

AOF Test Check program

Test Report

Round 3 2022.

Summary

1. The test materials for the AOF test check program Round 3 2022 were dispatched in August 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 5 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	65.49	0.49	(kg/hL)	13
Impurities	1.13	0.32	%	13
Oil NIR	46.06	0.67	% by weight	14
Oil solvent	45.88	1.68	% by weight	8
Moisture NIR	6.26	0.22	% by weight	14
Moisture oven	6.23	0.32	% by weight	11
Oleic acid	60.38	1.22	% total fatty acids	6
Linoleic acid	20.41	0.20	% total fatty acids	6
Linolenic acid	10.61	0.36	% total fatty acids	6
Free fatty acid	0.18	0.07	% (as oleic acid)	8

Table 2 Sample 6 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	65.23	0.38	(kg/hL)	13
Impurities	1.06	0.19	%	13
Oil NIR	44.04	0.58	% by weight	14
Oil solvent	44.03	1.06	% by weight	8
Moisture NIR	6.51	0.31	% by weight	14
Moisture oven	6.45	0.29	% by weight	11
Oleic acid	61.52	1.22	% total fatty acids	6
Linoleic acid	19.55	0.35	% total fatty acids	6
Linolenic acid	10.24	0.34	% total fatty acids	6
Free fatty acid	0.17	0.09	% (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:

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

3. Results and Z-scores

Table 3 Results and Z-scores for test weight.

Lab number	Test weight (kg/hL)			
	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	65.40	-0.18	65.70	1.23
P04	65.60	0.24	64.80	-1.12
P05	64.75	-1.52	64.75	-1.25
P06	65.88	0.81	65.69	1.20
P07	65.65	0.34	65.12	-0.30
P08				
P09	70.00	9.30	69.80	11.94
P10	66.11	1.27	65.42	0.48
P11	65.00	-1.00	65.50	0.71
P12	64.80	-1.41	63.20	-5.30
P13				
P14	65.18	-0.64	65.53	0.77
P15				
P16	66.18	1.43	66.36	2.95
P17	65.90	0.85	64.75	-1.25
P18	65.40	-0.18	65.05	-0.47
Assigned value	65.49		65.23	
Standard Deviation	0.49		0.38	
Count	13		13	

Note - Laboratory number P09 Sample 5 was removed from assigned value calculation as the result was an outlier.

Note - Laboratory number P09, P12 and P16 Sample 6 were removed from assigned value calculation as the results were outliers.

Figure 1 Z-scores for test weight.

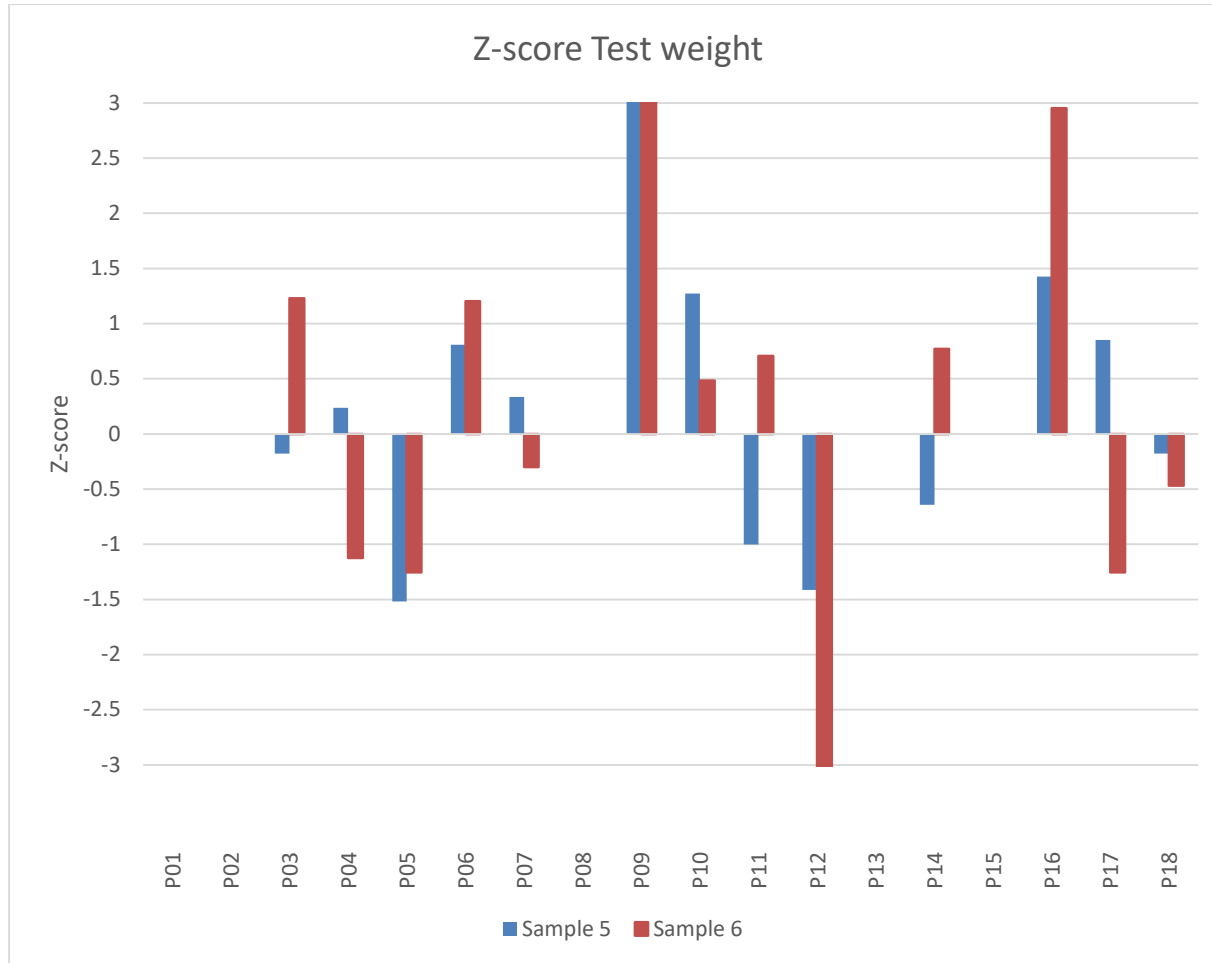


Table 4 Results and Z-scores for impurities.

Lab number	Impurities (%)			
	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	1.18	0.17	0.89	-0.89
P04	1.14	0.04	1.31	1.31
P05	1.45	1.03	1.15	0.46
P06	0.89	-0.75	0.82	-1.28
P07	1.15	0.06	1.24	0.91
P08				
P09	0.80	-1.03	1.00	-0.31
P10	1.55	1.33	1.81	-5.51
P11	1.74	1.94	0.83	-1.20
P12	0.90	-0.71	0.96	-0.52
P13				
P14	1.20	0.22	1.13	0.33
P15				
P16	1.17	0.12	1.33	1.40
P17	0.64	-1.55	1.23	0.88
P18	0.85	-0.87	0.85	-1.09
Assigned value	1.13		1.06	
Standard Deviation	0.32		0.19	
Count	13		13	

Note - Laboratory number P10 Sample 6 was removed from assigned value calculation as the result was an outlier.

Figure 2 Z-scores for impurities.

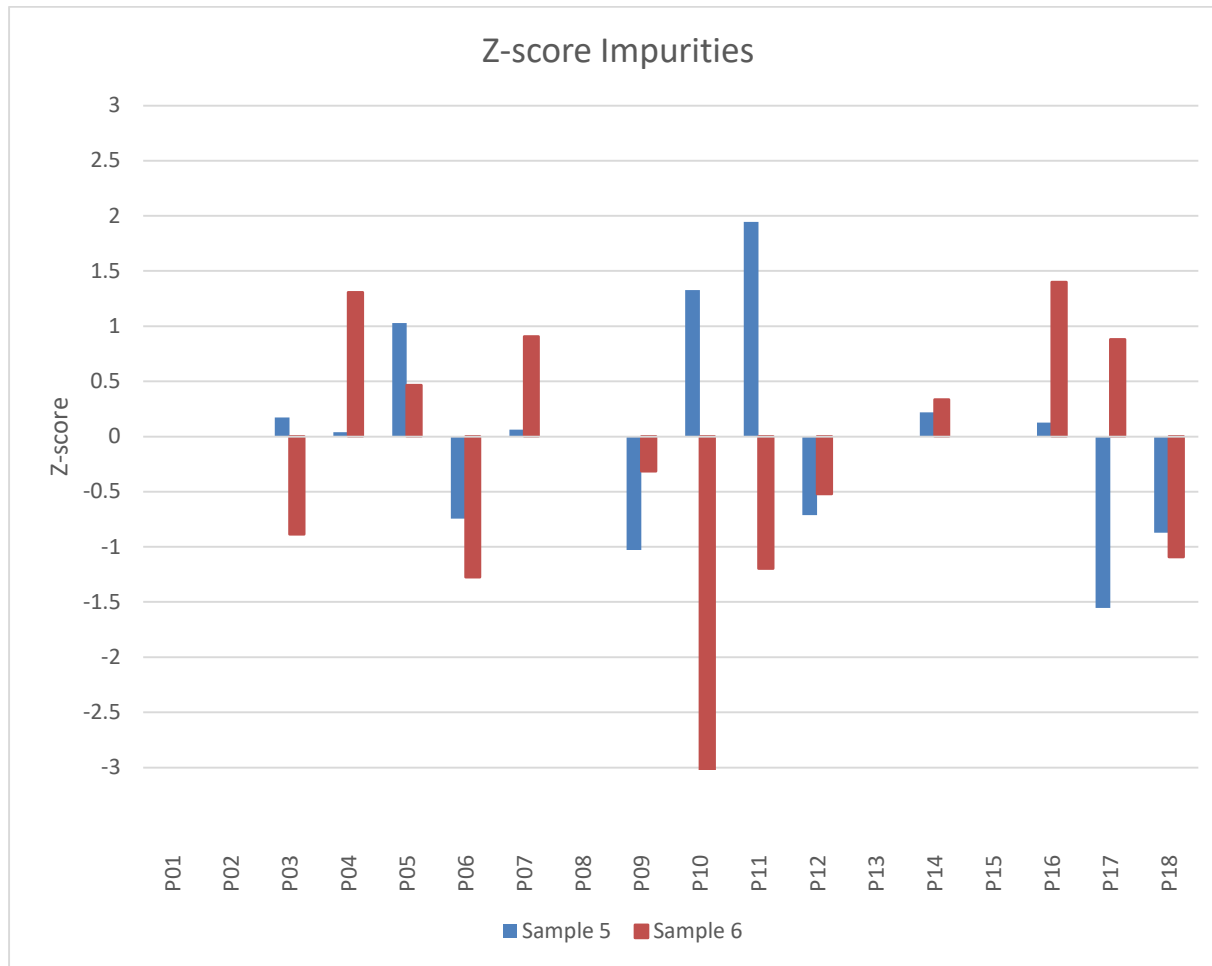


Table 5 Results and Z-scores for oil content (NIR).

Oil content NIR (%)				
Lab number	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02	46.70	0.95	45.10	1.83
P03	46.65	0.88	44.10	0.10
P04	44.97	-1.65	43.89	-0.26
P05	46.20	0.20	43.75	-0.50
P06	46.61	0.81	44.95	1.57
P07	45.31	-1.13	43.45	-1.03
P08				
P09	46.00	-0.10	43.55	-0.85
P10	45.48	-0.88	43.44	-1.03
P11	46.03	-0.06	43.79	-0.44
P12	47.30	1.85	44.91	1.50
P13				
P14	46.45	0.58	43.60	-0.76
P15				
P16	43.70	-3.54	46.10	3.55
P17	45.55	-0.77	44.00	-0.07
P18	45.60	-0.70	44.00	-0.47
Assigned value	46.06		44.04	
Standard Deviation	0.67		0.58	
Count	14		14	

Note - Laboratory number P16 Sample 5 and 6 were removed from assigned value calculations as the results were outliers.

Figure 3 Z-scores for oil content by NIR.

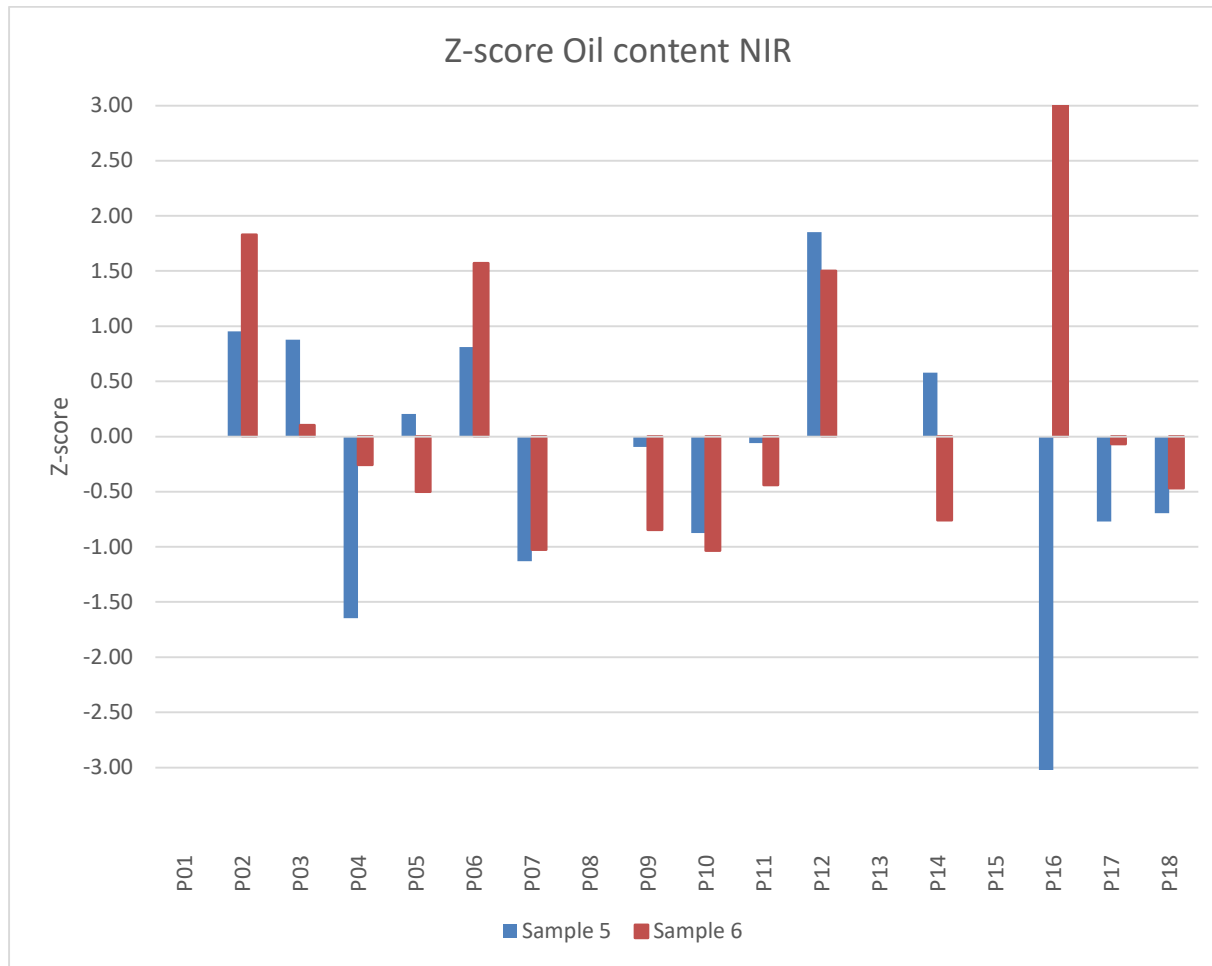


Table 6 Results and Z-scores for oil content solvent.

Lab number	Oil content solvent (%)			
	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	46.63	0.44	44.69	0.62
P04				
P05	42.34	-2.11	42.36	-1.57
P06	46.78	0.54	45.19	1.09
P07				
P08				
P09	44.88	-0.60	43.36	-0.63
P10				
P11				
P12	47.24	0.81	44.94	0.86
P13				
P14				
P15				
P16	47.96	1.24	45.05	0.96
P17	43.60	-1.36	43.35	-0.64
P18	44.10	-1.06	43.30	-0.69
Assigned value	45.88		44.03	
Standard Deviation	1.68		1.06	
Count	8		8	

Note - Laboratory number P05, sample 5 result was excluded from assigned value calculations. Despite the average value being within the statistically acceptable range, the raw data duplicate values were significantly different from each other.

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

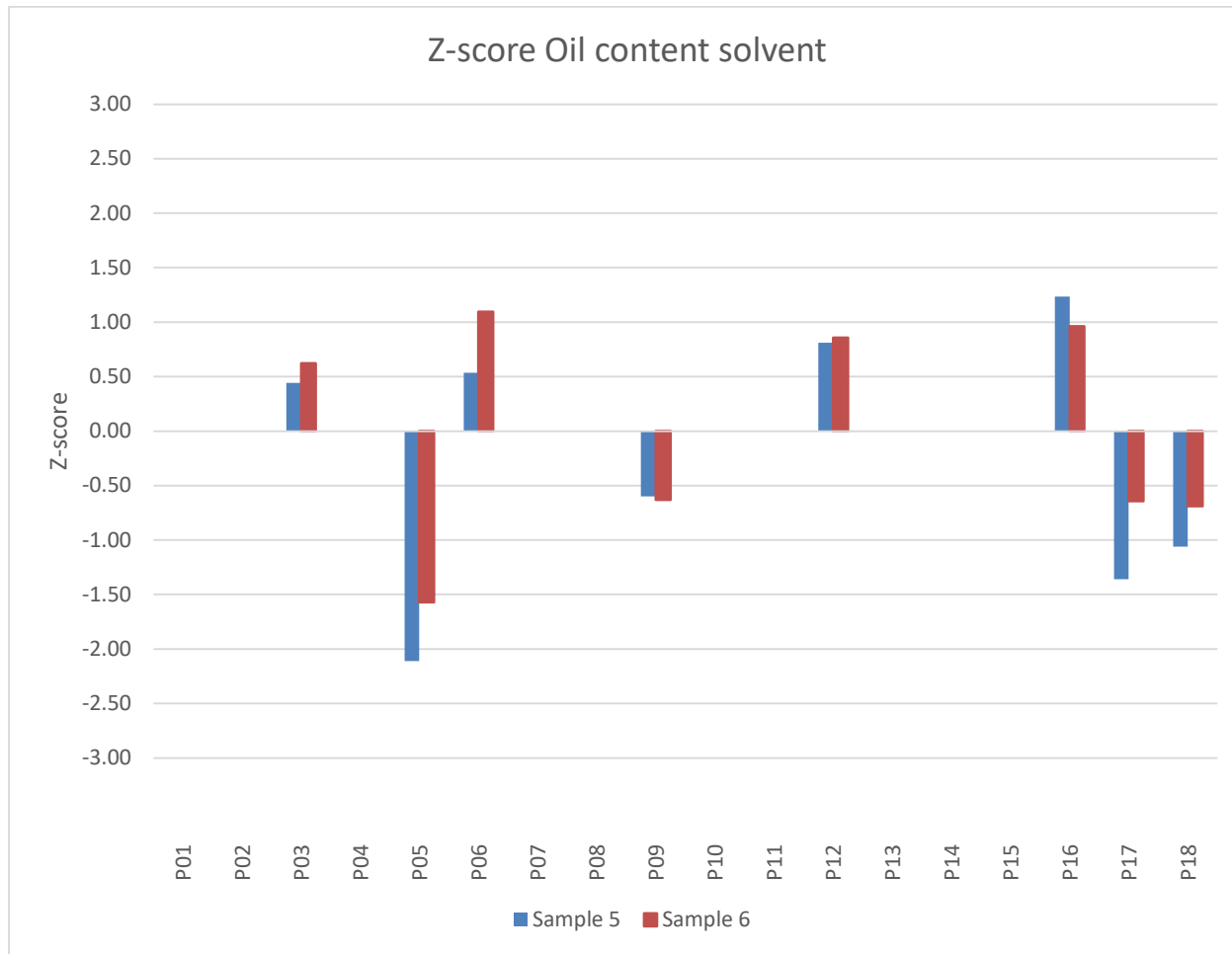


Figure 5 Absolute difference between oil content (NIR result minus wet chemistry)

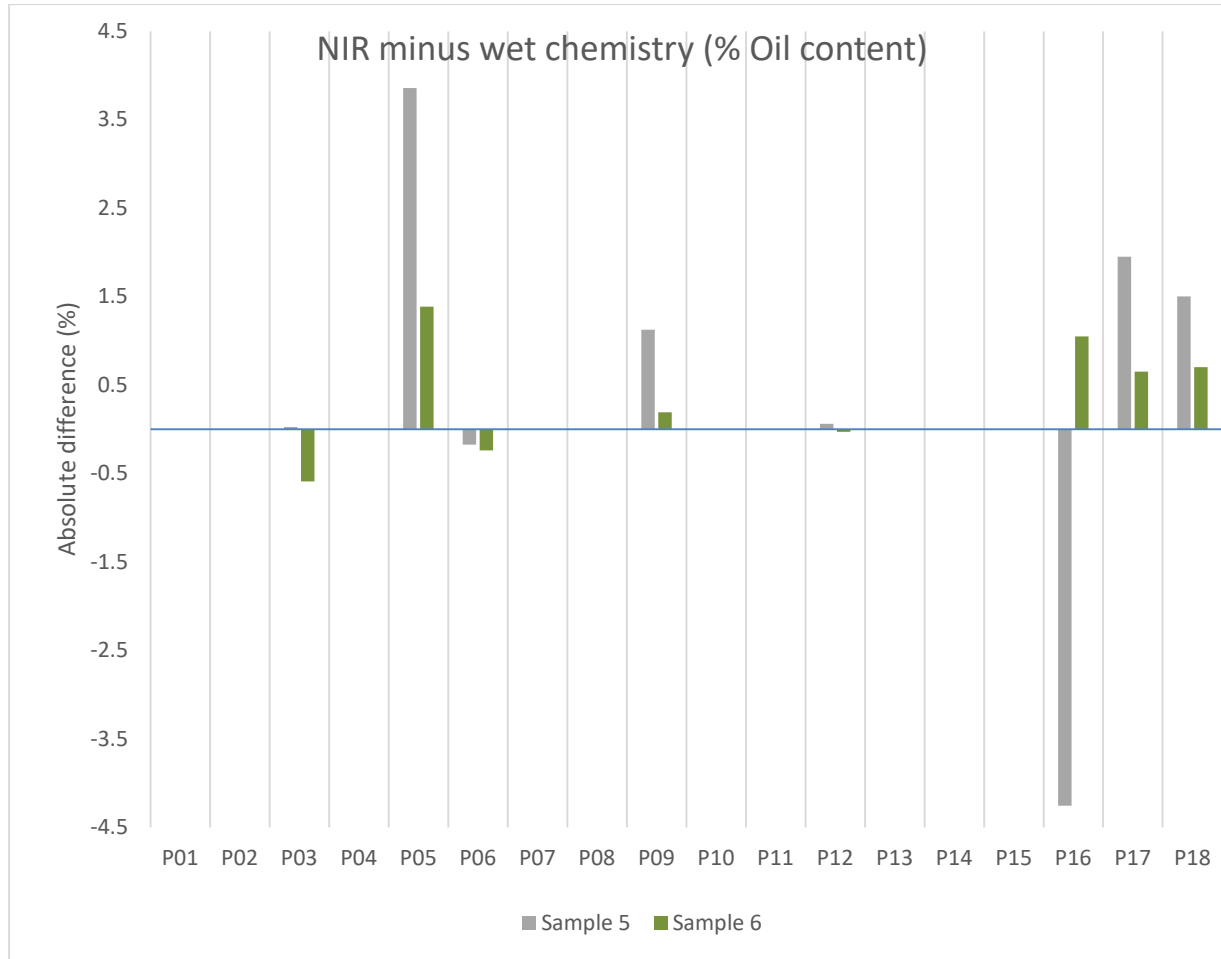


Table 7 Results and Z-scores for moisture content (NIR).

Moisture NIR (% by weight)				
Lab number	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02	6.50	1.10	6.60	0.29
P03	6.00	-1.19	6.30	-0.67
P04	6.48	1.00	6.52	0.02
P05	6.15	-0.51	6.50	-0.03
P06	5.96	-1.38	6.08	-1.39
P07	6.83	2.61	6.93	1.33
P08				
P09	6.25	-0.05	6.40	-0.35
P10	6.49	1.05	6.58	0.22
P11	6.13	-0.60	6.40	-0.37
P12	5.88	-1.74	6.10	-1.31
P13				
P14	6.45	0.87	7.10	1.89
P15				
P16	6.30	0.18	6.10	-1.31
P17	6.35	0.41	6.80	0.93
P18	6.45	0.87	6.75	0.77
Assigned value	6.26		6.51	
Standard Deviation	0.22		0.31	
Count	14		14	

Note - Laboratory number P07 Sample 5 was removed from assigned value calculation as the result was an outlier.

Figure 6 Z-scores for moisture content by NIR.

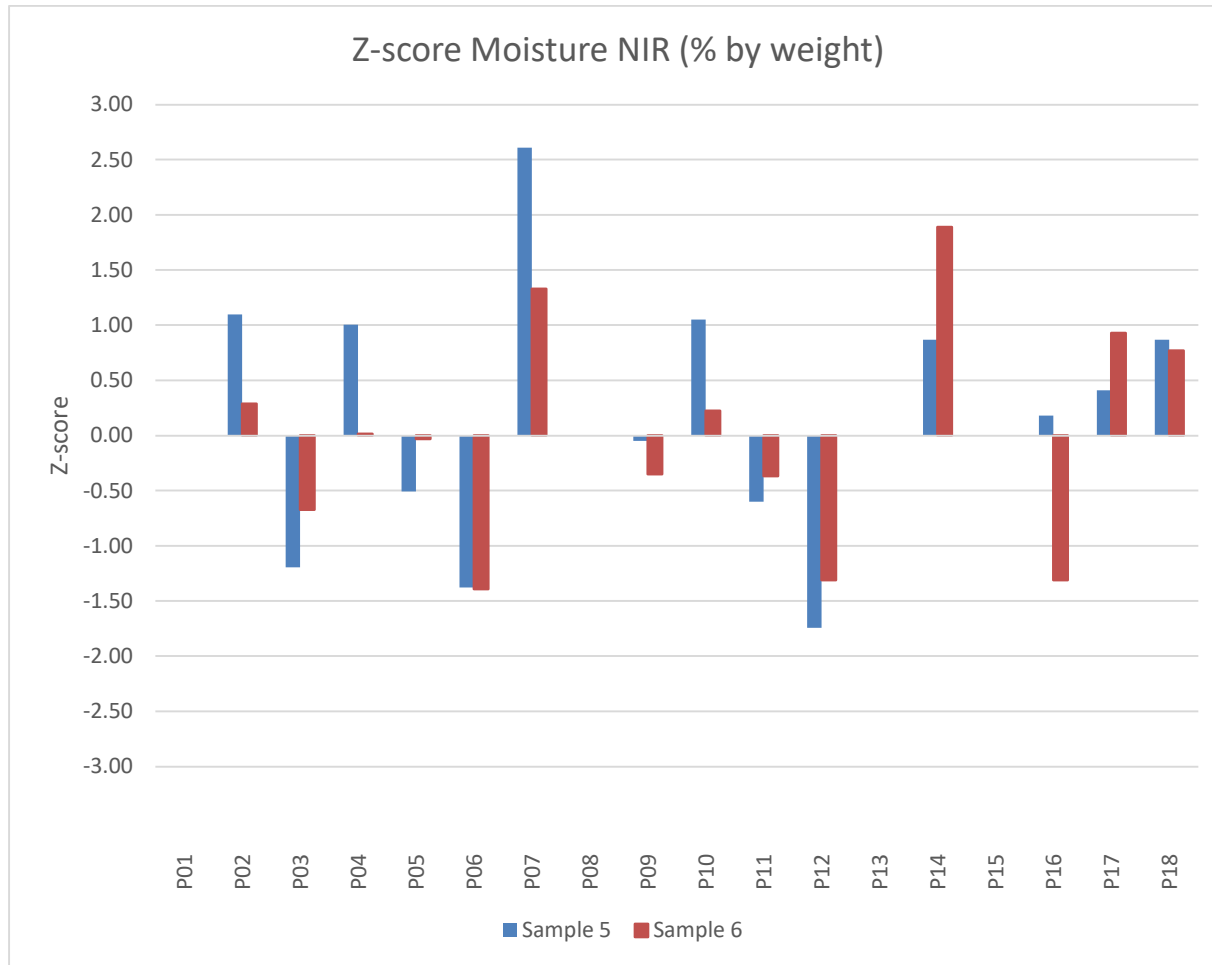


Table 8 Results and Z-scores for moisture content by oven.

Moisture Oven (% by weight)				
Lab number	Sample 5		Sample 6	
	Result t	Z-score	Result	Z-score
P01				
P02				
P03	6.60	1.16	6.75	1.04
P04	6.46	0.72	6.57	0.41
P05	5.72	-1.60	6.23	-0.79
P06	6.02	-0.66	6.18	-0.97
P07	6.13	-0.31	6.40	-0.18
P08				
P09	6.58	1.10	6.72	0.93
P10				
P11	6.41	0.58	6.72	0.92
P12	5.88	-1.10	6.21	-0.84
P13				
P14				
P15				
P16	6.47	0.75	6.61	0.55
P17	6.40	0.55	6.70	0.86
P18	5.85	-1.19	5.90	-1.92
Assigned value	6.23		6.45	
Standard Deviation	0.32		0.29	
Count	11		11	

Figure 7 Z-scores for moisture content by oven.

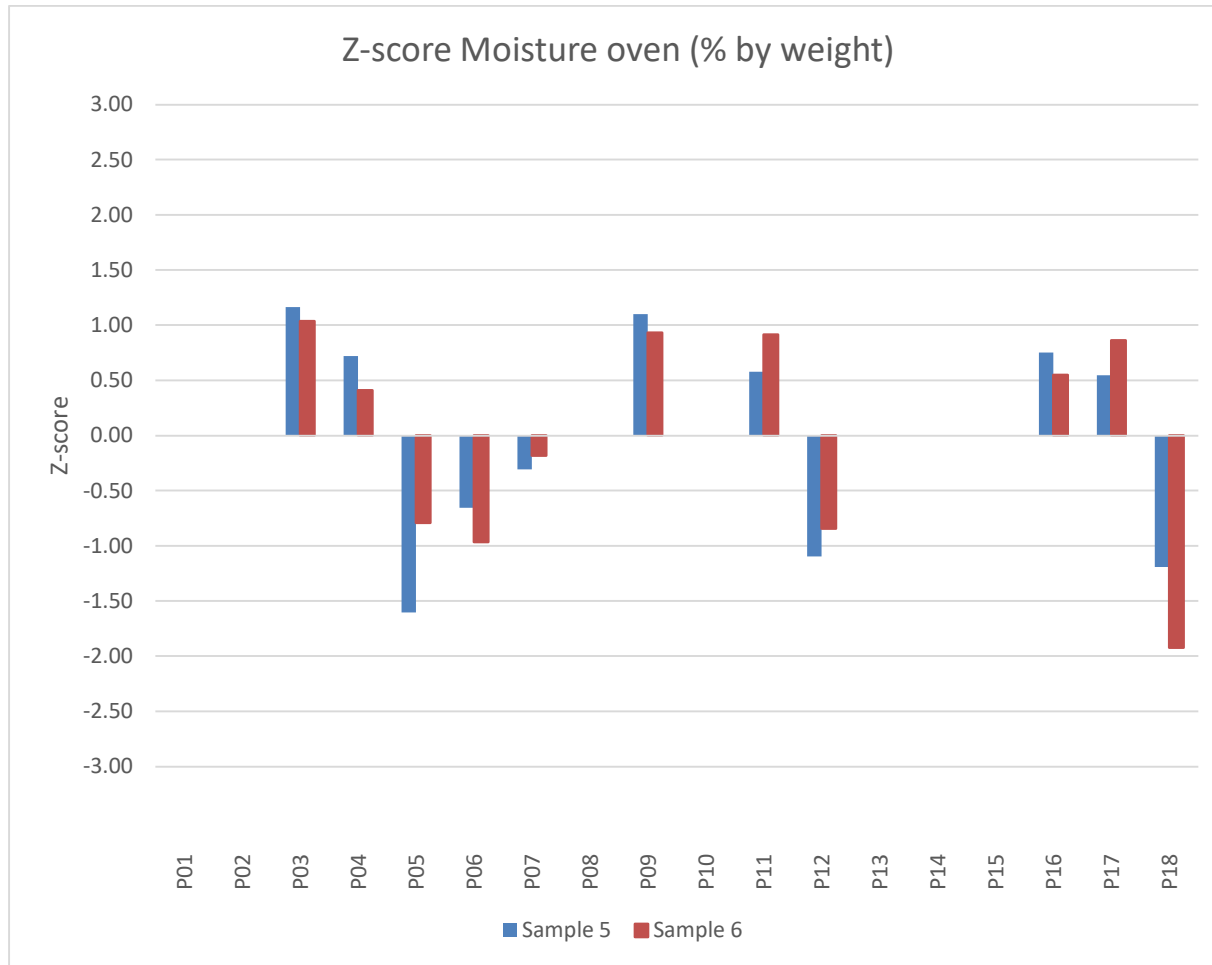


Figure 8 Absolute difference between moisture content (NIR result minus wet chemistry)

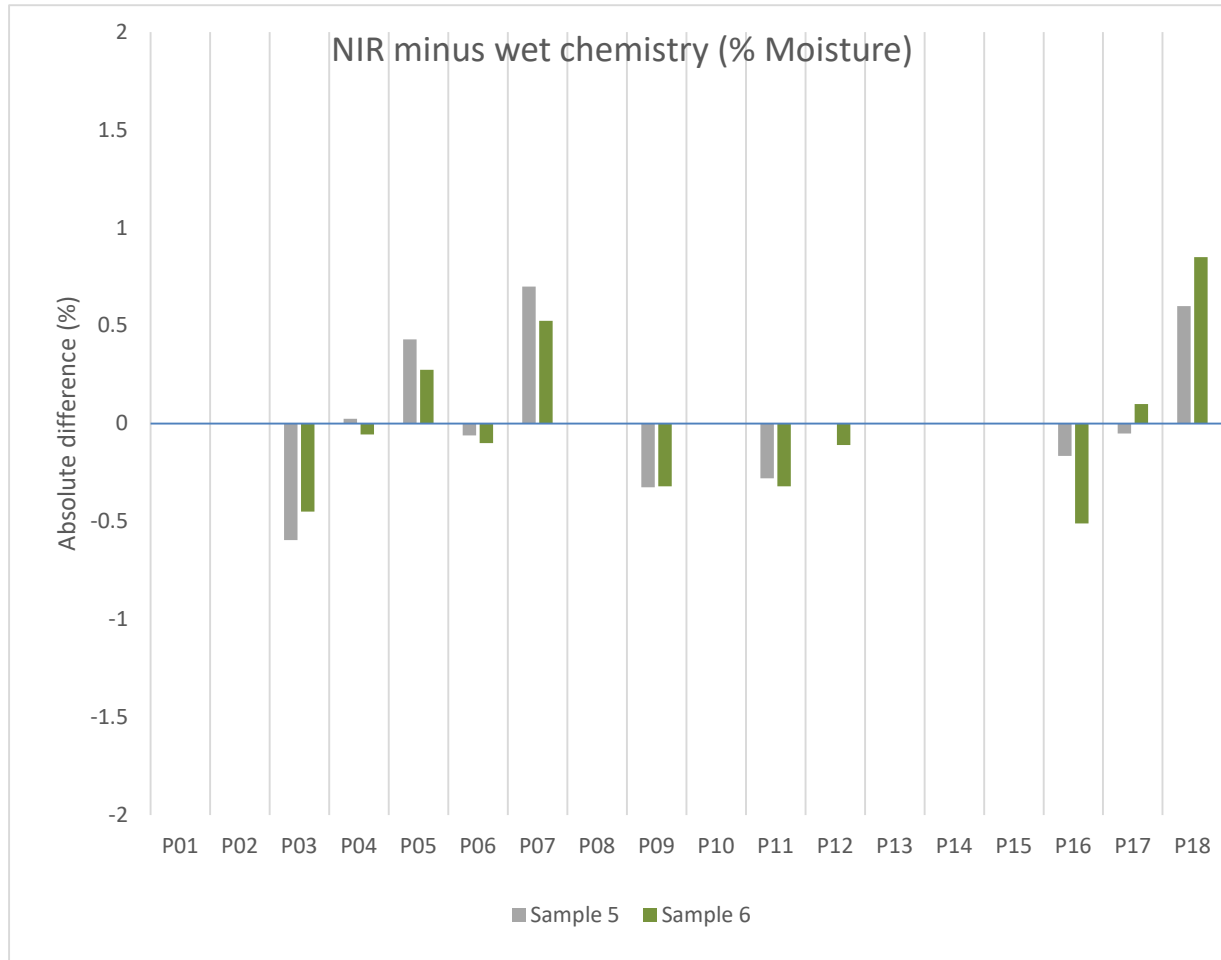


Table 9 Results and Z-scores for oleic acid.

Oleic acid (% of total fatty acids)				
Lab number	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	59.17	-0.99	60.14	-1.13
P04				
P05				
P06	59.74	-0.52	60.99	-0.44
P07				
P08				
P09	62.15	1.44	63.02	1.22
P10				
P11				
P12	59.72	-0.54	60.77	-0.62
P13				
P14				
P15				
P16	59.81	-0.47	61.18	-0.29
P17	61.70	1.08	63.05	1.25
P18				
Assigned value	60.38		61.52	
Standard Deviation	1.22		1.22	
Count	6		6	

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 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	20.60	0.91	20.01	1.31
P04				
P05				
P06	20.40	-0.09	19.50	-0.16
P07				
P08				
P09	20.21	-1.04	19.12	-1.26
P10				
P11				
P12	20.53	0.59	19.90	0.99
P13				
P14				
P15				
P16	20.61	0.96	19.54	-0.04
P17	20.15	-1.34	19.26	-0.84
P18				
Assigned value	20.41		19.55	
Standard Deviation	0.20		0.35	
Count	6		6	

Figure 10 Z-scores for linoleic acid content.

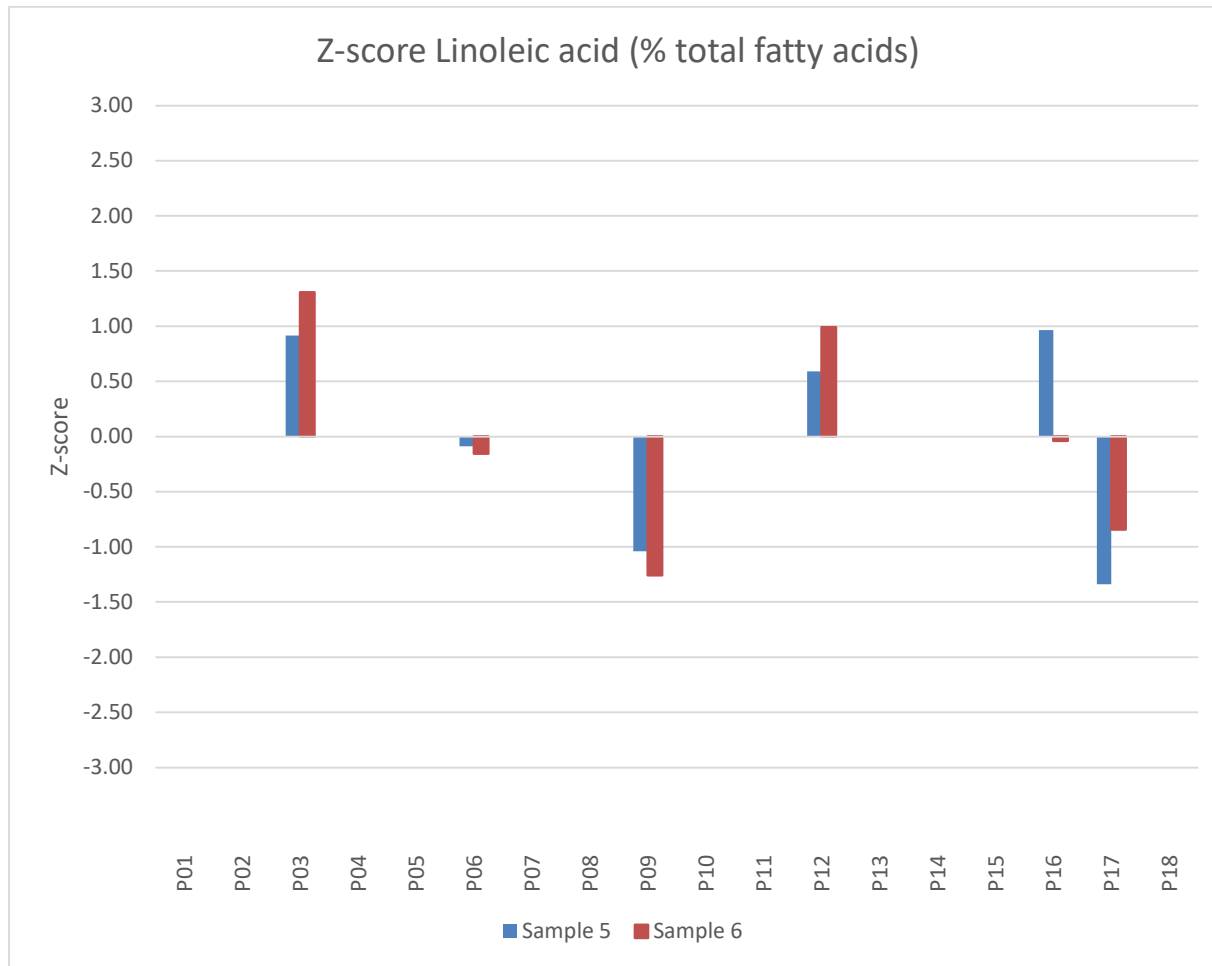


Table 11 Results and Z-scores for linolenic acid.

Linolenic acid (% of total fatty acids)				
Lab number	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	10.58	-0.08	10.17	-0.22
P04				
P05				
P06	11.03	1.15	10.58	0.98
P07				
P08				
P09	10.39	-0.59	10.12	-0.36
P10				
P11				
P12	10.68	0.21	10.39	0.44
P13				
P14				
P15				
P16	10.93	0.89	10.54	0.87
P17	10.03	-1.58	9.66	-1.71
P18				
Assigned value	10.61		10.24	
Standard Deviation	0.36		0.34	
Count	6		6	

Figure 11 Z-scores for linolenic acid content.

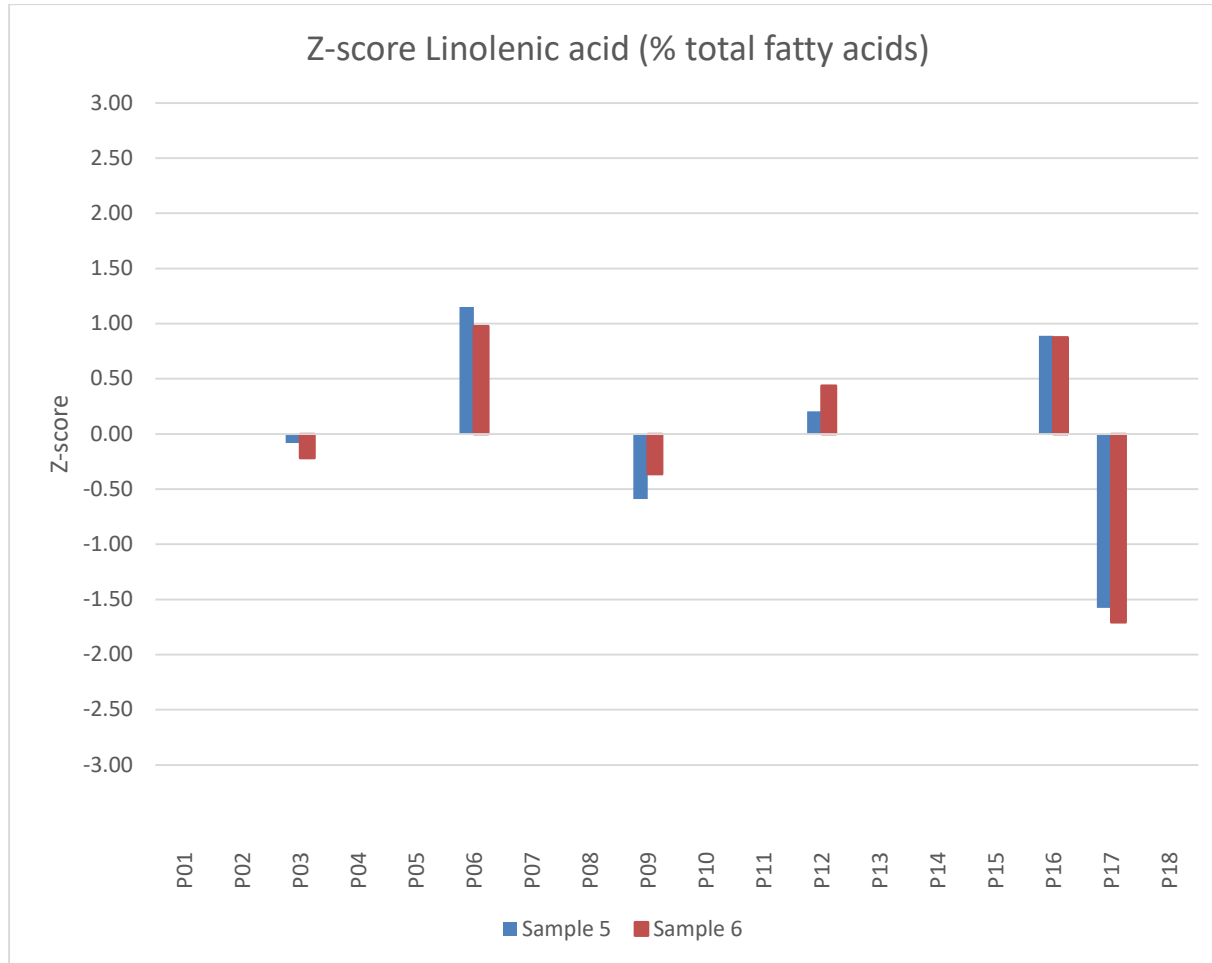
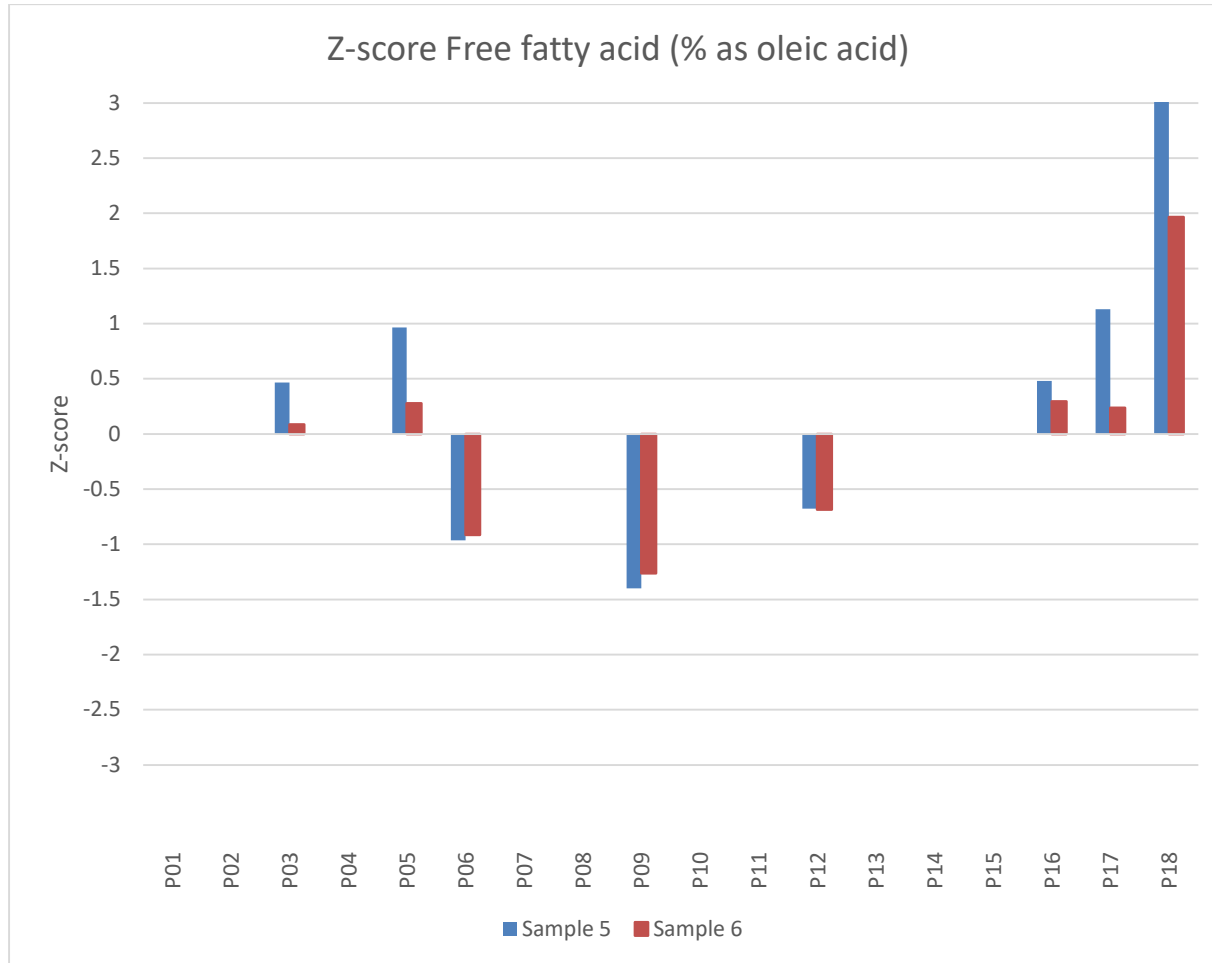


Table 12 Results and Z-scores for free fatty acids.

Lab number	Free fatty acid (% as oleic acid)			
	Sample 5		Sample 6	
	Result	Z-score	Result	Z-score
P01				
P02				
P03	0.21	0.47	0.18	0.09
P04				
P05	0.24	0.96	0.19	0.28
P06	0.11	-0.97	0.09	-0.92
P07				
P08				
P09	0.08	-1.40	0.06	-1.26
P10				
P11				
P12	0.13	-0.68	0.11	-0.69
P13				
P14				
P15				
P16	0.21	0.48	0.20	0.29
P17	0.26	1.13	0.19	0.24
P18	0.54	5.25	0.34	1.97
Assigned value	0.18		0.17	
Standard Deviation	0.07		0.09	
Count	8		8	

Note - Laboratory number P18 Sample 5 was removed from assigned value calculations as the result was an outlier.

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 (2), half litre measure (2), Test weight cup (1), not indicated (5), GAFTA 25.0 (1), TP/016 (1), analytical balance (1).

Impurities

AOF 4-1.2(b)(1), AOF 4-1.3 (6), not indicated (3), ISO658 (1), analytical balance (1), TP/052 (1).

Oil content (NIR)

Calibration based on ISO659 (3), NIR (2), FOSS NIR (1), Infratec 1241 (2), ISO 10565 (NMR) (1), not indicated (4), TP/054 (1).

Oil content (solvent)

ISO659:2009 (2), extract for 4,2,2 hours with regrind in between (1), AOF 4-1.24a (2), Not indicated (2), TP/053 (1).

Moisture (NIR)

Calibration based on ISO665 (1), FOSS NIR (1), NIR (3), Infratec 1241 (2), NMR (1), not indicated (5), TP/054 (1).

Moisture (oven)

AOF 4-1.5 (130°C for 1 hour) (5), ISO665 (103°C for 3 hours, then 1 hour, 5g) (2), 105°C for 2 hours (1), ISO662 (1), AOCS Ca 2b-38 (130°C, 2 hours) (1), TP/022 (1).

Fatty acids (oleic, linoleic and linolenic acid)

IOC doc no. 24 (1), AOCS Ce 1a-13 mod (1), AOCS Ce 1h-05 (1), ISO588 (1), TP/047(1), not indicated (1).

Free fatty acids

AOCS Ac 5-41 (3), AOCS Ca 5a-40 (2), ISO660 (2), TP/046 (1)).