AOF Test Check program

Test Report

Round 1 2022.

Summary

1. The test materials for the AOF test check program Round 3 2021-2022 were dispatched in February 2022. Each participant received two canola seed test samples 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 1 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	58.64	1.42	(kg/hL)	12
Impurities	2.16	0.70	%	12
Oil NIR	44.03	0.49	% by weight	13
Oil solvent	45.24	0.86	% by weight	7
Moisture NIR	7.35	0.31	% by weight	13
Moisture oven	7.06	0.24	% by weight	10
Oleic acid	58.03	1.59	% total fatty acids	4
Linoleic acid	22.60	0.19	% total fatty acids	4
Linolenic acid	10.88	0.87	% total fatty acids	4
Free fatty acid	0.37	0.14	% (as oleic acid)	6

Table 2 Sample 2 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	62.65	0.92	(kg/hL)	12
Impurities	1.45	0.29	%	12
Oil NIR	44.15	0.13	% by weight	13
Oil solvent	45.40	0.95	% by weight	7
Moisture NIR	7.01	0.26	% by weight	13
Moisture oven	6.68	0.30	% by weight	10
Oleic acid	56.86	1.46	% total fatty acids	4
Linoleic acid	23.31	0.08	% total fatty acids	4
Linolenic acid	11.02	0.82	% total fatty acids	4
Free fatty acid	0.41	0.19	% (as oleic acid)	6

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 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	<60	-	62.40	-0.27
P04	59.06	0.30	62.57	-0.08
P05	59.52	0.61	63.67	1.11
P06	57.38	-0.89	61.63	-1.11
P07	55.98	-1.87	62.40	-0.27
P08	57.60	-0.73	61.90	-0.81
P09	60.92	1.60	64.08	1.55
P10				
P11	59.98	0.94	62.54	-0.12
P12				
P13				
P14	58.25	-0.28	62.17	-0.52
P15	63.62	3.49	64.37	1.86
P16	58.50	-0.10	61.50	-1.24
P17				
P18	59.25	0.43	62.55	-0.10
Assigned value	58.64		62.65	
Standard Deviation	1.42		0.92	
Count	12		12	

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

Figure 1 Z-scores for test weight.

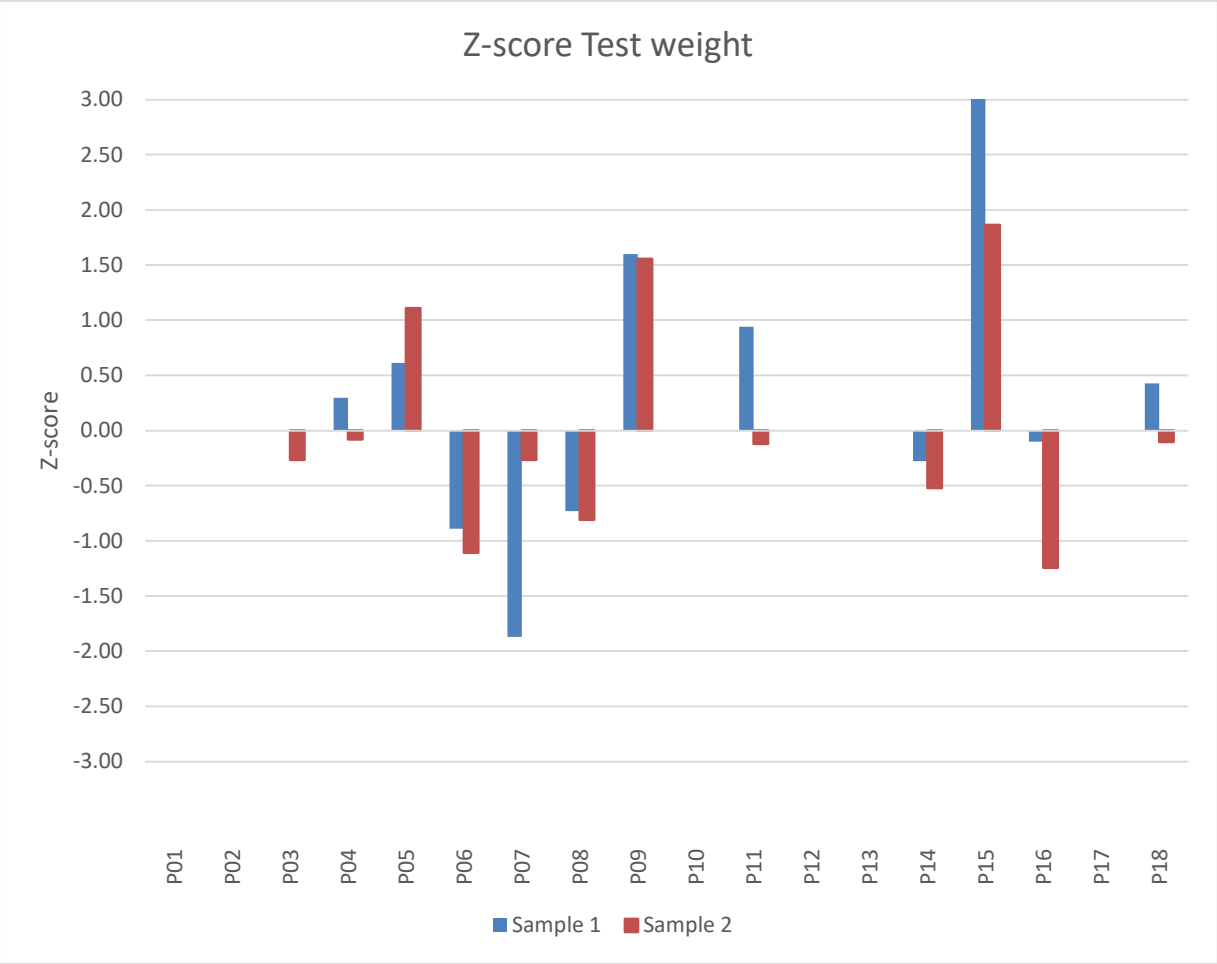

Table 4 Results and Z-scores for impurities.

Impurities (%)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	1.87	-0.42	1.36	-0.32
P04	2.29	0.20	1.84	1.33
P05	4.41	3.24	3.08	5.52
P06	1.84	-0.45	1.18	-0.94
P07	3.03	1.25	1.43	-0.07
P08	2.85	1.00	1.75	1.01
P09	2.95	1.14	1.05	-1.36
P10				
P11	1.50	-0.94	1.85	1.35
P12				
P13				
P14	2.15	-0.01	1.36	-0.33
P15	0.19	-2.82	0.12	-4.52
P16	2.29	0.18	1.26	-0.67
P17				
P18	0.80	-1.95	0.40	-3.57
Assigned value	2.16		1.45	
Standard Deviation	0.70		0.29	
Count	12		12	

Note - Laboratory numbers P05 and P15 Sample 1 were removed from assigned value calculation as the results were outliers

Note - Laboratory numbers P05, P15 and P18 Sample 2 were removed from assigned value calculation as the results were outliers

Figure 2 Z-scores for impurities.

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

Oil content NIR (%)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02	45.64	3.31	45.44	9.62
P03	44.30	0.55	44.40	1.88
P04	43.93	-0.21	44.21	0.43
P05	43.95	-0.17	43.90	-1.84
P06	46.62	5.33	46.54	17.81
P07	44.14	0.22	44.07	-0.57
P08	43.10	-1.92	42.80	-10.03
P09	44.30	0.55	44.10	-0.35
P10				
P11	44.57	1.11	44.15	0.02
P12				
P13				
P14	43.15	-1.82	44.20	0.39
P15	44.35	0.65	44.60	3.37
P16	44.38	0.70	44.10	-0.35
P17				
P18	44.20	0.34	44.20	-0.10
Assigned value	44.03		44.15	
Standard Deviation	0.49		0.13	
Count	13		13	

Note - Laboratory numbers P02 and P06 Sample 1 were removed from assigned value calculation as the results were outliers

Note - Laboratory numbers P02, P06, P08 and P15 Sample 2 were removed from assigned value calculation as the results were outliers

Figure 3 Z-scores for oil content by NIR.

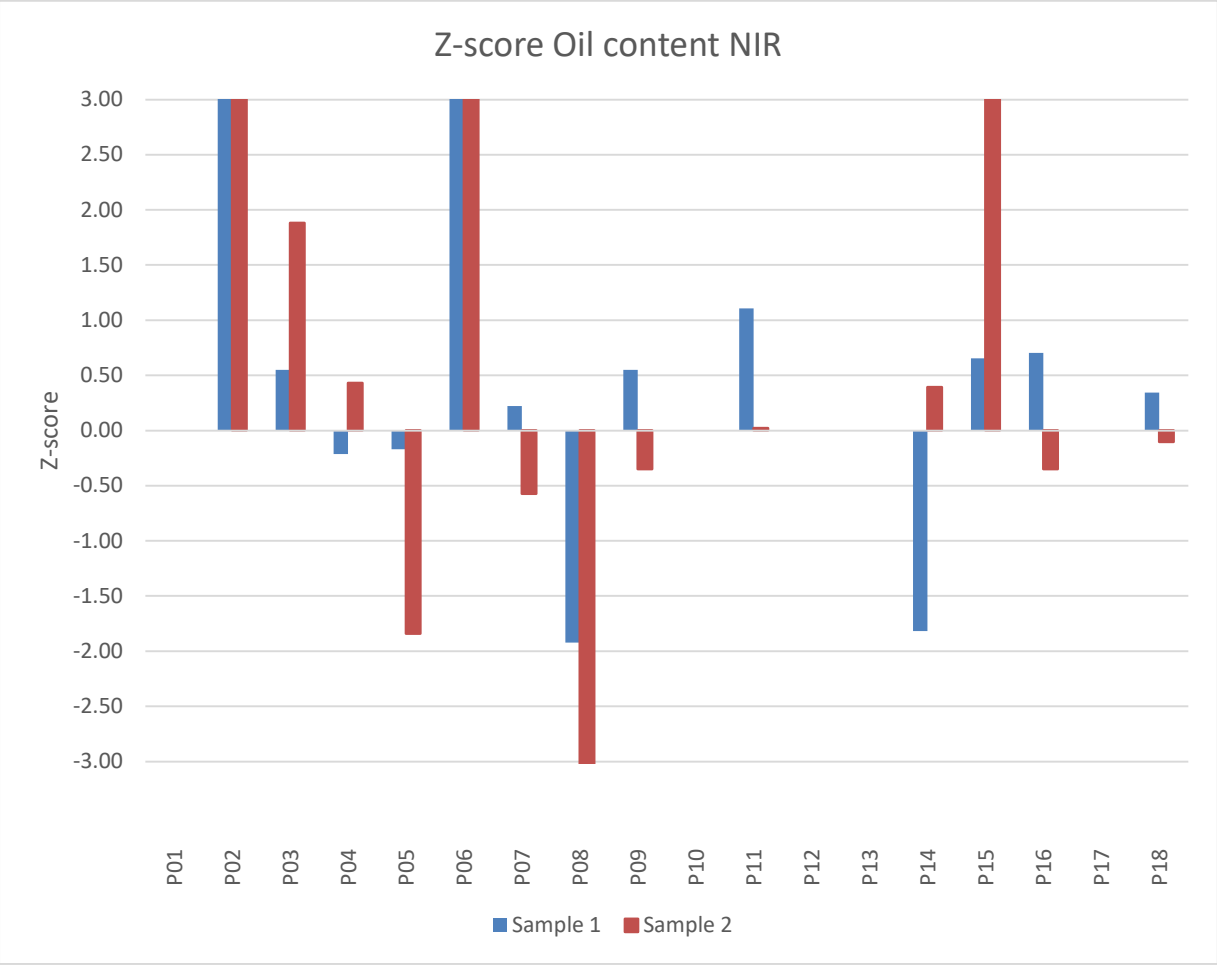

Table 6 Results and Z-scores for oil content solvent.

Oil content solvent (%)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	45.62	0.44	45.44	0.04
P04				
P05	43.99	-1.46	44.37	-1.08
P06	46.60	1.59	46.75	1.41
P07				
P08				
P09	45.07	-0.20	45.36	-0.05
P10				
P11				
P12				
P13				
P14				
P15	45.51	0.32	45.92	0.55
P16	45.48	0.28	45.98	0.61
P17				
P18	44.40	-0.97	44.00	-1.47
Assigned value	45.24		45.40	
Standard Deviation	0.86		0.95	
Count	7		7	

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

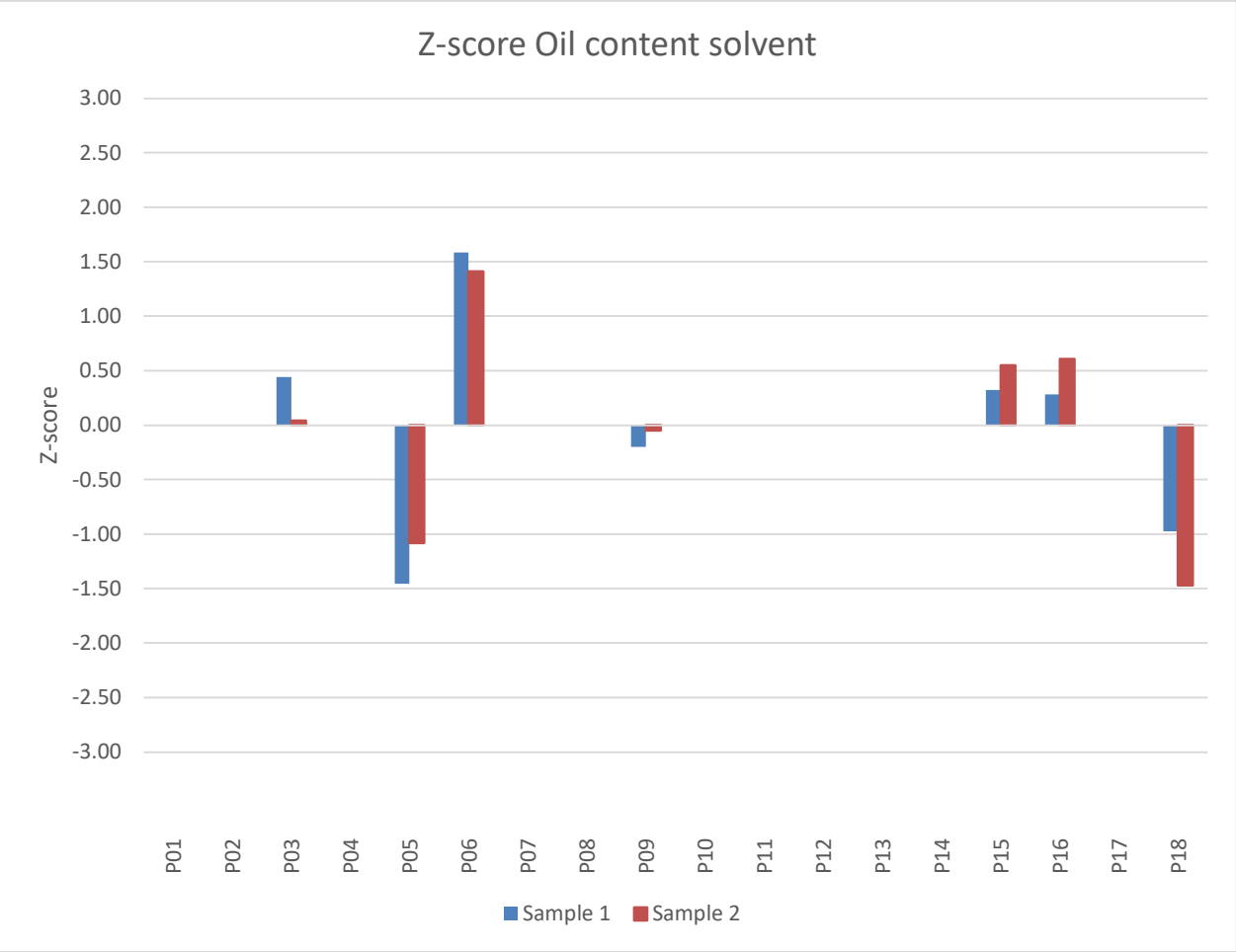

Figure 5 Absolute difference between oil content (NIR result minus wet chemistry)

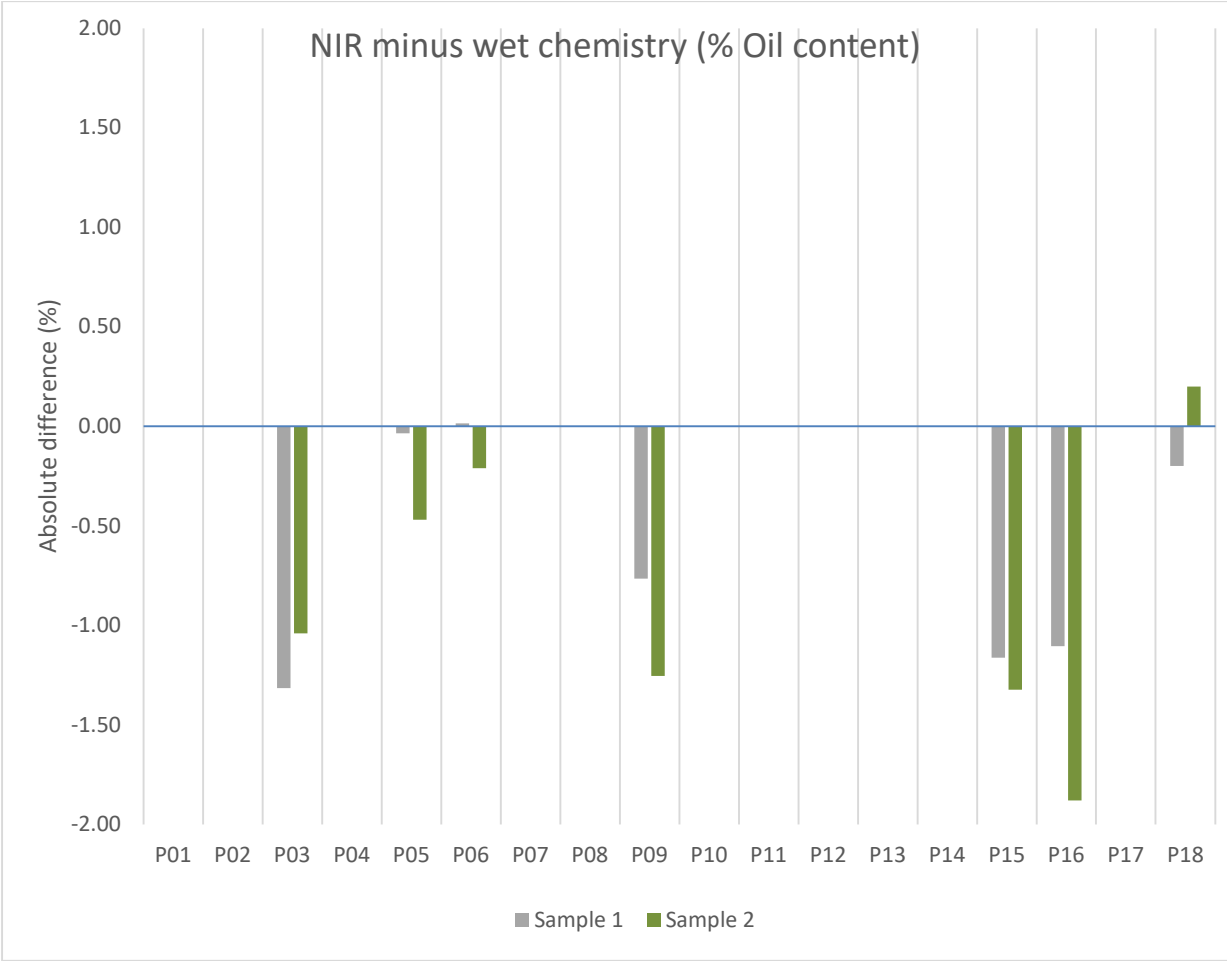

Table 7 Results and Z-scores for moisture content (NIR).

Moisture NIR (% by weight)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02	7.12	-0.76	6.76	-0.98
P03	7.40	0.15	6.90	-0.41
P04	7.60	0.78	7.22	0.82
P05	7.30	-0.18	6.90	-0.41
P06	7.01	-1.11	6.54	-1.82
P07	7.46	0.34	7.10	0.37
P08	6.75	-1.95	4.90	-8.24
P09	7.15	-0.66	6.85	-0.61
P10				
P11	7.42	0.21	7.26	0.98
P12				
P13				
P14	7.95	1.92	7.50	1.94
P15	7.65	0.96	7.15	0.57
P16	7.25	-0.34	7.00	-0.02
P17				
P18	7.55	0.63	6.90	-0.41
Assigned value	7.35		7.01	
Standard Deviation	0.31		0.26	
Count	13		13	

Note - Laboratory number P08 Sample 2 was removed from assigned value calculations as the result was an outlier

Figure 6 Z-scores for moisture content by NIR.

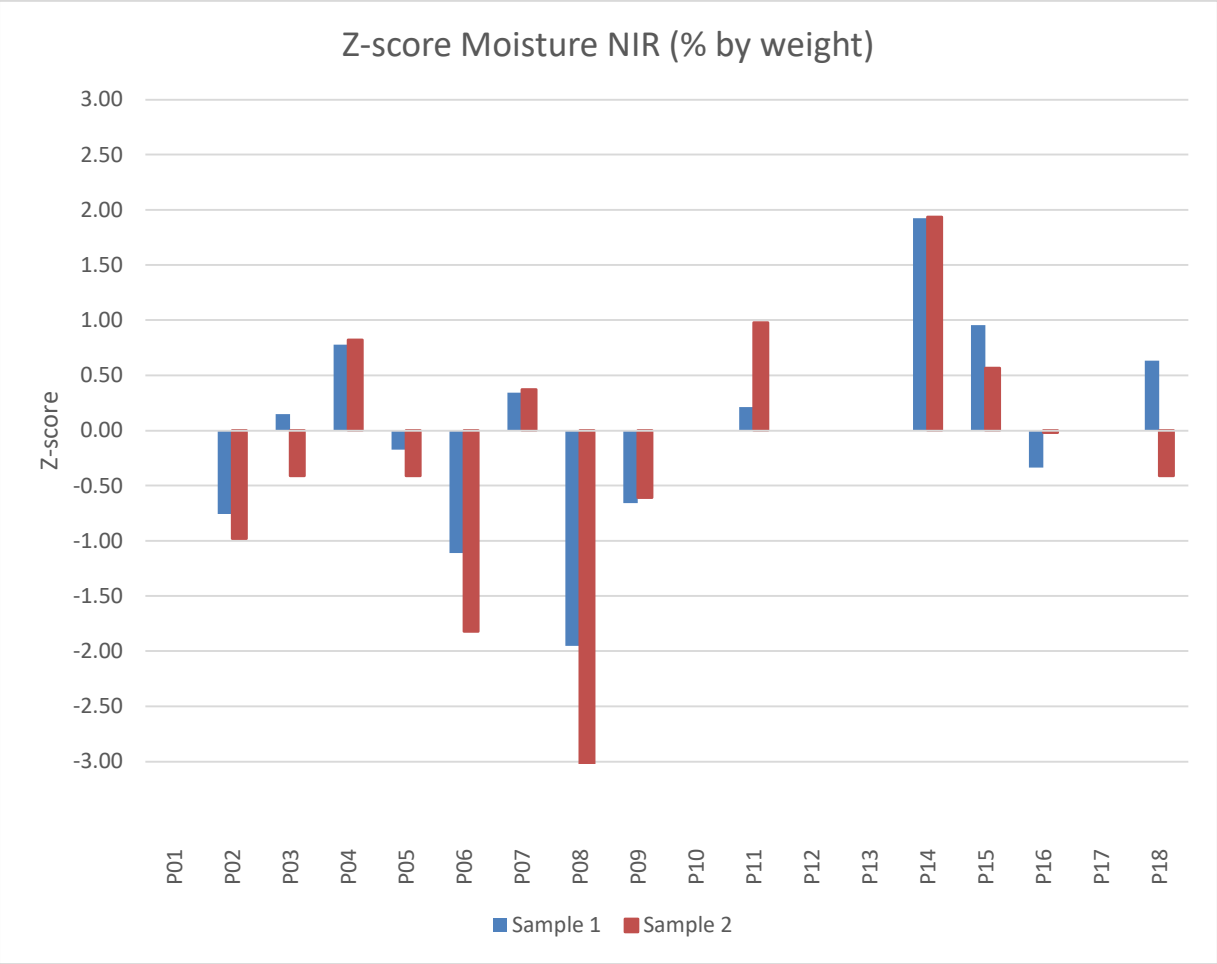

Table 8 Results and Z-scores for moisture content by oven.

Moisture Oven (% by weight)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	7.50	1.80	7.23	1.83
P04	7.09	0.12	6.90	0.74
P05	6.77	-1.23	6.37	-1.04
P06	7.04	-0.11	6.48	-0.69
P07	6.94	-0.53	6.56	-0.42
P08				
P09	7.06	-0.03	6.62	-0.20
P10				
P11	6.99	-0.30	6.50	-0.62
P12				
P13				
P14				
P15	7.26	0.82	6.99	1.03
P16	7.29	0.95	6.88	0.65
P17				
P18	6.70	-1.50	6.30	-1.28
Assigned value	7.06		6.68	
Standard Deviation	0.24		0.30	
Count	10		10	

Figure 7 Z-scores for moisture content by oven.

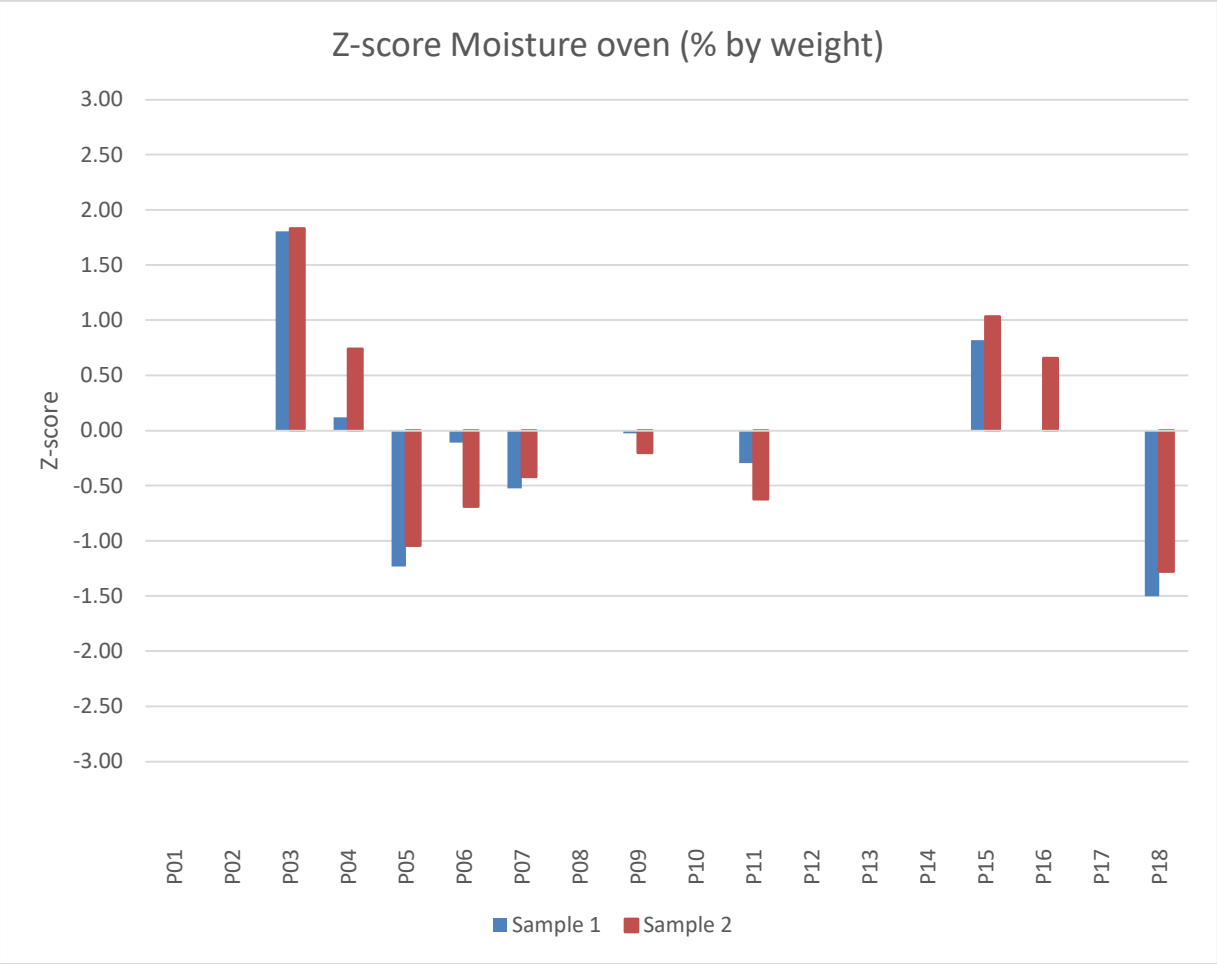

Figure 8 Absolute difference between moisture content (NIR result minus wet chemistry)

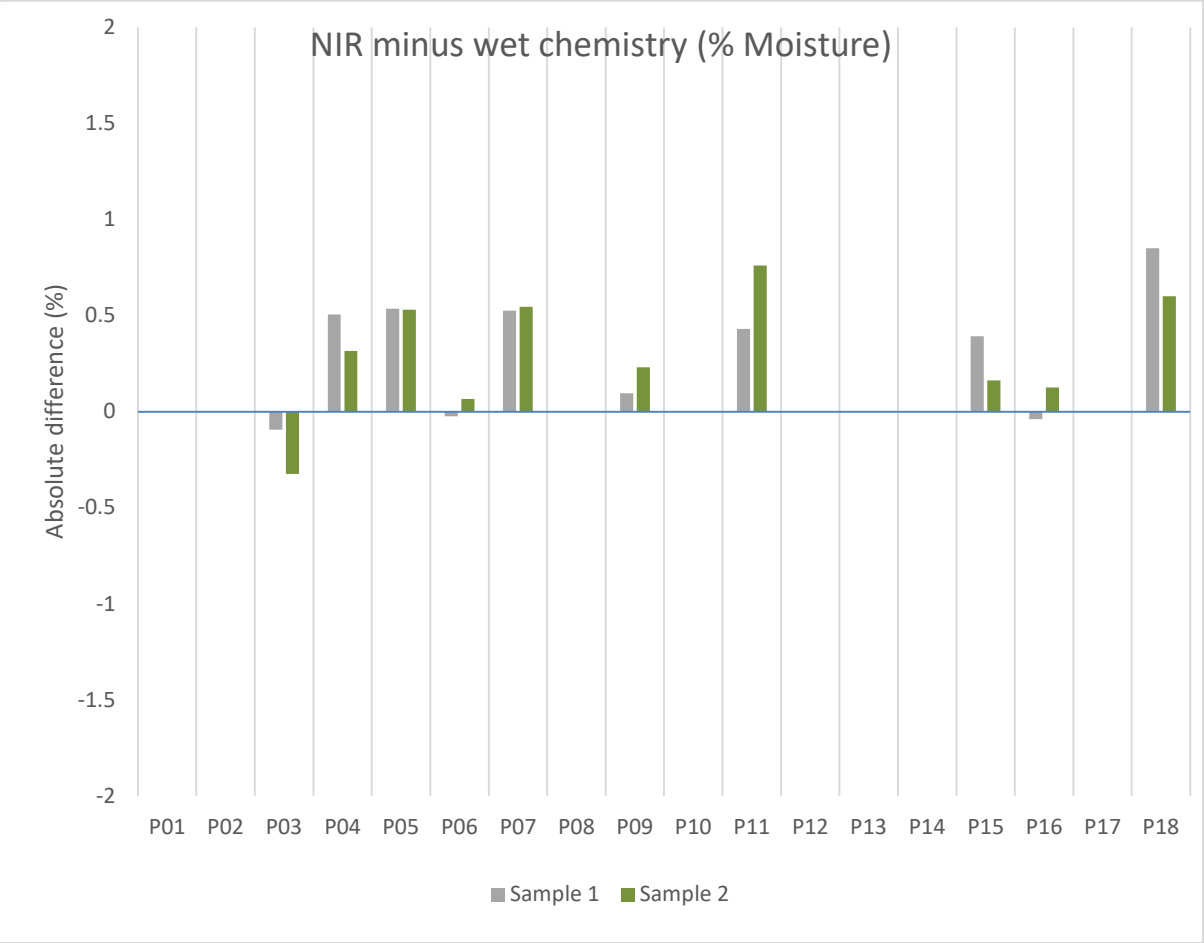

Table 9 Results and Z-scores for oleic acid.

Oleic acid (% of total fatty acids)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	57.08	-0.60	55.86	-0.69
P04				
P05	60.40	1.49	59.04	1.48
P06	57.43	-0.38	56.38	-0.33
P07				
P08				
P09				
P10				
P11				
P12				
P13				
P14				
P15				
P16	57.21	-0.52	56.19	-0.46
P17				
P18				
Assigned value	58.03		56.86	
Standard Deviation	1.59		1.46	
Count	4		4	

Figure 9 Z-scores for oleic acid content.

Table 10 Results and Z-scores for linoleic acid.

Linoleic acid (% of total fatty acids)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	22.75	0.77	23.43	1.47
P04				
P05	22.35	-1.39	23.28	-0.31
P06	22.60	-0.05	23.24	-0.79
P07				
P08				
P09				
P10				
P11				
P12				
P13				
P14				
P15				
P16	22.73	0.67	23.28	-0.37
P17				
P18				
Assigned value	22.60		23.31	
Standard Deviation	0.19		0.08	
Count	4		4	

Figure 10 Z-scores for linoleic acid content.

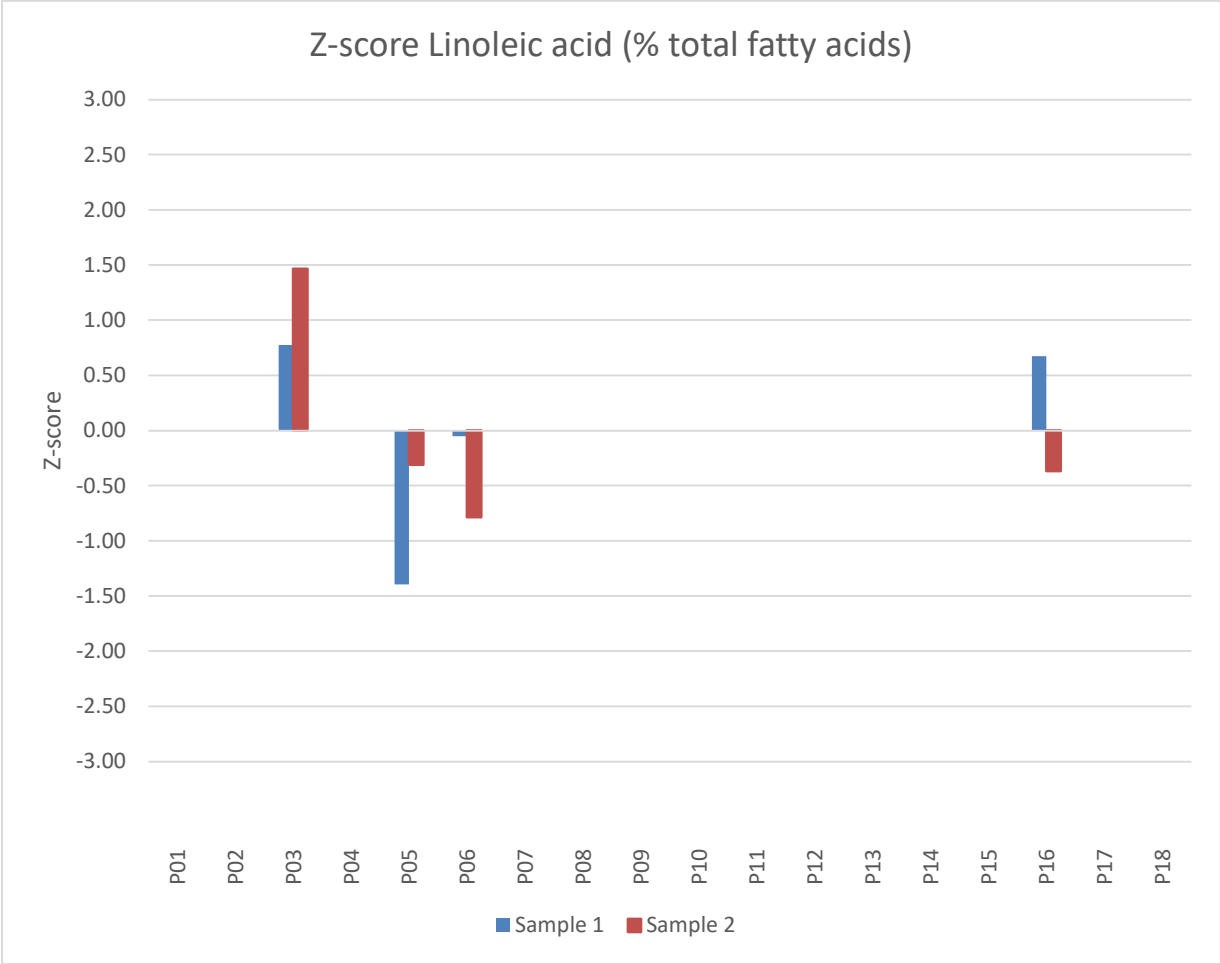

Table 11 Results and Z-scores for linolenic acid.

Linolenic acid (% of total fatty acids)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	11.27	0.45	11.37	0.42
P04				
P05	9.59	-1.49	9.81	-1.48
P06	11.43	0.63	11.60	0.70
P07				
P08				
P09				
P10				
P11				
P12				
P13				
P14				
P15				
P16	11.24	0.41	11.32	0.36
P17				
P18				
Assigned value	10.88		11.02	
Standard Deviation	0.87		0.82	
Count	4		4	

Figure 11 Z-scores for linolenic acid content.

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

Free fatty acid (% as oleic acid)				
	Sample 1		Sample 2	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	0.36	-0.11	0.33	-0.42
P04				
P05	0.21	-1.15	0.28	-0.73
P06	0.19	-1.25	0.20	-1.16
P07				
P08				
P09	0.51	0.96	0.68	1.45
P10				
P11				
P12				
P13				
P14				
P15				
P16	0.48	0.72	0.40	-0.06
P17				
P18	0.49	0.82	0.58	0.91
Assigned value	0.37		0.41	
Standard Deviation	0.14		0.19	
Count	6		6	

Figure 12 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 (2), Test weight cup (1), not indicated (5), MS55-measurement of grain density by CBH chrondrometer (1).

Impurities

AOF 4-1.2(b)(2), AOF 4-1.3 (7), not indicated (2), ISO658 (1).

Oil content (NIR)

Calibration based on ISO659 (1), NIR (2), FOSS NIR (1), Infratec 1241 (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 (2), AOCS Not indicated (1).

Moisture (NIR)

Calibration based on ISO665 (1), FOSS NIR (1), NIR (2), Infratec 1241 (1), not indicated (7), ISO662(1).

Moisture (oven)

AOF 4-1.5 (130°C for 1 hour) (6), ISO665 (103°C for 3 hours, then 1 hour, 5g) (1), 105°C for 2 hours (1), not indicated (2).

Fatty acids (oleic, linoleic and linolenic acid)

IOC doc no. 24 (1), GC (1), AOCS Ce 1h-05 (1), not indicated (1), ISO12966 (1).

Free fatty acids

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