THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

ICAR PROFICIENCY TEST - SEPTEMBER 2022

Raw cow milk

“Reference” Methods

THE GLOBAL STANDARD
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FRAME OF ACTIVITY :

ICAR MILK ANALYSES SUB-COMMITTEE (MA SC)

ORGANISER: ICAR, ARTHUR VAN SCHENDELSTRAAT 650, 3511 MJ UTRECHT, THE NETHERLANDS

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1. Introduction

Dear Participant,

Thank you for participating in the ICAR Proficiency Test (PT) September 2022 !

This is the fourthteenth round that ICAR organized since 2016 !!!

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

The synthetic report and control charts over the time are prepared by ICAR.

The advantage to participate in the PT round is to obtain a worldwide updated picture of the analytical situation for milk analyses.

For somatic cell parameter, since March 2020 we have the possibility to build the international traceability to the EC JRC Certified reference material for somatic cell counting in milk. Following the ISO/IDF Bullettin 508/2021 Guidance and application of EC JRC Certified reference material for somatic cell counting in milk we have characterized the ICAR PT samples These values and the ISO 13366-2 standard deviation of reproducibility, will be used to calculate, for **SCC ZScore FIX.** In this way the ZS FIX will better anchored to the international metrological traceability and you can follow your instrument performance over the time.

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 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, for each parameter, 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. ICAR Milk Analyses Sub Committee is monitoring these limits and eventually will 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 standard method) are summarized.

Z-Score$_{FIX}$ is calculated considering the standard deviation of reproducibility of the standardized method

If you have obtained all the -2<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.

Control Charts and tables

On the control charts are reported the last 3 proficiency tests where your lab participated

In the associated table are reported all the ZS-PT and ZS Fix where your laboratory participated

For this reason from this round the ZS values are reported according the sample order from 1 to 10 and not according the sample concentration as organized in the previous PT

In the second part of the report the statistical elaboration followed the template approved by ICAR's Milk Analyses Sub Committee. 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.

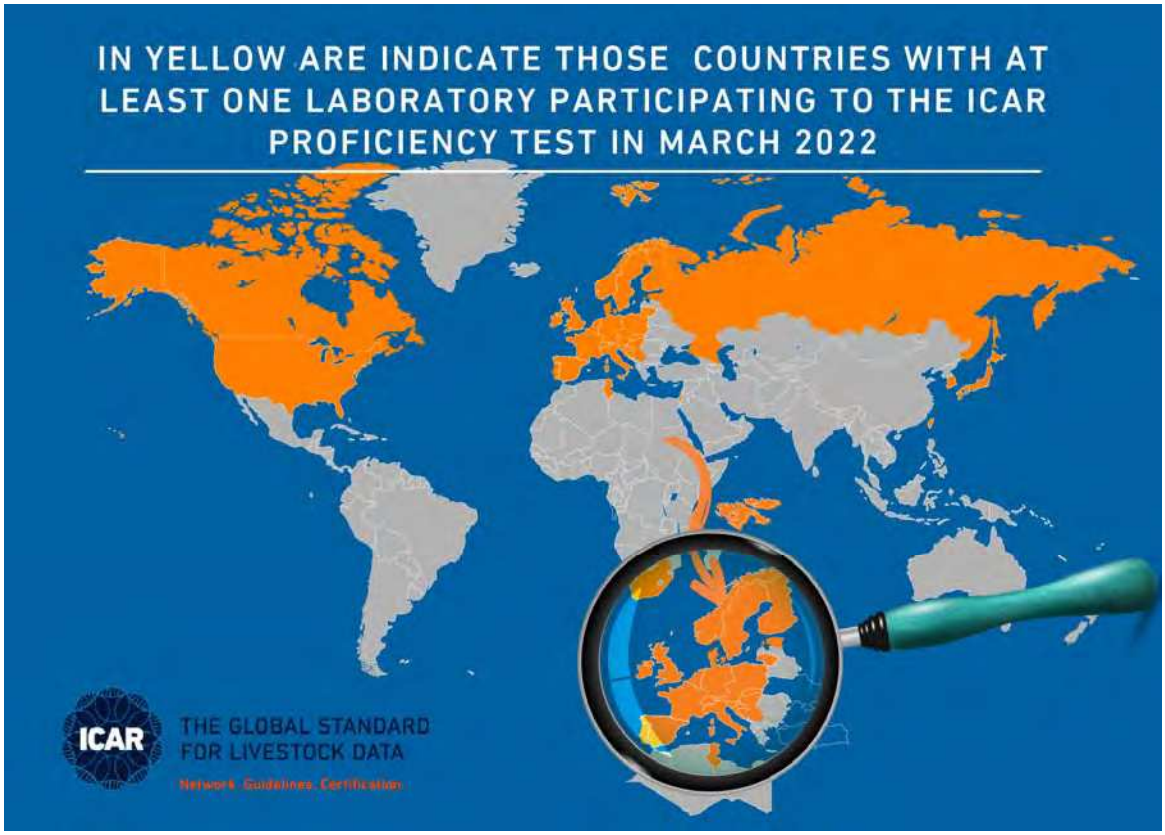
We are sure with your support and contribution it will grow to benefit all!

The list of laboratories that participated in ICAR PT September 2022 with at least one parameter is reported below

Table 1. Participating milk laboratories to the ICAR Proficiency Test (September 2022).

Laboratory	Country
Pruefstelle Labor Rotholz	Austria
Laboratory of milk analysis of the Valorisation of Agricultural Products, Department of Agricultural products of Walloon Agricultural Research Centre	Belgium
Lactanet Canada - Centre d'Expertise en Production Laitière du Québec	Canada
Pacific Milk Analysis laboratory (Lactanet)	Canada
Središnji laboratorij za kontrolu kvalitete mlijeka (Central Laboratory For Milk Quality Control)	Croatia
Ceskomoravska spolecnost chovatelll, a.s. Laborator pro rozbor mléka	Czech Republic
Eurofins Milk Testing Denmark	Denmark
Foss Analytical A/S	Denmark
LVK (Landbrugets Veterincere Konsulenttjenestes Laboratorium)	Denmark
Osuuskunta Satamaito, Laboratorio Kati Järvinen	Finland
Valio Oy, Regional laboratory	Finland
ACTALIA / ACTILAIT / CECALAIT	France
Thermo Fisher Scientific, Lab Service International	France
Milchkontroll- und Rinderzuchtverband eG	Germany
Milchprüfring-Bayern	Germany
Teagasc, Technical Services Laboratory	Ireland
Hudder Health Laboratory	Israel
Associazione Italiana Allevatori, Laboratorio Standard Latte (LSL-AIA)	Italy
Japan Dairy Technical Association	Japan
Pieno Tyrimai, State Laboratory for Milk Control	Lithuania
Tine Ramelklaboratoriet Heimdal	Norway
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

Laboratory	Country
PFHBiPM Region Oceny Bydgoszcz z/s w Minikowie	Poland
Laboratorija za ispitivanje kvaliteta mleka, Poljoprivredni fakultet Novi Sad	Serbia
Plemenárske služby SR, š.p., Centrálne laboratórium rozboru mlieka (Milk Laboratory, Slovak Agricultural Research Centre)	Slovak Republic
KGZS Zavod Ptuj	Slovenia
University of Ljubljana, Biotechnical Faculty, Department of Animai Science, Institute of Dairy Science and Probiotics	Slovenia
Mérieux NutriSciences South Africa	South Africa
Milk Laboratory, University of Pretoria	South Africa
Korea Animal Improvement Association, 111ho Green Dairy Tech. Univ. Han Kyong	South Korea
CICAP Centro Tecnológico	Spain
Ministero de Agricultura,Pesca y Alimentacion. Laboratorio Agroalimentario de Santander, Cantabria	Spain
DeLaval International AB	Sweden
Eurofins Milk Testing Sweden AB	Sweden
National Veterinary Institute	Sweden
Agroscope Institute for food Sciences IFS	Switzerland
Suisselab AG	Switzerland
Council of Agriculture, Executive Yuan, Taiwan Animal Germplasm Center of TLRI	Taiwan
Qlip B.V.	The Netherlands
Laboratoire d'Analyse du Lait Beja, Direction de l'Amelioration Génétique	Tunisia
Laboratoire d'Analyse du lait, Béja	Tunisia
Office de l'Elevage et des Pâturages, Laboratoire de Contrôle Laitier, Direction de l'Amélioration Génétique	Tunisia
National Milk Laboratory	United Kingdom
National Milk Records plc (Glasgow Laboratory)	United Kingdom
CIS, Cattle Information Service	United Kingdom
Eastern Laboratory Services	USA



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

ICAR THE GLOBAL STANDARD FOR LIVESTOCK DATA

Chemical Reference Methods
Laboratory participation codes and Performance analyses

ICAR PT RF0922

Laboratory Name	

A — Your participation Codes

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Subscription	Yes	Yes	Yes	Yes	Yes
Participation Codes	2	2	1	2	2
Are all the sample results received?	Yes	No	Yes	Yes	Yes

B — Data results received on time

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Results reception date	16/09/2022	16/09/2022	14/09/2022	15/09/2022	08/09/2022

C — Have you sent the data with the correct units of measurements?

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
	Yes	Yes	Yes	Yes	Yes

** It was requested to report the value in total nitrogen*

D — Ranking of your lab

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
Code	2	2	1	2	2
%	100	33	10	30	89
d	-0.021	-0.001	-0.007	-0.575	8%
Sd	0.017	0.011	0.007	0.525	8%
D	0.027	0.011	0.010	0.779	11%
Limits					
d	<= 0.020	<= 0.025	<= 0.10	-2.5 <= d <= 2.5	-10% <= d <= 10%
Sd	<= 0.030	<= 0.020	<= 0.10	<= 1.5	<= 10%

E — Outliers

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
Sample 1					
Sample 2					
Sample 3					
Sample 4					
Sample 5					
Sample 6					
Sample 7					
Sample 8					
Sample 9					
Sample 10	Outlier				

F

Repeatability

Your "r" performance

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
Sample 1	0.011	0.003	0.00	0.50	22
Sample 2	0.010	0.004	0.01	0.21	45
Sample 3	0.013	0.001	0.00	0.24	14
Sample 4	0.007	0.009	0.00	0.18	4
Sample 5	0.019	0.006	0.00	1.01	1
Sample 6	0.015	0.016	0.00	1.10	20
Sample 7	0.009	0.006	0.00	0.24	6
Sample 8	0.019	0.013	0.01	0.21	25
Sample 9	0.009	0.002	0.00	0.42	1
Sample 10	0.018	0.003	0.01	0.57	3

If the repeatability in smaller than the limit the cell is in green if there is a sample with a "r" bigger than the limit the cell is in red. Please check table II in correspondence of the parameter and your lab code.

Limits

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt	
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml	
	ISO 1211 IDF 1D	ISO 8968 IDF 20	ISO 22662 IDF 198	ISO 14637 IDF 195	ISO 13366-2 IDF 148-2	
	<= 0.043	<= 0.038	<= 0.06	<= 1.52	Level	r
					150	25
					300	42
					450	51
					750	64
					1500	126

G

Your Z-Score PT

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Sample 1	-1.09	0.28	-0.21	-0.73	1.87
Sample 2	-2.57	0.04	-0.22	-0.35	1.88
Sample 3	-1.49	-0.57	-0.23	-0.32	1.17
Sample 4	-1.06	-0.93	-0.15	-0.55	1.74
Sample 5	-0.63	-0.45	-0.17	-0.94	1.08
Sample 6	-0.06	-0.65	-0.26	-0.29	2.06
Sample 7	-2.22	-0.08	0.03	-0.68	1.86
Sample 8	-1.78	-0.07	-0.05	-0.18	1.78
Sample 9	-0.61	0.14	0.00	0.34	-0.10
Sample 10	-4.11	0.49	0.08	-0.25	0.85

Your Z-Score Fix

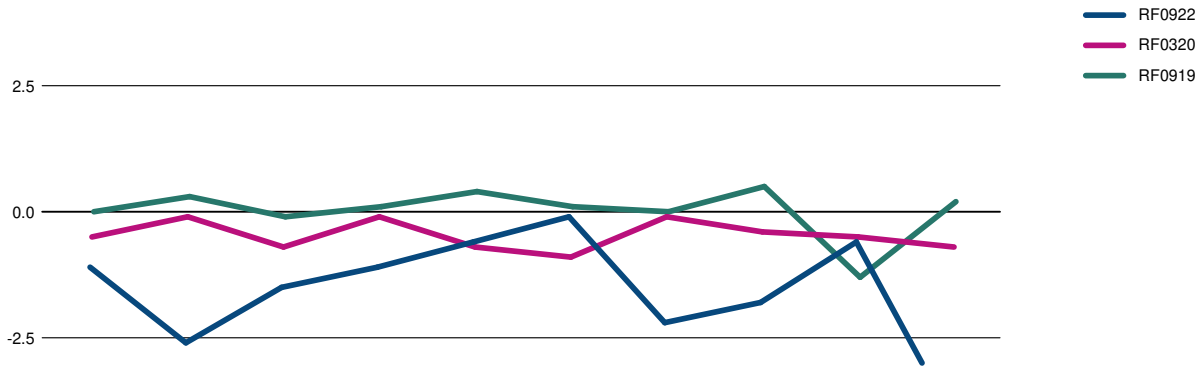
	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Sample 1	-0.50	0.51	-0.28	-0.58	1.49
Sample 2	-2.59	0.03	-0.29	-0.34	1.62
Sample 3	-1.04	-0.47	-0.34	-0.33	1.04
Sample 4	-0.73	-0.62	-0.14	-0.46	1.25
Sample 5	-0.43	-0.54	-0.18	-0.74	1.12
Sample 6	-0.03	-0.79	-0.25	-0.25	1.54
Sample 7	-1.81	-0.15	0.03	-0.38	1.51
Sample 8	-1.19	-0.08	-0.06	-0.12	1.44
Sample 9	-0.27	0.13	0.00	0.35	1.19
Sample 10	-2.07	1.27	0.09	-0.33	1.17

If there is a sample with a "z-score" in the yellow or red area please check table VI and VII in correspondence of your lab code.

Interpretation Z-Score

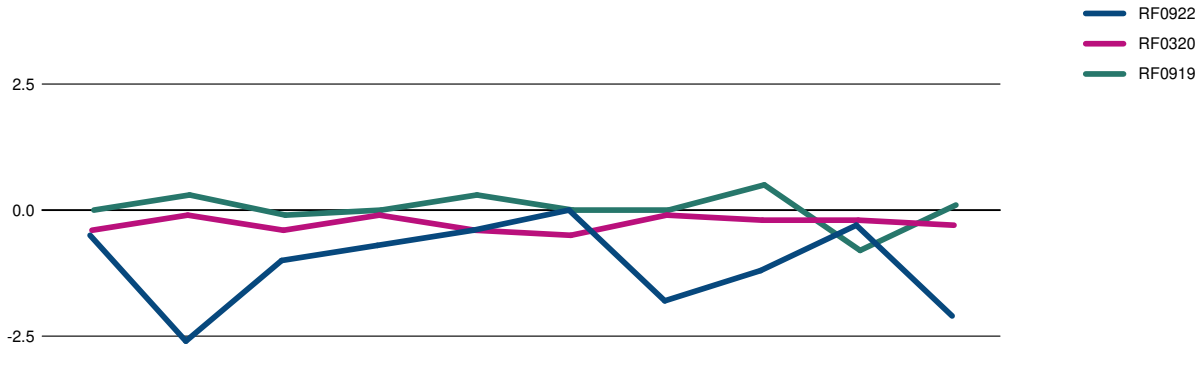
Z-Score < -3	-3 <= Z-Score < -2	-2 <= Z-Score <= 2	2 < Z-Score <= 3	Z-Score > 3
Poor	Moderate	Good	Moderate	Poor

ZSCORE-PT - FAT reference



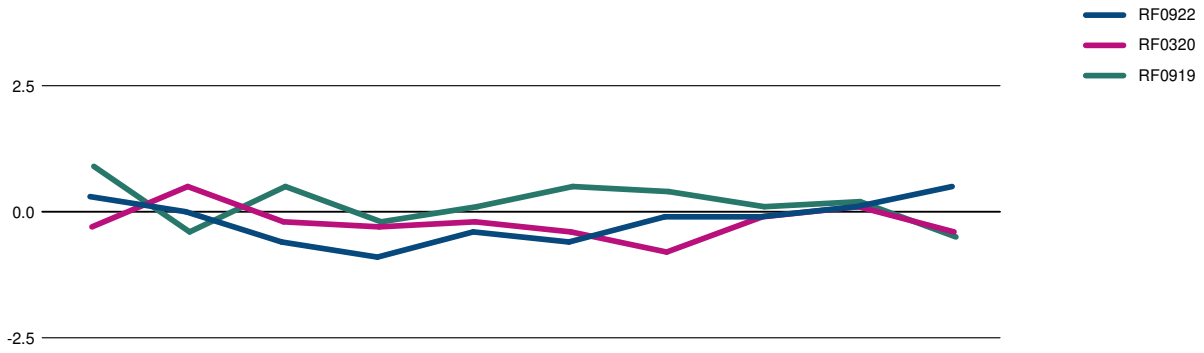
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	-1.1	-2.6	-1.5	-1.1	-0.6	-0.1	-2.2	-1.8	-0.6	-4.1	20%	10%	70%
2	RF0320	-0.5	-0.1	-0.7	-0.1	-0.7	-0.9	-0.1	-0.4	-0.5	-0.7	0%	0%	100%
1	RF0919	0.0	0.3	-0.1	0.1	0.4	0.1	0.0	0.5	-1.3	0.2	0%	0%	100%
2	RF0319	0.1	-1.9	-1.1	-0.1	0.2	0.1	-0.9	-2.3	-0.1	-1.0	10%	0%	90%
2	RF0918	0.6	0.7	0.5	-1.6	-0.6	0.6	-0.2	-0.2	-1.2	-0.6	0%	0%	100%
2	RF0318	-0.2	0.2	-0.1	0.3	0.2	0.2	0.0	-1.9	-0.4	0.1	0%	0%	100%
2	RF0917	0.0	0.3	-0.4	0.0	0.8	0.0	-0.2	0.0	-0.1	0.7	0%	0%	100%
2	RF0317	0.3	-0.3	0.3	0.6	1.0	0.3	0.5	0.6	1.6	0.6	0%	0%	100%
2	RF0916	0.7	0.8	0.8	0.7	0.7	0.2	0.8	0.6	0.1	0.7	0%	0%	100%
2	RF0316	-0.1	-0.4	-0.1	0.1	0.0	-0.3	0.5	0.1	0.0	0.5	0%	0%	100%

ZSCORE-FIX - FAT reference



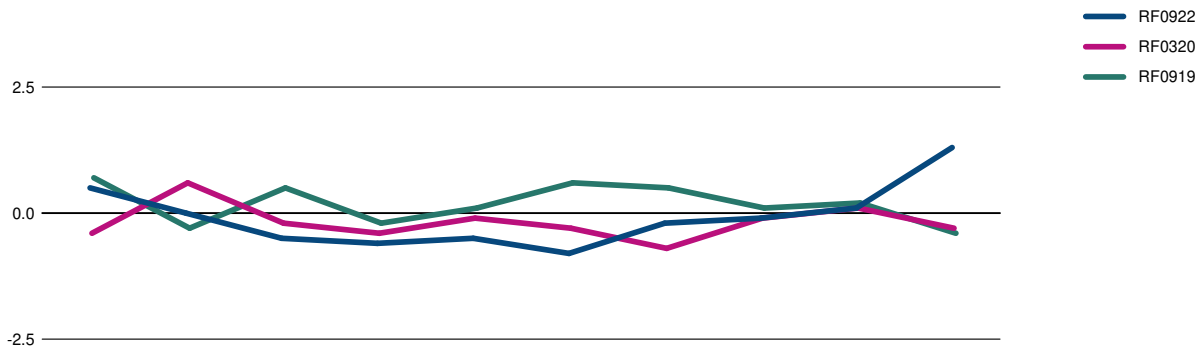
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	-0.5	-2.6	-1.0	-0.7	-0.4	0.0	-1.8	-1.2	-0.3	-2.1	20%	0%	80%
2	RF0320	-0.4	-0.1	-0.4	-0.1	-0.4	-0.5	-0.1	-0.2	-0.2	-0.3	0%	0%	100%
1	RF0919	0.0	0.3	-0.1	0.0	0.3	0.0	0.0	0.5	-0.8	0.1	0%	0%	100%
2	RF0319	0.1	-1.2	-0.5	-0.1	0.1	0.1	-0.4	-1.5	0.0	-0.3	0%	0%	100%
2	RF0918	0.6	0.5	0.3	-2.1	-0.4	0.5	-0.1	-0.2	-1.1	-0.6	10%	0%	90%
2	RF0318	-0.2	0.2	-0.1	0.4	0.2	0.2	0.1	-1.1	-0.3	0.1	0%	0%	100%
2	RF0917	0.0	0.4	-0.1	0.0	0.4	0.0	-0.1	0.0	0.0	0.6	0%	0%	100%
2	RF0317	0.3	-0.1	0.2	0.4	0.6	0.2	0.4	0.5	0.6	0.2	0%	0%	100%
2	RF0916	0.3	0.3	0.5	0.5	0.6	0.1	0.4	0.4	0.1	0.5	0%	0%	100%
2	RF0316	-0.1	-0.3	-0.1	0.1	0.0	-0.1	0.4	0.0	0.0	0.6	0%	0%	100%

ZSCORE-PT - PROTEIN reference



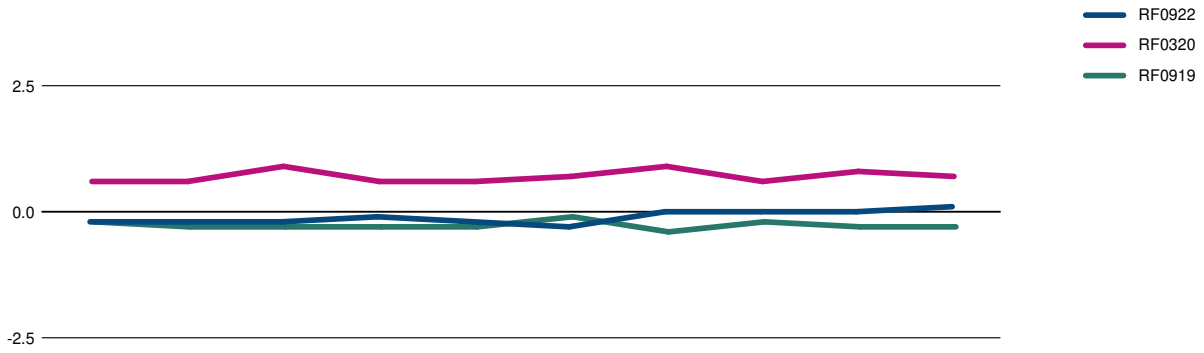
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	0.3	0.0	-0.6	-0.9	-0.4	-0.6	-0.1	-0.1	0.1	0.5	0%	0%	100%
2	RF0320	-0.3	0.5	-0.2	-0.3	-0.2	-0.4	-0.8	-0.1	0.1	-0.4	0%	0%	100%
1	RF0919	0.9	-0.4	0.5	-0.2	0.1	0.5	0.4	0.1	0.2	-0.5	0%	0%	100%
2	RF0319	-0.2	-1.1	-0.4	-0.1	-0.5	-0.3	0.2	-0.4	-0.1	0.0	0%	0%	100%
2	RF0918	-0.4	-0.5	0.2	-0.3	-0.3	0.2	0.0	-0.2	0.2	0.0	0%	0%	100%
2	RF0318	0.3	0.6	0.6	-0.1	0.0	0.2	-0.1	0.7	0.0	0.6	0%	0%	100%
2	RF0917	0.1	0.2	-0.1	-0.1	-0.2	0.5	0.6	0.0	0.2	-0.3	0%	0%	100%
2	RF0317	0.7	-0.3	0.7	-0.2	-0.2	-0.9	0.4	0.3	0.2	-0.3	0%	0%	100%
2	RF0916	-0.9	-0.3	-0.6	-1.0	-0.9	-1.3	-1.3	-1.1	-2.0	-0.9	0%	0%	100%
2	RF0316	0.6	0.2	0.2	0.4	0.3	-0.3	0.3	-0.6	0.1	-0.4	0%	0%	100%

ZSCORE-FIX - PROTEIN reference



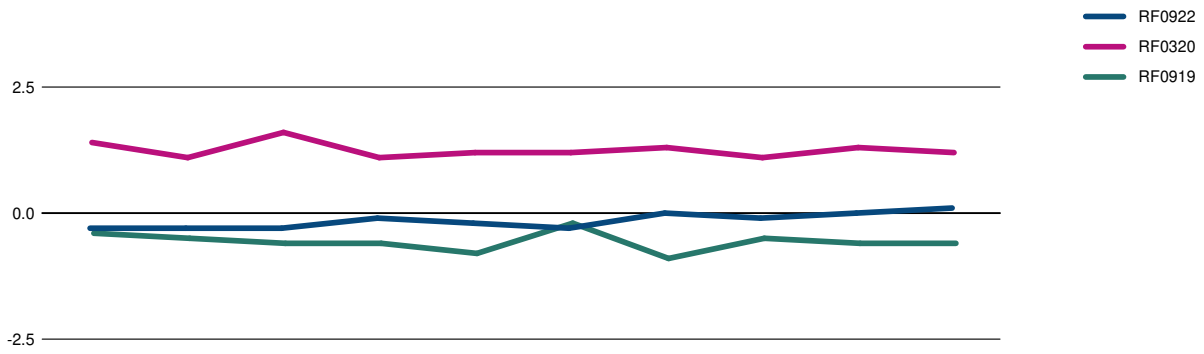
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	0.5	0.0	-0.5	-0.6	-0.5	-0.8	-0.2	-0.1	0.1	1.3	0%	0%	100%
2	RF0320	-0.4	0.6	-0.2	-0.4	-0.1	-0.3	-0.7	-0.1	0.1	-0.3	0%	0%	100%
1	RF0919	0.7	-0.3	0.5	-0.2	0.1	0.6	0.5	0.1	0.2	-0.4	0%	0%	100%
2	RF0319	-0.2	-1.5	-0.4	-0.1	-0.6	-0.5	0.2	-0.5	-0.2	0.0	0%	0%	100%
2	RF0918	-0.4	-0.3	0.2	-0.5	-0.5	0.2	0.0	-0.2	0.2	0.0	0%	0%	100%
2	RF0318	0.3	0.8	0.7	-0.2	0.1	0.5	-0.1	0.7	0.0	0.7	0%	0%	100%
2	RF0917	0.2	0.2	-0.1	-0.1	-0.2	0.5	0.5	0.0	0.4	-0.3	0%	0%	100%
2	RF0317	0.6	-0.3	0.7	-0.2	-0.2	-0.8	0.5	0.2	0.2	-0.3	0%	0%	100%
2	RF0916	-0.8	-0.3	-0.7	-0.9	-1.0	-1.5	-0.9	-0.8	-2.0	-1.1	0%	0%	100%
2	RF0316	0.6	0.2	0.2	0.5	0.4	-0.4	0.3	-0.5	0.1	-0.6	0%	0%	100%

ZSCORE-PT - LACTOSE reference



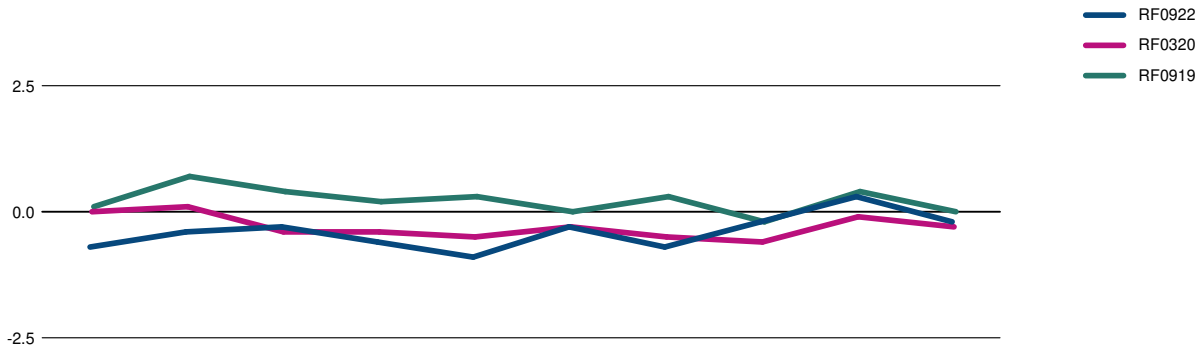
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
1	RF0922	-0.2	-0.2	-0.2	-0.1	-0.2	-0.3	0.0	0.0	0.0	0.1	0%	0%	100%
1	RF0320	0.6	0.6	0.9	0.6	0.6	0.7	0.9	0.6	0.8	0.7	0%	0%	100%
1	RF0919	-0.2	-0.3	-0.3	-0.3	-0.3	-0.1	-0.4	-0.2	-0.3	-0.3	0%	0%	100%
1	RF0319	-0.6	-0.4	-0.6	-0.3	0.1	-0.3	-0.4	-0.3	0.2	0.0	0%	0%	100%
2	RF0918	0.4	0.3	0.0	-0.2	0.1	0.0	-0.1	0.2	-0.2	0.1	0%	0%	100%
1	RF0318	-0.1	-0.3	-0.1	-0.2	0.2	-0.1	-0.1	-0.3	-0.1	0.0	0%	0%	100%
1	RF0917	-0.4	-0.3	-0.7	-0.8	-0.5	-0.4	-0.4	-0.3	-0.4	-0.1	0%	0%	100%
2	RF0317	-0.2	-0.2	-0.3	-0.1	-0.4	-0.3	-0.3	-0.4	-0.5	-0.5	0%	0%	100%
2	RF0916	0.0	-0.2	0.0	0.0	0.1	-0.4	-0.1	0.3	0.0	-0.2	0%	0%	100%
1	RF0316	0.5	0.6	0.1	0.3	0.1	-0.1	0.2	0.5	0.2	0.4	0%	0%	100%

ZSCORE-FIX - LACTOSE reference



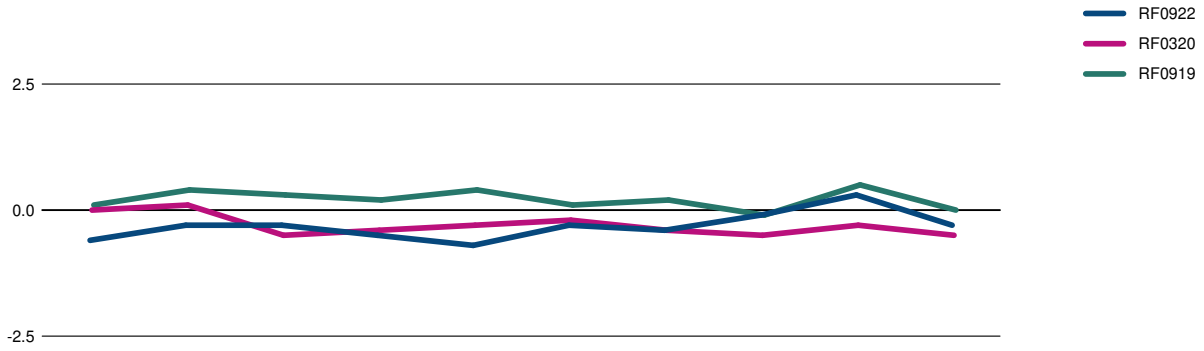
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
1	RF0922	-0.3	-0.3	-0.3	-0.1	-0.2	-0.3	0.0	-0.1	0.0	0.1	0%	0%	100%
1	RF0320	1.4	1.1	1.6	1.1	1.2	1.2	1.3	1.1	1.3	1.2	0%	0%	100%
1	RF0919	-0.4	-0.5	-0.6	-0.6	-0.8	-0.2	-0.9	-0.5	-0.6	-0.6	0%	0%	100%
1	RF0319	-0.5	-0.4	-0.9	-0.4	0.1	-0.4	-0.5	-0.5	0.2	0.0	0%	0%	100%
2	RF0918	0.6	0.4	0.0	-0.2	0.1	0.0	-0.1	0.3	-0.2	0.1	0%	0%	100%
1	RF0318	-0.1	-0.2	-0.1	-0.3	0.2	-0.1	-0.1	-0.4	-0.1	0.0	0%	0%	100%
1	RF0917	-0.5	-0.8	-1.4	-1.1	-1.3	-0.7	-0.6	-0.8	-0.7	-0.1	0%	0%	100%
2	RF0317	-0.3	-0.4	-0.4	-0.2	-0.6	-0.4	-0.5	-0.6	-0.6	-1.1	0%	0%	100%
2	RF0916	0.0	-0.3	-0.1	0.0	0.1	-0.7	-0.1	0.4	0.0	-0.3	0%	0%	100%
1	RF0316	0.4	0.5	0.1	0.3	0.1	-0.1	0.2	0.5	0.3	0.5	0%	0%	100%

ZSCORE-PT - UREA reference



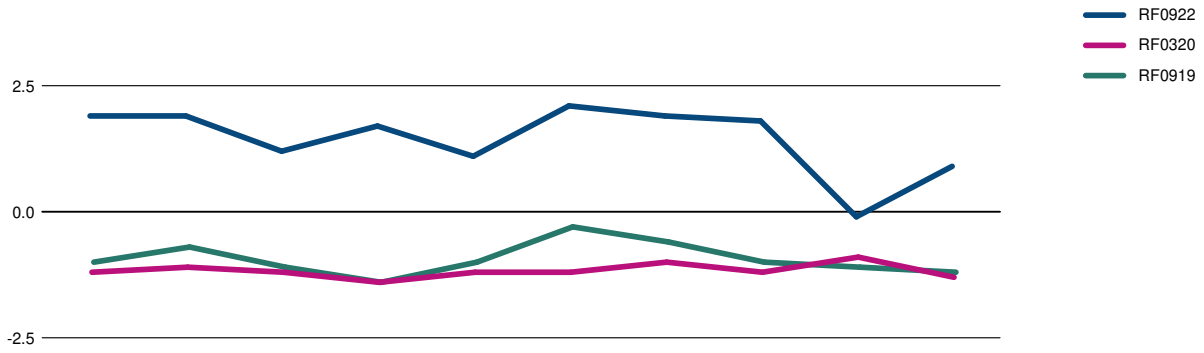
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	-0.7	-0.4	-0.3	-0.6	-0.9	-0.3	-0.7	-0.2	0.3	-0.2	0%	0%	100%
2	RF0320	0.0	0.1	-0.4	-0.4	-0.5	-0.3	-0.5	-0.6	-0.1	-0.3	0%	0%	100%
1	RF0919	0.1	0.7	0.4	0.2	0.3	0.0	0.3	-0.2	0.4	0.0	0%	0%	100%
2	RF0319	-0.1	0.0	-0.1	0.2	0.0	0.1	0.0	0.4	0.2	0.3	0%	0%	100%
2	RF0918	0.3	-0.5	-0.6	-0.7	-0.3	-0.8	0.6	0.9	-0.3	0.0	0%	0%	100%
1	RF0318	0.9	1.5	1.2	1.0	1.8	1.6	2.1	0.7	1.5	1.4	10%	0%	90%
1	RF0917	-1.3	-1.5	-1.6	-1.2	-1.8	-1.1	-2.1	-1.5	-1.9	-4.0	10%	10%	80%
2	RF0317	-5.1	0.2	0.3	-0.1	-0.1	-0.3	0.0	1.3	0.5	-0.1	0%	10%	90%
2	RF0916	0.2	0.2	-0.1	0.0	0.0	0.5	0.3	-0.1	0.1	0.2	0%	0%	100%
2	RF0316	0.3	-0.1	-0.1	0.0	0.6	0.8	1.1	2.2	0.3	0.2	10%	0%	90%

ZSCORE-FIX - UREA reference



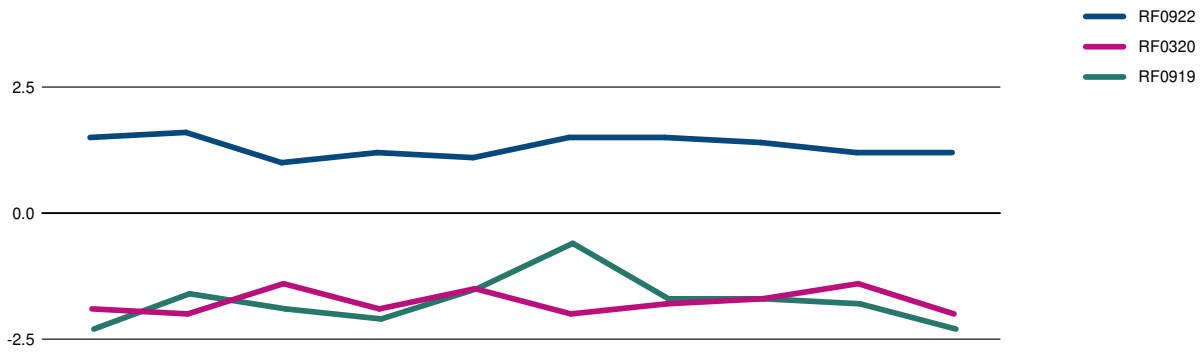
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	-0.6	-0.3	-0.3	-0.5	-0.7	-0.3	-0.4	-0.1	0.3	-0.3	0%	0%	100%
2	RF0320	0.0	0.1	-0.5	-0.4	-0.3	-0.2	-0.4	-0.5	-0.3	-0.5	0%	0%	100%
1	RF0919	0.1	0.4	0.3	0.2	0.4	0.1	0.2	-0.1	0.5	0.0	0%	0%	100%
2	RF0319	-0.1	0.1	-0.1	0.2	0.1	0.2	0.0	0.9	0.4	0.6	0%	0%	100%
2	RF0918	0.1	-0.2	-0.5	-0.2	0.0	-0.6	0.1	0.3	-0.4	-0.1	0%	0%	100%
1	RF0318	0.9	1.3	1.1	0.6	1.2	1.4	1.4	0.7	1.0	1.4	0%	0%	100%
1	RF0917	-0.8	-0.8	-0.8	-1.1	-1.0	-0.9	-0.9	-1.1	-0.7	-1.3	0%	0%	100%
2	RF0317	-3.7	0.2	0.2	-0.7	-0.1	-0.2	0.0	1.1	0.5	-0.1	0%	10%	90%
2	RF0916	0.2	0.2	-0.1	0.0	0.0	0.4	0.2	-0.1	0.0	0.1	0%	0%	100%
2	RF0316	0.2	0.0	0.0	0.0	0.4	0.6	0.5	2.8	0.3	0.2	10%	0%	90%

ZSCORE-PT - SCC



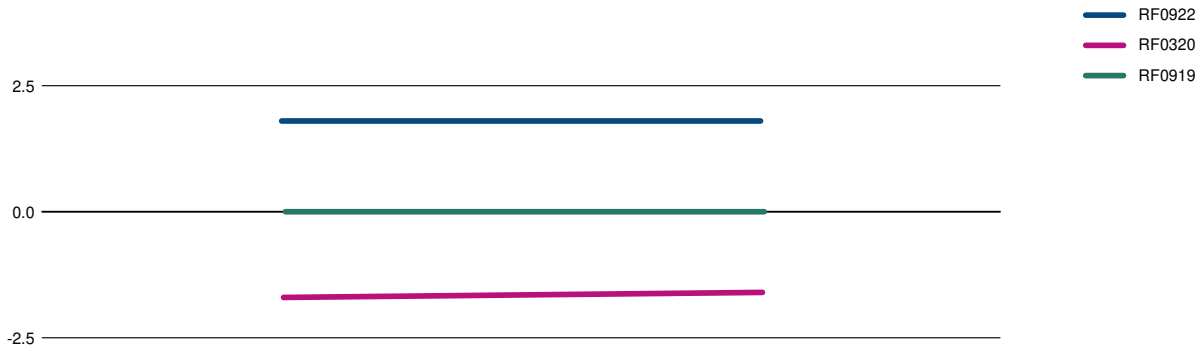
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	1.9	1.9	1.2	1.7	1.1	2.1	1.9	1.8	-0.1	0.9	10%	0%	90%
8	RF0320	-1.2	-1.1	-1.2	-1.4	-1.2	-1.2	-1.0	-1.2	-0.9	-1.3	0%	0%	100%
1	RF0919	-1.0	-0.7	-1.1	-1.4	-1.0	-0.3	-0.6	-1.0	-1.1	-1.2	0%	0%	100%
3	RF0319	-1.7	-1.6	-1.5	-1.7	-1.7	-1.5	-1.7	-1.5	-1.5	-1.3	0%	0%	100%
2	RF0918	-1.5	-1.2	-0.8	-1.3	-1.1	-1.3	-1.2	-1.2	-1.3	-1.1	0%	0%	100%
2	RF0318	-1.1	-1.0	-1.0	-0.8	-0.9	-1.0	-1.0	-1.4	-1.0	-1.1	0%	0%	100%
2	RF0917	-0.9	-1.0	-0.8	-1.0	-1.0	-1.1	-1.1	-1.0	-1.3	-1.1	0%	0%	100%
2	RF0317	-1.3	-1.5	-1.3	-1.4	-1.4	-1.6	-1.4	-1.5	-1.3	-1.2	0%	0%	100%
2	RF0916	-0.6	-1.4	-1.4	-1.2	-1.5	-1.4	-1.3	-1.4	-0.7	-1.5	0%	0%	100%
3	RF0316	-1.7	-1.9	-1.6	-1.4	-1.6	-2.3	-2.2	-1.8	-1.9	-1.6	20%	0%	80%

ZSCORE-FIX - SCC



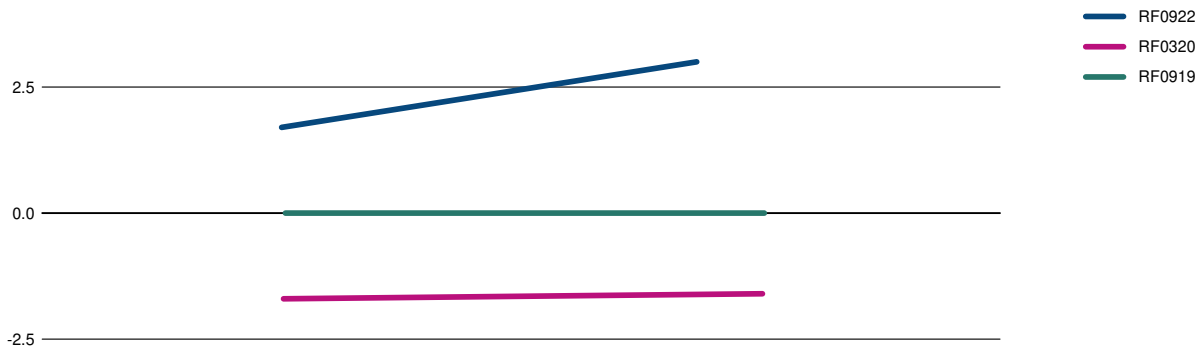
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
2	RF0922	1.5	1.6	1.0	1.2	1.1	1.5	1.5	1.4	1.2	1.2	0%	0%	100%
8	RF0320	-1.9	-2.0	-1.4	-1.9	-1.5	-2.0	-1.8	-1.7	-1.4	-2.0	0%	0%	100%
1	RF0919	-2.3	-1.6	-1.9	-2.1	-1.5	-0.6	-1.7	-1.7	-1.8	-2.3	30%	0%	70%
3	RF0319	-2.6	-2.5	-2.8	-2.4	-2.7	-2.7	-2.4	-3.2	-3.2	-3.0	80%	20%	0%
2	RF0918	-3.8	-2.6	-1.7	-2.5	-2.4	-2.9	-2.9	-3.1	-3.3	-2.7	60%	30%	10%
2	RF0318	-2.3	-2.4	-1.7	-2.4	-1.8	-1.7	-2.7	-2.9	-2.0	-3.1	50%	10%	40%
2	RF0917	-2.3	-3.4	-2.2	-2.6	-3.0	-3.8	-3.7	-4.0	-3.4	-3.6	40%	60%	0%
2	RF0317	-1.9	-2.0	-1.8	-3.0	-2.2	-2.5	-2.4	-1.9	-2.8	-2.7	60%	0%	40%
2	RF0916	-0.9	-2.9	-2.1	-1.8	-2.5	-2.1	-2.8	-2.6	-1.3	-3.2	60%	10%	30%
3	RF0316	-3.4	-3.3	-1.9	-1.8	-1.9	-3.9	-3.1	-2.4	-2.8	-2.4	30%	40%	30%

ZSCORE-PT - SCC - Sample A and B



Part. code	Round	Sample A	Sample B	Yellow	Red	White
2	RF0922	1.8	1.8	0%	0%	100%
8	RF0320	-1.7	-1.6	0%	0%	100%
1	RF0919	0.0	0.0	0%	0%	100%
3	RF0319	0.0	0.0	0%	0%	100%
2	RF0918	0.0	0.0	0%	0%	100%
2	RF0318	0.0	0.0	0%	0%	100%
2	RF0917	0.0	0.0	0%	0%	100%
2	RF0317	0.0	0.0	0%	0%	100%
2	RF0916	0.0	0.0	0%	0%	100%
3	RF0316	0.0	0.0	0%	0%	100%

ZSCORE-FIX - SCC - Sample A and B



Part. code	Round	Sample A	Sample B	Yellow	Red	White
2	RF0922	1.7	3.2	0%	10%	90%
8	RF0320	-1.7	-1.6	0%	0%	100%
1	RF0919	0.0	0.0	0%	0%	100%
3	RF0319	0.0	0.0	0%	0%	100%
2	RF0918	0.0	0.0	0%	0%	100%
2	RF0318	0.0	0.0	0%	0%	100%
2	RF0917	0.0	0.0	0%	0%	100%
2	RF0317	0.0	0.0	0%	0%	100%
2	RF0916	0.0	0.0	0%	0%	100%
3	RF0316	0.0	0.0	0%	0%	100%

ICAR
PROFICIENCY TESTING SCHEME

September 2022

Raw Milk

Determination of FAT CONTENT
Röse Gottlieb method

Sending date of statistical treatment : 28th September 2022

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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cofrac COMPARAISONS INTERLABORATOIRES

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

Nb	%	N°	d	Sd	D	Method
1	6	4	- 0,002	0,002	0,003	A
2	13	7	+ 0,002	0,002	0,003	A
3	19	11	+ 0,002	0,005	0,005	A
4	25	15	+ 0,004	0,004	0,006	A
5	31	9	+ 0,006	0,003	0,006	A
6	38	12	+ 0,005	0,006	0,007	A
7	44	5	- 0,003	0,007	0,008	A
8	50	6	+ 0,010	0,006	0,012	A
9	56	14	- 0,012	0,006	0,014	A
10	63	10	- 0,011	0,010	0,015	A
11	69	16	+ 0,006	0,015	0,016	A
12	75	1	+ 0,006	0,017	0,018	A
13	81	3	- 0,017	0,010	0,019	A
14	88	8	+ 0,018	0,007	0,020	A
15	94	13	- 0,006	0,020	0,021	A
16	100	2	- 0,021	0,017	0,027	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 16 laboratories using the reference method ISO 1211|IDF 1, after outliers discarging using Grubbs test at 5% risk level,

A ISO 1211|IDF 1 Röse Gottlieb Method

(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}	0,014

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	0,003	0,015	0,006	0,002	0,010	0,003	0,005	0,011	0,000	0,021	0,007	20
2	0,011	0,010	0,013	0,007	0,019	0,015	0,009	0,019	0,009	0,018	0,010	20
3	0,013	0,007	0,020	0,012	0,002	0,012	0,017	0,000	0,028 *	0,005	0,010	20
4	0,003	0,002	0,012	0,005	0,001	0,001	0,011	0,004	0,004	0,002	0,004	20
5	0,010	0,002	0,000	0,009	0,009	0,004	0,004	0,003	0,004	0,005	0,004	20
6	0,005	0,001	0,013	0,008	0,009	0,000	0,005	0,008	0,001	0,001	0,005	20
7	0,003	0,005	0,002	0,000	0,006	0,001	0,003	0,004	0,005	0,012	0,004	20
8	0,009	0,013	0,008	0,002	0,001	0,005	0,004	0,003	0,010	0,030	0,008	20
9	0,004	0,007	0,002	0,007	0,007	0,007	0,001	0,002	0,001	0,000	0,003	20
10	0,005	0,001	0,001	0,005	0,004	0,011	0,000	0,004	0,014	0,004	0,005	20
11	0,007	0,003	0,002	0,003	0,017	0,003	0,006	0,027	0,002	0,002	0,008	20
12	0,005	0,003	0,016	0,010	0,018	0,004	0,011	0,008	0,005	0,013	0,007	20
13	0,004	0,010	0,023	0,017	0,036	0,010	0,002	0,020	0,004	0,017	0,012	20
14	**	**	**	**	**	**	**	**	**	**		
15	0,015	0,009	0,002	0,006	0,000	0,003	0,017	0,012	0,007	0,014	0,007	20
16	0,010	0,001	0,008	0,014	0,012	0,013	0,007	0,016	0,008	0,005	0,007	20
Sr	0,006	0,005	0,008	0,006	0,010	0,005	0,006	0,008	0,007	0,010		280
NE	28	28	28	28	28	28	28	28	28	28		
L	0,021	0,020	0,030	0,023	0,036	0,021	0,023	0,032	0,017	0,035		

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	4,653	2,172	3,494	2,812	4,155	2,444	3,829	3,124	1,480	4,496
2	4,634	2,084	3,473	2,785	4,158	2,430	3,800	3,094	1,454	4,478 *
3	4,641	2,130	3,476	2,775	4,147	2,406	3,802	3,111	1,442	4,502
4	4,641	2,138	3,494	2,800	4,164	2,428	3,832	3,114	1,456	4,519
5	4,633	2,133	3,496	2,787	4,160	2,421	3,834	3,114	1,468	4,527
6	4,662	2,154	3,510	2,810	4,167	2,440	3,844	3,127	1,467	4,523
7	4,645	2,139	3,497	2,804	4,170	2,431	3,837	3,124	1,459	4,520
8	4,654	2,155	3,514	2,818	4,195	2,450	3,859	3,146	1,468	4,527
9	4,651	2,142	3,502	2,801	4,170	2,433	3,841	3,126	1,464	4,529
10	4,633	2,120	3,466	2,787	4,153	2,409	3,828	3,115	1,456	4,526
11	4,642	2,135	3,504	2,805	4,166	2,428	3,841	3,115	1,457	4,525
12	4,656	2,148	3,494	2,802	4,171	2,436	3,836	3,122	1,453	4,529
13	4,641	2,121	3,485	2,747 *	4,197	2,430	3,834	3,113	1,456	4,512
14	4,630	2,110	3,480	2,780	4,160	2,420	3,830	3,110	1,450	4,510
15	4,647	2,135	3,495	2,803	4,172	2,438	3,846	3,127	1,456	4,521
16	4,641	2,147	3,508	2,821	4,179	2,433	3,861	3,089	1,464	4,515
M	4,644	2,135	3,493	2,799	4,168	2,430	3,834	3,117	1,459	4,519
REF.	4,643	2,136	3,493	2,799	4,166	2,430	3,836	3,117	1,459	4,519
SD	0,009	0,020	0,014	0,014	0,014	0,012	0,016	0,013	0,009	0,010

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 16 laboratories using the reference method ISO 1211 | IDF 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									3	
Outlier Grubbs				13						2
sr	0,006	0,005	0,008	0,005	0,010	0,005	0,006	0,009	0,005	0,009
SR	0,010	0,020	0,015	0,014	0,016	0,012	0,017	0,015	0,008	0,012

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	+ 0,009	+ 0,036	+ 0,001	+ 0,013	- 0,011	+ 0,013	- 0,007	+ 0,006	+ 0,021	- 0,024	+ 0,006	0,017	1,05
2	- 0,010	- 0,052	- 0,021	- 0,015	- 0,009	- 0,001	- 0,036	- 0,024	- 0,005	- 0,041	- 0,021	0,017	3,99
3	- 0,003	- 0,006	- 0,017	- 0,024	- 0,019	- 0,024	- 0,034	- 0,006	- 0,017	- 0,018	- 0,017	0,010	5,58
4	- 0,003	+ 0,002	+ 0,001	+ 0,000	- 0,003	- 0,003	- 0,004	- 0,003	- 0,003	- 0,000	- 0,002	0,002	2,38
5	- 0,010	- 0,003	+ 0,003	- 0,013	- 0,007	- 0,009	- 0,002	- 0,004	+ 0,009	+ 0,007	- 0,003	0,007	1,23
6	+ 0,018	+ 0,018	+ 0,016	+ 0,011	+ 0,000	+ 0,010	+ 0,008	+ 0,010	+ 0,008	+ 0,003	+ 0,010	0,006	5,40
7	+ 0,001	+ 0,003	+ 0,004	+ 0,005	+ 0,004	+ 0,000	+ 0,001	+ 0,007	- 0,000	+ 0,001	+ 0,002	0,002	3,29
8	+ 0,010	+ 0,019	+ 0,021	+ 0,019	+ 0,028	+ 0,019	+ 0,023	+ 0,028	+ 0,009	+ 0,008	+ 0,018	0,007	7,81
9	+ 0,008	+ 0,006	+ 0,009	+ 0,001	+ 0,003	+ 0,002	+ 0,005	+ 0,009	+ 0,005	+ 0,010	+ 0,006	0,003	6,21
10	- 0,011	- 0,016	- 0,028	- 0,013	- 0,013	- 0,022	- 0,008	- 0,002	- 0,003	+ 0,007	- 0,011	0,010	3,47
11	- 0,002	- 0,001	+ 0,011	+ 0,005	- 0,001	- 0,003	+ 0,005	- 0,003	- 0,002	+ 0,006	+ 0,002	0,005	1,04
12	+ 0,012	+ 0,012	+ 0,001	+ 0,003	+ 0,005	+ 0,006	- 0,000	+ 0,005	- 0,006	+ 0,009	+ 0,005	0,006	2,52
13	- 0,002	- 0,015	- 0,009	- 0,053	+ 0,031	- 0,000	- 0,002	- 0,004	- 0,003	- 0,008	- 0,006	0,020	1,01
14	- 0,013	- 0,026	- 0,013	- 0,019	- 0,006	- 0,010	- 0,006	- 0,007	- 0,009	- 0,009	- 0,012	0,006	5,95
15	+ 0,003	- 0,001	+ 0,002	+ 0,004	+ 0,006	+ 0,007	+ 0,010	+ 0,010	- 0,003	+ 0,002	+ 0,004	0,004	2,72
16	- 0,002	+ 0,011	+ 0,015	+ 0,022	+ 0,013	+ 0,002	+ 0,025	- 0,028	+ 0,005	- 0,005	+ 0,006	0,015	1,16
d	+ 0,000	- 0,001	- 0,000	- 0,000	+ 0,001	- 0,001	- 0,001	- 0,001	+ 0,000	- 0,001	- 0,001	0,014	
Sd	0,009	0,020	0,014	0,014	0,014	0,012	0,016	0,013	0,009	0,010	0,013		

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

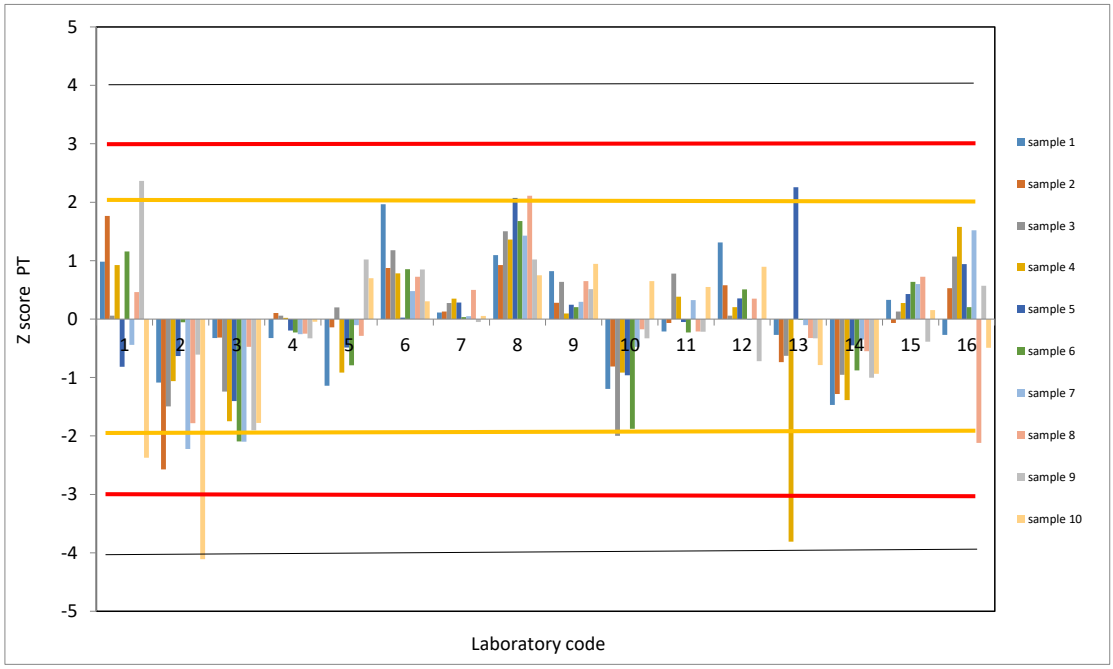
Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample/Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,98	+1,77	+0,06	+0,93	-0,82	+1,16	-0,44	+0,46	+2,37	-2,37
2	-1,09	-2,57	-1,49	-1,06	-0,63	-0,06	-2,22	-1,78	-0,61	-4,11
3	-0,32	-0,32	-1,24	-1,75	-1,40	-2,09	-2,10	-0,47	-1,90	-1,78
4	-0,32	+0,11	+0,06	+0,02	-0,19	-0,23	-0,26	-0,25	-0,33	-0,04
5	-1,14	-0,14	+0,20	-0,92	-0,49	-0,79	-0,10	-0,29	+1,02	+0,70
6	+1,97	+0,87	+1,18	+0,78	+0,03	+0,86	+0,48	+0,73	+0,85	+0,30
7	+0,11	+0,13	+0,27	+0,35	+0,28	+0,03	+0,05	+0,50	-0,05	+0,05
8	+1,09	+0,92	+1,50	+1,36	+2,07	+1,68	+1,43	+2,11	+1,02	+0,75
9	+0,82	+0,28	+0,64	+0,09	+0,24	+0,20	+0,29	+0,65	+0,51	+0,95
10	-1,20	-0,81	-2,00	-0,92	-0,96	-1,88	-0,47	-0,17	-0,33	+0,65
11	-0,21	-0,07	+0,78	+0,38	-0,05	-0,23	+0,32	-0,21	-0,22	+0,55
12	+1,31	+0,58	+0,06	+0,20	+0,35	+0,5	-0,0	+0,35	-0,7	+0,90
13	-0,27	-0,74	-0,63	-3,81	+2,26	-0,0	-0,1	-0,32	-0,3	-0,79
14	-1,47	-1,28	-0,95	-1,39	-0,45	-0,9	-0,4	-0,55	-1,0	-0,94
15	+0,33	-0,07	+0,13	+0,28	+0,43	+0,6	+0,6	+0,73	-0,4	+0,15
16	-0,27	+0,53	+1,07	+1,58	+0,94	+0,2	+1,5	-2,12	+0,6	-0,49

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



FIX Z-score

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

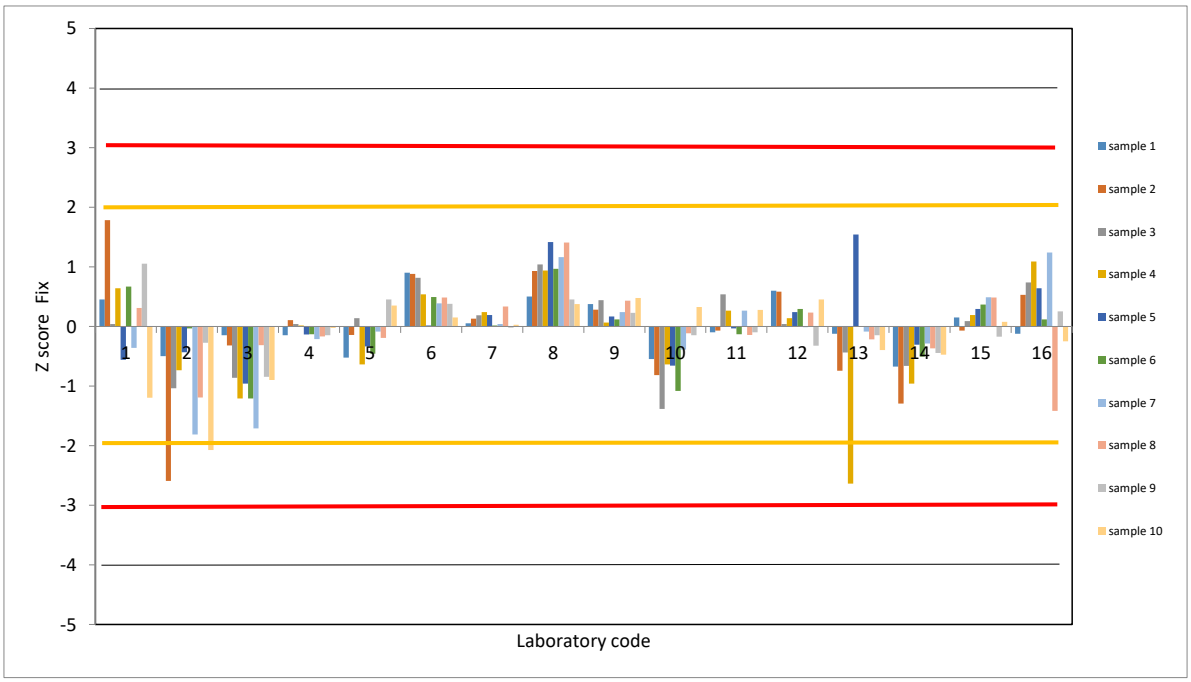
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,45	+1,78	+0,04	+0,64	-0,56	+0,67	-0,36	+0,31	+1,05	-1,20
2	-0,50	-2,59	-1,04	-0,73	-0,43	-0,03	-1,81	-1,19	-0,27	-2,07
3	-0,15	-0,32	-0,86	-1,21	-0,96	-1,21	-1,71	-0,32	-0,85	-0,90
4	-0,15	+0,11	+0,04	+0,02	-0,13	-0,13	-0,21	-0,17	-0,15	-0,02
5	-0,52	-0,14	+0,14	-0,63	-0,33	-0,46	-0,09	-0,19	+0,45	+0,35
6	+0,90	+0,88	+0,81	+0,54	+0,02	+0,49	+0,39	+0,48	+0,38	+0,15
7	+0,05	+0,13	+0,19	+0,24	+0,19	+0,02	+0,04	+0,33	-0,02	+0,03
8	+0,50	+0,93	+1,04	+0,94	+1,42	+0,97	+1,16	+1,41	+0,45	+0,38
9	+0,38	+0,28	+0,44	+0,07	+0,17	+0,12	+0,24	+0,43	+0,23	+0,48
10	-0,55	-0,82	-1,39	-0,63	-0,66	-1,08	-0,39	-0,12	-0,15	+0,33
11	-0,10	-0,07	+0,54	+0,27	-0,03	-0,13	+0,26	-0,14	-0,10	+0,28
12	+0,60	+0,58	+0,04	+0,14	+0,24	+0,29	-0,0	+0,23	-0,32	+0,45
13	-0,12	-0,74	-0,44	-2,63	+1,54	-0,01	-0,1	-0,22	-0,15	-0,40
14	-0,67	-1,29	-0,66	-0,96	-0,31	-0,51	-0,3	-0,37	-0,45	-0,47
15	+0,15	-0,07	+0,09	+0,19	+0,29	+0,37	+0,5	+0,48	-0,17	+0,08
16	-0,12	+0,53	+0,74	+1,09	+0,64	+0,12	+1,2	-1,42	+0,25	-0,25

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= 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



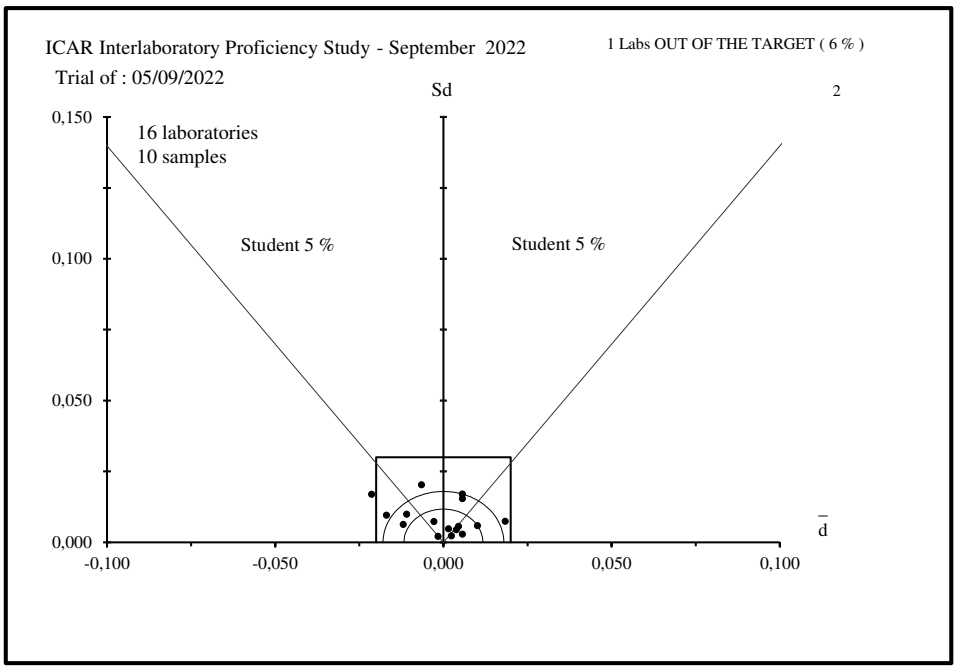


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

ICAR
PROFICIENCY TESTING SCHEME

September 2022

Raw Milk

Determination of CRUDE PROTEIN CONTENT
KJELDAHL Method

Sending date of statistical treatment : 28th September 2022

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 WWW.COFRAC.FR

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

Nb	%	N°	sig d	Sd	D	Method
1	7	5	- 0,001	0,008	0,008	ISO 8968-1 | IDF 20-1
2	13	9	- 0,007	0,007	0,010	ISO 8968-1 | IDF 20-1
3	20	7	+ 0,008	0,006	0,010	ISO 8968-1 | IDF 20-1
4	27	14	+ 0,009	0,006	0,010	ISO 8968-1 | IDF 20-1
5	33	2	- 0,001	0,011	0,011	ISO 8968-1 | IDF 20-1
6	40	10	- 0,004	0,010	0,011	ISO 8968-3 | IDF 20-3
7	47	4	- 0,008	0,008	0,012	ISO 8968-1 | IDF 20-1
8	53	8	- 0,012	0,008	0,014	ISO 8968-3 | IDF 20-3
9	60	12	- 0,003	0,020	0,020	ISO 8968-1 | IDF 20-1
10	67	6	+ 0,021	0,006	0,022	ISO 8968-1 | IDF 20-1
11	73	13	- 0,016	0,018	0,024	ISO 8968-1 | IDF 20-1
12	80	11	+ 0,031	0,009	0,032	ISO 8968-1 | IDF 20-1
13	87	15	+ 0,034	0,015	0,037	ISO 8968-1 | IDF 20-1
14	93	3	- 0,035	0,037	0,051	ISO 8968-1 | IDF 20-1
15	100	1	- 0,069	0,026	0,074	ISO 8968-1 | IDF 20-1

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 15 laboratories using the reference method (ISO 8968-1|IDF 20-1 and ISO 8968-3|IDF 20-3), after outlier discarging using Grubbs test at 5% risk level

N.B. : N° 8 and N° 10 : ISO 8968-3|IDF 20-3

(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}	0,008
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,025

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	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
2	0,003	0,004	0,001	0,009	0,006	0,016	0,006	0,013	0,002	0,003	0,006	20
3	**	0,014	0,004	0,008	0,034	0,017	0,027	0,038 *	0,015	**	0,016	16
4	0,017	0,017	0,001	0,007	0,031	0,004	0,013	0,001	0,002	0,028	0,011	20
5	0,014	0,004	0,005	0,003	0,011	0,005	0,026	0,001	0,013	0,008	0,008	20
6	0,007	0,001	0,000	0,006	0,004	0,001	0,001	0,006	0,006	0,003	0,003	20
7	0,017	0,001	0,004	0,000	0,001	0,004	0,007	0,022 *	0,002	0,004	0,007	20
8	0,004	0,008	0,009	0,000	0,003	0,007	0,003	0,003	0,002	0,004	0,004	20
9	0,024	0,008	0,008	0,001	0,011	0,001	0,002	0,008	0,007	0,001	0,007	20
10	0,006	0,011	0,013	0,015	0,008	0,004	0,000	0,003	0,030 *	0,028	0,011	20
11	0,010	0,006	0,006	0,001	0,006	0,003	0,005	0,009	0,003	0,006	0,004	20
12	0,006	0,035 *	0,008	0,028 *	0,012	0,009	0,033	0,003	0,004	0,026	0,014	20
13	**	**	**	**	**	**	**	**	**			
14	0,000	0,000	0,010	0,000	0,000	0,000	0,000	0,010	0,010	0,010	0,004	20
15	0,007	0,004	0,004	0,041 *	0,002	0,006	0,004	0,001	0,009	0,004	0,010	20
Sr	0,008	0,008	0,005	0,010	0,010	0,005	0,010	0,009	0,008	0,010		276
NE	26	28	28	28	28	28	28	28	28	26		
L	0,029	0,020	0,017	0,016	0,036	0,020	0,037	0,016	0,019	0,036		

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 accordingISO 8968-1 | IDF 20-1

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	3,760	2,770	3,290 *	2,900 *	3,560 *	2,840	3,480	3,150	3,290 *	3,660
2	3,855	2,792	3,366	2,962	3,641	2,873	3,558	3,179	3,385	3,768
3		2,766	3,371	2,951	3,604	2,899	3,500	3,170	3,339	3,633
4	3,835	2,777	3,370	2,970	3,639	2,887	3,566	3,161	3,364	3,741
5	3,838	2,791	3,365	2,977	3,643	2,891	3,553	3,178	3,383	3,761
6	3,872	2,807	3,388	2,986	3,676	2,908	3,585	3,205	3,399	3,777
7	3,848	2,798	3,380	2,978	3,666	2,892	3,571	3,198	3,383	3,759
8	3,843	2,796	3,359	2,960	3,632	2,875	3,554	3,162	3,366	3,728
9	3,832	2,786	3,366	2,970	3,633	2,882	3,549	3,174	3,380	3,752
10	3,832	2,798	3,360	2,971	3,657	2,895	3,552	3,181	3,381	3,721
11	3,876	2,818	3,400	2,999	3,682	2,910	3,595	3,212	3,411	3,798
12	3,864	2,794	3,390	2,978	3,664	2,877	3,562	3,152	3,378	3,702
13	3,790	2,780	3,360	2,970	3,630	2,850	3,550	3,180	3,380	3,740
14	3,860	2,800	3,375	2,980	3,660	2,890	3,570	3,185	3,395	3,765
15	3,877	2,801	3,403	3,020 *	3,672	2,927	3,612	3,224	3,397	3,796
M	3,842	2,791	3,375	2,973	3,650	2,886	3,557	3,181	3,381	3,740
REF.	3,846	2,791	3,375	2,973	3,651	2,888	3,561	3,180	3,383	3,745
SD	0,033	0,014	0,015	0,012	0,022	0,022	0,033	0,022	0,018	0,046

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 15 laboratories using the reference method ISO 8968-1 | IDF 20-1 and ISO 8968-3 | IDF 20-3, 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		12		12				3; 7	10	
Outlier Grubbs			1	1; 15	1				1	
sr	0,008	0,006	0,005	0,005	0,010	0,005	0,010	0,004	0,005	0,010
SR	0,031	0,015	0,015	0,013	0,023	0,021	0,035	0,024	0,019	0,039

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	- 0,086	- 0,021	- 0,085	- 0,073	- 0,091	- 0,048	- 0,081	- 0,030	- 0,093	- 0,085	- 0,069	0,026	8,31
2	+ 0,009	+ 0,001	- 0,008	- 0,011	- 0,010	- 0,014	- 0,003	- 0,002	+ 0,002	+ 0,023	- 0,001	0,011	0,37
3		- 0,026	- 0,004	- 0,022	- 0,047	+ 0,012	- 0,061	- 0,010	- 0,043	- 0,112	- 0,035	0,037	2,83
4	- 0,012	- 0,015	- 0,005	- 0,003	- 0,012	- 0,001	+ 0,006	- 0,019	- 0,019	- 0,004	- 0,008	0,008	3,20
5	- 0,008	- 0,000	- 0,009	+ 0,004	- 0,008	+ 0,004	- 0,008	- 0,002	+ 0,000	+ 0,016	- 0,001	0,008	0,50
6	+ 0,025	+ 0,016	+ 0,014	+ 0,013	+ 0,025	+ 0,020	+ 0,024	+ 0,025	+ 0,017	+ 0,032	+ 0,021	0,006	10,62
7	+ 0,002	+ 0,006	+ 0,005	+ 0,005	+ 0,015	+ 0,005	+ 0,010	+ 0,018	+ 0,000	+ 0,014	+ 0,008	0,006	4,40
8	- 0,003	+ 0,004	- 0,016	- 0,012	- 0,018	- 0,012	- 0,007	- 0,018	- 0,017	- 0,017	- 0,012	0,008	4,90
9	- 0,015	- 0,006	- 0,009	- 0,003	- 0,018	- 0,005	- 0,012	- 0,006	- 0,002	+ 0,007	- 0,007	0,007	3,14
10	- 0,014	+ 0,006	- 0,014	- 0,002	+ 0,006	+ 0,007	- 0,008	+ 0,001	- 0,001	- 0,024	- 0,004	0,010	1,34
11	+ 0,030	+ 0,027	+ 0,025	+ 0,026	+ 0,031	+ 0,023	+ 0,034	+ 0,032	+ 0,029	+ 0,053	+ 0,031	0,009	11,48
12	+ 0,018	+ 0,003	+ 0,015	+ 0,005	+ 0,014	- 0,011	+ 0,001	- 0,028	- 0,005	- 0,043	- 0,003	0,020	0,51
13	- 0,056	- 0,011	- 0,015	- 0,003	- 0,021	- 0,038	- 0,011	- 0,000	- 0,003	- 0,005	- 0,016	0,018	2,86
14	+ 0,014	+ 0,009	+ 0,000	+ 0,007	+ 0,009	+ 0,002	+ 0,009	+ 0,005	+ 0,012	+ 0,020	+ 0,009	0,006	4,87
15	+ 0,031	+ 0,009	+ 0,028	+ 0,047	+ 0,021	+ 0,039	+ 0,051	+ 0,044	+ 0,014	+ 0,051	+ 0,034	0,015	6,97
d	- 0,005	+ 0,000	+ 0,000	+ 0,000	- 0,001	- 0,001	- 0,004	+ 0,001	- 0,001	- 0,005	- 0,003	0,029	
Sd	0,033	0,014	0,015	0,012	0,022	0,022	0,033	0,022	0,018	0,046	0,026		

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

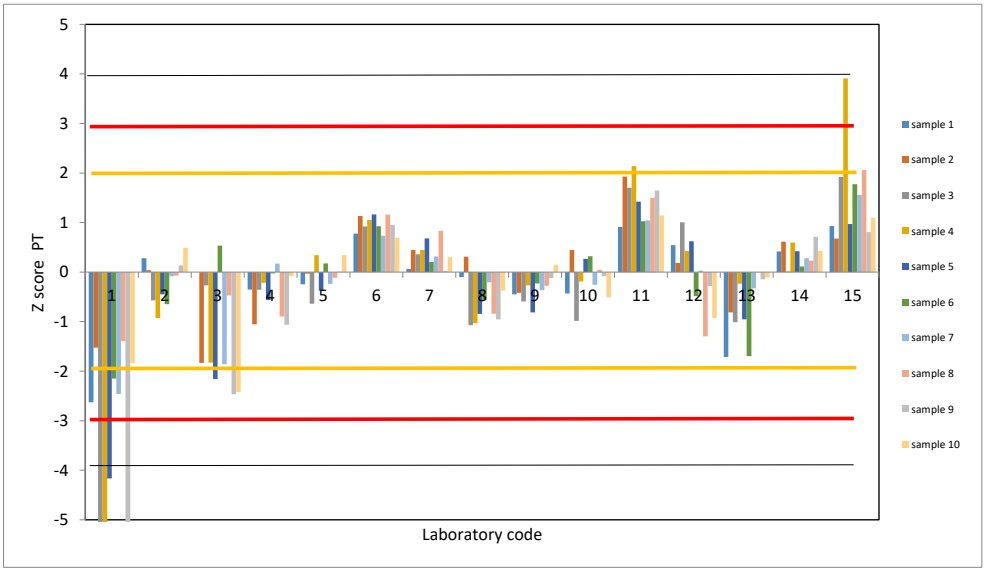
Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample/Lab code	1	2	3	4	5	6	7	8	9	10
1	-2,63	-1,53	-5,77	-6,03	-4,17	-2,15	-2,46	-1,39	-5,28	-1,84
2	+0,28	+0,04	-0,57	-0,93	-0,45	-0,65	-0,08	-0,07	+0,14	+0,49
3		-1,83	-0,27	-1,83	-2,16	+0,54	-1,86	-0,47	-2,47	-2,42
4	-0,35	-1,06	-0,36	-0,21	-0,56	-0,03	+0,17	-0,90	-1,06	-0,08
5	-0,25	-0,03	-0,64	+0,34	-0,37	+0,18	-0,24	-0,11	+0,01	+0,34
6	+0,78	+1,13	+0,92	+1,05	+1,16	+0,93	+0,73	+1,16	+0,95	+0,69
7	+0,07	+0,45	+0,36	+0,45	+0,68	+0,20	+0,32	+0,83	+0,03	+0,30
8	-0,10	+0,31	-1,07	-1,03	-0,84	-0,56	-0,21	-0,84	-0,96	-0,37
9	-0,45	-0,42	-0,60	-0,27	-0,81	-0,23	-0,36	-0,28	-0,12	+0,14
10	-0,43	+0,45	-0,99	-0,19	+0,27	+0,32	-0,26	+0,05	-0,08	-0,51
11	+0,91	+1,93	+1,70	+2,14	+1,42	+1,03	+1,04	+1,50	+1,65	+1,15
12	+0,54	+0,18	+1,00	+0,43	+0,62	-0,48	+0,03	-1,30	-0,28	-0,93
13	-1,71	-0,81	-1,01	-0,23	-0,96	-1,70	-0,33	-0,00	-0,14	-0,11
14	+0,42	+0,62	+0,01	+0,60	+0,42	+0,11	+0,28	+0,23	+0,71	+0,43
15	+0,93	+0,67	+1,92	+3,91	+0,97	+1,78	+1,56	+2,06	+0,81	+1,10

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



FIX Z-score

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

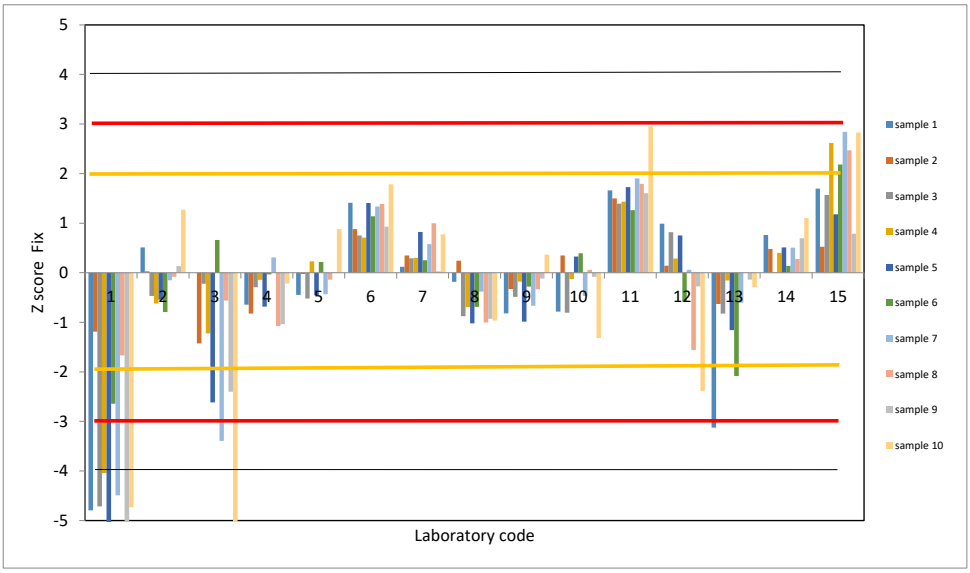
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-4,79	-1,19	-4,71	-4,04	-5,05	-2,64	-4,49	-1,67	-5,14	-4,73
2	+0,51	+0,03	-0,47	-0,62	-0,54	-0,79	-0,15	-0,08	+0,13	+1,27
3		-1,42	-0,22	-1,23	-2,62	+0,66	-3,39	-0,56	-2,40	-6,24
4	-0,64	-0,82	-0,29	-0,14	-0,68	-0,03	+0,31	-1,08	-1,04	-0,22
5	-0,45	-0,02	-0,52	+0,23	-0,45	+0,22	-0,43	-0,14	+0,01	+0,88
6	+1,41	+0,88	+0,75	+0,71	+1,41	+1,14	+1,34	+1,39	+0,93	+1,78
7	+0,12	+0,35	+0,29	+0,30	+0,82	+0,25	+0,58	+1,00	+0,03	+0,77
8	-0,18	+0,24	-0,88	-0,69	-1,02	-0,69	-0,38	-1,01	-0,93	-0,96
9	-0,82	-0,33	-0,49	-0,18	-0,99	-0,28	-0,67	-0,33	-0,12	+0,37
10	-0,78	+0,35	-0,81	-0,13	+0,33	+0,39	-0,47	+0,06	-0,08	-1,32
11	+1,66	+1,50	+1,39	+1,43	+1,73	+1,26	+1,90	+1,79	+1,60	+2,95
12	+0,99	+0,14	+0,82	+0,29	+0,75	-0,59	+0,06	-1,56	-0,27	-2,39
13	-3,13	-0,63	-0,82	-0,16	-1,16	-2,08	-0,60	-0,00	-0,14	-0,29
14	+0,76	+0,48	+0,01	+0,40	+0,51	+0,14	+0,51	+0,28	+0,69	+1,10
15	+1,70	+0,52	+1,57	+2,62	+1,18	+2,18	+2,84	+2,47	+0,79	+2,83

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



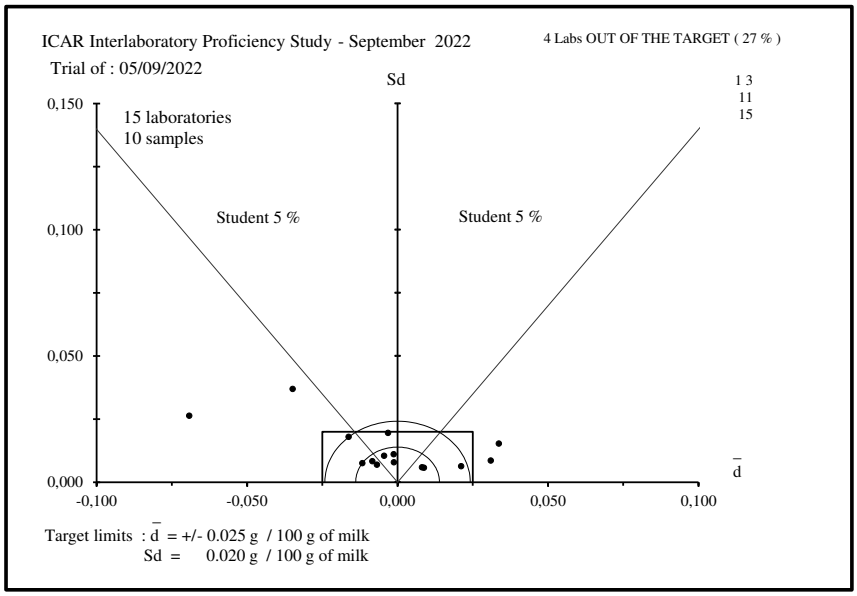


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

Table VIII : Relative recovery of nitrogen on pure solutions

N°	TRYP	GLY	SO4
1	91,3	99,9	
2	99,2	100,1	100,7
3			74,1
4	98,9	99,9	100,6
5	99,5	100,0	100,8
6	99,4	101,4	101,9
7	97,7	89,0	99,5
8	99,1	100,4	100,5
9	97,5	100,2	100,6
10	97,2	100,0	99,8
11	100,4	100,9	101,1
12	99,2	99,4	100,9
13			
14	99,7	100,2	99,9
15	103,1	101,1	103,6

TRY = Tryptophan solution to 5,60 g N/l
GLY = Glycine solution to 5.60 g N/l
SO4 = Ammonium sulfate solution to 5.60 g N/l

TRYP : recovery 97 à 101 %
GLY : recovery 99 à 101 %
SO4 : recovery 99 à 101 %

ICAR
PROFICIENCY TESTING SCHEME

September 2022

Raw Milk

Determination of LACTOSE CONTENT

Sending date of statistical treatment : 28th September 2022

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	10	1	- 0,007	0,007	0,010	Own method
2	20	2	- 0,018	0,015	0,024	ISO 22662 / IDF 198
3	30	7	+ 0,020	0,014	0,025	ISO 22662 / IDF 198
4	40	5	- 0,023	0,012	0,026	ISO 26462 / IDF 214
5	50	3	- 0,037	0,016	0,040	ISO 22662 / IDF 198
6	60	8	+ 0,058	0,026	0,064	Enzymatic method in house
7	70	9	- 0,027	0,063	0,068	ISO 22662 / IDF 198
8	80	4	+ 0,029	0,062	0,069	ISO 26462 / IDF 214
9	90	10	- 0,065	0,027	0,071	liquid chromatography pulse amperometric detector
10	100	6	+ 0,076	0,026	0,080	Lane-Eynon method

(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))

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 :

$$+/- 0.100 \text{ g / 100 g for } \bar{d} \text{ and } 0.100 \text{ g / 100g for Sd}$$

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 10 laboratories , after outliers discarging using Grubbs test at 5 % risk level.

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}	0,018
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,057

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

Sample / Lab code	11	12	13	14	15	16	17	18	19	20	Sr	NL
1	0,002	0,010	0,004	0,004	0,001	0,000	0,003	0,006	0,000	0,006	0,003	20
2	0,044	0,004	0,010	0,042	0,002	0,003	0,027	0,041	0,017	0,040	0,020	20
3	0,006	0,002	0,004	0,002	0,009	0,003	0,004	0,003	0,005	0,003	0,003	20
4	0,071	0,028	0,019	0,033	0,055	0,067	0,091	0,049	0,013	0,086 *	0,041	20
5	0,000	0,003	0,014	0,018	0,006	0,021	0,014	0,024	0,002	0,008	0,010	20
6	0,001	0,015	0,004	0,007	0,013	0,008	0,005	0,014	0,019	0,005	0,008	20
7	0,004	0,001	0,004	0,007	0,000	0,003	0,000	0,008	0,004	0,002	0,003	20
8	0,043	0,026	0,016	0,022	0,056	0,064	0,067	0,040	0,032	0,038	0,031	20
9	0,040	0,013	0,029	0,007	0,005	0,004	0,006	0,027	0,017	0,011	0,014	20
10	0,004	0,035	0,019	0,013	0,035	0,004	0,002	0,000	0,022	0,008	0,013	20
Sr	0,023	0,013	0,010	0,014	0,020	0,021	0,026	0,019	0,012	0,023		200
NE	20	20	20	20	20	20	20	20	20	20		
L	0,080	0,044	0,036	0,049	0,068	0,074	0,091	0,066	0,040	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	11	12	13	14	15	16	17	18	19	20	LACT
1	4,862	4,995	4,922	5,063	4,784	4,769	4,736	4,707	4,679	4,627	4,910
2	4,864	4,992	4,916	5,084	4,760	4,768	4,702	4,692	4,640	4,610	4,885
3	4,811	4,947	4,894	5,033	4,761	4,752	4,698	4,682	4,656	4,608	4,904
4	4,941	5,013	4,861	5,047	4,852	4,811	4,826	4,848	4,703	4,602	4,945
5	4,837	4,974	4,905	5,064	4,762	4,768	4,704	4,687	4,661	4,614	4,909
6	4,941	5,114	5,059	5,103	4,862	4,862	4,795	4,764	4,749	4,720	4,959
7	4,867	5,033	4,967	5,117	4,818	4,801	4,752	4,716	4,703	4,638	4,919
8	4,884	5,055	5,050	5,143	4,857	4,834	4,784	4,766	4,730	4,690	4,773
9	4,974	5,061	4,951	5,048	4,749	4,705	4,658	4,632	4,639	4,531	4,780
10	4,772	4,903	4,860	4,989	4,719	4,745	4,689	4,655	4,633	4,593	
M	4,875	5,008	4,938	5,069	4,792	4,781	4,734	4,715	4,679	4,623	
REF.	4,875	5,009	4,938	5,070	4,792	4,781	4,734	4,710	4,679	4,623	4,912
SD	0,062	0,061	0,070	0,045	0,051	0,046	0,054	0,063	0,040	0,052	

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 135
of 10 laboratories, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	11	12	13	14	15	16	17	18	19	20
Outliers Cochran										4
Outlier Grubbs										
sr	0,023	0,013	0,010	0,014	0,020	0,021	0,026	0,019	0,012	0,014
SR	0,064	0,061	0,070	0,046	0,053	0,048	0,057	0,064	0,041	0,056

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

Sample / Lab code	11	12	13	14	15	16	17	18	19	20	d	Sd_{lab}	t
1	- 0,013	- 0,014	- 0,016	- 0,007	- 0,009	- 0,012	+ 0,001	- 0,003	+ 0,000	+ 0,004	- 0,007	0,007	2,99
2	- 0,011	- 0,017	- 0,022	+ 0,014	- 0,032	- 0,013	- 0,033	- 0,018	- 0,039	- 0,013	- 0,018	0,015	3,87
3	- 0,064	- 0,062	- 0,044	- 0,037	- 0,032	- 0,029	- 0,036	- 0,028	- 0,023	- 0,015	- 0,037	0,016	7,47
4	+ 0,065	+ 0,004	- 0,078	- 0,023	+ 0,059	+ 0,030	+ 0,091	+ 0,138	+ 0,024	- 0,021	+ 0,029	0,062	1,47
5	- 0,038	- 0,035	- 0,033	- 0,006	- 0,030	- 0,013	- 0,030	- 0,023	- 0,018	- 0,009	- 0,023	0,012	6,43
6	+ 0,065	+ 0,105	+ 0,121	+ 0,033	+ 0,069	+ 0,081	+ 0,060	+ 0,054	+ 0,070	+ 0,097	+ 0,076	0,026	9,18
7	- 0,008	+ 0,024	+ 0,029	+ 0,047	+ 0,026	+ 0,020	+ 0,018	+ 0,006	+ 0,024	+ 0,015	+ 0,020	0,014	4,39
8	+ 0,008	+ 0,046	+ 0,112	+ 0,073	+ 0,065	+ 0,053	+ 0,049	+ 0,056	+ 0,051	+ 0,067	+ 0,058	0,026	7,11
9	+ 0,099	+ 0,052	+ 0,012	- 0,022	- 0,044	- 0,076	- 0,076	- 0,078	- 0,040	- 0,092	- 0,027	0,063	1,33
10	- 0,103	- 0,106	- 0,079	- 0,081	- 0,074	- 0,036	- 0,045	- 0,055	- 0,046	- 0,030	- 0,065	0,027	7,63
d	- 0,000	- 0,000	+ 0,000	- 0,001	+ 0,000	+ 0,000	+ 0,000	+ 0,005	+ 0,000	+ 0,000	+ 0,001	0,053	
Sd	0,062	0,061	0,070	0,045	0,051	0,046	0,054	0,063	0,040	0,052	0,055		

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

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

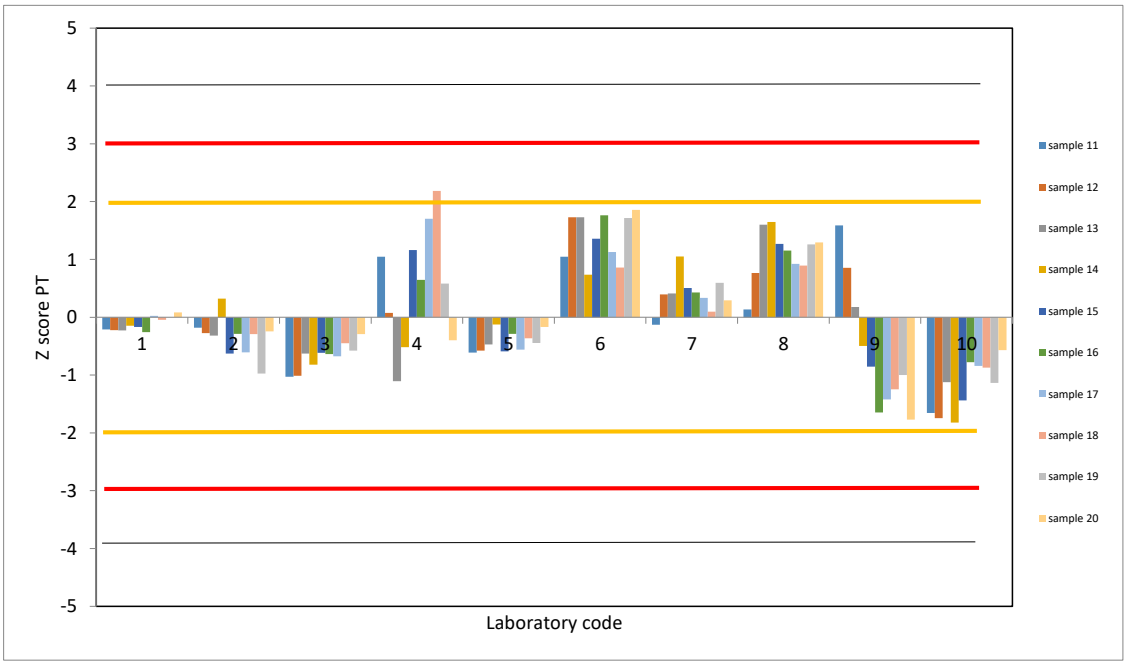
Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	11	12	13	14	15	16	17	18	19	20
1	-0,21	-0,22	-0,23	-0,15	-0,17	-0,26	+ 0,03	-0,05	+ 0,00	+ 0,08
2	-0,18	-0,27	-0,32	+ 0,32	-0,63	-0,29	-0,61	-0,29	-0,97	-0,24
3	-1,03	-1,01	-0,63	-0,82	-0,62	-0,64	-0,67	-0,45	-0,58	-0,29
4	+ 1,05	+ 0,07	-1,11	-0,52	+ 1,16	+ 0,64	+ 1,70	+ 2,19	+ 0,58	-0,40
5	-0,61	-0,58	-0,47	-0,13	-0,59	-0,29	-0,56	-0,36	-0,44	-0,17
6	+ 1,05	+ 1,73	+ 1,73	+ 0,74	+ 1,36	+ 1,76	+ 1,13	+ 0,86	+ 1,72	+ 1,86
7	-0,13	+ 0,39	+ 0,41	+ 1,05	+ 0,51	+ 0,43	+ 0,33	+ 0,10	+ 0,59	+ 0,29
8	+ 0,13	+ 0,76	+ 1,60	+ 1,65	+ 1,27	+ 1,16	+ 0,92	+ 0,89	+ 1,26	+ 1,29
9	+ 1,59	+ 0,86	+ 0,18	-0,50	-0,85	-1,65	-1,42	-1,25	-1,00	-1,77
10	-1,66	-1,75	-1,12	-1,82	-1,44	-0,78	-0,84	-0,87	-1,13	-0,57

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



FIX Z-score

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

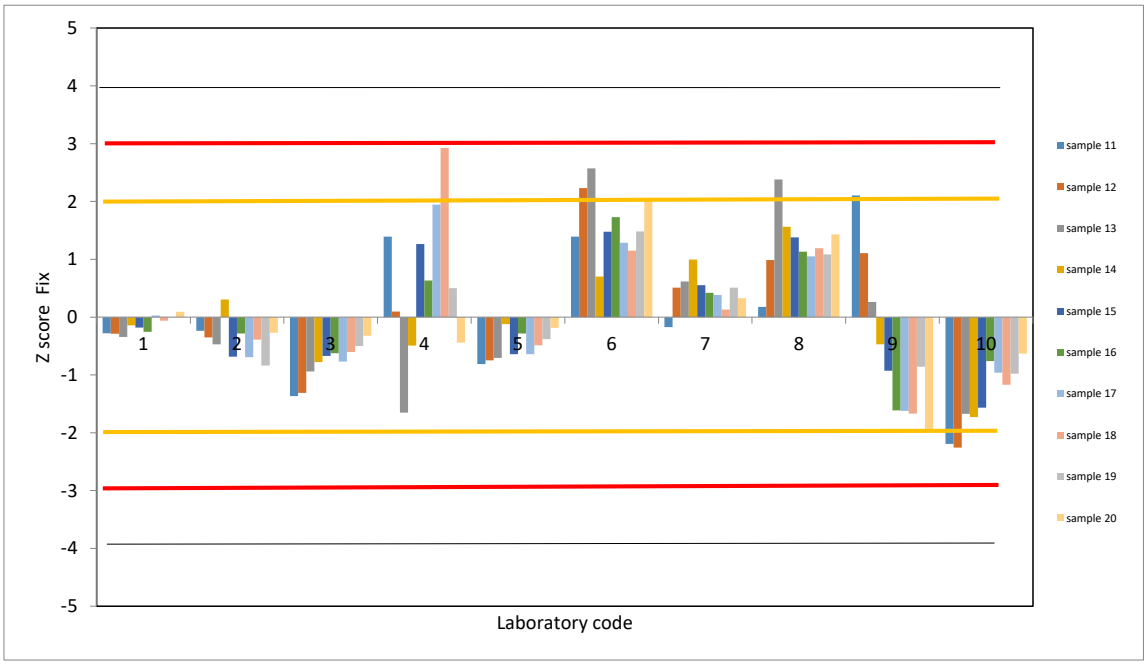
Sample / Lab code	11	12	13	14	15	16	17	18	19	20
1	-0,28	-0,29	-0,34	-0,14	-0,18	-0,25	+0,03	-0,06	+0,00	+0,09
2	-0,24	-0,35	-0,47	+0,31	-0,68	-0,28	-0,69	-0,39	-0,84	-0,27
3	-1,36	-1,31	-0,94	-0,78	-0,67	-0,62	-0,77	-0,60	-0,50	-0,32
4	+1,39	+0,09	-1,65	-0,49	+1,26	+0,63	+1,94	+2,93	+0,50	-0,44
5	-0,81	-0,75	-0,70	-0,12	-0,64	-0,28	-0,64	-0,49	-0,38	-0,18
6	+1,39	+2,23	+2,57	+0,70	+1,48	+1,73	+1,28	+1,15	+1,48	+2,06
7	-0,17	+0,51	+0,62	+1,00	+0,55	+0,42	+0,38	+0,13	+0,51	+0,33
8	+0,18	+0,99	+2,38	+1,56	+1,38	+1,13	+1,05	+1,19	+1,09	+1,43
9	+2,10	+1,11	+0,26	-0,47	-0,93	-1,61	-1,62	-1,67	-0,86	-1,96
10	-2,19	-2,26	-1,67	-1,73	-1,57	-0,76	-0,96	-1,17	-0,98	-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= 0,047

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



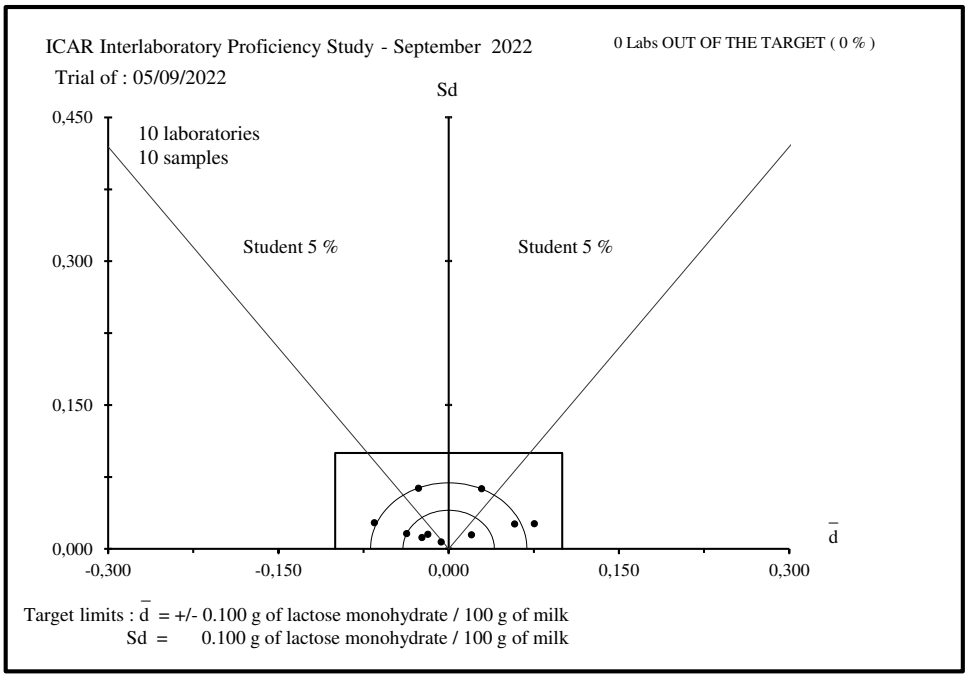


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2022

Raw Milk

Determination of UREA CONTENT

Sending date of statistical treatment : 28th Septembre 2022

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 / dl

Nb	%	N°	ig d	Sd	D	**Method**
1	10	3	+ 0,47	0,27	0,54	ISO 14637 / IDF 195
2	20	5	+ 0,21	0,51	0,55	ISO 14637 / IDF 195
3	30	2	- 0,57	0,53	0,78	ISO 14637 / IDF 195
4	40	9	- 0,68	0,50	0,85	ISO 14637 / IDF 195
5	50	6	- 0,74	0,42	0,85	ISO 14637 / IDF 195
6	60	8	- 0,98	0,92	1,35	Enzymatic method in house
7	70	4	+ 1,59	0,70	1,73	Skalar 612-322
8	80	7	+ 1,80	0,49	1,87	ISO 14637 / IDF 195
9	90	10	+ 3,95	1,03	4,08	enzymatische Bestimmung
10	100	1	- 21,96	8,06	23,39	ISO 14637 / IDF 195

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 :

$\pm$ 2,50 mg / dl for $\bar{d}$ and 1,50 mg / dl for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 6 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}	0,39
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	1,68

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

Sample / Lab code	21	22	23	24	25	26	27	28	29	30	Sr	NL
1	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,00	20
2	0,500	0,210	0,240	0,180	1,010	1,100	0,240	0,210	0,420	0,570	0,40	20
3	0,460	0,620	0,280	0,150	0,490	0,210	0,920	0,470	0,520	0,870	0,39	20
4	0,140	0,490	0,640	0,560	0,440	0,990	0,540	1,130	2,120 *	2,450 *	0,84	20
5	0,200	0,500	0,700	0,500	0,200	0,500	0,200	0,400	0,200	0,100	0,28	20
6	0,680	0,550	0,290	0,000	0,920	0,280	0,780	0,860	0,480	0,370	0,42	20
7	0,400	0,300	0,500	0,200	0,700	0,700	0,500	0,500	0,400	0,400	0,34	20
8	0,190	0,220	0,040	0,120	0,100	0,330	0,080	0,090	0,240	0,250	0,13	20
9	1,100	0,730	0,440	0,070	0,870	0,410	0,990	0,430	0,250	0,510	0,47	20
10	0,600	1,200	1,000	0,900	0,400	1,400	0,200	0,600	0,600	0,300	0,57	20
Sr	0,37	0,41	0,36	0,27	0,43	0,51	0,40	0,40	0,54	0,62		200
NE	20	20	20	20	20	20	20	20	20	20		
L	1,29	1,42	1,24	0,95	1,50	1,78	1,37	1,40	0,93	1,07		

Sr : repeatability standard deviation of each laboratory limit 0,54 mg/dl
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 / dl**

Sample / Lab code	21	22	23	24	25	26	27	28	29	30
1	9,10 *	19,60 *	13,20 *	15,10 *	17,20 *	21,40 *	11,40 *	23,10 *	25,40 *	27,40 *
2	18,36	41,95	27,80	32,68	36,25	46,58	23,16	51,52	57,79	60,68
3	20,32	43,13	28,68	33,94	38,01	47,76	24,35	51,74	57,36	61,96
4	19,95	45,29	29,84	35,08	39,14	49,16	24,62	52,85	58,71	63,75
5	19,20	42,15	29,05	33,75	38,50	46,55	23,70	52,50	57,30	61,85
6	18,49	42,32	28,37	32,77	36,72	46,45	23,34	50,37	55,88	60,41
7	20,80	44,65	31,35	35,50	38,75	48,65	25,45	53,35	59,10	62,90
8	18,75	42,04	28,06	32,86	37,61	46,34	23,57	50,03	54,81	58,61
9	19,27	42,04	28,05	32,71	37,32	46,62	23,43	50,92	55,54	59,81
10	22,90	46,70	33,40	36,85	41,00	50,80	26,00	57,20 *	60,60	66,55
M	19,78	43,36	29,40	34,01	38,14	47,65	24,18	51,66	57,45	61,83
REF.	19,41	42,57	28,39	33,50	37,59	47,04	23,84	51,73	57,16	61,27
SD	1,43	1,75	1,87	1,49	1,43	1,57	1,00	1,19	1,85	2,37

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 6 laboratories using the reference method ISO 14637 | IDF 195 , after outliers discarging using Grubbs test 5% risk level

Table IV : Outlier identification

Sample	21	22	23	24	25	26	27	28	29	30
Outliers Cochran									4	4
Outlier Grubbs	1	1	1	1	1	1	1	1; 10	1	1
sr	0,39	0,43	0,38	0,29	0,46	0,54	0,42	0,42	0,29	0,34
SR	1,46	1,78	1,89	1,51	1,46	1,62	1,05	1,23	1,93	2,43

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

Sample / Lab code	21	22	23	24	25	26	27	28	29	30	d	Sd_{lab}	t
1	- 10,31	- 22,97	- 15,19	- 18,40	- 20,39	- 25,64	- 12,44	- 28,63	- 31,76	- 33,87	- 21,96	8,06	8,62
2	- 1,05	- 0,62	- 0,59	- 0,82	- 1,34	- 0,46	- 0,68	- 0,22	+ 0,63	- 0,59	- 0,57	0,53	3,46
3	+ 0,91	+ 0,56	+ 0,29	+ 0,43	+ 0,42	+ 0,72	+ 0,51	+ 0,00	+ 0,20	+ 0,69	+ 0,47	0,27	5,60
4	+ 0,54	+ 2,72	+ 1,45	+ 1,58	+ 1,55	+ 2,12	+ 0,78	+ 1,11	+ 1,55	+ 2,48	+ 1,59	0,70	7,22
5	- 0,21	- 0,42	+ 0,66	+ 0,25	+ 0,91	- 0,49	- 0,14	+ 0,77	+ 0,14	+ 0,58	+ 0,21	0,51	1,28
6	- 0,92	- 0,25	- 0,02	- 0,73	- 0,87	- 0,59	- 0,50	- 1,36	- 1,28	- 0,86	- 0,74	0,42	5,60
7	+ 1,39	+ 2,08	+ 2,96	+ 2,00	+ 1,16	+ 1,61	+ 1,61	+ 1,62	+ 1,94	+ 1,64	+ 1,80	0,49	11,54
8	- 0,66	- 0,53	- 0,33	- 0,64	+ 0,02	- 0,70	- 0,27	- 1,71	- 2,35	- 2,66	- 0,98	0,92	3,37
9	- 0,14	- 0,53	- 0,34	- 0,80	- 0,27	- 0,42	- 0,42	- 0,82	- 1,63	- 1,46	- 0,68	0,50	4,30
10	+ 3,49	+ 4,13	+ 5,01	+ 3,35	+ 3,41	+ 3,76	+ 2,16	+ 5,47	+ 3,44	+ 5,29	+ 3,95	1,03	12,08
d	+ 0,38	+ 0,79	+ 1,01	+ 0,51	+ 0,55	+ 0,62	+ 0,33	- 0,07	+ 0,29	+ 0,57	- 1,69	7,38	
Sd	1,43	1,75	1,87	1,49	1,43	1,57	1,00	1,19	1,85	2,37	1,64		

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

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

ISO 14637|IDF 195 : Precision of the method :

Sr = 0.54 mg / dl
SR = 1.81 mg / dl

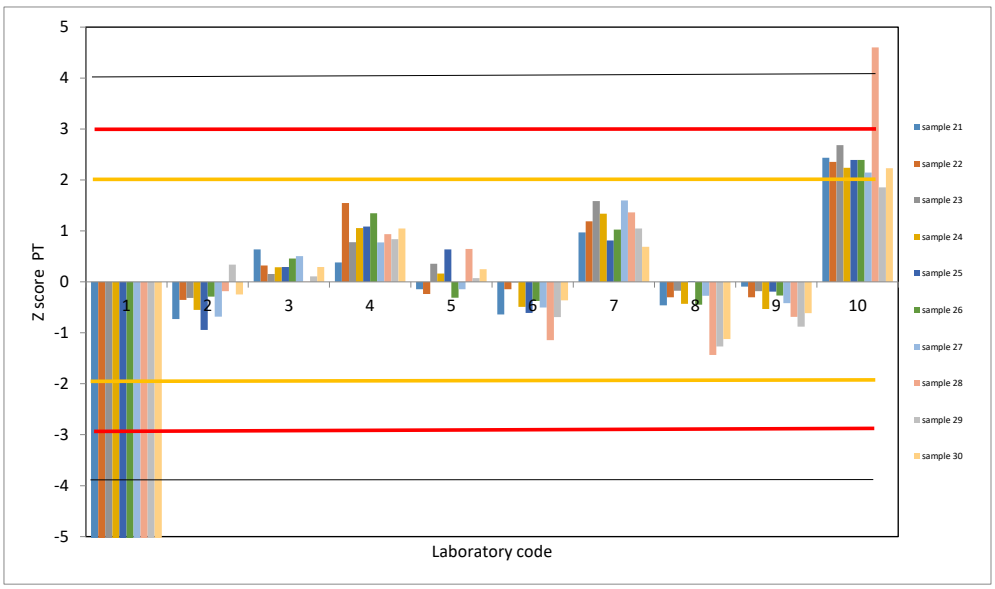
Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	21	22	23	24	25	26	27	28	29	30
1	-7,19	-13,09	-8,14	-12,33	-14,30	-16,30	-12,39	-24,09	-17,14	-14,28
2	-0,73	-0,35	-0,32	-0,55	-0,94	-0,29	-0,68	-0,18	+0,34	-0,25
3	+0,64	+0,32	+0,16	+0,29	+0,29	+0,46	+0,50	+0,00	+0,11	+0,29
4	+0,38	+1,55	+0,78	+1,06	+1,09	+1,35	+0,77	+0,94	+0,84	+1,05
5	-0,14	-0,24	+0,35	+0,16	+0,64	-0,31	-0,14	+0,65	+0,08	+0,25
6	-0,64	-0,14	-0,01	-0,49	-0,61	-0,37	-0,50	-1,15	-0,69	-0,36
7	+0,97	+1,19	+1,59	+1,34	+0,81	+1,02	+1,60	+1,36	+1,05	+0,69
8	-0,46	-0,30	-0,18	-0,43	+0,01	-0,45	-0,27	-1,44	-1,27	-1,12
9	-0,10	-0,30	-0,18	-0,54	-0,19	-0,27	-0,42	-0,69	-0,88	-0,62
10	+2,44	+2,35	+2,68	+2,24	+2,39	+2,39	+2,15	+4,60	+1,86	+2,23

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



FIX Z-score

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

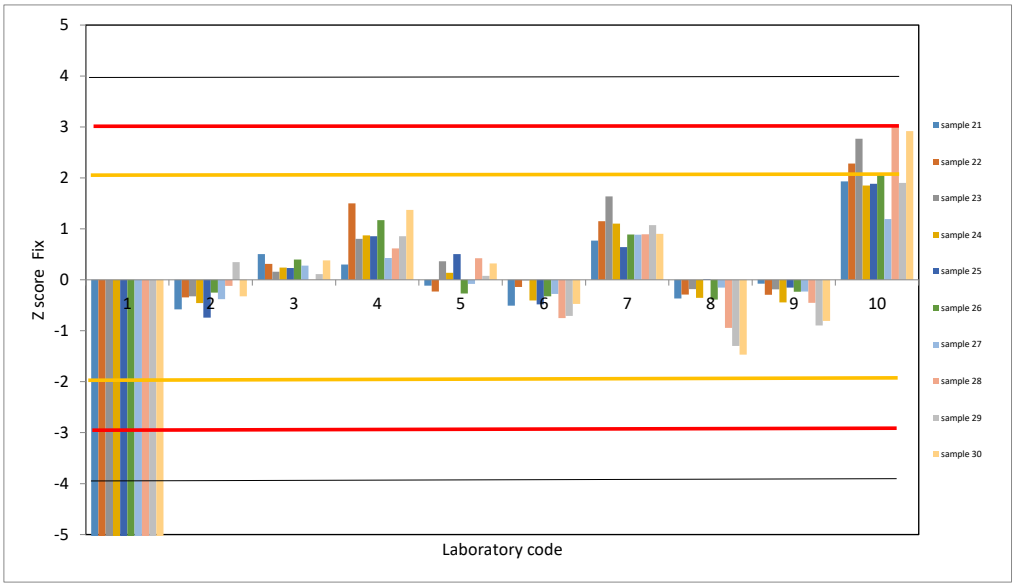
Sample / Lab code	21	22	23	24	25	26	27	28	29	30
1	-5,69	-12,69	-8,39	-10,17	-11,26	-14,16	-6,88	-15,82	-17,55	-18,71
2	-0,58	-0,34	-0,33	-0,46	-0,74	-0,25	-0,38	-0,12	+0,35	-0,33
3	+0,50	+0,31	+0,16	+0,24	+0,23	+0,40	+0,28	+0,00	+0,11	+0,38
4	+0,30	+1,50	+0,80	+0,87	+0,86	+1,17	+0,43	+0,62	+0,86	+1,37
5	-0,11	-0,23	+0,37	+0,14	+0,50	-0,27	-0,08	+0,42	+0,08	+0,32
6	-0,51	-0,14	-0,01	-0,41	-0,48	-0,32	-0,28	-0,75	-0,71	-0,48
7	+0,77	+1,15	+1,64	+1,10	+0,64	+0,89	+0,89	+0,89	+1,07	+0,90
8	-0,37	-0,29	-0,18	-0,36	+0,01	-0,39	-0,15	-0,94	-1,30	-1,47
9	-0,08	-0,29	-0,19	-0,44	-0,15	-0,23	-0,23	-0,45	-0,90	-0,81
10	+1,93	+2,28	+2,77	+1,85	+1,88	+2,08	+1,19	+3,02	+1,90	+2,92

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



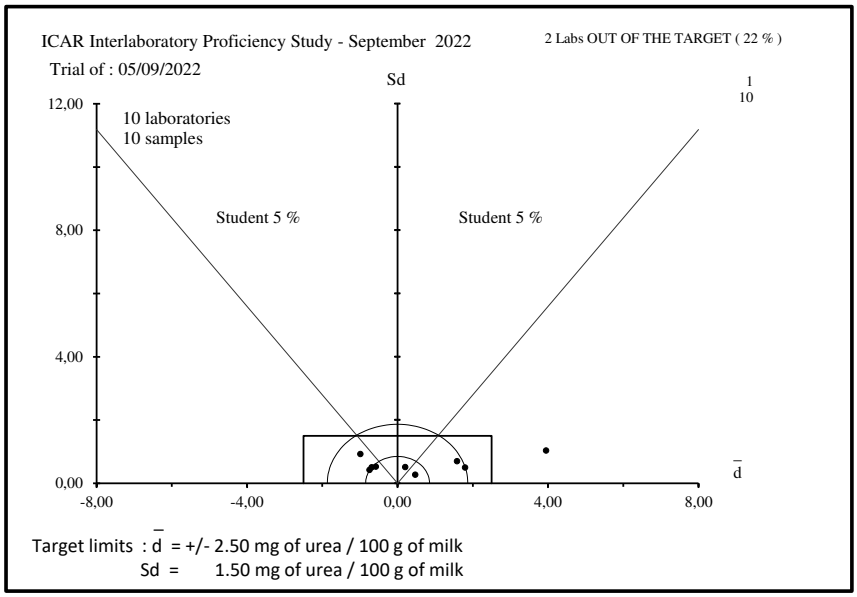


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2022

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 28th September 2022

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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DISPONIBLE SUR
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Table I : **Ranking of the laboratories in %**

Nb	%	N°	d	Sd	D	Method
1	2	7	+ 0%	1%	1%	B
2	3	44	+ 0%	1%	1%	B
3	5	56	- 1%	1%	1%	B
4	6	48	+ 1%	1%	1%	B
5	8	17	- 0%	1%	1%	B
6	10	22	+ 0%	1%	1%	B
7	11	45	- 0%	1%	1%	B
8	13	30	+ 1%	1%	1%	B
9	14	9	- 1%	1%	2%	B
10	16	53	- 1%	1%	2%	B
11	17	5	- 1%	1%	2%	B
12	19	25	+ 1%	2%	2%	B
13	21	20	- 1%	1%	2%	B
14	22	21	+ 1%	2%	2%	B
15	24	31	- 1%	2%	2%	B
16	25	10	+ 1%	2%	2%	B
17	27	11	- 1%	2%	2%	B
18	29	27	- 1%	2%	2%	B
19	30	54	- 0%	3%	3%	B
20	32	15	+ 2%	2%	3%	B
21	33	16	+ 2%	2%	3%	B
22	35	28	+ 2%	2%	3%	B
23	37	62	- 2%	2%	3%	B
24	38	8	+ 2%	2%	3%	B
25	40	26	+ 1%	3%	3%	B
26	41	63	- 2%	2%	3%	B
27	43	29	+ 0%	3%	3%	B
28	44	49	- 1%	3%	4%	B
29	46	36	- 1%	3%	4%	B
30	48	3	- 3%	3%	4%	B
31	49	55	+ 3%	2%	4%	B
32	51	23	+ 3%	3%	4%	B
33	52	41	- 1%	4%	4%	B
34	54	42	+ 3%	3%	4%	B
35	56	37	+ 1%	4%	4%	B
36	57	52	- 4%	2%	4%	B
37	59	35	- 4%	3%	4%	B
38	60	61	+ 4%	3%	5%	B
39	62	24	- 3%	5%	5%	B
40	63	32	+ 4%	4%	5%	B
41	65	39	+ 4%	4%	6%	B
42	67	50	- 4%	4%	6%	B
43	68	51	+ 3%	5%	6%	A
44	70	57	- 1%	6%	6%	B
45	71	4	- 5%	4%	6%	B
46	73	13	- 2%	6%	7%	A
47	75	33	- 4%	6%	7%	B
48	76	14	- 1%	7%	7%	B
49	78	40	+ 7%	5%	9%	A
50	79	6	- 7%	6%	9%	B
51	81	1	- 1%	10%	10%	A
52	83	34	- 8%	6%	10%	B
53	84	58	- 6%	9%	11%	B
54	86	59	+ 8%	7%	11%	B
55	87	47	+ 8%	7%	11%	B
56	89	2	+ 8%	8%	11%	B
57	90	18	- 9%	7%	11%	B
58	92	12	- 5%	12%	13%	B
59	94	38	+ 11%	9%	14%	B
60	95	19	- 5%	27%	27%	B
61	97	46	- 19%	23%	30%	C
62	98	60	- 27%	16%	32%	B
63	100	43	- 24%	26%	36%	A

(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))

A ISO 13366-1 | IDF 148-1

B ISO 13366-2 | IDF 148-2

C DeLaval Cell Counter (DCC)

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 61 laboratories using reference metod ISO 13366-1|IDF 148-1 and alternative method ISO 13366-2|IDF 148-2 after outlier discarging using Grubbs test at 5% risk level

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	2%
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	40	6%

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	Sr	NL
1	0	110	30	20	10	170 *	20	40	5	10	47	20
2	22	45	14	4	1	20	6	25	1	3	14	20
3	2	4	5	10	12	5	27	16	4	3	8	20
4	2	27	11	9	4	34	23	27	2	1	13	20
5	21	4	3	11	0	62	36	37	10	6	19	20
6	16	37	21	2	4	42	31	26	3	20	17	20
7	23	21	10	7	9	13	17	16	0	3	10	20
8	30	42	0	16	8	31	19	31	3	5	16	20
9	10	18	30	13	7	5	13	26	6	16	12	20
10	29	14	12	16	6	10	21	8	4	1	10	20
11	9	46	20	6	4	22	3	23	1	6	14	20
12	38	22	9	11	21	6	36	4	1	1	14	20
13	10	6	0	2	0	4	2	6	0	1	3	20
14	204 *	28	3	25	2	84 *	12	19	7	2	50	20
15	7	17	9	14	12	10	33	32	8	9	12	20
16	4	63	9	9	2	33	3	14	3	2	17	20
17	13	6	13	9	6	34	17	22	3	5	11	20
18	13	14	10	2	18	8	5	12	1	8	7	20
19	12	5	3	4	2	1	20	3	2	4	6	20
20	103 *	62	33	64 *	27	129 *	74	41	8	0	47	20
21	17	16	6	15	4	13	35	4	5	10	11	20
22	6	41	17	10	2	25	17	10	3	9	13	20
23	24	17	3	8	0	17	6	12	0	0	8	20
24	14	10	12	0	13	4	10	24	7	14	9	20
25	4	4	26	17	15	15	2	16	4	2	9	20
26	6	14	7	7	0	23	26	12	3	0	9	20
27	26	0	16	6	11	29	11	5	1	17	11	20
28	25	7	1	18	4	1	30	6	6	1	10	20
29	6	16	25	4	5	3	33	18	9	7	11	20
30	13	4	4	4	10	6	10	14	2	4	6	20

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	Sr	NL
31	35	9	7	16	12	50	66	23	1	20	22	20
32	36	11	11	1	10	7	12	6	3	2	10	20
33	22	9	23	10	2	23	7	5	0	0	9	20
34	51	66	20	28	15	17	20	16	2	13	22	20
35	37	55	11	20	2	19	24	37	9	6	19	20
36	0	25	16	8	18	14	7	11	3	3	9	20
37	6	15	20	1	7	12	4	8	5	2	7	20
38	5	6	0	11	3	2	0	4	1	1	3	20
39	1	11	2	1	1	1	5	7	1	11	4	20
40	5	23	1	6	2	4	21	5	7	3	8	20
41	9	21	16	1	9	68	27	11	5	0	18	20
42	7	2	8	4	5	4	10	7	3	1	4	20
43	4	7	15	2	2	0	8	8	1	4	5	20
44	11	25	11	6	13	41	37	27	1	6	16	20
45	25	5	8	5	8	20	29	32	2	1	12	20
46	139 *	103	76 *	109 *	4	9	17	11	4	12	49	20
47	22	26	18	17	10	2	31	2	1	3	12	20
48	24	25	1	1	11	16	4	6	7	2	9	20
49	98 *	40	5	7	3	6	29	3	1	1	25	20
50	72 *	97	9	10	2	35	18	30	7	6	29	20
51	2	26	2	3	6	14	9	5	1	1	7	20
52	43	2	6	1	3	19	5	12	1	1	11	20
53	6	61	13	16	4	9	36	9	1	10	17	20
54	2	13	2	11	8	14	6	10	2	5	6	20
55	12	1	4	7	1	11	11	4	1	3	5	20
56	3	3	3	4	1	6	5	7	0	3	3	20
57	0	11	0	6	1	1	4	9	1	0	4	20
58	0	7	2	3	6	6	1	11	2	6	4	20
59	6	19	8	11	8	34	43	14	2	1	14	20
60	26	28	26	8	8	16	19	6	0	0	12	20
61	10	13	5	3	6	9	8	2	5	0	5	20
62	15	11	0	1	6	4	11	12	3	4	6	20
63	68 *	43	10	23	12	43	10	33	9	1	23	20
Sr	30	24	12	14	6	26	16	13	3	5		1260
r	126	126	50	63	42	126	126	63	25	25		
NE	126	126	126	126	126	126	126	126	126	126		
L	60	110	43	35	28	72	74	58	13	22		

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	31	32	33	34	35	36	37	38	39	40
1	1090	1145	365	560 *	235	1625	940	660	71	105
2	1215	1441	399	522	250	1701	978	711	59	123
3	1080	1288	373	484	237	1504	881	648	58	118
4	1056	1254	375	462	218	1497	864	608	62	112
5	1117	1308	367	476	231	1544	890	649	59	122
6	1028	1216	365	447	233	1479	840	605	53	117
7	1118	1325	379	489	236	1570	907	657	59	118
8	1148	1358	395	499	243	1587	934	669	59	116
9	1112	1321	375	480	243	1544	883	664	58	111
10	1133	1348	387	488	237	1566	930	638	62	117
11	1097	1286	386	491	239	1533	900	656	57	115
12	1146	1359	379	480	178 *	1463	656 *	666	60	116
13	1077	1211	377	483	273 *	1588	873	606	65	121
14	989	1360	376	497	241	1576	917	679	56	113
15	1145	1336	396	489	235	1597	900	672	64	116
16	1137	1353	388	486	241	1580	943	674	68	124
17	1126	1310	375	496	251	1553	898	637	61	117
18	1022	1188	348	453	222	1421	827	602	57	109
19	1169	1379	389	509	244	997 *	953	695	58	122
20	1129	1312	375	491	236	1523	896	643	49	113
21	1130	1309	403	496	254	1551	932	661	73	129
22	1143	1327	388	483	245	1546	899	653	65	111
23	1134	1362	396	493	242	1620	926	667	59	121
24	1115	1336	369	479	222	1452	888	628	58	112
25	1122	1327	386	505	239	1582	897	660	57	113
26	1175	1312	378	488	231	1589	888	664	61	122
27	1097	1291	379	489	238	1576	885	643	62	121
28	1162	1319	385	495	254	1580	944	656	65	122
29	1107	1375	381	473	238	1576	916	637	54	114
30	1115	1330	376	502	250	1565	910	672	57	116

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 61 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	31	32	33	34	35	36	37	38	39	40
Outliers Cochran	14;20 46;49 50;63		46	20;46		1;14 20				
Outlier Grubbs	43;46 60	46;60	43;60	1;43 60	12;13 43;60	19;43 46;60	12;43 46;60	60	60	60
sr	13	23	9	8	6	17	17	13	3	5
SR	48	66	16	19	10	74	42	32	5	7
sr %	1%	2%	2%	2%	3%	1%	2%	2%	5%	4%
SR %	4%	5%	4%	4%	4%	5%	5%	5%	9%	6%

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

Sample Lab code	31	32	33	34	35	36	37	38	39	40
31	1100	1329	381	486	236	1536	873	647	65	118
32	1155	1390	400	511	243	1625	897	687	62	117
33	1065	1250	376	497	239	1455	855	657	55	123
34	1036	1211	357	461	221	1435	812	602	49	107
35	1087	1275	372	474	237	1498	868	630	57	107
36	1130	1285	385	494	243	1492	912	674	58	120
37	1151	1355	386	493	239	1482	918	685	62	125
38	1235	1467	410	547	255	1721	1019	723	67	125
39	1167	1369	398	511	245	1625	948	695	51	103
40	1228	1377	427	526	264	1644	969	709	64	126
41	1112	1304	378	496	236	1471	916	652	58	126
42	1166	1355	398	492	243	1608	940	680	50	124
43	721 *	1117	325 *	377 *	202 *	1036 *	646 *	576	56	119
44	1113	1312	388	487	242	1568	900	661	61	118
45	1109	1310	387	489	241	1573	898	652	59	119
46	782 *	987 *	397	473	232	1205 *	726 *	599	49	112
47	1212	1423	414	517	258	1701	985	717	61	127
48	1125	1313	390	492	238	1563	923	659	62	119
49	1149	1349	364	491	238	1546	851	637	57	107
50	1090	1249	366	486	230	1466	870	647	51	118
51	1188	1376	387	488	245	1642	880	642	61	129
52	1078	1271	366	467	225	1537	859	627	53	117
53	1114	1301	368	477	236	1546	898	649	56	114
54	1078	1304	391	509	246	1552	897	650	69	118
55	1158	1366	400	509	246	1574	928	690	56	111
56	1116	1312	373	479	234	1564	897	655	58	116
57	1155	1342	385	499	244	1437	914	624	62	121
58	1112	1267	373	474	237	1350	859	600	57	117
59	1208	1424	404	535	254	1687	1004	712	63	125
60	853 *	990 *	283 *	357 *	152 *	1174 *	708 *	461 *	1 *	0 *
61	1175	1359	387	510	243	1622	935	679	60	120
62	1091	1280	371	498	237	1541	886	628	58	118
63	1109	1283	391	473	225	1511	878	645	59	111
M	1124	1316	383	491	239	1553	905	654	59	117
REF.	1124	1320	382	491	240	1553	904	655	59	117
SD	49	64	14	18	9	72	40	31	5	6
AVT	1115	1313	370	481	228	1557	897	651	53	111

M = mean per sample REF. = reference values

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

AVT = Assign value traceable to the ERM BD001

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 61 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	31	32	33	34	35	36	37	38	39	40
Outliers Cochran	14;20 46;49 50;63		46	20;46		1;14 20				
Outlier Grubbs	43;46 60	46;60	43;60	1;43 60	12;13 43;60	19;43 46;60	12;43 46;60	60	60	60
sr	13	23	9	8	6	17	17	13	3	5
SR	48	66	16	19	10	74	42	32	5	7
sr %	1%	2%	2%	2%	3%	1%	2%	2%	5%	4%
SR %	4%	5%	4%	4%	4%	5%	5%	5%	9%	6%

SR Method for AVT values	67	79	28	33	19	93	54	41	5	10

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	d	Sd_{lab}	t
1	- 3%	- 13%	- 5%	+ 14%	- 2%	+ 5%	+ 4%	+ 1%	+ 20%	- 11%	- 1%	10%	0,22
2	+ 8%	+ 9%	+ 4%	+ 6%	+ 4%	+ 10%	+ 8%	+ 8%	- 1%	+ 4%	+ 8%	8%	3,36
3	- 4%	- 2%	- 3%	- 1%	- 1%	- 3%	- 3%	- 1%	- 2%	+ 0%	- 3%	3%	3,03
4	- 6%	- 5%	- 2%	- 6%	- 9%	- 4%	- 4%	- 7%	+ 5%	- 5%	- 5%	4%	4,19
5	- 1%	- 1%	- 4%	- 3%	- 4%	- 1%	- 2%	- 1%	+ 0%	+ 4%	- 1%	1%	4,06
6	- 9%	- 8%	- 5%	- 9%	- 3%	- 5%	- 7%	- 8%	- 11%	- 0%	- 7%	6%	3,86
7	- 1%	+ 0%	- 1%	- 0%	- 2%	+ 1%	+ 0%	+ 0%	+ 0%	+ 0%	+ 0%	1%	0,48
8	+ 2%	+ 3%	+ 3%	+ 2%	+ 1%	+ 2%	+ 3%	+ 2%	- 1%	- 2%	+ 2%	2%	3,50
9	- 1%	+ 0%	- 2%	- 2%	+ 1%	- 1%	- 2%	+ 1%	- 2%	- 6%	- 1%	1%	2,01
10	+ 1%	+ 2%	+ 1%	- 1%	- 1%	+ 1%	+ 3%	- 3%	+ 5%	- 1%	+ 1%	2%	1,38
11	- 2%	- 3%	+ 1%	+ 0%	- 0%	- 1%	- 0%	+ 0%	- 4%	- 2%	- 1%	2%	2,07
12	+ 2%	+ 3%	- 1%	- 2%	- 26%	- 6%	- 27%	+ 2%	+ 1%	- 2%	- 5%	12%	1,29
13	- 4%	- 8%	- 1%	- 2%	+ 14%	+ 2%	- 3%	- 8%	+ 10%	+ 3%	- 2%	6%	1,25
14	- 12%	+ 3%	- 2%	+ 1%	+ 1%	+ 1%	+ 1%	+ 4%	- 6%	- 4%	- 1%	7%	0,28
15	+ 2%	+ 1%	+ 3%	- 0%	- 2%	+ 3%	- 0%	+ 3%	+ 8%	- 2%	+ 2%	2%	2,14
16	+ 1%	+ 3%	+ 1%	- 1%	+ 1%	+ 2%	+ 4%	+ 3%	+ 14%	+ 6%	+ 2%	2%	3,23
17	+ 0%	- 1%	- 2%	+ 1%	+ 5%	+ 0%	- 1%	- 3%	+ 3%	- 1%	- 0%	1%	0,90
18	- 9%	- 10%	- 9%	- 8%	- 7%	- 8%	- 9%	- 8%	- 4%	- 7%	- 9%	7%	3,88
19	+ 4%	+ 4%	+ 2%	+ 4%	+ 2%	- 36%	+ 5%	+ 6%	- 2%	+ 4%	- 5%	27%	0,57
20	+ 0%	- 1%	- 2%	+ 0%	- 2%	- 2%	- 1%	- 2%	- 17%	- 4%	- 1%	1%	2,73
21	+ 0%	- 1%	+ 5%	+ 1%	+ 6%	- 0%	+ 3%	+ 1%	+ 23%	+ 10%	+ 1%	2%	2,61
22	+ 2%	+ 1%	+ 1%	- 2%	+ 2%	- 0%	- 1%	- 0%	+ 9%	- 6%	+ 0%	1%	0,46
23	+ 1%	+ 3%	+ 3%	+ 0%	+ 1%	+ 4%	+ 2%	+ 2%	+ 0%	+ 3%	+ 3%	3%	2,57
24	- 1%	+ 1%	- 4%	- 2%	- 8%	- 6%	- 2%	- 4%	- 3%	- 5%	- 3%	5%	1,90
25	- 0%	+ 1%	+ 1%	+ 3%	- 0%	+ 2%	- 1%	+ 1%	- 3%	- 4%	+ 1%	2%	1,25
26	+ 5%	- 1%	- 1%	- 1%	- 4%	+ 2%	- 2%	+ 1%	+ 3%	+ 4%	+ 1%	3%	0,92
27	- 2%	- 2%	- 1%	- 0%	- 1%	+ 1%	- 2%	- 2%	+ 4%	+ 3%	- 1%	2%	1,35
28	+ 3%	- 0%	+ 1%	+ 1%	+ 6%	+ 2%	+ 4%	+ 0%	+ 10%	+ 3%	+ 2%	2%	2,73
29	- 2%	+ 4%	- 0%	- 4%	- 1%	+ 1%	+ 1%	- 3%	- 9%	- 3%	+ 0%	3%	0,33
30	- 1%	+ 1%	- 2%	+ 2%	+ 4%	+ 1%	+ 1%	+ 3%	- 3%	- 1%	+ 1%	1%	1,69

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	d	Sd_{lab}	t
31	- 2%	+ 1%	- 0%	- 1%	- 2%	- 1%	- 3%	- 1%	+ 9%	+ 0%	- 1%	2%	1,88
32	+ 3%	+ 5%	+ 4%	+ 4%	+ 1%	+ 5%	- 1%	+ 5%	+ 4%	- 0%	+ 4%	4%	2,72
33	- 5%	- 5%	- 2%	+ 1%	- 0%	- 6%	- 5%	+ 0%	- 7%	+ 5%	- 4%	6%	2,28
34	- 8%	- 8%	- 7%	- 6%	- 8%	- 8%	- 10%	- 8%	- 17%	- 9%	- 8%	6%	4,15
35	- 3%	- 3%	- 3%	- 3%	- 1%	- 4%	- 4%	- 4%	- 4%	- 9%	- 4%	3%	4,15
36	+ 1%	- 3%	+ 1%	+ 1%	+ 1%	- 4%	+ 1%	+ 3%	- 3%	+ 2%	- 1%	3%	0,72
37	+ 2%	+ 3%	+ 1%	+ 0%	- 0%	- 5%	+ 2%	+ 5%	+ 4%	+ 6%	+ 1%	4%	0,53
38	+ 10%	+ 11%	+ 7%	+ 11%	+ 6%	+ 11%	+ 13%	+ 10%	+ 13%	+ 6%	+ 11%	9%	3,82
39	+ 4%	+ 4%	+ 4%	+ 4%	+ 2%	+ 5%	+ 5%	+ 6%	- 14%	- 13%	+ 4%	4%	3,02
40	+ 9%	+ 4%	+ 12%	+ 7%	+ 10%	+ 6%	+ 7%	+ 8%	+ 8%	+ 7%	+ 7%	5%	4,72
41	- 1%	- 1%	- 1%	+ 1%	- 2%	- 5%	+ 1%	- 1%	- 3%	+ 7%	- 1%	4%	1,17
42	+ 4%	+ 3%	+ 4%	+ 0%	+ 1%	+ 4%	+ 4%	+ 4%	- 16%	+ 5%	+ 3%	3%	3,16
43	- 36%	- 15%	- 15%	- 23%	- 16%	- 33%	- 29%	- 12%	- 6%	+ 1%	- 24%	26%	2,99
44	- 1%	- 1%	+ 1%	- 1%	+ 1%	+ 1%	- 0%	+ 1%	+ 3%	+ 0%	+ 0%	1%	0,06
45	- 1%	- 1%	+ 1%	- 0%	+ 1%	+ 1%	- 1%	- 0%	+ 0%	+ 1%	- 0%	1%	0,33
46	- 30%	- 25%	+ 4%	- 4%	- 3%	- 22%	- 20%	- 9%	- 17%	- 5%	- 19%	23%	2,60
47	+ 8%	+ 8%	+ 8%	+ 5%	+ 8%	+ 10%	+ 9%	+ 9%	+ 3%	+ 8%	+ 8%	7%	3,77
48	+ 0%	- 1%	+ 2%	+ 0%	- 1%	+ 1%	+ 2%	+ 1%	+ 4%	+ 1%	+ 1%	1%	1,62
49	+ 2%	+ 2%	- 5%	- 0%	- 1%	- 0%	- 6%	- 3%	- 4%	- 9%	- 1%	3%	0,80
50	- 3%	- 5%	- 4%	- 1%	- 4%	- 6%	- 4%	- 1%	- 14%	+ 0%	- 4%	4%	2,90
51	+ 6%	+ 4%	+ 1%	- 1%	+ 2%	+ 6%	- 3%	- 2%	+ 3%	+ 9%	+ 3%	5%	1,62
52	- 4%	- 4%	- 4%	- 5%	- 6%	- 1%	- 5%	- 4%	- 11%	- 1%	- 4%	2%	4,61
53	- 1%	- 1%	- 4%	- 3%	- 2%	- 0%	- 1%	- 1%	- 6%	- 3%	- 1%	1%	5,12
54	- 4%	- 1%	+ 2%	+ 4%	+ 3%	- 0%	- 1%	- 1%	+ 17%	+ 0%	- 0%	3%	0,57
55	+ 3%	+ 3%	+ 5%	+ 4%	+ 2%	+ 1%	+ 3%	+ 5%	- 6%	- 6%	+ 3%	2%	3,54
56	- 1%	- 1%	- 3%	- 2%	- 3%	+ 1%	- 1%	- 0%	- 2%	- 2%	- 1%	1%	2,09
57	+ 3%	+ 2%	+ 1%	+ 2%	+ 2%	- 7%	+ 1%	- 5%	+ 4%	+ 3%	- 1%	6%	0,48
58	- 1%	- 4%	- 2%	- 4%	- 1%	- 13%	- 5%	- 8%	- 3%	- 0%	- 6%	9%	2,07
59	+ 7%	+ 8%	+ 6%	+ 9%	+ 6%	+ 9%	+ 11%	+ 9%	+ 7%	+ 6%	+ 8%	7%	3,89
60	- 24%	- 25%	- 26%	- 27%	- 37%	- 24%	- 22%	- 30%	- 98%	- 100%	- 27%	16%	5,43
61	+ 5%	+ 3%	+ 1%	+ 4%	+ 1%	+ 4%	+ 3%	+ 4%	+ 1%	+ 2%	+ 4%	3%	3,31
62	- 3%	- 3%	- 3%	+ 1%	- 1%	- 1%	- 2%	- 4%	- 3%	+ 0%	- 2%	2%	2,82
63	- 1%	- 3%	+ 2%	- 4%	- 6%	- 3%	- 3%	- 2%	- 1%	- 6%	- 2%	2%	3,30
d	- 0%	- 0%	+ 0%	+ 0%	- 0%	+ 0%	+ 0%	- 0%	- 0%	- 0%	- 1%	9%	
Sd	4%	5%	4%	4%	4%	5%	4%	5%	9%	5%			

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 * 10³ /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	31	32	33	34	35	36	37	38	39	40
1	-0,70	-2,72	-1,22	+3,85	-0,51	+1,00	+0,91	+0,16	+2,27	-2,13
2	+1,87	+1,88	+1,17	+1,74	+1,08	+2,06	+1,86	+1,78	-0,10	+0,85
3	-0,91	-0,49	-0,70	-0,37	-0,29	-0,69	-0,58	-0,23	-0,20	+0,00
4	-1,40	-1,03	-0,56	-1,62	-2,37	-0,78	-1,00	-1,53	+0,59	-1,02
5	-0,16	-0,18	-1,12	-0,84	-0,95	-0,12	-0,34	-0,21	+0,00	+0,77
6	-1,97	-1,62	-1,26	-2,43	-0,73	-1,03	-1,60	-1,61	-1,28	-0,08
7	-0,14	+0,08	-0,24	-0,12	-0,46	+0,23	+0,07	+0,06	+0,00	+0,00
8	+0,49	+0,60	+0,89	+0,46	+0,37	+0,47	+0,74	+0,43	-0,10	-0,34
9	-0,25	+0,02	-0,52	-0,62	+0,31	-0,13	-0,53	+0,28	-0,20	-1,11
10	+0,17	+0,44	+0,32	-0,15	-0,29	+0,18	+0,64	-0,55	+0,59	-0,17
11	-0,57	-0,52	+0,25	+0,02	-0,07	-0,28	-0,10	+0,01	-0,49	-0,42
12	+0,45	+0,61	-0,27	-0,62	-6,80	-1,25	-6,19	+0,35	+0,10	-0,34
13	-0,97	-1,69	-0,38	-0,43	+3,65	+0,49	-0,77	-1,58	+1,19	+0,51
14	-2,77	+0,63	-0,49	+0,32	+0,15	+0,32	+0,33	+0,75	-0,69	-0,76
15	+0,42	+0,25	+0,92	-0,09	-0,51	+0,61	-0,10	+0,54	+0,99	-0,34
16	+0,26	+0,51	+0,36	-0,29	+0,15	+0,37	+0,97	+0,61	+1,68	+1,11
17	+0,03	-0,15	-0,56	+0,27	+1,24	+0,00	-0,15	-0,58	+0,30	-0,17
18	-2,11	-2,05	-2,42	-2,09	-1,93	-1,83	-1,93	-1,71	-0,49	-1,45
19	+0,92	+0,92	+0,43	+1,02	+0,47	-7,73	+1,23	+1,26	-0,20	+0,77
20	+0,09	-0,12	-0,56	+0,02	-0,46	-0,42	-0,19	-0,41	-1,97	-0,76
21	+0,11	-0,16	+1,45	+0,27	+1,57	-0,03	+0,69	+0,19	+2,67	+1,96
22	+0,39	+0,11	+0,36	-0,43	+0,58	-0,10	-0,13	-0,07	+1,09	-1,19
23	+0,20	+0,65	+0,92	+0,13	+0,26	+0,93	+0,56	+0,38	+0,00	+0,60
24	-0,19	+0,26	-0,94	-0,65	-1,99	-1,40	-0,39	-0,87	-0,29	-0,94
25	-0,04	+0,12	+0,25	+0,77	-0,13	+0,40	-0,17	+0,16	-0,39	-0,76
26	+1,04	-0,12	-0,34	-0,18	-0,95	+0,50	-0,39	+0,28	+0,30	+0,77
27	-0,56	-0,44	-0,24	-0,09	-0,24	+0,31	-0,48	-0,41	+0,50	+0,51
28	+0,77	-0,02	+0,15	+0,24	+1,57	+0,37	+1,01	+0,03	+1,19	+0,68
29	-0,35	+0,86	-0,13	-0,98	-0,24	+0,31	+0,30	-0,58	-1,08	-0,68
30	-0,20	+0,16	-0,45	+0,63	+1,13	+0,17	+0,16	+0,54	-0,39	-0,25

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

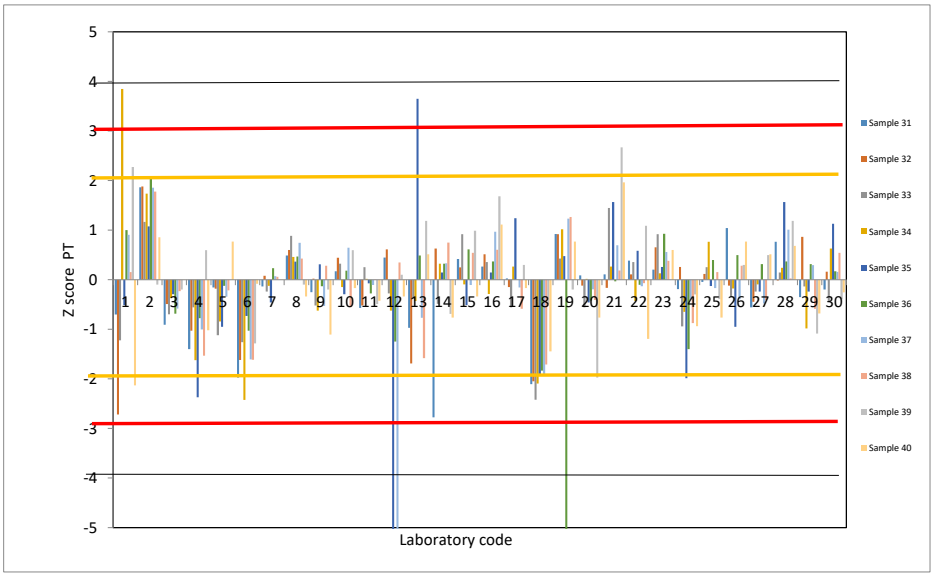


Table VI : **Zscore of the different laboratories for each sample.**

ZS calculated on the PT standard deviation

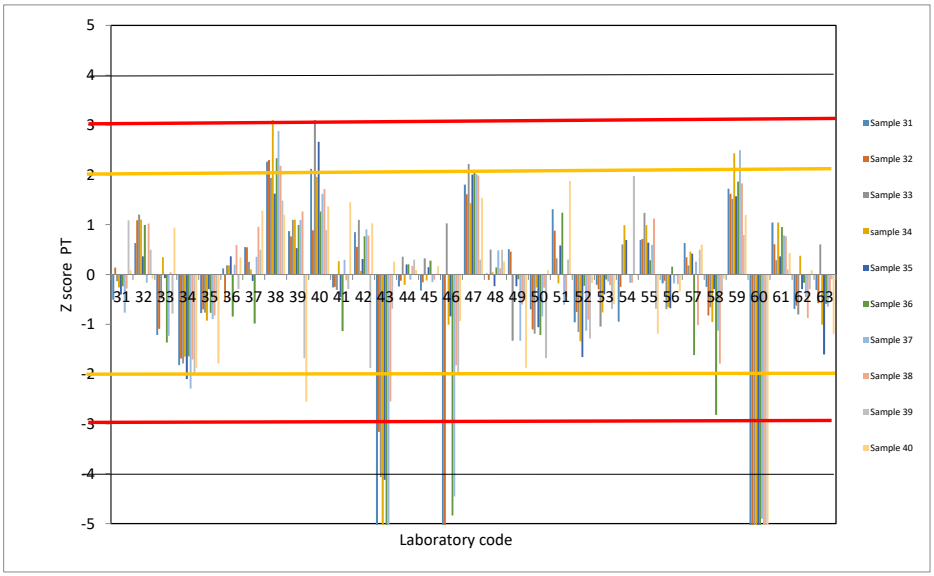
Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	-0,51	+0,14	-0,13	-0,26	-0,40	-0,23	-0,77	-0,28	+1,09	+0,09
32	+0,63	+1,09	+1,20	+1,10	+0,37	+1,00	-0,17	+1,02	+0,50	-0,08
33	-1,21	-1,09	-0,49	+0,35	-0,07	-1,37	-1,23	+0,04	-0,79	+0,94
34	-1,82	-1,69	-1,79	-1,65	-2,10	-1,64	-2,29	-1,71	-1,97	-1,87
35	-0,77	-0,70	-0,77	-0,93	-0,29	-0,77	-0,89	-0,83	-0,49	-1,79
36	+0,12	-0,54	+0,18	+0,18	+0,37	-0,85	+0,20	+0,59	-0,29	+0,34
37	+0,55	+0,54	+0,25	+0,10	-0,13	-0,98	+0,36	+0,96	+0,50	+1,28
38	+2,27	+2,30	+1,94	+3,10	+1,62	+2,34	+2,88	+2,18	+1,48	+1,20
39	+0,87	+0,76	+1,10	+1,10	+0,53	+1,00	+1,09	+1,26	-1,68	-2,56
40	+2,12	+0,89	+3,10	+1,96	+2,66	+1,27	+1,62	+1,71	+0,89	+1,37
41	-0,26	-0,25	-0,31	+0,27	-0,46	-1,14	+0,30	-0,12	-0,29	+1,45
42	+0,85	+0,55	+1,10	+0,07	+0,31	+0,77	+0,91	+0,78	-1,88	+1,03
43	-8,28	-3,16	-4,07	-6,31	-4,12	-7,18	-6,44	-2,55	-0,69	+0,26
44	-0,24	-0,12	+0,36	-0,21	+0,20	+0,20	-0,10	+0,17	+0,30	+0,09
45	-0,32	-0,16	+0,32	-0,12	+0,15	+0,28	-0,15	-0,10	+0,00	+0,17
46	-7,03	-5,18	+1,03	-1,01	-0,84	-4,84	-4,45	-1,82	-1,97	-0,94
47	+1,80	+1,61	+2,22	+1,43	+2,01	+2,06	+2,02	+1,99	+0,30	+1,54
48	+0,02	-0,11	+0,50	+0,04	-0,24	+0,14	+0,48	+0,12	+0,50	+0,26
49	+0,51	+0,46	-1,33	-0,01	-0,24	-0,09	-1,33	-0,60	-0,49	-1,87
50	-0,70	-1,10	-1,19	-0,26	-1,06	-1,21	-0,84	-0,26	-1,68	+0,09
51	+1,31	+0,88	+0,32	-0,18	+0,58	+1,24	-0,60	-0,44	+0,30	+1,88
52	-0,96	-0,75	-1,15	-1,34	-1,66	-0,23	-1,13	-0,91	-1,28	-0,17
53	-0,21	-0,30	-1,05	-0,76	-0,40	-0,10	-0,14	-0,21	-0,69	-0,59
54	-0,95	-0,25	+0,60	+0,99	+0,69	-0,01	-0,17	-0,17	+1,98	+0,00
55	+0,70	+0,72	+1,24	+0,99	+0,64	+0,29	+0,59	+1,12	-0,69	-1,19
56	-0,18	-0,12	-0,70	-0,65	-0,67	+0,16	-0,18	-0,02	-0,20	-0,34
57	+0,63	+0,34	+0,18	+0,46	+0,42	-1,62	+0,26	-1,02	+0,50	+0,60
58	-0,25	-0,82	-0,66	-0,95	-0,29	-2,82	-1,13	-1,79	-0,39	-0,08
59	+1,72	+1,62	+1,52	+2,43	+1,57	+1,86	+2,49	+1,83	+0,79	+1,20
60	-5,57	-5,13	-6,99	-7,42	-9,59	-5,26	-4,90	-6,24	-11,46	-20,03
61	+1,04	+0,61	+0,29	+1,04	+0,37	+0,95	+0,78	+0,77	+0,10	+0,43
62	-0,69	-0,62	-0,80	+0,38	-0,29	-0,16	-0,45	-0,87	-0,29	+0,09
63	-0,31	-0,58	+0,60	-1,01	-1,60	-0,59	-0,64	-0,34	-0,10	-1,19

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



FIX Z-score

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

ZS calculated on AVT and standard deviation of reproducibility of the method

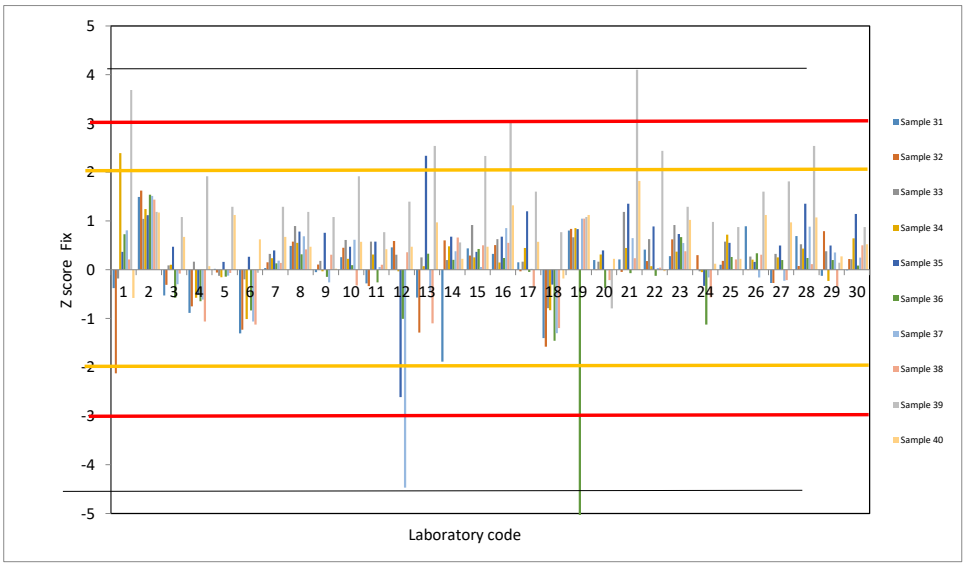
Sample / Lab code	31	32	33	34	35	36	37	38	39	40
1	-0,38	-2,13	-0,18	+2,39	+0,37	+0,73	+0,81	+0,21	+3,69	-0,58
2	+1,49	+1,62	+1,04	+1,25	+1,12	+1,54	+1,51	+1,44	+1,19	+1,17
3	-0,53	-0,31	+0,09	+0,10	+0,47	-0,57	-0,30	-0,08	+1,08	+0,67
4	-0,89	-0,75	+0,16	-0,58	-0,51	-0,64	-0,61	-1,06	+1,92	+0,07
5	+0,02	-0,06	-0,12	-0,15	+0,16	-0,14	-0,12	-0,07	+1,29	+1,12
6	-1,30	-1,23	-0,20	-1,01	+0,26	-0,84	-1,06	-1,12	-0,06	+0,62
7	+0,03	+0,15	+0,32	+0,24	+0,39	+0,13	+0,19	+0,14	+1,29	+0,67
8	+0,49	+0,58	+0,90	+0,55	+0,78	+0,31	+0,69	+0,42	+1,19	+0,47
9	-0,05	+0,11	+0,18	-0,03	+0,76	-0,15	-0,26	+0,31	+1,08	+0,02
10	+0,26	+0,45	+0,61	+0,22	+0,47	+0,09	+0,61	-0,32	+1,92	+0,57
11	-0,28	-0,34	+0,58	+0,31	+0,58	-0,26	+0,06	+0,10	+0,77	+0,42
12	+0,46	+0,59	+0,31	-0,03	-2,61	-1,01	-4,47	+0,36	+1,40	+0,47
13	-0,57	-1,29	+0,25	+0,07	+2,34	+0,33	-0,44	-1,10	+2,54	+0,97
14	-1,89	+0,60	+0,20	+0,48	+0,68	+0,20	+0,38	+0,66	+0,56	+0,22
15	+0,44	+0,29	+0,92	+0,25	+0,37	+0,43	+0,06	+0,50	+2,33	+0,47
16	+0,33	+0,51	+0,63	+0,15	+0,68	+0,24	+0,85	+0,55	+3,06	+1,32
17	+0,15	-0,03	+0,16	+0,45	+1,20	-0,04	+0,02	-0,35	+1,60	+0,57
18	-1,40	-1,58	-0,79	-0,83	-0,31	-1,46	-1,30	-1,20	+0,77	-0,18
19	+0,80	+0,84	+0,66	+0,85	+0,83	-6,00	+1,05	+1,05	+1,08	+1,12
20	+0,20	-0,01	+0,16	+0,31	+0,39	-0,37	-0,01	-0,21	-0,79	+0,22
21	+0,21	-0,04	+1,18	+0,45	+1,35	-0,07	+0,65	+0,24	+4,10	+1,82
22	+0,41	+0,18	+0,63	+0,07	+0,89	-0,12	+0,04	+0,04	+2,44	-0,03
23	+0,28	+0,62	+0,92	+0,37	+0,73	+0,67	+0,55	+0,38	+1,29	+1,02
24	-0,00	+0,30	-0,03	-0,05	-0,33	-1,13	-0,16	-0,57	+0,98	+0,12
25	+0,10	+0,18	+0,58	+0,72	+0,55	+0,26	+0,01	+0,21	+0,87	+0,22
26	+0,89	-0,01	+0,27	+0,21	+0,16	+0,34	-0,16	+0,31	+1,60	+1,12
27	-0,27	-0,27	+0,32	+0,25	+0,50	+0,20	-0,22	-0,21	+1,81	+0,97
28	+0,69	+0,08	+0,52	+0,43	+1,35	+0,24	+0,88	+0,11	+2,54	+1,07
29	-0,12	+0,79	+0,38	-0,23	+0,50	+0,20	+0,35	-0,35	+0,15	+0,27
30	-0,01	+0,22	+0,22	+0,64	+1,15	+0,08	+0,25	+0,50	+0,87	+0,52

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 7 and 8 /13

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



FIX Z-score

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

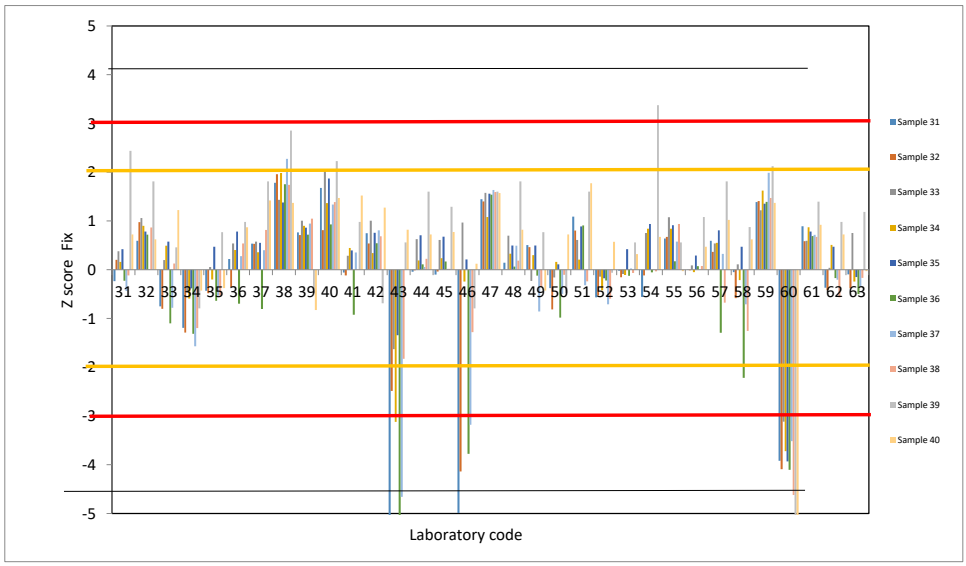
Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	-0,24	+0,20	+0,38	+0,16	+0,42	-0,23	-0,44	-0,12	+2,44	+0,72
32	+0,59	+0,98	+1,06	+0,90	+0,78	+0,72	+0,01	+0,87	+1,81	+0,62
33	-0,75	-0,80	+0,20	+0,49	+0,58	-1,10	-0,78	+0,13	+0,46	+1,22
34	-1,19	-1,29	-0,46	-0,59	-0,38	-1,31	-1,57	-1,20	-0,79	-0,43
35	-0,43	-0,48	+0,06	-0,20	+0,47	-0,64	-0,53	-0,53	+0,77	-0,38
36	+0,22	-0,36	+0,54	+0,40	+0,78	-0,70	+0,28	+0,54	+0,98	+0,87
37	+0,53	+0,53	+0,58	+0,36	+0,55	-0,80	+0,40	+0,82	+1,81	+1,42
38	+1,78	+1,96	+1,44	+1,98	+1,38	+1,75	+2,28	+1,74	+2,85	+1,37
39	+0,77	+0,71	+1,01	+0,90	+0,86	+0,72	+0,95	+1,05	-0,48	-0,83
40	+1,68	+0,81	+2,03	+1,37	+1,87	+0,93	+1,34	+1,39	+2,23	+1,47
41	-0,06	-0,11	+0,29	+0,45	+0,39	-0,92	+0,35	+0,00	+0,98	+1,52
42	+0,75	+0,54	+1,01	+0,34	+0,76	+0,54	+0,81	+0,68	-0,69	+1,27
43	-5,89	-2,49	-1,63	-3,12	-1,34	-5,58	-4,66	-1,83	+0,56	+0,82
44	-0,04	-0,01	+0,63	+0,19	+0,70	+0,11	+0,06	+0,22	+1,60	+0,72
45	-0,10	-0,04	+0,61	+0,24	+0,68	+0,17	+0,02	+0,02	+1,29	+0,77
46	-4,99	-4,14	+0,97	-0,24	+0,21	-3,78	-3,18	-1,28	-0,79	+0,12
47	+1,45	+1,40	+1,58	+1,08	+1,56	+1,54	+1,63	+1,59	+1,60	+1,57
48	+0,15	-0,00	+0,70	+0,33	+0,50	+0,06	+0,49	+0,19	+1,81	+0,82
49	+0,50	+0,46	-0,23	+0,30	+0,50	-0,12	-0,86	-0,36	+0,77	-0,43
50	-0,38	-0,81	-0,16	+0,16	+0,11	-0,98	-0,49	-0,10	-0,48	+0,72
51	+1,09	+0,81	+0,61	+0,21	+0,89	+0,91	-0,32	-0,24	+1,60	+1,77
52	-0,56	-0,53	-0,14	-0,43	-0,18	-0,22	-0,71	-0,59	-0,06	+0,57
53	-0,02	-0,15	-0,09	-0,11	+0,42	-0,12	+0,03	-0,07	+0,56	+0,32
54	-0,56	-0,11	+0,75	+0,84	+0,94	-0,05	+0,01	-0,03	+3,37	+0,67
55	+0,64	+0,67	+1,08	+0,84	+0,91	+0,18	+0,58	+0,94	+0,56	-0,03
56	+0,00	-0,01	+0,09	-0,05	+0,29	+0,07	-0,00	+0,08	+1,08	+0,47
57	+0,59	+0,37	+0,54	+0,55	+0,81	-1,29	+0,32	-0,67	+1,81	+1,02
58	-0,05	-0,58	+0,11	-0,21	+0,47	-2,22	-0,71	-1,26	+0,87	+0,62
59	+1,39	+1,41	+1,22	+1,62	+1,35	+1,39	+1,99	+1,47	+2,12	+1,37
60	-3,92	-4,09	-3,12	-3,72	-3,93	-4,10	-3,51	-4,62	-10,79	-11,08
61	+0,89	+0,58	+0,59	+0,87	+0,78	+0,69	+0,71	+0,67	+1,40	+0,92
62	-0,37	-0,42	+0,04	+0,51	+0,47	-0,17	-0,21	-0,57	+0,98	+0,72
63	-0,09	-0,38	+0,75	-0,24	-0,15	-0,50	-0,34	-0,16	+1,19	-0,03

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 7 and 8 /13

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



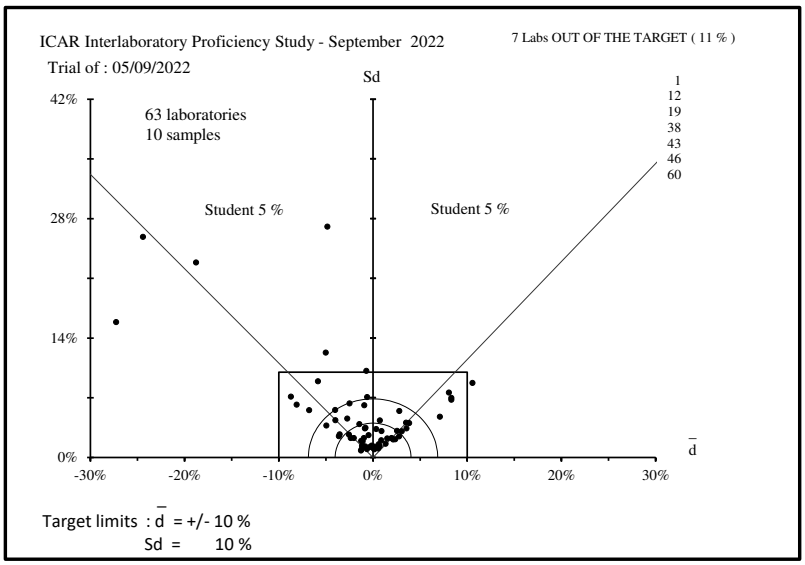


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

ICAR
PROFICIENCY TESTING SCHEME

September 2022

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 28th September 2022

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 in %**

Nb	%	N°	ig d	Sd	D	Method
1	2	53	- 1%	1%	1%	B
2	4	12	- 1%	1%	2%	B
3	6	8	- 0%	2%	2%	B
4	8	52	- 2%	1%	2%	B
5	10	42	- 2%	1%	2%	B
6	12	9	- 3%	0%	3%	B
7	14	10	- 2%	3%	4%	B
8	16	20	- 3%	3%	4%	B
9	18	57	- 3%	2%	4%	B
10	20	22	- 3%	2%	4%	B
11	22	4	- 3%	3%	4%	B
12	24	11	- 4%	2%	4%	B
13	25	7	- 4%	2%	5%	B
14	27	56	- 4%	3%	5%	B
15	29	1	- 0%	5%	5%	A
16	31	47	- 2%	6%	7%	B
17	33	59	+ 5%	4%	7%	B
18	35	24	- 5%	5%	7%	B
19	37	45	+ 5%	5%	7%	B
20	39	17	- 5%	5%	7%	B
21	41	44	+ 5%	6%	8%	B
22	43	16	- 0%	8%	8%	B
23	45	48	- 7%	4%	8%	B
24	47	55	+ 6%	5%	8%	B
25	49	15	- 5%	6%	8%	B
26	51	21	- 5%	7%	9%	B
27	53	32	+ 6%	6%	9%	B
28	55	3	- 6%	6%	9%	B
29	57	13	+ 4%	8%	9%	A
30	59	23	- 5%	8%	9%	B
31	61	37	+ 5%	8%	9%	B
32	63	35	- 3%	9%	10%	B
33	65	54	+ 6%	7%	10%	B
34	67	62	- 7%	8%	10%	B
35	69	49	- 7%	8%	11%	B
36	71	34	- 10%	8%	13%	B
37	73	39	+ 7%	10%	13%	B
38	75	43	+ 8%	10%	13%	A
39	76	36	+ 13%	8%	15%	B
40	78	19	+ 11%	10%	15%	B
41	80	61	+ 13%	10%	17%	B
42	82	14	+ 17%	6%	18%	B
43	84	18	+ 12%	17%	21%	B
44	86	2	+ 15%	15%	21%	B
45	88	63	- 14%	17%	22%	B
46	90	38	+ 16%	16%	23%	B
47	92	51	+ 6%	23%	23%	A
48	94	40	+ 17%	16%	24%	A
49	96	46	- 20%	28%	35%	C
50	98	33	- 8%	37%	38%	B
51	100	60	- 45%	44%	63%	B
N.C.		5				B
N.C.		6				B
N.C.		25				B
N.C.		26				B
N.C.		27				B
N.C.		28				B
N.C.		29				B
N.C.		30				B
N.C.		31				B
N.C.		41				B
N.C.		50				B
N.C.		58				B

(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))

A ISO 13366-1 | IDF 148-1

B ISO 13366-2 | IDF 148-2

C DeLaval Cell Counter (DCC)

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 :

+/- 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 49 laboratories using reference metod ISO 13366-1|IDF 148-1 and alternative method ISO 13366-2|IDF 148-2 after outlier discarging using Grubbs test at 5% risk level

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.

Sr_{PT}	15	3%
SR_{PT}	56	10%

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)

Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)

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

Sample / Lab code	A	B	Sr	NL
1	20	70	36	4
2	3	3	2	4
3	5	12	7	4
4	13	2	7	4
5	**	**		
6	**	**		
7	16	62	32	4
8	4	7	4	4
9	11	17	10	4
10	2	15	8	4
11	9	0	5	4
12	4	1	2	4
13	0	2	1	4
14	3	43	22	4
15	10	55	28	4
16	4	43	22	4
17	15	40	21	4
18	10	19	11	4
19	6	4	4	4
20	7	61	31	4
21	2	20	10	4
22	14	6	8	4
23	15	39	21	4
24	1	1	1	4
25	**	**		
26	**	**		
27	**	**		
28	**	**		
29	**	**		
30	**	**		

Sample / Lab code	A	B	Sr	NL
31	**	**		
32	1	37	19	4
33	16	3	8	4
34	14	5	7	4
35	5	17	9	4
36	16	30	17	4
37	1	6	3	4
38	1	36	18	4
39	3	1	2	4
40	15	84	43	4
41	**	**		
42	4	12	6	4
43	0	35	18	4
44	15	23	14	4
45	4	1	2	4
46	6	26	13	4
47	13	5	7	4
48	3	2	2	4
49	2	18	9	4
50	**	**		
51	14	125 *	63	4
52	0	22	11	4
53	7	27	14	4
54	1	1	1	4
55	4	8	4	4
56	3	1	2	4
57	4	5	3	4
58	**	**		
59	5	40	20	4
60	2	8	4	4
61	10	15	9	4
62	16	14	11	4
63	11	9	7	4
Sr	6	24		204
r	42	126		
NE	102	102		
L	29	90		

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

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

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

Sample / Lab code	A	B
1	210	865
2	216	1027
3	177	831
4	188	859
5		
6		
7	173	857
8	182	895
9	178	873
10	188	864
11	177	858
12	180	883
13	182	939
14	259 *	998
15	186	834
16	217	856
17	183	839
18	320 *	889
19	209	984
20	187	863
21	190	834
22	181	859
23	192	830
24	182	843
25		
26		
27		
28		
29		
30		

Sample / Lab code	A	B
31		
32	202	943
33	287 *	703
34	170	805
35	209	837
36	287 *	926
37	187	944
38	214	1034
39	190	966
40	221	1041
41		
42	175	878
43	197	971
44	195	936
45	196	934
46	187	670
47	203	852
48	167	835
49	184	819
50		
51	310 *	835
52	176	880
53	183	889
54	199	949
55	204	940
56	183	856
57	183	862
58		
59	202	931
60	115 *	476 *
61	222	998
62	183	820
63	181	747
M	191	883
REF.	190	887
SD	14	76
AVT	188	860

REF. = reference values

*: discarded data using the test of Grubbs 5 %

M = mean per sample

SD = standard deviation per sample

AVT = Assign value traceable to the ERM BD001

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 49 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	**A**	**B**
Outliers Cochran		
Outlier Grubbs		
sr	6	20
SR	15	78
sr %	3%	2%
SR %	8%	9%

SR Method for AVT values	16	52

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

Sample / Lab code	A	B	d	Sd_{lab}	t
1	+ 10%	- 2%	- 0%	5%	0,05
2	+ 13%	+ 16%	+ 15%	15%	1,44
3	- 7%	- 6%	- 6%	6%	1,65
4	- 1%	- 3%	- 3%	3%	1,21
5					
6					
7	- 9%	- 3%	- 4%	2%	3,69
8	- 4%	+ 1%	- 0%	2%	0,04
9	- 7%	- 2%	- 3%	0%	15,40
10	- 1%	- 3%	- 2%	3%	1,20
11	- 7%	- 3%	- 4%	2%	2,79
12	- 5%	- 0%	- 1%	1%	2,54
13	- 4%	+ 6%	+ 4%	8%	0,73
14	+ 36%	+ 12%	+ 17%	6%	4,24
15	- 2%	- 6%	- 5%	6%	1,17
16	+ 14%	- 4%	- 0%	8%	0,08
17	- 4%	- 5%	- 5%	5%	1,38
18	+ 68%	+ 0%	+ 12%	17%	1,02
19	+ 10%	+ 11%	+ 11%	10%	1,48
20	- 2%	- 3%	- 3%	3%	1,35
21	- 0%	- 6%	- 5%	7%	1,01
22	- 5%	- 3%	- 3%	2%	1,98
23	+ 1%	- 6%	- 5%	8%	0,95
24	- 5%	- 5%	- 5%	5%	1,48
25					
26					
27					
28					
29					
30					
31					
32	+ 6%	+ 6%	+ 6%	6%	1,51
33	+ 51%	- 21%	- 8%	37%	0,31
34	- 11%	- 9%	- 10%	8%	1,65
35	+ 10%	- 6%	- 3%	9%	0,47
36	+ 51%	+ 4%	+ 13%	8%	2,35
37	- 2%	+ 6%	+ 5%	8%	0,88
38	+ 12%	+ 17%	+ 16%	16%	1,38
39	- 0%	+ 9%	+ 7%	10%	0,98
40	+ 16%	+ 17%	+ 17%	16%	1,49
41					
42	- 8%	- 1%	- 2%	1%	3,86
43	+ 4%	+ 9%	+ 8%	10%	1,18
44	+ 2%	+ 5%	+ 5%	6%	1,20
45	+ 3%	+ 5%	+ 5%	5%	1,29
46	- 2%	- 24%	- 20%	28%	1,03
47	+ 6%	- 4%	- 2%	6%	0,48
48	- 12%	- 6%	- 7%	4%	2,68
49	- 3%	- 8%	- 7%	8%	1,20
50					
51	+ 63%	- 6%	+ 6%	23%	0,39
52	- 7%	- 1%	- 2%	1%	2,91
53	- 4%	+ 0%	- 1%	1%	0,66
54	+ 4%	+ 7%	+ 6%	7%	1,31
55	+ 7%	+ 6%	+ 6%	5%	1,70
56	- 4%	- 4%	- 4%	3%	1,65
57	- 4%	- 3%	- 3%	2%	1,79
58					
59	+ 6%	+ 5%	+ 5%	4%	1,69
60	- 40%	- 46%	- 45%	44%	1,45
61	+ 17%	+ 12%	+ 13%	10%	1,81
62	- 4%	- 8%	- 7%	8%	1,24
63	- 5%	- 16%	- 14%	17%	1,15
d	+ 0%	- 0%	- 2%	16%	
Sd	7%	9%			

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	A	B
1	+ 1,40	-0,29
2	+ 1,79	+ 1,83
3	-0,97	-0,73
4	-0,19	-0,37
5		
6		
7	-1,22	-0,39
8	-0,58	+ 0,10
9	-0,90	-0,19
10	-0,15	-0,31
11	-0,97	-0,38
12	-0,72	-0,06
13	-0,58	+ 0,68
14	+ 4,84	+ 1,45
15	-0,30	-0,70
16	+ 1,90	-0,41
17	-0,54	-0,63
18	+ 9,19	+ 0,02
19	+ 1,33	+ 1,27
20	-0,26	-0,32
21	-0,01	-0,69
22	-0,65	-0,37
23	+ 0,09	-0,75
24	-0,61	-0,58
25		
26		
27		
28		
29		
30		

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

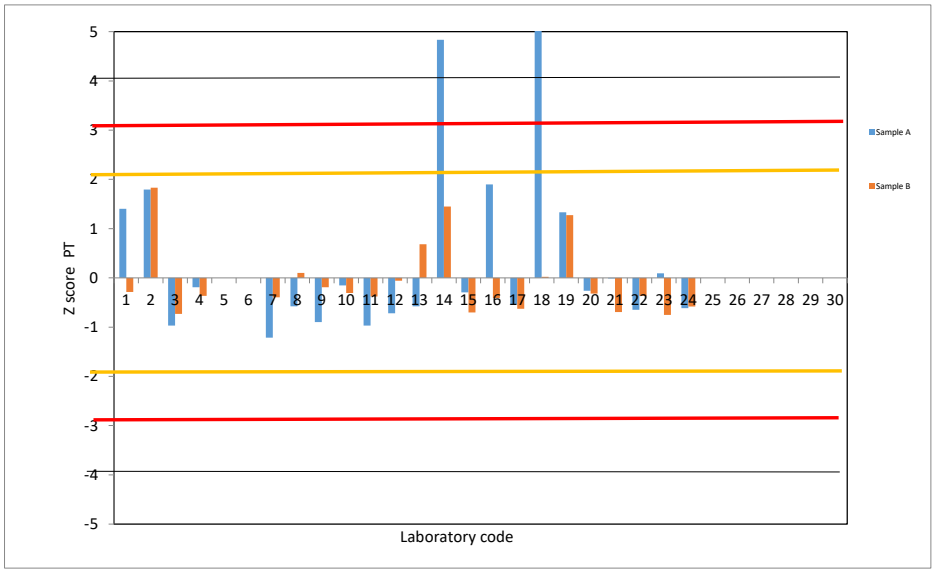


Table VI : **Zscore of the different laboratories for each sample.**

ZS calculated on the PT standard deviation

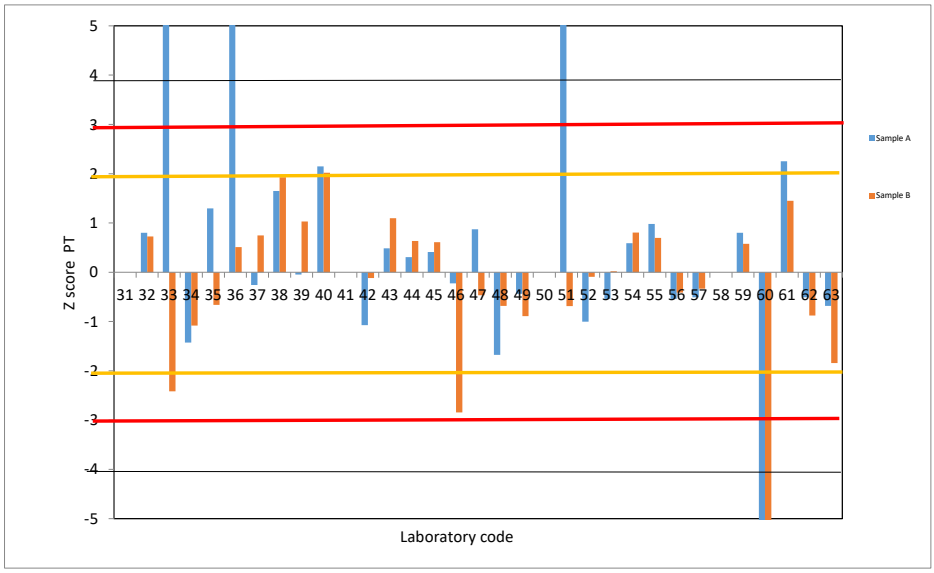
Sample / Lab code	A	B
31		
32	+ 0,80	+ 0,73
33	+ 6,85	-2,42
34	-1,43	-1,08
35	+ 1,30	-0,66
36	+ 6,85	+ 0,51
37	-0,26	+ 0,75
38	+ 1,65	+ 1,93
39	-0,05	+ 1,03
40	+ 2,15	+ 2,02
41		
42	-1,07	-0,12
43	+ 0,48	+ 1,10
44	+ 0,31	+ 0,64
45	+ 0,41	+ 0,61
46	-0,22	-2,84
47	+ 0,87	-0,46
48	-1,68	-0,68
49	-0,44	-0,89
50		
51	+ 8,48	-0,69
52	-1,00	-0,09
53	-0,54	+ 0,02
54	+ 0,59	+ 0,81
55	+ 0,98	+ 0,70
56	-0,54	-0,41
57	-0,51	-0,33
58		
59	+ 0,80	+ 0,58
60	-5,32	-5,39
61	+ 2,25	+ 1,45
62	-0,51	-0,88
63	-0,68	-1,84

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



FIX Z-score

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

ZS calculated on AVT and standard deviation of reproducibility of the method

Sample / Lab code	A	B
1	+1,34	+0,10
2	+1,67	+3,23
3	-0,70	-0,56
4	-0,03	-0,02
5		
6		
7	-0,92	-0,05
8	-0,37	+0,67
9	-0,64	+0,25
10	-0,00	+0,07
11	-0,70	-0,04
12	-0,49	+0,44
13	-0,37	+1,53
14	+4,30	+2,67
15	-0,13	-0,51
16	+1,77	-0,08
17	-0,34	-0,40
18	+8,05	+0,56
19	+1,28	+2,41
20	-0,09	+0,05
21	+0,12	-0,50
22	-0,43	-0,02
23	+0,21	-0,59
24	-0,40	-0,34
25		
26		
27		
28		
29		
30		

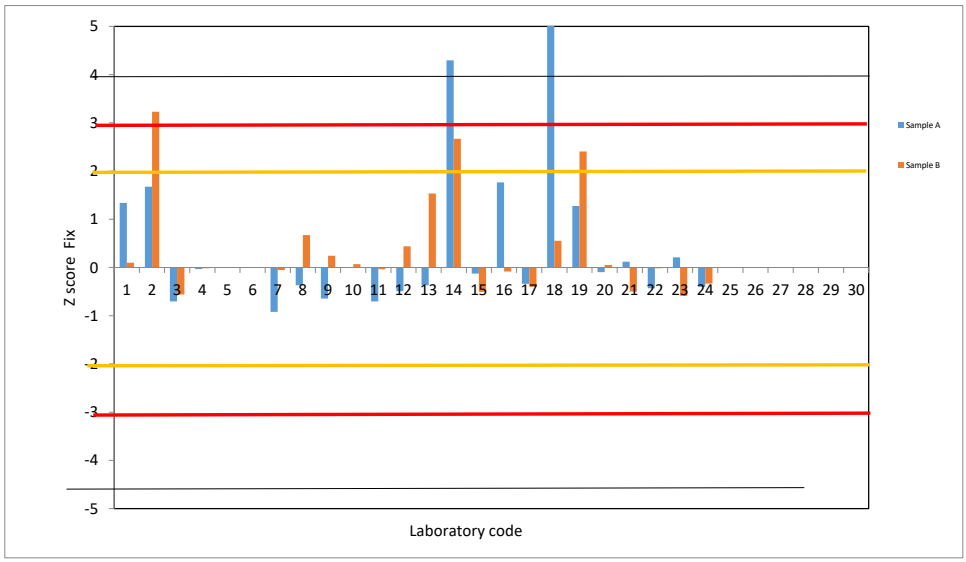
This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR : Cf page 7 and 8 /13

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



FIX Z-score

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

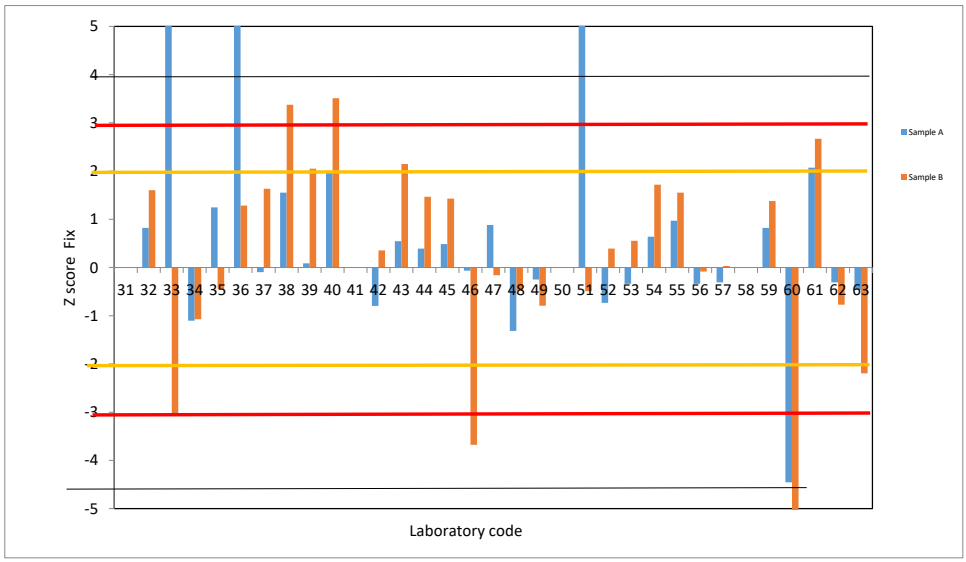
Sample / Lab code	A	B
31		
32	+0,82	+1,60
33	+6,03	-3,05
34	-1,10	-1,07
35	+1,25	-0,45
36	+6,03	+1,28
37	-0,09	+1,63
38	+1,55	+3,38
39	+0,09	+2,05
40	+1,98	+3,51
41		
42	-0,80	+0,35
43	+0,55	+2,15
44	+0,39	+1,47
45	+0,48	+1,43
46	-0,06	-3,68
47	+0,88	-0,16
48	-1,31	-0,48
49	-0,25	-0,79
50		
51	+7,44	-0,49
52	-0,73	+0,39
53	-0,34	+0,56
54	+0,64	+1,72
55	+0,97	+1,55
56	-0,34	-0,08
57	-0,31	+0,03
58		
59	+0,82	+1,38
60	-4,45	-7,44
61	+2,07	+2,67
62	-0,31	-0,77
63	-0,46	-2,20

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 7 and 8 /13

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



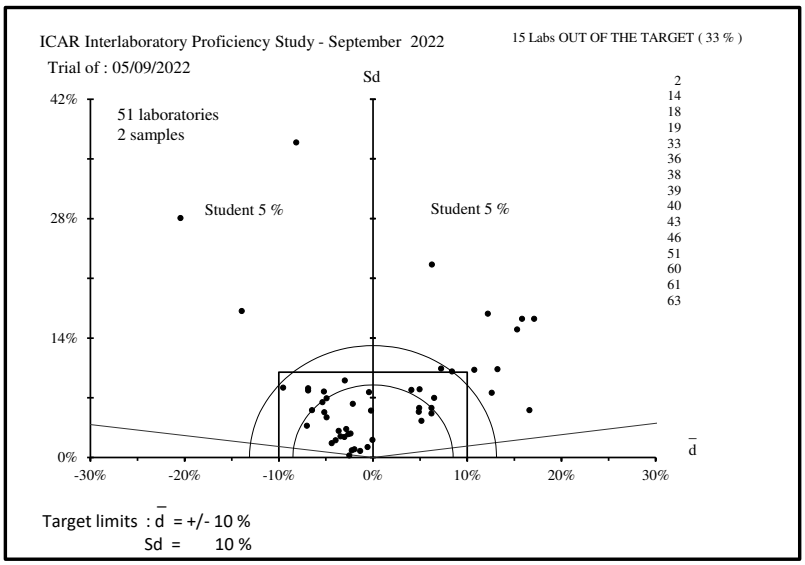


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**