AOF Test Check program

Test Report

Round 4 2022.

Summary

1. The test materials for the AOF test check program Round 4 2022 were dispatched in October 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 7 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	67.04	0.46	(kg/hL)	11
Impurities	0.90	0.15	%	11
Oil NIR	45.19	0.48	% by weight	12
Oil solvent	44.94	1.66	% by weight	7
Moisture NIR	6.03	0.12	% by weight	12
Moisture oven	6.24	0.23	% by weight	10
Oleic acid	60.40	1.18	% total fatty acids	5
Linoleic acid	20.22	0.27	% total fatty acids	5
Linolenic acid	9.90	0.34	% total fatty acids	5
Free fatty acid	0.25	0.11	% (as oleic acid)	6

Table 2 Sample 8 - Assigned values and standard deviation

Analyte	Assigned value	Standard deviation	units	No. of participating laboratories
Test weight	66.97	0.50	(kg/hL)	11
Impurities	0.71	0.14	%	11
Oil NIR	43.95	0.25	% by weight	12
Oil solvent	44.41	1.72	% by weight	7
Moisture NIR	6.31	0.16	% by weight	12
Moisture oven	6.33	0.21	% by weight	10
Oleic acid	61.26	1.07	% total fatty acids	5
Linoleic acid	19.98	0.21	% total fatty acids	5
Linolenic acid	10.11	0.30	% total fatty acids	5
Free fatty acid	0.20	0.10	% (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 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	66.70	-0.75	66.70	-0.55
P04	67.54	1.09	67.16	0.38
P05	67.50	1.00	67.50	1.06
P06	65.53	-3.32	66.50	-0.95
P07	67.13	0.19	66.81	-0.34
P08	66.30	-1.63	66.10	0.00
P09	67.60	1.22	67.45	0.96
P10				
P11	67.00	-0.09	67.00	0.05
P12				
P13				
P14				
P15	66.57	-1.04	67.82	1.69
P16	67.05	0.01	67.05	0.15
P17	64.31	-5.98	66.62	-0.71
P18				
Assigned value	67.04		66.97	
Standard Deviation	0.46		0.50	
Count	11		11	

Note - Laboratory numbers P06 and P17 Sample 7 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.

Impurities (%)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	0.79	-0.76	0.90	1.33
P04	1.11	1.46	1.16	3.27
P05	0.85	-0.35	0.70	-0.09
P06	1.00	0.68	0.70	-0.09
P07	1.00	0.68	0.85	1.00
P08	1.00	0.68	0.80	0.64
P09	0.71	-1.34	0.60	-0.81
P10				
P11	0.70	-1.37	0.55	-1.18
P12				
P13				
P14				
P15	0.25	-4.50	0.16	-4.05
P16	0.95	0.31	0.81	0.71
P17	1.55	4.43	0.51	-1.50
P18				
Assigned value	0.90		0.71	
Standard Deviation	0.15		0.14	
Count	11		11	

Note - Laboratory numbers P15 and P17 Sample 7 were removed from assigned value calculation as the results were outliers.
Note - Laboratory numbers P04 and P15 Sample 8 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 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02	46.15	1.99	45.35	5.65
P03	45.60	0.86	44.25	1.22
P04	44.98	-0.42	44.04	0.35
P05	45.60	0.86	44.10	0.61
P06	46.71	3.16	45.12	4.72
P07	44.69	-1.02	43.75	-0.82
P08	44.80	-0.80	44.35	1.62
P09	45.50	0.65	43.65	-1.20
P10				
P11	45.02	-0.34	43.65	-1.20
P12				
P13				
P14				
P15	44.80	-0.80	43.90	-0.19
P16	44.60	-1.21	43.75	-0.80
P17	45.30	0.24	44.05	0.41
P18				
Assigned value	45.19		43.95	
Standard Deviation	0.48		0.25	
Count	12		12	

Note - Laboratory number P06 was removed from assigned value calculation as the result was an outlier.

Note - Laboratory numbers P02 and P06 Sample 8 were removed from assigned value calculation as the results were outliers.

Figure 3 Z-scores for oil content by NIR.

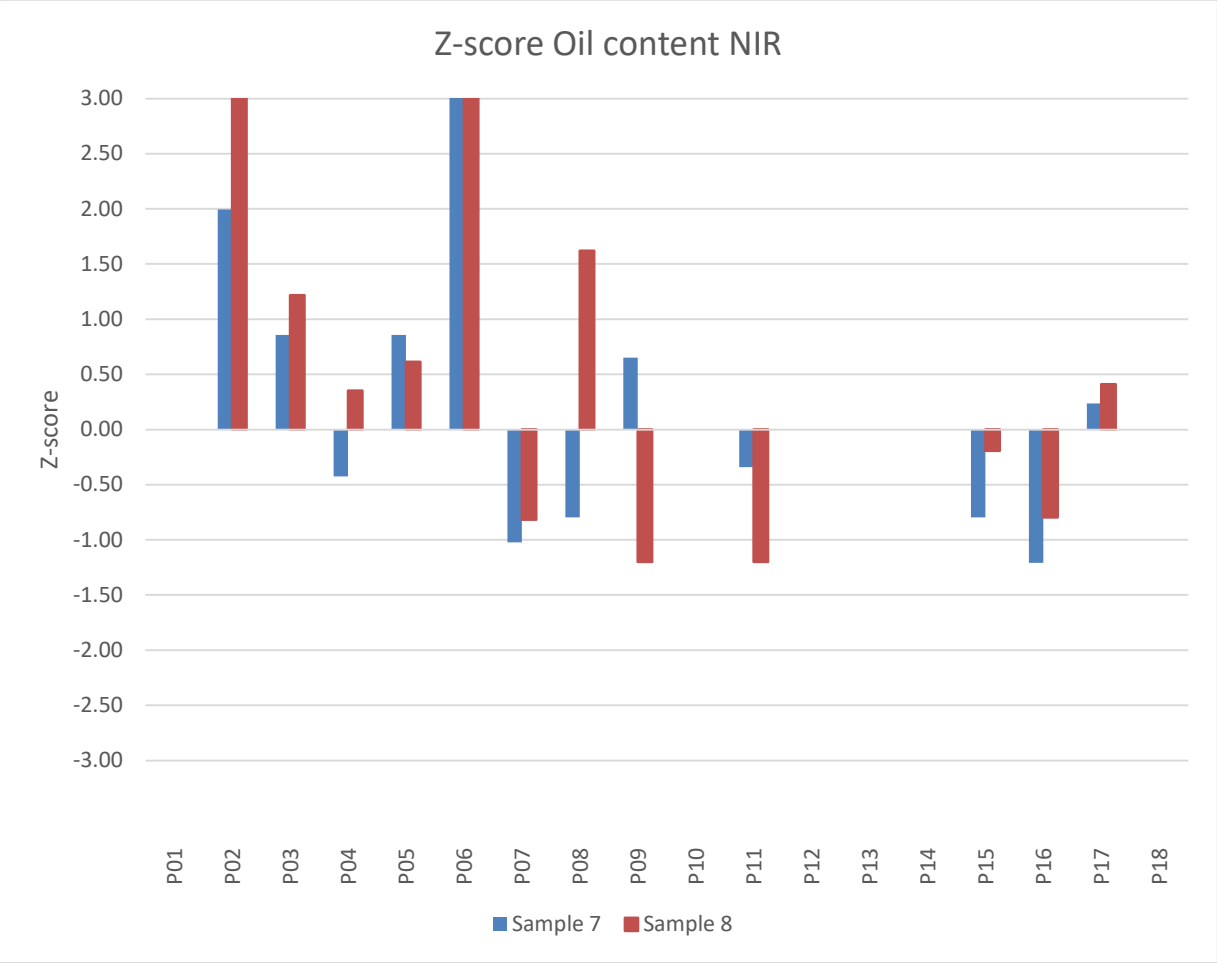


Table 6 Results and Z-scores for oil content solvent.

Oil content solvent (%)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	46.46	0.91	45.38	0.56
P04				
P05	42.82	-1.28	47.04	1.53
P06	47.01	1.24	45.46	0.61
P07				
P08				
P09	44.48	-0.28	42.65	-1.02
P10				
P11				
P12				
P13				
P14				
P15	45.66	0.43	44.69	0.16
P16	45.37	0.25	43.35	-0.61
P17	42.81	-1.28	42.28	-1.23
P18				
Assigned value	44.94		44.41	
Standard Deviation	1.66		1.72	
Count	7		7	

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

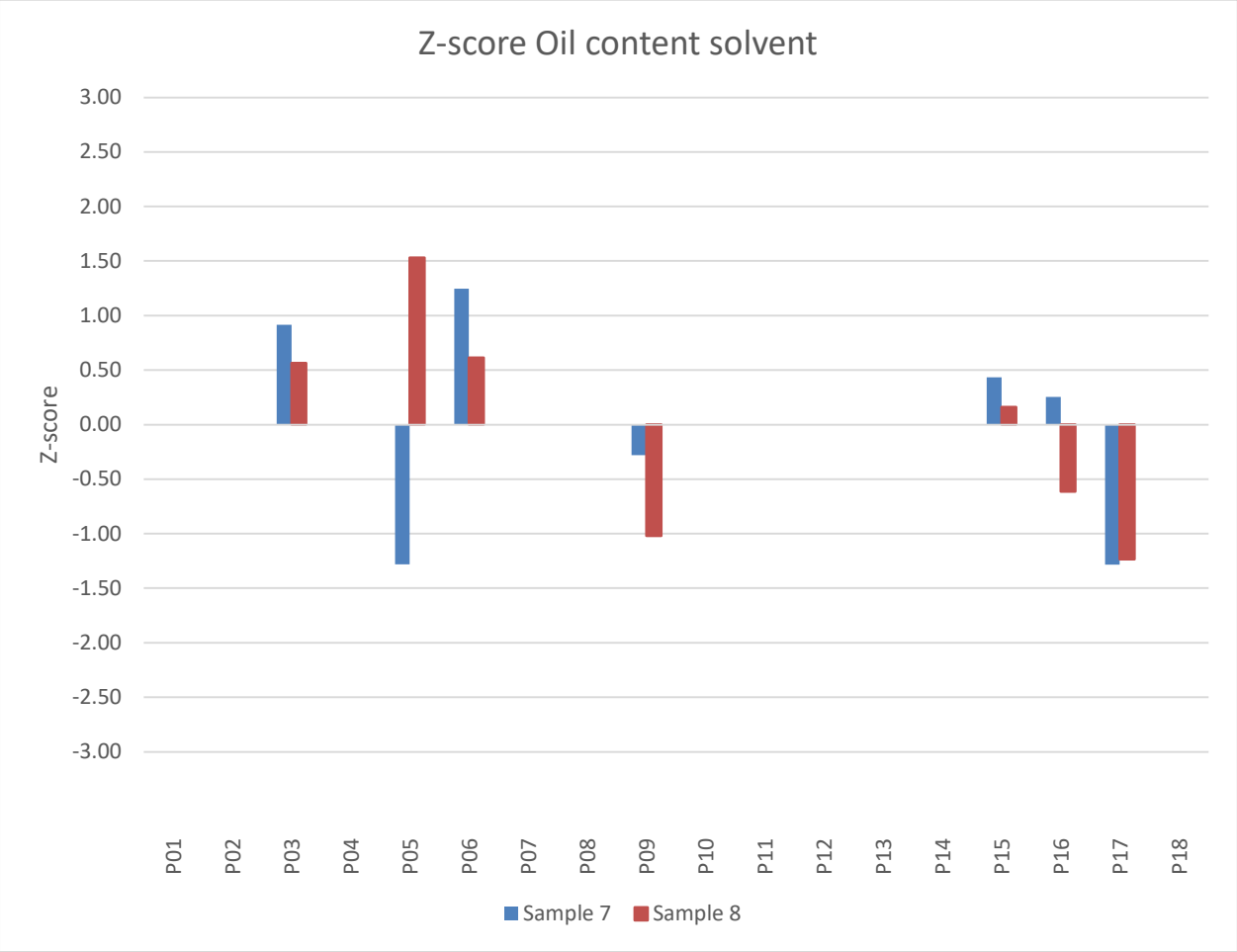


Figure 5 Absolute difference between oil content (NIR result minus wet chemistry)

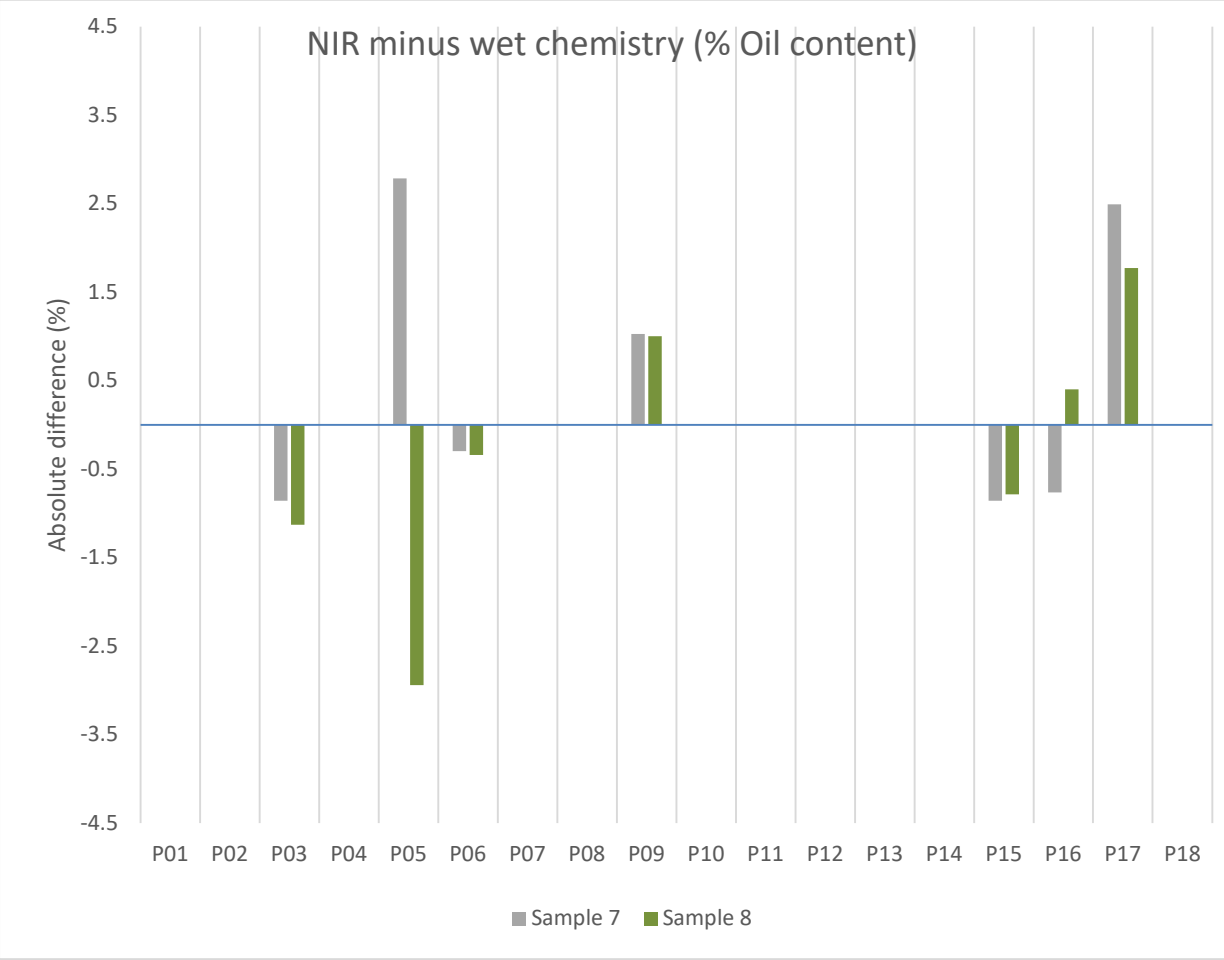


Table 7 Results and Z-scores for moisture content (NIR).

Moisture NIR (% by weight)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02	6.25	1.79	6.35	0.27
P03	5.85	-1.46	6.20	-0.65
P04	6.11	0.66	6.41	0.61
P05	5.90	-1.05	6.05	-1.57
P06	5.93	-0.78	6.04	-1.62
P07	6.52	3.99	6.61	1.86
P08	6.10	0.57	5.85	-2.80
P09	5.90	-1.05	6.30	-0.04
P10				
P11	6.13	0.82	6.41	0.64
P12				
P13				
P14				
P15	6.10	0.57	6.30	-0.04
P16	6.00	-0.24	6.35	0.27
P17	6.05	0.17	6.35	0.27
P18				
Assigned value	6.03		6.31	
Standard Deviation	0.12		0.16	
Count	12		12	

Note - Laboratory number P07 Sample 7 was removed from assigned value calculation as the result was an outlier.

Note - Laboratory number P08 Sample 8 was removed from assigned value calculation as the result was an outlier.

Figure 6 Z-scores for moisture content by NIR.

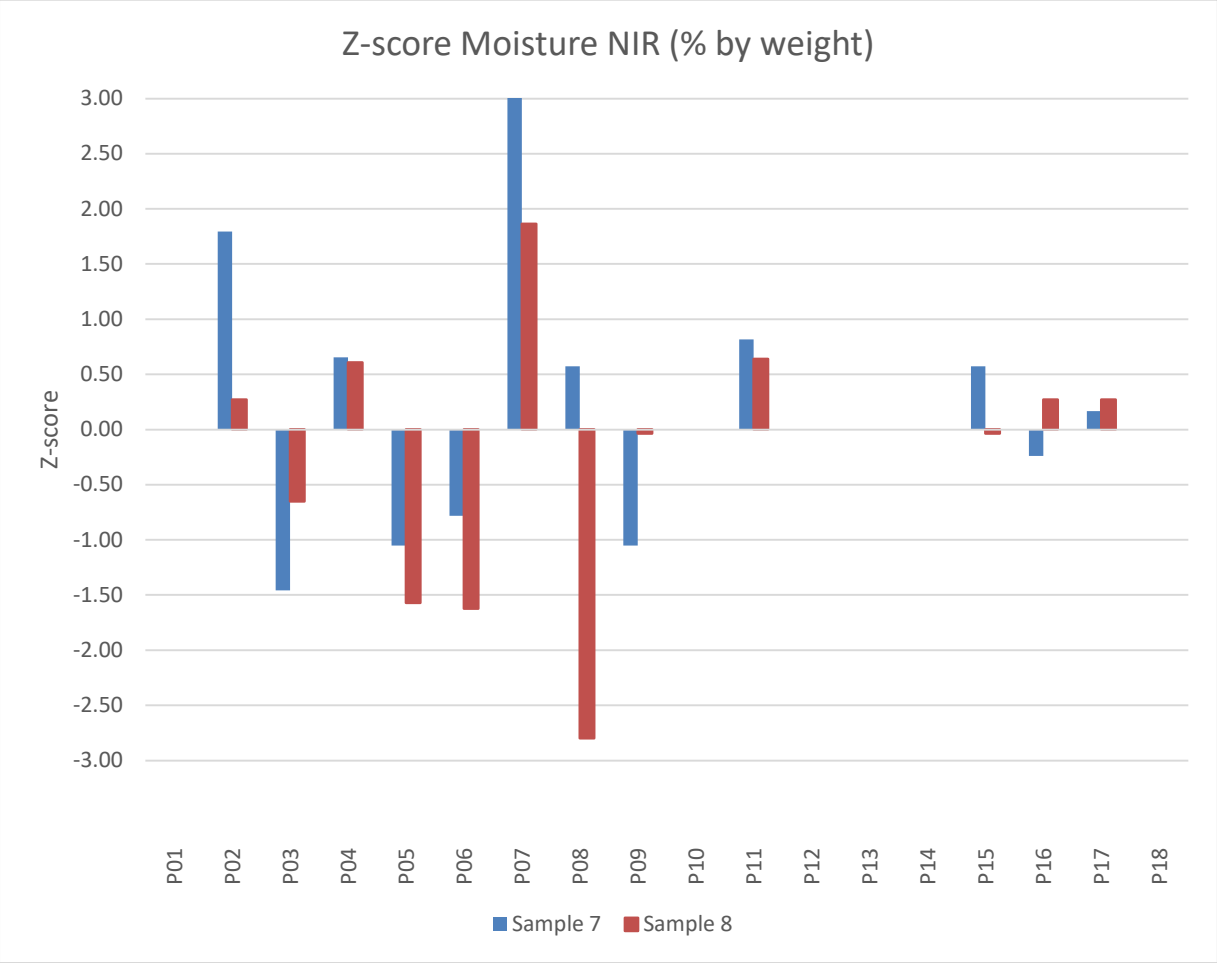


Table 8 Results and Z-scores for moisture content by oven.

Moisture Oven (% by weight)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	6.38	0.59	6.63	1.43
P04	6.45	0.90	6.29	-0.22
P05	5.55	-3.03	5.65	-3.31
P06	5.84	-1.74	5.94	-1.90
P07	6.05	-0.83	6.22	-0.57
P08				
P09	6.25	0.05	6.44	0.53
P10				
P11	6.57	1.42	6.54	0.99
P12				
P13				
P14				
P15	6.20	-0.17	6.23	-0.49
P16	6.05	-0.83	6.26	-0.35
P17	6.38	0.61	6.45	0.58
P18				
Assigned value	6.24		6.33	
Standard Deviation	0.23		0.21	
Count	10		10	

Note - Laboratory number P05 Sample 7 was removed from assigned value calculation as the result was an outlier.

Note - Laboratory number P05 Sample 8 was removed from assigned value calculation as the result was an outlier.

Figure 7 Z-scores for moisture content by oven.

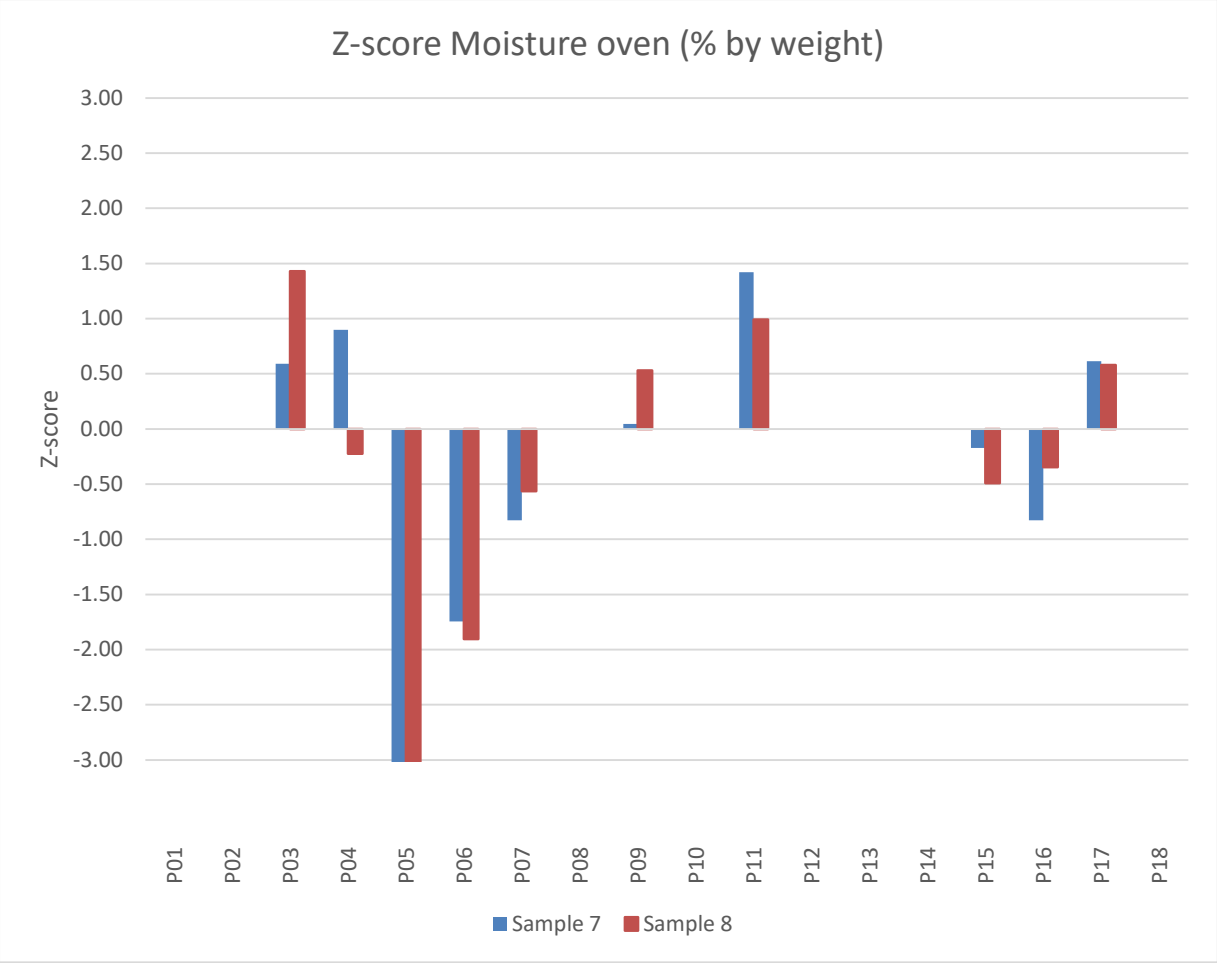


Figure 8 Absolute difference between moisture content (NIR result minus wet chemistry)

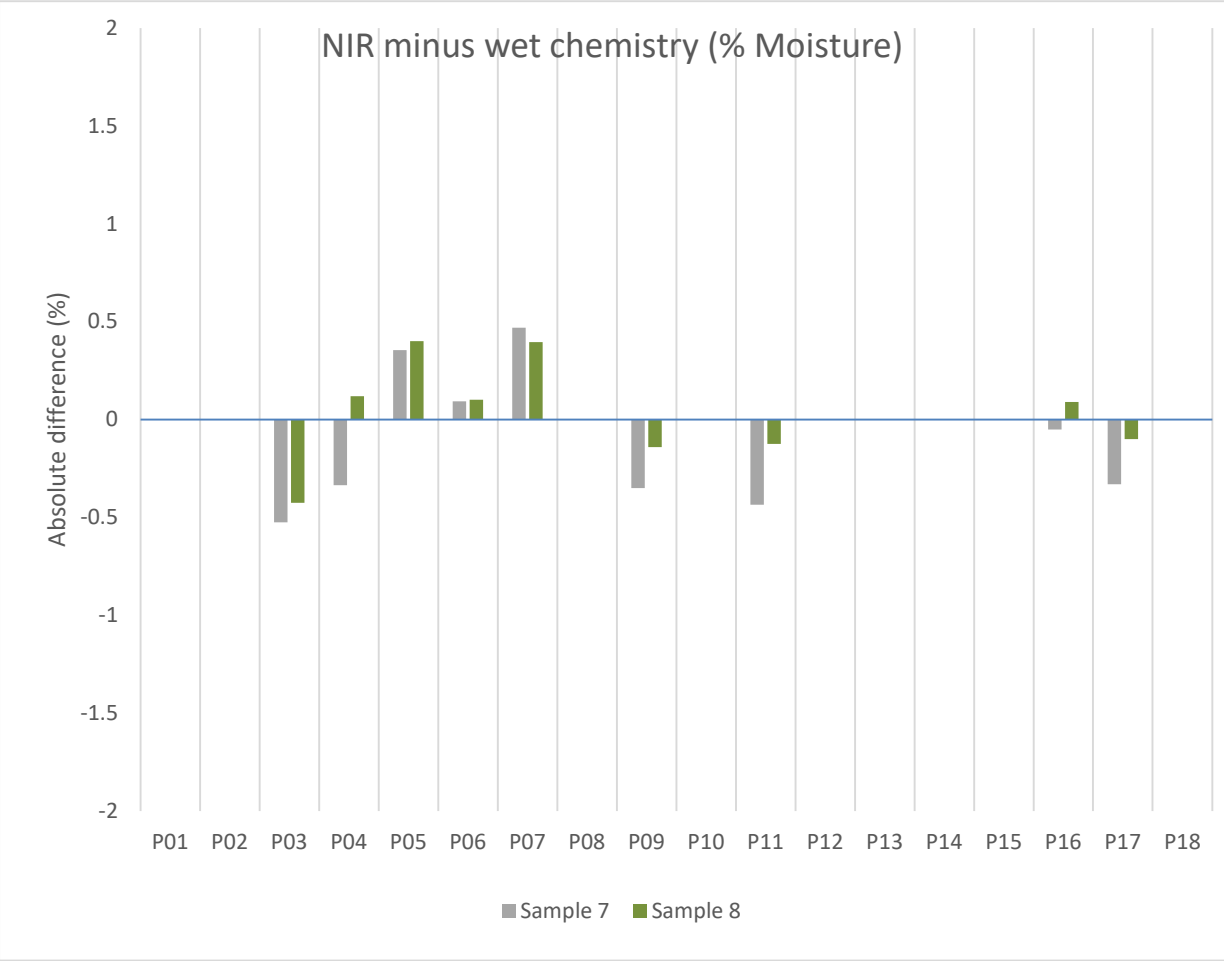


Table 9 Results and Z-scores for oleic acid.

Oleic acid (% of total fatty acids)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	59.92	-0.41	60.66	-0.56
P04				
P05				
P06	60.14	-0.22	60.73	-0.50
P07				
P08				
P09	62.47	1.76	63.18	1.78
P10				
P11				
P12				
P13				
P14				
P15				
P16	59.94	-0.39	60.86	-0.37
P17	59.54	-0.73	60.89	-0.35
P18				
Assigned value	60.40		61.26	
Standard Deviation	1.18		1.07	
Count	5		5	

Figure 9 Z-scores for oleic acid content.

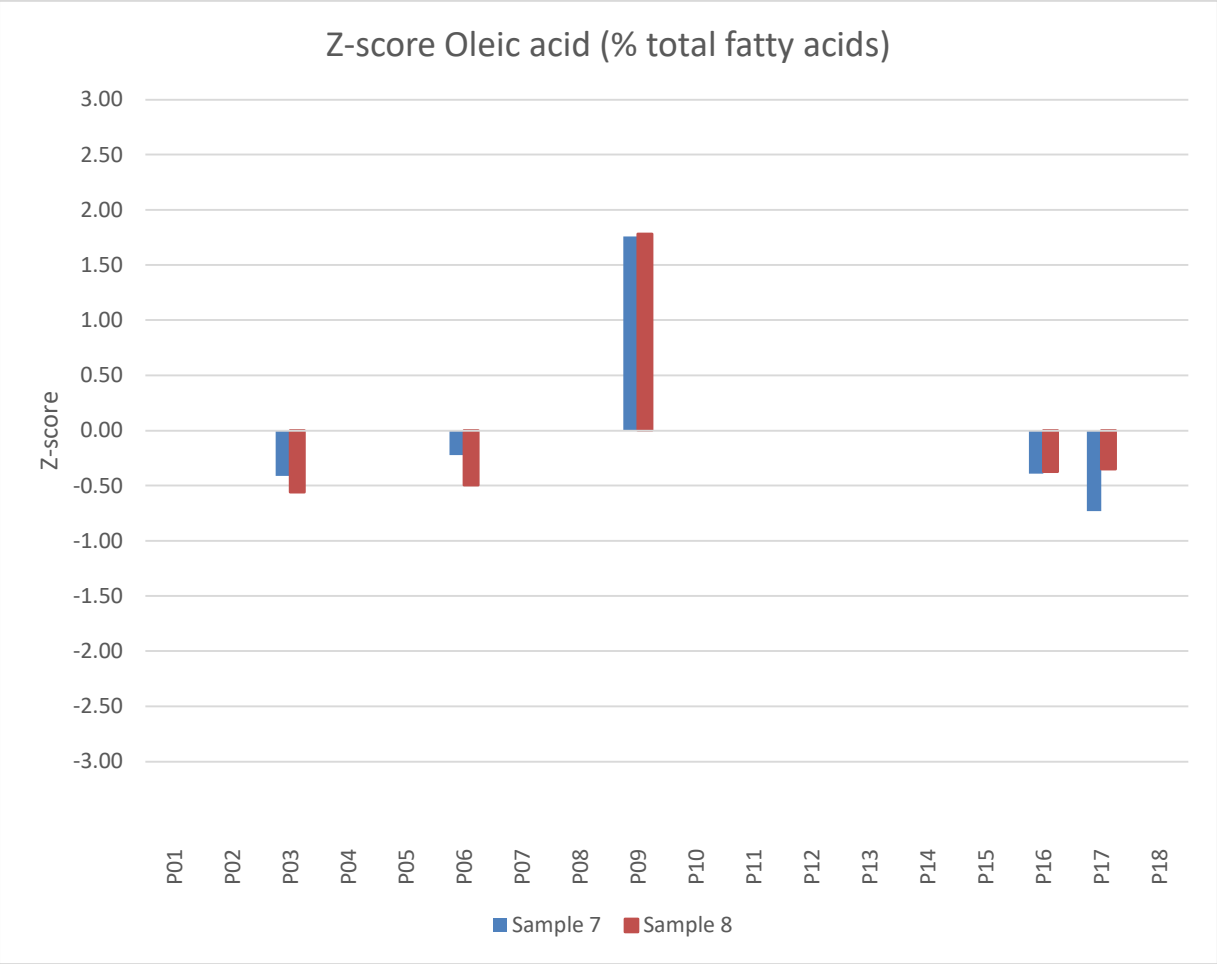


Table 10 Results and Z-scores for linoleic acid.

Linoleic acid (% of total fatty acids)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	21.19	-0.10	19.98	0.00
P04				
P05				
P06	21.10	-0.44	20.01	0.16
P07				
P08				
P09	20.86	-1.33	19.62	-1.67
P10				
P11				
P12				
P13				
P14				
P15				
P16	21.37	0.56	20.16	0.86
P17	21.57	1.31	20.12	0.65
P18				
Assigned value	21.22		19.98	
Standard Deviation	0.27		0.21	
Count	5		5	

Figure 10 Z-scores for linoleic acid content.

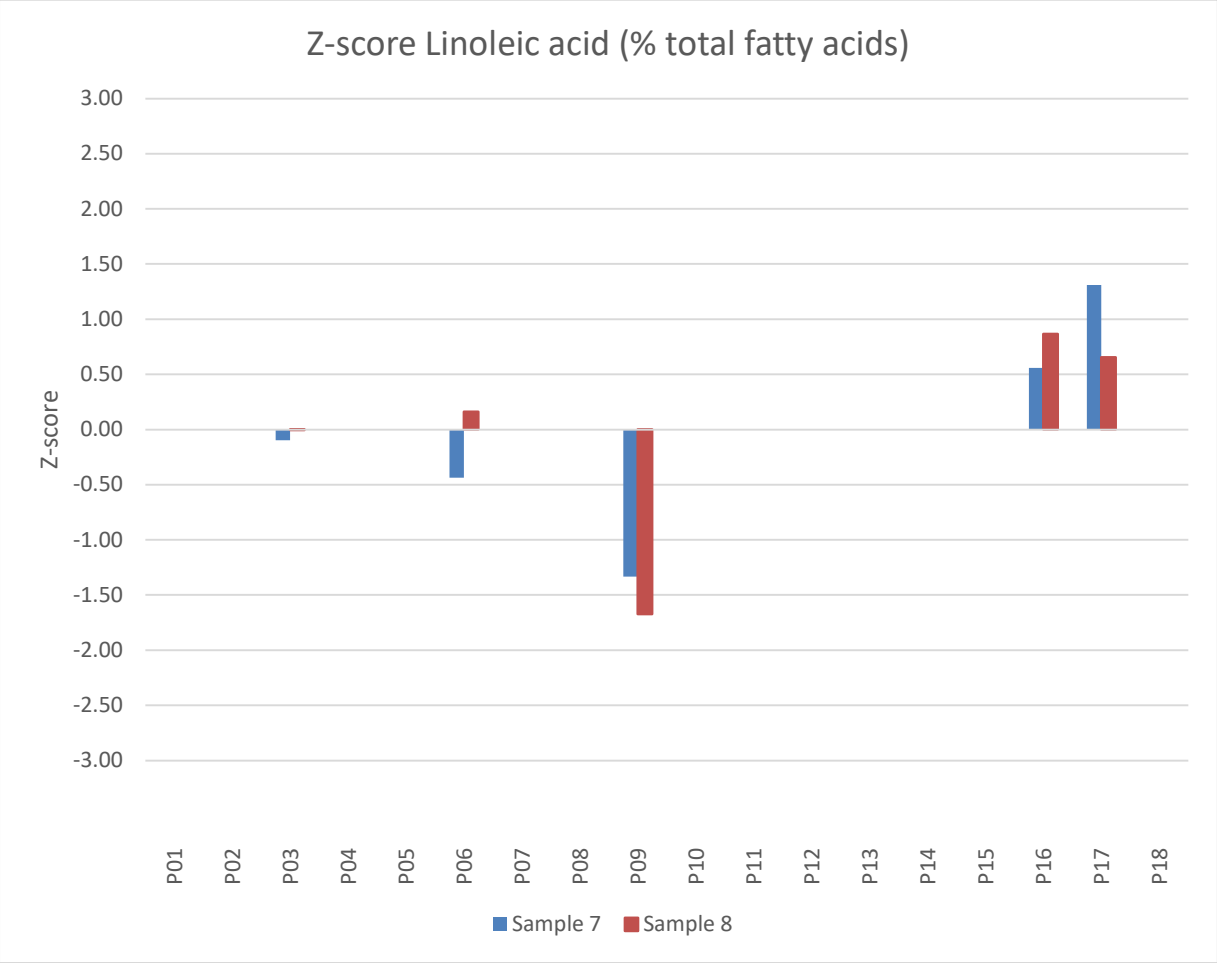


Table 11 Results and Z-scores for linolenic acid.

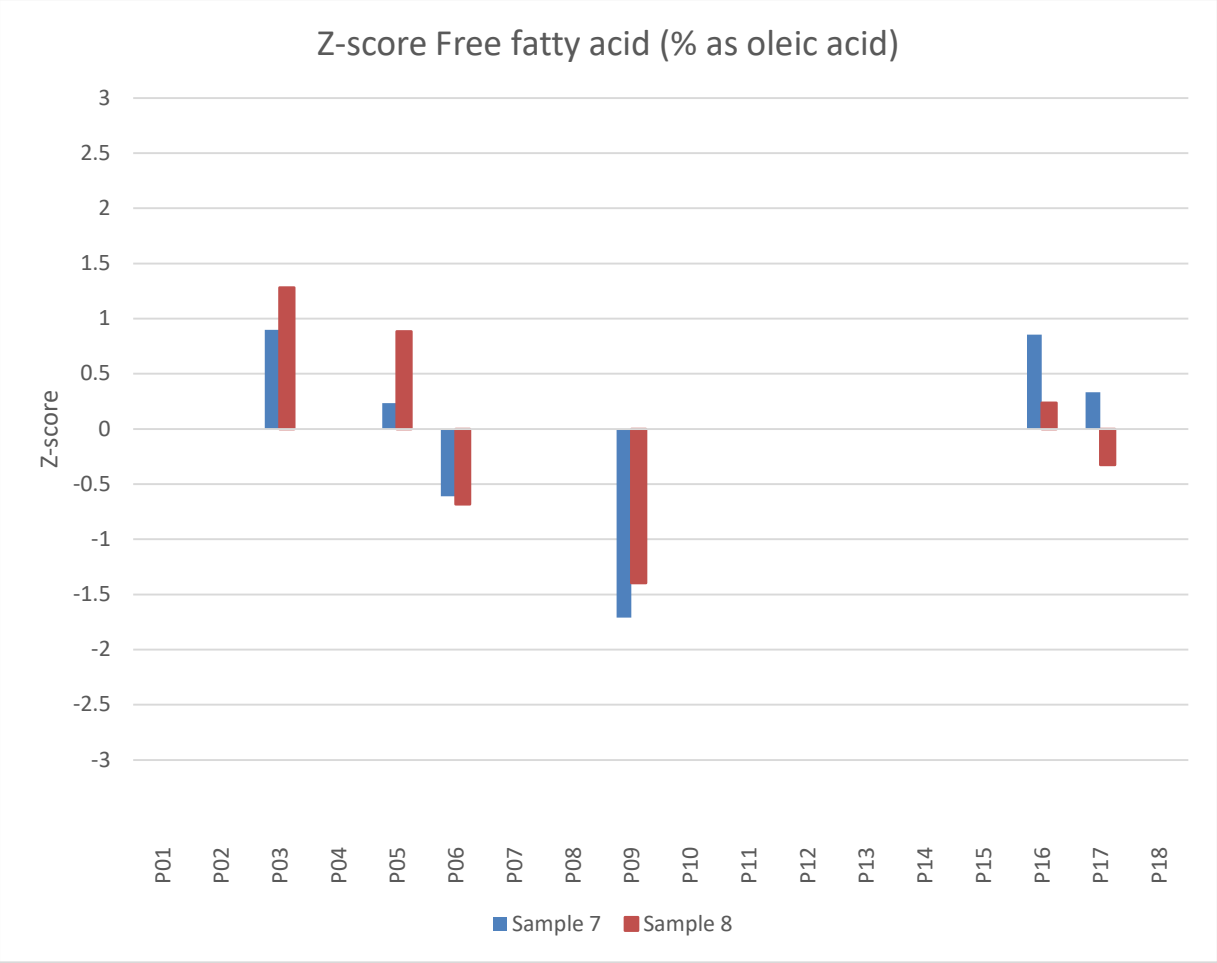
Linolenic acid (% of total fatty acids)				
	Sample 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	9.49	-1.22	9.78	-1.10
P04				
P05				
P06	10.12	0.66	10.37	0.90
P07				
P08				
P09	9.63	-0.80	9.90	-0.70
P10				
P11				
P12				
P13				
P14				
P15				
P16	10.30	1.19	10.46	1.19
P17	9.96	0.18	10.02	-0.29
P18				
Assigned value	9.90		10.11	
Standard Deviation	0.34		0.30	
Count	5		5	

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 7		Sample 8	
Lab number	**Result**	**Z-score**	**Result**	**Z-score**
P01				
P02				
P03	0.34	0.90	0.32	1.28
P04				
P05	0.27	0.23	0.28	0.88
P06	0.18	-0.61	0.13	-0.68
P07				
P08				
P09	0.06	-1.71	0.06	-1.40
P10				
P11				
P12				
P13				
P14				
P15				
P16	0.34	0.86	0.22	0.24
P17	0.28	0.33	0.17	-0.32
P18				
Assigned value	0.25		0.20	
Standard Deviation	0.11		0.10	
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 (3), TP/016 (1), M55 - Measurement of grain density by CBH chrondrometer (1).

Impurities

AOF 4-1.2(b)(2), AOF 4-1.3 (5), not indicated (2), ISO658 (1), TP/052 (1).

Oil content (NIR)

Calibration based on ISO659 (1), NIR (2), FOSS NIR (1), Infratec 1241 (1), not indicated (6), 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 (1), TP/053 (1).

Moisture (NIR)

Calibration based on ISO665 (1), FOSS NIR (1), NIR (2), Infratec 1241 (1), not indicated (6),TP/054 (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), 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),TP/047(1),not indicated (1).

Free fatty acids

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