

SoxCap Study Report

Cereals, Cereal Products & Animal Feeding Stuffs –

Determination of fat content

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Collaborative Study Report: Determination of total fat using the SoxCap

Abstract

During June to September 2005 a collaborative study for the determination of total fat in cereals, cereal products and animal feeding stuff using the SoxCap system was performed, involving 8 participants from 6 countries. The samples analyzed covered a range from 1 to 26 % fat. Repeatability standard deviations ranged from 0,05 to 0,28 % fat. The reproducibility standard deviations ranged from 0,15 to 8,7 % fat. For most of the samples substantial and significant differences for fat A and fat B contents were found.

A comparison with the simultaneously performed study for the validation of the ISO 11085 standard showed that there were no statistically significant differences between the ISO 11085 method and the SoxCap method.

Analyzed samples comprised parboiled rice, whole wheat kernels, rye flower, sorghum, couscous (durum wheat), croutons, cornbread, cattle feed, chicken feed and pig feed.

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1. Introduction

This report summarizes the results of an interlaboratory study performed during June to September 2005 under swedish project leadership by the company FOSS, following the protocol described in ISO 5725-2 [1].

The study was performed in parallel and simultaneously with the ISO study for the validation of the ISO 11085 standard, using the same samples.

2 Materials and Methods.

2.1 Selection of samples

The following 11 samples, all milled and homogenized and thus ready for analysis, were sent out to 8 participating labs:

Sample 1	Rice, parboiled
Sample 2	Whole wheat kernels
Sample 3	Rye flour
Sample 4	Sorghum kernels
Sample 5	Couscous (durum wheat)
Sample 6	Flour mix (multicorn)
Sample 7	Croutons
Sample 8	Cornbread
Sample 9	Cattle feed
Sample 10	Chicken feed
Sample 11	Pig feed

All laboratories were requested to analyze the samples for moisture content according to ISO 712, as well for fat A (crude fat) using Soxtec and fat B (total fat) using SoxCap. If the moisture content was higher than 10% the thimbles with the samples had to be pre-dried for 2 h at 103° C (only fat A).

In total each participating laboratory received about 50 g per sample to be analyzed according to the analysis scheme in figure 2.1.

For sample 9 there was not enough sample material to be sent out to all participants.

All samples were dried and ground to a particle size < 0,5 mm using Retsch or Cyclotec mills. After visual check of the ground material a subdivision of the samples was made. No other specific tests for checking the homogeneity of the subdivided samples were made.

2.2 Sample stability

By comparing the protein content of the samples before and after the study and finding no significant differences, the samples were assumed to be sufficiently stable for the study.

2.3 Study design

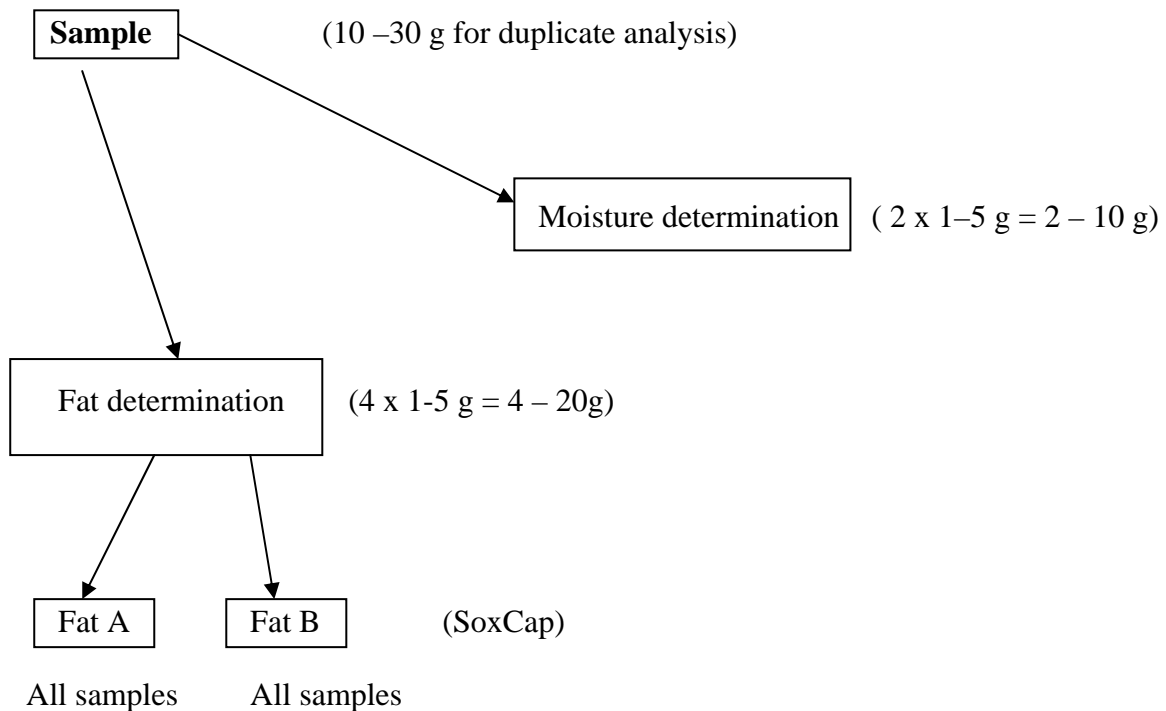
The study was performed in parallel with the ISO 11085 study.

Together with the samples each laboratory received a draft of the method to be followed and a reporting scheme, as well as an analysis scheme (see figure 2.1).

The deadline for the submission of results was originally set to August 30, 2005 and was later extended to end of September 2005.

The study design and the evaluation of results were made in accordance with ISO 5725 [1].

Fig. 2.1 Analysis scheme for the SoxCap study:



|

3 Participating labs (by country):

<i>Country</i>	<i>Name</i>	<i>Adress</i>
<u>China</u>	Mr. Jiarong Pan	Chinese Academy of Agriculture Sciences
<u>Denmark</u>	Mr Sven Erik Sørensen	Steins laboratorium
<u>Germany</u>	Frau Angelika Preiß-Weigert (z.Hd. Frau Angelika Hiller)	Bundesinstitut für Risikobewertung
<u>Germany</u>	Dr Knut Werkmeister, Frau Doris Kugler	Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit
<u>Japan</u>	Mr. T. Nakasato, Ms. Komiyama	Japan Food Research Laboratories, Tama Laboratory
<u>Spain</u>	Ms Judit Font and Ms Regina Blanco	Laboratorio Ordesa, S.L
<u>Sweden</u>	Mr Erik Nordkvist	National Veterinary Institute, SVA
<u>Sweden</u>	Jürgen Möller (PL)	Foss Analytical AB,

4 Results

4.1 Compilation of results

4.1.1 Moisture content (%)

SoxCap study (in parallell with ISO 7302 study): reported moisture values (%) n.v. = no value reported

Lab	Sample										
	1	2	3	4	5	6	7	8	9	10	11
1	11,33	11,92	10,28	11,45	9,39	8,09	4,89	5,89	5,73	10,74	12,02
2	10,70	10,80	8,90	10,40	8,90	7,20	4,20	5,70	5,40	10,40	11,40
3	11,01	11,72	9,91	10,97	9,05	8,49	5,38	6,24	n.v.	10,65	11,92
4	11,83	12,47	10,82	12,18	9,87	8,65	5,44	6,83	7,04	11,71	12,99
5	11,29	12,39	10,41	11,78	9,53	8,41	4,95	6,20	6,91	11,87	12,51
6	11,01	11,65	10,01	11,03	9,18	7,98	5,32	6,15	n.v.	10,52	11,83
7	11,38	11,68	10,20	11,23	9,34	8,14	4,75	6,06	5,83	10,72	12,06
8	11,50	12,00	10,40	11,70	9,60	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.
mean	11,26	11,83	10,12	11,34	9,36	8,14	4,99	6,15	6,18	10,94	12,10
sd	0,3467	0,5194	0,5643	0,5567	0,3135	0,4773	0,4391	0,3538	0,7426	0,5914	0,5105
rsd %	3,1	4,4	5,6	4,9	3,4	5,9	8,8	5,8	12,0	5,4	4,2

4.1.1 Crude fat content – Fat A (% d.m.)

Lab	Sample										
	1	2	3	4	5	6	7	8	9	10	11
1	0,42	1,81	1,46	3,60	0,87	11,53	14,20	24,29	11,58	6,37	2,67
1	0,39	1,81	1,43	3,64	0,79	11,55	14,13	24,24	11,61	6,35	2,83
2	0,48	1,84	1,64	3,42	0,71	11,15	14,14	25,80	11,65	6,10	2,95
2	0,64	1,79	1,62	3,45	0,85	11,25	14,08	25,92	11,70	6,17	2,96
3	0,07	1,73	1,18	3,31	0,80	11,52	12,81	21,93	n.v.	6,08	3,22
3	0,18	1,67	1,52	3,22	0,88	11,51	13,16	23,35	n.v.	6,04	3,03
4	0,27	1,51	1,27	3,39	0,67	11,32	14,05	26,02	13,60	5,93	2,74
4	0,36	1,53	1,29	3,30	0,78	11,34	14,09	25,79	13,31	5,95	2,84
5	0,45	1,60	1,05	3,19	0,83	11,38	13,98	25,72	11,66	6,29	2,97
5	0,48	1,62	1,19	3,32	0,81	11,32	13,78	24,99	11,86	6,29	2,80
6	0,41	1,55	1,26	3,24	0,77	11,24	14,21	23,82	n.v.	6,57	3,10
6	0,40	1,51	1,32	3,24	0,78	11,14	14,38	23,70	n.v.	6,45	3,17
7	0,42	1,68	1,37	3,31	0,81	11,17	13,75	25,41	12,32	6,04	2,93
7	0,41	1,59	1,30	3,30	0,77	11,21	13,90	25,49	11,87	5,98	2,93
8	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.
8	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.

n.v. = no value reported

4.1.1 Total fat content – Fat B (% d.m.)

Lab	Level										
	1	2	3	4	5	6	7	8	9	10	11
1	0,98	2,30	1,79	3,77	2,24	11,62	15,76	26,45	14,46	6,33	3,81
1	0,91	2,32	1,78	3,81	2,15	11,86	15,32	26,96	14,32	6,48	3,22
2	1,21	2,28	1,82	3,38	1,92	12,27	15,29	26,88	14,13	6,83	4,02
2	1,16	2,33	1,95	3,39	1,99	12,21	15,28	26,60	14,32	6,96	4,21
3	1,75	2,73	2,39	3,30	1,87	13,01	16,73	25,67	n.v.	7,78	5,00
3	1,67	2,61	2,60	3,36	2,33	13,21	16,56	25,94	n.v.	7,87	5,13
4	1,02	2,27	1,83	3,92	2,25	11,80	16,00	27,21	14,41	6,83	3,30
4	1,03	2,25	1,79	3,86	2,14	11,81	15,66	27,41	14,54	6,65	3,40
5	0,58	1,92	1,59	3,31	1,92	12,16	17,31	33,74	12,10	5,99	3,57
5	0,64	1,79	1,43	2,75	1,82	12,25	16,56	33,65	15,18	6,07	3,09
6	1,10	2,02	1,64	3,39	1,92	12,07	16,82	25,23	n.v.	6,98	3,88
6	1,03	1,85	1,48	3,44	1,97	12,71	16,40	25,05	n.v.	6,70	3,88
7	0,92	2,08	1,60	3,26	2,00	10,68	14,53	24,90	13,54	6,22	3,34
7	1,01	2,02	1,62	3,15	2,03	10,78	14,69	25,50	13,47	6,18	3,54
8	1,20	2,26	1,72	3,26	2,00	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.
8	1,27	2,26	1,65	3,01	1,85	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.

n.v. = no value reported

4.2 Statistical evaluation of results

Table 4.2.1 Results for crude fat (fat A)

Fat A/ SoxCap study	crude fat										
Units of the results:	% (m/m)										
material descripton:	Rice	Wheat	Rye	Sorghum	Couscous	Flourmix	Croutons	Cornbread	Cattlefeed	Chicken f	Pig feed
Samples:	1	2	3	4	5	6	7	8	9	10	11
number of labs:	7	7	7	7	7	7	7	7	5	7	7
number of labs after outlier elimination:	7	7	7	7	7	7	6	6	5	7	7
mean :	0,384	1,669	1,35	3,352	0,794	11,331	14,057	25,099	12,116	6,186	2,939
repetability standard deviation sr (g/100g)	0,0584	0,0344	0,1019	0,0505	0,0577	0,0432	0,092	0,228	0,1817	0,0425	0,0868
rel.sr%	15,205	2,064	7,549	1,506	7,264	0,381	0,654	0,308	1,499	0,687	2,956
Repeatability index r (2,8 x sr) in g/100g	0,1636	0,0964	0,2853	0,1414	0,1615	0,1209	2575	0,638	0,5086	0,119	0,2432
Reproducibility standard deviation sR (g/100g)	0,1423	0,1234	0,1733	0,1403	0,0577	0,153	0,1885	0,898	0,7829	0,2087	0,1617
rel.sR%	37,025	7,431	12,837	4,186	7,264	1,35	1,341	3,58	6,462	3,374	5,501
Reproducibility index R (2,8 x sR, in g/100g)	0,3984	0,3454	0,4853	0,3929	0,1615	0,4283	5277	2,516	2,1922	0,5845	0,4527

Table 4.2.2 Results of the SoxCap interlaboratory test for total fat (fat B)

Parameter	Sample ^a										
	1	2	3	4	5	6	7	8	9	10	11
Number of laboratories retained after elimination of outliers	8	8	7	7	7	7	7	6	4	7	7
Mean total fat content, g/100 g (based on dry matter basis)	1,093	2,207	1,692	3,451	2,014	12,031	15,922	26,15	14,149	6,705	3,814
Repeatability standard deviation (s_r), g/100 g total fat	0,047	0,066	0,073	0,076	0,066	0,134	0,281	0,265	0,098	0,109	0,221
Repeatability relative standard deviation %	4,3	3,0	4,3	2,2	3,3	1,6	1,8	1,0	0,7	1,6	5,8
Repeatability limit r [$r = 2,8 \times s_r$], g/100 g total fat	0,132	0,185	0,205	0,213	0,185	0,544	0,786	0,742	0,276	0,305	0,618
Horrrat value $Ho_{p,b}$	1,653	1,278	1,775	1,007	1,379	0,890	1,013	0,628	0,393	0,820	2,681
Reproducibility standard deviation (s_R), g/100 g total fat	0,315	0,260	0,149	0,289	0,139	0,743	0,870	0,919	0,447	0,598	0,644
Reproducibility relative standard deviation %	28,8	11,8	8,8	8,4	6,9	6,2	5,5	3,5	3,2	8,9	16,9
Reproducibility limit (R) [$R = 2,8 \times s_R$], g/100 g total fat	0,882	0,729	0,417	0,810	0,388	2,079	2,436	2,572	1,252	1,675	1,802
Horrrat value Ho_R^b	7,302	3,324	2,383	2,526	1,913	2,244	2,072	1,435	1,177	2,97	5,16

(a) sample types:

Sample 1	Rice, parboiled
Sample 2	Whole wheat kernels
Sample 3	Rye flour
Sample 4	Sorghum kernels
Sample 5	Couscous (durum wheat)
Sample 6	Flour mix (multicorn)
Sample 7	Croutons
Sample 8	Cornbread
Sample 9	Cattle feed
Sample 10	Chicken feed
Sample 11	Pig feed

(b) A Horrat value of 1 usually indicates satisfactory precision, while a value >2 indicates unsatisfactory precision, i.e. a precision that is too variable for most analytical purposes or where the variation obtained is greater than expected for the type of method employed

5 Discussion and conclusions

5.1 Crude fat (Fat A)

Crude fat was not the parameter to be studied in this study but as it is an important step in the determination of the total fat content it was of interest to compare the results of this study with the parallel ISO 11085 study (see table below).

Sample	SoxCap				ISO 11085			
	# labs	mean	sr	sR	# labs	mean	sr	sR
1	7	0,38	0,058	0,142	13	0,43	0,044	0,179
2	7	1,67	0,034	0,123	13	1,64	0,058	0,258
3	7	1,35	0,102	0,173	13	1,33	0,092	0,259
4	7	3,35	0,051	0,140	13	3,45	0,058	0,185
5	7	0,79	0,058	0,058	13	0,85	0,047	0,107
6	7	11,33	0,043	0,153	13	11,36	0,070	0,151
7	6	14,06	0,092	0,189	12	14,03	0,137	0,221
8	6	25,10	0,228	0,898	12	25,77	0,186	0,259
9	5	12,12	0,182	0,783	13	11,98	0,145	0,588
10	7	6,19	0,043	0,209	13	6,25	0,063	0,257
11	7	2,94	0,087	0,162	13	2,96	0,073	0,145

Table 5.1 Comparison of mean values for crude fat and standard deviations for the repeatability and reproducibility for this study (SoxCap) and the ISO 11085 study.

As the table shows comparable values were obtained by the participants of the SoxCap study and the participants of the simultaneous validation study for the ISO 11085 standard.

5.2 Total fat (Fat B)

The performance data in form of relative errors (coefficient of variation of repeatability and reproducibility) are depicted figure 5.2.1. They fulfil the demands of the ISO for the standardization of analytical methods.

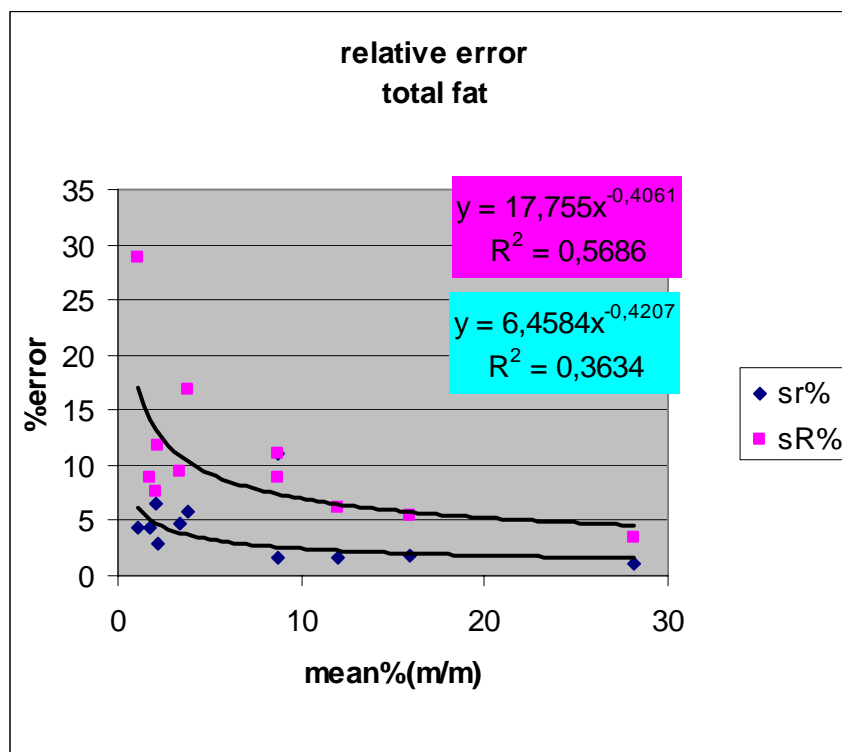


Figure 5.2.1 Relative errors for the determination of total fat using SoxCap as a function of the total fat content.

5.2 Comparison with ISO 11085

Sample #	Sample type	mean 11085	sd R	mean SoxCap	sd R
1	Rice	1,066	0,143	1,093	0,315
2	Wheat	2,366	0,271	2,207	0,26
3	Rye	1,78	0,169	1,692	0,149
4	Sorghum	4,003	0,158	3,451	0,289
5	Couscous	2,193	0,199	2,014	0,139
6	Flourmix	12,035	0,48	12,031	0,743
7	Croutons	15,751	0,511	15,922	0,87
8	Cornbread	27,08	0,698	26,15	0,919
9	Cattlefeed	14,872	0,896	14,149	0,447
10	Chickenfeed	6,813	0,463	6,705	0,598
11	Pigfeed	3,883	0,351	3,814	0,644

Table 5.2.1 Comparison ISO 11085 and SoxCap (SC) for total fat

In table 5.2.1 the mean values and standard deviations for the reproducibility for the collaborative studies ISO 11085 and SoxCap are compared. These values are also shown in figure 5.2.1:

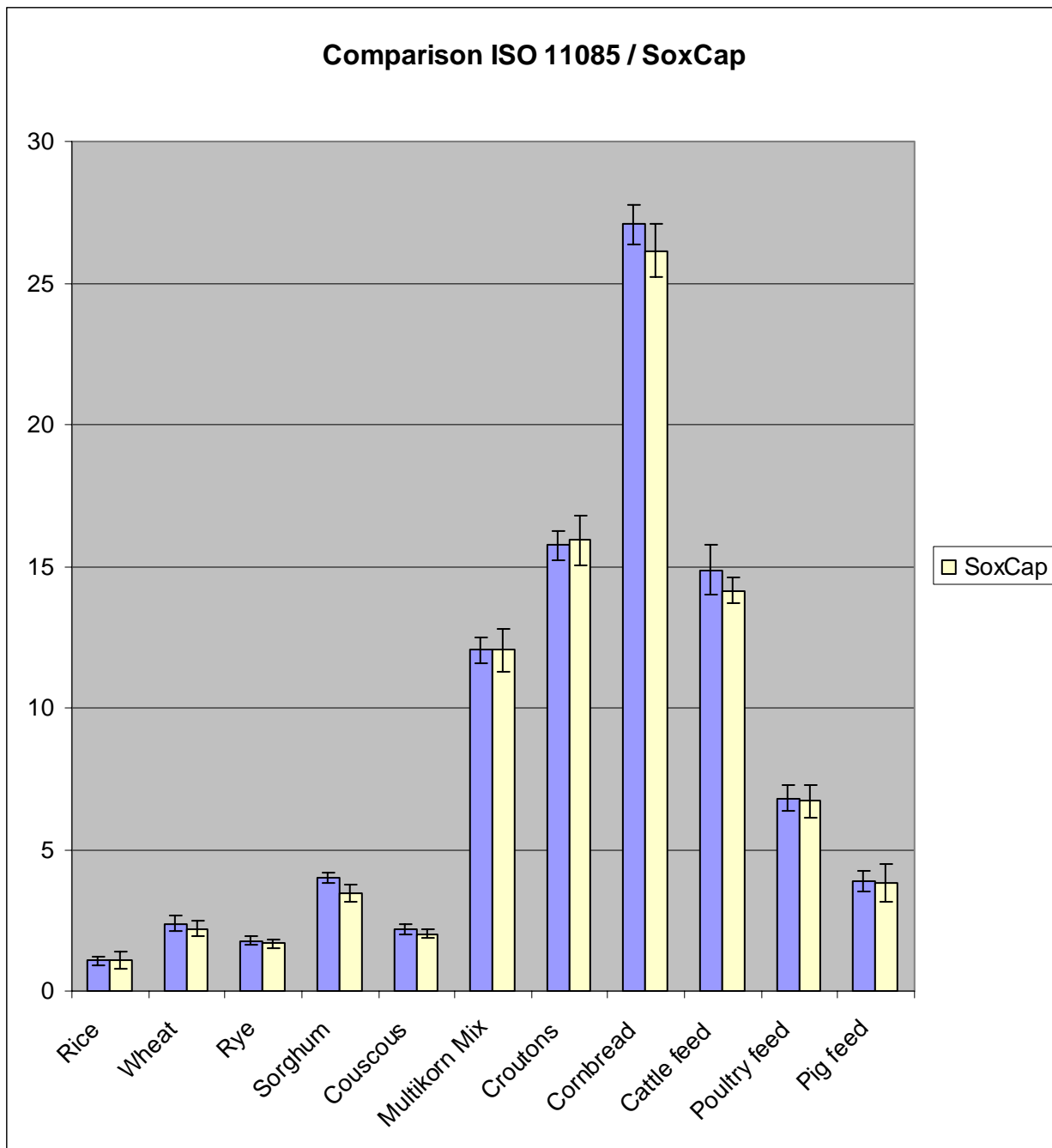


Fig. 5.2.1 Mean values for the total fat content (% fat) as determined by ISO 11085 (dark) and SoxCap (light). (Error bars show reproducibility standard deviation).

As can be seen there are no significant differences of the total fat content between the both methods. All values, with the exception of sorghum, overlap within one standard deviation of the reproducibility. A statistical analysis (t-test of means) reveals that there is no difference of the values between ISO 11085 and SoxCap in 98 out of 100 cases.

6 References

- [1] **ISO 5725-2:1994**, Accuracy (trueness and precision) of measurement methods and results - Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method.

- [2] **ISO 11085:2008** Cereals, cereals-based products and animal feeding stuffs -- Determination of crude fat and total fat content by the Randall extraction method

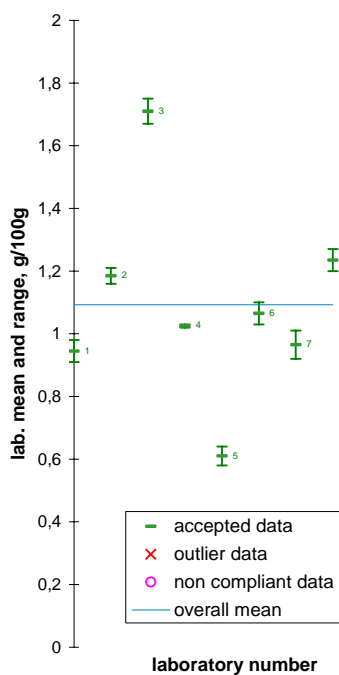
Appendix

This appendix comprises the detailed results of the statistical evaluation.

SoxCap total fat Sample 1			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		0,98	0,91
2		1,21	1,16
3		1,75	1,67
4		1,02	1,03
5		0,58	0,64
6		1,1	1,03
7		0,92	1,01
8		1,2	1,27

SoxCap total fat Sample 1		
blind reps		
MEAN: n ₁ , units, ..	1,093	g/100g
mean rep ₁ ...rep _n	1,095	1,090
n	8	
nc	0	
outliers	0	
n ₁	8	
r	0,132	
s _r	0,047	
RSD _r	4,305	
Ho _r	1,653	
R	0,882	
s _R	0,315	
RSD _R	28,822	
Ho _R	7,302	

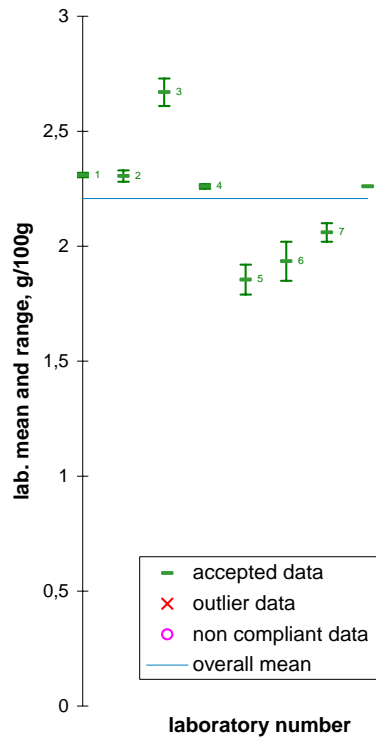
SoxCap total fat Sample 1 : blind replicates



SoxCap total fat Sample 2			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		2,3	2,32
2		2,28	2,33
3		2,73	2,61
4		2,27	2,25
5		1,92	1,79
6		2,02	1,85
7		2,1	2,02
8		2,26	2,26

SoxCap total fat Sample 2			
blind reps			
MEAN: n ₁ , units, no of reps	2,207	g/100g	
mean rep ₁ ...rep _n	2,235	2,179	
n	8		
nc	0		
outliers	0		
n ₁	8		
r	0,185		
s _r	0,066		
RSD _r	2,995		
Ho _r	1,278		
R	0,729		
s _R	0,260		
RSD _R	11,804		
Ho _R	3,324		

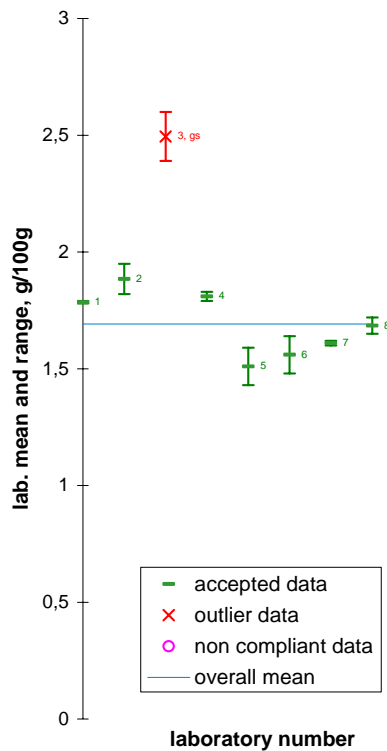
SoxCap total fat Sample 2 : blind replicates



SoxCap total fat Sample 3		blind reps	
Lab ID	removed by	rep 1	rep 2
1		1,79	1,78
2		1,82	1,95
3	3, gs	2,39	2,6
4		1,83	1,79
5		1,59	1,43
6		1,64	1,48
7		1,6	1,62
8		1,72	1,65

SoxCap total fat Sample 3		
	blind reps	
MEAN: n ₁ , units, ...	1,692	g/100g
mean rep ₁ ...rep _n	1,713	1,671
n	8	
nc	0	
outliers	1	
n ₁	7	
r	0,205	
s _r	0,073	
RSD _r	4,328	
Ho _r	1,775	
R	0,417	
s _R	0,149	
RSD _R	8,806	
Ho _R	2,383	

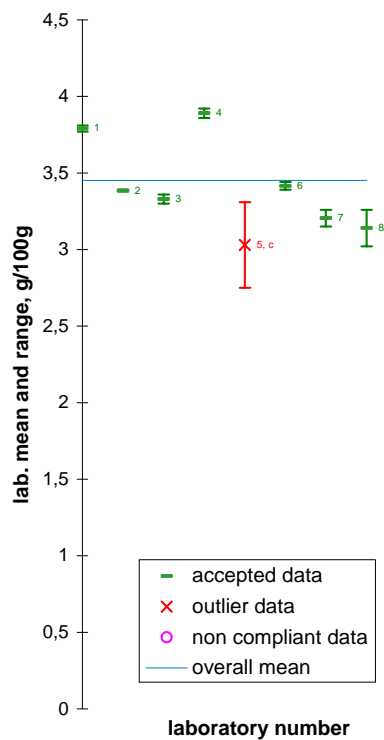
SoxCap total fat Sample 3 : blind replicates



SoxCap total fat Sample 4			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		3,77	3,81
2		3,38	3,39
3		3,3	3,36
4		3,92	3,86
5	5, c	3,31	2,75
6		3,39	3,44
7		3,26	3,15
8		3,26	3,02

SoxCap total fat Sample 4		
blind reps		
MEAN: n ₁ , units, ..	3,451	g/100g
mean rep ₁ ...rep _n	3,469	3,433
n	8	
nc	0	
outliers	1	
n ₁	7	
r	0,213	
s _r	0,076	
RSD _r	2,206	
Ho _r	1,007	
R	0,810	
s _R	0,289	
RSD _R	8,387	
Ho _R	2,526	

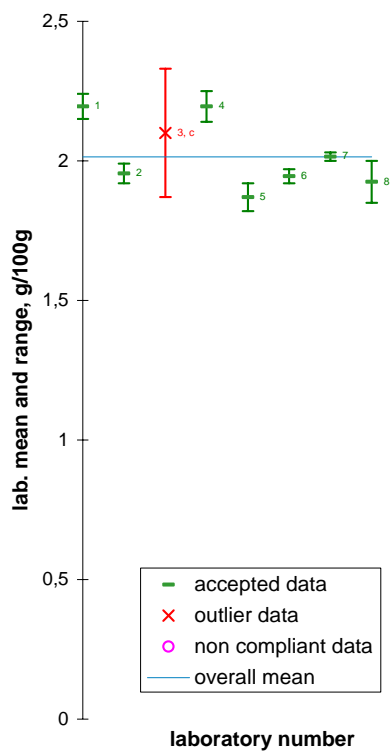
SoxCap total fat Sample 4 : blind replicates



SoxCap total fat Sample 5			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		2,24	2,15
2		1,92	1,99
3	3, c	1,87	2,33
4		2,25	2,14
5		1,92	1,82
6		1,92	1,97
7		2	2,03
8		2	1,85

SoxCap total fat Sample 5		
	blind reps	
MEAN: n ₁ , units, ..	2,014	g/100g
mean rep ₁ ...rep _n	2,036	1,993
n	8	
nc	0	
outliers	1	
n ₁	7	
r	0,185	
s _r	0,066	
RSD _r	3,277	
Ho _r	1,379	
R	0,388	
s _R	0,139	
RSD _R	6,888	
Ho _R	1,913	

SoxCap total fat Sample 5 : blind replicates

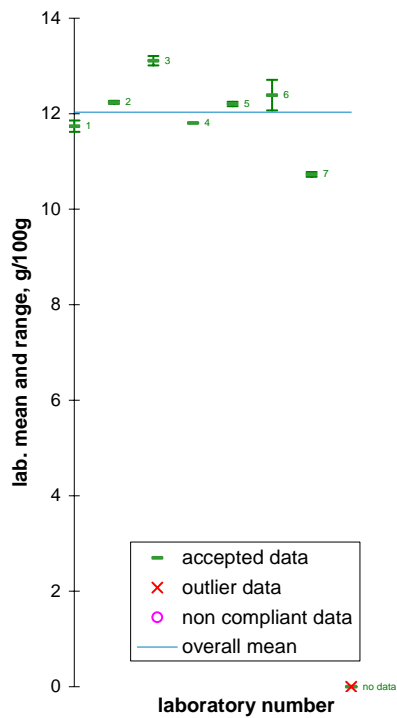


SoxCap total fat Sample 6			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		11,62	11,86
2		12,27	12,21
3		13,01	13,21
4		11,8	11,81
5		12,16	12,25
6		12,07	12,71
7		10,68	10,78

no data

SoxCap total fat Sample 6			
blind reps			
MEAN: n_1 , units, no of reps	12,031	g/100g	
mean $rep_1 \dots rep_n$	11,944	12,119	
n	7		
nc	0		
outliers	0		
n_1	7		
r	0,544		
s_r	0,194		
RSD_r	1,616		
Ho_r	0,890		
R	2,079		
s_R	0,743		
RSD_R	6,172		
Ho_R	2,244		

SoxCap total fat Sample 6 : blind replicates

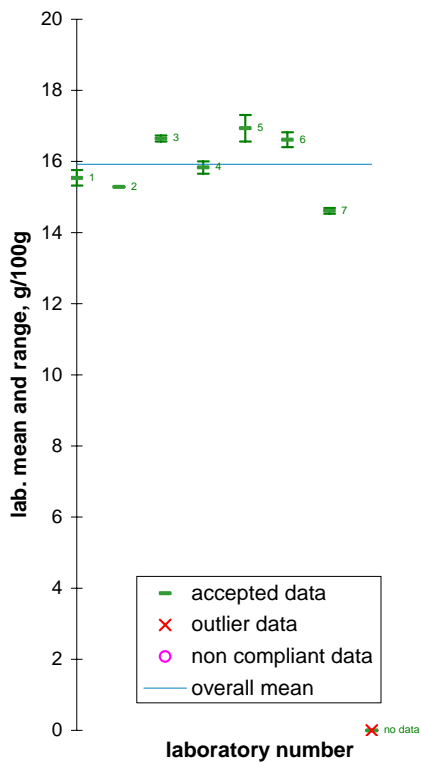


SoxCap total fat Sample 7			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		15,76	15,32
2		15,29	15,28
3		16,73	16,56
4		16	15,66
5		17,31	16,56
6		16,82	16,4
7		14,53	14,69

no data

SoxCap total fat Sample 7			
blind reps			
MEAN: n ₁ , units, ..	15,922	g/100g	
mean rep ₁ ...rep _n	16,063	15,781	
n	7		
nc	0		
outliers	0		
n ₁	7		
r	0,786		
s _r	0,281		
RSD _r	1,763		
Ho _r	1,013		
R	2,436		
s _R	0,870		
RSD _R	5,463		
Ho _R	2,072		

SoxCap total fat Sample 7 : blind replicates

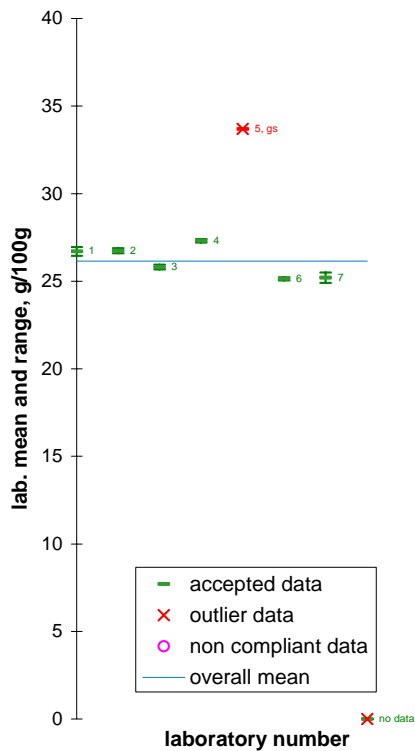


SoxCap total fat Sample 8		blind reps	
Lab ID	removed by	rep 1	rep 2
1		26,45	26,96
2		26,88	26,6
3		25,67	25,94
4		27,21	27,41
5	5, gs	33,74	33,65
6		25,23	25,05
7		24,9	25,5

no data

SoxCap total fat Sample 8		
blind reps		
MEAN: n ₁ , units, ..	26,150	g/100g
mean rep ₁ ...rep _n	26,057	26,243
n	7	
nc	0	
outliers	1	
n ₁	6	
r	0,742	
s _r	0,265	
RSD _r	1,014	
Ho _r	0,628	
R	2,572	
S _R	0,919	
RSD _R	3,513	
Ho _R	1,435	

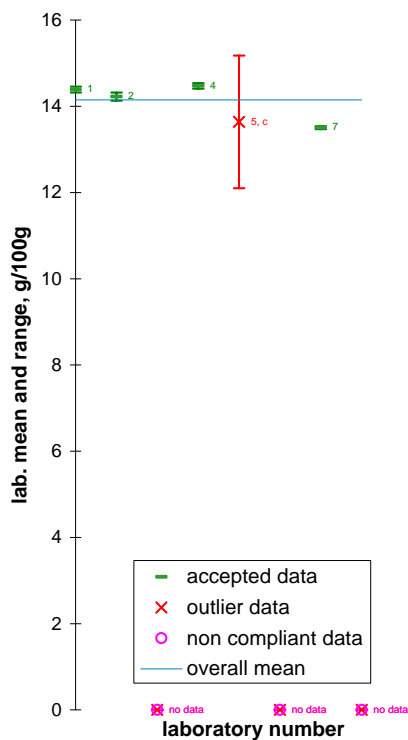
SoxCap total fat Sample 8 : blind replicates



SoxCap total fat Sample 9			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		14,46	14,32
2		14,13	14,32
3	no data		
4		14,41	14,54
5	5, c	12,1	15,18
6	no data		
7		13,54	13,47
8	no data		

SoxCap total fat Sample 9		
	blind reps	
MEAN: n_1 , units, ..	14,149	g/100g
mean $rep_1 \dots rep_n$	14,135	14,163
n	8	
nc	0	
outliers	4	
n_1	4	
r	0,276	
s_r	0,098	
RSD_r	0,696	
Ho_r	0,393	
R	1,252	
s_R	0,447	
RSD_R	3,159	
Ho_R	1,177	

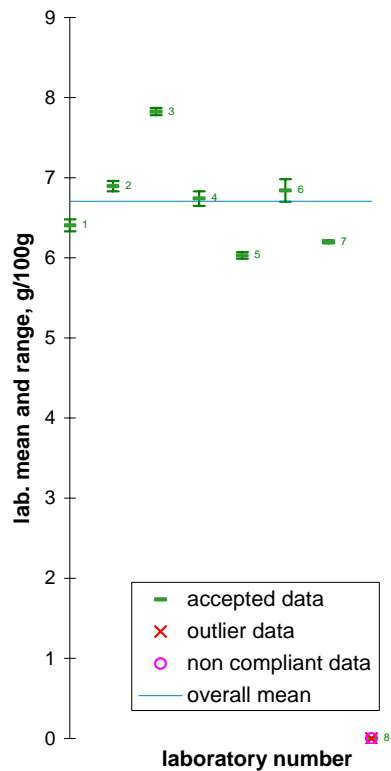
SoxCap total fat Sample 9 : blind replicates



SoxCap total fat Sample 10			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		6,33	6,48
2		6,83	6,96
3		7,78	7,87
4		6,83	6,65
5		5,99	6,07
6		6,98	6,7
7		6,22	6,18
8	No data		

SoxCap total fat Sample 10		
blind reps		
MEAN: n ₁ , units, ..	6,705	g/100g
mean rep ₁ ...rep _n	6,709	6,701
n	8	
nc	0	
outliers	1	
n ₁	7	
r	0,305	
s _r	0,109	
RSD _r	1,625	
Ho _r	0,820	
R	1,675	
s _R	0,598	
RSD _R	8,920	
Ho _R	2,970	

SoxCap total fat Sample 10 : blind replicates



SoxCap total fat Sample 11			
Lab ID	removed by	blind reps	
		rep 1	rep 2
1		3,81	3,22
2		4,02	4,21
3		5	5,13
4		3,3	3,4
5		3,57	3,09
6		3,88	3,88
7		3,34	3,54
8	no data		

SoxCap total fat Sample 11		
blind reps		
MEAN: n ₁ , units, ..	3,814	g/100g
mean rep ₁ ...rep _n	3,846	3,781
n	8	
nc	0	
outliers	1	
n ₁	7	
r	0,618	
s _r	0,221	
RSD _r	5,785	
Ho _r	2,681	
R	1,802	
S _R	0,644	
RSD _R	16,875	
Ho _R	5,160	

SoxCap total fat Sample 11 : blind replicates

