THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

ICAR PROFICIENCY TEST - MARCH 2018

Raw cow milk

Chemical “Reference” Methods

THE GLOBAL STANDARD FOR LIVESTOCK DATA

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1. Introduction

Dear Participant,

Thank you for participating in the ICAR Proficiency Test (PT) March 2018 !

This is the fifth round that ICAR organized sine 2016 !!!

In this report you will find sections 2 and 3 which are dedicated to "your" quality assurance management and section 4 dedicated to the "general" statistical elaboration for each parameter.

The proficiency test is a tool to help evaluate the performance of the laboratory process and to support your laboratory quality assurance system. It's aim is to provide independent data for you to monitor, evaluate and ultimately improve your processes as you see fit.

From the analyses of the data received we have identified some aspects that if evaluated and managed may serve to improve some control steps of your quality management ISO 17025.

When the PT samples arrive to your laboratory they can be viewed as being from a 'customer' that is asking you to provide timely, precise and accurate results.

In tables A,B,C,D,E,F,G if all the information is reported correctly from the participant, then the cells are filled in green, otherwise they are highlighted in red for your attention, so you can review and verify any causal reasons internally. The control charts, will help you to follow your performance over the time.

A) In table A you find your participation codes and the information if all the results from the samples received, have been sent to the PT provider.

B) In table B is indicated if the results have been sent on time.

C) In table C is indicated if the results have been reported in the correct unit of measurements.

D) It is the ranking of your laboratory. The values of table 1 for each parameter are reported. In table F the ranking of your lab will be green if the mean of difference and standard deviation of difference value are in the box of figure 2 of each parameter. Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation. According the results obtained the MA SC will decide eventually to revise. During the meeting of Milk Analyses Sub Committee held in Copenhagen in June 2016 the experts decided to update the limit of the box to evaluate the accuracy.

E) Here are reported the samples that resulted outlier for your participation code for Cochran and/or Grubbs test

F) The evaluation of repeatability of the results should be one of the first controls before communication of the data. In table F the absolute difference between replicates is compared with the repeatability limit of the relevant "reference" method indicated. If one or more results have a result out of the limit, the cell is in red. It may be that you have deployed a chemical method that is different from the reference method indicated. If the repeatability is bigger it will be evaluated internally with the precision of the specific method used. You can find all the detailed information of your data in Table II in the section Statistical elaboration for each parameter.

G) In table G the results of your Z-Score_{PT} (standard deviation calculated on this proficiency test) and the Z-Score_{FIX} (standard deviation of the reference method) are summarized. If you have obtained all the $-2<\text{Z-Score results}<+2$ the cell will be filled in green. If you have obtained one or more results in the moderate or poor performance range the cells will be filled in yellow or red respectively.

The sample preparation and statistical elaboration have been done by ICAR Sub- contractor Actalia, accreditated for ISO 17043.

In the second part of the report the statistical elaboration followed the template approved by ICAR's Milk Analyses Sub Committee chaired by Dr. Gavin Scott (NZ). You find the statistical elaboration for all the ICAR interested parameters, fat, protein, lactose, urea and somatic cell.

We think it is important to show you, as ICAR member, the reproducibility of the ICAR laboratories, even if you have not participated in this PT round.

For each parameter the SR=standard deviation of reproducibility has been calculated after the outlier elimination. If you have participated, and your results are in the repeatability limits, you can use this value for the calculation of your uncertainty of measurement.

ICAR would like to see, in the next years, part 4 of this report, completed with the results, reference and/or routine methods, from all the ICAR countries for the parameters indicated.

We are sure with your support and contribution it will grow to benefit all!

The list of all ICAR reference laboratories and those participated in ICAR PT 2018 with at least one parameter is reported below and upload on ICAR website. The web page is available here

Table 1. Participating milk laboratories to the ICAR Proficiency Test (March 2018)

Country	Institute
Belgium	Comite du Lait ASBL
Belgium	Laboratory of milk analysis of the Valorisation of Agricultural Products, Department of Agricultural products of Walloon Agricultural Research Centre
Canada	Central Milk Testing Lab
Canada	Horizon Lab Ltd
Canada	Pacific Milk Analysis
Canada	Valacta - Centre d'Expertise en Production Laitière du Québec
China	Shanghai Dairy Cattle Breeding Center Co., Ltd
Croatia	Croatian Agricultural Agency, Central Laboratory for Milk Quality Control
Croatia	University of Zagreb, Faculty of Agriculture, Department of Dairy Science, Reference Laboratory for Milk and Dairy Products
Czech Republic	Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.
Czech Republic	MILCOM a.s Dairy Research Institute
Denmark	Eurofins Steins Laboratorium A/S
Estonia	Eesti Pollumajandusloomade Joudluskontrolli AS, Milk Analysing Laboratory
Finland	Valio Ltd, Regional laboratory
France	ACTALIA / ACTILAIT / CECALAIT
Germany	Milchprüfring Baden-Württemberg e.V., Zentrallabor Kirchheim
Ireland	Teagasc, Technical Services Laboratory
Israel	Central Milk Laboratory – ICBA
Italy	Associazione Italiana Allevatori, Laboratorio Standard Latte (LSL-AIA)
Italy	Federazione Latterie Alto Adige Soc. Agr. Coop.
Japan	Japan Dairy Technical Association
Norway	Tine Ramelklaboratoriet Bergen
Norway	Tine Ramelklaboratoriet Heimdal
Poland	Laboratorium Oceny Mleka, Krajowego Centrum Hodowli Zwierzat (KCHZ), Laboratorium Referencyjne z siedziba w Parzniewie
Poland	PFHBiPM Laboratorium w Bialymstoku zs.w jezewie Starym
Poland	PFHBiPM Laboratorium w Kobiernie
Poland	PFHBiPM Laboratorium w Parzniewie
Poland	PFHBiPM Region Oceny Bydgoszcz z/s w Minikowie
Portugal	LRV - Laboratorio Regional de Veterinaria
Serbia	Laboratorija za ispitivanje kvaliteta mleka, Poljoprivredni fakultet Novi Sad
Slovenia	KGZS Zavod Ptuj
Slovenia	University of Ljubljana, Biotechnical Faculty, Zootech. Dept., Laboratory for Dairying
South Africa	Deltamune Pty Ltd.
South Africa	Merieux NutriScciences South Africa (Midrand)
South Africa	Merieux NutriScience Cape Town
South Africa	Mérieux NutriSciences South Africa
Spain	Laboratorio Agroalimentario de Santander
Sweden	Eurofins Steins Laboratory A/B

Country	Institute
Switzerland	Agroscope Institute for food Sciences IFS
Taiwan	Council of Agriculture, Executive Yuan, Taiwan Animal Germplasm Center of TLRI
The Netherlands	Qlip B.V.
Tunisia	Office de l'Elevage et des Pâturages, Laboratoire de Contrôle Laitier, Direction de l'Amélioration Génétique
United Kingdom	CIS
USA	Eastern Laboratory Services
Zambia	Vetlab Agricultural Showgrouds

Attached to this report you find the certificate of your participation in the ICAR PT.-

ICAR would like to stay at your side to support you in any way we can to help improve overall quality management systems for milk analyses. Your active participation in the ICAR PTs and in the Milk Analyses meetings is encouraging. We welcome any and all feedback/comments you may have on this activity, as it will help us continuously improve and to ultimately provide you a better service.

Kind Regards,

ICAR Secretariat

THE GLOBAL STANDARD
FOR LIVESTOCK DATA

ICAR
PROFICIENCY TESTING SCHEME

March 2018

Raw Milk

Determination of FAT CONTENT
Röse Gottlieb method

Sending date of statistical treatment : 3th April 2018

Frame of activity :	ICAR Milk Analyses Sub Committee (MA SC)		
ICAR Staff	Silvia Orlandini	pt@icar.org	silvia@icar.org

Proficiency test accreditated ISO 17043

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Table I : **Ranking of the laboratories** Units : g / 100 g

Nb	%	N°	d	Sd	D	Method
1	7	14	+ 0,001	0,004	0,004	A
2	13	10	- 0,003	0,004	0,005	A
3	20	12	+ 0,005	0,005	0,007	A
4	27	3	- 0,000	0,007	0,007	A
5	33	1	+ 0,003	0,008	0,008	A
6	40	2	- 0,001	0,008	0,008	A
7	47	8	+ 0,008	0,004	0,009	A
8	53	9	+ 0,008	0,005	0,009	A
9	60	11	- 0,004	0,010	0,011	A
10	67	15	+ 0,013	0,015	0,019	C
11	73	13	+ 0,005	0,020	0,020	B
12	80	7	+ 0,017	0,013	0,022	A
13	87	5	- 0,023	0,012	0,026	A
14	93	6	+ 0,021	0,033	0,039	B
15	100	4	- 0,048	0,019	0,051	A

The table should be studied in parallel with figure 1 where the laboratories are located according to an acceptability area (or target) the limits of which are :

+/- 0,020 g / 100 g for $\bar{d}$ and 0,030 g / 100 g for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 12 laboratories using the reference method ISO 1211|IDF 1, after outliers discarging using Grubbs test at 5% risk level,

A ISO 1211 IDF 1D Röse Gottlieb Method
B ISO 2446 / IDF 226 Gerber method
C Not communicated

(NC : OUT of RANKING because of insufficient data number)
(Nb : laboratory rank; % : relative rank)
(N° : laboratory identification number)

(d et Sd : mean and standard deviation of the differences (laboratory -reference))
(D : Euclidian distance to YX-axis origin = SQUARE ROOT.(d^2 + Sd^2))

Note : Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation.

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,006
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,019

Table II : **REPEATABILITY - Absolute difference between replicates in g / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,001	0,002	0,009	0,008	0,009	0,001	0,003	0,017	0,004	0,003	0,005	20
2	0,004	0,002	0,005	0,005	0,013	0,003	0,000	0,006	0,006	0,004	0,004	20
3	0,013	0,025	0,007	0,000	0,017	0,007	0,001	0,000	0,010	0,005	0,008	20
4	0,008	0,014	0,012	0,007	0,007	0,017	0,019	0,016	0,011	0,001	0,009	20
5	0,010	0,010	0,000	0,000	0,010	0,010	0,010	0,010	0,010	0,020 *	0,007	20
6	0,000	0,000	0,010	0,000	0,010	0,010	0,010	0,000	0,000	0,000	0,004	20
7	0,009	0,015	0,000	0,001	0,002	0,003	0,014	0,005	0,004	0,005	0,005	20
8	0,002	0,008	0,010	0,012	0,000	0,009	0,006	0,004	0,005	0,002	0,005	20
9	0,003	0,006	0,015	0,012	0,003	0,010	0,003	0,007	0,001	0,007	0,006	20
10	0,008	0,005	0,010	0,004	0,005	0,010	0,001	0,000	0,002	0,003	0,004	20
11	0,000	0,019	0,006	0,002	0,002	0,004	0,005	0,005	0,012	0,010	0,006	20
12	0,013	0,004	0,001	0,002	0,003	0,005	0,000	0,018	0,005	0,005	0,005	20
13	0,010	0,010	0,029	0,019	0,010	0,009	0,019	0,019	0,000	0,029 *	0,013	20
14	0,003	0,000	0,000	0,000	**	**	**	**	**	**	0,001	8
15	0,004	0,013	0,014	0,006	0,011	0,006	0,008	0,015	0,007	0,010	0,007	20
Sr	0,005	0,008	0,008	0,005	0,006	0,006	0,007	0,008	0,005	0,008		288
NE	30	30	30	30	28	28	28	28	28	28		
L	0,019	0,030	0,030	0,020	0,023	0,022	0,025	0,029	0,018	0,014		

Sr : repeatability standard deviation of each laboratory limit 0,016 g/100g
NL : number of measurements per laboratory
L : Limit for difference between duplicates according Cochran test at 5% level.
SE : repeatability standard deviation per sample
NE : number of measurements per sample
*: discarded data using the test of Cochran at 5 %
** : missing data
r : limit of repeatability, absolute difference betwen two replicates=0,043 according ISO 1211 IDF 1D 2010

Table III

Sample / Lab code
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
M
REF.
SD

M = mean p
SD = stand

REF : Assig
of 12 labo
risk level.

Table IV :

Sample
Outliers
Cochran
Outlier
Grubbs
sr
SR

: Means of the replicates in g / 100 g

1	2	3	4	5	6	7	8	9	10
5,041	4,348	3,522	2,849	2,170	4,724	3,900	3,131	2,460	1,491
5,031	4,347	3,518	2,837	2,172	4,730	3,909	3,111	2,446	1,490
5,024	4,332	3,517	2,832	2,172	4,721	3,914	3,140	2,452	1,497
4,997	4,304	3,469 *	2,769	2,123	4,659 *	3,854	3,056 *	2,417	1,480
5,025	4,325	3,510	2,800	2,135	4,695	3,865	3,125	2,425	1,470
5,040	4,360	3,495	2,820	2,225	4,755	3,965	3,110	2,510 *	1,530 *
5,079	4,365	3,536	2,864	2,184	4,735	3,925	3,136	2,450	1,501
5,044	4,354	3,523	2,844	2,173	4,738	3,913	3,142	2,461	1,491
5,050	4,353	3,528	2,836	2,171	4,728	3,919	3,147	2,463	1,487
5,038	4,344	3,508	2,827	2,165	4,725	3,906	3,124	2,452	1,485
5,037	4,334	3,514	2,798	2,163	4,723	3,911	3,136	2,451	1,494
5,038	4,353	3,522	2,836	2,171	4,726	3,915	3,136	2,466	1,489
5,073	4,364	3,530	2,826	2,141	4,753	3,913	3,117	2,447	1,491
5,033	4,344	3,519	2,835						
5,071	4,378	3,532	2,846	2,166	4,740	3,929	3,130	2,448	1,492
5,041	4,347	3,519	2,828	2,166	4,730	3,910	3,129	2,449	1,489
5,036	4,343	3,519	2,829	2,168	4,726	3,908	3,133	2,451	1,489
0,021	0,018	0,011	0,024	0,024	0,015	0,026	0,012	0,014	0,008

er sample REF. = reference values

ard deviation per sample *: discarded data using the test of Grubbs at 5 %

ined values are robust average values per sample according to algorithm A of standard ISO 13528,
ratories using the reference method ISO 1211 | IDF 1, after outliers discarging using Grubbs test at 5 %

Outlier identification

1	2	3	4	5	6	7	8	9	10
									5; 13
		4			4		4	6	6
0,005	0,008	0,008	0,005	0,006	0,005	0,007	0,007	0,005	0,004
0,021	0,019	0,012	0,024	0,024	0,016	0,027	0,013	0,014	0,006

Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	+ 0,005	+ 0,005	+ 0,002	+ 0,020	+ 0,002	- 0,003	- 0,008	- 0,003	+ 0,009	+ 0,002	+ 0,003	0,008	1,24
2	- 0,005	+ 0,004	- 0,002	+ 0,007	+ 0,004	+ 0,003	+ 0,001	- 0,022	- 0,005	+ 0,001	- 0,001	0,008	0,51
3	- 0,012	- 0,012	- 0,003	+ 0,003	+ 0,004	- 0,006	+ 0,006	+ 0,007	+ 0,001	+ 0,008	- 0,000	0,007	0,22
4	- 0,039	- 0,039	- 0,050	- 0,061	- 0,045	- 0,068	- 0,054	- 0,077	- 0,035	- 0,009	- 0,048	0,019	7,91
5	- 0,011	- 0,018	- 0,009	- 0,029	- 0,033	- 0,031	- 0,043	- 0,008	- 0,026	- 0,019	- 0,023	0,012	6,22
6	+ 0,004	+ 0,017	- 0,024	- 0,009	+ 0,057	+ 0,029	+ 0,057	- 0,023	+ 0,059	+ 0,041	+ 0,021	0,033	2,00
7	+ 0,043	+ 0,021	+ 0,017	+ 0,034	+ 0,016	+ 0,008	+ 0,017	+ 0,002	- 0,001	+ 0,012	+ 0,017	0,013	3,97
8	+ 0,008	+ 0,011	+ 0,004	+ 0,015	+ 0,005	+ 0,011	+ 0,005	+ 0,009	+ 0,009	+ 0,002	+ 0,008	0,004	6,45
9	+ 0,014	+ 0,010	+ 0,008	+ 0,007	+ 0,003	+ 0,002	+ 0,011	+ 0,013	+ 0,011	- 0,002	+ 0,008	0,005	4,50
10	+ 0,002	+ 0,001	- 0,011	- 0,002	- 0,002	- 0,001	- 0,002	- 0,010	+ 0,000	- 0,004	- 0,003	0,004	2,22
11	+ 0,001	- 0,010	- 0,005	- 0,031	- 0,005	- 0,003	+ 0,003	+ 0,002	- 0,000	+ 0,005	- 0,004	0,010	1,31
12	+ 0,002	+ 0,010	+ 0,002	+ 0,007	+ 0,003	- 0,001	+ 0,007	+ 0,003	+ 0,014	- 0,000	+ 0,005	0,005	3,08
13	+ 0,037	+ 0,021	+ 0,010	- 0,004	- 0,027	+ 0,026	+ 0,005	- 0,017	- 0,004	+ 0,002	+ 0,005	0,020	0,80
14	- 0,003	+ 0,001	- 0,000	+ 0,006							+ 0,001	0,004	0,44
15	+ 0,035	+ 0,034	+ 0,013	+ 0,017	- 0,002	+ 0,014	+ 0,021	- 0,004	- 0,004	+ 0,003	+ 0,013	0,015	2,76
d	+ 0,005	+ 0,004	+ 0,000	- 0,001	- 0,002	+ 0,004	+ 0,002	- 0,004	- 0,002	- 0,000	- 0,000	0,021	
Sd	0,021	0,018	0,011	0,024	0,024	0,015	0,026	0,012	0,014	0,008	0,018		

d = mean of differences Sd = standard deviation of differences t = Student test - comparison to 0

Upper limits : $\bar{d}$ = +/- 0,02 g / 100 g Sd = 0,03 g / 100g

ISO 1211|IDF 1 : Precision of the method : Sr = 0.016 g / 100 g
SR = 0.020 g / 100 g

Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,22	+0,26	+0,23	+0,84	+0,07	-0,18	-0,32	-0,24	+0,62	+0,20
2	-0,23	+0,21	-0,14	+0,31	+0,15	+0,22	+0,04	-1,92	-0,37	+0,13
3	-0,59	-0,65	-0,24	+0,12	+0,15	-0,37	+0,21	+0,58	+0,05	+0,98
4	-1,86	-2,17	-4,68	-2,56	-1,89	-4,46	-2,06	-6,66	-2,47	-1,23
5	-0,52	-1,01	-0,84	-1,23	-1,37	-2,05	-1,62	-0,72	-1,87	-2,47
6	+0,20	+0,93	-2,25	-0,38	+2,39	+1,90	+2,16	-2,01	+4,18	+5,34
7	+2,04	+1,18	+1,59	+1,45	+0,68	+0,55	+0,65	+0,19	-0,09	+1,50
8	+0,39	+0,60	+0,37	+0,63	+0,22	+0,75	+0,19	+0,75	+0,66	+0,26
9	+0,65	+0,54	+0,80	+0,29	+0,11	+0,12	+0,40	+1,14	+0,80	-0,32
10	+0,08	+0,04	-1,04	-0,10	-0,10	-0,08	-0,06	-0,82	+0,02	-0,57
11	+0,06	-0,54	-0,47	-1,31	-0,20	-0,21	+0,10	+0,19	-0,02	+0,65
12	+0,08	+0,54	+0,23	+0,29	+0,11	-0,04	+0,27	+0,23	+1,01	-0,06
13	+1,78	+1,15	+0,98	-0,15	-1,12	+1,73	+0,18	-1,45	-0,30	+0,20
14	-0,16	+0,04	-0,00	+0,25						
15	+1,68	+1,89	+1,22	+0,72	-0,10	+0,91	+0,80	-0,33	-0,27	+0,39

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 2 :
Zscore of the different laboratories for each sample. ZS calculated on the PT standard deviation

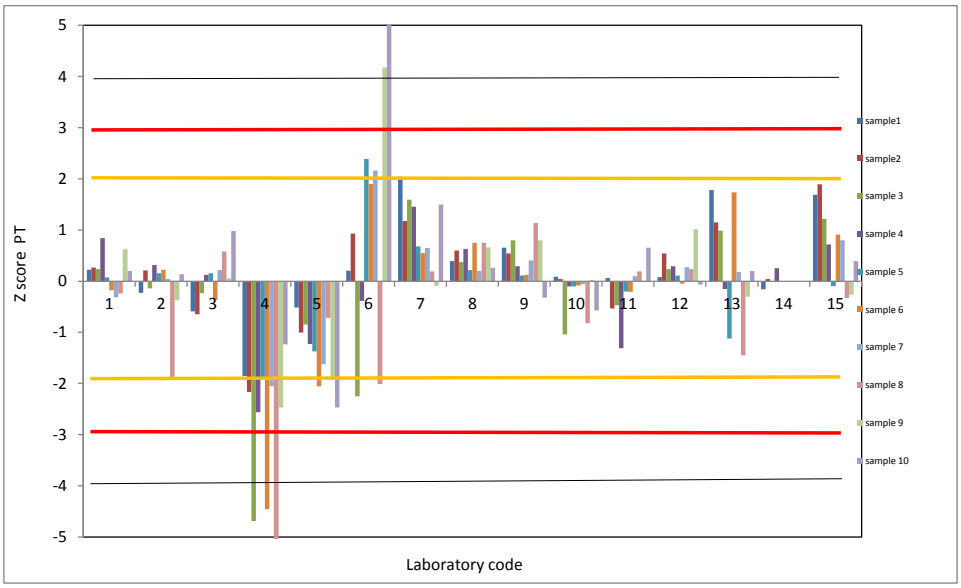


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

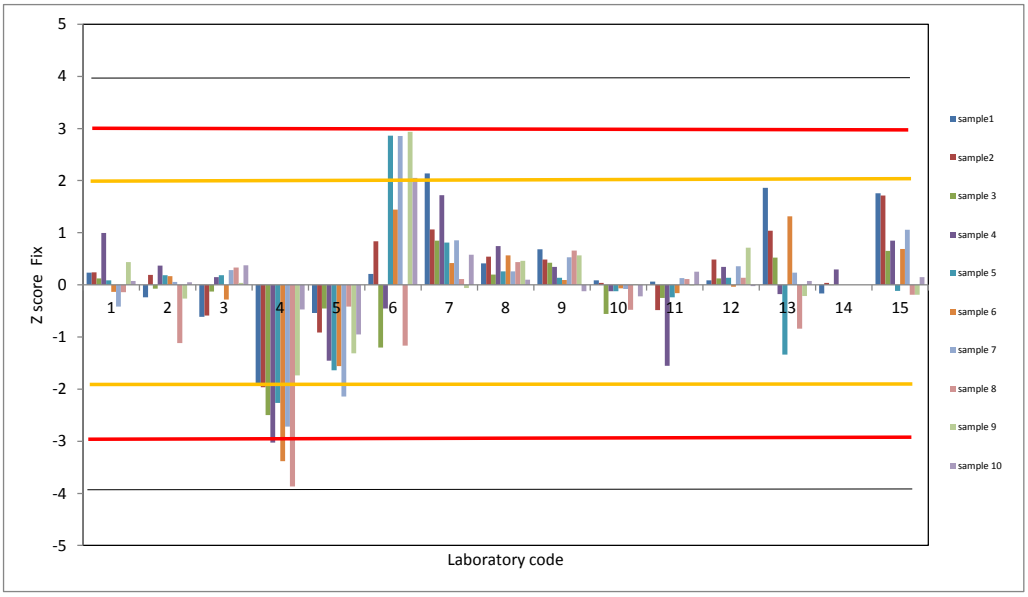
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,23	+0,24	+0,12	+1,00	+0,08	-0,13	-0,42	-0,14	+0,44	+0,08
2	-0,24	+0,19	-0,08	+0,37	+0,18	+0,17	+0,06	-1,12	-0,26	+0,05
3	-0,62	-0,59	-0,13	+0,15	+0,18	-0,28	+0,28	+0,33	+0,04	+0,38
4	-1,94	-1,96	-2,50	-3,03	-2,27	-3,38	-2,72	-3,87	-1,74	-0,47
5	-0,54	-0,91	-0,45	-1,45	-1,64	-1,56	-2,14	-0,42	-1,31	-0,95
6	+0,21	+0,84	-1,20	-0,45	+2,86	+1,44	+2,86	-1,17	+2,94	+2,05
7	+2,13	+1,06	+0,85	+1,72	+0,81	+0,42	+0,86	+0,11	-0,06	+0,58
8	+0,41	+0,54	+0,20	+0,75	+0,26	+0,57	+0,26	+0,43	+0,46	+0,10
9	+0,68	+0,49	+0,42	+0,35	+0,13	+0,09	+0,53	+0,66	+0,56	-0,12
10	+0,09	+0,04	-0,56	-0,12	-0,12	-0,06	-0,08	-0,48	+0,01	-0,22
11	+0,06	-0,49	-0,25	-1,55	-0,24	-0,16	+0,13	+0,11	-0,01	+0,25
12	+0,08	+0,49	+0,12	+0,35	+0,13	-0,03	+0,36	+0,13	+0,71	-0,02
13	+1,86	+1,04	+0,52	-0,18	-1,34	+1,32	+0,23	-0,84	-0,21	+0,08
14	-0,17	+0,04	-0,00	+0,30						
15	+1,76	+1,71	+0,65	+0,85	-0,12	+0,69	+1,06	-0,19	-0,19	+0,15

This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR=0,02

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 3 :
Zscore of the different laboratories for each sample. ZS calculated on the standard deviation of reproducibility of the method



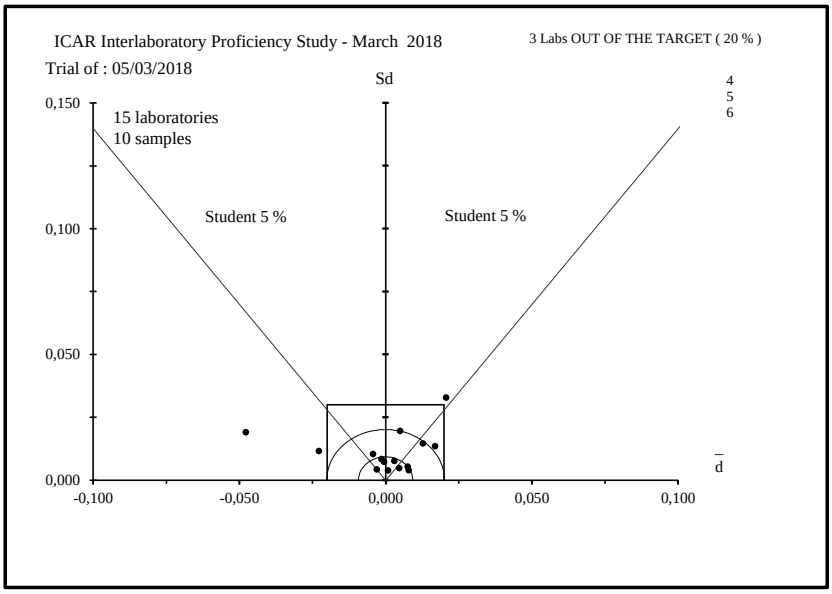


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST
RAW MILK
FAT CONTENT Röse Göttlieb
March 2018

Name	City	Country
Actalia	Poligny	France
Agroscope Institute for food Sciences IFS	Bern-Liebefeld	Switzerland
Central Milk Lab ICBA	Caesarea	Israel
Deltamune	Pretoria	South Africa
Department Valorisation des productions Agricoles	Gembloux	Belgium
Eastern Lab services	Medina	USA
Estonian Livestock Performance Recording Ltd	Tartu	Estonie
Japan Dairy Technical Association	Tokyo	Japan
Lab Agroalimentario de Santander	Santander Cantabria	Spain
Laboratorio Standard Latte	Maccarese	Italy
Milchprüfring Baden-Württemberg e.V.	Kirchheim unter Teck	Germany
Milkom a.s Dairy research institute	Praha	Czech Republic
Qlip B.V.,	Zutphen	Netherlands
Teagasc Food research Center	Cork	Ireland
Uni. of Ljubljana Biotechnical faculty dept. of Anim. Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia

ICAR
PROFICIENCY TESTING SCHEME

March 2018

Raw Milk

Determination of CRUDE PROTEIN CONTENT
KJELDAHL Method

Sending date of statistical treatment : 3th April 2018

Frame of activity :	ICAR Milk Analyses Sub Committee (MA SC)		
ICAR Staff	Silvia Orlandini	pt@icar.org	silvia@icar.org

Proficiency test accreditated ISO 17043

ACCRÉDITATION
N° 1-2473
PORTÉE
DISPONIBLE SUR
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Table I : **Ranking of the laboratories** Units : g / 100 g

Nb	%	N°	d	Sd	D
1	6	9	- 0,009	0,005	0,011
2	13	16	- 0,009	0,006	0,011
3	19	2	+ 0,009	0,006	0,011
4	25	8	+ 0,009	0,007	0,011
5	31	7	- 0,014	0,006	0,015
6	38	4	- 0,015	0,006	0,016
7	44	11	- 0,011	0,014	0,017
8	50	12	- 0,016	0,007	0,017
9	56	10	- 0,018	0,006	0,019
10	63	15	- 0,016	0,014	0,021
11	69	1	- 0,017	0,019	0,025
12	75	13	+ 0,029	0,007	0,030
13	81	6	+ 0,007	0,034	0,034
14	88	14	+ 0,034	0,007	0,035
15	94	5	+ 0,043	0,037	0,057
16	100	3	+ 0,057	0,046	0,074

The table should be studied in parallel with figure 1 where the laboratories are located according to an acceptability area (or target) the limits of which are :

+/- 0,025 g / 100 g for $\bar{d}$ and 0,020 g / 100 g for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 14 laboratories using the reference method (ISO 8968-1|IDF 20-1), after outlier discarging using Grubbs test at 5% risk level

N.B. : N° 10 and 15 Method not communicated

(NC : OUT of RANKING because of insufficient data number)
(Nb : laboratory rank; % : relative rank)

(N° : laboratory identification number)
(d et Sd : mean and standard deviation of the differences (laboratory -reference))
(D : Euclidian distance to YX-axis origin = SQUARE ROOT.(d^2 + Sd^2))

Note : Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation.

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,007
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,026

Table II : **REPEATABILITY - Absolute difference between replicates in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,015	0,028	0,004	0,007	0,010	0,004	0,003	0,012	0,004	0,009	0,008	20
2	0,023	0,008	0,006	0,011	0,003	0,003	0,003	0,001	0,006	0,002	0,006	20
3	0,026	0,019	0,006	0,000	0,013	0,032	0,000	0,013	0,006	0,006	0,011	20
4	0,000	0,001	0,024	0,002	0,011	0,006	0,001	0,004	0,005	0,005	0,006	20
5	0,001	0,026	**	0,032	0,011	0,018	0,009	0,008	0,031 *	0,020	0,014	18
6	0,010	0,027	0,011	0,024	0,010	0,024	0,013	0,009	0,006	0,003	0,011	20
7	0,018	0,012	0,005	0,008	0,003	0,017	0,008	0,006	0,003	0,008	0,007	20
8	0,000	0,001	0,003	0,001	0,000	0,001	0,006	0,006	0,001	0,001	0,002	20
9	0,013	0,017	0,015	0,010	0,003	0,018	0,018	0,002	0,011	0,000	0,009	20
10	0,001	0,006	0,011	0,004	0,008	0,009	0,003	0,003	0,008	0,002	0,005	20
11	0,001	0,001	0,021	0,008	0,011	0,009	0,028 *	0,002	0,001	0,002	0,009	20
12	0,006	0,013	0,000	0,006	0,006	0,006	0,000	0,019	0,013	0,026	0,009	20
13	0,004	0,002	0,001	0,013	0,000	0,004	0,004	0,003	0,003	0,003	0,003	20
14	0,004	0,002	0,005	0,000	0,005	0,010	0,006	0,001	0,020	0,003	0,006	20
15	0,009	0,002	0,005	0,007	0,003	0,001	0,007	0,010	0,010	0,013	0,005	20
16	0,001	0,001	0,016	0,005	0,002	0,011	0,010	0,004	0,005	0,006	0,006	20
Sr	0,008	0,010	0,008	0,008	0,005	0,010	0,007	0,006	0,008	0,007		318
NE	32	32	30	32	32	32	32	32	32	32		
L	0,031	0,039	0,030	0,032	0,020	0,037	0,021	0,022	0,022	0,026		

Sr : repeatability standard deviation of each laboratory limit 0,014 g /100g

NL : number of measurements per laboratory

L : Limit for difference between duplicates according Cochran test at 5% level.

SE : repeatability standard deviation per sample

NE : number of measurements per sample

*: discarded data using the test of Cochran at 5 %

** : missing data

r : limit of repeatability, absolute difference betwen two replicates=0,040 according ISO 8968 / IDF 20

Table III : **Means of the replicates in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	9	10
1	3,718	3,538	3,267	2,856	2,751	3,623	3,449	3,090	2,821	3,284
2	3,755	3,562	3,299	2,910	2,737	3,664	3,474	3,105	2,834	3,314
3	3,860 *	3,672 *	3,308	2,935	2,750	3,748	3,496	3,113	2,849	3,404 *
4	3,732	3,535	3,262	2,888	2,716	3,638	3,448	3,085	2,819	3,288
5	3,824 *	3,578		2,988	2,794	3,725	3,522	3,081	2,876	3,279
6	3,757	3,546	3,303	2,956	2,752	3,579	3,485	3,074	2,839	3,341
7	3,737	3,534	3,269	2,896	2,717	3,642	3,448	3,086	2,809	3,285
8	3,763	3,560	3,302	2,920	2,731	3,658	3,477	3,099	2,832	3,310
9	3,741	3,532	3,270	2,896	2,723	3,637	3,471	3,084	2,823	3,290
10	3,717	3,527	3,270	2,898	2,707	3,642	3,454	3,072	2,809	3,287
11	3,752	3,510	3,278	2,886	2,707	3,654	3,464	3,091	2,826	3,287
12	3,735	3,535	3,273	2,893	2,715	3,640	3,445	3,066	2,820	3,279
13	3,779	3,585	3,313	2,935	2,752	3,682	3,501	3,126	2,850	3,334
14	3,779	3,583	3,314	2,940	2,754	3,683	3,503	3,134	2,868	3,340
15	3,715	3,525	3,267	2,869	2,737	3,643	3,459	3,087	2,800	3,303
16	3,744	3,531	3,273	2,900	2,730	3,632	3,471	3,081	2,817	3,290
M	3,745	3,545	3,285	2,910	2,736	3,656	3,473	3,092	2,831	3,301
REF.	3,749	3,548	3,287	2,913	2,736	3,655	3,475	3,093	2,833	3,302
SD	0,021	0,023	0,019	0,034	0,023	0,040	0,023	0,019	0,021	0,022

M = mean per sample
SD = standard deviation per sample
REF. = reference values
*: discarded data using the test of Grubbs 5 %

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 14 laboratories using the reference method ISO 8968-1 | IDF 20-1, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran							11			5
Outlier Grubbs	3; 5	3								3
sr	0,007	0,010	0,008	0,008	0,005	0,010	0,005	0,006	0,006	0,007
SR	0,022	0,024	0,020	0,034	0,023	0,041	0,024	0,020	0,018	0,023

Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	- 0,032	- 0,010	- 0,020	- 0,057	+ 0,015	- 0,032	- 0,026	- 0,003	- 0,012	- 0,018	- 0,020	0,019	3,18
2	+ 0,006	+ 0,014	+ 0,012	- 0,003	+ 0,001	+ 0,009	- 0,001	+ 0,013	+ 0,001	+ 0,012	+ 0,006	0,006	3,07
3	+ 0,110	+ 0,123	+ 0,021	+ 0,022	+ 0,014	+ 0,093	+ 0,021	+ 0,020	+ 0,016	+ 0,102	+ 0,054	0,046	3,72
4	- 0,017	- 0,014	- 0,025	- 0,025	- 0,020	- 0,017	- 0,026	- 0,008	- 0,014	- 0,014	- 0,018	0,006	9,45
5	+ 0,074	+ 0,029		+ 0,075	+ 0,058	+ 0,070	+ 0,047	- 0,012	+ 0,043	- 0,023	+ 0,040	0,036	3,33
6	+ 0,007	- 0,003	+ 0,016	+ 0,043	+ 0,016	- 0,076	+ 0,011	- 0,019	+ 0,006	+ 0,039	+ 0,004	0,034	0,38
7	- 0,013	- 0,014	- 0,018	- 0,017	- 0,019	- 0,013	- 0,026	- 0,007	- 0,024	- 0,017	- 0,017	0,006	9,27
8	+ 0,013	+ 0,012	+ 0,015	+ 0,007	- 0,005	+ 0,003	+ 0,002	+ 0,006	- 0,001	+ 0,008	+ 0,006	0,007	2,92
9	- 0,008	- 0,017	- 0,017	- 0,017	- 0,013	- 0,018	- 0,003	- 0,009	- 0,010	- 0,011	- 0,012	0,005	7,92
10	- 0,033	- 0,021	- 0,017	- 0,015	- 0,028	- 0,013	- 0,020	- 0,021	- 0,024	- 0,014	- 0,021	0,006	10,17
11	+ 0,003	- 0,039	- 0,009	- 0,027	- 0,028	- 0,001	- 0,011	- 0,002	- 0,007	- 0,015	- 0,014	0,014	3,15
12	- 0,014	- 0,014	- 0,014	- 0,020	- 0,021	- 0,015	- 0,030	- 0,027	- 0,013	- 0,022	- 0,019	0,006	10,04
13	+ 0,029	+ 0,037	+ 0,026	+ 0,022	+ 0,016	+ 0,027	+ 0,026	+ 0,033	+ 0,017	+ 0,033	+ 0,027	0,007	12,22
14	+ 0,030	+ 0,035	+ 0,027	+ 0,027	+ 0,018	+ 0,028	+ 0,028	+ 0,042	+ 0,035	+ 0,038	+ 0,031	0,007	14,36
15	- 0,034	- 0,024	- 0,020	- 0,044	+ 0,001	- 0,012	- 0,016	- 0,006	- 0,033	+ 0,002	- 0,019	0,015	3,88
16	- 0,005	- 0,018	- 0,014	- 0,013	- 0,006	- 0,023	- 0,003	- 0,012	- 0,016	- 0,011	- 0,012	0,006	6,35
d	- 0,005	- 0,003	- 0,002	- 0,003	- 0,000	+ 0,001	- 0,002	- 0,001	- 0,002	- 0,001	+ 0,001	0,030	
Sd	0,021	0,023	0,019	0,034	0,023	0,040	0,023	0,019	0,021	0,022	0,025		

d = mean of differences Sd = standard deviation of differences t = Student test - comparison to 0

Upper limits : $\bar{d}$ = +/- 0,025 g / 100 g Sd = 0,020 g / 100 g

ISO 8968-1|IDF 20-1 : Precision of the method : Sr = 0.014 g / 100 g
SR = 0.018 g / 100 g

Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-1,52	-0,44	-1,04	-1,70	+0,67	-0,80	-1,14	-0,15	-0,58	-0,82
2	+0,28	+0,60	+0,63	-0,10	+0,04	+0,22	-0,05	+0,65	+0,04	+0,57
3	+5,27	+5,36	+1,09	+0,65	+0,62	+2,33	+0,93	+1,07	+0,74	+4,64
4	-0,82	-0,60	-1,30	-0,74	-0,86	-0,43	-1,14	-0,41	-0,66	-0,64
5	+3,55	+1,27		+2,22	+2,58	+1,76	+2,04	-0,65	+2,02	-1,03
6	+0,34	-0,11	+0,81	+1,29	+0,72	-1,91	+0,46	-1,00	+0,30	+1,79
7	-0,60	-0,61	-0,93	-0,50	-0,82	-0,32	-1,14	-0,35	-1,12	-0,75
8	+0,64	+0,51	+0,78	+0,22	-0,23	+0,07	+0,10	+0,30	-0,07	+0,38
9	-0,39	-0,72	-0,88	-0,50	-0,57	-0,46	-0,15	-0,45	-0,46	-0,52
10	-1,56	-0,93	-0,88	-0,44	-1,26	-0,32	-0,88	-1,10	-1,14	-0,65
11	+0,13	-1,67	-0,49	-0,80	-1,25	-0,02	-0,46	-0,09	-0,32	-0,67
12	-0,67	-0,60	-0,73	-0,58	-0,93	-0,38	-1,28	-1,43	-0,63	-1,01
13	+1,41	+1,61	+1,36	+0,65	+0,70	+0,67	+1,12	+1,72	+0,80	+1,48
14	+1,42	+1,52	+1,42	+0,80	+0,79	+0,71	+1,23	+2,17	+1,67	+1,74
15	-1,63	-1,03	-1,03	-1,29	+0,03	-0,31	-0,70	-0,33	-1,56	+0,08
16	-0,24	-0,76	-0,72	-0,39	-0,27	-0,57	-0,15	-0,61	-0,75	-0,52

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 2 :
Zscore of the different laboratories for each sample. ZS calculated on the PT standard deviation

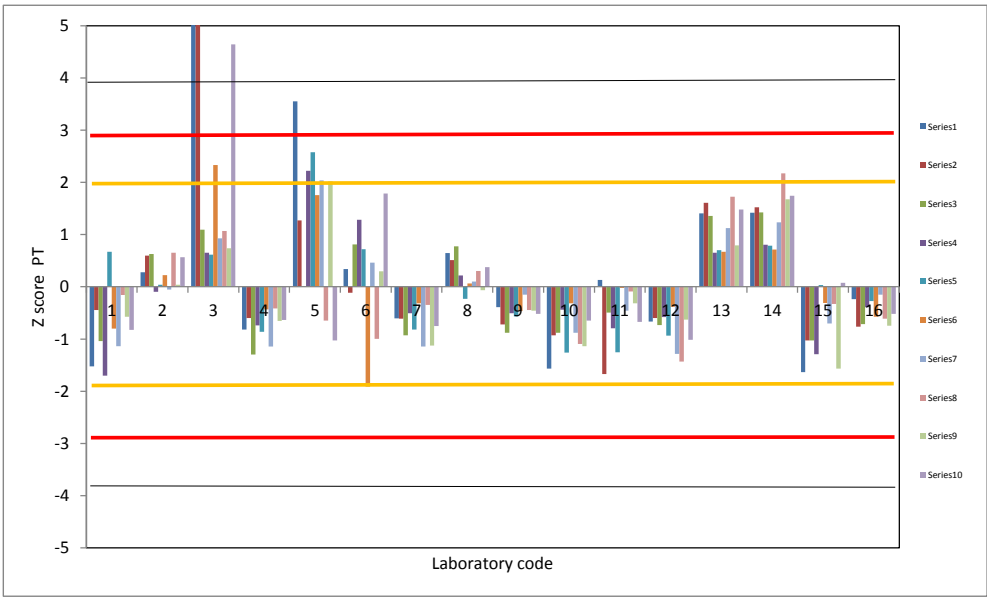


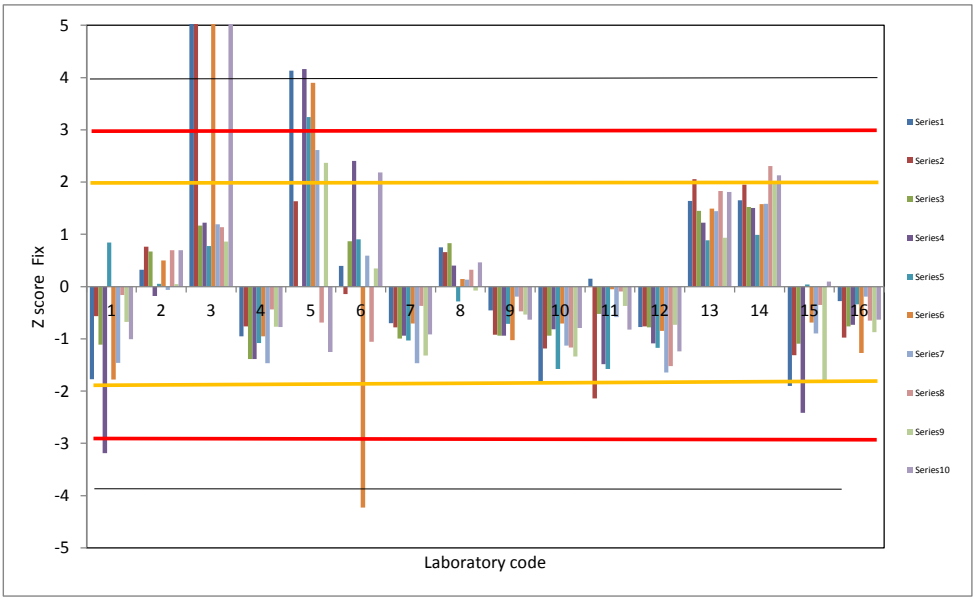
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-1,77	-0,57	-1,11	-3,19	+0,85	-1,78	-1,46	-0,16	-0,68	-1,01
2	+0,32	+0,76	+0,67	-0,18	+0,05	+0,50	-0,07	+0,70	+0,05	+0,69
3	+6,14	+6,86	+1,17	+1,22	+0,78	+5,18	+1,19	+1,14	+0,86	+5,67
4	-0,95	-0,76	-1,38	-1,39	-1,08	-0,95	-1,47	-0,44	-0,77	-0,78
5	+4,13	+1,63		+4,16	+3,24	+3,90	+2,61	-0,69	+2,37	-1,26
6	+0,40	-0,14	+0,87	+2,41	+0,90	-4,23	+0,59	-1,06	+0,35	+2,18
7	-0,70	-0,78	-0,99	-0,94	-1,03	-0,71	-1,47	-0,37	-1,32	-0,92
8	+0,75	+0,66	+0,83	+0,40	-0,29	+0,14	+0,13	+0,32	-0,08	+0,46
9	-0,46	-0,92	-0,94	-0,94	-0,71	-1,02	-0,19	-0,47	-0,54	-0,63
10	-1,82	-1,19	-0,94	-0,82	-1,58	-0,71	-1,13	-1,17	-1,34	-0,79
11	+0,15	-2,14	-0,53	-1,49	-1,57	-0,05	-0,58	-0,10	-0,37	-0,82
12	-0,77	-0,76	-0,78	-1,08	-1,17	-0,85	-1,64	-1,52	-0,73	-1,24
13	+1,64	+2,06	+1,45	+1,22	+0,88	+1,49	+1,44	+1,83	+0,93	+1,81
14	+1,65	+1,95	+1,52	+1,50	+0,99	+1,58	+1,58	+2,31	+1,96	+2,13
15	-1,90	-1,32	-1,10	-2,42	+0,04	-0,69	-0,90	-0,35	-1,83	+0,09
16	-0,28	-0,97	-0,76	-0,73	-0,34	-1,27	-0,19	-0,65	-0,87	-0,63

This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR=0,018

In yellow the values bigger or smaller than 2/-2 In red the values bigger or smaller than 3/-3

Figure 3 :
Zscore of the different laboratories for each sample. ZS calculated on the standard deviation of reproducibility of the method



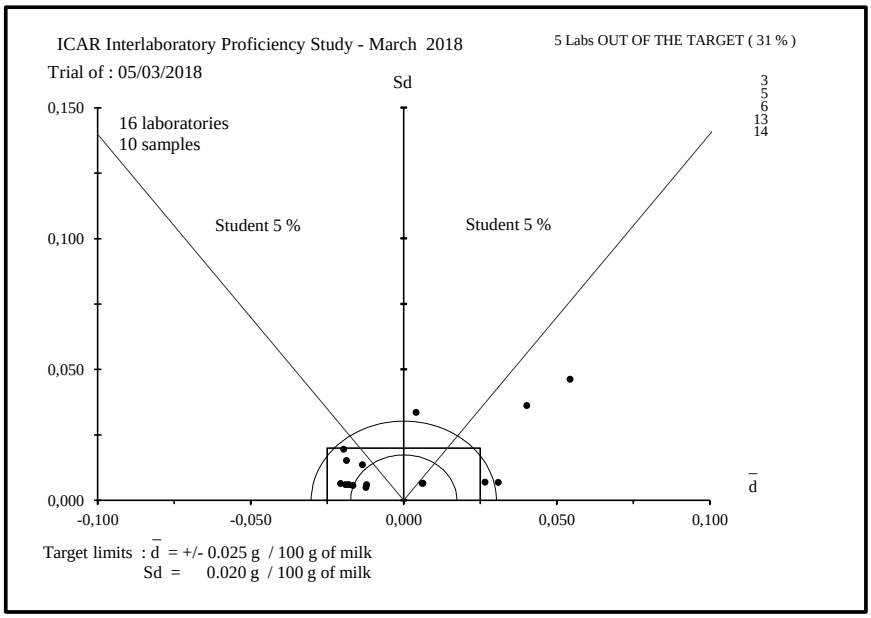


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST
RAW MILK
PROTEIN CONTENT KJELDAHL
March 2018

Name	City	Country
Actalia	Poligny	France
Agroscope Institute for food Sciences IFS	Bern-Liebefeld	Switzerland
Central Milk Lab ICBA	Caesarea	Israel
Department Valorisation des productions Agricoles	Gembloux	Belgium
Eastern Lab services	Medina	USA
Estonian Livestock Performance Recording Ltd	Tartu	Estonie
Japan Dairy Technical Association	Tokyo	Japan
Lab Agroalimentario de Santander	Santander Cantabria	Spain
Laboratorio Standard Latte	Maccarese	Italy
Laboratorium Oceny Mleka KCHZ Laboratorium Referecyjne z/s w Parzniewie	Pruszkow	Poland
Milchprüfring Baden-Württemberg e.V.	Kirchheim unter Teck	Germany
Milkom a.s Dairy research institute	Praha	Czech Republic
Qlip B.V.,	Zutphen	Netherlands
Teagasc Food research Center	. Cork	Ireland
Uni. of Ljubljana Biotechnical faculty dept. of Anim. Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia

ICAR
PROFICIENCY TESTING SCHEME

March 2018

Raw Milk

Determination of LACTOSE CONTENT

Sending date of statistical treatment : 3th April 2018

Frame of activity :	ICAR Milk Analyses Sub Committee (MA SC)		
ICAR Staff	Silvia Orlandini	pt@icar.org	silvia@icar.org

Table I : **Ranking of the laboratories** Units : g / 100 g

Nb	%	N°	d	Sd	D	**Method**
1	8	1	- 0,006	0,008	0,010	Own method
2	17	5	- 0,004	0,019	0,019	IDF 198
3	25	2	+ 0,007	0,021	0,022	Not communicated
4	33	6	- 0,026	0,013	0,029	Gravimetric method
5	42	8	- 0,018	0,024	0,030	N.C.
6	50	10	+ 0,032	0,024	0,041	IDF 198
7	58	7	+ 0,040	0,023	0,047	IDF 214
8	67	4	+ 0,047	0,026	0,054	IDF 198
9	75	3	- 0,024	0,050	0,056	Enzymatic Test
10	83	11	- 0,055	0,020	0,059	IDF 214
11	92	12	+ 0,074	0,054	0,092	Not communicated
12	100	9	- 0,065	0,068	0,094	continuous flow analysis

The table should be studied in parallel with figure 1 where the laboratories are located according to an acceptability area (or target) the limits of which are :

–

+/- 0.100 g / 100 g for d and 0.100 g / 100g for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 12 laboratories , after outliers discarging using Grubbs test at 5 % risk level.

(NC : OUT of RANKING because of insufficient data number)
(Nb : laboratory rank; % : relative rank)
(N° : laboratory identification number)
(d et Sd : mean and standard deviation of the differences (laboratory -reference))
(D : Euclidian distance to YX-axis origin = SQUARE ROOT.(d^2 + Sd^2))

Note : Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation.

ɛatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %) Sr_{PT} 0,012
ʳoducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %) SR_{PT} 0,051

Table II : **REPEATABILITY - Absolute difference between replicates in g / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,001	0,006	0,005	0,005	0,007	0,001	0,001	0,001	0,005	0,006	0,003	20
2	0,000	0,010	0,030	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,007	20
3	0,036	0,016	0,000	0,000	0,034	0,019	0,037	0,038	0,036	0,038	0,021	20
4	0,044	0,012	0,015	0,020	0,017	0,002	0,017	0,030	0,015	0,024	0,016	20
5	0,035	0,026	0,031	0,025	0,007	0,001	0,001	0,001	0,002	0,001	0,013	20
6	0,012	0,010	0,008	0,001	0,002	0,010	0,017	0,010	0,008	0,009	0,007	20
7	0,006	0,005	0,019	0,015	0,024	0,008	0,025	0,031	0,012	0,010	0,012	20
8	0,008	0,008	0,008	0,016	0,004	0,001	0,004	0,021	0,016	0,006	0,008	20
9	0,010	0,019	0,029	0,039	0,000	0,049 *	0,010	0,039	0,010	0,029	0,020	20
10	0,000	0,011	0,007	0,003	0,018	0,013	0,006	0,013	0,001	0,005	0,007	20
11	0,011	0,009	0,010	0,009	0,008	0,009	0,002	0,004	0,013	0,019	0,007	20
12	0,011	0,005	0,031	0,009	0,025	0,014	0,007	0,008	0,038	0,020	0,014	20
Sr	0,014	0,009	0,014	0,012	0,011	0,012	0,011	0,015	0,012	0,013		240
NE	24	24	24	24	24	24	24	24	24	24		
L	0,052	0,033	0,050	0,042	0,041	0,024	0,039	0,055	0,045	0,046		

Sr : repeatability standard deviation of each laboratory limit 0,022 g/100g

NL : number of measurements per laboratory

L : Limit for difference between duplicates according Cochran test at 5% level.

SE : repeatability standard deviation per sample

NE : number of measurements per sample

*: discarded data using the test of Cochran at 5 %

** : missing data

r : limit of repeatability, absolute difference betwen two replicates=0,061 according ISO 22662 / IDF 198

Table III : **Means of the replicates in g / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	4,898	4,754	5,105	5,043	4,845	4,721	4,779	4,978	4,822	4,643
2	4,920	4,755	5,135	5,085	4,860	4,710	4,790	5,010	4,840	4,610
3	4,793	4,738	5,090	5,056	4,800	4,680	4,698	5,039	4,817	4,694
4	4,927	4,802	5,127	5,079	4,896	4,745	4,860	5,085	4,887	4,714
5	4,890	4,733	5,079	5,034	4,852	4,734	4,794	4,995	4,837	4,664
6	4,900	4,751	5,065	5,036	4,792	4,698	4,754	4,962	4,805	4,624
7	4,954	4,807	5,150	5,091	4,857	4,789	4,842	5,009	4,829	4,722
8	4,857	4,703	5,083	5,053	4,833	4,719	4,784	5,002	4,829	4,604
9	4,917	4,796	5,083	4,990	4,777	4,636	4,607	4,835	4,743	4,617
10	4,939	4,800	5,155	5,084	4,892	4,755	4,836	5,026	4,871	4,614
11	4,843	4,716	5,054	4,962	4,789	4,693	4,739	4,910	4,785	4,602
12	5,011	4,816	5,199	5,166	5,015 *	4,803	4,862	5,051	4,829	4,639
M	4,904	4,764	5,110	5,056	4,836	4,723	4,778	4,992	4,824	4,645
REF.	4,904	4,764	5,108	5,055	4,836	4,724	4,785	4,998	4,826	4,645
SD	0,056	0,038	0,043	0,052	0,041	0,046	0,073	0,067	0,037	0,043

M = mean per sample
REF. = reference values
SD = standard deviation per sample
*: discarded data using the test of Grubbs 5 %

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 12 laboratories, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Outliers Cochran						9				
Outlier Grubbs					12					
sr	0,014	0,009	0,014	0,012	0,011	0,007	0,011	0,015	0,012	0,013
SR	0,057	0,039	0,044	0,052	0,042	0,039	0,074	0,067	0,038	0,044

Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	- 0,007	- 0,010	- 0,004	- 0,012	+ 0,009	- 0,004	- 0,006	- 0,020	- 0,005	- 0,002	- 0,006	0,008	2,58
2	+ 0,016	- 0,009	+ 0,027	+ 0,030	+ 0,024	- 0,014	+ 0,005	+ 0,012	+ 0,014	- 0,035	+ 0,007	0,021	1,06
3	- 0,111	- 0,026	- 0,018	+ 0,001	- 0,036	- 0,045	- 0,087	+ 0,041	- 0,009	+ 0,049	- 0,024	0,050	1,52
4	+ 0,023	+ 0,038	+ 0,018	+ 0,024	+ 0,060	+ 0,021	+ 0,075	+ 0,087	+ 0,060	+ 0,069	+ 0,047	0,026	5,86
5	- 0,015	- 0,031	- 0,030	- 0,021	+ 0,016	+ 0,009	+ 0,009	- 0,003	+ 0,011	+ 0,018	- 0,004	0,019	0,62
6	- 0,004	- 0,013	- 0,043	- 0,019	- 0,044	- 0,026	- 0,031	- 0,036	- 0,021	- 0,022	- 0,026	0,013	6,50
7	+ 0,050	+ 0,042	+ 0,041	+ 0,036	+ 0,021	+ 0,065	+ 0,057	+ 0,011	+ 0,003	+ 0,077	+ 0,040	0,023	5,42
8	- 0,047	- 0,061	- 0,025	- 0,002	- 0,003	- 0,006	- 0,001	+ 0,004	+ 0,003	- 0,041	- 0,018	0,024	2,37
9	+ 0,013	+ 0,032	- 0,026	- 0,065	- 0,059	- 0,088	- 0,178	- 0,163	- 0,084	- 0,029	- 0,065	0,068	3,00
10	+ 0,035	+ 0,035	+ 0,046	+ 0,029	+ 0,056	+ 0,030	+ 0,051	+ 0,028	+ 0,044	- 0,032	+ 0,032	0,024	4,17
11	- 0,061	- 0,048	- 0,054	- 0,093	- 0,046	- 0,031	- 0,046	- 0,088	- 0,041	- 0,043	- 0,055	0,020	8,65
12	+ 0,106	+ 0,051	+ 0,090	+ 0,111	+ 0,179	+ 0,079	+ 0,077	+ 0,053	+ 0,003	- 0,006	+ 0,074	0,054	4,36
d	- 0,000	- 0,000	+ 0,002	+ 0,001	+ 0,000	- 0,001	- 0,007	- 0,006	- 0,002	+ 0,000	+ 0,000	0,052	
Sd	0,056	0,038	0,043	0,052	0,041	0,046	0,073	0,067	0,037	0,043	0,051		

d = mean of differences Sd = standard deviation of differences t = Student test - comparison to 0

Upper limits : $\bar{d}$ = +/- 0.100 g / 100g Sd = 0.100 g / 100g

ISO 22662|IDF 198 : Precision of the method : Sr = 0.022 g / 100 g
SR = 0.047 g / 100 g

Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,12	-0,26	-0,08	-0,24	+0,22	-0,08	-0,09	-0,30	-0,13	-0,05
2	+0,28	-0,24	+0,63	+0,58	+0,59	-0,31	+0,07	+0,19	+0,37	-0,81
3	-1,99	-0,68	-0,42	+0,02	-0,86	-0,96	-1,19	+0,62	-0,25	+1,14
4	+0,40	+0,99	+0,43	+0,47	+1,46	+0,45	+1,01	+1,31	+1,62	+1,60
5	-0,27	-0,81	-0,69	-0,41	+0,39	+0,20	+0,12	-0,05	+0,29	+0,43
6	-0,08	-0,34	-1,00	-0,37	-1,06	-0,56	-0,43	-0,54	-0,58	-0,50
7	+0,88	+1,10	+0,96	+0,69	+0,52	+1,40	+0,77	+0,16	+0,07	+1,78
8	-0,85	-1,59	-0,58	-0,04	-0,06	-0,12	-0,01	+0,06	+0,07	-0,95
9	+0,23	+0,83	-0,59	-1,25	-1,43	-1,91	-2,43	-2,45	-2,26	-0,66
10	+0,62	+0,92	+1,08	+0,55	+1,37	+0,66	+0,69	+0,42	+1,19	-0,73
11	-1,09	-1,25	-1,26	-1,79	-1,12	-0,68	-0,62	-1,32	-1,11	-0,99
12	+1,89	+1,34	+2,10	+2,13	+4,35	+1,70	+1,04	+0,80	+0,07	-0,14

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 2 :
Zscore of the different laboratories for each sample. ZS calculated on the PT standard deviation

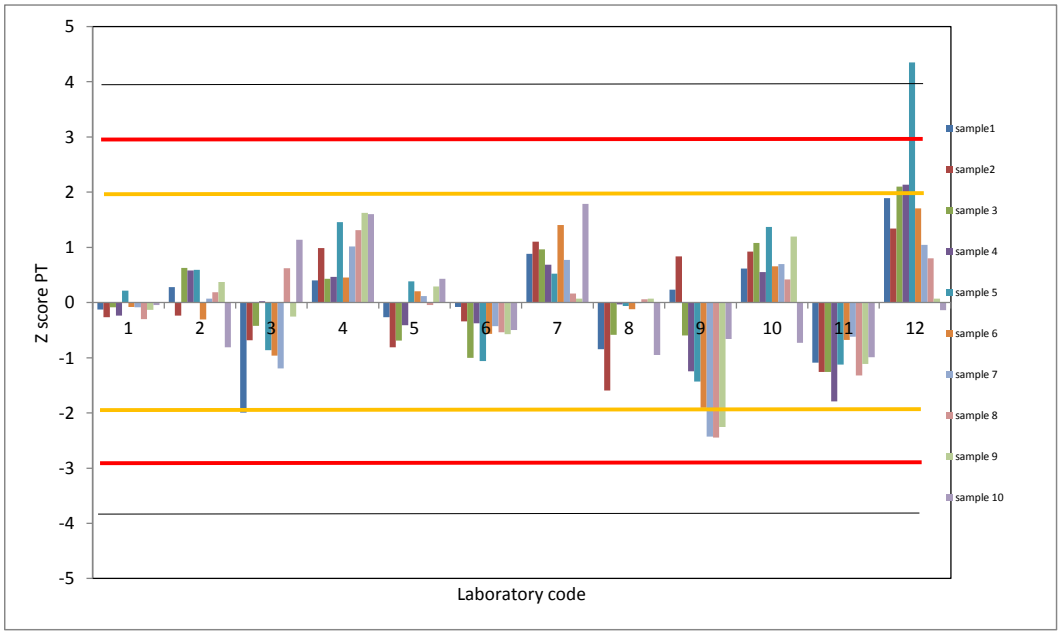


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample/Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,15	-0,22	-0,08	-0,26	+0,19	-0,08	-0,14	-0,43	-0,10	-0,04
2	+0,33	-0,19	+0,57	+0,64	+0,52	-0,30	+0,11	+0,26	+0,29	-0,75
3	-2,37	-0,56	-0,39	+0,02	-0,76	-0,95	-1,86	+0,88	-0,20	+1,04
4	+0,48	+0,81	+0,39	+0,51	+1,27	+0,44	+1,59	+1,86	+1,28	+1,47
5	-0,32	-0,66	-0,63	-0,45	+0,34	+0,20	+0,18	-0,07	+0,23	+0,39
6	-0,10	-0,28	-0,92	-0,41	-0,93	-0,56	-0,67	-0,76	-0,45	-0,46
7	+1,05	+0,90	+0,88	+0,76	+0,46	+1,38	+1,20	+0,23	+0,06	+1,64
8	-1,01	-1,30	-0,53	-0,04	-0,06	-0,12	-0,02	+0,08	+0,06	-0,87
9	+0,28	+0,68	-0,54	-1,37	-1,25	-1,88	-3,79	-3,46	-1,78	-0,61
10	+0,73	+0,75	+0,99	+0,61	+1,20	+0,65	+1,09	+0,59	+0,94	-0,67
11	-1,30	-1,03	-1,15	-1,97	-0,98	-0,67	-0,97	-1,87	-0,88	-0,91
12	+2,26	+1,09	+1,92	+2,35	+3,81	+1,68	+1,63	+1,13	+0,06	-0,13

This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR=0,047

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 3 :
Zscore of the different laboratories for each sample. ZS calculated on the standard deviation of reproducibility of the method

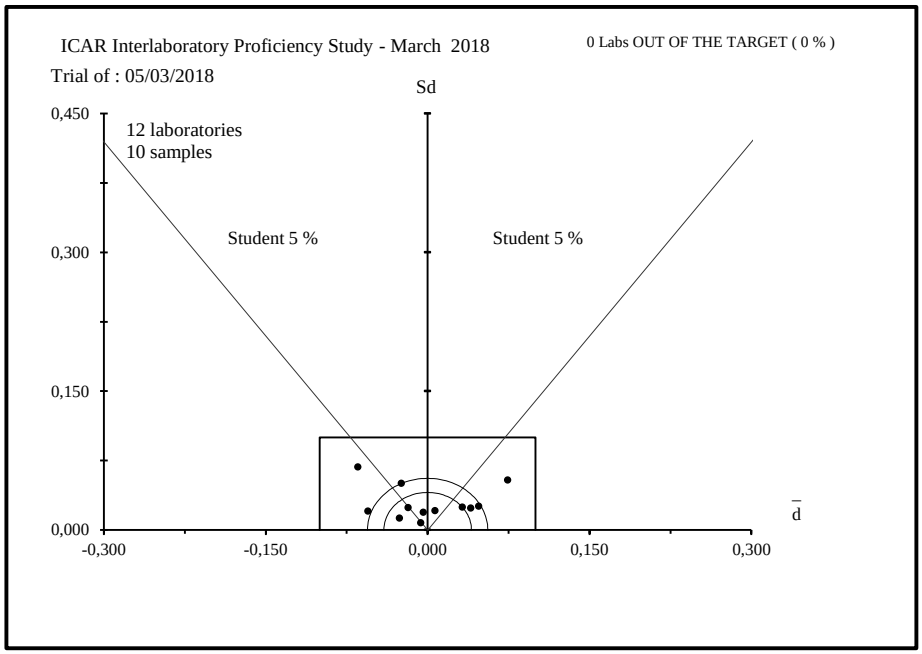


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST
RAW MILK
LACTOSE CONTENT
March 2018

Agroscope Institute for food Sciences IFS	Bern-Liebefeld	Switzerland
Department Valorisation des productions Agricoles	Gembloux	Belgium
Estonian Livestock Performance Recording Ltd	Tartu	Estonie
Japan Dairy Technical Association	Tokyo	Japan
Lab Agroalimentario de Santander	Santander Car	Spain
Laboratorium Oceny Mleka KCHZ Laboratorium Referecyjne z/s w Parzniewie	Pruszkow	Poland
Milchprüfring Baden-Württemberg e.V.	Kirchheim unt	Germany
Milkom a.s Dairy research institute	Praha	Czech Republic
Qlip B.V.,	Zutphen	Netherlands
Teagasc Food research Center	. Cork	Ireland
Uni. of Ljubljana Biotechnical faculty dept. of Anim. Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia
Valacta	Quebec	Canada

ICAR
PROFICIENCY TESTING SCHEME

March 2018

Raw Milk

Determination of UREA CONTENT

Sending date of statistical treatment : 3th April 2018

Frame of activity :	ICAR Milk Analyses Sub Committee (MA SC)		
ICAR Staff	Silvia Orlandini	pt@icar.org	silvia@icar.org

Table I : **Ranking of the laboratories** Units : mg / 100 g

Nb	%	N°	d	Sd	D	**Method**
1	10	8	+ 0,10	0,54	0,55	IDF 195
2	20	5	+ 0,75	0,25	0,79	IDF 195
3	30	6	+ 0,64	0,46	0,79	IDF 195
4	40	3	- 0,83	0,91	1,24	IDF 195
5	50	10	- 1,21	0,72	1,41	IDF 195
6	60	9	- 1,33	0,65	1,48	IDF 195
7	70	7	+ 1,45	0,76	1,64	Continuous flow analyzer
8	80	2	+ 1,74	0,56	1,83	photometric method
9	90	1	+ 1,99	0,56	2,06	IDF 195
10	100	4	+ 2,52	0,86	2,66	Continuous flow analyzer

The table should be studied in parallel with figure 1 where the laboratories are located according to an acceptability area (or target) the limits of which are :

+/- 2,50 mg / 100 g for $\bar{d}$ and 1,50 mg / 100 g for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 7 laboratories using reference method (ISO 14637 | IDF 195), after outlier discarging using Grubbs test at 5% risk level

(NC : OUT of RANKING because of insufficient data number)

(Nb : laboratory rank; % : relative rank)

(N° : laboratory identification number)

(d et Sd : mean and standard deviation of the differences (laboratory -reference))

(D : Euclidian distance to YX-axis origin = SQUARE ROOT.(d^2 + Sd^2))

Note : Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation.

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,48
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	1,52

Table II : **REPEATABILITY - Absolute difference between replicates in mg / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,00	1,00	0,90	0,80	1,40	0,30	1,00	0,30	0,10	1,40	0,62	20
2	2,70 *	0,80	0,90	0,50	1,70	0,60	0,30	3,20 *	0,60	0,20	1,07	20
3	1,09	4,27 *	0,55	0,17	0,00	1,37	0,99	0,99	0,20	0,17	1,09	20
4	0,70	0,10	0,30	0,40	0,30	0,20	0,30	0,70	0,10	0,40	0,29	20
5	0,00	0,60	0,60	0,00	0,60	0,40	0,30	0,80	0,70	1,10	0,43	20
6	0,80	0,00	0,10	0,40	0,20	0,20	0,10	0,00	0,50	0,40	0,26	20
7	0,89	1,11	1,61	1,02	0,06	0,30	0,28	0,46	0,49	0,74	0,59	20
8	0,00	0,60	0,30	0,00	0,90	1,00	0,10	1,20	0,10	1,10	0,50	20
9	0,24	0,24	0,33	0,00	0,33	0,40	0,61	0,24	0,09	0,09	0,22	20
10	0,20	0,00	0,60	1,10	0,50	0,80	0,40	1,30	0,60	1,30	0,57	20
Sr	0,72	1,05	0,53	0,42	0,57	0,47	0,38	0,89	0,30	0,59		200
NE	20	20	20	20	20	20	20	20	20	20		
L	1,43	1,53	1,83	1,45	1,98	1,64	1,32	1,89	1,03	2,05		

Sr : repeatability standard deviation of each laboratory limit 0,54 mg/100g
NL : number of measurements per laboratory

L : Limit for difference between duplicates according Cochran test at 5% level.

SE : repeatability standard deviation per sample

NE : number of measurements per sample

*: discarded data using the test of Cochran at 5 %

** : missing data

r : limit of repeatability, absolute difference betwen two replicates=1,50 according ISO 14637 / IDF 195

Table III : **Means of the replicates in mg / 100 g**

Sample / Lab Code	1	2	3	4	5	6	7	8	9	10
1	56,50	29,40	47,65	33,10	39,00	43,85	25,00	51,85	19,55	62,30
2	57,35	28,60	47,95	33,85	38,65	43,30	23,65	52,00	18,50	61,90
3	54,81	24,40	45,27	31,61	36,24	40,11	21,12	50,28	16,07	60,16
4	58,35	29,45	48,65	33,60	38,55	43,70	24,15	54,55	19,55	63,00
5	55,90	27,90	46,30	32,50	37,30	42,10	23,25	51,30	19,05	60,25
6	56,40	28,20	46,35	32,70	36,80	42,10	22,95	51,30	18,15	59,80
7	57,23	28,61	48,01	34,20	38,12	42,83	23,36	52,33	17,95	60,23
8	54,80	26,60	45,95	31,70	37,15	41,20	21,95	51,80	17,75	60,45
9	52,87	26,59	44,00	30,81	35,09	39,89	21,84	48,88	17,51	57,54
10	52,60	26,30	44,50	31,85	36,15	39,70	22,00	48,95	16,70	57,45
M	55,68	27,60	46,46	32,59	37,30	41,88	22,93	51,32	18,08	60,31
REF.	54,84	27,05	45,72	32,04	36,77	41,28	22,49	50,62	17,83	59,71
SD	1,90	1,60	1,58	1,10	1,27	1,58	1,20	1,67	1,15	1,82

M = mean per sample
SD = standard deviation per sample
REF. = reference values
*: discarded data using the test of Grubbs 5 %

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 7 laboratories using the reference method ISO 14637 | IDF 195, after outliers discarging using Grubbs test 5% risk level

Table IV : Outlier identification

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Outliers Cochran	2	3						2		
Outlier Grubbs										
sr	0,42	0,45	0,53	0,42	0,57	0,47	0,38	0,56	0,30	0,59
SR	1,94	1,25	1,62	1,14	1,33	1,62	1,23	1,80	1,17	1,87

Table V : **ACCURACY - differences (laboratory - reference) in mg / 100 g**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	+ 1,66	+ 2,35	+ 1,93	+ 1,06	+ 2,23	+ 2,57	+ 2,51	+ 1,23	+ 1,72	+ 2,59	+ 1,99	0,56	11,30
2	+ 2,51	+ 1,55	+ 2,23	+ 1,81	+ 1,88	+ 2,02	+ 1,16	+ 1,38	+ 0,67	+ 2,19	+ 1,74	0,56	9,89
3	- 0,03	- 2,66	- 0,45	- 0,43	- 0,53	- 1,17	- 1,38	- 0,35	- 1,76	+ 0,45	- 0,83	0,91	2,88
4	+ 3,51	+ 2,40	+ 2,93	+ 1,56	+ 1,78	+ 2,42	+ 1,66	+ 3,93	+ 1,72	+ 3,29	+ 2,52	0,86	9,31
5	+ 1,06	+ 0,85	+ 0,58	+ 0,46	+ 0,53	+ 0,82	+ 0,76	+ 0,68	+ 1,22	+ 0,54	+ 0,75	0,25	9,65
6	+ 1,56	+ 1,15	+ 0,63	+ 0,66	+ 0,03	+ 0,82	+ 0,46	+ 0,68	+ 0,32	+ 0,09	+ 0,64	0,46	4,36
7	+ 2,39	+ 1,56	+ 2,29	+ 2,16	+ 1,34	+ 1,55	+ 0,87	+ 1,70	+ 0,13	+ 0,53	+ 1,45	0,76	6,08
8	- 0,04	- 0,45	+ 0,23	- 0,34	+ 0,38	- 0,08	- 0,54	+ 1,18	- 0,08	+ 0,74	+ 0,10	0,54	0,58
9	- 1,97	- 0,47	- 1,72	- 1,22	- 1,68	- 1,38	- 0,65	- 1,74	- 0,32	- 2,17	- 1,33	0,65	6,49
10	- 2,24	- 0,75	- 1,22	- 0,19	- 0,62	- 1,58	- 0,49	- 1,67	- 1,13	- 2,26	- 1,21	0,72	5,36
d	+ 0,84	+ 0,55	+ 0,75	+ 0,55	+ 0,53	+ 0,60	+ 0,44	+ 0,70	+ 0,25	+ 0,60	+ 0,58	1,45	
Sd	1,90	1,60	1,58	1,10	1,27	1,58	1,20	1,67	1,15	1,82	1,51		

d = mean of differences Sd = standard deviation of differences t = Student test - comparison to 0

Upper limits : $\bar{d}$ = +/- 2,50 mg / 100 g Sd = 1,50 mg / 100 g

ISO 14637|IDF 195 : Precision of the method : Sr = 0.54 mg / 100 g
SR = 1.81 mg / 100 g

Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,87	+1,46	+1,22	+0,96	+1,75	+1,63	+2,10	+0,74	+1,50	+1,42
2	+1,32	+0,96	+1,41	+1,64	+1,48	+1,28	+0,97	+0,83	+0,59	+1,20
3	-0,02	-1,66	-0,29	-0,39	-0,42	-0,74	-1,15	-0,21	-1,53	+0,25
4	+1,85	+1,49	+1,86	+1,42	+1,40	+1,53	+1,39	+2,35	+1,50	+1,81
5	+0,56	+0,53	+0,37	+0,42	+0,41	+0,52	+0,63	+0,41	+1,07	+0,30
6	+0,82	+0,71	+0,40	+0,60	+0,02	+0,52	+0,38	+0,41	+0,28	+0,05
7	+1,26	+0,97	+1,45	+1,96	+1,06	+0,98	+0,73	+1,02	+0,11	+0,29
8	-0,02	-0,28	+0,15	-0,31	+0,30	-0,05	-0,45	+0,71	-0,07	+0,41
9	-1,04	-0,29	-1,09	-1,11	-1,32	-0,88	-0,54	-1,04	-0,28	-1,19
10	-1,18	-0,47	-0,77	-0,17	-0,49	-1,00	-0,41	-1,00	-0,98	-1,24

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 2 :
Zscore of the different laboratories for each sample. ZS calculated on the PT standard deviation

Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,92	+1,30	+1,07	+0,59	+1,23	+1,42	+1,39	+0,68	+0,95	+1,43
2	+1,39	+0,85	+1,23	+1,00	+1,04	+1,12	+0,64	+0,76	+0,37	+1,21
3	-0,02	-1,47	-0,25	-0,24	-0,29	-0,65	-0,76	-0,19	-0,97	+0,25
4	+1,94	+1,32	+1,62	+0,86	+0,98	+1,34	+0,92	+2,17	+0,95	+1,82
5	+0,59	+0,47	+0,32	+0,25	+0,29	+0,45	+0,42	+0,37	+0,68	+0,30
6	+0,86	+0,63	+0,35	+0,37	+0,02	+0,45	+0,25	+0,37	+0,18	+0,05
7	+1,32	+0,86	+1,27	+1,19	+0,74	+0,86	+0,48	+0,94	+0,07	+0,29
8	-0,02	-0,25	+0,13	-0,19	+0,21	-0,04	-0,30	+0,65	-0,04	+0,41
9	-1,09	-0,26	-0,95	-0,68	-0,93	-0,76	-0,36	-0,96	-0,18	-1,20
10	-1,24	-0,42	-0,67	-0,10	-0,34	-0,87	-0,27	-0,92	-0,62	-1,25

This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR=1,81

In yellow the values bigger or smaller than 2/-2 In red the values bigger or smaller than 3/-3

Figure 3 :
Zscore of the different laboratories for each sample. ZS calculated on the standard deviation of reproducibility of the method

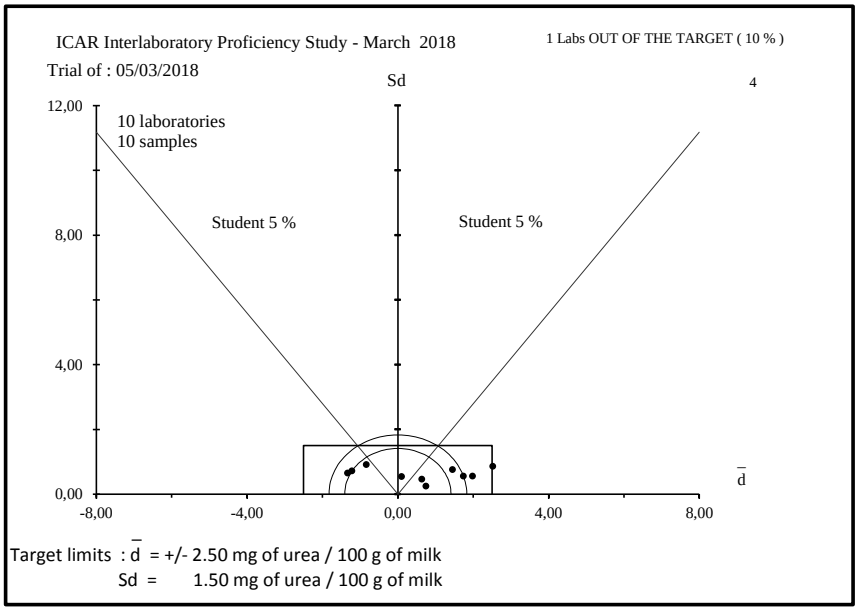


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST
RAW MILK
UREA CONTENT
March 2018

Actalia	Poligny	France
Agroscope	Bern-Liebefeld	Switzerland
Department Valorisation des productions Agricoles	Gembloux	Belgium
Eesti Pollumajandusloomade Joudluskontrolli AS, Milk Analysing Laboratory	Tartu	Estonie
Laboratorio Standard Latte	Maccarese	Italy
Laboratorium Oceny Mleka KCHZ Laboratorium Referecyjne z/s w Parzniewie	Pruszkow	Poland
Milchprüfring Baden-Württemberg e.V.	Kirchheim unt	Germany
Qlip B.V.,	Zutphen	NL
Uni. of Ljubljana, Biotechnical Faculty, Zootech. Dept., Laboratory for Dairying	Domzale	Slovenia
Valacta - Centre d'Expertise en Production Laitière du Québec	Quebec	Canada

ICAR
PROFICIENCY TESTING SCHEME

March 2018

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 3th April 2018

Frame of activity :	ICAR Milk Analyses Sub Committee (MA SC)		
ICAR Staff	Silvia Orlandini	pt@icar.org	silvia@icar.org

Proficiency test accreditated ISO 17043

ACCRÉDITATION
N° 1-2473
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Table I : **Ranking of the laboratories in %**

Nb	%	N°	d	Sd	D	Method
1	3	9	+ 0%	2%	2%	B
2	5	4	+ 1%	2%	2%	B
3	8	34	- 2%	3%	3%	B
4	11	32	- 1%	3%	3%	B
5	13	12	- 1%	4%	4%	B
6	16	1	- 1%	5%	5%	A
7	18	33	- 4%	2%	5%	B
8	21	24	+ 3%	5%	6%	B
9	24	30	- 6%	3%	6%	B
10	26	31	+ 0%	7%	7%	D
11	29	13	- 5%	5%	7%	B
12	32	11	- 6%	5%	8%	B
13	34	29	- 7%	2%	8%	B
14	37	3	- 5%	8%	10%	B
15	39	18	- 7%	7%	10%	B
16	42	22	- 8%	7%	11%	B
17	45	14	- 7%	8%	11%	B
18	47	8	- 9%	8%	12%	C
19	50	37	- 10%	6%	12%	B
20	53	36	- 12%	3%	12%	B
21	55	27	- 7%	13%	15%	B
22	58	10	+ 12%	8%	15%	A
23	61	35	- 15%	3%	15%	B
24	63	20	- 12%	10%	15%	B
25	66	23	- 11%	11%	16%	B
26	68	17	- 13%	10%	17%	B
27	71	16	- 14%	11%	18%	B
28	74	7	- 16%	13%	21%	B
29	76	2	- 16%	13%	21%	B
30	79	38	+ 26%	2%	27%	B
31	82	5	+ 23%	19%	30%	B
32	84	28	+ 31%	8%	32%	B
33	87	26	+ 28%	21%	35%	B
34	89	19	+ 27%	24%	37%	B
35	92	15	+ 29%	23%	37%	B
36	95	25	+ 40%	18%	43%	A
37	97	21	+ 50%	39%	63%	B
38	100	6	- 28%	67%	73%	A

The table should be studied in parallel with figure 1 where the laboratories are located according to an acceptability area (or target) the limits of which are :

$\pm$ 10% for $\bar{d}$ and 10% for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 36 laboratories using reference metod ISO 133666-1|IDF 148-1 and alternative method ISO 13366-2|IDF 148-2 after outlier discarging using Grubbs test at 5% risk level

A ISO 13366-1 IDF 148-1
B ISO 13366-2 IDF 148-2
C FM 5000
D Not communicated

(NC : OUT of RANKING because of insufficient data number)
(Nb : laboratory rank; % : relative rank)
(N° : laboratory identification number)
(d et Sd : mean and standard deviation of the differences (laboratory -reference))
(D : Euclidian distance to YX-axis origin = SQUARE ROOT.(d^2 + Sd^2))

Note : Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation.

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	13	3%
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	99	20%

Table II : **REPEATABILITY - Absolute difference between replicates in 10^3 cells / ml**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	5	10	10	20	10	10	26	2	18	25	11	20
2	38	7	1	12	3	17	3	6	10	13	11	20
3	3	10	3	12	2	4	8	2	13	10	6	20
4	4	12	2	19	26	6	30	9	3	6	11	20
5	34	18	0	64	3	8	55	7	24	61	26	20
6	47	2	1	4	39 *	21	1	6	25	37	18	20
7	9	11	4	39	3	3	16	6	1	34	13	20
8	3	24	4	36	12	10	2	2	5	32	13	20
9	2	5	1	3	0	2	15	5	13	5	5	20
10	8	6	2	23	3	2	2	1	6	6	6	20
11	14	6	1	7	1	1	0	2	7	0	4	20
12	26	7	5	1	4	3	18	1	36	10	11	20
13	5	3	5	14	9	12	7	2	26	47	13	20
14	40	17	3	39	6	14	19	2	9	22	15	20
15	6	16	2	7	0	5	2	2	11	22	7	20
16	2	13	6	3	11	9	42	1	8	5	11	20
17	1	9	5	31	11	1	5	9	8	12	9	20
18	6	0	0	8	0	1	14	0	1	0	4	20
19	4	14	1	3	10	4	14	3	11	18	7	20
20	0	16	0	13	2	7	24	0	1	57	15	20
21	62	15	0	32	11	9	54	25 *	1	34	22	20
22	15	6	3	17	4	24	25	6	10	53	15	20
23	29	7	4	38	11	3	5	11	19	17	13	20
24	2	1	2	19	4	1	3	4	0	14	6	20
25	30	1	13	4	38 *	13	4	10	12	22	13	20
26	38	77 *	16 *	50	57 *	29	142 *	32 *	68 *	123 *	53	20
27	9	12	4	15	4	8	5	1	4	28	8	20
28	7	6	5	39	17	4	65	3	14	13	18	20
29	35	2	1	1	5	5	35	3	5	14	12	20
30	6	13	2	13	16	9	55	2	4	20	14	20
31	8	4	11	24	7	4	18	1	4	6	8	20
32	21	42 *	6	47	6	15	75	32 *	34	65	29	20
33	2	5	2	57	12	7	6	6	9	36	16	20
34	9	4	1	17	0	3	48	8	8	11	12	20
35	10	4	0	28	12	2	12	16	1	26	10	20
36	14	1	1	8	5	4	25	7	5	10	7	20
37	6	2	4	5	2	1	27	3	8	16	8	20
38	11	8	4	5	8	3	4	4	3	13	5	20
Sr	15	12	4	19	11	7	26	7	12	24		760
r	63	50	25	126	42	42	126	25	50	126		
NE	76	76	76	76	76	76	76	76	76	76		
L	65	30	13	80	27	31	88	17	41	85		

Sr : repeatability standard deviation of each laboratory limit : **C**f up down

NL : number of measurements per laboratory

L : Limit for difference between duplicates according Cochran test at 5% level.

SE : repeatability standard deviation per sample

NE : number of measurements per sample

*: discarded data using the test of Cochran at 5 %

** : missing data

r : limit of repeatability, absolute difference betwen two replicates according ISO 13366-2 / IDF 148-2 : Cf up down

Level $10.^3$ / ml	Sr %	r
150	6	25
200	5	42
450	4	50
750	3	63
1500	3	126

Table III : **Means of the replicates in 10^3 cells / ml**

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	583	345	45	970	235	145	1152	71	443	888
2	499	280	36	853	196	128	993	60	374	682
3	560	341	52	908	232	151	1090	88	442	777
4	602	333	38	1004	237	143	1208	79	440	845
5	752	427	48	1208	272	197	1462	105	556	1026
6	611	292	43	940	182	130	108 *	79	374	760
7	506	288	37	827	190	134	995	75	386	705
8	546	316	41	888	203	147	1094	68	417	748
9	606	337	43	1005	233	159	1165	84	451	839
10	694	383	54	1122	276	174	1274	100	501	935
11	568	327	39	938	217	145	1113	79	423	778
12	598	344	44	1037	232	151	1162	88	419	801
13	582	331	40	960	214	142	1096	83	424	794
14	576	327	45	903	215	144	1082	78	421	757
15	778	443	55	1280	293	204	1513	101	582	1063
16	517	293	30	864	202	132	1014	73	388	724
17	523	296	32	878	201	142	1032	62	383	703
18	575	318	38	904	215	144	1101	74	424	764
19	771	434	50	1275	281	183	1528	89	565	1062
20	539	311	38	868	197	133	1054	67	397	724
21	962 *	553	57	1447	319	210	1734	122	700 *	1233
22	548	329	45	909	207	152	1094	71	422	751
23	534	313	35	856	220	146	1035	81	401	745
24	606	343	45	1021	235	156	1264	82	436	854
25	781	553	240 *	1305	359	240 *	1501	158 *	606	1108
26	780	463	34	1269	312	201	1449	117	571	1074
27	554	359	46	866	241	158	1041	82	470	742
28	770	471	46	1326	305	185	1581	100	578	1067
29	555	324	39	929	208	137	1099	74	414	764
30	560	319	42	933	222	137	1119	76	437	783
31	603	379	37	1019	231	158	1098	87	422	873
32	607	337	38	990	226	152	1146	78	455	841
33	576	329	40	941	223	151	1142	74	440	782
34	578	340	43	957	227	143	1154	78	451	846
35	514	297	33	829	210	127	1028	73	377	692
36	543	304	40	881	202	135	1052	66	389	723
37	551	324	38	907	207	134	1078	61	347	759
38	755	436	52	1258	292	196	1491	100	575	1047
M	605	356	42	1007	236	154	1195	82	448	843
REF.	595	346	42	994	233	151	1181	81	444	835
SD	88	68	7	166	41	23	194	15	69	140

M = mean per sample REF. = reference values

SD = standard deviation per sample *: discarded data using the test of Grubbs 5 %

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 36 laboratories using the reference method ISO 13366 | IDF 148-1 and alternative method ISO 13366-2 | IDF 148-2, after outlier discarging using Grubbs test at 5% risk level

Table IV : Outlier identification

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Outliers Cochran		26; 32	26		6; 26		26	21; 26 32	26	
Outlier Grubbs	21		25		25	25	6	25	21	
sr	13	7	3	19	6	7	21	4	10	20
SR	89	68	7	166	34	24	193	12	68	138
sr %	2%	2%	7%	2%	3%	5%	2%	5%	2%	2%
SR %	15%	19%	16%	17%	15%	15%	16%	15%	15%	16%

Table V : **ACCURACY - differences (laboratory - reference) in %**

Sample / Lab Code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	- 2%	- 0%	+ 8%	- 2%	+ 1%	- 4%	- 2%	- 12%	- 0%	+ 6%	- 1%	5%	0,37
2	- 16%	- 19%	- 15%	- 14%	- 16%	- 16%	- 16%	- 26%	- 16%	- 18%	- 16%	13%	4,05
3	- 6%	- 1%	+ 23%	- 9%	- 0%	- 0%	- 8%	+ 9%	- 0%	- 7%	- 5%	8%	2,13
4	+ 1%	- 4%	- 9%	+ 1%	+ 2%	- 5%	+ 2%	- 3%	- 1%	+ 1%	+ 1%	2%	0,71
5	+ 26%	+ 23%	+ 15%	+ 22%	+ 16%	+ 30%	+ 24%	+ 29%	+ 25%	+ 23%	+ 23%	19%	3,94
6	+ 3%	- 16%	+ 2%	- 5%	- 22%	- 14%	- 91%	- 2%	- 16%	- 9%	- 28%	67%	1,33
7	- 15%	- 17%	- 12%	- 17%	- 19%	- 12%	- 16%	- 7%	- 13%	- 16%	- 16%	13%	3,68
8	- 8%	- 9%	- 2%	- 11%	- 13%	- 3%	- 7%	- 16%	- 6%	- 10%	- 9%	8%	3,67
9	+ 2%	- 3%	+ 2%	+ 1%	- 0%	+ 5%	- 1%	+ 3%	+ 2%	+ 0%	+ 0%	2%	0,60
10	+ 17%	+ 11%	+ 29%	+ 13%	+ 18%	+ 15%	+ 8%	+ 23%	+ 13%	+ 12%	+ 12%	8%	4,73
11	- 5%	- 5%	- 8%	- 6%	- 7%	- 5%	- 6%	- 2%	- 5%	- 7%	- 6%	5%	3,62
12	+ 0%	- 1%	+ 4%	+ 4%	- 0%	- 1%	- 2%	+ 8%	- 6%	- 4%	- 1%	4%	0,43
13	- 2%	- 4%	- 6%	- 3%	- 8%	- 6%	- 7%	+ 3%	- 4%	- 5%	- 5%	5%	2,97
14	- 3%	- 6%	+ 6%	- 9%	- 8%	- 5%	- 8%	- 3%	- 5%	- 9%	- 7%	8%	2,93
15	+ 31%	+ 28%	+ 31%	+ 29%	+ 26%	+ 35%	+ 28%	+ 26%	+ 31%	+ 27%	+ 29%	23%	3,97
16	- 13%	- 15%	- 28%	- 13%	- 14%	- 13%	- 14%	- 10%	- 13%	- 13%	- 14%	11%	3,90
17	- 12%	- 15%	- 25%	- 12%	- 14%	- 6%	- 13%	- 24%	- 14%	- 16%	- 13%	10%	4,02
18	- 3%	- 8%	- 9%	- 9%	- 8%	- 5%	- 7%	- 8%	- 5%	- 9%	- 7%	7%	3,34
19	+ 30%	+ 25%	+ 18%	+ 28%	+ 21%	+ 21%	+ 29%	+ 10%	+ 27%	+ 27%	+ 27%	24%	3,52
20	- 9%	- 10%	- 9%	- 13%	- 15%	- 12%	- 11%	- 17%	- 11%	- 13%	- 12%	10%	3,87
21	+ 62%	+ 60%	+ 36%	+ 46%	+ 37%	+ 38%	+ 47%	+ 51%	+ 58%	+ 48%	+ 50%	39%	4,00
22	- 8%	- 5%	+ 6%	- 9%	- 11%	+ 0%	- 7%	- 12%	- 5%	- 10%	- 8%	7%	3,29
23	- 10%	- 10%	- 16%	- 14%	- 6%	- 4%	- 12%	- 0%	- 10%	- 11%	- 11%	11%	3,14
24	+ 2%	- 1%	+ 8%	+ 3%	+ 1%	+ 3%	+ 7%	+ 2%	- 2%	+ 2%	+ 3%	5%	1,67
25	+ 31%	+ 60%	+ 472%	+ 31%	+ 54%	+ 58%	+ 27%	+ 96%	+ 37%	+ 33%	+ 40%	18%	7,17
26	+ 31%	+ 34%	- 19%	+ 28%	+ 34%	+ 33%	+ 23%	+ 45%	+ 29%	+ 29%	+ 28%	21%	4,28
27	- 7%	+ 4%	+ 10%	- 13%	+ 3%	+ 4%	- 12%	+ 1%	+ 6%	- 11%	- 7%	13%	1,73
28	+ 29%	+ 36%	+ 9%	+ 33%	+ 31%	+ 22%	+ 34%	+ 23%	+ 30%	+ 28%	+ 31%	8%	12,38
29	- 7%	- 6%	- 8%	- 7%	- 11%	- 10%	- 7%	- 9%	- 7%	- 9%	- 7%	2%	15,00
30	- 6%	- 8%	+ 0%	- 6%	- 5%	- 10%	- 5%	- 6%	- 1%	- 6%	- 6%	3%	6,12
31	+ 1%	+ 10%	- 13%	+ 3%	- 1%	+ 4%	- 7%	+ 7%	- 5%	+ 5%	+ 0%	7%	0,03
32	+ 2%	- 3%	- 9%	- 0%	- 3%	+ 0%	- 3%	- 3%	+ 3%	+ 1%	- 1%	3%	0,65
33	- 3%	- 5%	- 4%	- 5%	- 4%	- 1%	- 3%	- 8%	- 1%	- 6%	- 4%	2%	5,66
34	- 3%	- 2%	+ 2%	- 4%	- 3%	- 6%	- 2%	- 3%	+ 2%	+ 1%	- 2%	3%	2,23
35	- 14%	- 14%	- 21%	- 17%	- 10%	- 16%	- 13%	- 10%	- 15%	- 17%	- 15%	3%	13,54
36	- 9%	- 12%	- 6%	- 11%	- 14%	- 11%	- 11%	- 19%	- 12%	- 13%	- 12%	3%	10,74
37	- 7%	- 6%	- 9%	- 9%	- 11%	- 12%	- 9%	- 25%	- 22%	- 9%	- 10%	6%	5,10
38	+ 27%	+ 26%	+ 24%	+ 27%	+ 25%	+ 29%	+ 26%	+ 24%	+ 29%	+ 25%	+ 26%	2%	45,13
d	+ 2%	+ 3%	+ 0%	+ 1%	+ 1%	+ 2%	+ 1%	+ 1%	+ 1%	+ 1%	- 3%	30%	
Sd	15%	20%	16%	17%	18%	15%	16%	18%	16%	17%			

d = mean of differences Sd = standard deviation of differences t = Student test - comparison to 0

Upper limits : $\bar{d}$ = +/- 10% Sd = 10%

ISO 13366-2|IDF 148-2 : Precision of the method :

Level SCC $*10^3$ /ml	Sr %	r	SR %	R
150	6	25	9	38
200	5	42	8	67
450	4	50	7	88
750	3	63	6	126
1500	3	126	6	252

Table VI : **Zscore of the different laboratories for each sample.**

ZS calculated on the PT standard deviation

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,14	-0,01	+0,48	-0,14	+0,05	-0,27	-0,15	-0,67	-0,01	+0,37
2	-1,09	-0,97	-0,97	-0,85	-0,92	-1,02	-0,97	-1,43	-1,00	-1,09
3	-0,41	-0,07	+1,47	-0,52	-0,03	-0,01	-0,47	+0,50	-0,03	-0,41
4	+0,08	-0,19	-0,59	+0,06	+0,09	-0,36	+0,14	-0,15	-0,06	+0,07
5	+1,78	+1,19	+0,94	+1,29	+0,93	+1,96	+1,44	+1,64	+1,62	+1,36
6	+0,17	-0,79	+0,10	-0,32	-1,26	-0,94	-5,53	-0,12	-1,01	-0,54
7	-1,02	-0,85	-0,74	-1,01	-1,06	-0,76	-0,96	-0,39	-0,84	-0,93
8	-0,56	-0,44	-0,13	-0,64	-0,73	-0,19	-0,45	-0,88	-0,39	-0,62
9	+0,12	-0,14	+0,10	+0,06	-0,00	+0,33	-0,09	+0,19	+0,10	+0,02
10	+1,12	+0,54	+1,85	+0,77	+1,03	+0,97	+0,48	+1,30	+0,83	+0,71
11	-0,31	-0,28	-0,51	-0,34	-0,40	-0,29	-0,35	-0,12	-0,30	-0,41
12	+0,03	-0,03	+0,25	+0,26	-0,03	-0,03	-0,10	+0,47	-0,36	-0,24
13	-0,16	-0,22	-0,36	-0,20	-0,48	-0,40	-0,44	+0,16	-0,28	-0,30
14	-0,22	-0,28	+0,40	-0,55	-0,44	-0,31	-0,51	-0,19	-0,33	-0,56
15	+2,07	+1,42	+2,01	+1,72	+1,46	+2,28	+1,71	+1,43	+1,99	+1,62
16	-0,89	-0,78	-1,81	-0,79	-0,77	-0,85	-0,86	-0,57	-0,80	-0,79
17	-0,82	-0,74	-1,58	-0,70	-0,79	-0,42	-0,77	-1,33	-0,87	-0,94
18	-0,23	-0,41	-0,59	-0,54	-0,44	-0,34	-0,41	-0,46	-0,29	-0,51
19	+1,99	+1,29	+1,17	+1,69	+1,17	+1,36	+1,79	+0,54	+1,74	+1,62
20	-0,64	-0,51	-0,59	-0,76	-0,88	-0,81	-0,66	-0,95	-0,68	-0,79
21	+4,16	+3,02	+2,31	+2,73	+2,08	+2,50	+2,85	+2,81	+3,69	+2,83
22	-0,54	-0,25	+0,40	-0,51	-0,64	+0,03	-0,45	-0,67	-0,31	-0,60
23	-0,70	-0,49	-1,04	-0,83	-0,33	-0,25	-0,76	-0,01	-0,62	-0,65
24	+0,12	-0,05	+0,48	+0,16	+0,05	+0,18	+0,42	+0,09	-0,11	+0,13
25	+2,11	+3,02	+30,13	+1,88	+3,06	+3,79	+1,65	+5,33	+2,34	+1,94
26	+2,09	+1,70	-1,20	+1,66	+1,91	+2,11	+1,38	+2,50	+1,84	+1,70
27	-0,47	+0,19	+0,63	-0,77	+0,19	+0,29	-0,72	+0,05	+0,38	-0,66
28	+1,98	+1,83	+0,56	+2,00	+1,74	+1,45	+2,06	+1,30	+1,94	+1,65
29	-0,46	-0,32	-0,51	-0,39	-0,62	-0,64	-0,43	-0,50	-0,43	-0,51
30	-0,40	-0,40	+0,02	-0,37	-0,27	-0,64	-0,32	-0,33	-0,10	-0,37
31	+0,09	+0,48	-0,81	+0,15	-0,06	+0,29	-0,43	+0,40	-0,31	+0,27
32	+0,13	-0,13	-0,59	-0,03	-0,17	+0,01	-0,18	-0,19	+0,16	+0,04
33	-0,22	-0,25	-0,28	-0,32	-0,25	-0,03	-0,20	-0,46	-0,06	-0,38
34	-0,20	-0,09	+0,10	-0,22	-0,15	-0,38	-0,14	-0,19	+0,11	+0,07
35	-0,92	-0,71	-1,35	-0,99	-0,56	-1,04	-0,79	-0,53	-0,97	-1,02
36	-0,59	-0,62	-0,36	-0,68	-0,77	-0,70	-0,67	-1,05	-0,79	-0,80
37	-0,50	-0,32	-0,59	-0,53	-0,64	-0,76	-0,53	-1,39	-1,39	-0,54
38	+1,81	+1,32	+1,55	+1,59	+1,43	+1,90	+1,60	+1,33	+1,89	+1,51

In yellow the values bigger or smaller than 2/-2

In red the values bigger or smaller than 3/-3

Figure 2 :

Zscore of the different laboratories for each sample. ZS calculated on the PT standard deviation

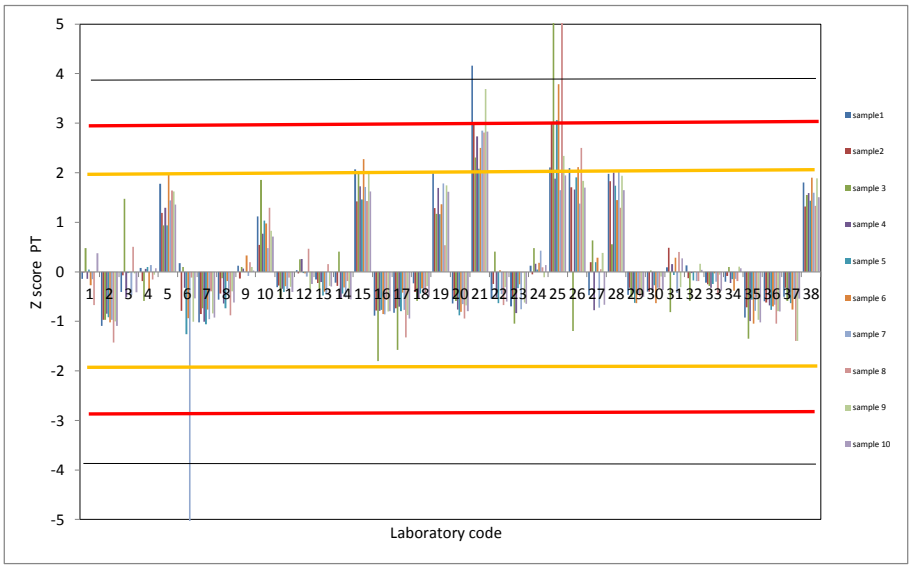


Table VII : **Zscore of the different laboratories for each sample.**

ZS calculated on the standard deviation of reproducibility of the method

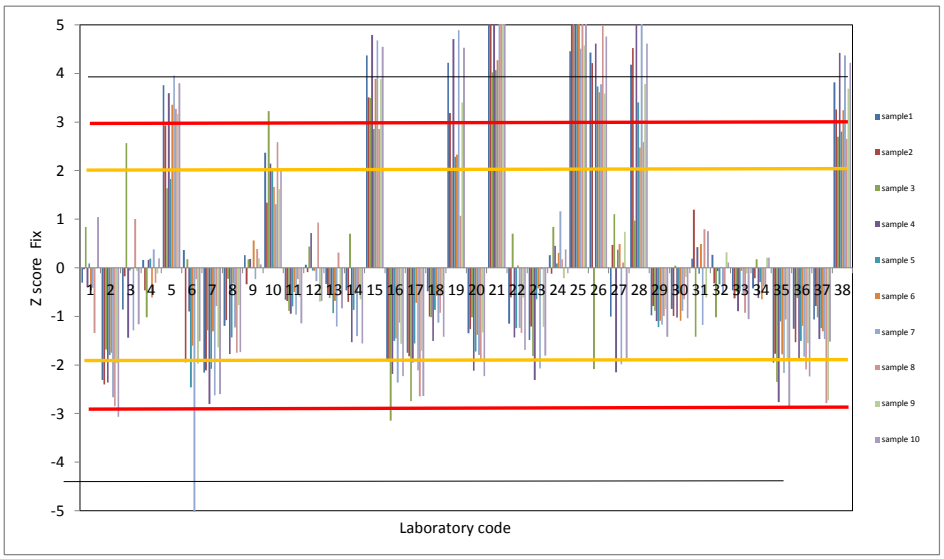
Sample Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,31	-0,03	+0,84	-0,40	+0,09	-0,46	-0,41	-1,34	-0,02	+1,05
2	-2,31	-2,40	-1,68	-2,36	-1,79	-1,75	-2,66	-2,85	-1,96	-3,07
3	-0,86	-0,18	+2,56	-1,44	-0,05	-0,02	-1,29	+1,00	-0,06	-1,16
4	+0,16	-0,47	-1,02	+0,16	+0,19	-0,61	+0,38	-0,30	-0,12	+0,20
5	+3,76	+2,93	+1,63	+3,59	+1,83	+3,36	+3,96	+3,27	+3,17	+3,80
6	+0,37	-1,95	+0,17	-0,90	-2,46	-1,60	-15,15	-0,24	-1,98	-1,51
7	-2,15	-2,11	-1,29	-2,81	-2,08	-1,31	-2,63	-0,79	-1,64	-2,60
8	-1,19	-1,08	-0,22	-1,77	-1,44	-0,32	-1,23	-1,75	-0,76	-1,74
9	+0,26	-0,34	+0,17	+0,18	-0,01	+0,56	-0,24	+0,38	+0,19	+0,07
10	+2,37	+1,34	+3,23	+2,14	+2,02	+1,67	+1,31	+2,59	+1,62	+1,99
11	-0,65	-0,68	-0,89	-0,94	-0,79	-0,50	-0,96	-0,24	-0,60	-1,14
12	+0,07	-0,09	+0,44	+0,72	-0,05	-0,06	-0,27	+0,93	-0,69	-0,68
13	-0,33	-0,56	-0,62	-0,57	-0,94	-0,68	-1,21	+0,31	-0,55	-0,83
14	-0,46	-0,70	+0,71	-1,53	-0,86	-0,54	-1,41	-0,37	-0,65	-1,56
15	+4,37	+3,51	+3,49	+4,79	+2,85	+3,89	+4,68	+2,85	+3,88	+4,55
16	-1,88	-1,93	-3,15	-2,18	-1,51	-1,45	-2,36	-1,13	-1,57	-2,23
17	-1,75	-1,82	-2,75	-1,95	-1,55	-0,72	-2,11	-2,65	-1,71	-2,64
18	-0,49	-1,01	-1,02	-1,51	-0,86	-0,57	-1,13	-0,92	-0,57	-1,42
19	+4,22	+3,19	+2,03	+4,71	+2,28	+2,33	+4,89	+1,07	+3,41	+4,53
20	-1,35	-1,26	-1,02	-2,12	-1,72	-1,38	-1,79	-1,89	-1,33	-2,23
21	+8,80	+7,47	+4,02	+7,60	+4,07	+4,27	+7,80	+5,61	+7,21	+7,94
22	-1,15	-0,61	+0,71	-1,43	-1,24	+0,05	-1,24	-1,34	-0,61	-1,69
23	-1,48	-1,21	-1,82	-2,31	-0,65	-0,43	-2,07	-0,03	-1,22	-1,81
24	+0,26	-0,12	+0,84	+0,45	+0,09	+0,31	+1,16	+0,18	-0,22	+0,38
25	+4,46	+7,47	+52,48	+5,22	+6,00	+6,48	+4,51	+10,64	+4,57	+5,45
26	+4,43	+4,22	-2,08	+4,62	+3,74	+3,61	+3,78	+4,99	+3,59	+4,76
27	-1,00	+0,47	+1,10	-2,15	+0,38	+0,49	-1,99	+0,11	+0,74	-1,86
28	+4,18	+4,52	+0,97	+5,56	+3,40	+2,47	+5,63	+2,59	+3,79	+4,62
29	-0,98	-0,79	-0,89	-1,09	-1,22	-1,09	-1,17	-0,99	-0,85	-1,42
30	-0,85	-0,99	+0,04	-1,03	-0,53	-1,09	-0,88	-0,65	-0,19	-1,04
31	+0,19	+1,20	-1,42	+0,42	-0,12	+0,49	-1,17	+0,80	-0,61	+0,76
32	+0,27	-0,32	-1,02	-0,07	-0,34	+0,01	-0,50	-0,37	+0,32	+0,11
33	-0,46	-0,63	-0,49	-0,89	-0,48	-0,06	-0,55	-0,92	-0,12	-1,06
34	-0,43	-0,21	+0,17	-0,62	-0,29	-0,65	-0,38	-0,37	+0,21	+0,21
35	-1,95	-1,77	-2,35	-2,76	-1,10	-1,79	-2,16	-1,06	-1,89	-2,86
36	-1,25	-1,53	-0,62	-1,89	-1,51	-1,20	-1,83	-2,09	-1,55	-2,24
37	-1,06	-0,79	-1,02	-1,46	-1,24	-1,31	-1,46	-2,78	-2,72	-1,52
38	+3,82	+3,26	+2,70	+4,42	+2,81	+3,24	+4,37	+2,65	+3,69	+4,22

This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR : Cf page 5./8

In yellow the values bigger or smaller than 2/-2 In red the values bigger or smaller than 3/-3

Figure 3 :

Zscore of the different laboratories for each sample. ZS calculated on the standard deviation of reproducibility of the method



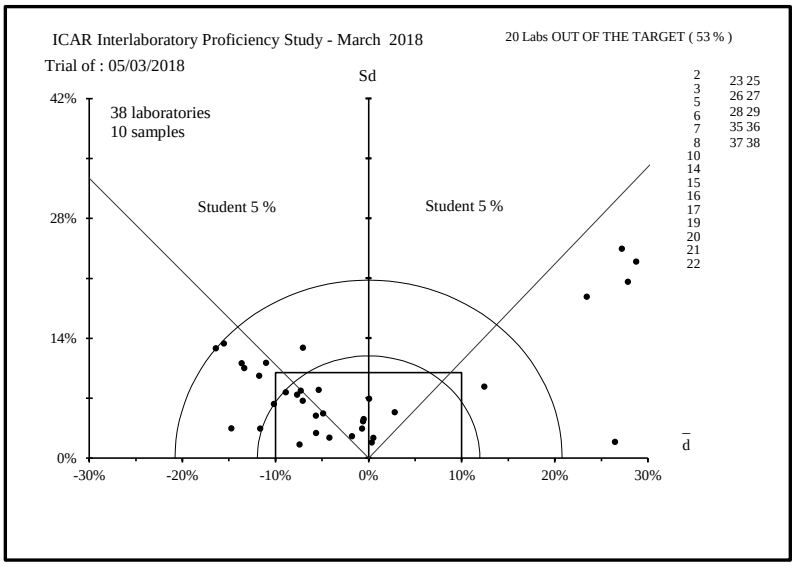


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ACTALIA / ACTILAIT / CECALAIT	Poligny	France
Agroscope Institute for food Sciences IFS	Bern-Liebefeld	Switzerland
AIA- Laboratorio Standard Latte	Maccarese	Italy
CIS	Teiford	England
Comite du Lait ASBL	Battice	Belgium
Council of Agriculture, Executive Yuan	Taiwan	Taiwan
Croatian Agricultural Agency	Krizevci	Croatia
Deltamune Pty Ltd.	Pretoria	South Africa
Eastern Lab services	Medina	USA
Eesti	Tartu	Estonie
Eurofins Steins Laboratorium A/S	Vejen	Denmark
Eurofins Steins Laboratory A/B Sweden	Jönköping	Sweden
Federazione Latterie Alto Adige	Bolzano	Italy
ICBA	Caesarea	IL
Lab. Oceny Mleka (KCHZ), Parzniewie	Pruszkow	Poland
Lab.Ceskomoravská spolecnost chovatelú a.s.	Brno	Czech Republic
Laboratorija za ispitivanje kvaliteta mleka	Novi Sad	Serbia
Laboratorio Agroalimentario de Santander	Santander Cantabria	Spain
Mérieux NutriSciences Cape Town	Cape Town	South Africa
Mérieux NutriSciences JBay	J Bay	South Africa
Mérieux NutriSciences Midrand	Midrand	South Africa
Milchprüfring Baden-Württemberg e.V.	Kirchheim unter Teck	Germany
Office de l'Elevage et des Pâturages	Sidi Thabet	Tunisie
PFHBiPM Laboratorium w Bialymstoku	Tykocin	Poland
PFHBiPM Laboratorium w Kobiernie	Kobierno	Poland
PFHBiPM Laboratorium w Parzniewie	Pruszkow	Poland
PFHBiPM Region Oceny Bydgoszcz z/s w Minikowie	Minikowo	poland
Qlip B.V.	Zutphen	Netherland
Shanghai Dairy Cattle Breeding Center Co., Ltd	Shanghai	China
Tine Ramelklaboratoriet Bergen	Bergen	Norvey
Tine Ramelklaboratoriet Heimdal	Heimdal	Norvey
University of Ljubljana	Ljubljana	Slovenia
Valio Ltd, Regional laboratory	Seinajoki	Finland