

AOF Test Check program

Test Report

Round 1 2023.

Summary

1. The test materials for the AOF test check program Round 1 2023 were dispatched in March 2023. 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	65.86	0.65	(kg/hL)	14
Impurities	0.89	0.29	%	14
Oil NIR	44.96	0.86	% by weight	15
Oil solvent	45.17	1.40	% by weight	8
Moisture NIR	5.99	0.23	% by weight	15
Moisture oven	5.75	0.31	% by weight	12
Oleic acid	59.68	1.27	% total fatty acids	7
Linoleic acid	19.93	0.45	% total fatty acids	7
Linolenic acid	11.51	0.20	% total fatty acids	7
Free fatty acid	0.28	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	63.11	1.31	(kg/hL)	14
Impurities	2.67	0.90	%	14
Oil NIR	44.74	0.64	% by weight	15
Oil solvent	44.12	1.33	% by weight	8
Moisture NIR	5.56	0.26	% by weight	15
Moisture oven	5.51	0.09	% by weight	12
Oleic acid	60.22	1.16	% total fatty acids	7
Linoleic acid	20.03	0.36	% total fatty acids	7
Linolenic acid	10.75	0.27	% total fatty acids	7
Free fatty acid	0.31	0.16	% (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:

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

3. Results and Z-scores

Table 3 Results and Z-scores for test weight.

Test weight (kg/hL)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	67.10	1.91	62.70	-0.31
P04	66.01	0.22	63.03	-0.06
P05	65.25	-0.95	62.50	-0.46
P06	65.19	-1.04	60.69	-1.85
P07	66.13	0.40	64.02	0.69
P08	65.20	-1.03	63.00	-0.08
P09	66.46	0.92	61.95	-0.89
P10				
P11	65.00	-1.34	64.00	0.68
P12	66.20	0.52	64.00	0.68
P13				
P14	65.99	0.19	64.14	0.79
P15	66.66	1.23	62.25	-0.66
P16				
P17	65.66	-0.32	61.42	-1.29
P18	60.45	-8.38	65.60	1.91
P19	65.40	-0.72	64.20	0.84
Assigned value				
	65.86		63.11	
Standard Deviation				
	0.65		1.31	
Count				
	14		14	

Note - Laboratory number P18 Sample 1 was removed from assigned value calculation as the result was an outlier.

Figure 1 Z-scores for test weight.

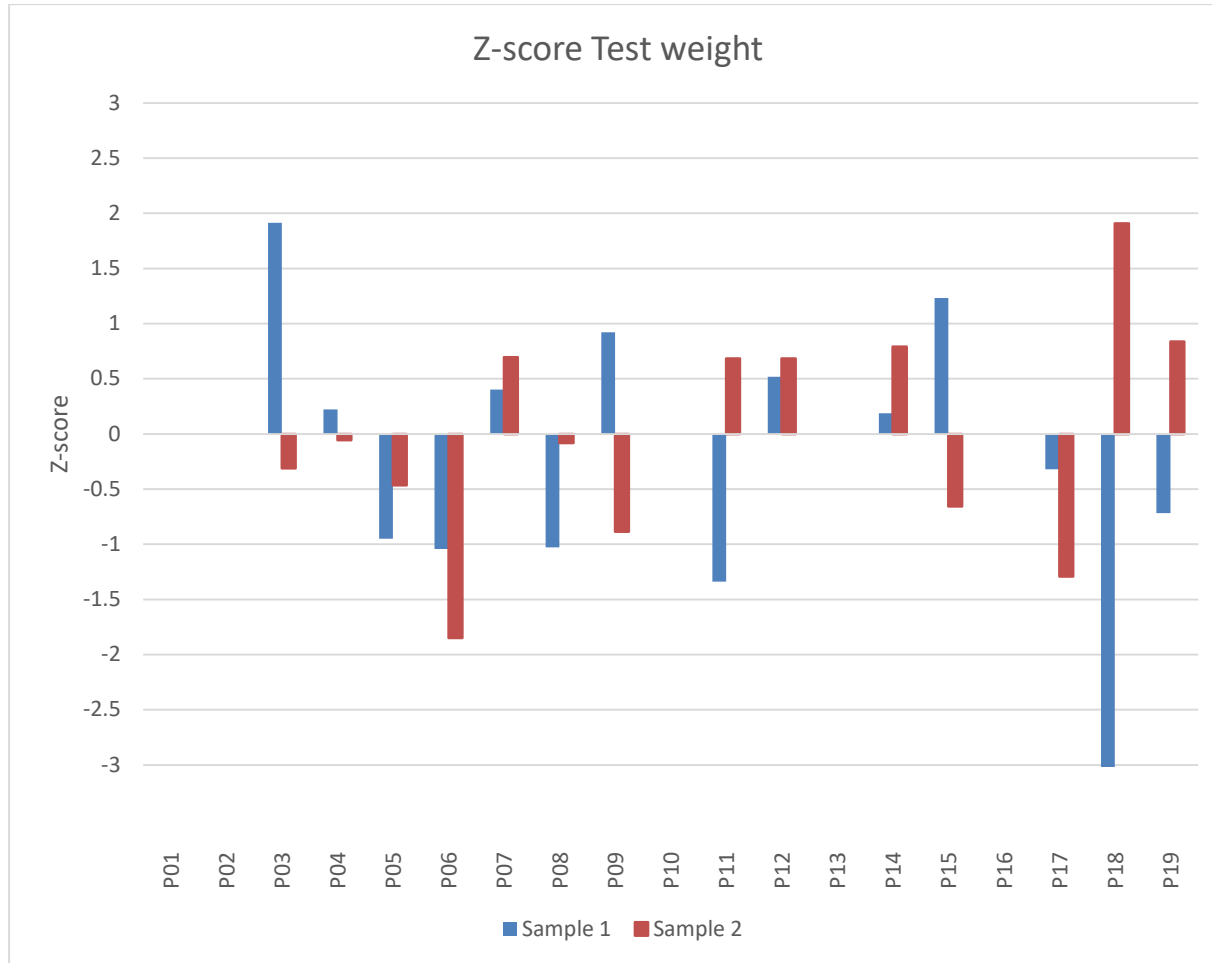


Table 4 Results and Z-scores for impurities.

Impurities (%)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	0.94	0.17	3.36	0.77
P04	1.37	1.63	3.27	0.67
P05	0.85	-0.13	2.35	-0.35
P06	1.01	0.40	3.89	1.36
P07	0.93	0.13	2.82	0.17
P08	1.10	0.72	3.30	0.71
P09	0.84	-0.16	3.75	1.21
P10				
P11	0.63	-0.87	1.57	-1.22
P12	0.80	-0.30	2.38	-0.32
P13				
P14	0.76	-0.45	2.71	0.05
P15	0.31	-1.98	1.00	-1.85
P16				
P17	0.63	-0.86	2.97	0.33
P18	4.70	12.95	1.15	-1.69
P19	1.39	1.69	2.81	0.16
Assigned value	0.89		2.67	
Standard Deviation	0.29		0.90	
Count	14		14	

Note - Laboratory number P18 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 (%)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02	47.85	3.36	47.60	4.48
P03	44.30	-0.77	44.50	-0.37
P04	44.64	-0.38	44.71	-0.05
P05	45.80	0.97	45.50	1.19
P06	46.64	1.95	45.77	1.61
P07	45.06	0.11	44.35	-0.61
P08	44.10	-1.01	44.45	-0.45
P09	43.85	-1.30	43.80	-1.47
P10				
P11	44.95	-0.02	44.55	-0.30
P12	45.92	1.11	45.12	0.60
P13				
P14	44.95	-0.02	44.55	-0.30
P15	46.00	1.20	44.60	-0.22
P16				
P17	44.40	-0.66	44.65	-0.14
P18	45.05	0.10	45.95	1.90
P19	43.85	-1.30	43.85	-1.39
Assigned value	44.96		44.74	
Standard Deviation	0.86		0.64	
Count	15		15	

Note - Laboratory number P02 Sample 1 was removed from assigned value calculation as the result was an outlier.

Note - Laboratory number P02 Sample 2 was removed from assigned value calculation as the result was an outlier.

Figure 3 Z-scores for oil content by NIR.

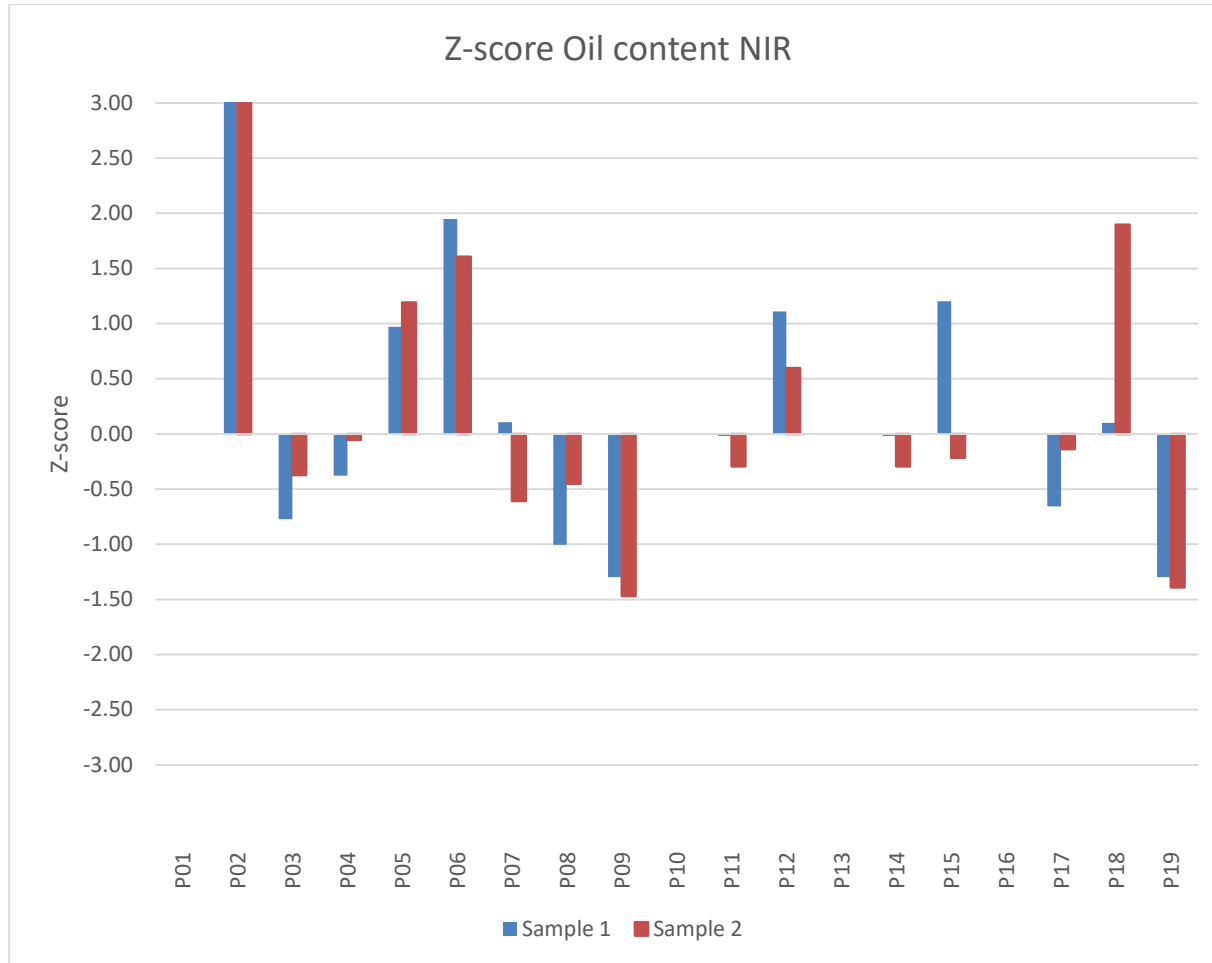


Table 6 Results and Z-scores for oil content solvent.

Oil content solvent (%)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	45.48	0.22	44.71	0.45
P04				
P05	45.26	0.07	42.29	-1.38
P06	46.71	1.10	45.90	1.35
P07				
P08				
P09	45.49	0.23	44.08	-0.03
P10				
P11				
P12				
P13				
P14				
P15	46.23	0.76	44.62	0.38
P16				
P17	46.03	0.61	45.47	1.02
P18	42.60	-1.84	43.45	-0.50
P19	43.55	-1.16	42.42	-1.28
Assigned value	45.17		44.12	
Standard Deviation	1.40		1.33	
Count	8		8	

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

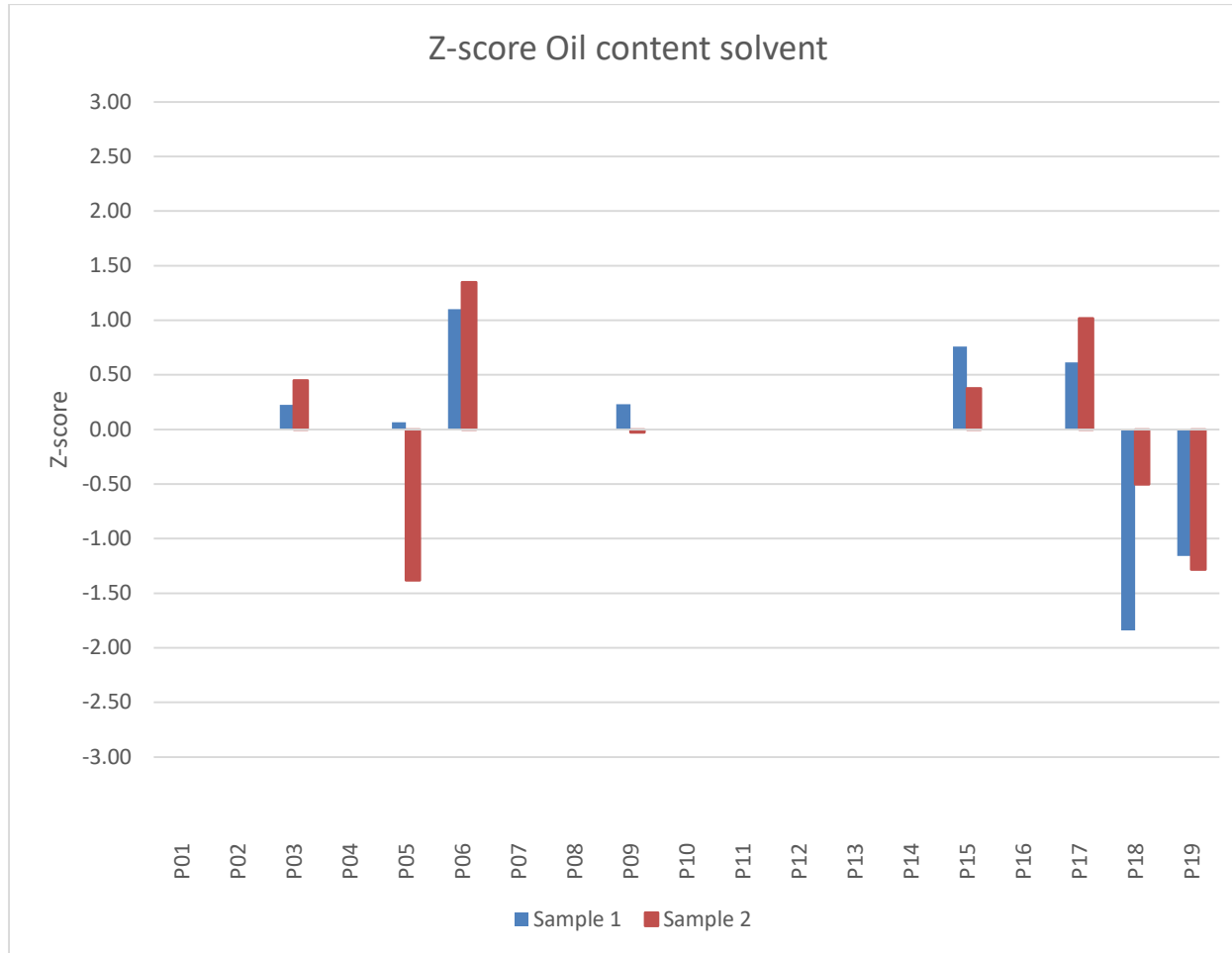


Figure 5 Absolute difference between oil content (NIR result minus wet chemistry).

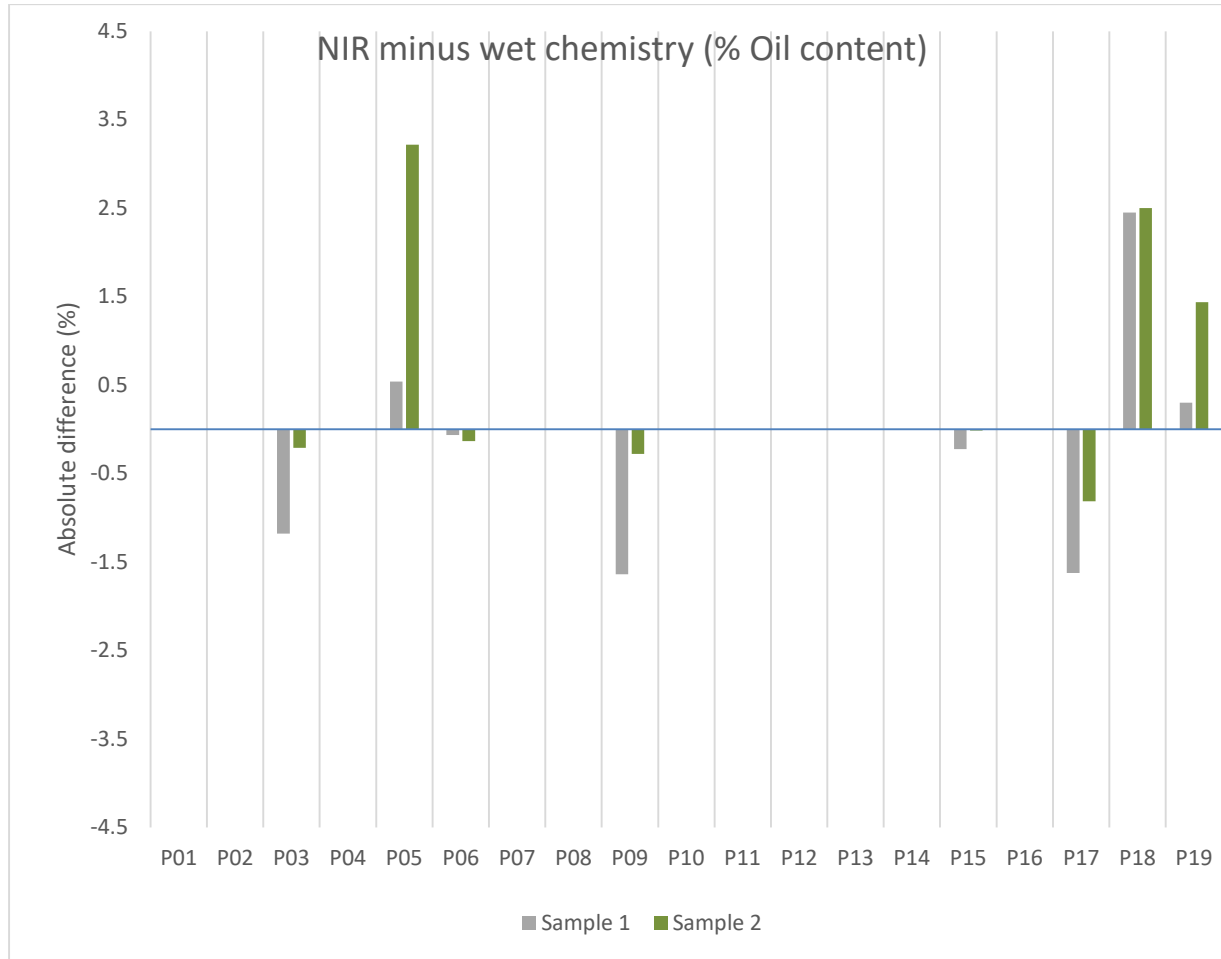


Table 7 Results and Z-scores for moisture content (NIR).

Lab number	Moisture NIR (% by weight)			
	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02	5.90	-0.38	5.85	1.10
P03	5.85	-0.59	5.25	-1.21
P04	6.08	0.39	5.39	-0.69
P05	5.90	-0.38	5.40	-0.63
P06	5.52	-2.00	5.05	-1.99
P07	6.08	0.39	5.87	1.16
P08	3.35	-11.30	2.45	-11.96
P09	6.10	0.48	5.50	-0.25
P10				
P11	5.75	-1.02	5.50	-0.25
P12	6.05	0.27	5.60	0.14
P13				
P14	6.40	1.77	5.75	0.71
P15	5.75	-1.02	5.55	-0.05
P16				
P17	6.05	0.27	5.60	0.14
P18	6.35	1.55	6.05	1.87
P19	6.05	0.27	5.55	-0.05
Assigned value	5.99		5.56	
Standard Deviation	0.23		0.26	
Count	15		15	

Note - Laboratory number P08 Sample 1 was removed from assigned value calculation as the result was an outlier.

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

Figure 6 Z-scores for moisture content by NIR.

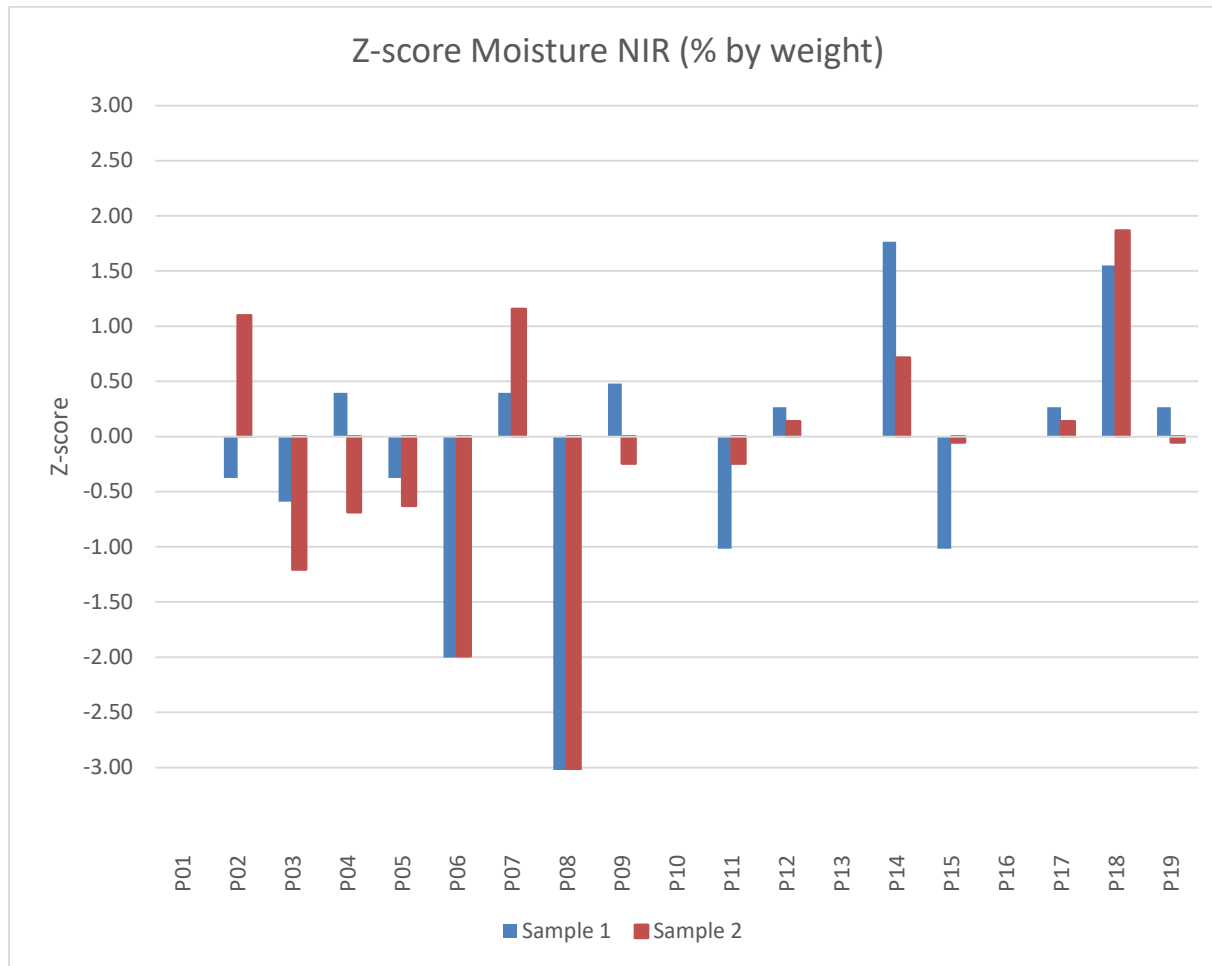


Table 8 Results and Z-scores for moisture content by oven.

Moisture Oven (% by weight)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	6.16	1.34	5.67	1.91
P04	5.80	0.15	5.45	-0.68
P05	5.82	0.21	5.47	-0.44
P06	5.44	-1.02	5.04	-5.50
P07	5.89	0.46	5.44	-0.80
P08				
P09	5.91	0.52	5.51	0.03
P10				
P11	5.80	0.17	5.45	-0.74
P12	5.19	-1.84	5.63	1.44
P13				
P14				
P15	5.83	0.26	5.51	-0.03
P16				
P17	5.80	0.17	5.45	-0.68
P18	5.25	-1.63	5.23	-3.26
P19	6.12	1.21	5.88	4.38
Assigned value	5.75		5.51	
Standard Deviation	0.31		0.09	
Count	12		12	

Note - Laboratory numbers P06, P18 and P19 Sample 2 were removed from assigned value calculations as the results were outliers.

Figure 7 Z-scores for moisture content by oven.

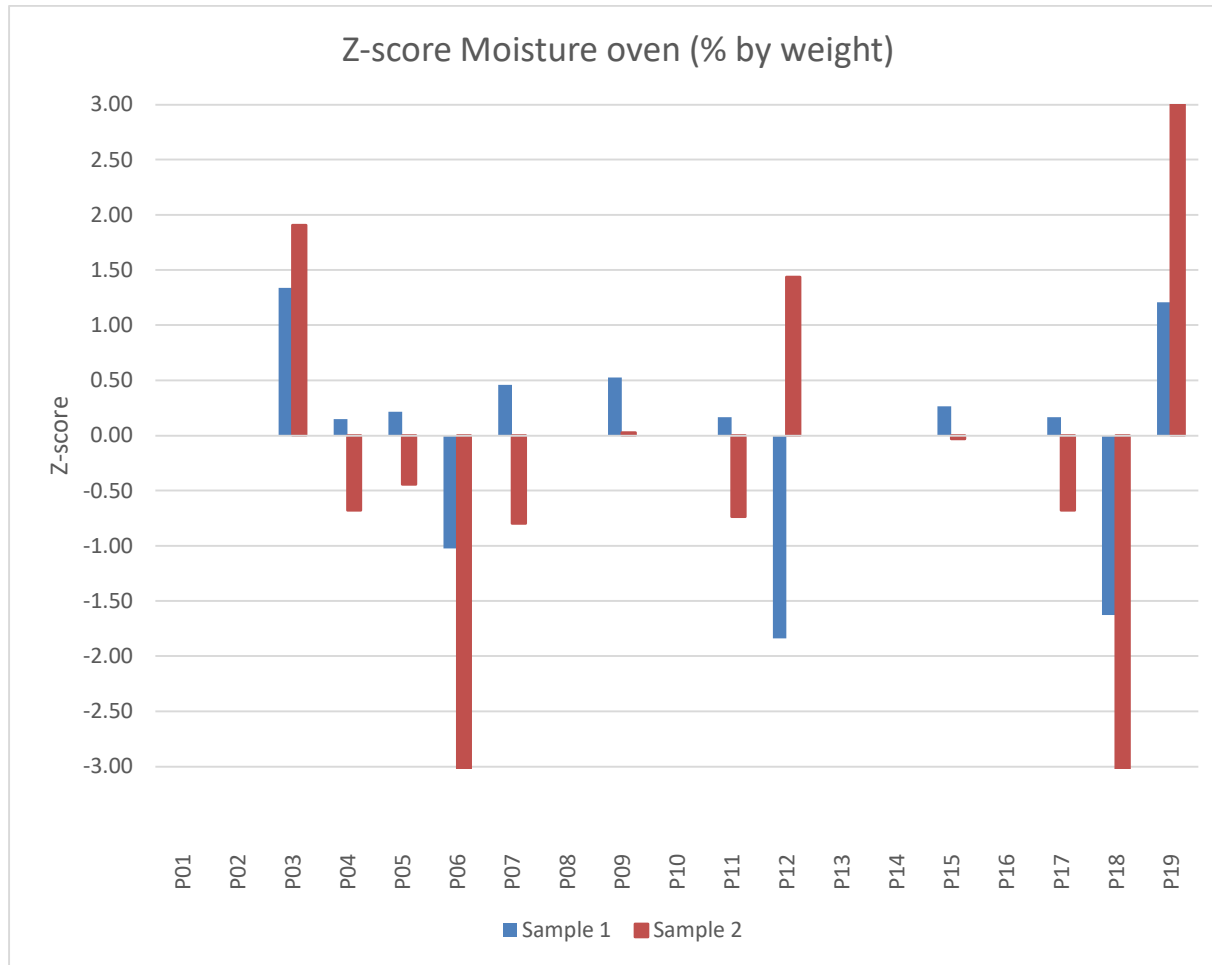


Figure 8 Absolute difference between moisture content (NIR result minus wet chemistry)

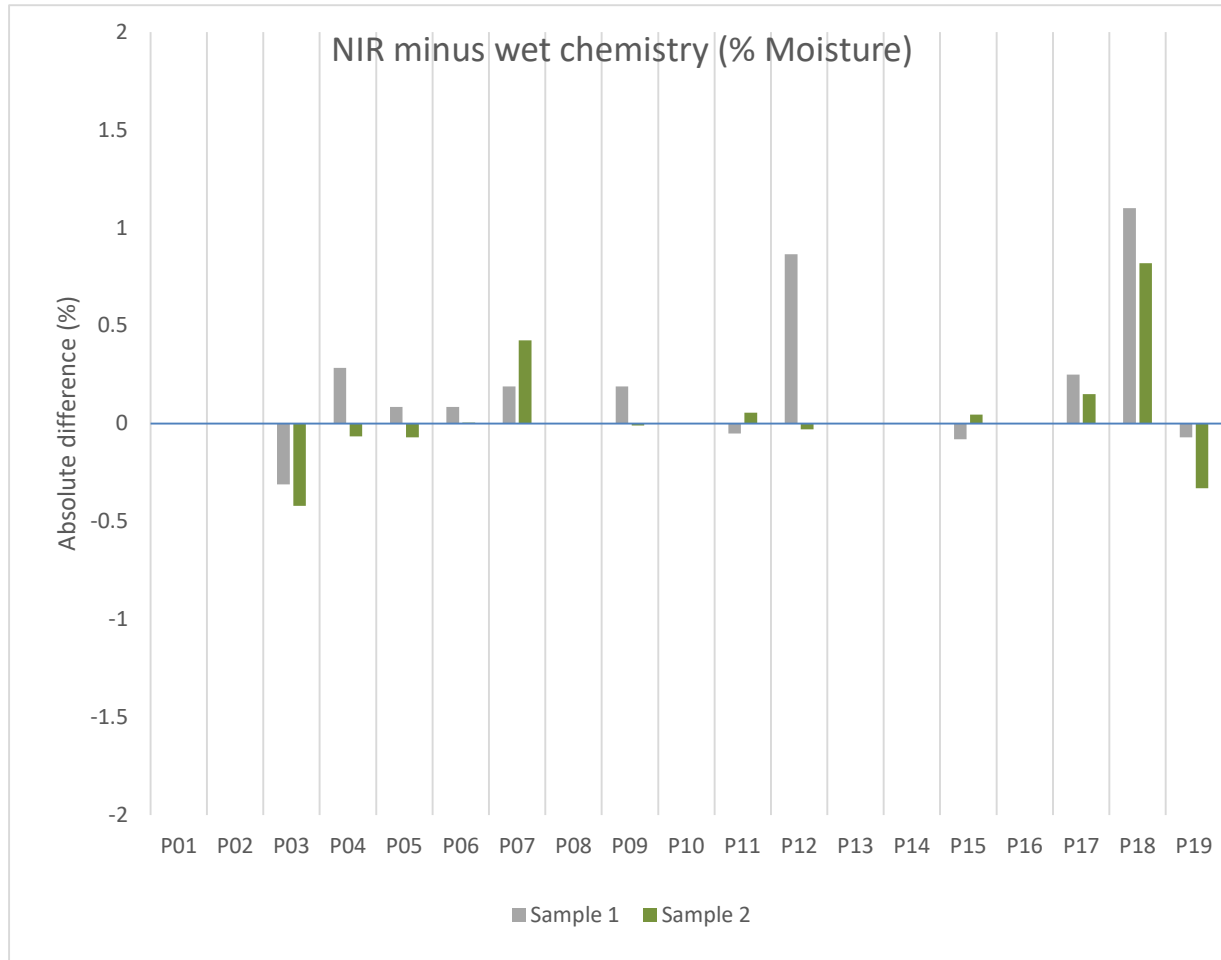


Table 9 Results and Z-scores for oleic acid.

Oleic acid (% of total fatty acids)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	58.52	-0.91	59.17	-0.90
P04				
P05	59.58	-0.08	60.24	0.02
P06	58.62	-0.83	59.77	-0.39
P07				
P08				
P09	61.47	1.41	62.48	1.95
P10				
P11				
P12	59.69	0.01	60.40	0.16
P13				
P14				
P15				
P16				
P17	58.54	-0.90	58.98	-1.07
P18	61.32	1.29	60.48	0.23
P19				
Assigned value	59.68		60.22	
Standard Deviation	1.27		1.16	
Count	7		7	

Figure 9 Z-scores for oleic acid content.



Table 10 Results and Z-scores for linoleic acid.

Linoleic acid (% of total fatty acids)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	19.91	-0.04	20.31	0.77
P04				
P05	19.63	-0.65	19.98	-0.14
P06	20.20	0.58	20.09	0.16
P07				
P08				
P09	19.34	-1.29	19.55	-1.35
P10				
P11				
P12	19.61	-0.70	19.57	-1.29
P13				
P14				
P15				
P16				
P17	20.11	0.40	20.47	1.22
P18	20.71	1.71	20.26	0.63
P19				
Assigned value	19.93		20.03	
Standard Deviation	0.45		0.36	
Count	7		7	

Figure 10 Z-scores for linoleic acid content.

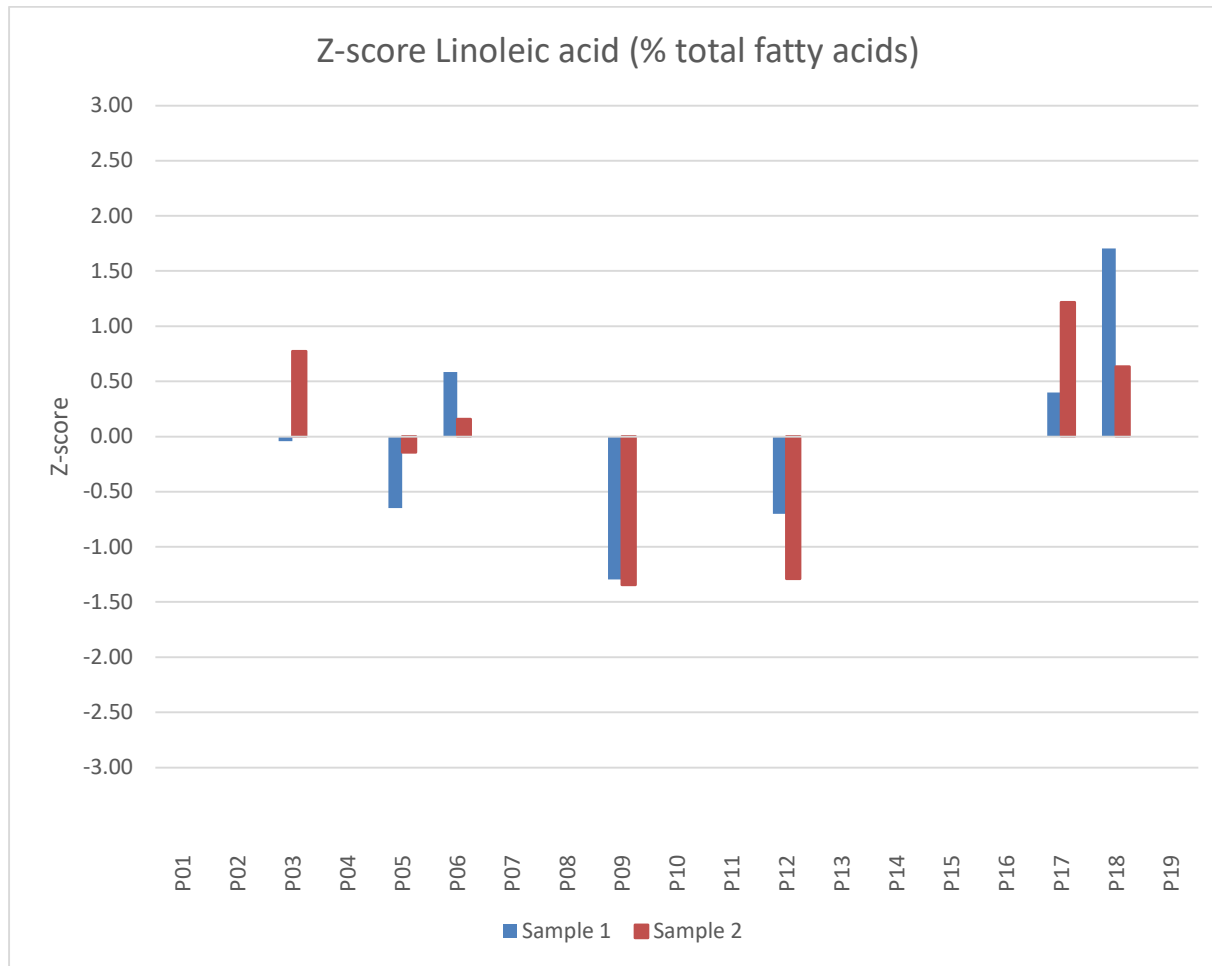


Table 11 Results and Z-scores for linolenic acid.

Linolenic acid (% of total fatty acids)				
Lab number	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	11.36	-0.73	10.44	-1.16
P04				
P05	11.53	0.11	10.51	-0.91
P06	11.59	0.37	10.89	0.52
P07				
P08				
P09	11.86	1.72	10.94	0.71
P10				
P11				
P12	11.28	-1.12	10.47	-1.05
P13				
P14				
P15				
P16				
P17	11.44	-0.34	10.94	0.69
P18	10.01	-7.36	11.08	1.21
P19				
Assigned value	11.51		10.75	
Standard Deviation	0.20		0.27	
Count	7		7	

Note - Laboratory number P18 Sample 1 was removed from assigned value calculation as the result was an outlier.

Figure 11 Z-scores for linolenic acid content.

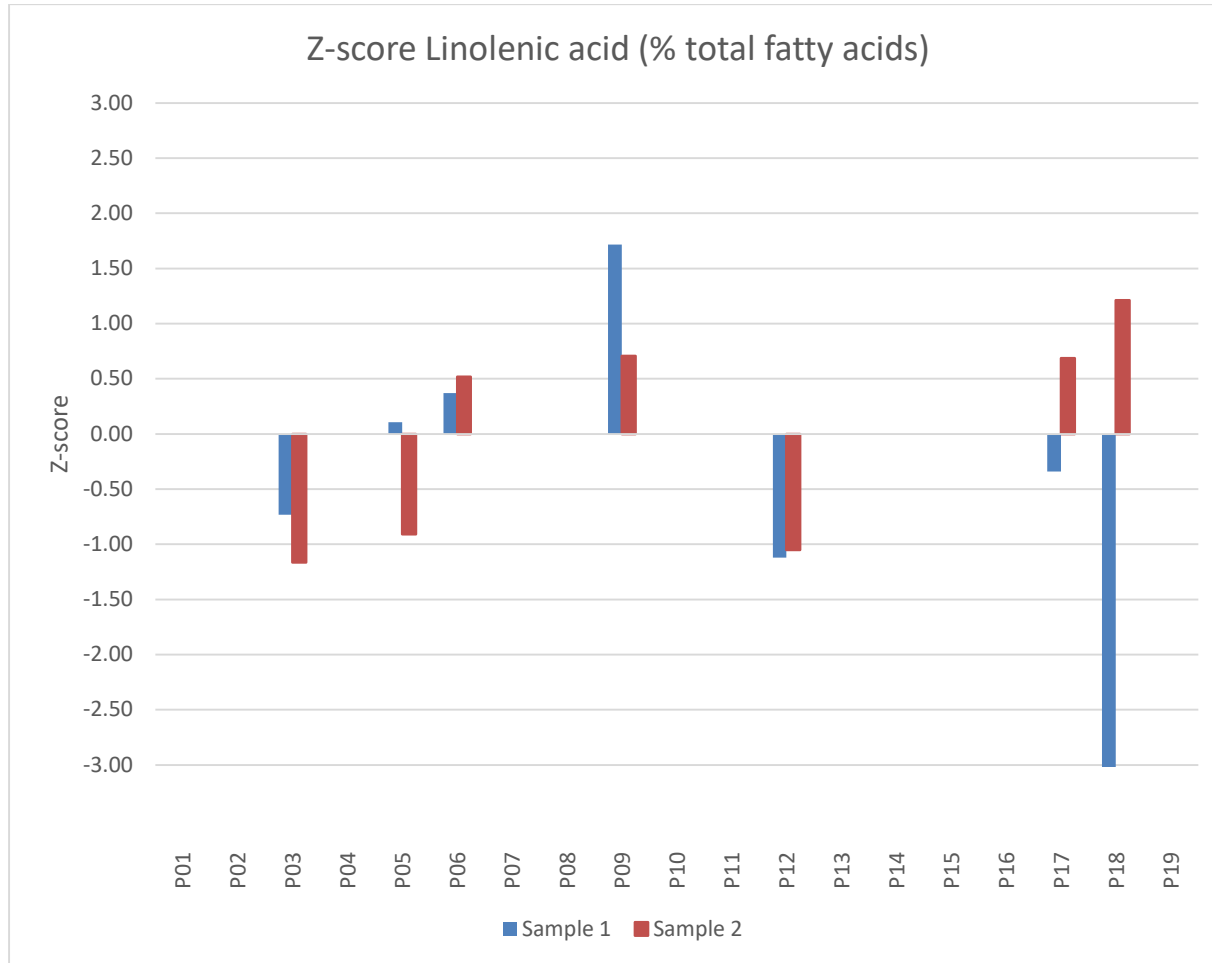
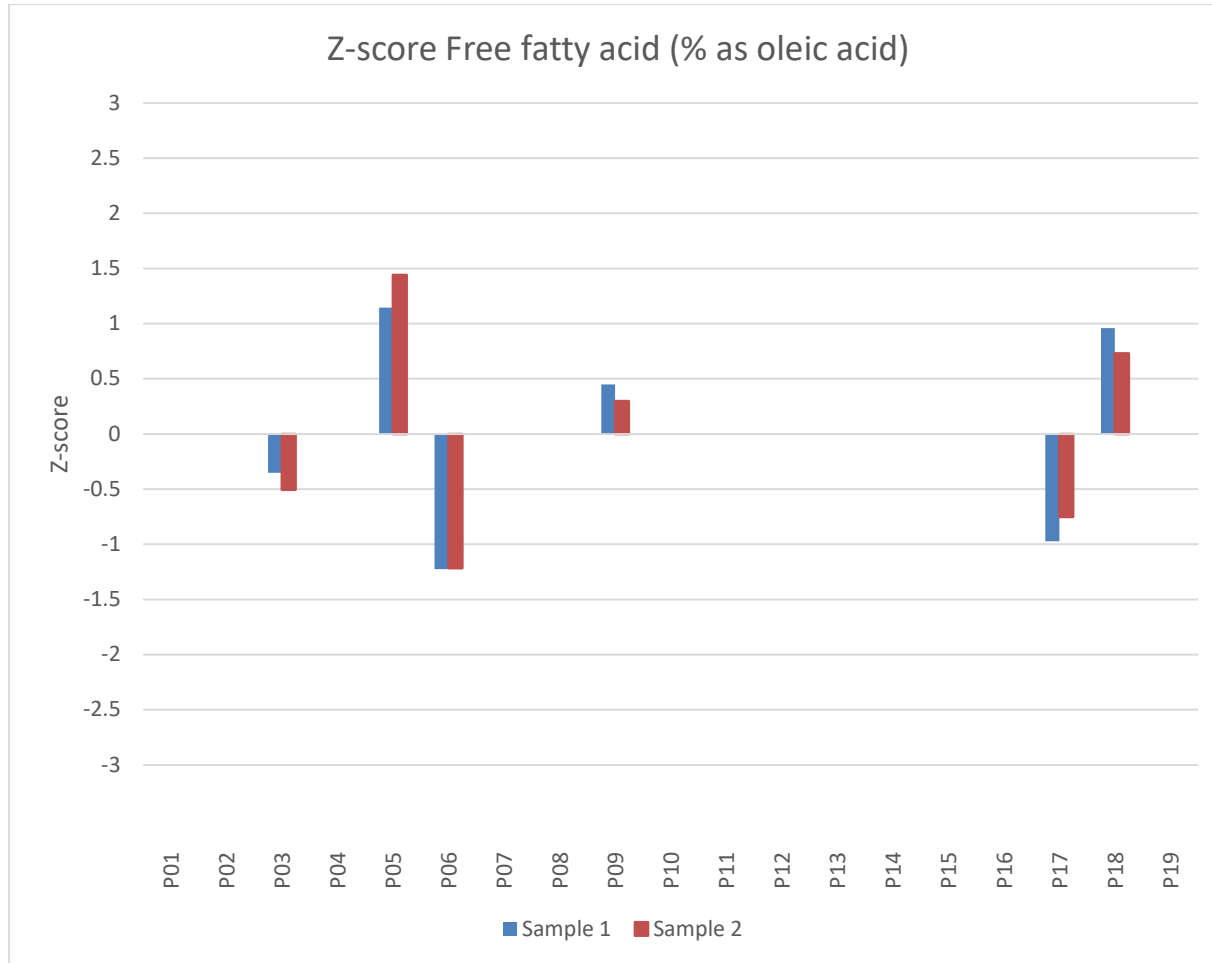


Table 12 Results and Z-scores for free fatty acids.

Lab number	Free fatty acid (% as oleic acid)			
	Sample 1		Sample 2	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	0.23	-0.35	0.23	-0.50
P04				
P05	0.44	1.14	0.55	1.44
P06	0.11	-1.23	0.12	-1.22
P07				
P08				
P09	0.34	0.45	0.36	0.30
P10				
P11				
P12				
P13				
P14				
P15				
P16				
P17	0.15	-0.97	0.19	-0.75
P18	0.41	0.96	0.43	0.73
P19				
Assigned value	0.28		0.31	
Standard Deviation	0.14		0.16	
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

Chondrometer (3), half litre measure (1), Test weight cup (1), not indicated (6), TP/016 (1), M55 - Measurement of grain density by CBH chondrometer (1), uncleaned seed (1).

Impurities

AOF 4-1.2(b)(1), AOF 4-1.3 (6), not indicated (4), ISO658 (1), TP/052 (1), screen and aspirator (1).

Oil content (NIR)

Calibration based on ISO659 (1), NIR (2), FOSS NIR (1), Infratec 1241 (2), not indicated (8), TP/054 (1).

Oil content (solvent)

ISO659:2009 (3), AOF 4-1.24a (1), Not indicated (2), TP/053 (1), Gerhardt Soxtherm hot extraction, 150°C (1).

Moisture (NIR)

Calibration based on ISO665 (1), FOSS NIR (1), NIR (2), Infratec 1241 (2), not indicated (8), TP/054 (1).

Moisture (oven)

AOF 4-1.5 (130°C for 1 hour) (3), ISO665 (103°C for 3 hours, then 1 hour, 5g) (2), 105°C for 2 hours (1), AOCS Ca 2b-38 (130°C, 2 hours) (1), TP/022 (1), not indicated (3), moisture balance 130°C, A90, 10gms, 30 min (12).

Fatty acids (oleic, linoleic and linolenic acid)

IOC doc no. 24 (1), AOCS Ce 1a-13 mod (1), AOCS Ce 1h-05 (1), TP/047(1), not indicated (1), Gas chromatography (1), ISO 12966-4 (1).

Free fatty acids

AOCS Ac 5-41 (3), AOCS Ca 5a-40 (1), TP/046 (1), ISO660 (1).