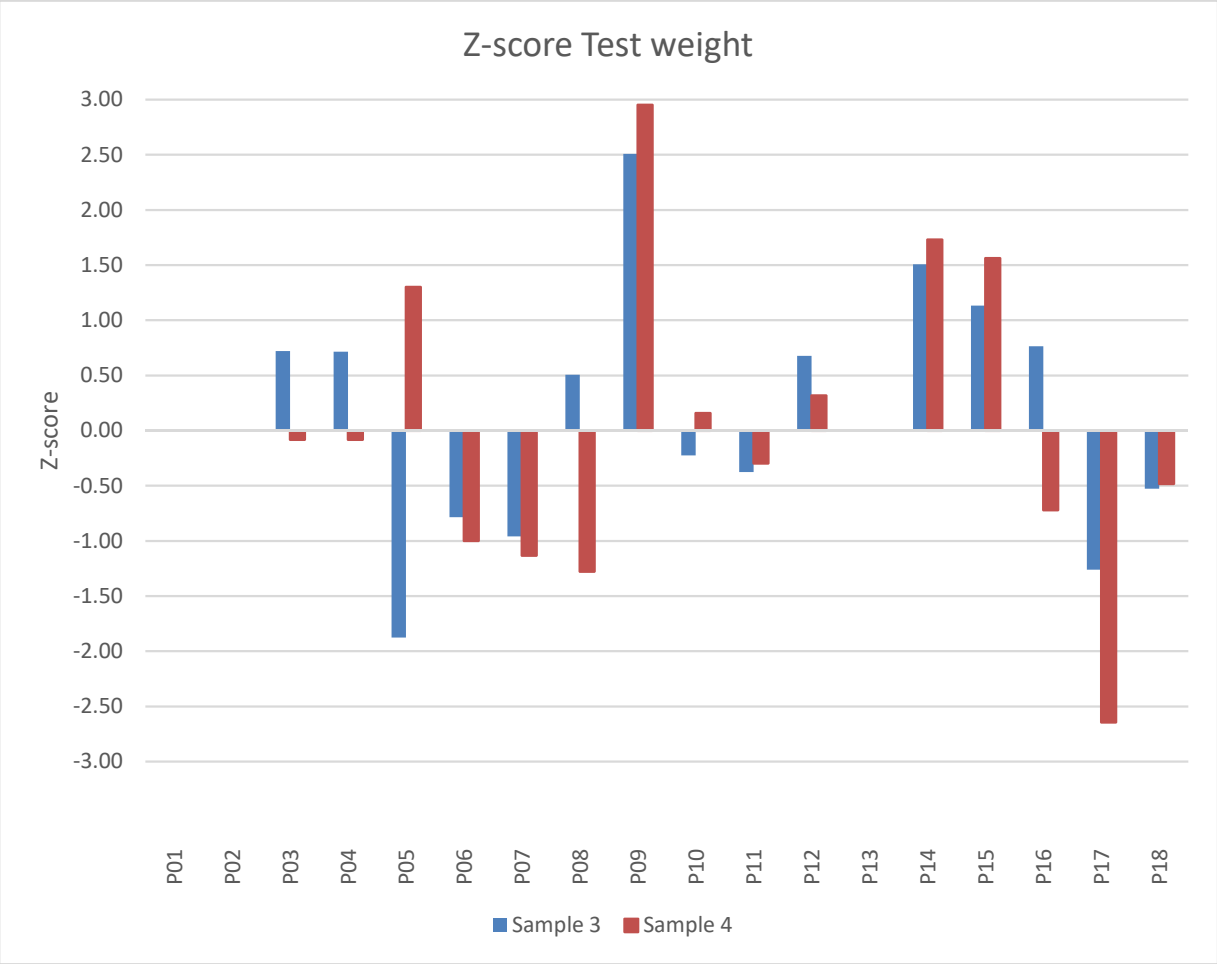

Table 4 Results and Z-scores for impurities.

Impurities (%)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	2.07	-0.10	1.05	1.65
P04	1.69	-0.99	0.78	-0.16
P05	2.75	1.52	0.79	-0.09
P06	1.81	-0.70	0.67	-0.85
P07	2.59	1.15	0.85	0.31
P08	1.80	-0.73	0.75	-0.32
P09	2.50	0.94	0.80	0.00
P10	2.30	0.46	0.80	0.00
P11	2.05	-0.13	0.80	0.00
P12	2.57	1.09	0.96	1.02
P13				
P14	1.42	-1.63	0.68	-0.82
P15	0.57	-3.65	0.61	-1.24
P16	2.09	-0.04	0.95	0.96
P17	2.36	0.59	1.03	1.51
P18	1.50	-1.44	0.50	-1.97
Assigned value	2.11		0.80	
Standard Deviation	0.42		0.15	
Count	15		15	

Note - Laboratory number P15 Sample 1 was removed from assigned value calculation as the result was an outlier

Figure 2 Z-scores for impurities.

Table 5 Results and Z-scores for oil content (NIR).

Oil content NIR (%)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02	46.08	3.29	46.18	3.09
P03	45.70	1.66	45.60	0.65
P04	46.19	3.74	46.31	3.64
P05	45.05	-1.12	45.45	0.02
P06	45.09	-0.94	45.27	-0.74
P07	45.07	-1.03	45.05	-1.69
P08	45.25	-0.26	45.50	0.23
P09	45.60	1.23	45.60	0.65
P10	45.35	0.16	45.45	0.02
P11	45.05	-1.12	45.08	-1.55
P12	45.70	1.66	45.71	1.09
P13				
P14	45.30	-0.05	45.90	1.91
P15	45.25	-0.26	45.35	-0.41
P16	45.10	-0.91	45.30	-0.62
P17	45.45	0.59	45.65	0.86
P18	45.40	0.38	45.35	-0.48
Assigned value	45.31		45.45	
Standard Deviation	0.23		0.24	
Count	16		16	

Note - Laboratory number P02 and P04 Sample 3 were removed from assigned value calculations as the results were outliers

Note - Laboratory number P02 and P04 Sample 4 were removed from assigned value calculations as the results were outliers

Figure 3 Z-scores for oil content by NIR.

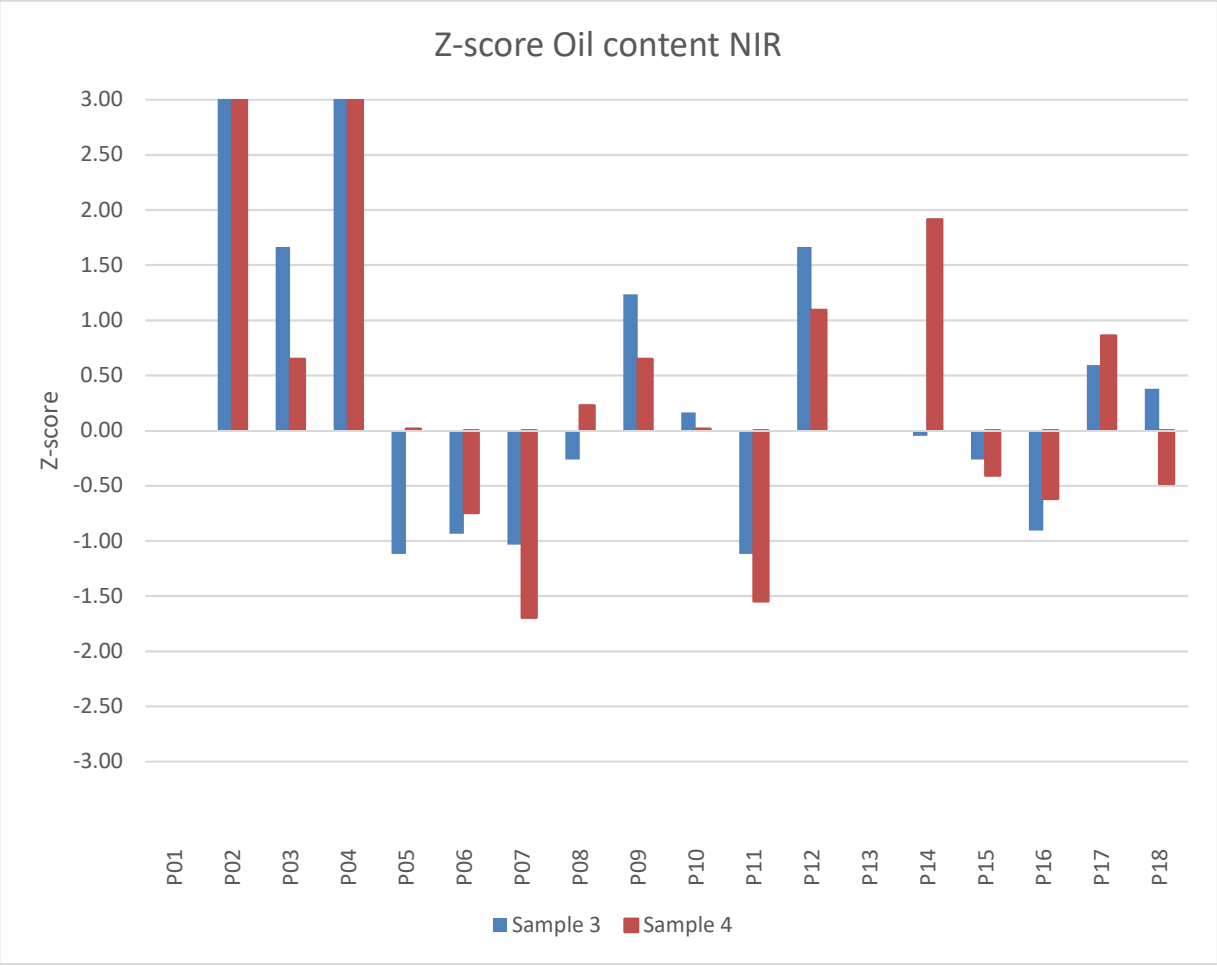

Table 6 Results and Z-scores for oil content solvent.

Oil content solvent (%)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	45.20	0.16	45.52	0.87
P04				
P05	45.41	0.62	45.36	0.53
P06	45.34	0.46	45.18	0.16
P07				
P08				
P09	44.75	-0.79	44.29	-1.72
P10				
P11				
P12	45.54	0.90	45.67	1.18
P13				
P14				
P15	45.62	1.06	45.37	0.55
P16	44.87	-0.53	44.65	-0.96
P17	44.24	-1.88	44.82	-0.61
P18	42.25	-6.12	43.20	-3.99
Assigned value	45.12		45.10	
Standard Deviation	0.47		0.48	
Count	9		9	

Note - Laboratory number P18 Sample 3 was removed from assigned value calculations as the result was an outlier

Note - Laboratory number P18 Sample 4 was removed from assigned value calculations as the result was an outlier

Figure 4 Z-scores for oil content by solvent extraction.

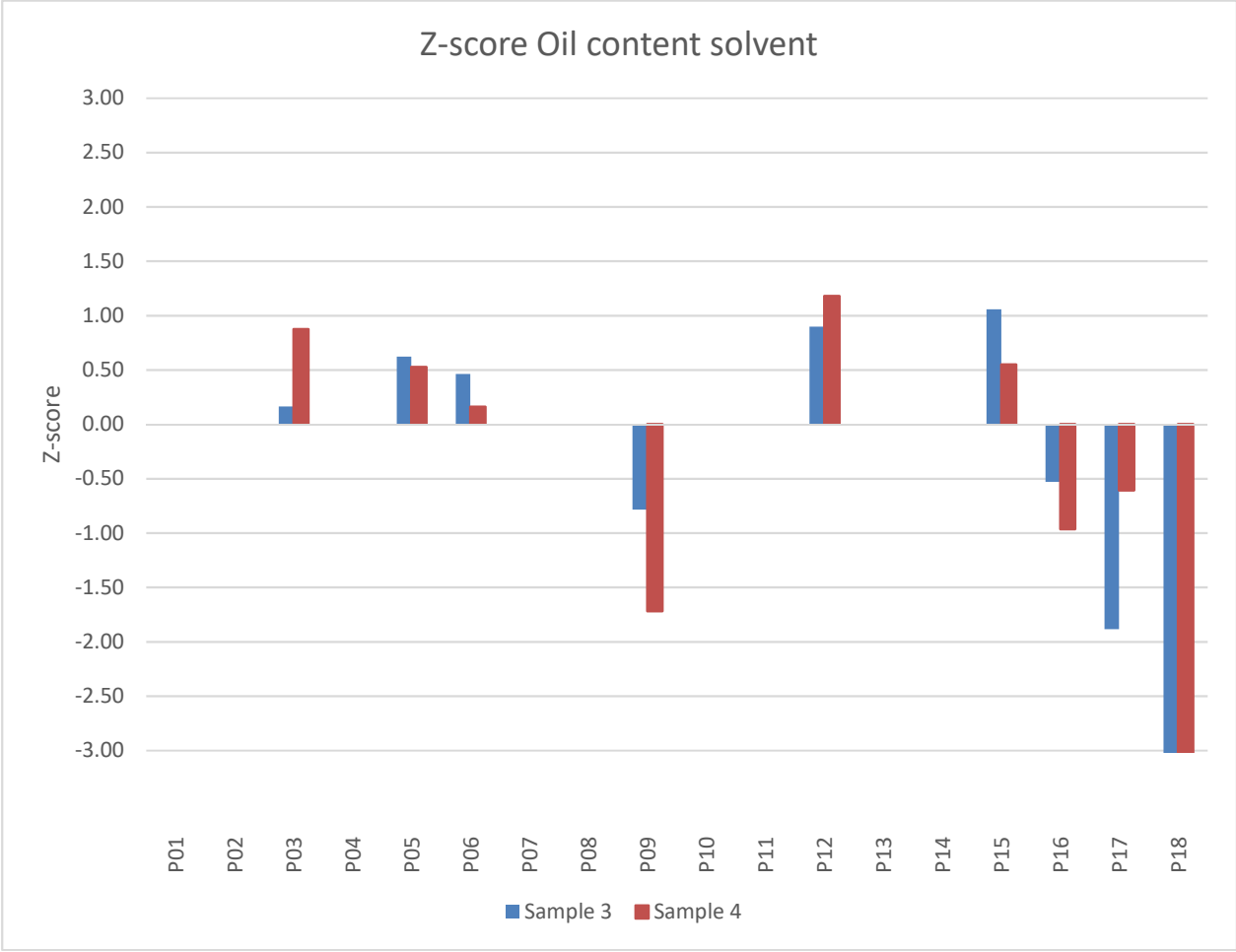

Table 7 Results and Z-scores for moisture content (NIR).

Moisture NIR (% by weight)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02	6.23	0.70	6.26	0.69
P03	5.75	-1.07	5.80	-0.98
P04	5.98	-0.22	6.02	-0.17
P05	6.00	-0.15	6.00	-0.24
P06	5.69	-1.31	5.75	-1.16
P07	6.48	1.63	6.57	1.83
P08	5.95	-0.33	5.95	-0.43
P09	5.80	-0.88	5.70	-1.34
P10	6.40	1.33	6.40	1.23
P11	6.12	0.28	6.08	0.03
P12	5.64	-1.47	5.74	-1.20
P13				
P14	6.45	1.52	6.55	1.78
P15	6.30	0.96	6.25	0.68
P16	5.80	-0.88	5.95	-0.43
P17	6.05	0.04	6.00	-0.24
P18	6.00	-0.15	6.05	-0.06
Assigned value	6.04		6.07	
Standard Deviation	0.27		0.27	
Count	16		16	

Figure 5 Z-scores for moisture content by NIR.

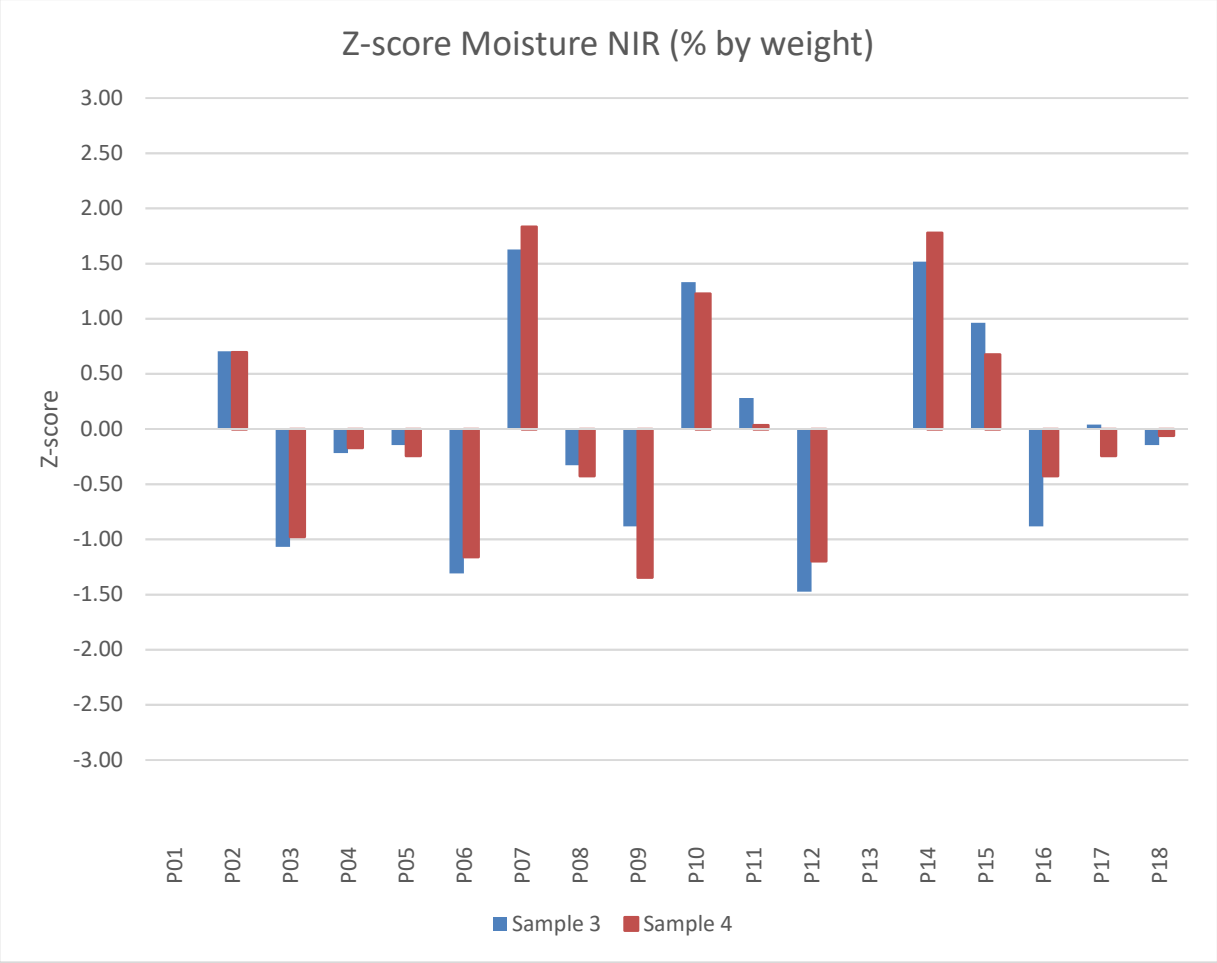

Table 8 Results and Z-scores for moisture content by oven.

Moisture Oven (% by weight)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	6.36	1.64	6.45	1.78
P04	6.11	0.54	6.16	0.61
P05	5.25	-3.26	5.23	-3.14
P06	5.75	-1.03	5.78	-0.93
P07	5.76	-1.01	5.79	-0.87
P08				
P09	5.66	-1.45	5.62	-1.58
P10				
P11	6.20	0.96	6.05	0.18
P12	5.83	-0.70	5.85	-0.65
P13				
P14				
P15	6.10	0.51	6.20	0.79
P16	6.03	0.18	6.07	0.24
P17	6.07	0.36	6.12	0.44
P18	4.00	-8.76	4.05	-7.92
Assigned value	5.98		6.01	
Standard Deviation	0.23		0.25	
Count	12		12	

Note - Laboratory number P05 and P18 Sample 3 were removed from assigned value calculations as the results were outliers

Note - Laboratory number P05 and P18 Sample 4 were removed from assigned value calculations as the results were outliers

Figure 6 Z-scores for moisture content by oven.

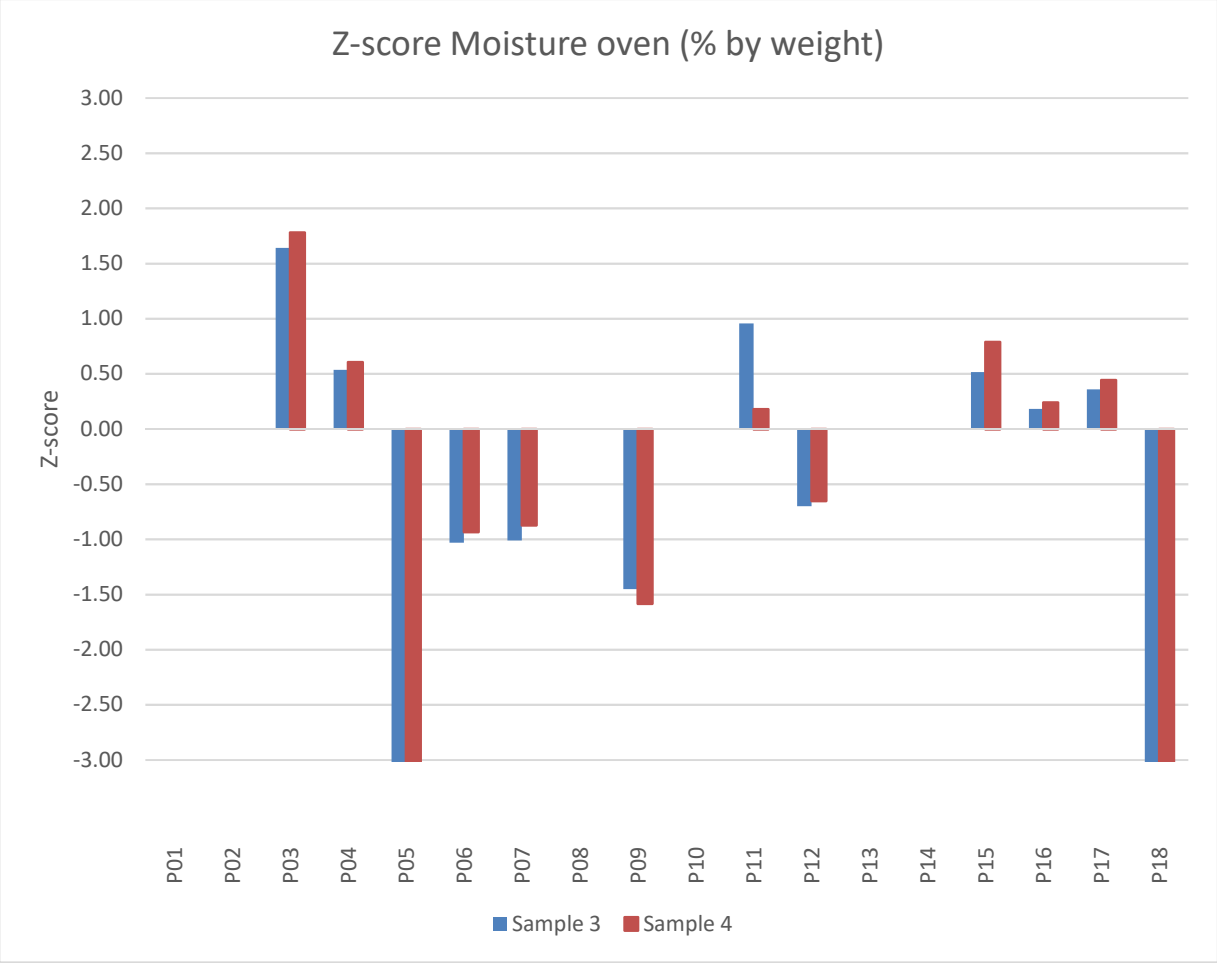

Table 9 Results and Z-scores for oleic acid.

Oleic acid (% of total fatty acids)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	60.73	-0.98	60.48	-1.09
P04				
P05	64.28	1.59	63.76	1.50
P06	61.23	-0.62	61.22	-0.51
P07				
P08				
P09	63.55	1.07	63.24	1.10
P10				
P11				
P12	61.77	-0.23	61.54	-0.25
P13				
P14				
P15				
P16	60.75	-0.96	60.60	-0.99
P17	62.26	0.13	62.16	0.24
P18	47.60	-10.49	50.30	-7.79
Assigned value	62.08		61.86	
Standard Deviation	1.38		1.26	
Count	8		8	

Note - Laboratory number P18 Sample 3 was removed from assigned value calculations as the result was an outlier

Note - Laboratory number P18 Sample 4 was removed from assigned value calculations as the result was an outlier

Figure 7 Z-scores for oleic acid content.

Table 10 Results and Z-scores for linoleic acid.

Linoleic acid (% of total fatty acids)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	20.03	0.71	20.33	0.99
P04				
P05	19.60	-0.25	19.76	-0.29
P06	19.93	0.49	20.02	0.30
P07				
P08				
P09	19.36	-0.79	19.47	-0.93
P10				
P11				
P12	18.92	-1.79	19.15	-1.64
P13				
P14				
P15				
P16	20.12	0.93	20.31	0.94
P17	20.02	0.70	20.18	0.64
P18	22.20	5.63	23.10	7.15
Assigned value	19.71		19.89	
Standard Deviation	0.44		0.45	
Count	8		8	

Note - Laboratory number P18 Sample 3 was removed from assigned value calculations as the result was an outlier

Note - Laboratory number P18 Sample 4 was removed from assigned value calculations as the result was an outlier

Figure 8 Z-scores for linoleic acid content.

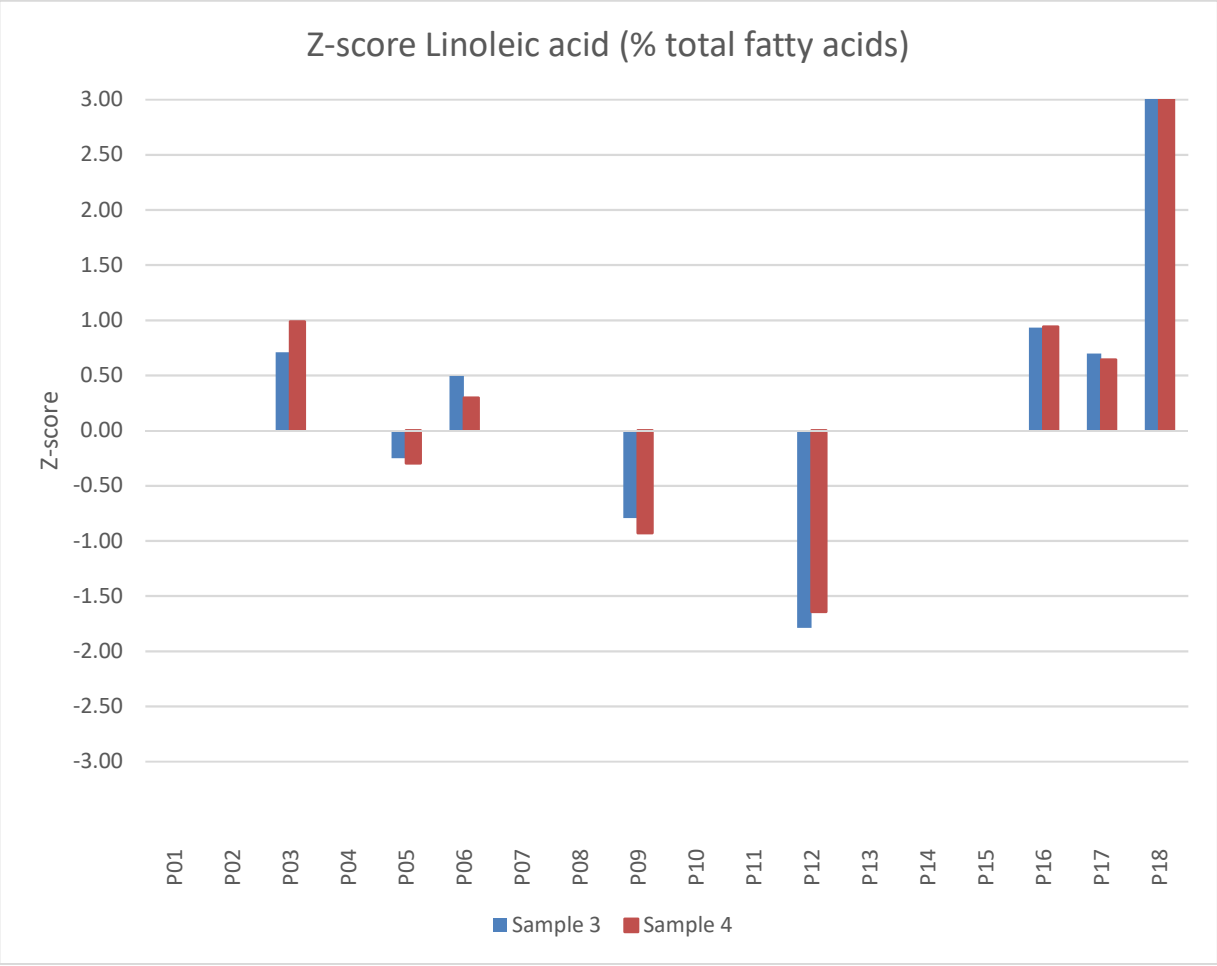

Table 11 Results and Z-scores for linolenic acid.

Linolenic acid (% of total fatty acids)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	9.86	0.22	9.89	0.36
P04				
P05	9.22	-1.30	8.81	-1.69
P06	10.33	1.33	10.34	1.21
P07				
P08				
P09	9.85	0.20	9.78	0.15
P10				
P11				
P12	9.32	-1.07	9.32	-0.73
P13				
P14				
P15				
P16	10.22	1.06	10.21	0.97
P17	9.58	-0.44	9.56	-0.27
P18	<0.05		<0.05	
Assigned value	9.77		9.70	
Standard Deviation	0.42		0.53	
Count	8		8	

Note - Laboratory number P18 Sample 3 was removed from assigned value calculations as the result was an outlier

Note - Laboratory number P18 Sample 4 was removed from assigned value calculations as the result was an outlier

Figure 9 Z-scores for linolenic acid content.

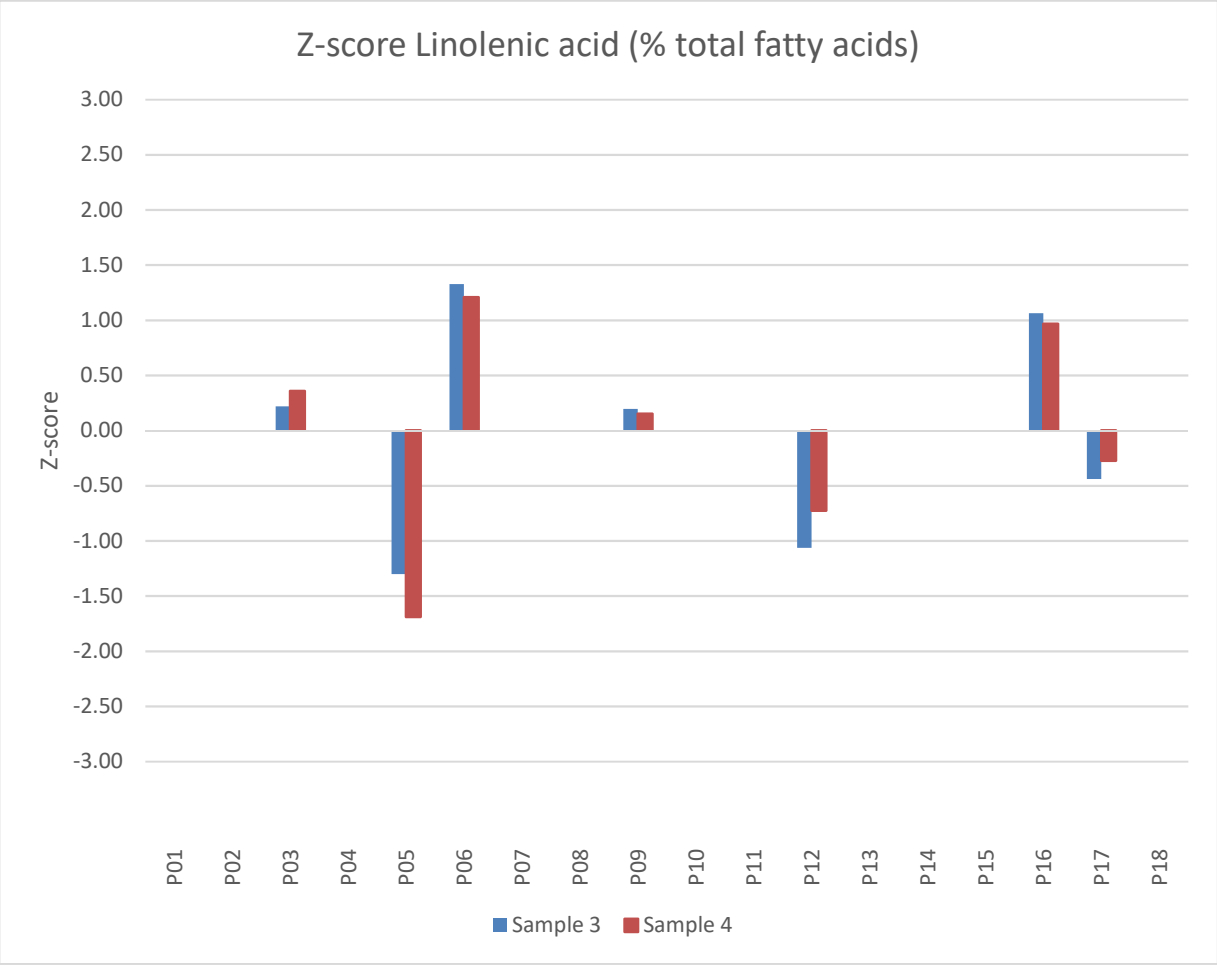

Table 12 Results and Z-scores for free fatty acids.

Free fatty acid (% as oleic acid)				
	Sample 3		Sample 4	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	0.24	-0.16	0.23	-0.19
P04				
P05	0.17	-0.92	0.16	-0.77
P06	0.15	-1.16	0.14	-0.98
P07				
P08				
P09	0.39	1.66	0.69	3.66
P10				
P11				
P12	0.33	0.96	0.32	0.53
P13				
P14				
P15				
P16	0.22	-0.34	0.22	-0.27
P17	0.25	-0.04	0.22	-0.31
P18	0.74	5.77	0.49	1.99
Assigned value	0.25		0.25	
Standard Deviation	0.09		0.12	
Count	8		8	

Note - Laboratory number P18 Sample 3 was removed from assigned value calculations as the result was an outlier

Note - Laboratory number P09 Sample 4 was removed from assigned value calculations as the result was an outlier

Figure 10 Z-scores for free fatty acid content.

Appendix

Analytical methods used

Participating laboratories were asked to indicate which analytical methods were used for each determination. Information is summarised below (number of laboratories using method in brackets):

Test weight

Chrondrometer (3), half litre measure (4), Test weight cup (1), GAFTA 25.0 (1), NIR (1), not indicated (5).

Impurities

AOF 4-1.2(b)(3), AOF 4-1.3 (4), Screens and aspirator (1), ISO658:2002 (2), as per GTA (1), not indicated (4).

Oil content (NIR)

Calibration based on ISO659 (1), NIR (2), FOSS NIR (1), Infratec 1241 (3), NMR (1), not indicated (8).

Oil content (solvent)

ISO659:2009 (3), extract for 4,2,2 hours with regrind in between (1), AOF 4-1.24a (3), AOCS AOCS Am 2-93 (1), not indicated (1).

Moisture (NIR)

Calibration based on ISO665 (1), FOSS NIR (2) Infratec 1241 (2), NMR (1), not indicated (10).

Moisture (oven)

AOF 4-1.5 (130°C for 1 hour) (7), ISO665 (103°C for 3 hours, then 1 hour, 5g) (3), 105°C for 2 hours (1), not indicated (1).

Fatty acids (oleic, linoleic and linolenic acid)

IOC doc no. 24 (2), GC (1), ISO5508:1990 (1), AOCS Ce 1h-05 (1), AOCS Ce 1a-13 mod (1), GC-MS (1), not indicated (1).

Free fatty acids

AOCS Ac 5-41 (3), AOCS Ca 5a-40 (3), ISO660:2009 (1), Not indicated (1).