



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 783



General Information

In this report an overview is given of analytical data for this sample collected in our proficiency testing program. The consensus values are calculated using a robust statistical model. With this NDA model mean and standard deviation are calculated using all reported data when at least 8 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into three sections: Consensus Values, Indicative Values and Values for Information. The division is made on the reliability of the data. Consensus Values are based on at least 16 results while the coefficient of variation is smaller than 25 %. Indicative Values are based on at least 8 and less than 16 results or a coefficient of variation between 25 % and 50 %. Other values, based on more than 2 and less than 8 results or a coefficient of variation higher than 50 %, are given for information only.

In the sections with Consensus Values and Indicative Values the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median and MAD (Median of Absolute Deviation) and the uncertainty in the consensus values. The confidence limits (at 95 % probability) are calculated for these determinands.

In the section with Information Values the following parameters are given: median, MAD and number of results. For determinands which have at least 5 results reported as smaller than (<) the median of these 'smaller than results' is calculated. In some cases this median of '<' values is much smaller than median and mean of the indicative values. This may be caused by a too optimistic (too low) value for the detection limit reported by a (small) majority of participating laboratories who report '<' -values.

All values, expressed on a weight basis (kg or %), are reported in oven dry (105 °C) material. Moisture is reported in the material as received.

Sample information

WEPAL reference materials are from natural sources only. There is no spiking, mixing or other alterations of the samples. For sample preparation the IPE samples are dried at 70 °C and milled to pass a 0.5 mm sieve.

This IPE sample 783 of Wheat (grain) / Triticum aestivum from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 5 periods (or rounds). The results on which the values in this report are based were taken from the periods given in the following table.

Year	Round	Number
2010	2	4
2006	2	4
1999	2	2
1998	2	6
1995	5	2



Consensus Values IPE 783



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	100	20.8	20.8	69	102	14.5	3.1	95.0	-	105
Ca	g/kg	0.357	0.0814	22.8	591	0.368	0.0580	0.0042	0.351	-	0.364
Cl (as Cl)	g/kg	0.725	0.1494	20.6	117	0.734	0.1038	0.0173	0.697	-	0.752
Cu	mg/kg	3.31	0.482	14.6	571	3.33	0.330	0.025	3.27	-	3.35
Fe	mg/kg	34.4	5.74	16.7	573	35.0	4.01	0.30	33.9	-	34.9
K	g/kg	5.41	0.417	7.7	624	5.43	0.287	0.021	5.38	-	5.45
Mg	g/kg	1.17	0.090	7.7	616	1.18	0.063	0.005	1.17	-	1.18
Mn	mg/kg	19.0	1.88	9.9	603	19.0	1.30	0.10	18.83	-	19.13
Mo	µg/kg	658	68.0	10.3	119	663	47.0	7.8	646	-	670
N - Kjeldahl (as N)	g/kg	13.2	0.72	5.5	428	13.2	0.50	0.04	13.15	-	13.29
P (as P)	g/kg	3.90	0.243	6.2	617	3.89	0.170	0.012	3.88	-	3.91
Rb	µg/kg	3340	171	5.1	18	3350	119	51	3256	-	3426
S (as S)	g/kg	0.973	0.0993	10.2	306	0.978	0.0706	0.0071	0.961	-	0.984
Se	µg/kg	67.2	12.95	19.3	41	68.1	9.10	2.53	63.1	-	71.3
Sr	mg/kg	1.96	0.168	8.6	60	2.00	0.115	0.027	1.91	-	2.00
Zn	mg/kg	23.0	2.18	9.5	604	23.0	1.50	0.11	22.85	-	23.20

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
C - elementary	g/kg	441	12.6	2.9	98	441	8.4	1.6	438.0	-	443.0
N - elementary	g/kg	13.5	0.81	6.0	207	13.6	0.57	0.07	13.43	-	13.65

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Crude fibre	g/kg	25.3	3.60	14.2	19	25.5	2.40	1.03	23.6	-	27.0
Total ash	g/kg	19.0	1.35	7.1	30	18.9	0.95	0.31	18.5	-	19.5



Indicative Values IPE 783

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Ba	mg/kg	0.681	0.2173	31.9	48	0.700	0.1550	0.0392	0.618	- 0.744
Cd	µg/kg	38.4	10.59	27.5	144	39.6	7.45	1.10	36.7	- 40.2
Li	µg/kg	20.4	8.54	41.9	8	23.5	5.80	3.77	13.4	- 27.3

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	mg/kg	11.0	4.80	43.8	19	10.0	3.37	1.38	8.67	- 13.3

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	mg/kg	7.11	3.311	46.6	38	7.08	2.250	0.671	6.02	- 8.19

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
delta 13C	‰ V-PDB	-25.5	0.14	0.6	12	-25.5	0.10	0.05	-25.55	- -25.37

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Total fat	g/kg	16.3	7.11	43.7	10	16.3	5.00	2.81	11.2	- 21.3



Informative Values IPE 783



Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
Ag	µg/kg	185	60.0	3	15.0	6
B	mg/kg	1.82	0.660	336	2.27	40
Be	µg/kg	12.4	8.00	12	15.0	18
Bi	µg/kg	-	-	0	20.0	7
Br	mg/kg	2.26	0.290	7		
Co	µg/kg	10.00	5.000	62	100.00	66
Cr	µg/kg	200	95.0	85	400	61
Cs	µg/kg	2.20	2.196	3		
F	mg/kg	2.10	1.040	4		
Hg	µg/kg	1.85	0.750	63	40.00	46
N - NH4 (as N)	mg/kg	35.9	19.05	17		
N - NO3 (as N)	mg/kg	14.01	11.623	44	28.02	25
Na	mg/kg	41.6	18.62	356	115.0	43
Ni	µg/kg	173	71.5	90	300	69
Pb	µg/kg	125	62.1	118	444	74
Sb	µg/kg	4.20	2.700	13	20.00	13
Sn	µg/kg	34.8	25.94	8	1200.0	7
SO4 (as SO4)	g/kg	0.210	0.1400	17		
Ti	mg/kg	0.485	0.3250	8		
V	µg/kg	28.0	18.00	25	100.0	25

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	242	74.0	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	75.7	18.30	3

Method: Other determinations

Element	Unit	Median	MAD	N
delta 15N	‰ Air	1.25	0.800	13

Method: Nutritional values



Informative Values IPE 783

Element	Unit	Median	MAD	N
ADF-ash-free	g/kg	32.1	1.10	5
NDF-ash-containing	g/kg	181	73.0	3

Method: Nutritional values (cont.)

Element	Unit	Median	MAD	N
NDF-ash-free	g/kg	144	24.0	5
Polysaccharides (starch)	g/kg	788	48.0	4