THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

ICAR PROFICIENCY TEST - SEPTEMBER 2021

Raw cow milk

"Reference" Methods

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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 2021 !

This is the twelfth 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 2021 with at least one parameter is reported below

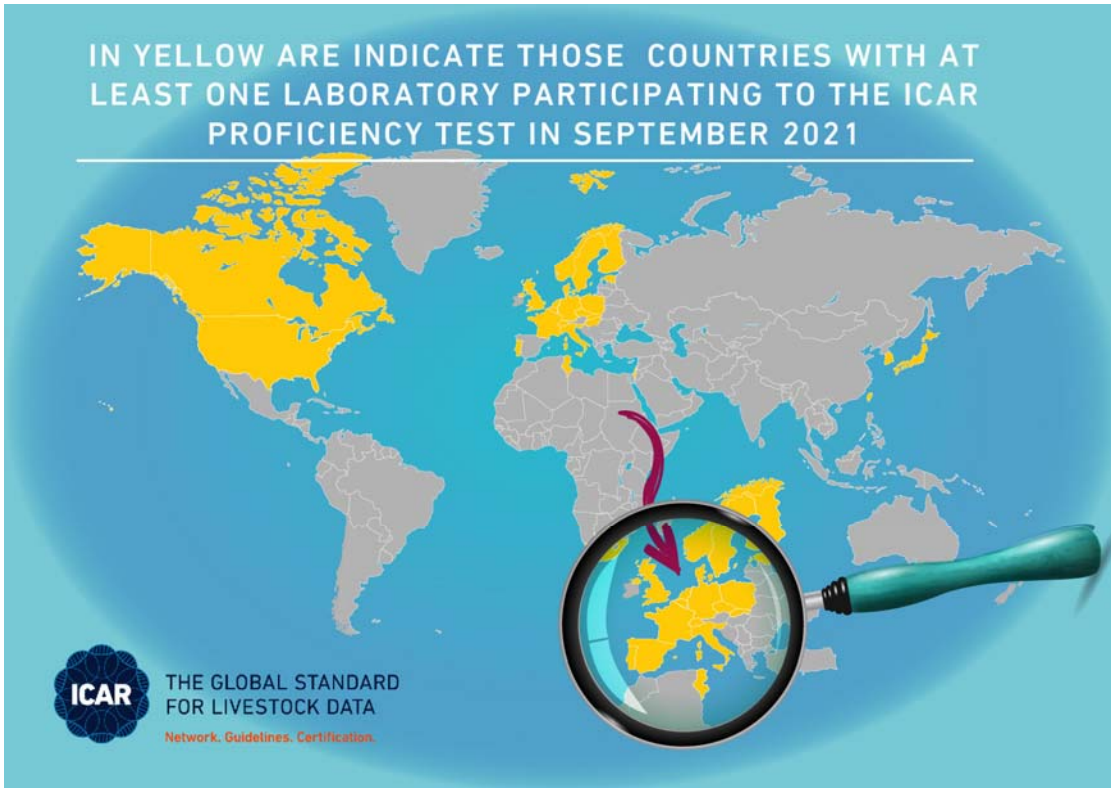

Table 1. Participating milk laboratories to the ICAR Proficiency Test (September 2021)

Country	Laboratory
Belgium	Comite du Lait ASBL
Belgium	Department of Agricultural products of Walloon Agricultural Research Centre
Canada	Lactanet
Canada	Lactanet Central Milk Testing Lab
Canada	Lactanet Pacific Milk Analysis
Czech Rep.	Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.
Czech Rep.	Laboratorija za ispitivanje kvaliteta mleka, Poljoprivredni fakultet Novi Sad
Czech Rep.	MILCOM a.s Dairy Research Institute
Denmark	Eurofins Milk Testing Denmark
Denmark	Foss Analytical A/S
Denmark	LVK
Estonia	Eesti Pollumajandusloomade Joudluskontrolli AS, Milk Analysing Laboratory
Finland	Valio Oy, Regional laboratory
France	Labilait
Germany	Milchkontroll und Rinderzuchtverband eG
Germany	Milchlabor Weser-Ems eG
Germany	Milchprüfring Bayern
Holland	Qlip B.V.
Hungary	Hrvatska Ag. za poljoprivredu i hanru
Israel	Central Milk Laboratory – ICBA
Italy	Associazione Italiana Allevatori, Laboratorio Standard Latte (LSL-AIA)

Country	Laboratory
Italy	Federazione Latterie Alto Adige Soc. Agr. Coop.
Japan	Japan Dairy Technical Association
Norway	Tine Ramelklaboratoriet Heimdal
Norway	Tine SA Mastittlaboratoriet i Molde
Poland	Laboratorium Oceny Mleka (KCHZ), Laboratorium Referencyjne z siedziba w Parzniewie
Poland	Laboratorium Oceny Mleka (KCHZ), Laboratorium Referencyjne z siedziba w Parzniewie
Poland	PFHBiPM Laboratorium w Kobiernie
Poland	PFHBiPM Laboratorium w Parzniewie
Poland	PFHBiPM Region Oceny Bydgoszcz z/s w Minikowie
Portugal	Associação Interprofissional do Leite e Lacticínios
Portugal	LRV-LABORATORIO REGIONAL DE VETERINARIA
Slovak Rep	Plemenárske služby SR, š.p., Centrálne laboratórium rozboru mlieka
Slovenia	KGZS Zavod Ptui
Slovenia	University of Ljubljana, Biotechnical Faculty, Zootech. Dept., Laboratory for Dairying
South Africa	Mérieux NutriSciences Cape Town
Soutk Korea	Korea Animal Improvement Association 111ho Green Dairy tech. Univ. HanKyong
Sweden	Eurofins Milk Testing Sweden AB
Switzerland	Agroscope
Switzerland	Suisselab AG
Taiwan	Council of Agriculture, Executive Yuan, Taiwan Animal Germplasm Center of TLRI
Tunisia	Office de l'Elevage et des Pâturages, Laboratoire de Contrôle Laitier
UK	CIS
UK	National Milk Records plc_ Glasgow
UK	National Milk Records plc_ Glasgow
UK	Nationl Milk Laboratory_Wolverhampton
USA	Eastern Laboratory Services

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

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Chemical Reference Methods
Laboratory participation codes and Performance analyses

ICAR PT RF0921

Laboratory Name	

A

Your participation Codes					
Subscription	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	Yes	Yes	Yes	Yes	Yes
Participation Codes	10	11	8	8	30
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	14/09/2021	15/09/2021	13/09/2021	16/09/2021	10/09/2021

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	10	11	8	8	30
%	33	88	20	56	45
d	0.011	0.026	-0.027	-1.791	1%
Sd	0.005	0.006	0.012	0.513	2%
D	0.012	0.027	0.029	1.863	3%
	Limits				
d	<= 0.020	<= 0.025	<= 0.10	<= 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					

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	0.009	0.008	0.03	0.09	2
Sample 2	0.003	0.001	0.00	0.00	8
Sample 3	0.000	0.016	0.04	0.36	1
Sample 4	0.004	0.003	0.03	0.51	7
Sample 5	0.002	0.003	0.03	0.20	8
Sample 6	0.005	0.003	0.02	0.00	6
Sample 7	0.006	0.005	0.03	0.21	2
Sample 8	0.005	0.004	0.00	0.08	1
Sample 9	0.010	0.001	0.01	0.06	2
Sample 10	0.001	0.003	0.00	0.96	8

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	0.62	1.15	-0.90	-0.88	-0.19
Sample 2	0.81	1.07	-0.53	-0.87	-0.01
Sample 3	0.48	0.88	-0.88	-1.07	0.28
Sample 4	0.30	1.18	-0.38	-0.92	-0.01
Sample 5	0.45	1.33	-0.94	-1.11	0.60
Sample 6	0.18	1.59	-0.85	-0.88	-0.34
Sample 7	0.67	1.85	-0.52	-0.93	0.15
Sample 8	0.59	1.84	0.02	-0.66	0.35
Sample 9	0.33	2.16	-0.74	-0.90	0.32
Sample 10	0.00	1.79	-0.48	-1.00	0.74

Your Z-Score Fix

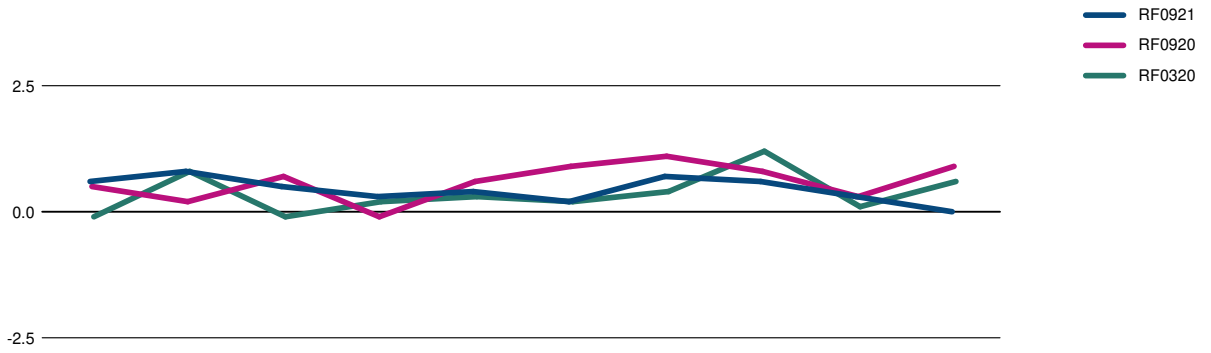
	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Sample 1	0.84	1.47	-0.71	-0.77	0.50
Sample 2	0.85	1.22	-0.55	-0.78	0.85
Sample 3	0.63	1.09	-0.55	-1.06	1.06
Sample 4	0.49	1.15	-0.37	-1.03	0.80
Sample 5	0.50	1.04	-0.84	-0.94	1.14
Sample 6	0.39	1.58	-0.86	-1.27	0.52
Sample 7	0.77	1.38	-0.52	-0.72	0.56
Sample 8	0.53	1.67	0.02	-0.64	0.90
Sample 9	0.29	1.99	-0.72	-1.14	0.94
Sample 10	0.00	1.88	-0.56	-1.56	1.53

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

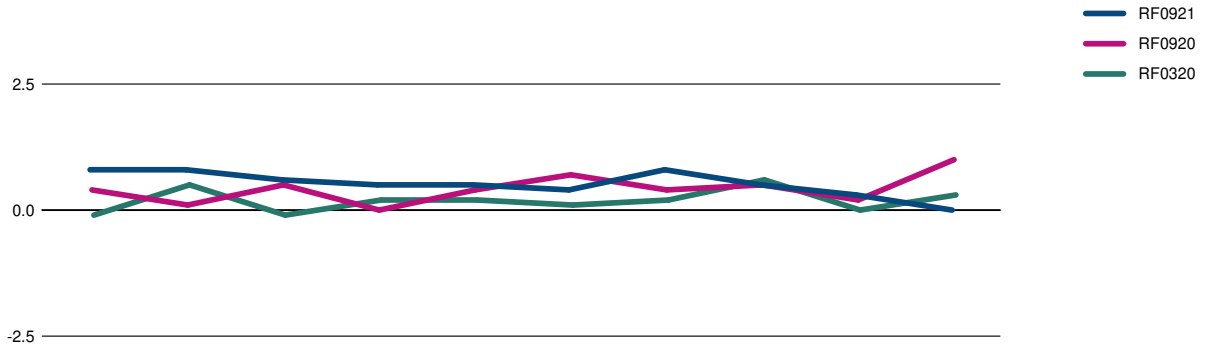
Z-Score < -3	-3 <= Z-Score < -2	-2 <= Z-Score <= 2	2 < Z-Score <= 3	Z-Score > 3
Poor	Moderate	Good	Moderate	Poor

ZSCORE-PT - FAT reference



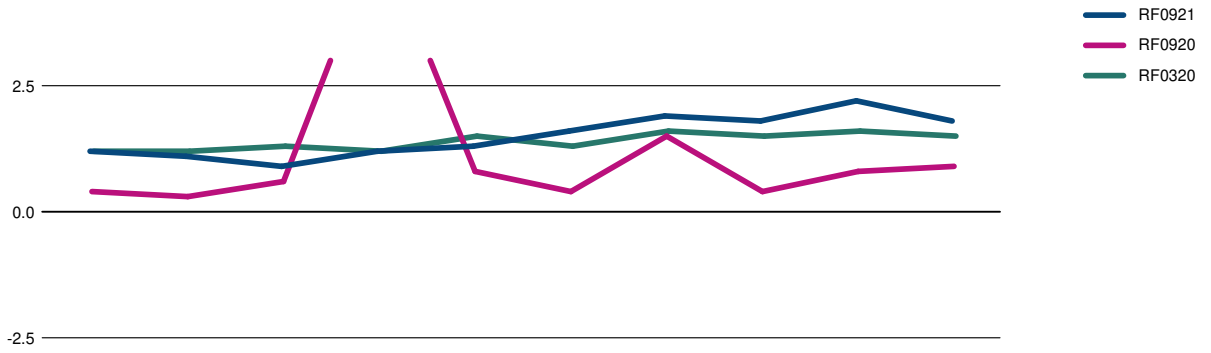
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
10	RF0921	0.6	0.8	0.5	0.3	0.4	0.2	0.7	0.6	0.3	0.0	0%	0%	100%
9	RF0920	0.5	0.2	0.7	-0.1	0.6	0.9	1.1	0.8	0.3	0.9	0%	0%	100%
8	RF0320	-0.1	0.8	-0.1	0.2	0.3	0.2	0.4	1.2	0.1	0.6	0%	0%	100%
13	RF0919	0.2	0.1	0.3	0.6	0.1	0.7	0.9	0.9	0.4	-0.1	0%	0%	100%
14	RF0319	0.1	0.6	0.3	0.3	1.2	0.9	0.2	0.5	0.3	-0.2	0%	0%	100%
14	RF0918	-0.5	-0.4	-1.1	-0.1	-0.5	-0.5	-0.9	0.0	-0.5	0.0	0%	0%	100%
12	RF0318	0.1	0.5	0.2	0.3	0.1	0.0	0.3	0.2	1.0	-0.1	0%	0%	100%
14	RF0917	-0.6	-0.3	-1.2	-0.3	-0.9	0.2	0.0	0.8	0.3	0.2	0%	0%	100%
15	RF0317	0.2	0.5	0.2	0.0	0.4	1.0	0.3	0.5	0.1	0.5	0%	0%	100%
15	RF0916	0.8	1.3	0.9	1.1	0.7	0.5	0.9	1.2	0.6	-2.1	10%	0%	90%

ZSCORE-FIX - FAT reference



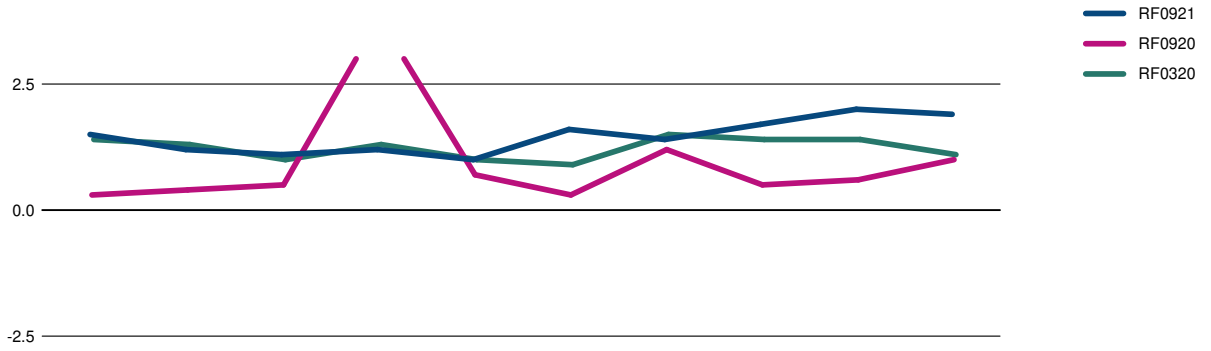
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
10	RF0921	0.8	0.8	0.6	0.5	0.5	0.4	0.8	0.5	0.3	0.0	0%	0%	100%
9	RF0920	0.4	0.1	0.5	0.0	0.4	0.7	0.4	0.5	0.2	1.0	0%	0%	100%
8	RF0320	-0.1	0.5	-0.1	0.2	0.2	0.1	0.2	0.6	0.0	0.3	0%	0%	100%
13	RF0919	0.2	0.1	0.3	0.4	0.1	0.4	0.7	0.8	0.3	0.0	0%	0%	100%
14	RF0319	0.0	0.4	0.1	0.2	0.8	0.5	0.1	0.3	0.1	-0.1	0%	0%	100%
14	RF0918	-0.5	-0.3	-0.7	-0.1	-0.3	-0.5	-0.4	0.0	-0.4	0.0	0%	0%	100%
12	RF0318	0.1	0.5	0.1	0.3	0.1	0.0	0.4	0.1	0.7	0.0	0%	0%	100%
14	RF0917	-0.2	-0.4	-0.4	-0.1	-0.5	0.1	0.0	0.4	0.1	0.2	0%	0%	100%
15	RF0317	0.3	0.3	0.1	0.0	0.3	0.5	0.3	0.4	0.0	0.2	0%	0%	100%
15	RF0916	0.3	0.6	0.6	0.8	0.7	0.3	0.5	0.8	0.7	-1.6	0%	0%	100%

ZSCORE-PT - PROTEIN reference



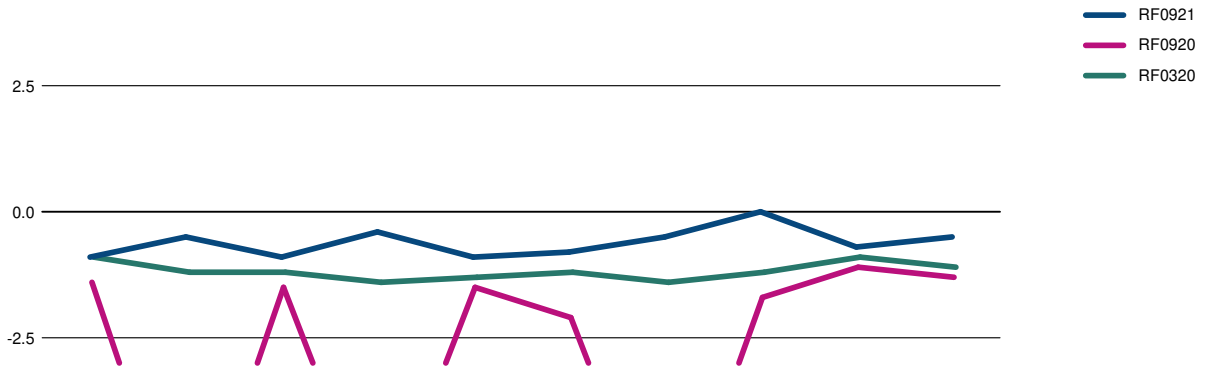
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
11	RF0921	1.2	1.1	0.9	1.2	1.3	1.6	1.9	1.8	2.2	1.8	10%	0%	90%
9	RF0920	0.4	0.3	0.6	5.5	0.8	0.4	1.5	0.4	0.8	0.9	0%	10%	90%
8	RF0320	1.2	1.2	1.3	1.2	1.5	1.3	1.6	1.5	1.6	1.5	0%	0%	100%
13	RF0919	0.7	0.4	2.1	1.4	0.2	0.9	2.0	1.2	1.5	0.9	10%	0%	90%
14	RF0319	1.8	1.9	1.5	1.5	1.5	1.6	2.1	1.2	1.2	2.2	20%	0%	80%
13	RF0918	0.5	1.0	0.8	0.6	0.3	1.1	1.0	0.5	1.3	0.8	0%	0%	100%
13	RF0318	1.4	1.6	1.4	0.7	0.7	0.7	1.1	1.7	0.8	1.5	0%	0%	100%
14	RF0917	1.3	1.6	1.2	0.7	0.6	1.4	1.3	0.5	0.8	0.3	0%	0%	100%
15	RF0317	1.6	1.6	1.6	1.6	0.7	1.5	1.4	1.3	1.0	1.7	0%	0%	100%
15	RF0916	0.3	0.4	0.3	0.8	0.3	0.5	1.0	0.7	0.6	0.3	0%	0%	100%

ZSCORE-FIX - PROTEIN reference



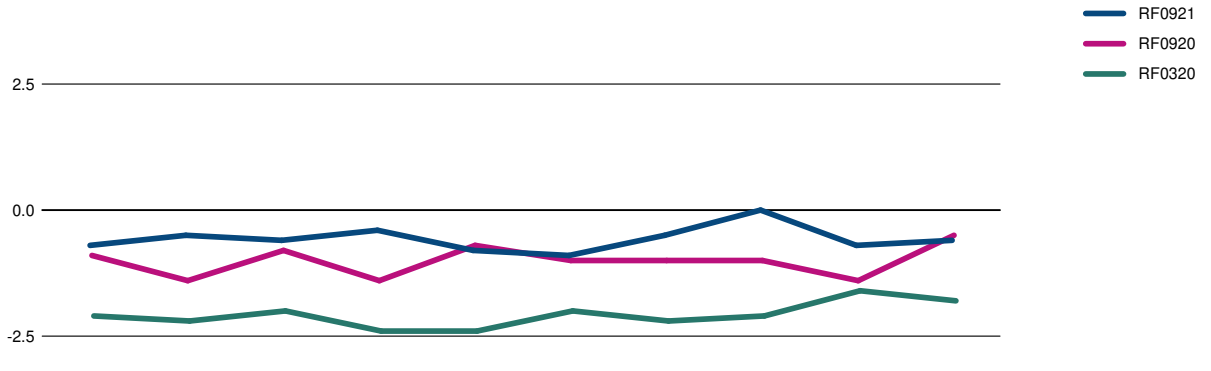
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
11	RF0921	1.5	1.2	1.1	1.2	1.0	1.6	1.4	1.7	2.0	1.9	0%	0%	100%
9	RF0920	0.3	0.4	0.5	3.8	0.7	0.3	1.2	0.5	0.6	1.0	0%	10%	90%
8	RF0320	1.4	1.3	1.0	1.3	1.0	0.9	1.5	1.4	1.4	1.1	0%	0%	100%
13	RF0919	0.6	0.4	2.2	1.4	0.2	1.0	2.9	0.9	1.4	0.8	20%	0%	80%
14	RF0319	2.1	2.4	1.8	1.9	1.6	2.7	2.7	1.3	1.8	2.5	50%	0%	50%
13	RF0918	0.4	0.7	0.8	1.1	0.5	1.3	1.0	0.6	1.2	0.7	0%	0%	100%
13	RF0318	1.6	2.1	1.5	1.2	0.9	1.5	1.4	1.8	0.9	1.8	10%	0%	90%
14	RF0917	1.5	1.8	1.3	0.7	0.5	1.3	1.1	0.8	1.3	0.3	0%	0%	100%
15	RF0317	1.5	1.5	1.6	1.6	0.8	1.3	1.6	1.1	1.1	1.5	0%	0%	100%
15	RF0916	0.2	0.5	0.3	0.8	0.4	0.6	0.7	0.6	0.6	0.4	0%	0%	100%

ZSCORE-PT - LACTOSE reference



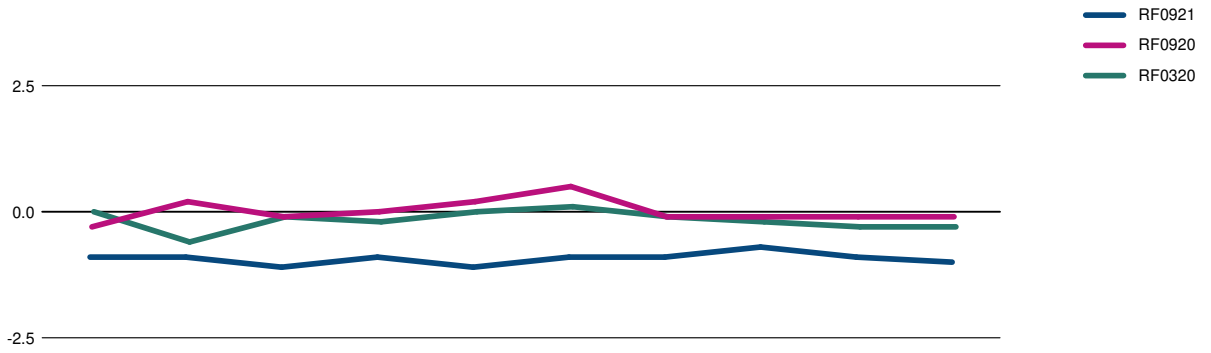
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
8	RF0921	-0.9	-0.5	-0.9	-0.4	-0.9	-0.8	-0.5	0.0	-0.7	-0.5	0%	0%	100%
7	RF0920	-1.4	-7.0	-1.5	-6.4	-1.5	-2.1	-7.0	-1.7	-1.1	-1.3	10%	30%	60%
7	RF0320	-0.9	-1.2	-1.2	-1.4	-1.3	-1.2	-1.4	-1.2	-0.9	-1.1	0%	0%	100%
12	RF0919	2.0	1.6	1.9	1.6	1.6	1.7	1.6	1.8	1.5	1.1	0%	0%	100%
11	RF0319	-1.7	-1.5	-1.3	-1.3	-0.4	-1.0	-1.4	-1.5	-1.3	-1.5	0%	0%	100%
13	RF0918	-0.8	-1.0	-1.9	-1.7	-1.3	-1.5	-1.5	-1.2	-0.9	-1.3	0%	0%	100%
11	RF0318	-1.1	-1.3	-1.3	-1.8	-1.1	-0.7	-0.6	-1.3	-1.1	-1.0	0%	0%	100%
13	RF0917	-0.3	-0.1	-0.3	-0.4	-0.4	0.3	-0.1	0.0	-0.1	0.3	0%	0%	100%
13	RF0317	0.4	0.2	0.1	0.1	0.2	0.1	0.2	0.5	0.2	0.0	0%	0%	100%
13	RF0916	0.4	0.3	0.6	0.7	0.7	0.3	0.7	0.8	0.8	0.9	0%	0%	100%

ZSCORE-FIX - LACTOSE reference



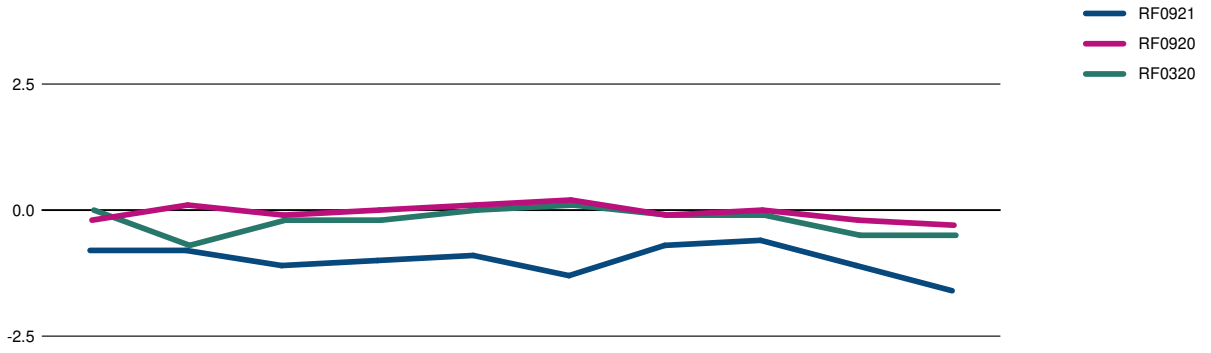
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
8	RF0921	-0.7	-0.5	-0.6	-0.4	-0.8	-0.9	-0.5	0.0	-0.7	-0.6	0%	0%	100%
7	RF0920	-0.9	-1.4	-0.8	-1.4	-0.7	-1.0	-1.0	-1.0	-1.4	-0.5	0%	0%	100%
7	RF0320	-2.1	-2.2	-2.0	-2.4	-2.4	-2.0	-2.2	-2.1	-1.6	-1.8	60%	0%	40%
12	RF0919	3.7	2.9	3.6	3.4	3.6	4.9	3.3	4.5	3.1	2.6	20%	80%	0%
11	RF0319	-1.4	-1.6	-2.1	-1.6	-1.0	-1.6	-1.8	-2.0	-1.6	-1.9	10%	0%	90%
13	RF0918	-1.4	-1.3	-1.8	-1.8	-1.2	-1.4	-1.9	-1.4	-1.0	-1.7	0%	0%	100%
11	RF0318	-1.3	-1.0	-1.2	-2.0	-1.0	-0.7	-1.0	-1.9	-0.9	-0.9	0%	0%	100%
13	RF0917	-0.3	-0.4	-0.6	-0.6	-0.9	0.5	-0.1	0.0	-0.2	0.4	0%	0%	100%
13	RF0317	0.6	0.4	0.2	0.2	0.2	0.1	0.3	0.7	0.3	0.0	0%	0%	100%
13	RF0916	0.6	0.4	0.8	1.0	1.0	0.5	0.9	1.4	1.0	1.1	0%	0%	100%

ZSCORE-PT - UREA reference



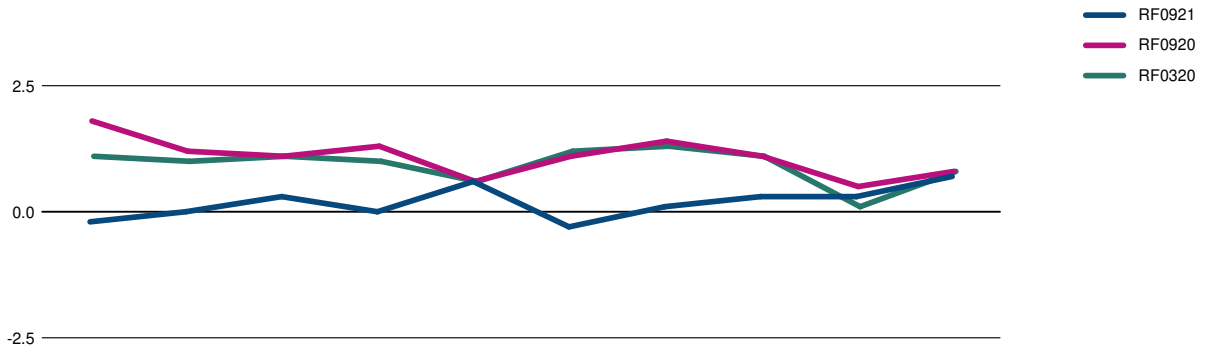
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
8	RF0921	-0.9	-0.9	-1.1	-0.9	-1.1	-0.9	-0.9	-0.7	-0.9	-1.0	0%	0%	100%
7	RF0920	-0.3	0.2	-0.1	0.0	0.2	0.5	-0.1	-0.1	-0.1	-0.1	0%	0%	100%
6	RF0320	0.0	-0.6	-0.1	-0.2	0.0	0.1	-0.1	-0.2	-0.3	-0.3	0%	0%	100%
9	RF0919	-0.4	-0.8	-0.3	-0.3	-0.6	-0.7	-0.2	-0.3	-0.7	0.0	0%	0%	100%
11	RF0319	-1.2	-1.2	-1.3	-0.7	-0.6	-1.4	-1.0	-0.6	-0.9	-1.0	0%	0%	100%
10	RF0918	-1.3	-0.4	0.2	-0.5	0.2	0.1	2.2	1.3	0.3	0.2	10%	0%	90%
9	RF0318	-1.0	-0.3	-1.1	-1.1	-1.3	-0.9	-0.5	-1.0	-0.3	-1.2	0%	0%	100%
9	RF0917	-0.3	-0.8	-0.9	-0.8	-0.7	-0.9	-0.9	-1.1	33.6	-41.4	0%	20%	80%
11	RF0317	-1.2	-1.6	-1.0	-0.2	-0.7	-2.2	-1.4	-1.1	-0.9	-1.6	10%	0%	90%
11	RF0916	0.0	-0.4	-0.6	-0.5	-0.5	-1.4	0.2	-0.2	-1.0	-0.5	0%	0%	100%

ZSCORE-FIX - UREA reference



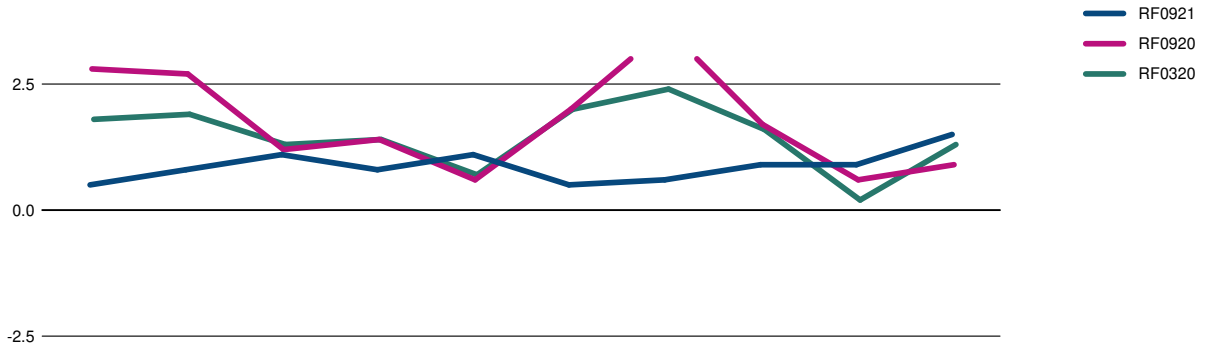
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
8	RF0921	-0.8	-0.8	-1.1	-1.0	-0.9	-1.3	-0.7	-0.6	-1.1	-1.6	0%	0%	100%
7	RF0920	-0.2	0.1	-0.1	0.0	0.1	0.2	-0.1	0.0	-0.2	-0.3	0%	0%	100%
6	RF0320	0.0	-0.7	-0.2	-0.2	0.0	0.1	-0.1	-0.1	-0.5	-0.5	0%	0%	100%
9	RF0919	-0.4	-0.5	-0.3	-0.2	-1.0	-0.8	-0.2	-0.2	-1.0	0.0	0%	0%	100%
11	RF0319	-1.1	-2.0	-1.7	-0.9	-1.3	-2.6	-1.2	-1.3	-1.7	-2.0	10%	0%	90%
10	RF0918	-0.4	-0.2	0.2	-0.2	0.0	0.1	0.5	0.5	0.3	0.4	0%	0%	100%
9	RF0318	-1.1	-0.3	-0.9	-0.7	-0.9	-0.8	-0.4	-1.0	-0.2	-1.2	0%	0%	100%
9	RF0917	-0.2	-0.4	-0.5	-0.7	-0.4	-0.7	-0.4	-0.8	12.5	-13.7	0%	20%	80%
11	RF0317	-0.9	-1.1	-0.7	-1.3	-0.7	-1.2	-1.0	-0.9	-0.8	-1.3	0%	0%	100%
11	RF0916	0.0	-0.4	-0.5	-0.4	-0.4	-1.1	0.1	-0.2	-0.7	-0.4	0%	0%	100%

ZSCORE-PT - SCC



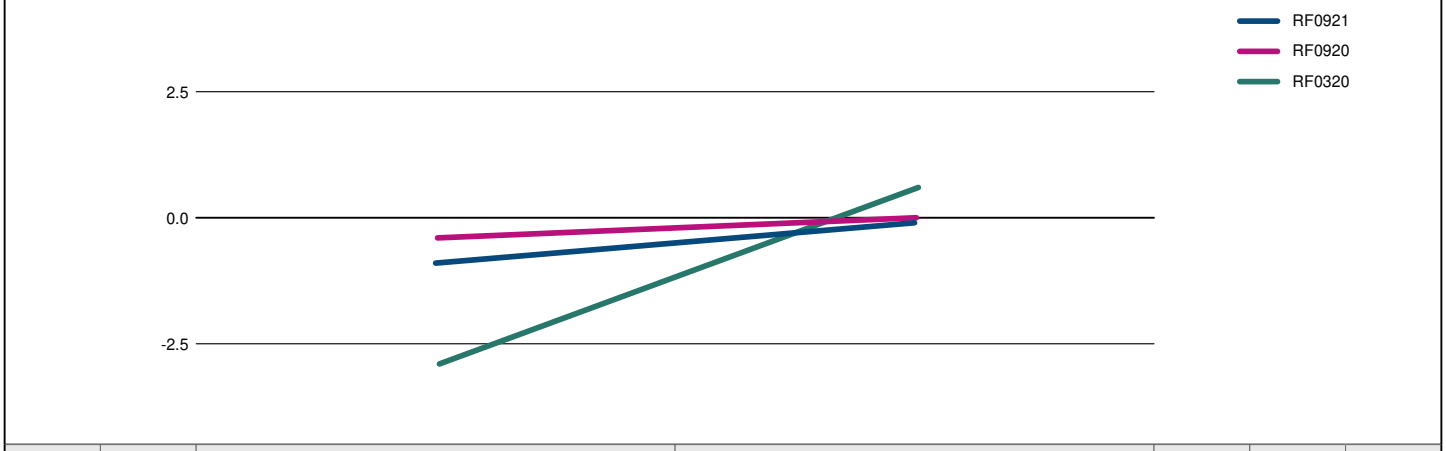
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
30	RF0921	-0.2	0.0	0.3	0.0	0.6	-0.3	0.1	0.3	0.3	0.7	0%	0%	100%
14	RF0920	1.8	1.2	1.1	1.3	0.6	1.1	1.4	1.1	0.5	0.8	0%	0%	100%
11	RF0320	1.1	1.0	1.1	1.0	0.6	1.2	1.3	1.1	0.1	0.8	0%	0%	100%
14	RF0919	-0.7	-0.7	-0.8	-0.6	-0.6	-0.9	-0.6	-0.6	-0.9	-0.8	0%	0%	100%
22	RF0319	0.0	-1.0	-0.7	-0.6	-0.7	-0.9	-0.8	-0.8	-0.9	-0.9	0%	0%	100%
12	RF0918	-0.5	-0.7	-0.4	-0.4	-0.6	-0.4	-0.6	-0.6	-0.5	-0.6	0%	0%	100%
18	RF0318	-0.2	-0.4	-0.6	-0.5	-0.4	-0.3	-0.4	-0.5	-0.3	-0.5	0%	0%	100%
14	RF0917	-0.2	-0.6	-0.6	-0.5	-0.8	-0.7	-0.7	-0.8	-0.8	-0.8	0%	0%	100%
19	RF0317	-0.2	-1.0	-0.6	-0.7	-0.4	-0.7	-0.6	-0.1	-0.5	-0.4	0%	0%	100%
15	RF0916	0.0	-0.9	0.5	-0.8	-0.7	0.3	-0.9	-0.4	2.8	-0.9	10%	0%	90%

ZSCORE-FIX - SCC



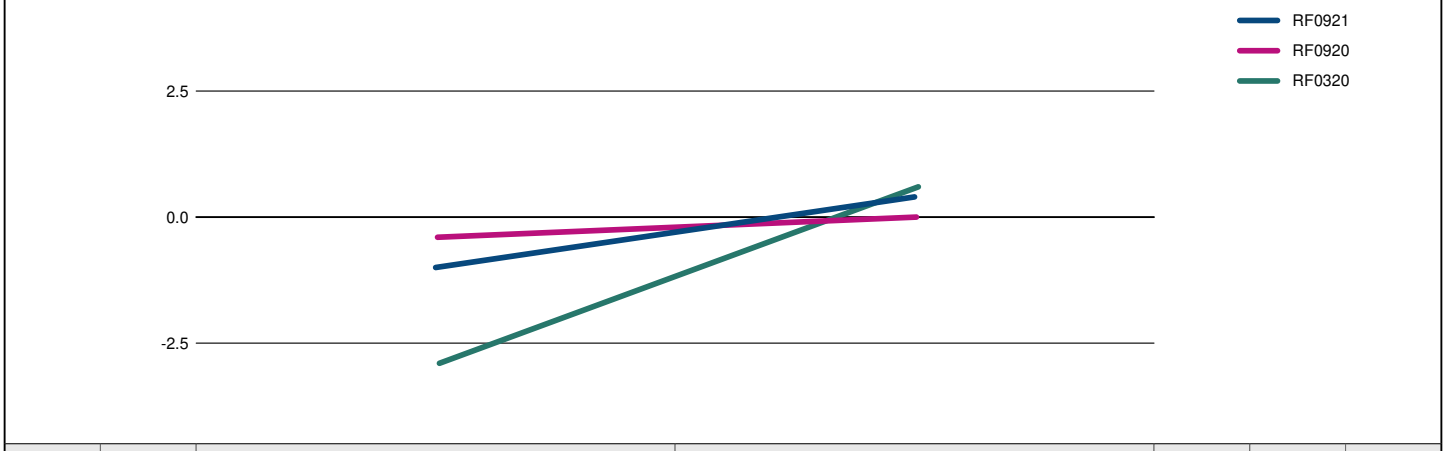
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
30	RF0921	0.5	0.8	1.1	0.8	1.1	0.5	0.6	0.9	0.9	1.5	0%	0%	100%
14	RF0920	2.8	2.7	1.2	1.4	0.6	2.0	3.6	1.7	0.6	0.9	20%	10%	70%
11	RF0320	1.8	1.9	1.3	1.4	0.7	2.0	2.4	1.6	0.2	1.3	10%	0%	90%
14	RF0919	-1.6	-1.6	-1.3	-0.9	-0.9	-1.6	-1.5	-1.0	-1.5	-1.6	0%	0%	100%
22	RF0319	0.0	-1.5	-1.3	-0.8	-1.1	-1.7	-1.1	-1.7	-2.0	-2.1	10%	0%	90%
12	RF0918	-1.3	-1.4	-0.8	-0.8	-1.3	-0.9	-1.4	-1.5	-1.2	-1.5	0%	0%	100%
18	RF0318	-0.5	-1.0	-1.0	-1.5	-0.9	-0.6	-1.1	-0.9	-0.6	-1.4	0%	0%	100%
14	RF0917	-0.6	-2.0	-1.7	-1.5	-2.3	-2.4	-2.2	-3.1	-2.2	-2.8	50%	10%	40%
19	RF0317	-0.3	-1.4	-0.8	-1.4	-0.7	-1.1	-0.9	-0.2	-1.1	-0.8	0%	0%	100%
15	RF0916	0.1	-1.8	0.8	-1.2	-1.3	0.4	-1.9	-0.8	5.3	-1.9	0%	10%	90%

ZSCORE-PT - SCC - Sample A and B



Part. code	Round	Sample A	Sample B	Yellow	Red	White
30	RF0921	-0.9	-0.1	0%	0%	100%
14	RF0920	-0.4	0.0	0%	0%	100%
11	RF0320	-2.9	0.6	10%	0%	90%
14	RF0919	0.0	0.0	0%	0%	100%
22	RF0319	0.0	0.0	0%	0%	100%
12	RF0918	0.0	0.0	0%	0%	100%
18	RF0318	0.0	0.0	0%	0%	100%
14	RF0917	0.0	0.0	0%	0%	100%
19	RF0317	0.0	0.0	0%	0%	100%
15	RF0916	0.0	0.0	0%	0%	100%

ZSCORE-FIX - SCC - Sample A and B



Part. code	Round	Sample A	Sample B	Yellow	Red	White
30	RF0921	-1.0	0.4	0%	0%	100%
14	RF0920	-0.4	0.0	0%	0%	100%
11	RF0320	-2.9	0.6	10%	0%	90%
14	RF0919	0.0	0.0	0%	0%	100%
22	RF0319	0.0	0.0	0%	0%	100%
12	RF0918	0.0	0.0	0%	0%	100%
18	RF0318	0.0	0.0	0%	0%	100%
14	RF0917	0.0	0.0	0%	0%	100%
19	RF0317	0.0	0.0	0%	0%	100%
15	RF0916	0.0	0.0	0%	0%	100%

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Determination of FAT CONTENT
Röse Gottlieb method

Sending date of statistical treatment : 4th October 2021

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

Proficiency test accreditated ISO 17043

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

Nb	%	N°	d	Sd	D	Method
1	7	14	+ 0,002	0,008	0,008	A
2	13	6	+ 0,005	0,007	0,008	A
3	20	5	+ 0,009	0,003	0,010	A
4	27	8	+ 0,010	0,004	0,011	A
5	33	10	+ 0,011	0,005	0,012	A
6	40	3	+ 0,008	0,016	0,018	A
7	47	11	+ 0,010	0,017	0,020	A
8	53	7	+ 0,019	0,006	0,020	A
9	60	9	- 0,021	0,006	0,022	A
10	67	13	- 0,026	0,005	0,026	A
11	73	4	- 0,030	0,011	0,032	A
12	80	15	- 0,011	0,030	0,032	A
13	87	2	- 0,033	0,017	0,037	A
14	93	1	+ 0,010	0,042	0,043	A
15	100	12	+ 0,097	0,049	0,108	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 15 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}	0,025

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	0,007	0,001	0,048 *	0,092 *	0,139 *	0,270 *	0,017	0,013	0,009	0,000	0,072	20
2	0,002	0,003	0,008	0,002	0,017	0,002	0,001	0,005	0,008	0,000	0,005	20
3	0,020	0,010	0,030	0,000	0,000	0,020	0,030	0,000	0,010	0,020	0,013	20
4	0,012	0,003	0,008	0,004	0,005	0,012	0,002	0,006	0,001	0,017	0,006	20
5	0,003	0,005	0,003	0,000	0,003	0,001	0,004	0,006	0,002	0,005	0,003	20
6	0,010	0,012	0,014	0,010	0,004	0,010	0,008	0,006	0,012	0,002	0,007	20
7	0,002	0,003	0,010	0,005	0,010	0,011	0,001	0,001	0,002	0,005	0,004	20
8	0,012	0,003	0,001	0,002	0,003	0,001	0,008	0,002	0,001	0,000	0,003	20
9	0,014	0,001	0,001	0,016	0,006	0,005	0,009	0,016	0,006	0,004	0,007	20
10	0,009	0,003	0,000	0,004	0,002	0,005	0,006	0,005	0,010	0,001	0,004	20
11	0,008	0,014	0,008	0,011	0,002	0,016	0,017	0,003	0,009	0,000	0,007	20
12	0,011	0,017	0,025	0,002	0,007	0,002	0,023	0,001	0,043 *	0,024	0,014	20
13	0,000	0,010	0,000	0,010	0,000	**	**	**	**	**	0,004	10
14	0,007	0,008	0,001	0,006	0,010	0,015	0,001	0,014	0,001	0,005	0,006	20
15	0,001	0,002	0,002	0,005	0,001	0,007	0,001	0,001	0,005	0,005	0,003	20
Sr	0,007	0,006	0,012	0,017	0,026	0,051	0,009	0,005	0,009	0,007		290
NE	30	30	30	30	30	28	28	28	28	28		
L	0,025	0,021	0,032	0,019	0,018	0,026	0,033	0,020	0,018	0,026		

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	4,721	4,159	3,507	2,878	2,061	4,561	3,782	3,073	2,432	1,463
2	4,690	4,114	3,423	2,804	2,108	4,412	3,776	3,085	2,388	1,406
3	4,720	4,135	3,465	2,840	2,140	4,470	3,835	3,120	2,435	1,450
4	4,704	4,131	3,444	2,782	2,092	4,434	3,752	3,073	2,399	1,425
5	4,735	4,154	3,482	2,834	2,127	4,479	3,803	3,110	2,436	1,469
6	4,721	4,146	3,464	2,826	2,124	4,480	3,805	3,111	2,427	1,477
7	4,749	4,171	3,489	2,841	2,131	4,486	3,816	3,117	2,450	1,476
8	4,731	4,150	3,486	2,834	2,133	4,479	3,804	3,115	2,440	1,464
9	4,695	4,117	3,461	2,809	2,101	4,451	3,764	3,073	2,405	1,449
10	4,736	4,160	3,485	2,835	2,129	4,478	3,811	3,111	2,433	1,462
11	4,770	4,133	3,470	2,828	2,142	4,466	3,807	3,113	2,437	1,469
12	4,754	4,188	3,534	2,905	2,204 *	4,561	3,887 *	3,242 *	2,575 *	1,650 *
13	4,690	4,115	3,450	2,795	2,100					
14	4,700	4,148	3,478	2,825	2,119	4,469	3,808	3,107	2,430	1,466
15	4,673	4,133	3,461	2,784	2,133	4,429	3,778	3,093	2,426	1,517
M	4,719	4,143	3,473	2,828	2,117	4,475	3,795	3,100	2,426	1,461
REF.	4,719	4,143	3,472	2,825	2,119	4,470	3,796	3,100	2,427	1,462
SD	0,027	0,021	0,026	0,033	0,023	0,043	0,023	0,018	0,018	0,026

M = mean per sample
SD = standard deviation per sample
REF. = reference values
*: 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 15 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			1	1	1	1			12	
Outlier Grubbs					12	12	12	12	12	12
sr	0,007	0,006	0,009	0,005	0,005	0,007	0,008	0,006	0,005	0,006
SR	0,028	0,021	0,026	0,031	0,017	0,036	0,024	0,019	0,018	0,027

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	+ 0,002	+ 0,016	+ 0,035	+ 0,053	- 0,058	+ 0,091	- 0,014	- 0,027	+ 0,004	+ 0,001	+ 0,010	0,042	0,77
2	- 0,029	- 0,029	- 0,049	- 0,021	- 0,011	- 0,058	- 0,020	- 0,015	- 0,039	- 0,056	- 0,033	0,017	6,15
3	+ 0,001	- 0,008	- 0,007	+ 0,015	+ 0,021	+ 0,000	+ 0,039	+ 0,020	+ 0,008	- 0,012	+ 0,008	0,016	1,55
4	- 0,015	- 0,012	- 0,028	- 0,043	- 0,027	- 0,036	- 0,044	- 0,027	- 0,029	- 0,037	- 0,030	0,011	8,85
5	+ 0,016	+ 0,011	+ 0,009	+ 0,009	+ 0,008	+ 0,009	+ 0,007	+ 0,010	+ 0,009	+ 0,007	+ 0,009	0,003	11,78
6	+ 0,002	+ 0,003	- 0,008	+ 0,001	+ 0,005	+ 0,010	+ 0,009	+ 0,011	- 0,000	+ 0,015	+ 0,005	0,007	2,28
7	+ 0,030	+ 0,028	+ 0,017	+ 0,015	+ 0,012	+ 0,016	+ 0,020	+ 0,017	+ 0,023	+ 0,014	+ 0,019	0,006	9,97
8	+ 0,012	+ 0,007	+ 0,013	+ 0,009	+ 0,014	+ 0,009	+ 0,008	+ 0,015	+ 0,012	+ 0,002	+ 0,010	0,004	8,43
9	- 0,024	- 0,026	- 0,012	- 0,016	- 0,018	- 0,019	- 0,032	- 0,027	- 0,022	- 0,013	- 0,021	0,006	10,15
10	+ 0,017	+ 0,017	+ 0,013	+ 0,010	+ 0,010	+ 0,008	+ 0,015	+ 0,011	+ 0,006	- 0,000	+ 0,011	0,005	6,32
11	+ 0,051	- 0,010	- 0,002	+ 0,002	+ 0,023	- 0,004	+ 0,011	+ 0,013	+ 0,009	+ 0,007	+ 0,010	0,017	1,86
12	+ 0,035	+ 0,045	+ 0,061	+ 0,080	+ 0,085	+ 0,091	+ 0,091	+ 0,142	+ 0,147	+ 0,188	+ 0,097	0,049	6,28
13	- 0,029	- 0,028	- 0,022	- 0,030	- 0,019						- 0,026	0,005	12,08
14	- 0,019	+ 0,005	+ 0,005	- 0,000	+ 0,000	- 0,001	+ 0,012	+ 0,007	+ 0,002	+ 0,004	+ 0,002	0,008	0,59
15	- 0,046	- 0,010	- 0,011	- 0,042	+ 0,014	- 0,041	- 0,018	- 0,007	- 0,002	+ 0,055	- 0,011	0,030	1,14
d	+ 0,000	+ 0,001	+ 0,001	+ 0,003	- 0,002	+ 0,005	- 0,000	- 0,000	- 0,001	- 0,001	+ 0,005	0,036	
Sd	0,027	0,021	0,026	0,033	0,023	0,043	0,023	0,018	0,018	0,026	0,027		

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	+0,06	+0,76	+1,31	+1,62	-2,59	+2,14	-0,60	-1,51	+0,25	+0,05
2	-1,06	-1,38	-1,86	-0,65	-0,51	-1,36	-0,86	-0,85	-2,20	-2,11
3	+0,05	-0,36	-0,28	+0,45	+0,94	+0,01	+1,69	+1,11	+0,44	-0,44
4	-0,54	-0,57	-1,07	-1,32	-1,22	-0,84	-1,87	-1,48	-1,61	-1,41
5	+0,58	+0,52	+0,35	+0,27	+0,34	+0,20	+0,32	+0,56	+0,50	+0,26
6	+0,08	+0,17	-0,31	+0,03	+0,23	+0,24	+0,41	+0,62	-0,01	+0,58
7	+1,11	+1,33	+0,63	+0,47	+0,54	+0,37	+0,86	+0,92	+1,29	+0,53
8	+0,45	+0,33	+0,50	+0,27	+0,60	+0,20	+0,36	+0,84	+0,70	+0,09
9	-0,87	-1,23	-0,45	-0,49	-0,80	-0,45	-1,37	-1,48	-1,25	-0,48
10	+0,62	+0,81	+0,48	+0,30	+0,45	+0,18	+0,67	+0,59	+0,33	-0,00
11	+1,88	-0,45	-0,09	+0,07	+1,02	-0,09	+0,47	+0,70	+0,53	+0,28
12	+1,28	+2,14	+2,31	+2,44	+3,75	+2,1	+3,9	+7,81	+8,3	+7,15
13	-1,06	-1,31	-0,84	-0,92	-0,84					
14	-0,71	+0,26	+0,20	-0,00	+0,00	-0,0	+0,5	+0,39	+0,1	+0,15
15	-1,70	-0,45	-0,43	-1,27	+0,60	-1,0	-0,8	-0,41	-0,1	+2,08

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

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

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

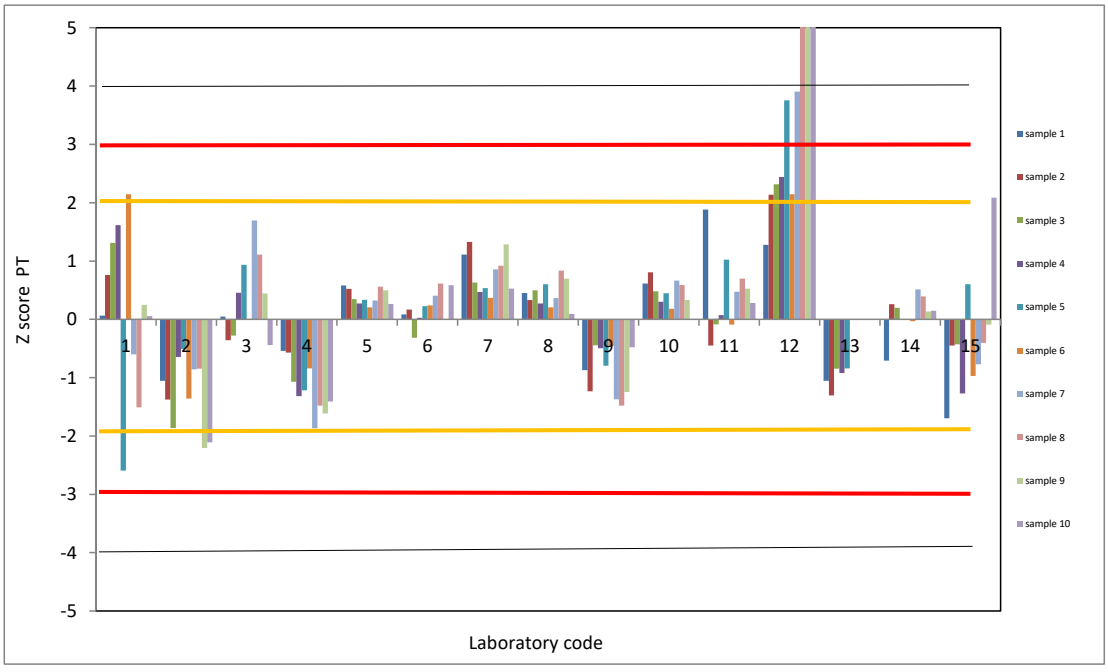


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

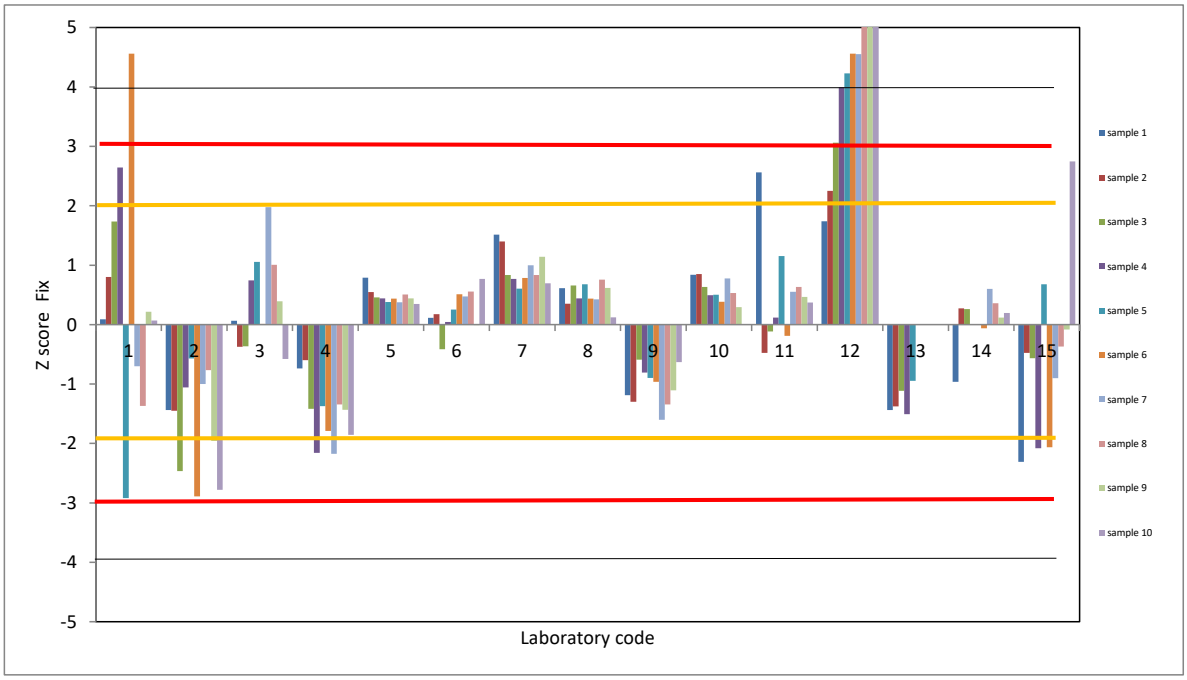
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,09	+0,80	+1,73	+2,64	-2,92	+4,56	-0,70	-1,37	+0,22	+0,07
2	-1,44	-1,45	-2,47	-1,06	-0,57	-2,89	-1,00	-0,77	-1,96	-2,78
3	+0,06	-0,38	-0,37	+0,74	+1,05	+0,01	+1,97	+1,01	+0,39	-0,58
4	-0,74	-0,60	-1,42	-2,16	-1,37	-1,79	-2,18	-1,34	-1,43	-1,85
5	+0,79	+0,55	+0,46	+0,44	+0,38	+0,44	+0,37	+0,51	+0,44	+0,35
6	+0,11	+0,17	-0,42	+0,04	+0,25	+0,51	+0,47	+0,56	-0,01	+0,77
7	+1,51	+1,40	+0,83	+0,77	+0,60	+0,79	+1,00	+0,83	+1,14	+0,70
8	+0,61	+0,35	+0,66	+0,44	+0,68	+0,44	+0,42	+0,76	+0,62	+0,12
9	-1,19	-1,30	-0,59	-0,81	-0,90	-0,96	-1,60	-1,34	-1,11	-0,63
10	+0,84	+0,85	+0,63	+0,49	+0,50	+0,39	+0,77	+0,53	+0,29	-0,00
11	+2,56	-0,48	-0,12	+0,12	+1,15	-0,19	+0,55	+0,63	+0,47	+0,37
12	+1,74	+2,25	+3,06	+3,99	+4,23	+4,56	+4,5	+7,08	+7,37	+9,42
13	-1,44	-1,38	-1,12	-1,51	-0,95					
14	-0,96	+0,27	+0,26	-0,01	+0,00	-0,06	+0,6	+0,36	+0,12	+0,20
15	-2,31	-0,48	-0,57	-2,08	+0,68	-2,06	-0,9	-0,37	-0,08	+2,75

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



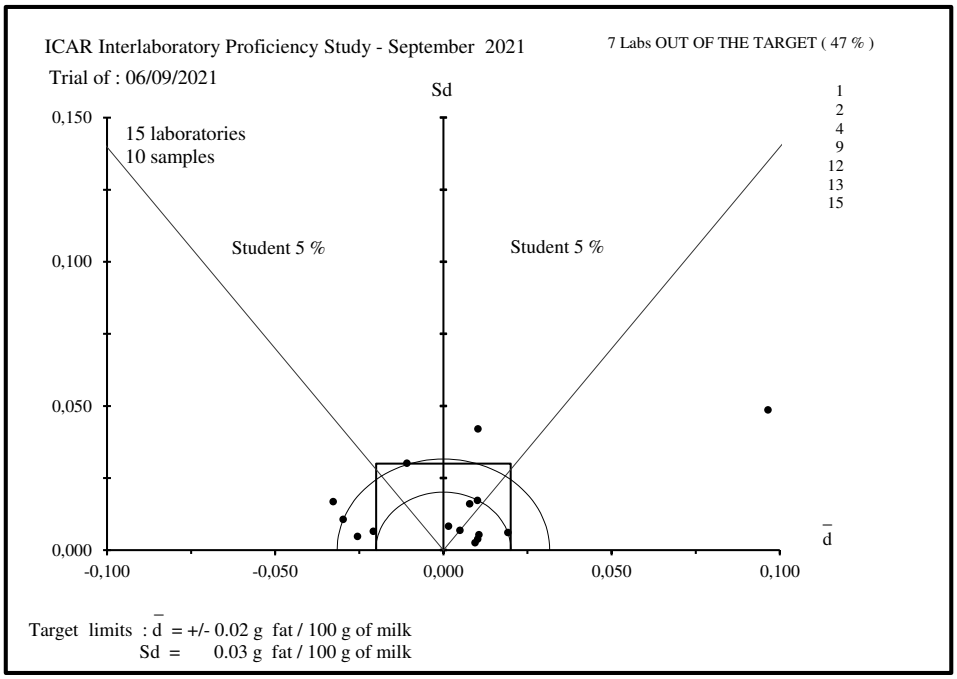


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Determination of CRUDE PROTEIN CONTENT
KJELDAHL Method

Sending date of statistical treatment : 4th October 2021

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

Proficiency test accreditated ISO 17043

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

Nb	%	N°	d	Sd	D
1	6	2	+ 0,001	0,004	0,004
2	13	9	- 0,004	0,005	0,006
3	19	4	- 0,002	0,006	0,006
4	25	5	+ 0,005	0,005	0,007
5	31	15	+ 0,006	0,005	0,008
6	38	12	+ 0,002	0,009	0,009
7	44	16	- 0,008	0,010	0,013
8	50	7	+ 0,013	0,011	0,018
9	56	8	- 0,015	0,009	0,018
10	63	14	+ 0,017	0,007	0,018
11	69	10	- 0,013	0,014	0,019
12	75	6	- 0,022	0,008	0,024
13	81	13	- 0,021	0,013	0,024
14	88	11	+ 0,026	0,006	0,027
15	94	3	- 0,013	0,029	0,032
16	100	1	+ 0,062	0,054	0,082

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

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

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

N.B. : N° 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}	0,006
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,019

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

Sample/Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
2	0,000	0,014	0,004	0,003	0,000	0,004	0,000	0,004	0,002	0,000	0,004	20
3	0,019	**	0,018	0,010	0,018 *	0,014	0,010	0,008	0,015 *	0,011	0,010	18
4	0,022	0,015	0,008	0,005	0,006	0,031	0,002	0,006	0,003	0,004	0,010	20
5	0,006	0,009	0,004	0,004	0,001	0,003	0,010	0,001	0,011 *	0,006	0,005	20
6	0,004	0,001	0,003	0,004	0,000	0,001	0,007	0,000	0,008 *	0,002	0,003	20
7	0,001	0,005	0,012	0,013	0,003	0,013	0,013	0,003	0,001	0,006	0,006	20
8	0,006	0,003	0,011	0,010	0,008	0,008	0,002	0,001	0,001	0,003	0,005	20
9	0,006	0,005	0,001	0,002	0,008	0,008	0,016	0,009	0,001	0,005	0,005	20
10	0,006	0,013	0,026	0,006	0,006	0,000	0,000	0,006	0,000	0,006	0,007	20
11	0,008	0,001	0,016	0,003	0,003	0,003	0,005	0,004	0,001	0,003	0,004	20
12	0,003	0,007	0,011	0,011	0,005	0,001	0,005	0,030 *	0,003	0,003	0,008	20
13	0,026	0,015	0,051 *	0,006	0,012	0,021	0,007	0,010	0,056 *	0,034 *	0,021	20
14	0,000	0,010	0,010	0,010	0,000	**	**	**	**	**	0,005	10
15	0,020	0,003	0,009	0,002	0,001	0,003	0,003	0,001	0,001	0,001	0,005	20
16	0,004	0,002	0,004	0,005	0,002	0,003	0,003	0,005	0,003	0,006	0,003	20
Sr	0,008	0,006	0,012	0,005	0,005	0,008	0,005	0,007	0,011	0,007		308
NE	32	30	32	32	32	30	30	30	30	30		
L	0,031	0,023	0,030	0,019	0,013	0,022	0,019	0,014	0,005	0,013		

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	3,774	3,657	3,373	3,031 *	2,801 *	3,743	3,592 *	3,308 *	2,919 *	3,382 *
2	3,810	3,614	3,327	2,941	2,742	3,714	3,515	3,135	2,854	3,316
3	3,867		3,300	2,915	2,715	3,694	3,516	3,096	2,852	3,270
4	3,804	3,616	3,323	2,941	2,731	3,720	3,518	3,137	2,848	3,305
5	3,813	3,624	3,331	2,943	2,746	3,714	3,514	3,145	2,854	3,321
6	3,780	3,585	3,301	2,918	2,725	3,683	3,495	3,119	2,839	3,287
7	3,821	3,616	3,342	2,977	2,760	3,711	3,522	3,145	2,867	3,331
8	3,799	3,593	3,311	2,916	2,724	3,698	3,495	3,120	2,835	3,313
9	3,811	3,615	3,324	2,937	2,734	3,701	3,500	3,130	2,852	3,312
10	3,793	3,598	3,292	2,932	2,721	3,688	3,503	3,136	2,852	3,314
11	3,839	3,640	3,351	2,961	2,758	3,740	3,538	3,161	2,888	3,342
12	3,809	3,613	3,344	2,947	2,749	3,718	3,512	3,114	2,852	3,316
13	3,795	3,579	3,304	2,920	2,731	3,689	3,487	3,131	2,814	3,301
14	3,840	3,635	3,345	2,955	2,750					
15	3,815	3,613	3,346	2,947	2,746	3,721	3,520	3,140	2,860	3,310
16	3,811	3,620	3,337	2,934	2,723	3,701	3,517	3,116	2,841	3,282
M	3,811	3,615	3,328	2,939	2,737	3,709	3,511	3,130	2,850	3,309
REF.	3,812	3,618	3,331	2,941	2,739	3,711	3,513	3,131	2,852	3,308
SD	0,023	0,020	0,022	0,018	0,014	0,018	0,013	0,016	0,017	0,019

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 14 laboratories using the reference method ISO 8968-1 | IDF 20-1, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Outliers Cochran		13			3			12	3; 5; 6; 13	13
Outlier Grubbs				1	1	1	1	1	1	1
sr	0,008	0,006	0,008	0,005	0,004	0,006	0,005	0,004	0,001	0,004
SR	0,024	0,021	0,023	0,018	0,013	0,019	0,014	0,017	0,015	0,020

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	- 0,038	+ 0,039	+ 0,042	+ 0,090	+ 0,061	+ 0,032	+ 0,079	+ 0,177	+ 0,068	+ 0,074	+ 0,062	0,054	3,65
2	- 0,002	- 0,004	- 0,004	+ 0,001	+ 0,003	+ 0,003	+ 0,002	+ 0,004	+ 0,002	+ 0,008	+ 0,001	0,004	1,08
3	+ 0,055		- 0,032	- 0,025	- 0,024	- 0,017	+ 0,003	- 0,036	+ 0,001	- 0,038	- 0,013	0,029	1,29
4	- 0,008	- 0,002	- 0,008	- 0,000	- 0,008	+ 0,008	+ 0,005	+ 0,006	- 0,004	- 0,003	- 0,002	0,006	0,78
5	+ 0,001	+ 0,007	- 0,000	+ 0,003	+ 0,006	+ 0,003	+ 0,001	+ 0,014	+ 0,002	+ 0,013	+ 0,005	0,005	3,10
6	- 0,032	- 0,033	- 0,031	- 0,023	- 0,014	- 0,028	- 0,018	- 0,013	- 0,012	- 0,021	- 0,022	0,008	8,74
7	+ 0,008	- 0,002	+ 0,011	+ 0,036	+ 0,021	- 0,000	+ 0,009	+ 0,014	+ 0,015	+ 0,023	+ 0,013	0,011	3,76
8	- 0,013	- 0,025	- 0,020	- 0,025	- 0,016	- 0,014	- 0,018	- 0,011	- 0,017	+ 0,005	- 0,015	0,009	5,60
9	- 0,002	- 0,003	- 0,007	- 0,004	- 0,005	- 0,010	- 0,013	- 0,001	- 0,000	+ 0,004	- 0,004	0,005	2,60
10	- 0,019	- 0,020	- 0,039	- 0,009	- 0,018	- 0,024	- 0,010	+ 0,005	+ 0,000	+ 0,006	- 0,013	0,014	2,87
11	+ 0,026	+ 0,022	+ 0,020	+ 0,021	+ 0,019	+ 0,028	+ 0,025	+ 0,030	+ 0,036	+ 0,034	+ 0,026	0,006	13,83
12	- 0,003	- 0,005	+ 0,012	+ 0,006	+ 0,009	+ 0,006	- 0,001	- 0,017	+ 0,000	+ 0,008	+ 0,002	0,009	0,60
13	- 0,017	- 0,039	- 0,028	- 0,020	- 0,008	- 0,022	- 0,026	- 0,000	- 0,038	- 0,007	- 0,021	0,013	5,09
14	+ 0,028	+ 0,017	+ 0,014	+ 0,014	+ 0,011						+ 0,017	0,007	5,71
15	+ 0,003	- 0,005	+ 0,014	+ 0,007	+ 0,007	+ 0,009	+ 0,007	+ 0,009	+ 0,008	+ 0,002	+ 0,006	0,005	3,76
16	- 0,001	+ 0,002	+ 0,006	- 0,007	- 0,016	- 0,011	+ 0,004	- 0,016	- 0,011	- 0,026	- 0,008	0,010	2,40
d	- 0,001	- 0,003	- 0,003	- 0,002	- 0,002	- 0,002	- 0,002	- 0,001	- 0,001	+ 0,001	+ 0,002	0,026	
Sd	0,023	0,020	0,022	0,018	0,014	0,018	0,013	0,016	0,017	0,019	0,018		

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

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

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

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-1,67	+1,91	+1,87	+5,12	+4,35	+1,80	+5,89	+10,76	+4,07	+3,90
2	-0,10	-0,18	-0,17	+0,05	+0,20	+0,14	+0,13	+0,24	+0,14	+0,41
3	+2,37		-1,42	-1,44	-1,70	-0,96	+0,25	-2,17	+0,04	-1,99
4	-0,36	-0,12	-0,37	-0,00	-0,60	+0,46	+0,40	+0,36	-0,25	-0,18
5	+0,03	+0,32	-0,02	+0,14	+0,45	+0,18	+0,11	+0,83	+0,12	+0,71
6	-1,39	-1,63	-1,38	-1,31	-1,03	-1,56	-1,32	-0,77	-0,75	-1,09
7	+0,36	-0,12	+0,48	+2,05	+1,46	-0,02	+0,71	+0,85	+0,89	+1,22
8	-0,58	-1,21	-0,90	-1,42	-1,12	-0,76	-1,37	-0,67	-1,02	+0,29
9	-0,07	-0,15	-0,32	-0,20	-0,35	-0,55	-0,99	-0,07	-0,02	+0,21
10	-0,85	-0,96	-1,76	-0,51	-1,30	-1,32	-0,77	+0,28	+0,00	+0,34
11	+1,15	+1,07	+0,88	+1,18	+1,33	+1,59	+1,85	+1,84	+2,16	+1,79
12	-0,14	-0,26	+0,55	+0,36	+0,65	+0,36	-0,06	-1,02	+0,02	+0,41
13	-0,76	-1,90	-1,25	-1,15	-0,56	-1,23	-1,92	-0,02	-2,29	-0,39
14	+1,20	+0,84	+0,61	+0,82	+0,76					
15	+0,12	-0,23	+0,64	+0,38	+0,49	+0,52	+0,49	+0,55	+0,50	+0,09
16	-0,06	+0,10	+0,25	-0,40	-1,16	-0,60	+0,27	-0,95	-0,68	-1,37

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

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

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

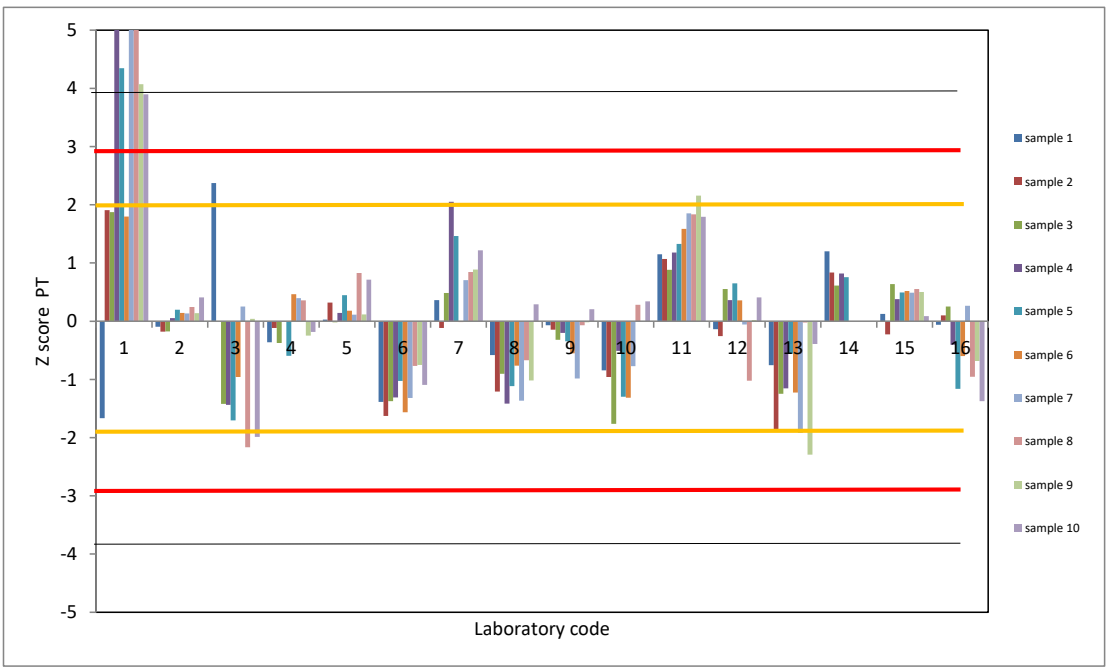


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample Lab code	1	2	3	4	5	6	7	8	9	10
1	-2,13	+2,17	+2,32	+5,00	+3,40	+1,79	+4,38	+9,81	+3,75	+4,09
2	-0,12	-0,20	-0,22	+0,05	+0,15	+0,14	+0,10	+0,22	+0,13	+0,43
3	+3,03		-1,76	-1,40	-1,33	-0,96	+0,19	-1,98	+0,04	-2,09
4	-0,46	-0,13	-0,46	-0,00	-0,47	+0,46	+0,30	+0,33	-0,23	-0,19
5	+0,04	+0,36	-0,02	+0,14	+0,35	+0,18	+0,08	+0,75	+0,11	+0,75
6	-1,77	-1,85	-1,71	-1,28	-0,80	-1,56	-0,98	-0,70	-0,69	-1,15
7	+0,46	-0,13	+0,60	+2,00	+1,15	-0,02	+0,53	+0,77	+0,82	+1,28
8	-0,74	-1,37	-1,12	-1,38	-0,87	-0,76	-1,02	-0,61	-0,94	+0,31
9	-0,09	-0,17	-0,39	-0,20	-0,27	-0,55	-0,73	-0,06	-0,02	+0,22
10	-1,08	-1,09	-2,18	-0,50	-1,02	-1,31	-0,57	+0,26	+0,00	+0,36
11	+1,47	+1,22	+1,09	+1,15	+1,04	+1,58	+1,38	+1,67	+1,99	+1,88
12	-0,18	-0,29	+0,69	+0,35	+0,51	+0,36	-0,04	-0,93	+0,02	+0,43
13	-0,97	-2,16	-1,55	-1,13	-0,44	-1,22	-1,43	-0,02	-2,11	-0,41
14	+1,54	+0,95	+0,76	+0,80	+0,59					
15	+0,16	-0,26	+0,79	+0,37	+0,39	+0,52	+0,36	+0,51	+0,46	+0,09
16	-0,08	+0,12	+0,31	-0,39	-0,91	-0,60	+0,20	-0,87	-0,63	-1,44

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

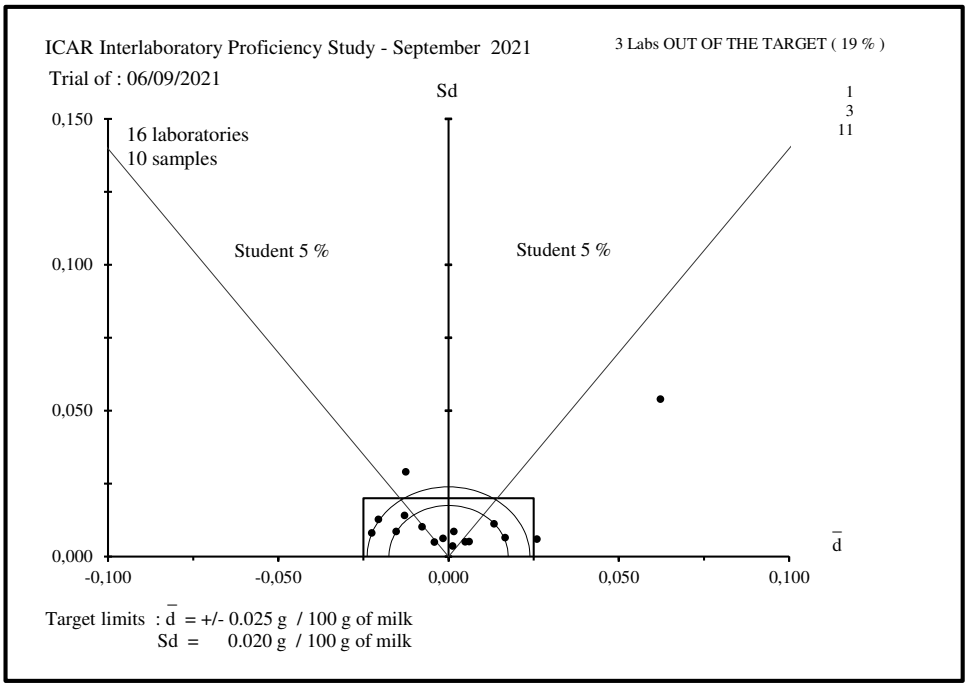


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

Table VIII : Relative recovery of nitrogen on pure solutions

N°	TRYP	GLY	SO4
1	100,0	99,9	100,0
2	98,3	99,9	100,3
3	98,9	99,8	99,9
4		99,2	98,9
5	99,4	99,9	99,8
6	99,9	100,4	100,4
7	99,6	100,1	100,4
8	99,6	99,4	99,5
9	98,6	98,5	99,8
10	99,7	99,9	100,3
11	96,0	99,3	102,2
12	99,5	100,6	100,7
13	100,0	100,2	100,8
14	99,9	100,1	100,3
15			
16			
17			
18	100,8	101,1	100,5
19	97,9	100,4	100,6

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 2021

Raw Milk

Determination of LACTOSE CONTENT

Sending date of statistical treatment : 4th October 2021

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	- 0,015	0,008	0,017	Own method
2	20	8	- 0,027	0,012	0,029	Enzymatic method in house
3	30	6	- 0,025	0,020	0,032	Lane-Eynon method
4	40	7	- 0,019	0,028	0,034	ISO 22662 / IDF 198
5	50	3	- 0,034	0,006	0,035	ISO 22662 / IDF 198
6	60	2	+ 0,037	0,009	0,038	ISO 22662 / IDF 198
7	70	9	- 0,037	0,023	0,043	ISO 26462 / IDF 214
8	80	4	+ 0,040	0,021	0,045	ISO 26462 / IDF 214
9	90	10	- 0,005	0,074	0,074	liquid chromatography pulse amperometric detector
10	100	5	+ 0,078	0,011	0,079	ISO 26462 / IDF 214

(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 :

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

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}	0,014
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,045

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

Sample Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,001	0,002	0,004	0,002	0,007	0,001	0,000	0,002	0,019	0,007	0,005	20
2	0,011	0,000	0,016	0,013	0,002	0,033	0,014	0,037	0,023	0,003	0,014	20
3	0,006	0,004	0,004	0,006	0,003	0,000	0,001	0,011	0,002	0,013	0,005	20
4	0,054 *	0,004	0,051	0,016	0,010	0,006	0,013	0,011	0,034	0,009	0,019	20
5	0,002	0,002	0,002	0,014	0,002	0,007	0,005	0,004	0,001	0,006	0,004	20
6	0,003	0,001	0,005	0,004	0,002	0,001	0,006	0,010	0,011	0,007	0,004	20
7	0,001	0,006	0,001	0,030	0,006	0,006	0,002	0,012	0,004	0,007	0,008	20
8	0,028	0,005	0,041	0,032	0,031	0,020	0,028	0,002	0,007	0,001	0,017	20
9	0,023	0,021 *	0,067	0,058	0,020	0,010	0,065 *	0,028	0,059 *	0,035	0,031	20
10	0,008	0,005	0,027	0,010	0,018	0,014	0,036	0,031	0,004	0,031	0,015	20
Sr	0,015	0,005	0,022	0,017	0,010	0,010	0,018	0,013	0,017	0,011		200
NE	20	20	20	20	20	20	20	20	20	20		
L	0,031	0,009	0,077	0,060	0,034	0,034	0,040	0,047	0,038	0,040		

Sr : repeatability standard deviation of each laboratory limit 0,022 g/100g
NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample
NE : number of measurements per sample

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

** : missing data

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

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	LACT
1	5,208	5,004	5,141	5,076	4,927	4,850	4,876	4,908	4,756	4,822	4,901
2	5,255	5,057	5,176	5,123	4,982	4,904	4,936	4,951	4,820	4,886	4,941
3	5,190	4,979	5,111	5,053	4,911	4,832	4,858	4,887	4,744	4,813	4,893
4	5,259	5,049	5,164	5,132	4,978	4,924	4,954	4,926	4,831	4,905	5,009
5	5,296	5,105	5,223	5,173	5,021	4,953	4,966	5,002	4,852	4,912	4,926
6	5,196	4,982	5,164	5,013	4,926	4,832	4,858	4,907	4,780	4,818	4,916
7	5,209	4,970	5,167	5,084	4,936	4,855	4,882	4,924	4,741	4,768	4,928
8	5,184	4,987	5,134	5,067	4,902	4,822	4,864	4,922	4,752	4,823	4,768
9	5,205	4,954	5,164	5,052	4,901	4,808	4,868	4,849	4,738	4,814	4,807
10	5,198	5,052	5,168	5,087	4,762 *	4,859	4,823	4,946	4,843	4,932	5,110
M	5,220	5,014	5,161	5,086	4,943	4,864	4,888	4,922	4,785	4,849	
REF.	5,217	5,012	5,159	5,084	4,941	4,862	4,888	4,921	4,785	4,849	**4,912**
SD	0,037	0,049	0,029	0,046	0,042	0,047	0,047	0,041	0,046	0,055	

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 13
of 10 laboratories, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran	4	9					9		9	
Outlier Grubbs					10					
sr	0,009	0,003	0,022	0,017	0,009	0,010	0,012	0,013	0,011	0,011
SR	0,037	0,047	0,033	0,048	0,042	0,048	0,050	0,042	0,046	0,055

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	- 0,010	- 0,008	- 0,018	- 0,008	- 0,014	- 0,013	- 0,012	- 0,013	- 0,030	- 0,027	- 0,015	0,008	6,45
2	+ 0,037	+ 0,045	+ 0,017	+ 0,038	+ 0,041	+ 0,041	+ 0,048	+ 0,029	+ 0,034	+ 0,037	+ 0,037	0,009	13,24
3	- 0,027	- 0,033	- 0,048	- 0,031	- 0,030	- 0,030	- 0,031	- 0,035	- 0,041	- 0,036	- 0,034	0,006	17,31
4	+ 0,042	+ 0,037	+ 0,004	+ 0,048	+ 0,037	+ 0,062	+ 0,065	+ 0,004	+ 0,046	+ 0,056	+ 0,040	0,021	5,98
5	+ 0,079	+ 0,093	+ 0,064	+ 0,089	+ 0,080	+ 0,090	+ 0,077	+ 0,081	+ 0,066	+ 0,063	+ 0,078	0,011	22,74
6	- 0,022	- 0,031	+ 0,004	- 0,071	- 0,015	- 0,031	- 0,030	- 0,014	- 0,006	- 0,031	- 0,025	0,020	3,84
7	- 0,009	- 0,042	+ 0,007	- 0,000	- 0,005	- 0,007	- 0,006	+ 0,003	- 0,044	- 0,081	- 0,019	0,028	2,08
8	- 0,033	- 0,026	- 0,026	- 0,017	- 0,039	- 0,040	- 0,024	+ 0,001	- 0,034	- 0,026	- 0,027	0,012	7,00
9	- 0,013	- 0,059	+ 0,004	- 0,032	- 0,040	- 0,054	- 0,021	- 0,072	- 0,048	- 0,035	- 0,037	0,023	5,12
10	- 0,019	+ 0,039	+ 0,008	+ 0,003	- 0,179	- 0,003	- 0,065	+ 0,024	+ 0,058	+ 0,083	- 0,005	0,074	0,22
d	+ 0,002	+ 0,001	+ 0,002	+ 0,002	+ 0,002	+ 0,001	+ 0,000	+ 0,001	- 0,000	+ 0,000	- 0,001	0,046	
Sd	0,037	0,049	0,029	0,046	0,042	0,047	0,047	0,041	0,046	0,055	0,044		

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

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

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

Sample / Lab code	1	1	1	1	1	1	1	1	1	1
1	-0,26	-0,17	-0,62	-0,18	-0,34	-0,27	-0,26	-0,32	-0,65	-0,50
2	+1,01	+0,92	+0,56	+0,83	+0,98	+0,87	+1,02	+0,72	+0,74	+0,67
3	-0,74	-0,68	-1,64	-0,68	-0,73	-0,64	-0,66	-0,85	-0,90	-0,67
4	+1,13	+0,75	+0,14	+1,03	+0,89	+1,30	+1,39	+0,11	+0,99	+1,02
5	+2,13	+1,90	+2,16	+1,93	+1,92	+1,90	+1,64	+1,99	+1,44	+1,16
6	-0,59	-0,63	+0,14	-1,55	-0,36	-0,65	-0,65	-0,35	-0,13	-0,57
7	-0,24	-0,86	+0,24	-0,01	-0,12	-0,15	-0,13	+0,07	-0,97	-1,49
8	-0,90	-0,53	-0,88	-0,38	-0,94	-0,85	-0,52	+0,02	-0,74	-0,48
9	-0,35	-1,20	+0,14	-0,70	-0,95	-1,14	-0,44	-1,78	-1,04	-0,65
10	-0,52	+0,80	+0,28	+0,06	-4,28	-0,07	-1,39	+0,60	+1,25	+1,51

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

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

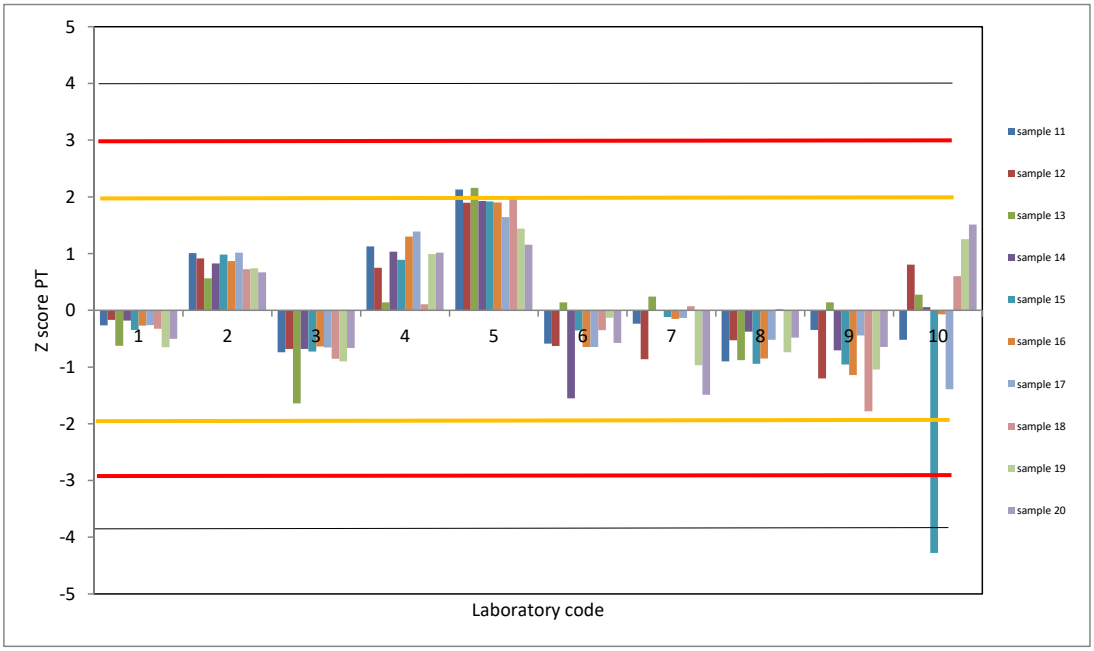


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

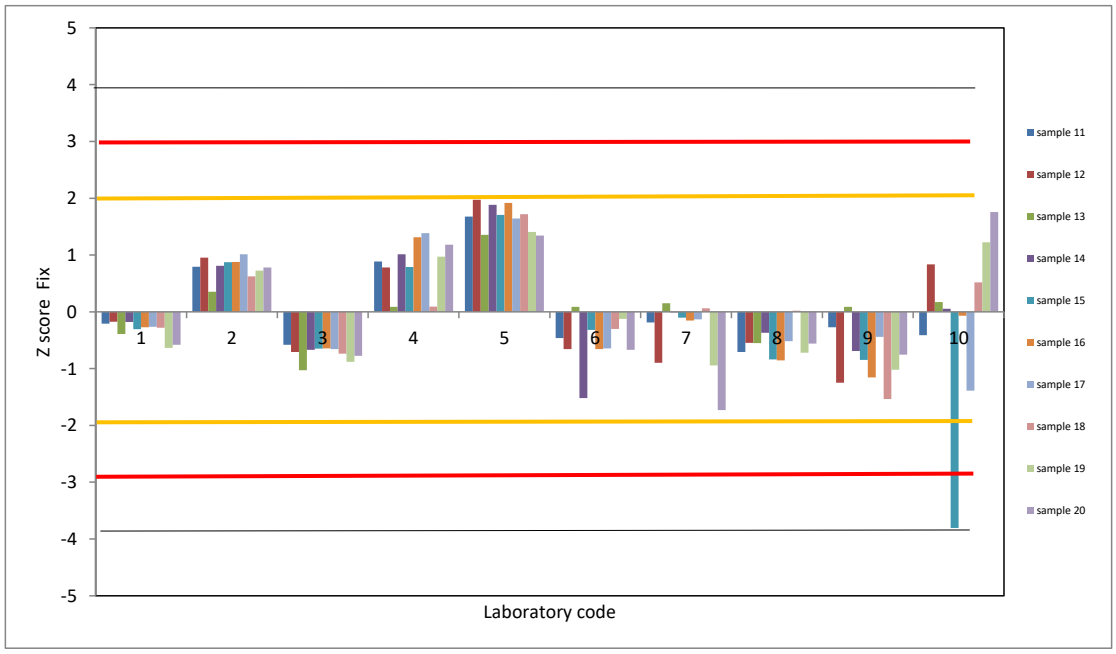
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,21	-0,18	-0,39	-0,18	-0,31	-0,27	-0,26	-0,28	-0,64	-0,58
2	+0,79	+0,95	+0,35	+0,81	+0,87	+0,88	+1,01	+0,62	+0,73	+0,78
3	-0,58	-0,71	-1,03	-0,67	-0,65	-0,64	-0,66	-0,74	-0,88	-0,77
4	+0,89	+0,78	+0,09	+1,01	+0,79	+1,31	+1,39	+0,09	+0,97	+1,18
5	+1,67	+1,97	+1,35	+1,89	+1,70	+1,92	+1,64	+1,72	+1,41	+1,34
6	-0,46	-0,65	+0,09	-1,52	-0,32	-0,65	-0,64	-0,30	-0,13	-0,67
7	-0,19	-0,90	+0,15	-0,01	-0,10	-0,15	-0,13	+0,06	-0,94	-1,73
8	-0,71	-0,55	-0,55	-0,37	-0,84	-0,86	-0,52	+0,02	-0,72	-0,56
9	-0,27	-1,25	+0,09	-0,69	-0,85	-1,15	-0,44	-1,53	-1,02	-0,75
10	-0,41	+0,84	+0,17	+0,06	-3,81	-0,07	-1,39	+0,52	+1,23	+1,76

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



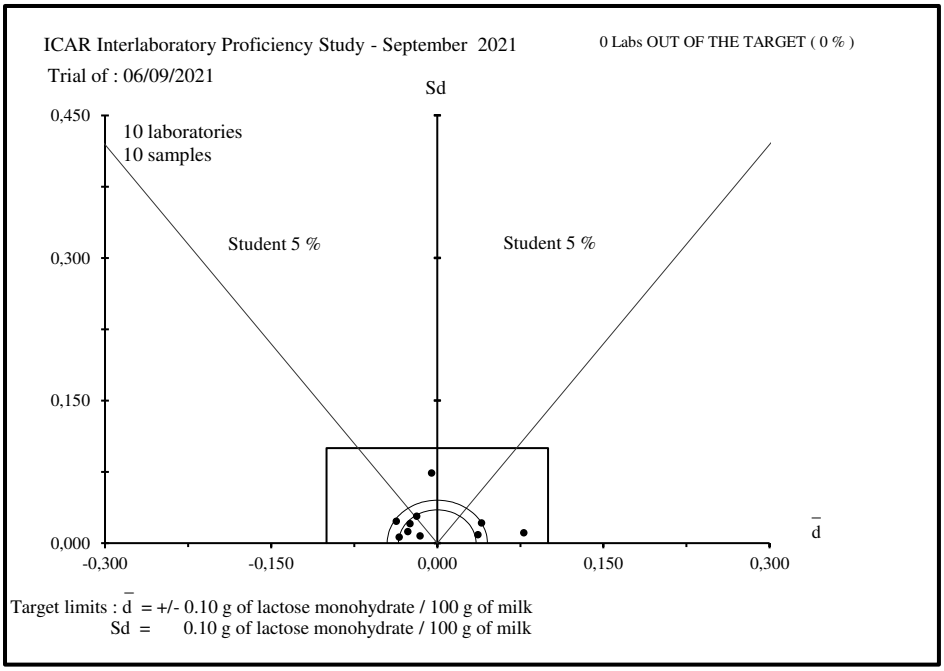


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Determination of UREA CONTENT

Sending date of statistical treatment : 4th October 2021

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

ACTALIA CECALAIT

cofrac COMPARAISONS INTERLABORATOIRES

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Table I : **Ranking of the laboratories** Units : mg / dl

Nb	%	N°	d	Sd	D	**Method**
1	11	7	- 0,03	0,45	0,45	ISO 14637 / IDF 195
2	22	4	+ 0,75	0,75	1,06	Continuous flow analyzer
3	33	5	+ 1,16	0,49	1,26	ISO 14637 / IDF 195
4	44	2	- 1,49	0,44	1,55	ISO 14637 / IDF 195
5	56	8	- 1,79	0,51	1,86	Enzymatic method in house
6	67	9	- 2,18	1,03	2,41	Continuous flow analyzer
7	78	3	- 2,48	0,42	2,52	ISO 14637 / IDF 195
8	89	6	+ 2,84	0,80	2,95	ISO 14637 / IDF 195
9	100	1	- 20,09	7,61	21,49	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 :

+/- 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 5 laboratories using reference method (ISO 14637|IDF 195 or V 04-217), 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}	0,37
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	2,00

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,000	0,000	0,000	0,100	0,100	0,100	0,000	0,100	0,000	0,200	0,06	20
2	0,300	0,100	0,700	0,300	0,300	0,300	0,300	0,400	0,300	1,100	0,35	20
3	0,080	0,160	0,000	0,420	0,160	0,810	0,260	0,000	0,160	0,060	0,22	20
4	0,200	0,100	0,600	0,700	0,600	1,200	0,400	1,000	0,300	0,100	0,45	20
5	0,100	0,000	0,500	0,300	0,700	0,300	0,200	0,200	0,600	0,400	0,28	20
6	0,400	0,600	0,600	0,600	0,500	0,000	0,300	0,400	0,500	1,000	0,39	20
7	0,200	0,000	0,290	0,580	0,480	0,190	0,680	0,290	0,100	0,190	0,26	20
8	0,090	0,000	0,360	0,510	0,200	0,000	0,210	0,080	0,060	0,960	0,27	20
9	0,190	0,580	0,560	1,130	2,640 *	2,100 *	2,920 *	1,100	1,750 *	1,600	1,20	20
Sr	0,15	0,20	0,33	0,41	0,69	0,61	0,73	0,39	0,46	0,57		180
NE	18	18	18	18	18	18	18	18	18	18		
L	0,50	0,69	1,13	1,40	1,01	1,26	0,81	1,31	0,75	1,95		

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	1	2	3	4	5	6	7	8	9	10
1	14,80 *	10,30 *	19,20 *	21,35 *	12,35 *	26,05 *	8,30 *	17,05 *	23,80 *	28,30 *
2	30,05	20,65	38,85	43,75	24,85	53,05	16,05	34,60	48,25	57,45
3	28,95	19,71	38,25	42,74	23,62	52,22	15,24	33,43	46,86	56,60
4	31,80	21,75	41,80	46,65	26,00	56,60	16,50	36,30	51,15	61,35
5	31,95	22,50	42,15	46,95	26,85	56,95	17,60	36,60	51,00	61,50
6	33,80	23,50	43,00	48,20	28,35	58,90	18,95	38,90	53,45	63,80
7	31,07	22,14	41,12	45,05	26,65	54,47	17,33	35,78	49,37	59,13
8	29,78	20,29	38,76	43,47	24,37	52,82	15,74	34,71	47,72	56,88
9	29,81	18,55	39,89	43,15	25,42	51,67	14,66	33,99	47,32	56,17
M	30,90	21,14	40,48	44,99	25,76	54,58	16,51	35,54	49,39	59,11
REF.	31,16	21,70	40,67	45,34	26,06	55,12	17,03	35,86	49,79	59,70
SD	1,57	1,63	1,78	2,04	1,52	2,62	1,40	1,75	2,30	2,81

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 5 laboratories using the reference method ISO 14637 | IDF 195 or V 04-2017, after outliers discarging using Grubbs test 5% risk level

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran					9	9	9		9	
Outlier Grubbs	1	1	1	1	1	1	1	1	1	1
sr	0,16	0,22	0,35	0,44	0,33	0,41	0,26	0,41	0,24	0,61
SR	1,58	1,63	1,80	2,07	1,65	2,54	1,29	1,78	2,32	2,85

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	- 16,36	- 11,40	- 21,47	- 23,99	- 13,71	- 29,07	- 8,73	- 18,81	- 25,99	- 31,40	- 20,09	7,61	8,35
2	- 1,11	- 1,05	- 1,82	- 1,59	- 1,21	- 2,07	- 0,98	- 1,26	- 1,54	- 2,25	- 1,49	0,44	10,69
3	- 2,21	- 1,99	- 2,42	- 2,60	- 2,44	- 2,90	- 1,79	- 2,43	- 2,93	- 3,10	- 2,48	0,42	18,87
4	+ 0,64	+ 0,05	+ 1,13	+ 1,31	- 0,06	+ 1,48	- 0,53	+ 0,44	+ 1,36	+ 1,65	+ 0,75	0,75	3,14
5	+ 0,79	+ 0,80	+ 1,48	+ 1,61	+ 0,79	+ 1,83	+ 0,57	+ 0,74	+ 1,21	+ 1,80	+ 1,16	0,49	7,58
6	+ 2,64	+ 1,80	+ 2,33	+ 2,86	+ 2,29	+ 3,78	+ 1,92	+ 3,04	+ 3,66	+ 4,10	+ 2,84	0,80	11,24
7	- 0,09	+ 0,44	+ 0,44	- 0,29	+ 0,59	- 0,65	+ 0,30	- 0,09	- 0,42	- 0,57	- 0,03	0,45	0,24
8	- 1,39	- 1,41	- 1,91	- 1,87	- 1,69	- 2,30	- 1,30	- 1,15	- 2,07	- 2,82	- 1,79	0,51	11,04
9	- 1,36	- 3,15	- 0,78	- 2,19	- 0,64	- 3,45	- 2,37	- 1,87	- 2,47	- 3,53	- 2,18	1,03	6,70
d	- 0,26	- 0,56	- 0,20	- 0,34	- 0,30	- 0,53	- 0,53	- 0,32	- 0,40	- 0,59	- 2,59	6,91	
Sd	1,57	1,63	1,78	2,04	1,52	2,62	1,40	1,75	2,30	2,81	2,00		

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	1	2	3	4	5	6	7	8	9	10
1	-10,40	-7,01	-12,05	-11,74	-9,01	-11,11	-6,25	-10,74	-11,31	-11,16
2	-0,71	-0,65	-1,02	-0,78	-0,80	-0,79	-0,70	-0,72	-0,67	-0,80
3	-1,41	-1,22	-1,36	-1,27	-1,61	-1,11	-1,28	-1,39	-1,27	-1,10
4	+0,40	+0,03	+0,63	+0,64	-0,04	+0,57	-0,38	+0,25	+0,59	+0,59
5	+0,50	+0,49	+0,83	+0,79	+0,52	+0,70	+0,41	+0,42	+0,53	+0,64
6	+1,67	+1,11	+1,31	+1,40	+1,50	+1,45	+1,37	+1,74	+1,59	+1,46
7	-0,06	+0,27	+0,25	-0,14	+0,39	-0,25	+0,21	-0,05	-0,18	-0,20
8	-0,88	-0,87	-1,07	-0,92	-1,11	-0,88	-0,93	-0,66	-0,90	-1,00
9	-0,86	-1,94	-0,44	-1,07	-0,42	-1,32	-1,70	-1,07	-1,08	-1,25

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

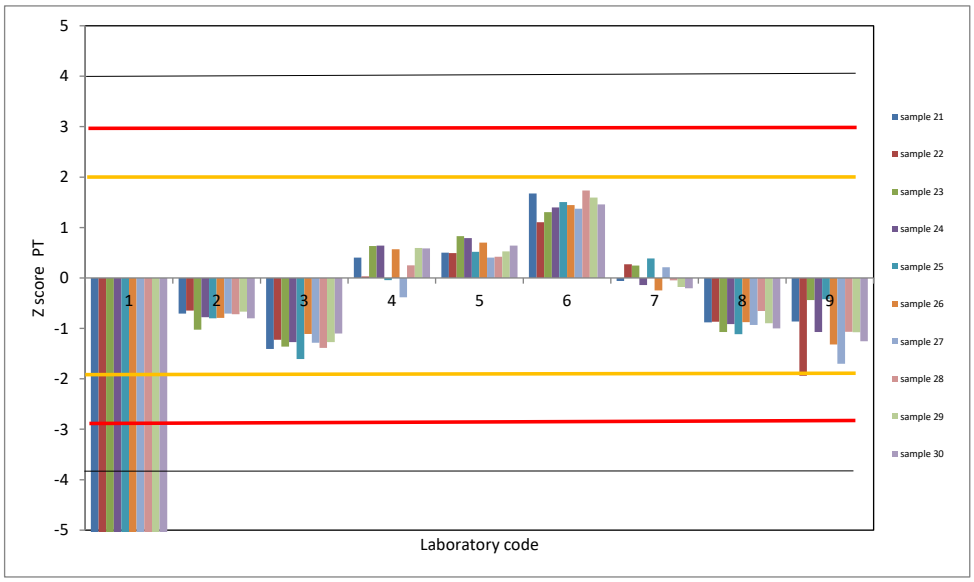


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

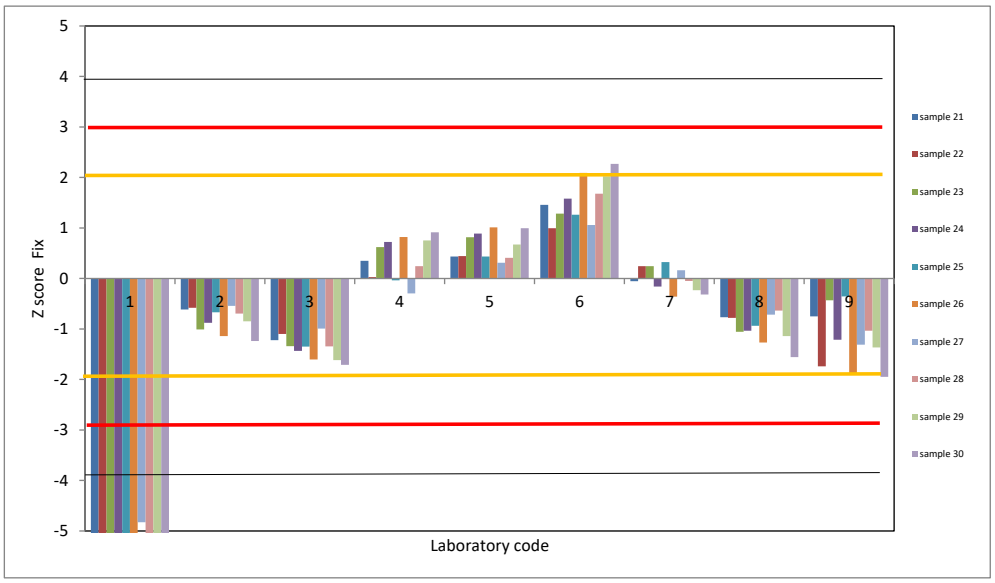
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-9,04	-6,30	-11,86	-13,25	-7,58	-16,06	-4,83	-10,39	-14,36	-17,35
2	-0,62	-0,58	-1,01	-0,88	-0,67	-1,14	-0,54	-0,70	-0,85	-1,24
3	-1,22	-1,10	-1,34	-1,44	-1,35	-1,60	-0,99	-1,34	-1,62	-1,71
4	+0,35	+0,03	+0,62	+0,72	-0,04	+0,82	-0,30	+0,24	+0,75	+0,91
5	+0,43	+0,44	+0,82	+0,89	+0,43	+1,01	+0,31	+0,41	+0,67	+1,00
6	+1,46	+0,99	+1,29	+1,58	+1,26	+2,09	+1,06	+1,68	+2,02	+2,27
7	-0,05	+0,24	+0,24	-0,16	+0,32	-0,36	+0,16	-0,05	-0,23	-0,31
8	-0,77	-0,78	-1,06	-1,03	-0,94	-1,27	-0,72	-0,64	-1,14	-1,56
9	-0,75	-1,74	-0,43	-1,21	-0,36	-1,90	-1,31	-1,03	-1,37	-1,95

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



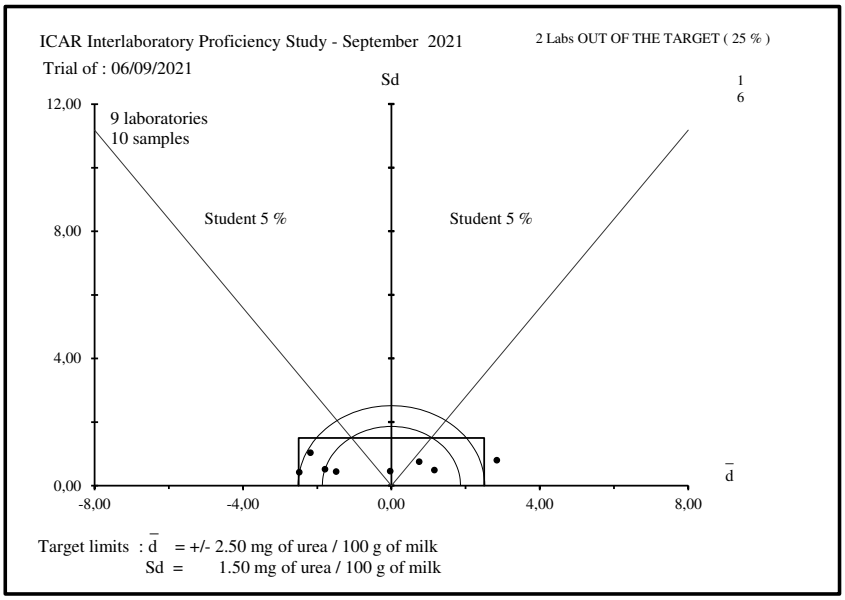


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 6th October 2021

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

Nb	%	N°	d	Sd	D	Method
1	2	20	- 1%	0%	1%	B
2	4	18	- 1%	1%	2%	B
3	6	6	- 2%	1%	2%	B
4	9	21	- 0%	2%	2%	B
5	11	29	+ 0%	3%	3%	B
6	13	1	- 3%	2%	3%	B
7	15	2	- 3%	2%	3%	B
8	17	9	+ 4%	0%	4%	B
9	19	53	+ 1%	4%	4%	B
10	21	44	+ 1%	4%	4%	B
11	23	38	+ 4%	1%	4%	B
12	26	52	+ 2%	4%	5%	B
13	28	49	- 5%	2%	5%	B
14	30	42	+ 5%	1%	5%	B
15	32	4	- 4%	3%	5%	B
16	34	5	- 4%	3%	5%	B
17	36	30	- 4%	4%	5%	B
18	38	50	+ 3%	5%	6%	B
19	40	51	- 4%	4%	6%	B
20	43	54	- 5%	4%	6%	B
21	45	3	- 6%	2%	6%	B
22	47	19	- 1%	6%	6%	B
23	49	11	+ 0%	6%	6%	B
24	51	10	- 4%	5%	7%	A
25	53	12	+ 5%	5%	7%	B
26	55	15	+ 5%	5%	7%	B
27	57	45	+ 6%	6%	8%	C
28	60	37	+ 2%	8%	8%	B
29	62	35	+ 3%	8%	8%	B
30	64	55	- 3%	8%	8%	B
31	66	34	+ 6%	7%	9%	B
32	68	17	- 8%	6%	10%	B
33	70	33	+ 6%	9%	11%	B
34	72	43	- 4%	11%	11%	B
35	74	14	+ 8%	10%	13%	B
36	77	41	- 8%	11%	13%	B
37	79	16	- 6%	12%	14%	B
38	81	36	+ 11%	9%	14%	B
39	83	13	+ 5%	14%	15%	B
40	85	28	+ 15%	0%	15%	B
41	87	48	- 14%	11%	18%	B
42	89	56	- 2%	22%	22%	B
43	91	58	- 20%	9%	22%	A
44	94	40	+ 12%	21%	24%	B
45	96	32	+ 26%	7%	27%	B
46	98	47	+ 17%	23%	28%	A
47	100	57	- 30%	51%	59%	A
NC		7				B
NC		8				B
NC		22				B
NC		23				B
NC		24				B
NC		25				B
NC		26				B
NC		27				B
NC		31				B
NC		39				B
NC		46				B

A ISO 13366-1 | IDF 148-1
B ISO 13366-2 | IDF 148-2
C CCD Camera

(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 :

+/- 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 45 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}	12	2%
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	43	9%

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

Sample / Lab code	A	B	Sr	NL
1	0	32	16	4
2	0	32	16	4
3	8	33	17	4
4	12	19	11	4
5	12	19	11	4
6	12	36	19	4
7	**	**		
8	**	**		
9	3	3	2	4
10	7	23	12	4
11	9	2	5	4
12	7	12	7	4
13	31	14	17	4
14	32	14	17	4
15	11	15	9	4
16	2	24	12	4
17	10	27	14	4
18	3	34	17	4
19	9	14	8	4
20	4	3	3	4
21	2	7	4	4
22	**	**		
23	**	**		
24	**	**		
25	**	**		
26	**	**		
27	**	**		
28	10	25	13	4
29	24	2	12	4
30	6	11	6	4

Sample / Lab code	A	B	Sr	NL
31	**	**		
32	3	2	2	4
33	5	11	6	4
34	8	13	8	4
35	9	11	7	4
36	11	2	6	4
37	1	15	8	4
38	23	17	14	4
39	**	**		
40	1	4	2	4
41	10	18	10	4
42	4	6	4	4
43	3	1	2	4
44	1	14	7	4
45	1	43	22	4
46	**	**		
47	2	12	6	4
48	5	14	7	4
49	8	59	30	4
50	5	12	7	4
51	2	10	5	4
52	1	8	4	4
53	2	9	5	4
54	11	26	14	4
55	6	27	14	4
56	3	1	2	4
57	11	4	6	4
58	5	79 *	40	4
Sr	8	13		136
r	25	63		
NE	68	68		
L	33	63		

Sr : repeatability standard deviation of each laboratory limit : **Cf**

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	A	B
1	146	761
2	146	761
3	144	737
4	136	759
5	136	759
6	160	760
7		
8		
9	183	787
10	166	734
11	147	792
12	206	775
13	236	749
14	235	772
15	174	812
16	179	701
17	150	715
18	158	769
19	182	744
20	162	767
21	158	774
22		
23		
24		
25		
26		
27		
28	239	841
29	157	782
30	135	764

Sample / Lab code	A	B
31		
32	265	914
33	168	829
34	169	819
35	153	809
36	188	851
37	203	754
38	188	788
39		
40	291 *	757
41	162	696
42	184	797
43	183	717
44	155	786
45	212	779
46		
47	167	923
48	138	666
49	151	742
50	162	798
51	163	738
52	161	792
53	160	788
54	156	735
55	176	729
56	82	831
57	195	464 *
58	103	644
M	169	771
REF.	166	770
SD	33	53

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 45 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		58
Outlier Grubbs	40	57
sr	7	14
SR	34	51
sr %	4%	2%
SR %	20%	7%

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

Sample / Lab code	A	B	d	Sd_{lab}	t
1	- 12%	- 1%	- 3%	2%	2,50
2	- 12%	- 1%	- 3%	2%	2,50
3	- 13%	- 4%	- 6%	2%	4,91
4	- 18%	- 1%	- 4%	3%	2,17
5	- 18%	- 1%	- 4%	3%	2,17
6	- 4%	- 1%	- 2%	1%	4,17
7					
8					
9	+ 10%	+ 2%	+ 4%	0%	104,92
10	- 0%	- 5%	- 4%	5%	1,02
11	- 12%	+ 3%	+ 0%	6%	0,08
12	+ 24%	+ 1%	+ 5%	5%	1,32
13	+ 42%	- 3%	+ 5%	14%	0,55
14	+ 42%	+ 0%	+ 8%	10%	1,07
15	+ 5%	+ 5%	+ 5%	5%	1,45
16	+ 8%	- 9%	- 6%	12%	0,68
17	- 10%	- 7%	- 8%	6%	1,81
18	- 5%	- 0%	- 1%	1%	1,13
19	+ 9%	- 3%	- 1%	6%	0,24
20	- 2%	- 0%	- 1%	0%	8,34
21	- 5%	+ 1%	- 0%	2%	0,33
22					
23					
24					
25					
26					
27					
28	+ 44%	+ 9%	+ 15%	0%	66,15
29	- 5%	+ 2%	+ 0%	3%	0,17
30	- 19%	- 1%	- 4%	4%	1,48

Sample / Lab code	A	B	d	Sd_{lab}	t
31					
32	+ 59%	+ 19%	+ 26%	7%	5,31
33	+ 1%	+ 8%	+ 6%	9%	1,06
34	+ 2%	+ 6%	+ 4%	5%	1,10
35	- 8%	+ 5%	+ 2%	6%	0,60
36	+ 13%	+ 11%	+ 9%	7%	1,71
37	+ 22%	- 2%	+ 3%	6%	0,75
38	+ 13%	+ 2%	+ 5%	1%	9,90
39					
40	+ 75%	- 2%	+ 10%	15%	0,92
41	- 2%	- 10%	- 4%	11%	0,46
42	+ 11%	+ 4%	+ 5%	1%	5,45
43	+ 10%	- 7%	+ 0%	10%	0,03
44	- 7%	+ 2%	+ 4%	6%	0,84
45	+ 28%	+ 1%	+ 6%	6%	1,49
46					
47	+ 1%	+ 20%	+ 17%	23%	1,02
48	- 17%	- 13%	- 14%	11%	1,75
49	- 9%	- 4%	- 5%	2%	3,25
50	- 3%	+ 4%	+ 3%	5%	0,74
51	- 2%	- 4%	- 4%	4%	1,20
52	- 3%	+ 3%	+ 2%	4%	0,62
53	- 4%	+ 2%	+ 1%	4%	0,51
54	- 6%	- 4%	- 5%	4%	1,85
55	+ 6%	- 5%	- 3%	8%	0,60
56	- 51%	+ 8%	- 2%	22%	0,16
57	+ 17%	- 40%	- 30%	51%	0,83
58	- 38%	- 16%	- 20%	9%	3,02
d	+ 2%	+ 0%	- 1%	17%	
Sd	20%	7%			

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	-0,59	-0,16
2	-0,59	-0,16
3	-0,65	-0,63
4	-0,89	-0,21
5	-0,89	-0,21
6	-0,17	-0,18
7		
8		
9	+0,50	+0,32
10	-0,01	-0,68
11	-0,58	+0,43
12	+1,19	+0,10
13	+2,09	-0,39
14	+2,07	+0,05
15	+0,23	+0,80
16	+0,39	-1,30
17	-0,47	-1,05
18	-0,25	-0,01
19	+0,47	-0,49
20	-0,11	-0,06
21	-0,23	+0,08
22		
23		
24		
25		
26		
27		
28	+2,19	+1,35
29	-0,26	+0,24
30	-0,92	-0,11

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

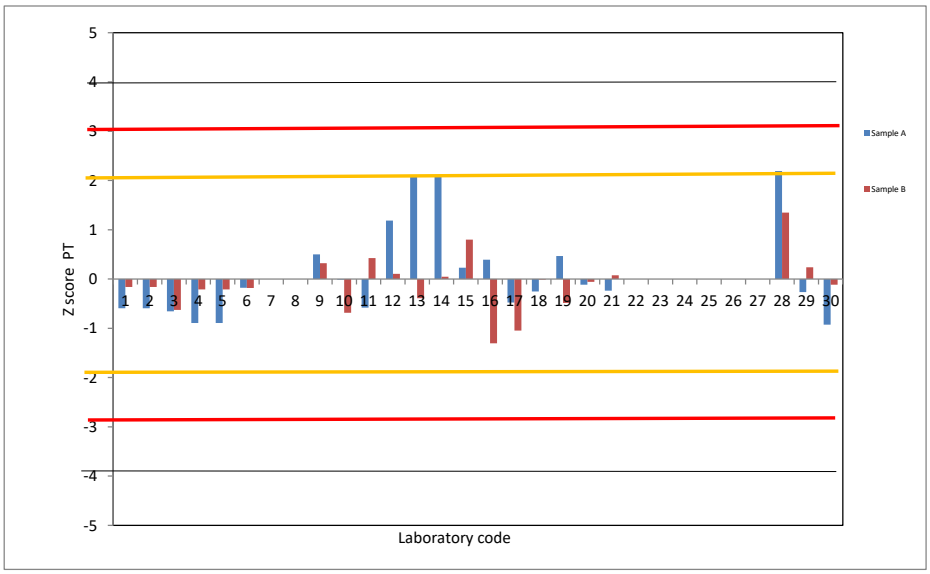


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	A	B
31		
32	+2,96	+2,75
33	+0,05	+1,12
34	+0,09	+0,93
35	-0,40	+0,74
36	+0,65	+1,55
37	+1,10	-0,30
38	+0,65	+0,34
39		
40	+3,74	-0,24
41	-0,11	-1,40
42	+0,54	+0,52
43	+0,50	-1,01
44	-0,34	+0,31
45	+1,37	+0,17
46		
47	+0,03	+2,92
48	-0,85	-1,97
49	-0,44	-0,53
50	-0,13	+0,54
51	-0,08	-0,60
52	-0,16	+0,43
53	-0,17	+0,34
54	-0,31	-0,66
55	+0,30	-0,78
56	-2,53	+1,16
57	+0,86	-5,81
58	-1,90	-2,40

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

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

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

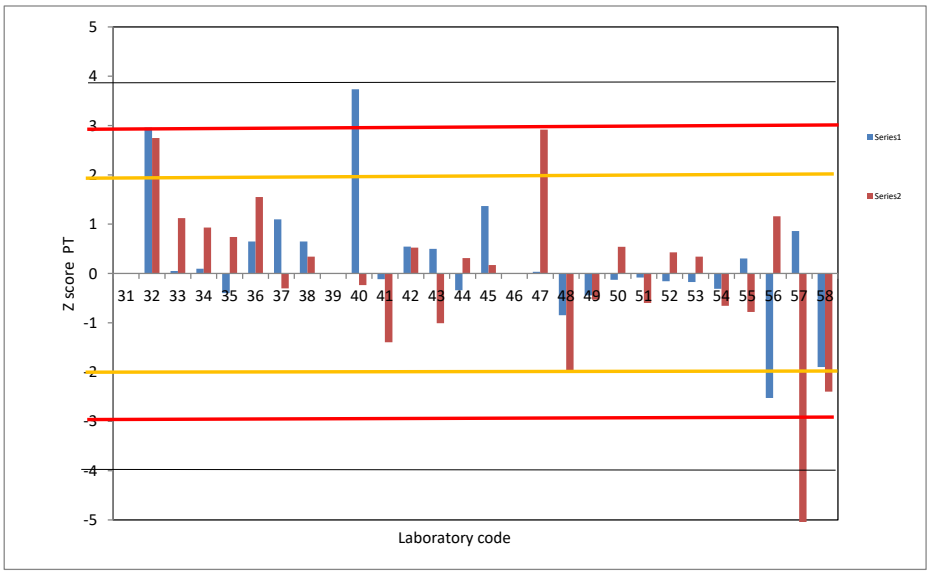


Table VII : **Zscore of the different laboratories for each sample. CRM and the standard deviation of reproducibility of the method**

Sample / Lab Code	A	B
1	-0,22	+0,33
2	-0,22	+0,33
3	-0,37	-0,21
4	-0,97	+0,28
5	-0,97	+0,28
6	+0,82	+0,31
7		
8		
9	+2,50	+0,90
10	+1,23	-0,28
11	-0,19	+1,02
12	+4,22	+0,65
13	+6,46	+0,07
14	+6,42	+0,58
15	+1,83	+1,46
16	+2,24	-1,00
17	+0,07	-0,70
18	+0,63	+0,51
19	+2,43	-0,04
20	+0,97	+0,46
21	+0,67	+0,61
22		
23		
24		
25		
26		
27		
28	+6,72	+2,10
29	+0,60	+0,80
30	-1,04	+0,39

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

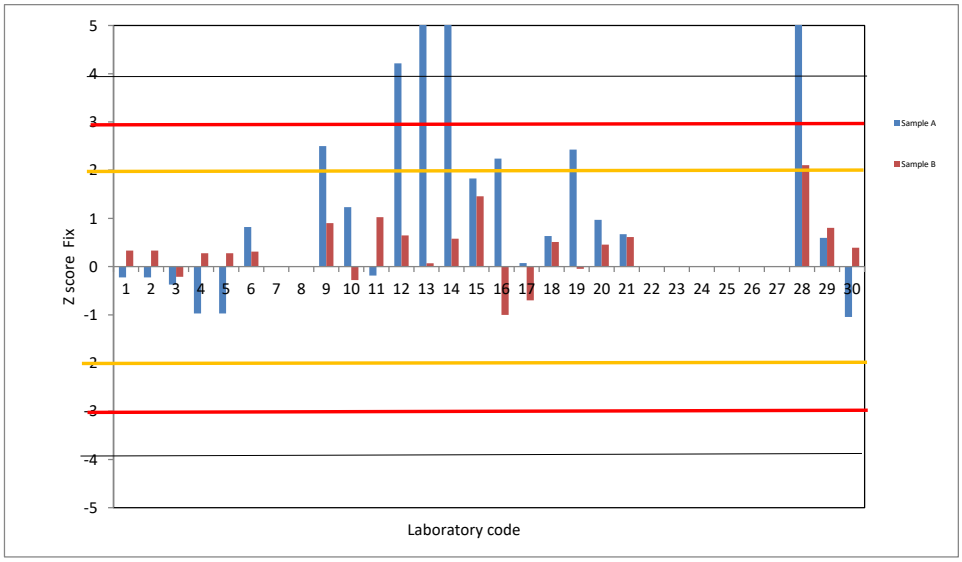


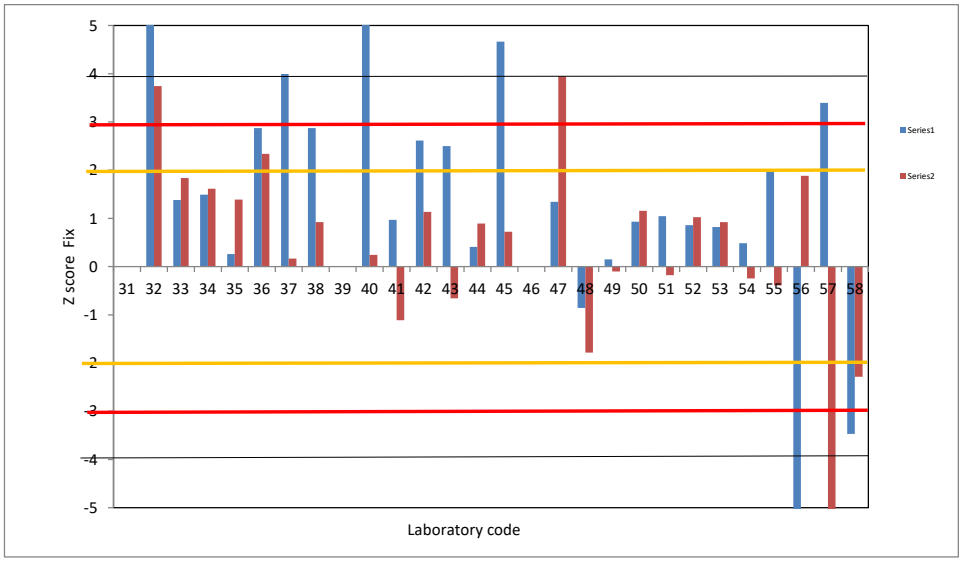
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on PT SAMPLES characterized with EU JRC CRM and the standard deviation of reproducibility of the method

Sample / Lab code	A	B
31		
32	+8,62	+3,74
33	+1,38	+1,84
34	+1,49	+1,61
35	+0,26	+1,39
36	+2,87	+2,34
37	+3,99	+0,17
38	+2,87	+0,92
39		
40	+10,56	+0,24
41	+0,97	-1,11
42	+2,61	+1,14
43	+2,50	-0,66
44	+0,41	+0,89
45	+4,66	+0,72
46		
47	+1,34	+3,94
48	-0,86	-1,78
49	+0,15	-0,10
50	+0,93	+1,16
51	+1,04	-0,18
52	+0,86	+1,02
53	+0,82	+0,92
54	+0,49	-0,24
55	+2,01	-0,39
56	-5,04	+1,88
57	+3,40	-6,28
58	-3,47	-2,28

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



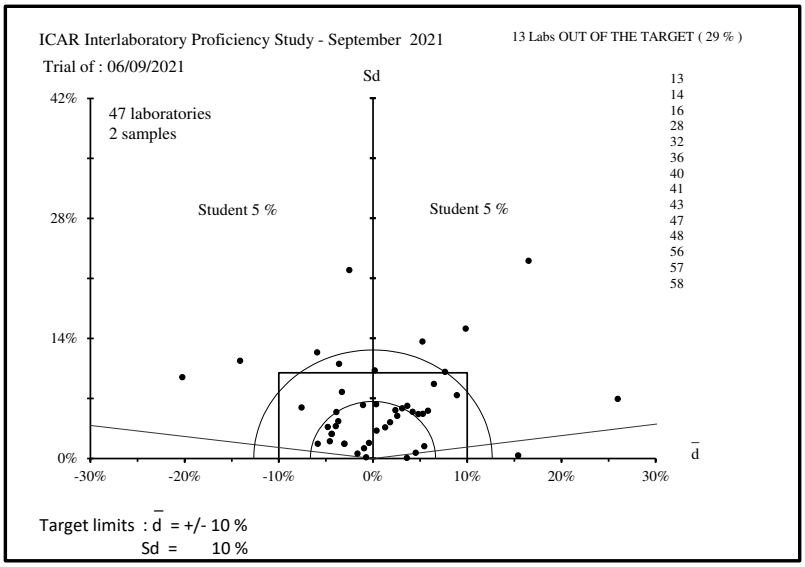


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Determination of CRUDE PROTEIN CONTENT
KJELDAHL Method

Sending date of statistical treatment : 4th October 2021

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

Proficiency test accreditated ISO 17043

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

Nb	%	N°	d	Sd	D
1	6	2	+ 0,001	0,004	0,004
2	13	9	- 0,004	0,005	0,006
3	19	4	- 0,002	0,006	0,006
4	25	5	+ 0,005	0,005	0,007
5	31	15	+ 0,006	0,005	0,008
6	38	12	+ 0,002	0,009	0,009
7	44	16	- 0,008	0,010	0,013
8	50	7	+ 0,013	0,011	0,018
9	56	8	- 0,015	0,009	0,018
10	63	14	+ 0,017	0,007	0,018
11	69	10	- 0,013	0,014	0,019
12	75	6	- 0,022	0,008	0,024
13	81	13	- 0,021	0,013	0,024
14	88	11	+ 0,026	0,006	0,027
15	94	3	- 0,013	0,029	0,032
16	100	1	+ 0,062	0,054	0,082

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

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

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

N.B. : N° 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}	0,006
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,019

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

Sample/Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
2	0,000	0,014	0,004	0,003	0,000	0,004	0,000	0,004	0,002	0,000	0,004	20
3	0,019	**	0,018	0,010	0,018 *	0,014	0,010	0,008	0,015 *	0,011	0,010	18
4	0,022	0,015	0,008	0,005	0,006	0,031	0,002	0,006	0,003	0,004	0,010	20
5	0,006	0,009	0,004	0,004	0,001	0,003	0,010	0,001	0,011 *	0,006	0,005	20
6	0,004	0,001	0,003	0,004	0,000	0,001	0,007	0,000	0,008 *	0,002	0,003	20
7	0,001	0,005	0,012	0,013	0,003	0,013	0,013	0,003	0,001	0,006	0,006	20
8	0,006	0,003	0,011	0,010	0,008	0,008	0,002	0,001	0,001	0,003	0,005	20
9	0,006	0,005	0,001	0,002	0,008	0,008	0,016	0,009	0,001	0,005	0,005	20
10	0,006	0,013	0,026	0,006	0,006	0,000	0,000	0,006	0,000	0,006	0,007	20
11	0,008	0,001	0,016	0,003	0,003	0,003	0,005	0,004	0,001	0,003	0,004	20
12	0,003	0,007	0,011	0,011	0,005	0,001	0,005	0,030 *	0,003	0,003	0,008	20
13	0,026	0,015	0,051 *	0,006	0,012	0,021	0,007	0,010	0,056 *	0,034 *	0,021	20
14	0,000	0,010	0,010	0,010	0,000	**	**	**	**	**	0,005	10
15	0,020	0,003	0,009	0,002	0,001	0,003	0,003	0,001	0,001	0,001	0,005	20
16	0,004	0,002	0,004	0,005	0,002	0,003	0,003	0,005	0,003	0,006	0,003	20
Sr	0,008	0,006	0,012	0,005	0,005	0,008	0,005	0,007	0,011	0,007		308
NE	32	30	32	32	32	30	30	30	30	30		
L	0,031	0,023	0,030	0,019	0,013	0,022	0,019	0,014	0,005	0,013		

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	3,774	3,657	3,373	3,031 *	2,801 *	3,743	3,592 *	3,308 *	2,919 *	3,382 *
2	3,810	3,614	3,327	2,941	2,742	3,714	3,515	3,135	2,854	3,316
3	3,867		3,300	2,915	2,715	3,694	3,516	3,096	2,852	3,270
4	3,804	3,616	3,323	2,941	2,731	3,720	3,518	3,137	2,848	3,305
5	3,813	3,624	3,331	2,943	2,746	3,714	3,514	3,145	2,854	3,321
6	3,780	3,585	3,301	2,918	2,725	3,683	3,495	3,119	2,839	3,287
7	3,821	3,616	3,342	2,977	2,760	3,711	3,522	3,145	2,867	3,331
8	3,799	3,593	3,311	2,916	2,724	3,698	3,495	3,120	2,835	3,313
9	3,811	3,615	3,324	2,937	2,734	3,701	3,500	3,130	2,852	3,312
10	3,793	3,598	3,292	2,932	2,721	3,688	3,503	3,136	2,852	3,314
11	3,839	3,640	3,351	2,961	2,758	3,740	3,538	3,161	2,888	3,342
12	3,809	3,613	3,344	2,947	2,749	3,718	3,512	3,114	2,852	3,316
13	3,795	3,579	3,304	2,920	2,731	3,689	3,487	3,131	2,814	3,301
14	3,840	3,635	3,345	2,955	2,750					
15	3,815	3,613	3,346	2,947	2,746	3,721	3,520	3,140	2,860	3,310
16	3,811	3,620	3,337	2,934	2,723	3,701	3,517	3,116	2,841	3,282
M	3,811	3,615	3,328	2,939	2,737	3,709	3,511	3,130	2,850	3,309
REF.	3,812	3,618	3,331	2,941	2,739	3,711	3,513	3,131	2,852	3,308
SD	0,023	0,020	0,022	0,018	0,014	0,018	0,013	0,016	0,017	0,019

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 14 laboratories using the reference method ISO 8968-1 | IDF 20-1, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Outliers Cochran		13			3			12	3; 5; 6; 13	13
Outlier Grubbs				1	1	1	1	1	1	1
sr	0,008	0,006	0,008	0,005	0,004	0,006	0,005	0,004	0,001	0,004
SR	0,024	0,021	0,023	0,018	0,013	0,019	0,014	0,017	0,015	0,020

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	- 0,038	+ 0,039	+ 0,042	+ 0,090	+ 0,061	+ 0,032	+ 0,079	+ 0,177	+ 0,068	+ 0,074	+ 0,062	0,054	3,65
2	- 0,002	- 0,004	- 0,004	+ 0,001	+ 0,003	+ 0,003	+ 0,002	+ 0,004	+ 0,002	+ 0,008	+ 0,001	0,004	1,08
3	+ 0,055		- 0,032	- 0,025	- 0,024	- 0,017	+ 0,003	- 0,036	+ 0,001	- 0,038	- 0,013	0,029	1,29
4	- 0,008	- 0,002	- 0,008	- 0,000	- 0,008	+ 0,008	+ 0,005	+ 0,006	- 0,004	- 0,003	- 0,002	0,006	0,78
5	+ 0,001	+ 0,007	- 0,000	+ 0,003	+ 0,006	+ 0,003	+ 0,001	+ 0,014	+ 0,002	+ 0,013	+ 0,005	0,005	3,10
6	- 0,032	- 0,033	- 0,031	- 0,023	- 0,014	- 0,028	- 0,018	- 0,013	- 0,012	- 0,021	- 0,022	0,008	8,74
7	+ 0,008	- 0,002	+ 0,011	+ 0,036	+ 0,021	- 0,000	+ 0,009	+ 0,014	+ 0,015	+ 0,023	+ 0,013	0,011	3,76
8	- 0,013	- 0,025	- 0,020	- 0,025	- 0,016	- 0,014	- 0,018	- 0,011	- 0,017	+ 0,005	- 0,015	0,009	5,60
9	- 0,002	- 0,003	- 0,007	- 0,004	- 0,005	- 0,010	- 0,013	- 0,001	- 0,000	+ 0,004	- 0,004	0,005	2,60
10	- 0,019	- 0,020	- 0,039	- 0,009	- 0,018	- 0,024	- 0,010	+ 0,005	+ 0,000	+ 0,006	- 0,013	0,014	2,87
11	+ 0,026	+ 0,022	+ 0,020	+ 0,021	+ 0,019	+ 0,028	+ 0,025	+ 0,030	+ 0,036	+ 0,034	+ 0,026	0,006	13,83
12	- 0,003	- 0,005	+ 0,012	+ 0,006	+ 0,009	+ 0,006	- 0,001	- 0,017	+ 0,000	+ 0,008	+ 0,002	0,009	0,60
13	- 0,017	- 0,039	- 0,028	- 0,020	- 0,008	- 0,022	- 0,026	- 0,000	- 0,038	- 0,007	- 0,021	0,013	5,09
14	+ 0,028	+ 0,017	+ 0,014	+ 0,014	+ 0,011						+ 0,017	0,007	5,71
15	+ 0,003	- 0,005	+ 0,014	+ 0,007	+ 0,007	+ 0,009	+ 0,007	+ 0,009	+ 0,008	+ 0,002	+ 0,006	0,005	3,76
16	- 0,001	+ 0,002	+ 0,006	- 0,007	- 0,016	- 0,011	+ 0,004	- 0,016	- 0,011	- 0,026	- 0,008	0,010	2,40
d	- 0,001	- 0,003	- 0,003	- 0,002	- 0,002	- 0,002	- 0,002	- 0,001	- 0,001	+ 0,001	+ 0,002	0,026	
Sd	0,023	0,020	0,022	0,018	0,014	0,018	0,013	0,016	0,017	0,019	0,018		

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

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

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

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-1,67	+1,91	+1,87	+5,12	+4,35	+1,80	+5,89	+10,76	+4,07	+3,90
2	-0,10	-0,18	-0,17	+0,05	+0,20	+0,14	+0,13	+0,24	+0,14	+0,41
3	+2,37		-1,42	-1,44	-1,70	-0,96	+0,25	-2,17	+0,04	-1,99
4	-0,36	-0,12	-0,37	-0,00	-0,60	+0,46	+0,40	+0,36	-0,25	-0,18
5	+0,03	+0,32	-0,02	+0,14	+0,45	+0,18	+0,11	+0,83	+0,12	+0,71
6	-1,39	-1,63	-1,38	-1,31	-1,03	-1,56	-1,32	-0,77	-0,75	-1,09
7	+0,36	-0,12	+0,48	+2,05	+1,46	-0,02	+0,71	+0,85	+0,89	+1,22
8	-0,58	-1,21	-0,90	-1,42	-1,12	-0,76	-1,37	-0,67	-1,02	+0,29
9	-0,07	-0,15	-0,32	-0,20	-0,35	-0,55	-0,99	-0,07	-0,02	+0,21
10	-0,85	-0,96	-1,76	-0,51	-1,30	-1,32	-0,77	+0,28	+0,00	+0,34
11	+1,15	+1,07	+0,88	+1,18	+1,33	+1,59	+1,85	+1,84	+2,16	+1,79
12	-0,14	-0,26	+0,55	+0,36	+0,65	+0,36	-0,06	-1,02	+0,02	+0,41
13	-0,76	-1,90	-1,25	-1,15	-0,56	-1,23	-1,92	-0,02	-2,29	-0,39
14	+1,20	+0,84	+0,61	+0,82	+0,76					
15	+0,12	-0,23	+0,64	+0,38	+0,49	+0,52	+0,49	+0,55	+0,50	+0,09
16	-0,06	+0,10	+0,25	-0,40	-1,16	-0,60	+0,27	-0,95	-0,68	-1,37

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

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

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

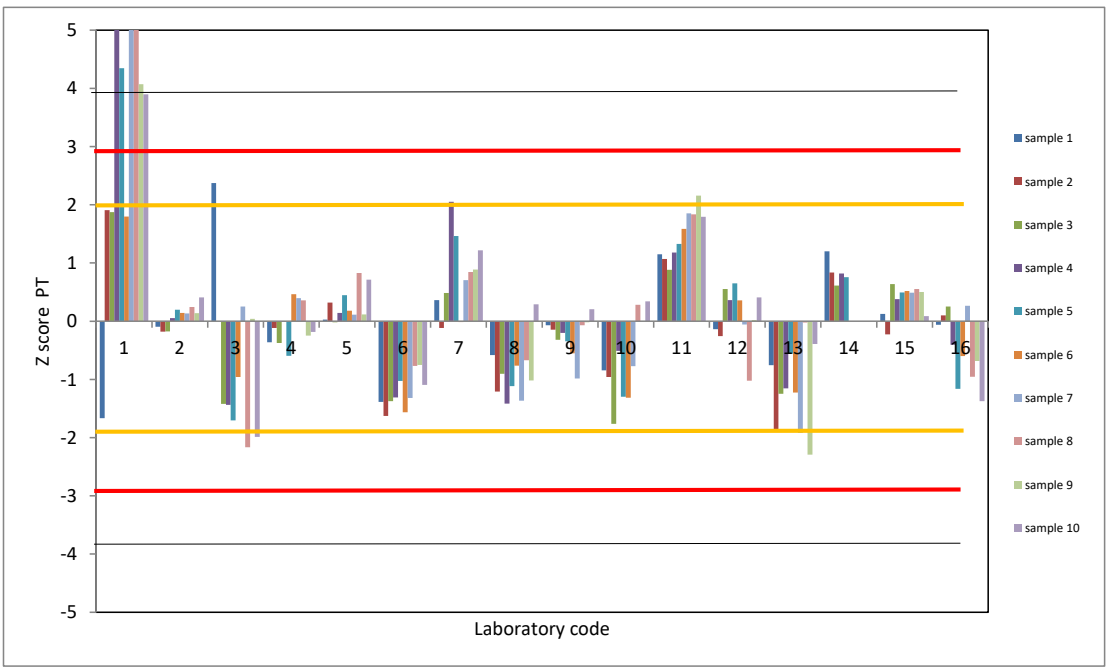


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample Lab code	1	2	3	4	5	6	7	8	9	10
1	-2,13	+2,17	+2,32	+5,00	+3,40	+1,79	+4,38	+9,81	+3,75	+4,09
2	-0,12	-0,20	-0,22	+0,05	+0,15	+0,14	+0,10	+0,22	+0,13	+0,43
3	+3,03		-1,76	-1,40	-1,33	-0,96	+0,19	-1,98	+0,04	-2,09
4	-0,46	-0,13	-0,46	-0,00	-0,47	+0,46	+0,30	+0,33	-0,23	-0,19
5	+0,04	+0,36	-0,02	+0,14	+0,35	+0,18	+0,08	+0,75	+0,11	+0,75
6	-1,77	-1,85	-1,71	-1,28	-0,80	-1,56	-0,98	-0,70	-0,69	-1,15
7	+0,46	-0,13	+0,60	+2,00	+1,15	-0,02	+0,53	+0,77	+0,82	+1,28
8	-0,74	-1,37	-1,12	-1,38	-0,87	-0,76	-1,02	-0,61	-0,94	+0,31
9	-0,09	-0,17	-0,39	-0,20	-0,27	-0,55	-0,73	-0,06	-0,02	+0,22
10	-1,08	-1,09	-2,18	-0,50	-1,02	-1,31	-0,57	+0,26	+0,00	+0,36
11	+1,47	+1,22	+1,09	+1,15	+1,04	+1,58	+1,38	+1,67	+1,99	+1,88
12	-0,18	-0,29	+0,69	+0,35	+0,51	+0,36	-0,04	-0,93	+0,02	+0,43
13	-0,97	-2,16	-1,55	-1,13	-0,44	-1,22	-1,43	-0,02	-2,11	-0,41
14	+1,54	+0,95	+0,76	+0,80	+0,59					
15	+0,16	-0,26	+0,79	+0,37	+0,39	+0,52	+0,36	+0,51	+0,46	+0,09
16	-0,08	+0,12	+0,31	-0,39	-0,91	-0,60	+0,20	-0,87	-0,63	-1,44

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

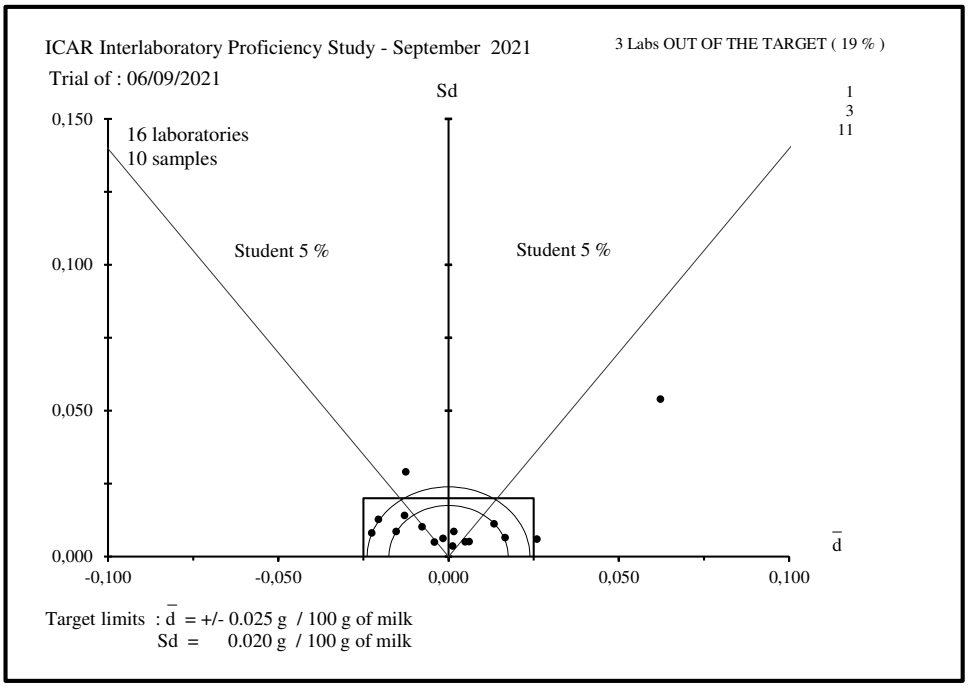


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

Table VIII : Relative recovery of nitrogen on pure solutions

N°	TRYP	GLY	SO4
1	100,0	99,9	100,0
2	98,3	99,9	100,3
3	98,9	99,8	99,9
4		99,2	98,9
5	99,4	99,9	99,8
6	99,9	100,4	100,4
7	99,6	100,1	100,4
8	99,6	99,4	99,5
9	98,6	98,5	99,8
10	99,7	99,9	100,3
11	96,0	99,3	102,2
12	99,5	100,6	100,7
13	100,0	100,2	100,8
14	99,9	100,1	100,3
15			
16			
17			
18	100,8	101,1	100,5
19	97,9	100,4	100,6

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 2021

Raw Milk

Determination of LACTOSE CONTENT

Sending date of statistical treatment : 4th October 2021

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	- 0,015	0,008	0,017	Own method
2	20	8	- 0,027	0,012	0,029	Enzymatic method in house
3	30	6	- 0,025	0,020	0,032	Lane-Eynon method
4	40	7	- 0,019	0,028	0,034	ISO 22662 / IDF 198
5	50	3	- 0,034	0,006	0,035	ISO 22662 / IDF 198
6	60	2	+ 0,037	0,009	0,038	ISO 22662 / IDF 198
7	70	9	- 0,037	0,023	0,043	ISO 26462 / IDF 214
8	80	4	+ 0,040	0,021	0,045	ISO 26462 / IDF 214
9	90	10	- 0,005	0,074	0,074	liquid chromatography pulse amperometric detector
10	100	5	+ 0,078	0,011	0,079	ISO 26462 / IDF 214

(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 :

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

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}	0,014
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,045

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

Sample Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,001	0,002	0,004	0,002	0,007	0,001	0,000	0,002	0,019	0,007	0,005	20
2	0,011	0,000	0,016	0,013	0,002	0,033	0,014	0,037	0,023	0,003	0,014	20
3	0,006	0,004	0,004	0,006	0,003	0,000	0,001	0,011	0,002	0,013	0,005	20
4	0,054 *	0,004	0,051	0,016	0,010	0,006	0,013	0,011	0,034	0,009	0,019	20
5	0,002	0,002	0,002	0,014	0,002	0,007	0,005	0,004	0,001	0,006	0,004	20
6	0,003	0,001	0,005	0,004	0,002	0,001	0,006	0,010	0,011	0,007	0,004	20
7	0,001	0,006	0,001	0,030	0,006	0,006	0,002	0,012	0,004	0,007	0,008	20
8	0,028	0,005	0,041	0,032	0,031	0,020	0,028	0,002	0,007	0,001	0,017	20
9	0,023	0,021 *	0,067	0,058	0,020	0,010	0,065 *	0,028	0,059 *	0,035	0,031	20
10	0,008	0,005	0,027	0,010	0,018	0,014	0,036	0,031	0,004	0,031	0,015	20
Sr	0,015	0,005	0,022	0,017	0,010	0,010	0,018	0,013	0,017	0,011		200
NE	20	20	20	20	20	20	20	20	20	20		
L	0,031	0,009	0,077	0,060	0,034	0,034	0,040	0,047	0,038	0,040		

Sr : repeatability standard deviation of each laboratory limit 0,022 g/100g
NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample
NE : number of measurements per sample

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

** : missing data

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

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	LACT
1	5,208	5,004	5,141	5,076	4,927	4,850	4,876	4,908	4,756	4,822	4,901
2	5,255	5,057	5,176	5,123	4,982	4,904	4,936	4,951	4,820	4,886	4,941
3	5,190	4,979	5,111	5,053	4,911	4,832	4,858	4,887	4,744	4,813	4,893
4	5,259	5,049	5,164	5,132	4,978	4,924	4,954	4,926	4,831	4,905	5,009
5	5,296	5,105	5,223	5,173	5,021	4,953	4,966	5,002	4,852	4,912	4,926
6	5,196	4,982	5,164	5,013	4,926	4,832	4,858	4,907	4,780	4,818	4,916
7	5,209	4,970	5,167	5,084	4,936	4,855	4,882	4,924	4,741	4,768	4,928
8	5,184	4,987	5,134	5,067	4,902	4,822	4,864	4,922	4,752	4,823	4,768
9	5,205	4,954	5,164	5,052	4,901	4,808	4,868	4,849	4,738	4,814	4,807
10	5,198	5,052	5,168	5,087	4,762 *	4,859	4,823	4,946	4,843	4,932	5,110
M	5,220	5,014	5,161	5,086	4,943	4,864	4,888	4,922	4,785	4,849	
REF.	5,217	5,012	5,159	5,084	4,941	4,862	4,888	4,921	4,785	4,849	**4,912**
SD	0,037	0,049	0,029	0,046	0,042	0,047	0,047	0,041	0,046	0,055	

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 13
of 10 laboratories, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran	4	9					9		9	
Outlier Grubbs					10					
sr	0,009	0,003	0,022	0,017	0,009	0,010	0,012	0,013	0,011	0,011
SR	0,037	0,047	0,033	0,048	0,042	0,048	0,050	0,042	0,046	0,055

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	- 0,010	- 0,008	- 0,018	- 0,008	- 0,014	- 0,013	- 0,012	- 0,013	- 0,030	- 0,027	- 0,015	0,008	6,45
2	+ 0,037	+ 0,045	+ 0,017	+ 0,038	+ 0,041	+ 0,041	+ 0,048	+ 0,029	+ 0,034	+ 0,037	+ 0,037	0,009	13,24
3	- 0,027	- 0,033	- 0,048	- 0,031	- 0,030	- 0,030	- 0,031	- 0,035	- 0,041	- 0,036	- 0,034	0,006	17,31
4	+ 0,042	+ 0,037	+ 0,004	+ 0,048	+ 0,037	+ 0,062	+ 0,065	+ 0,004	+ 0,046	+ 0,056	+ 0,040	0,021	5,98
5	+ 0,079	+ 0,093	+ 0,064	+ 0,089	+ 0,080	+ 0,090	+ 0,077	+ 0,081	+ 0,066	+ 0,063	+ 0,078	0,011	22,74
6	- 0,022	- 0,031	+ 0,004	- 0,071	- 0,015	- 0,031	- 0,030	- 0,014	- 0,006	- 0,031	- 0,025	0,020	3,84
7	- 0,009	- 0,042	+ 0,007	- 0,000	- 0,005	- 0,007	- 0,006	+ 0,003	- 0,044	- 0,081	- 0,019	0,028	2,08
8	- 0,033	- 0,026	- 0,026	- 0,017	- 0,039	- 0,040	- 0,024	+ 0,001	- 0,034	- 0,026	- 0,027	0,012	7,00
9	- 0,013	- 0,059	+ 0,004	- 0,032	- 0,040	- 0,054	- 0,021	- 0,072	- 0,048	- 0,035	- 0,037	0,023	5,12
10	- 0,019	+ 0,039	+ 0,008	+ 0,003	- 0,179	- 0,003	- 0,065	+ 0,024	+ 0,058	+ 0,083	- 0,005	0,074	0,22
d	+ 0,002	+ 0,001	+ 0,002	+ 0,002	+ 0,002	+ 0,001	+ 0,000	+ 0,001	- 0,000	+ 0,000	- 0,001	0,046	
Sd	0,037	0,049	0,029	0,046	0,042	0,047	0,047	0,041	0,046	0,055	0,044		

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

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

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

Sample / Lab code	1	1	1	1	1	1	1	1	1	1
1	-0,26	-0,17	-0,62	-0,18	-0,34	-0,27	-0,26	-0,32	-0,65	-0,50
2	+1,01	+0,92	+0,56	+0,83	+0,98	+0,87	+1,02	+0,72	+0,74	+0,67
3	-0,74	-0,68	-1,64	-0,68	-0,73	-0,64	-0,66	-0,85	-0,90	-0,67
4	+1,13	+0,75	+0,14	+1,03	+0,89	+1,30	+1,39	+0,11	+0,99	+1,02
5	+2,13	+1,90	+2,16	+1,93	+1,92	+1,90	+1,64	+1,99	+1,44	+1,16
6	-0,59	-0,63	+0,14	-1,55	-0,36	-0,65	-0,65	-0,35	-0,13	-0,57
7	-0,24	-0,86	+0,24	-0,01	-0,12	-0,15	-0,13	+0,07	-0,97	-1,49
8	-0,90	-0,53	-0,88	-0,38	-0,94	-0,85	-0,52	+0,02	-0,74	-0,48
9	-0,35	-1,20	+0,14	-0,70	-0,95	-1,14	-0,44	-1,78	-1,04	-0,65
10	-0,52	+0,80	+0,28	+0,06	-4,28	-0,07	-1,39	+0,60	+1,25	+1,51

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

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

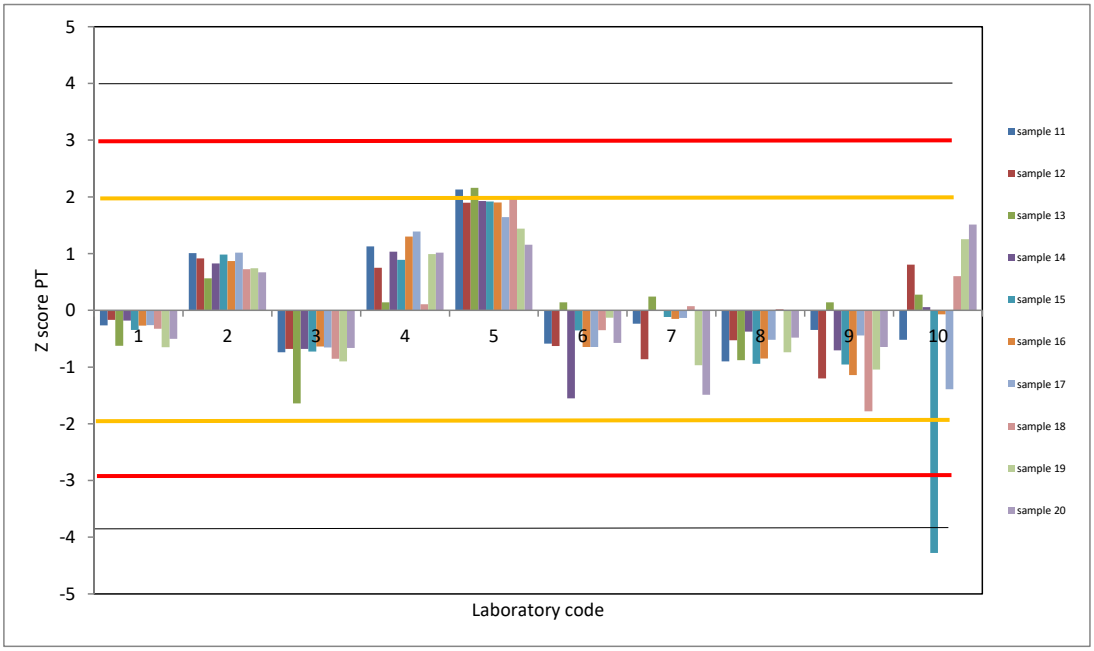


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

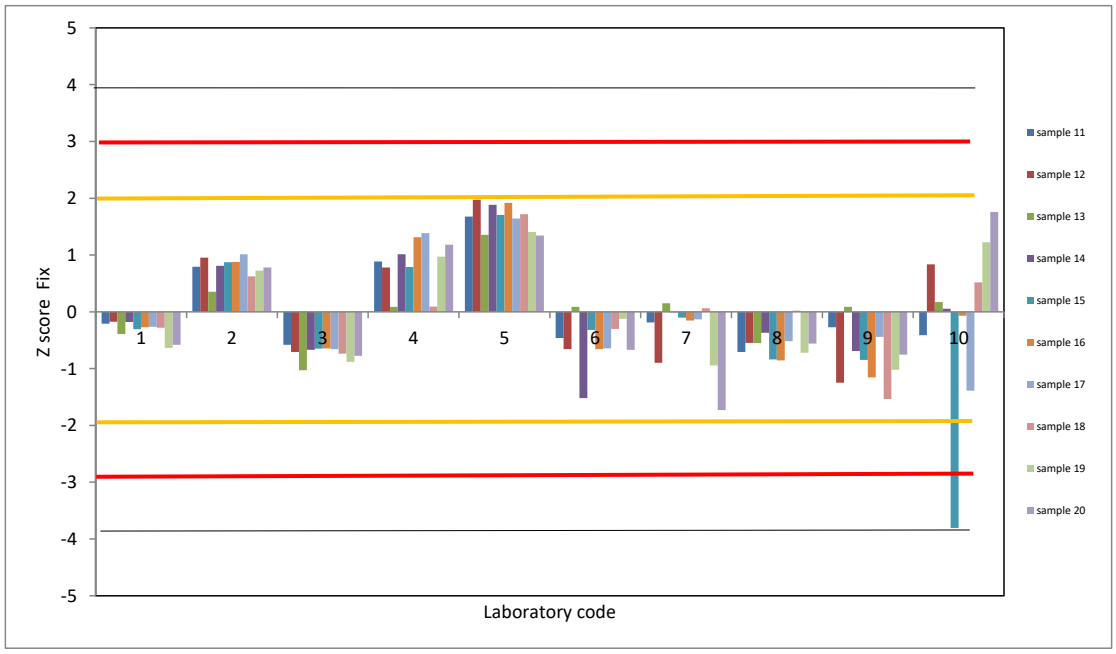
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,21	-0,18	-0,39	-0,18	-0,31	-0,27	-0,26	-0,28	-0,64	-0,58
2	+0,79	+0,95	+0,35	+0,81	+0,87	+0,88	+1,01	+0,62	+0,73	+0,78
3	-0,58	-0,71	-1,03	-0,67	-0,65	-0,64	-0,66	-0,74	-0,88	-0,77
4	+0,89	+0,78	+0,09	+1,01	+0,79	+1,31	+1,39	+0,09	+0,97	+1,18
5	+1,67	+1,97	+1,35	+1,89	+1,70	+1,92	+1,64	+1,72	+1,41	+1,34
6	-0,46	-0,65	+0,09	-1,52	-0,32	-0,65	-0,64	-0,30	-0,13	-0,67
7	-0,19	-0,90	+0,15	-0,01	-0,10	-0,15	-0,13	+0,06	-0,94	-1,73
8	-0,71	-0,55	-0,55	-0,37	-0,84	-0,86	-0,52	+0,02	-0,72	-0,56
9	-0,27	-1,25	+0,09	-0,69	-0,85	-1,15	-0,44	-1,53	-1,02	-0,75
10	-0,41	+0,84	+0,17	+0,06	-3,81	-0,07	-1,39	+0,52	+1,23	+1,76

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



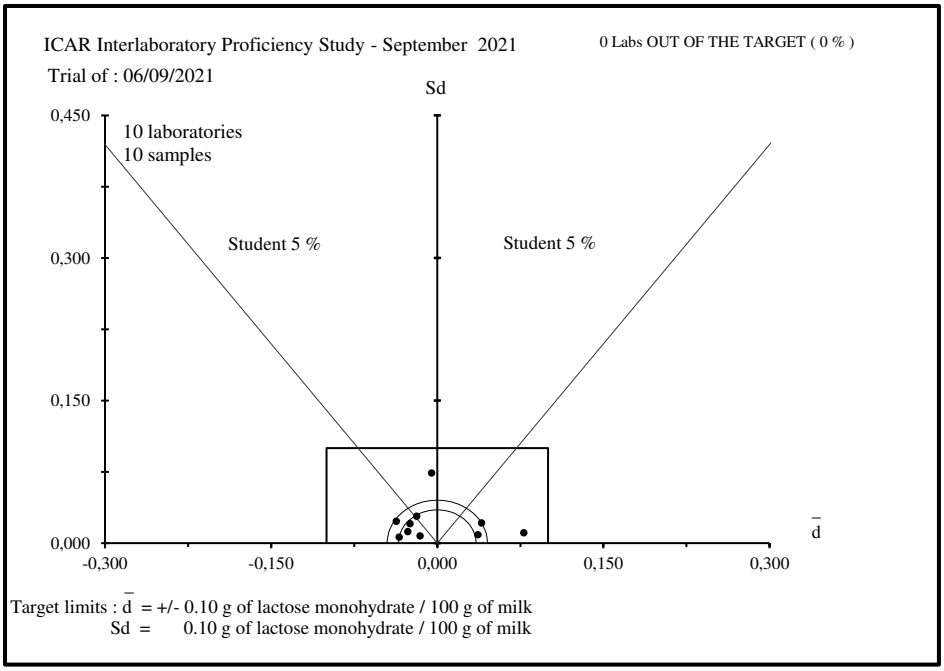


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Determination of UREA CONTENT

Sending date of statistical treatment : 4th October 2021

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

ACTALIA CECALAIT

cofrac COMPARAISONS INTERLABORATOIRES

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Table I : **Ranking of the laboratories** Units : mg / dl

Nb	%	N°	d	Sd	D	**Method**
1	11	7	- 0,03	0,45	0,45	ISO 14637 / IDF 195
2	22	4	+ 0,75	0,75	1,06	Continuous flow analyzer
3	33	5	+ 1,16	0,49	1,26	ISO 14637 / IDF 195
4	44	2	- 1,49	0,44	1,55	ISO 14637 / IDF 195
5	56	8	- 1,79	0,51	1,86	Enzymatic method in house
6	67	9	- 2,18	1,03	2,41	Continuous flow analyzer
7	78	3	- 2,48	0,42	2,52	ISO 14637 / IDF 195
8	89	6	+ 2,84	0,80	2,95	ISO 14637 / IDF 195
9	100	1	- 20,09	7,61	21,49	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 :

+/- 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 5 laboratories using reference method (ISO 14637|IDF 195 or V 04-217), 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}	0,37
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	2,00

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,000	0,000	0,000	0,100	0,100	0,100	0,000	0,100	0,000	0,200	0,06	20
2	0,300	0,100	0,700	0,300	0,300	0,300	0,300	0,400	0,300	1,100	0,35	20
3	0,080	0,160	0,000	0,420	0,160	0,810	0,260	0,000	0,160	0,060	0,22	20
4	0,200	0,100	0,600	0,700	0,600	1,200	0,400	1,000	0,300	0,100	0,45	20
5	0,100	0,000	0,500	0,300	0,700	0,300	0,200	0,200	0,600	0,400	0,28	20
6	0,400	0,600	0,600	0,600	0,500	0,000	0,300	0,400	0,500	1,000	0,39	20
7	0,200	0,000	0,290	0,580	0,480	0,190	0,680	0,290	0,100	0,190	0,26	20
8	0,090	0,000	0,360	0,510	0,200	0,000	0,210	0,080	0,060	0,960	0,27	20
9	0,190	0,580	0,560	1,130	2,640 *	2,100 *	2,920 *	1,100	1,750 *	1,600	1,20	20
Sr	0,15	0,20	0,33	0,41	0,69	0,61	0,73	0,39	0,46	0,57		180
NE	18	18	18	18	18	18	18	18	18	18		
L	0,50	0,69	1,13	1,40	1,01	1,26	0,81	1,31	0,75	1,95		

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	1	2	3	4	5	6	7	8	9	10
1	14,80 *	10,30 *	19,20 *	21,35 *	12,35 *	26,05 *	8,30 *	17,05 *	23,80 *	28,30 *
2	30,05	20,65	38,85	43,75	24,85	53,05	16,05	34,60	48,25	57,45
3	28,95	19,71	38,25	42,74	23,62	52,22	15,24	33,43	46,86	56,60
4	31,80	21,75	41,80	46,65	26,00	56,60	16,50	36,30	51,15	61,35
5	31,95	22,50	42,15	46,95	26,85	56,95	17,60	36,60	51,00	61,50
6	33,80	23,50	43,00	48,20	28,35	58,90	18,95	38,90	53,45	63,80
7	31,07	22,14	41,12	45,05	26,65	54,47	17,33	35,78	49,37	59,13
8	29,78	20,29	38,76	43,47	24,37	52,82	15,74	34,71	47,72	56,88
9	29,81	18,55	39,89	43,15	25,42	51,67	14,66	33,99	47,32	56,17
M	30,90	21,14	40,48	44,99	25,76	54,58	16,51	35,54	49,39	59,11
REF.	31,16	21,70	40,67	45,34	26,06	55,12	17,03	35,86	49,79	59,70
SD	1,57	1,63	1,78	2,04	1,52	2,62	1,40	1,75	2,30	2,81

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 5 laboratories using the reference method ISO 14637 | IDF 195 or V 04-2017, after outliers discarging using Grubbs test 5% risk level

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran					9	9	9		9	
Outlier Grubbs	1	1	1	1	1	1	1	1	1	1
sr	0,16	0,22	0,35	0,44	0,33	0,41	0,26	0,41	0,24	0,61
SR	1,58	1,63	1,80	2,07	1,65	2,54	1,29	1,78	2,32	2,85

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	- 16,36	- 11,40	- 21,47	- 23,99	- 13,71	- 29,07	- 8,73	- 18,81	- 25,99	- 31,40	- 20,09	7,61	8,35
2	- 1,11	- 1,05	- 1,82	- 1,59	- 1,21	- 2,07	- 0,98	- 1,26	- 1,54	- 2,25	- 1,49	0,44	10,69
3	- 2,21	- 1,99	- 2,42	- 2,60	- 2,44	- 2,90	- 1,79	- 2,43	- 2,93	- 3,10	- 2,48	0,42	18,87
4	+ 0,64	+ 0,05	+ 1,13	+ 1,31	- 0,06	+ 1,48	- 0,53	+ 0,44	+ 1,36	+ 1,65	+ 0,75	0,75	3,14
5	+ 0,79	+ 0,80	+ 1,48	+ 1,61	+ 0,79	+ 1,83	+ 0,57	+ 0,74	+ 1,21	+ 1,80	+ 1,16	0,49	7,58
6	+ 2,64	+ 1,80	+ 2,33	+ 2,86	+ 2,29	+ 3,78	+ 1,92	+ 3,04	+ 3,66	+ 4,10	+ 2,84	0,80	11,24
7	- 0,09	+ 0,44	+ 0,44	- 0,29	+ 0,59	- 0,65	+ 0,30	- 0,09	- 0,42	- 0,57	- 0,03	0,45	0,24
8	- 1,39	- 1,41	- 1,91	- 1,87	- 1,69	- 2,30	- 1,30	- 1,15	- 2,07	- 2,82	- 1,79	0,51	11,04
9	- 1,36	- 3,15	- 0,78	- 2,19	- 0,64	- 3,45	- 2,37	- 1,87	- 2,47	- 3,53	- 2,18	1,03	6,70
d	- 0,26	- 0,56	- 0,20	- 0,34	- 0,30	- 0,53	- 0,53	- 0,32	- 0,40	- 0,59	- 2,59	6,91	
Sd	1,57	1,63	1,78	2,04	1,52	2,62	1,40	1,75	2,30	2,81	2,00		

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	1	2	3	4	5	6	7	8	9	10
1	-10,40	-7,01	-12,05	-11,74	-9,01	-11,11	-6,25	-10,74	-11,31	-11,16
2	-0,71	-0,65	-1,02	-0,78	-0,80	-0,79	-0,70	-0,72	-0,67	-0,80
3	-1,41	-1,22	-1,36	-1,27	-1,61	-1,11	-1,28	-1,39	-1,27	-1,10
4	+0,40	+0,03	+0,63	+0,64	-0,04	+0,57	-0,38	+0,25	+0,59	+0,59
5	+0,50	+0,49	+0,83	+0,79	+0,52	+0,70	+0,41	+0,42	+0,53	+0,64
6	+1,67	+1,11	+1,31	+1,40	+1,50	+1,45	+1,37	+1,74	+1,59	+1,46
7	-0,06	+0,27	+0,25	-0,14	+0,39	-0,25	+0,21	-0,05	-0,18	-0,20
8	-0,88	-0,87	-1,07	-0,92	-1,11	-0,88	-0,93	-0,66	-0,90	-1,00
9	-0,86	-1,94	-0,44	-1,07	-0,42	-1,32	-1,70	-1,07	-1,08	-1,25

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

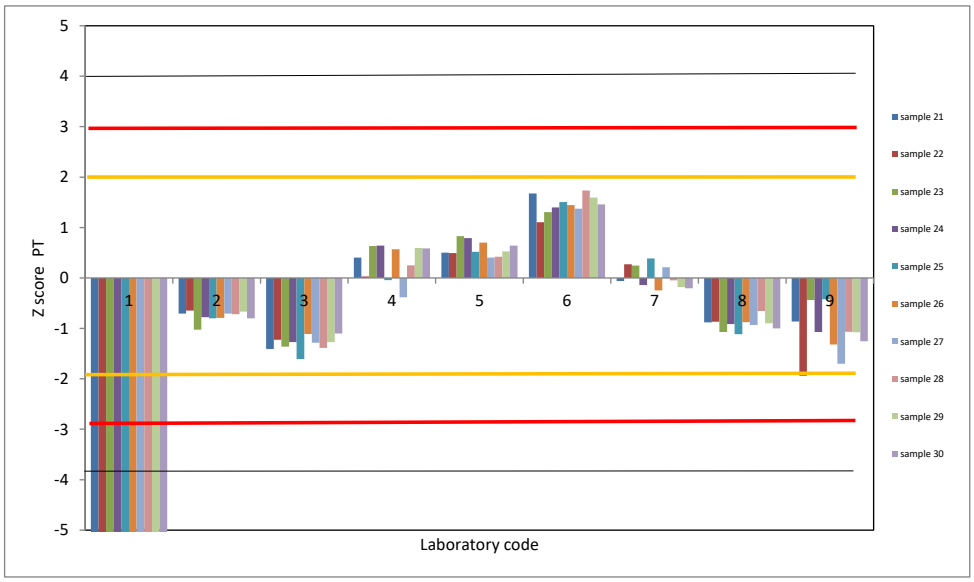


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

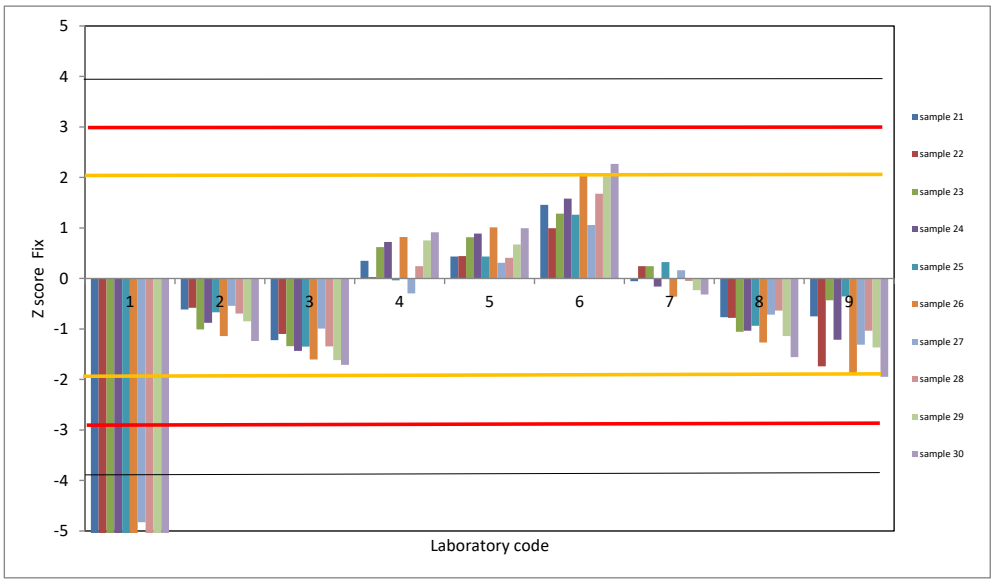
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-9,04	-6,30	-11,86	-13,25	-7,58	-16,06	-4,83	-10,39	-14,36	-17,35
2	-0,62	-0,58	-1,01	-0,88	-0,67	-1,14	-0,54	-0,70	-0,85	-1,24
3	-1,22	-1,10	-1,34	-1,44	-1,35	-1,60	-0,99	-1,34	-1,62	-1,71
4	+0,35	+0,03	+0,62	+0,72	-0,04	+0,82	-0,30	+0,24	+0,75	+0,91
5	+0,43	+0,44	+0,82	+0,89	+0,43	+1,01	+0,31	+0,41	+0,67	+1,00
6	+1,46	+0,99	+1,29	+1,58	+1,26	+2,09	+1,06	+1,68	+2,02	+2,27
7	-0,05	+0,24	+0,24	-0,16	+0,32	-0,36	+0,16	-0,05	-0,23	-0,31
8	-0,77	-0,78	-1,06	-1,03	-0,94	-1,27	-0,72	-0,64	-1,14	-1,56
9	-0,75	-1,74	-0,43	-1,21	-0,36	-1,90	-1,31	-1,03	-1,37	-1,95

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



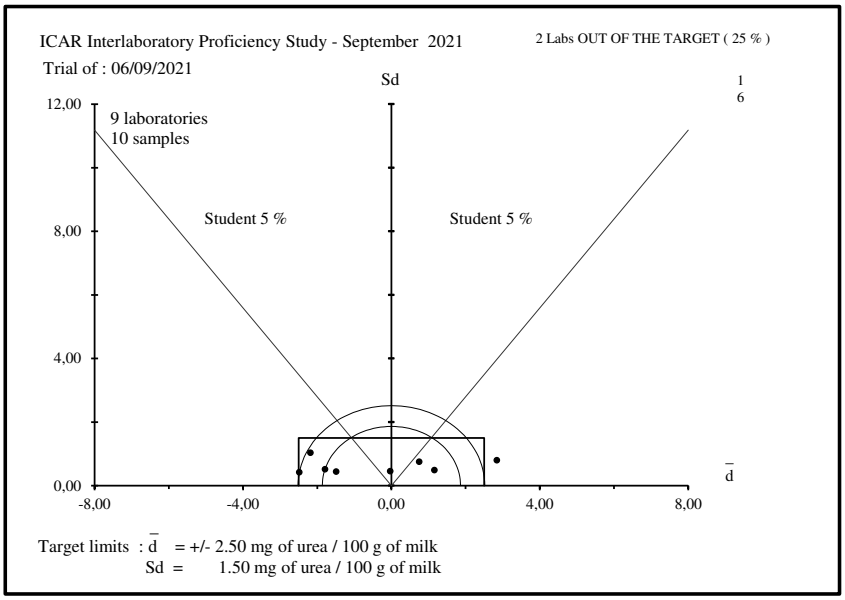


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 6‴ October 2021

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

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

Nb	%	N°	d	Sd	D	Method
1	2	52	- 0%	1%	1%	B
2	3	42	- 0%	1%	1%	B
3	5	22	- 0%	1%	1%	B
4	7	44	+ 1%	1%	1%	B
5	9	57	- 1%	1%	2%	A
6	10	28	+ 1%	1%	2%	B
7	12	29	- 1%	1%	2%	B
8	14	11	- 1%	2%	2%	B
9	16	10	+ 0%	2%	2%	A
10	17	35	+ 1%	2%	2%	B
11	19	38	+ 1%	1%	2%	B
12	21	49	- 1%	2%	2%	B
13	22	39	- 0%	2%	2%	B
14	24	34	- 1%	2%	2%	B
15	26	41	- 1%	2%	2%	B
16	28	40	+ 0%	2%	2%	B
17	29	12	+ 1%	2%	2%	B
18	31	25	- 1%	2%	2%	B
19	33	7	- 2%	2%	2%	B
20	34	24	- 1%	2%	2%	B
21	36	43	- 1%	2%	2%	B
22	38	1	+ 0%	2%	3%	B
23	40	2	+ 0%	2%	3%	B
24	41	51	- 1%	2%	3%	B
25	43	23	+ 1%	2%	3%	B
26	45	30	+ 1%	2%	3%	B
27	47	9	+ 2%	2%	3%	B
28	48	14	+ 2%	2%	3%	B
29	50	13	+ 2%	2%	3%	B
30	52	21	- 2%	3%	3%	B
31	53	8	- 2%	3%	3%	B
32	55	19	- 2%	3%	3%	B
33	57	50	+ 3%	2%	3%	B
34	59	53	+ 3%	2%	3%	B
35	60	36	+ 3%	2%	4%	B
36	62	47	+ 2%	3%	4%	A
37	64	26	+ 3%	2%	4%	B
38	66	37	+ 3%	2%	4%	B
39	67	54	- 3%	3%	4%	B
40	69	15	- 3%	3%	4%	B
41	71	18	+ 4%	2%	4%	B
42	72	20	+ 4%	3%	5%	B
43	74	6	+ 4%	3%	5%	B
44	76	17	- 4%	4%	6%	B
45	78	33	- 4%	4%	6%	B
46	79	4	+ 4%	5%	7%	B
47	81	5	+ 4%	5%	7%	B
48	83	55	- 4%	6%	7%	B
49	84	56	- 5%	7%	9%	B
50	86	3	- 7%	5%	9%	B
51	88	16	- 6%	7%	9%	B
52	90	31	+ 7%	7%	10%	B
53	91	45	- 7%	7%	10%	C
54	93	32	+ 7%	7%	10%	B
55	95	48	- 8%	8%	11%	B
56	97	58	+ 2%	12%	12%	A
57	98	46	- 9%	9%	13%	B
58	100	27	+ 5%	14%	15%	B

A ISO 13366-1 | IDF 148-1
B ISO 13366-2 | IDF 148-2
C CCD Camera

(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 :

+/- 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 58 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}	30	5%

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	7	15	37	37	19	17	12	7	0	52	18	20
2	7	15	37	37	19	17	12	7	0	52	18	20
3	1	10	5	6	10	15	8	4	6	42	11	20
4	6	34	29	42	6	32	3	13	6	27	17	20
5	6	34	29	42	6	32	7	13	6	27	17	20
6	12	14	6	6	1	20	26	3	10	54	15	20
7	3	24	0	27	23	1	4	3	1	5	10	20
8	2	37	0	7	36	16	0	6	4	48	16	20
9	1	22	2	18	7	19	1	2	3	24	10	20
10	0	10	32	37	22	1	3	3	2	44	16	20
11	9	22	19	4	9	70 *	13	2	8	9	18	20
12	7	8	4	14	9	16	15	11	3	38	11	20
13	4	60	4	4	26	3	0	6	6	19	15	20
14	2	5	17	3	16	19	23	16	0	19	10	20
15	1	23	7	9	16	16	13	3	2	40	12	20
16	3	37	42	37	3	2	6	9	6	36	17	20
17	6	8	21	16	3	6	4	11	11	50	13	20
18	0	15	32	2	14	8	5	9	6	53	15	20
19	0	38	2	41	24	29	23	10	8	23	17	20
20	4	4	8	6	8	2	3	3	2	3	3	20
21	3	65	39	32	13	18	11	2	6	10	19	20
22	8	19	17	14	9	17	3	2	16	16	10	20
23	5	20	4	16	2	24	16	26 *	1	66	18	20
24	8	10	18	61	47	20	3	17	0	12	19	20
25	8	58	39	48	1	20	3	6	8	50	23	20
26	4	0	20	42	18	9	6	1	2	3	11	20
27	11	54	13	21	33	18	13	18	12	4	17	20
28	2	47	32	2	31	1	3	2	6	53	19	20
29	1	23	11	2	5	2	6	5	4	3	6	20
30	2	8	1	7	8	6	2	1	2	8	4	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	2	15	8	27	22	19	13	7	1	50	15	20
32	5	36	4	5	9	4	0	5	13	56	15	20
33	7	20	36	8	2	1	10	10	6	3	10	20
34	2	21	9	29	14	34	10	5	7	10	12	20
35	1	17	6	28	2	7	7	10	1	5	8	20
36	3	37	32	40	15	1	9	0	1	7	15	20
37	1	27	8	1	15	4	1	12	2	2	8	20
38	5	52	55	11	1	10	9	1	6	1	17	20
39	4	15	4	40	12	14	18	11	8	12	12	20
40	1	9	1	23	17	19	2	0	3	1	8	20
41	3	20	35	10	2	2	1	6	0	44	14	20
42	1	51	19	25	6	11	11	5	1	9	14	20
43	4	5	6	12	5	7	7	1	6	11	5	20
44	6	1	12	1	8	3	4	4	3	9	4	20
45	2	36	0	19	13	10	4	2	4	58	16	20
46	15	39	45	24	17	27	11	2	11	53	21	20
47	2	16	12	5	2	13	2	6	2	16	7	20
48	4	24	13	15	6	19	22	3	13	37	13	20
49	8	15	15	13	8	15	35	5	8	19	12	20
50	2	5	4	3	7	6	4	0	2	11	4	20
51	1	0	15	23	1	9	12	14	12	1	8	20
52	0	8	13	5	3	3	4	0	4	15	5	20
53	1	6	6	7	6	7	5	2	1	9	4	20
54	2	1	10	2	0	13	1	1	3	0	4	20
55	1	16	1	3	4	4	3	3	2	33	8	20
56	1	19	16	10	9	6	1	12	5	5	7	20
57	5	8	30	15	10	2	3	3	2	1	8	20
58	29 *	141 *	24	68	124 *	2	22	37 *	15	328 *	87	20
Sr	4	21	16	18	12	13	7	6	4	23		880
r	25	126	126	63	63	50	42	42	25	126		
NE	88	88	88	88	88	88	88	88	88	88		
L	16	87	69	79	48	47	35	24	20	99		

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	41	1226	1026	750	566	418	305	186	95	1469
2	41	1226	1026	750	566	418	305	186	95	1469
3	43	1136	979	690	514	392	253	174	88	1355
4	40	1271	1077	788	589	442	291	200	94	1530
5	40	1271	1077	788	589	442	296	200	94	1530
6	56	1238	1100	797	578	468	290	206	102	1487
7	41	1201	1032	732	557	424	282	185	94	1410
8	44	1221	1009	749	556	415	272	184	89	1402
9	47	1238	1040	759	571	434	303	205	94	1474
10	46	1223	1044	752	540	425	280	194	97	1455
11	44	1182	1045	746	560	419	286	190	91	1450
12	48	1231	1071	740	566	417	280	201	97	1452
13	50	1240	1072	773	574	436	286	201	93	1465
14	48	1223	1077	752	584	434	291	194	97	1474
15	46	1175	1020	719	549	414	271	197	96	1390
16	43	1160	967	736	532	410	253	175	88	1301
17	46	1173	1017	727	561	407	272	179	92	1353
18	56	1247	1090	786	584	453	307	213	109	1454
19	45	1205	1059	750	549	419	272	181	92	1391
20	45	1248	1084	778	596	452	287	210	92	1484
21	43	1170	1028	756	540	414	283	196	97	1415
22	46	1197	1060	749	559	433	284	198	94	1428
23	43	1233	1067	758	555	425	288	199	96	1473
24	39	1194	1007	752	566	425	273	190	88	1446
25	43	1204	1055	757	547	405	274	185	95	1419
26	48	1250	1083	772	573	454	285	202	97	1467
27	41	1479 *	1047	768	560	435	274	189	91	1463
28	45	1220	1043	752	578	430	293	195	97	1463
29	46	1192	1037	746	548	419	287	192	95	1429
30	44	1209	1055	751	575	422	285	198	96	1487

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 58 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						11		23		
Outlier Grubbs		27								
sr	4	19	15	18	11	10	8	5	4	22
SR	4	42	38	29	20	17	13	10	6	63
sr %	8%	2%	1%	2%	2%	2%	3%	3%	5%	2%
SR %	10%	3%	4%	4%	4%	4%	5%	5%	6%	4%

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	45	1277	1115	806	603	451	304	213	103	1578
32	47	1359 *	1114	803	610	455	298	205	104	1502
33	44	1141	1007	723	547	405	277	181	86	1378
34	46	1233	1025	742	562	429	273	180	88	1439
35	47	1234	1046	736	564	432	284	195	97	1456
36	48	1246	1071	790	574	444	287	196	96	1461
37	53	1256	1064	772	579	460	301	195	102	1476
38	40	1207	1061	770	580	431	298	202	101	1442
39	41	1180	1041	754	582	426	290	197	95	1446
40	47	1212	1026	754	572	423	273	203	102	1470
41	46	1178	1050	735	562	422	278	193	89	1432
42	46	1203	1046	731	565	431	286	191	92	1441
43	43	1219	1015	743	540	431	280	195	94	1460
44	45	1201	1055	770	566	430	283	204	97	1445
45	43	1112	969	702	544	406	269	191	89	1315
46	44	1099	954	690	513	403	266	179	81	1265
47	48	1214	1103	753	559	438	275	192	94	1472
48	49	1116	945	700	534	406	266	190	93	1294
49	45	1193	1031	742	564	423	276	198	100	1415
50	39	1247	1065	774	585	441	293	202	94	1470
51	42	1183	1039	724	555	435	289	200	108	1425
52	46	1216	1043	747	558	425	283	193	93	1435
53	47	1246	1065	767	573	437	293	201	98	1484
54	48	1169	1019	720	554	419	292	193	92	1392
55	46	1177	1013	735	555	427	286	193	93	1316
56	47	1170	1035	689	556	419	280	189	89	1304
57	45	1214	1029	741	551	421	277	189	92	1429
58	80 *	1251	864 *	768	594	454	273	220	116 *	1536
M	45	1207	1043	750	563	428	283	194	95	1435
REF.	45	1209	1044	751	563	427	283	194	94	1441
SD	4	40	36	27	19	16	12	9	5	62

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 58 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	58	32; 58			58			58		58
Outlier Grubbs	58		58						58	
sr	4	19	15	18	11	10	8	5	4	22
SR	4	42	38	29	20	17	13	10	6	63
sr %	8%	2%	1%	2%	2%	2%	3%	3%	5%	2%
SR %	10%	3%	4%	4%	4%	4%	5%	5%	6%	4%

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	- 9%	+ 1%	- 2%	- 0%	+ 0%	- 2%	+ 8%	- 4%	+ 1%	+ 2%	+ 0%	2%	0,54
2	- 9%	+ 1%	- 2%	- 0%	+ 0%	- 2%	+ 8%	- 4%	+ 1%	+ 2%	+ 0%	2%	0,54
3	- 5%	- 6%	- 6%	- 8%	- 9%	- 8%	- 11%	- 10%	- 7%	- 6%	- 7%	5%	4,75
4	- 10%	+ 5%	+ 3%	+ 5%	+ 5%	+ 3%	+ 3%	+ 3%	- 0%	+ 6%	+ 4%	5%	2,85
5	- 10%	+ 5%	+ 3%	+ 5%	+ 5%	+ 3%	+ 4%	+ 3%	- 0%	+ 6%	+ 4%	5%	2,94
6	+ 25%	+ 2%	+ 5%	+ 6%	+ 2%	+ 10%	+ 2%	+ 6%	+ 8%	+ 3%	+ 4%	3%	4,51
7	- 9%	- 1%	- 1%	- 3%	- 1%	- 1%	- 0%	- 5%	- 1%	- 2%	- 2%	2%	3,31
8	- 2%	+ 1%	- 3%	- 0%	- 1%	- 3%	- 4%	- 5%	- 6%	- 3%	- 2%	3%	2,34
9	+ 4%	+ 2%	- 0%	+ 1%	+ 1%	+ 1%	+ 7%	+ 6%	- 1%	+ 2%	+ 2%	2%	2,81
10	+ 3%	+ 1%	- 0%	+ 0%	- 4%	- 1%	- 1%	- 0%	+ 3%	+ 1%	+ 0%	2%	0,03
11	- 3%	- 2%	+ 0%	- 1%	- 1%	- 2%	+ 1%	- 2%	- 4%	+ 1%	- 1%	2%	1,43
12	+ 6%	+ 2%	+ 3%	- 1%	+ 0%	- 2%	- 1%	+ 3%	+ 2%	+ 1%	+ 1%	2%	1,23
13	+ 12%	+ 3%	+ 3%	+ 3%	+ 2%	+ 2%	+ 1%	+ 3%	- 1%	+ 2%	+ 2%	2%	3,81
14	+ 7%	+ 1%	+ 3%	+ 0%	+ 4%	+ 1%	+ 3%	- 0%	+ 3%	+ 2%	+ 2%	2%	3,00
15	+ 2%	- 3%	- 2%	- 4%	- 3%	- 3%	- 5%	+ 1%	+ 2%	- 4%	- 3%	3%	3,19
16	- 5%	- 4%	- 7%	- 2%	- 6%	- 4%	- 11%	- 10%	- 7%	- 10%	- 6%	7%	2,95
17	+ 3%	- 3%	- 3%	- 3%	- 1%	- 5%	- 4%	- 8%	- 3%	- 6%	- 4%	4%	2,79
18	+ 25%	+ 3%	+ 4%	+ 5%	+ 4%	+ 6%	+ 8%	+ 9%	+ 16%	+ 1%	+ 4%	2%	6,72
19	+ 1%	- 0%	+ 1%	- 0%	- 3%	- 2%	- 4%	- 7%	- 2%	- 4%	- 2%	3%	1,73
20	+ 1%	+ 3%	+ 4%	+ 4%	+ 6%	+ 6%	+ 1%	+ 8%	- 2%	+ 3%	+ 4%	3%	4,12
21	- 5%	- 3%	- 2%	+ 1%	- 4%	- 3%	- 0%	+ 1%	+ 3%	- 2%	- 2%	3%	2,37
22	+ 3%	- 1%	+ 1%	- 0%	- 1%	+ 1%	+ 0%	+ 2%	- 0%	- 1%	- 0%	1%	0,28
23	- 5%	+ 2%	+ 2%	+ 1%	- 2%	- 1%	+ 2%	+ 2%	+ 1%	+ 2%	+ 1%	2%	1,98
24	- 13%	- 1%	- 4%	+ 0%	+ 0%	- 1%	- 4%	- 2%	- 7%	+ 0%	- 1%	2%	1,95
25	- 4%	- 0%	+ 1%	+ 1%	- 3%	- 5%	- 3%	- 5%	+ 1%	- 2%	- 1%	2%	1,99
26	+ 7%	+ 3%	+ 4%	+ 3%	+ 2%	+ 6%	+ 1%	+ 4%	+ 3%	+ 2%	+ 3%	2%	3,78
27	- 9%	+ 22%	+ 0%	+ 2%	- 1%	+ 2%	- 3%	- 3%	- 4%	+ 2%	+ 5%	14%	1,08
28	+ 1%	+ 1%	- 0%	+ 0%	+ 2%	+ 1%	+ 3%	+ 0%	+ 3%	+ 1%	+ 1%	1%	2,58
29	+ 2%	- 1%	- 1%	- 1%	- 3%	- 2%	+ 1%	- 1%	+ 1%	- 1%	- 1%	1%	2,79
30	- 2%	- 0%	+ 1%	- 0%	+ 2%	- 1%	+ 1%	+ 2%	+ 2%	+ 3%	+ 1%	2%	1,46

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	+ 1%	+ 6%	+ 7%	+ 7%	+ 7%	+ 5%	+ 7%	+ 9%	+ 9%	+ 10%	+ 7%	7%	3,41
32	+ 4%	+ 12%	+ 7%	+ 7%	+ 8%	+ 6%	+ 5%	+ 5%	+ 10%	+ 4%	+ 7%	7%	3,18
33	- 3%	- 6%	- 4%	- 4%	- 3%	- 5%	- 2%	- 7%	- 9%	- 4%	- 4%	4%	3,59
34	+ 3%	+ 2%	- 2%	- 1%	- 0%	+ 0%	- 4%	- 8%	- 7%	- 0%	- 1%	2%	1,03
35	+ 4%	+ 2%	+ 0%	- 2%	+ 0%	+ 1%	+ 0%	+ 0%	+ 2%	+ 1%	+ 1%	2%	1,10
36	+ 6%	+ 3%	+ 3%	+ 5%	+ 2%	+ 4%	+ 1%	+ 1%	+ 1%	+ 1%	+ 3%	2%	3,44
37	+ 18%	+ 4%	+ 2%	+ 3%	+ 3%	+ 8%	+ 6%	+ 0%	+ 8%	+ 2%	+ 3%	2%	4,57
38	- 12%	- 0%	+ 2%	+ 2%	+ 3%	+ 1%	+ 5%	+ 4%	+ 7%	+ 0%	+ 1%	1%	2,83
39	- 8%	- 2%	- 0%	+ 0%	+ 3%	- 0%	+ 2%	+ 1%	+ 1%	+ 0%	- 0%	2%	0,05
40	+ 4%	+ 0%	- 2%	+ 0%	+ 1%	- 1%	- 4%	+ 5%	+ 8%	+ 2%	+ 0%	2%	0,63
41	+ 2%	- 3%	+ 0%	- 2%	- 0%	- 1%	- 2%	- 1%	- 6%	- 1%	- 1%	2%	2,13
42	+ 2%	- 1%	+ 0%	- 3%	+ 0%	+ 1%	+ 1%	- 2%	- 3%	- 0%	- 0%	1%	1,16
43	- 4%	+ 1%	- 3%	- 1%	- 4%	+ 1%	- 1%	+ 0%	- 0%	+ 1%	- 1%	2%	0,80
44	+ 1%	- 1%	+ 1%	+ 2%	+ 0%	+ 1%	- 0%	+ 5%	+ 2%	+ 0%	+ 1%	1%	1,72
45	- 4%	- 8%	- 7%	- 7%	- 4%	- 5%	- 5%	- 2%	- 6%	- 9%	- 7%	7%	2,97
46	- 3%	- 9%	- 9%	- 8%	- 9%	- 6%	- 6%	- 8%	- 15%	- 12%	- 9%	9%	3,21
47	+ 7%	+ 0%	+ 6%	+ 0%	- 1%	+ 2%	- 3%	- 1%	- 0%	+ 2%	+ 2%	3%	1,46
48	+ 10%	- 8%	- 10%	- 7%	- 5%	- 5%	- 6%	- 2%	- 2%	- 10%	- 8%	8%	2,87
49	+ 1%	- 1%	- 1%	- 1%	+ 0%	- 1%	- 3%	+ 2%	+ 6%	- 2%	- 1%	2%	2,18
50	- 13%	+ 3%	+ 2%	+ 3%	+ 4%	+ 3%	+ 3%	+ 4%	- 0%	+ 2%	+ 3%	2%	3,75
51	- 7%	- 2%	- 1%	- 4%	- 2%	+ 2%	+ 2%	+ 3%	+ 14%	- 1%	- 1%	2%	1,24
52	+ 3%	+ 1%	- 0%	- 1%	- 1%	- 1%	- 0%	- 1%	- 1%	- 0%	- 0%	1%	1,37
53	+ 4%	+ 3%	+ 2%	+ 2%	+ 2%	+ 2%	+ 3%	+ 3%	+ 3%	+ 3%	+ 3%	2%	3,54
54	+ 7%	- 3%	- 2%	- 4%	- 2%	- 2%	+ 3%	- 1%	- 3%	- 3%	- 3%	3%	2,54
55	+ 2%	- 3%	- 3%	- 2%	- 2%	- 0%	+ 1%	- 1%	- 1%	- 9%	- 4%	6%	1,75
56	+ 4%	- 3%	- 1%	- 8%	- 1%	- 2%	- 1%	- 3%	- 6%	- 10%	- 5%	7%	2,03
57	- 0%	+ 0%	- 1%	- 1%	- 2%	- 1%	- 2%	- 3%	- 2%	- 1%	- 1%	1%	3,44
58	+ 78%	+ 3%	- 17%	+ 2%	+ 5%	+ 6%	- 4%	+ 13%	+ 22%	+ 7%	+ 2%	12%	0,44
d	+ 1%	- 0%	- 0%	- 0%	- 0%	+ 0%	- 0%	+ 0%	+ 0%	- 0%	- 0%	6%	
Sd	8%	3%	3%	4%	3%	4%	4%	5%	5%	4%			

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	31	32	33	34	35	36	37	38	39	40
1	-1,17	+0,41	-0,52	-0,05	+0,10	-0,63	+1,85	-0,93	+0,13	+0,45
2	-1,17	+0,41	-0,52	-0,05	+0,10	-0,63	+1,85	-0,93	+0,13	+0,45
3	-0,61	-1,85	-1,81	-2,29	-2,57	-2,29	-2,57	-2,16	-1,23	-1,38
4	-1,31	+1,56	+0,88	+1,40	+1,32	+0,94	+0,62	+0,56	-0,06	+1,42
5	-1,31	+1,56	+0,88	+1,40	+1,32	+0,94	+1,04	+0,56	-0,06	+1,42
6	+3,17	+0,72	+1,53	+1,74	+0,73	+2,59	+0,57	+1,20	+1,49	+0,74
7	-1,17	-0,21	-0,34	-0,72	-0,36	-0,24	-0,11	-1,04	-0,16	-0,51
8	-0,19	+0,28	-0,97	-0,08	-0,39	-0,79	-0,96	-1,09	-1,03	-0,63
9	+0,51	+0,72	-0,12	+0,31	+0,36	+0,39	+1,63	+1,15	-0,16	+0,53
10	+0,37	+0,34	-0,01	+0,03	-1,22	-0,18	-0,32	-0,08	+0,52	+0,23
11	-0,33	-0,69	+0,00	-0,18	-0,21	-0,53	+0,19	-0,45	-0,65	+0,14
12	+0,79	+0,55	+0,73	-0,40	+0,10	-0,66	-0,32	+0,67	+0,42	+0,18
13	+1,49	+0,77	+0,76	+0,84	+0,55	+0,52	+0,23	+0,72	-0,26	+0,38
14	+0,93	+0,33	+0,88	+0,03	+1,06	+0,39	+0,62	-0,02	+0,52	+0,52
15	+0,23	-0,88	-0,69	-1,21	-0,75	-0,85	-1,08	+0,24	+0,32	-0,82
16	-0,61	-1,26	-2,13	-0,57	-1,66	-1,11	-2,57	-2,11	-1,23	-2,25
17	+0,37	-0,92	-0,77	-0,89	-0,16	-1,30	-0,96	-1,68	-0,55	-1,41
18	+3,17	+0,94	+1,25	+1,33	+1,06	+1,64	+1,97	+1,95	+2,85	+0,20
19	+0,09	-0,11	+0,40	-0,05	-0,75	-0,56	-1,00	-1,41	-0,45	-0,81
20	+0,09	+0,98	+1,09	+1,03	+1,69	+1,57	+0,28	+1,63	-0,45	+0,68
21	-0,61	-1,01	-0,47	+0,20	-1,24	-0,85	-0,06	+0,19	+0,52	-0,42
22	+0,37	-0,33	+0,41	-0,07	-0,26	+0,33	+0,02	+0,40	-0,06	-0,21
23	-0,61	+0,60	+0,62	+0,27	-0,44	-0,15	+0,40	+0,51	+0,23	+0,52
24	-1,59	-0,39	-1,03	+0,03	+0,10	-0,15	-0,91	-0,50	-1,23	+0,08
25	-0,47	-0,14	+0,28	+0,24	-0,88	-1,42	-0,83	-0,98	+0,13	-0,35
26	+0,93	+1,03	+1,06	+0,80	+0,49	+1,67	+0,15	+0,78	+0,52	+0,41
27	-1,17	+6,81	+0,06	+0,63	-0,21	+0,49	-0,83	-0,56	-0,65	+0,35
28	+0,09	+0,25	-0,04	+0,05	+0,73	+0,14	+0,79	+0,08	+0,52	+0,35
29	+0,23	-0,45	-0,22	-0,18	-0,83	-0,53	+0,32	-0,29	+0,13	-0,20
30	-0,19	-0,01	+0,28	-0,01	+0,60	-0,34	+0,15	+0,35	+0,32	+0,74

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

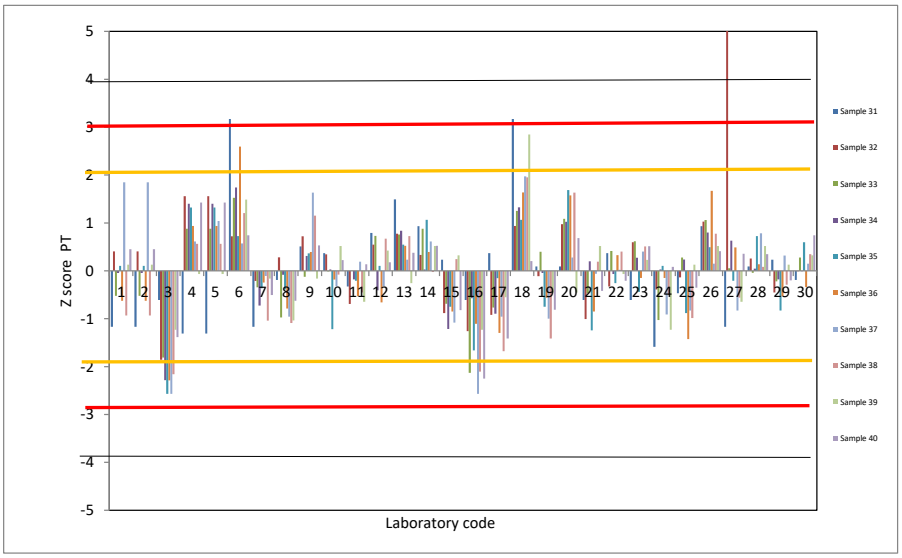


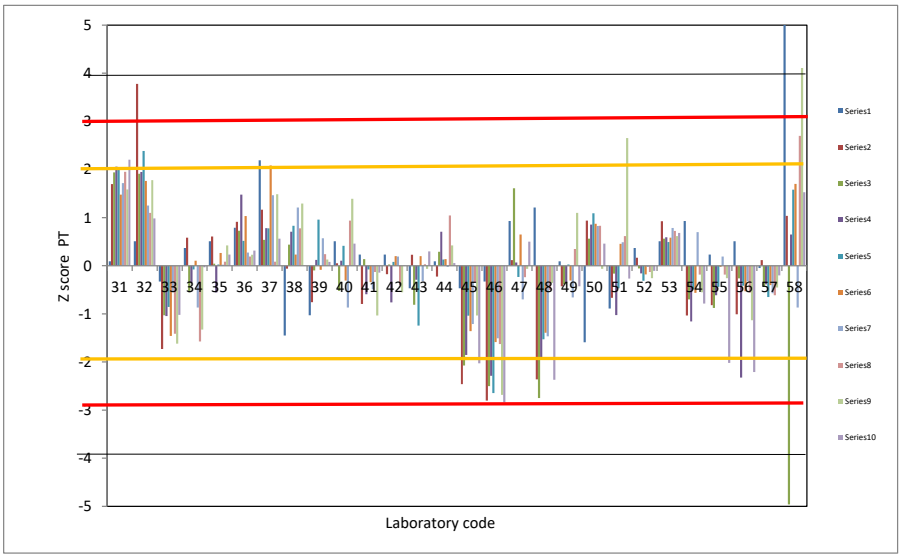
Table VI : **Zscore of the different laboratories for each sample.**

ZS calculated on the PT standard deviation

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	+0,09	+1,70	+1,94	+2,06	+2,05	+1,48	+1,72	+1,95	+1,59	+2,20
32	+0,51	+3,78	+1,91	+1,95	+2,39	+1,76	+1,25	+1,10	+1,78	+0,98
33	-0,33	-1,73	-1,03	-1,04	-0,86	-1,46	-0,53	-1,41	-1,62	-1,02
34	+0,37	+0,58	-0,55	-0,35	-0,08	+0,11	-0,87	-1,57	-1,33	-0,03
35	+0,51	+0,61	+0,04	-0,55	+0,03	+0,27	+0,02	+0,08	+0,42	+0,23
36	+0,79	+0,91	+0,73	+1,48	+0,52	+1,03	+0,28	+0,19	+0,23	+0,31
37	+2,19	+1,16	+0,54	+0,78	+0,78	+2,08	+1,46	+0,08	+1,49	+0,56
38	-1,45	-0,06	+0,44	+0,71	+0,83	+0,23	+1,21	+0,78	+1,29	+0,01
39	-1,03	-0,76	-0,10	+0,12	+0,96	-0,09	+0,57	+0,24	+0,13	+0,08
40	+0,51	+0,05	-0,52	+0,10	+0,42	-0,31	-0,87	+0,94	+1,39	+0,46
41	+0,23	-0,79	+0,14	-0,59	-0,08	-0,34	-0,49	-0,13	-1,03	-0,14
42	+0,23	-0,17	+0,03	-0,76	+0,08	+0,20	+0,19	-0,40	-0,55	-0,01
43	-0,47	+0,23	-0,81	-0,29	-1,24	+0,20	-0,32	+0,03	-0,06	+0,30
44	+0,09	-0,23	+0,29	+0,71	+0,13	+0,14	-0,02	+1,04	+0,42	+0,06
45	-0,47	-2,46	-2,07	-1,85	-1,04	-1,36	-1,21	-0,34	-1,03	-2,03
46	-0,33	-2,80	-2,50	-2,29	-2,65	-1,58	-1,51	-1,63	-2,68	-2,84
47	+0,93	+0,12	+1,61	+0,07	-0,23	+0,65	-0,70	-0,24	-0,06	+0,50
48	+1,21	-2,36	-2,75	-1,93	-1,53	-1,39	-1,46	-0,50	-0,36	-2,37
49	+0,09	-0,43	-0,38	-0,35	+0,03	-0,31	-0,66	+0,35	+1,10	-0,43
50	-1,59	+0,94	+0,56	+0,86	+1,09	+0,87	+0,83	+0,83	-0,06	+0,46
51	-0,89	-0,67	-0,16	-1,02	-0,47	+0,46	+0,49	+0,62	+2,65	-0,26
52	+0,37	+0,17	-0,05	-0,16	-0,31	-0,18	-0,02	-0,13	-0,26	-0,10
53	+0,51	+0,92	+0,56	+0,59	+0,49	+0,58	+0,79	+0,72	+0,61	+0,68
54	+0,93	-1,03	-0,70	-1,16	-0,49	-0,56	+0,70	-0,18	-0,55	-0,79
55	+0,23	-0,82	-0,88	-0,61	-0,44	-0,02	+0,19	-0,18	-0,26	-2,02
56	+0,51	-1,01	-0,26	-2,32	-0,41	-0,53	-0,32	-0,56	-1,13	-2,21
57	-0,05	+0,12	-0,43	-0,39	-0,65	-0,40	-0,57	-0,61	-0,45	-0,20
58	+9,75	+1,04	-4,96	+0,65	+1,58	+1,70	-0,87	+2,70	+4,11	+1,53

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



ZS FIX

Table VII : **Zscore of the different laboratories for each sample. ZS calculated on PT SAMPLES characterized with EU JRC CRM and the standard deviation of reproducibility of the method**

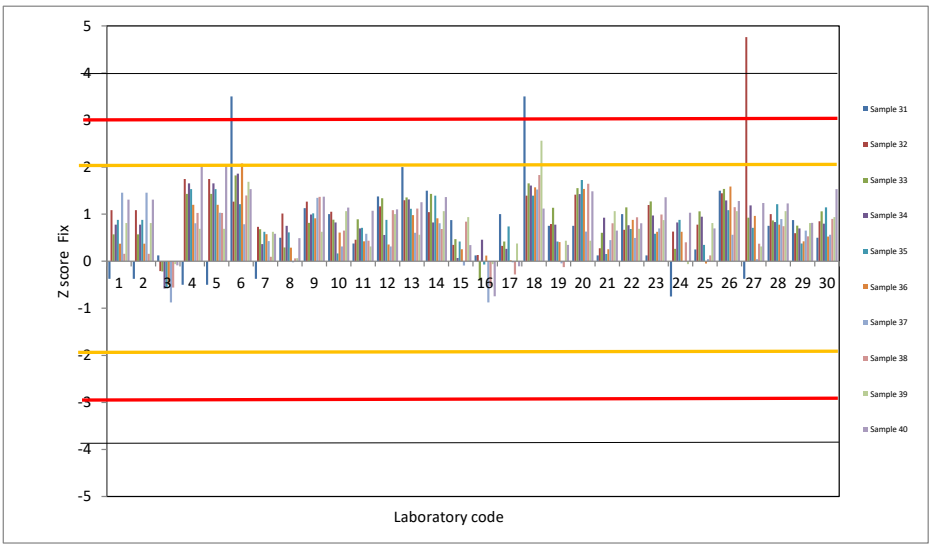
Sample / Lab code	31	32	33	34	35	36	37	38	39	40
1	-0,38	+1,09	+0,57	+0,78	+0,88	+0,37	+1,46	+0,16	+0,81	+1,31
2	-0,38	+1,09	+0,57	+0,78	+0,88	+0,37	+1,46	+0,16	+0,81	+1,31
3	+0,13	-0,21	-0,22	-0,58	-0,56	-0,51	-0,87	-0,56	-0,06	-0,09
4	-0,50	+1,75	+1,43	+1,66	+1,53	+1,20	+0,81	+1,02	+0,69	+2,05
5	-0,50	+1,75	+1,43	+1,66	+1,53	+1,20	+1,03	+1,02	+0,69	+2,05
6	+3,50	+1,27	+1,82	+1,86	+1,21	+2,08	+0,78	+1,40	+1,69	+1,53
7	-0,38	+0,73	+0,68	+0,37	+0,63	+0,57	+0,43	+0,09	+0,63	+0,58
8	+0,50	+1,01	+0,29	+0,75	+0,61	+0,29	-0,02	+0,06	+0,06	+0,49
9	+1,13	+1,27	+0,82	+0,99	+1,02	+0,91	+1,35	+1,37	+0,63	+1,37
10	+1,00	+1,05	+0,88	+0,82	+0,17	+0,61	+0,31	+0,65	+1,06	+1,14
11	+0,38	+0,46	+0,89	+0,70	+0,71	+0,42	+0,58	+0,43	+0,31	+1,07
12	+1,38	+1,17	+1,34	+0,56	+0,88	+0,35	+0,31	+1,09	+1,00	+1,10
13	+2,00	+1,30	+1,35	+1,31	+1,11	+0,98	+0,61	+1,12	+0,56	+1,25
14	+1,50	+1,04	+1,43	+0,82	+1,39	+0,91	+0,81	+0,68	+1,06	+1,36
15	+0,88	+0,35	+0,47	+0,07	+0,42	+0,25	-0,09	+0,84	+0,94	+0,34
16	+0,13	+0,13	-0,41	+0,46	-0,07	+0,12	-0,87	-0,53	-0,06	-0,75
17	+1,00	+0,33	+0,42	+0,26	+0,74	+0,02	-0,02	-0,28	+0,38	-0,11
18	+3,50	+1,39	+1,66	+1,61	+1,39	+1,57	+1,52	+1,83	+2,56	+1,12
19	+0,75	+0,79	+1,13	+0,78	+0,42	+0,41	-0,04	-0,12	+0,44	+0,35
20	+0,75	+1,41	+1,55	+1,43	+1,73	+1,54	+0,63	+1,65	+0,44	+1,49
21	+0,13	+0,28	+0,61	+0,92	+0,15	+0,25	+0,45	+0,81	+1,06	+0,65
22	+1,00	+0,67	+1,14	+0,76	+0,68	+0,88	+0,49	+0,93	+0,69	+0,81
23	+0,13	+1,20	+1,27	+0,97	+0,58	+0,63	+0,70	+0,99	+0,88	+1,36
24	-0,75	+0,63	+0,26	+0,82	+0,88	+0,63	+0,00	+0,40	-0,06	+1,03
25	+0,25	+0,78	+1,06	+0,95	+0,35	-0,05	+0,04	+0,12	+0,81	+0,70
26	+1,50	+1,44	+1,54	+1,29	+1,09	+1,59	+0,56	+1,15	+1,06	+1,28
27	-0,38	+4,76	+0,92	+1,19	+0,71	+0,96	+0,04	+0,37	+0,31	+1,24
28	+0,75	+1,00	+0,87	+0,83	+1,21	+0,78	+0,90	+0,75	+1,06	+1,23
29	+0,88	+0,59	+0,76	+0,70	+0,38	+0,42	+0,65	+0,53	+0,81	+0,81
30	+0,50	+0,85	+1,06	+0,80	+1,14	+0,52	+0,56	+0,90	+0,94	+1,53

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



ZS FIX

Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on PT SAMPLES characterized with EU JRC CRM and the standard deviation of reproducibility of the method

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	+0,75	+1,83	+2,08	+2,05	+1,92	+1,49	+1,39	+1,83	+1,75	+2,64
32	+1,13	+3,02	+2,06	+1,99	+2,10	+1,64	+1,14	+1,34	+1,88	+1,71
33	+0,38	-0,14	+0,26	+0,17	+0,36	-0,07	+0,20	-0,12	-0,31	+0,19
34	+1,00	+1,19	+0,55	+0,59	+0,78	+0,76	+0,02	-0,22	-0,13	+0,94
35	+1,13	+1,20	+0,92	+0,47	+0,84	+0,84	+0,49	+0,75	+1,00	+1,14
36	+1,38	+1,38	+1,34	+1,70	+1,10	+1,25	+0,63	+0,81	+0,88	+1,21
37	+2,63	+1,52	+1,22	+1,28	+1,24	+1,81	+1,26	+0,75	+1,69	+1,40
38	-0,63	+0,82	+1,16	+1,23	+1,27	+0,83	+1,12	+1,15	+1,56	+0,97
39	-0,25	+0,42	+0,83	+0,88	+1,34	+0,66	+0,78	+0,84	+0,81	+1,03
40	+1,13	+0,88	+0,57	+0,87	+1,04	+0,54	+0,02	+1,24	+1,63	+1,32
41	+0,88	+0,40	+0,97	+0,45	+0,78	+0,52	+0,22	+0,62	+0,06	+0,86
42	+0,88	+0,75	+0,91	+0,34	+0,86	+0,81	+0,58	+0,47	+0,38	+0,96
43	+0,25	+0,99	+0,39	+0,63	+0,15	+0,81	+0,31	+0,71	+0,69	+1,19
44	+0,75	+0,72	+1,07	+1,23	+0,89	+0,78	+0,47	+1,30	+1,00	+1,01
45	+0,25	-0,56	-0,38	-0,32	+0,26	-0,02	-0,16	+0,50	+0,06	-0,58
46	+0,38	-0,75	-0,64	-0,58	-0,60	-0,14	-0,31	-0,25	-1,00	-1,19
47	+1,50	+0,92	+1,87	+0,84	+0,70	+1,05	+0,11	+0,56	+0,69	+1,35
48	+1,75	-0,50	-0,79	-0,37	+0,00	-0,03	-0,29	+0,40	+0,50	-0,84
49	+0,75	+0,61	+0,66	+0,59	+0,84	+0,54	+0,13	+0,90	+1,44	+0,64
50	-0,75	+1,39	+1,24	+1,32	+1,41	+1,17	+0,92	+1,18	+0,69	+1,32
51	-0,13	+0,47	+0,79	+0,18	+0,57	+0,95	+0,74	+1,06	+2,44	+0,76
52	+1,00	+0,95	+0,86	+0,71	+0,65	+0,61	+0,47	+0,62	+0,56	+0,89
53	+1,13	+1,38	+1,24	+1,16	+1,09	+1,01	+0,90	+1,12	+1,13	+1,49
54	+1,50	+0,26	+0,46	+0,10	+0,56	+0,41	+0,85	+0,59	+0,38	+0,37
55	+0,88	+0,38	+0,35	+0,43	+0,58	+0,69	+0,58	+0,59	+0,56	-0,57
56	+1,13	+0,28	+0,73	-0,61	+0,60	+0,42	+0,31	+0,37	+0,00	-0,72
57	+0,63	+0,92	+0,63	+0,57	+0,47	+0,49	+0,18	+0,34	+0,44	+0,81
58	+9,38	+1,45	-2,14	+1,20	+1,67	+1,60	+0,02	+2,27	+3,38	+2,13

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

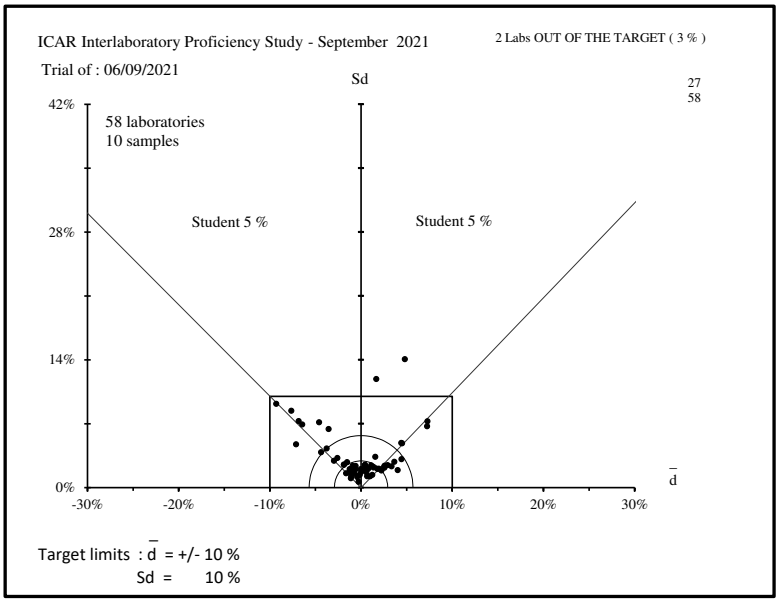


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

ICAR
PROFICIENCY TESTING SCHEME

September 2021

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 6th October 2021

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

Proficiency test accreditated ISO 17043

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

Nb	%	N°	d	Sd	D	Method
1	2	20	- 1%	0%	1%	B
2	4	18	- 1%	1%	2%	B
3	6	6	- 2%	1%	2%	B
4	9	21	- 0%	2%	2%	B
5	11	29	+ 0%	3%	3%	B
6	13	1	- 3%	2%	3%	B
7	15	2	- 3%	2%	3%	B
8	17	9	+ 4%	0%	4%	B
9	19	53	+ 1%	4%	4%	B
10	21	44	+ 1%	4%	4%	B
11	23	38	+ 4%	1%	4%	B
12	26	52	+ 2%	4%	5%	B
13	28	49	- 5%	2%	5%	B
14	30	42	+ 5%	1%	5%	B
15	32	4	- 4%	3%	5%	B
16	34	5	- 4%	3%	5%	B
17	36	30	- 4%	4%	5%	B
18	38	50	+ 3%	5%	6%	B
19	40	51	- 4%	4%	6%	B
20	43	54	- 5%	4%	6%	B
21	45	3	- 6%	2%	6%	B
22	47	19	- 1%	6%	6%	B
23	49	11	+ 0%	6%	6%	B
24	51	10	- 4%	5%	7%	A
25	53	12	+ 5%	5%	7%	B
26	55	15	+ 5%	5%	7%	B
27	57	45	+ 6%	6%	8%	C
28	60	37	+ 2%	8%	8%	B
29	62	35	+ 3%	8%	8%	B
30	64	55	- 3%	8%	8%	B
31	66	34	+ 6%	7%	9%	B
32	68	17	- 8%	6%	10%	B
33	70	33	+ 6%	9%	11%	B
34	72	43	- 4%	11%	11%	B
35	74	14	+ 8%	10%	13%	B
36	77	41	- 8%	11%	13%	B
37	79	16	- 6%	12%	14%	B
38	81	36	+ 11%	9%	14%	B
39	83	13	+ 5%	14%	15%	B
40	85	28	+ 15%	0%	15%	B
41	87	48	- 14%	11%	18%	B
42	89	56	- 2%	22%	22%	B
43	91	58	- 20%	9%	22%	A
44	94	40	+ 12%	21%	24%	B
45	96	32	+ 26%	7%	27%	B
46	98	47	+ 17%	23%	28%	A
47	100	57	- 30%	51%	59%	A
NC		7				B
NC		8				B
NC		22				B
NC		23				B
NC		24				B
NC		25				B
NC		26				B
NC		27				B
NC		31				B
NC		39				B
NC		46				B

A ISO 13366-1 | IDF 148-1
B ISO 13366-2 | IDF 148-2
C CCD Camera

(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 :

+/- 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 45 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}	12	2%
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	43	9%

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

Sample / Lab code	A	B	Sr	NL
1	0	32	16	4
2	0	32	16	4
3	8	33	17	4
4	12	19	11	4
5	12	19	11	4
6	12	36	19	4
7	**	**		
8	**	**		
9	3	3	2	4
10	7	23	12	4
11	9	2	5	4
12	7	12	7	4
13	31	14	17	4
14	32	14	17	4
15	11	15	9	4
16	2	24	12	4
17	10	27	14	4
18	3	34	17	4
19	9	14	8	4
20	4	3	3	4
21	2	7	4	4
22	**	**		
23	**	**		
24	**	**		
25	**	**		
26	**	**		
27	**	**		
28	10	25	13	4
29	24	2	12	4
30	6	11	6	4

Sample / Lab code	A	B	Sr	NL
31	**	**		
32	3	2	2	4
33	5	11	6	4
34	8	13	8	4
35	9	11	7	4
36	11	2	6	4
37	1	15	8	4
38	23	17	14	4
39	**	**		
40	1	4	2	4
41	10	18	10	4
42	4	6	4	4
43	3	1	2	4
44	1	14	7	4
45	1	43	22	4
46	**	**		
47	2	12	6	4
48	5	14	7	4
49	8	59	30	4
50	5	12	7	4
51	2	10	5	4
52	1	8	4	4
53	2	9	5	4
54	11	26	14	4
55	6	27	14	4
56	3	1	2	4
57	11	4	6	4
58	5	79 *	40	4
Sr	8	13		136
r	25	63		
NE	68	68		
L	33	63		

Sr : repeatability standard deviation of each laboratory limit : **Cf**

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	A	B
1	146	761
2	146	761
3	144	737
4	136	759
5	136	759
6	160	760
7		
8		
9	183	787
10	166	734
11	147	792
12	206	775
13	236	749
14	235	772
15	174	812
16	179	701
17	150	715
18	158	769
19	182	744
20	162	767
21	158	774
22		
23		
24		
25		
26		
27		
28	239	841
29	157	782
30	135	764

Sample / Lab code	A	B
31		
32	265	914
33	168	829
34	169	819
35	153	809
36	188	851
37	203	754
38	188	788
39		
40	291 *	757
41	162	696
42	184	797
43	183	717
44	155	786
45	212	779
46		
47	167	923
48	138	666
49	151	742
50	162	798
51	163	738
52	161	792
53	160	788
54	156	735
55	176	729
56	82	831
57	195	464 *
58	103	644
M	169	771
REF.	166	770
SD	33	53

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 45 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		58
Outlier Grubbs	40	57
sr	7	14
SR	34	51
sr %	4%	2%
SR %	20%	7%

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

Sample / Lab code	A	B	d	Sd_{lab}	t
1	- 12%	- 1%	- 3%	2%	2,50
2	- 12%	- 1%	- 3%	2%	2,50
3	- 13%	- 4%	- 6%	2%	4,91
4	- 18%	- 1%	- 4%	3%	2,17
5	- 18%	- 1%	- 4%	3%	2,17
6	- 4%	- 1%	- 2%	1%	4,17
7					
8					
9	+ 10%	+ 2%	+ 4%	0%	104,92
10	- 0%	- 5%	- 4%	5%	1,02
11	- 12%	+ 3%	+ 0%	6%	0,08
12	+ 24%	+ 1%	+ 5%	5%	1,32
13	+ 42%	- 3%	+ 5%	14%	0,55
14	+ 42%	+ 0%	+ 8%	10%	1,07
15	+ 5%	+ 5%	+ 5%	5%	1,45
16	+ 8%	- 9%	- 6%	12%	0,68
17	- 10%	- 7%	- 8%	6%	1,81
18	- 5%	- 0%	- 1%	1%	1,13
19	+ 9%	- 3%	- 1%	6%	0,24
20	- 2%	- 0%	- 1%	0%	8,34
21	- 5%	+ 1%	- 0%	2%	0,33
22					
23					
24					
25					
26					
27					
28	+ 44%	+ 9%	+ 15%	0%	66,15
29	- 5%	+ 2%	+ 0%	3%	0,17
30	- 19%	- 1%	- 4%	4%	1,48

Sample / Lab code	A	B	d	Sd_{lab}	t
31					
32	+ 59%	+ 19%	+ 26%	7%	5,31
33	+ 1%	+ 8%	+ 6%	9%	1,06
34	+ 2%	+ 6%	+ 4%	5%	1,10
35	- 8%	+ 5%	+ 2%	6%	0,60
36	+ 13%	+ 11%	+ 9%	7%	1,71
37	+ 22%	- 2%	+ 3%	6%	0,75
38	+ 13%	+ 2%	+ 5%	1%	9,90
39					
40	+ 75%	- 2%	+ 10%	15%	0,92
41	- 2%	- 10%	- 4%	11%	0,46
42	+ 11%	+ 4%	+ 5%	1%	5,45
43	+ 10%	- 7%	+ 0%	10%	0,03
44	- 7%	+ 2%	+ 4%	6%	0,84
45	+ 28%	+ 1%	+ 6%	6%	1,49
46					
47	+ 1%	+ 20%	+ 17%	23%	1,02
48	- 17%	- 13%	- 14%	11%	1,75
49	- 9%	- 4%	- 5%	2%	3,25
50	- 3%	+ 4%	+ 3%	5%	0,74
51	- 2%	- 4%	- 4%	4%	1,20
52	- 3%	+ 3%	+ 2%	4%	0,62
53	- 4%	+ 2%	+ 1%	4%	0,51
54	- 6%	- 4%	- 5%	4%	1,85
55	+ 6%	- 5%	- 3%	8%	0,60
56	- 51%	+ 8%	- 2%	22%	0,16
57	+ 17%	- 40%	- 30%	51%	0,83
58	- 38%	- 16%	- 20%	9%	3,02
d	+ 2%	+ 0%	- 1%	17%	
Sd	20%	7%			

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	-0,59	-0,16
2	-0,59	-0,16
3	-0,65	-0,63
4	-0,89	-0,21
5	-0,89	-0,21
6	-0,17	-0,18
7		
8		
9	+0,50	+0,32
10	-0,01	-0,68
11	-0,58	+0,43
12	+1,19	+0,10
13	+2,09	-0,39
14	+2,07	+0,05
15	+0,23	+0,80
16	+0,39	-1,30
17	-0,47	-1,05
18	-0,25	-0,01
19	+0,47	-0,49
20	-0,11	-0,06
21	-0,23	+0,08
22		
23		
24		
25		
26		
27		
28	+2,19	+1,35
29	-0,26	+0,24
30	-0,92	-0,11

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

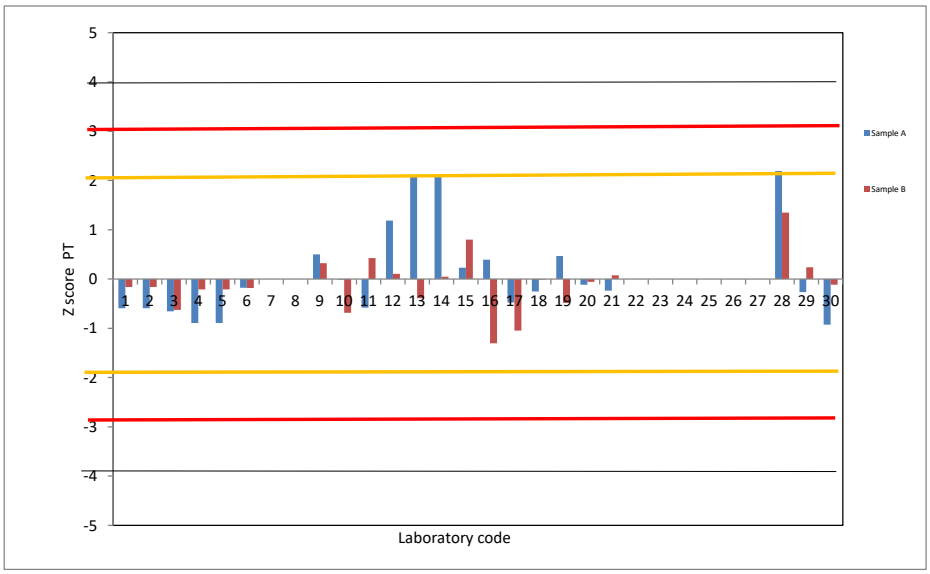


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	A	B
31		
32	+2,96	+2,75
33	+0,05	+1,12
34	+0,09	+0,93
35	-0,40	+0,74
36	+0,65	+1,55
37	+1,10	-0,30
38	+0,65	+0,34
39		
40	+3,74	-0,24
41	-0,11	-1,40
42	+0,54	+0,52
43	+0,50	-1,01
44	-0,34	+0,31
45	+1,37	+0,17
46		
47	+0,03	+2,92
48	-0,85	-1,97
49	-0,44	-0,53
50	-0,13	+0,54
51	-0,08	-0,60
52	-0,16	+0,43
53	-0,17	+0,34
54	-0,31	-0,66
55	+0,30	-0,78
56	-2,53	+1,16
57	+0,86	-5,81
58	-1,90	-2,40

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

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

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

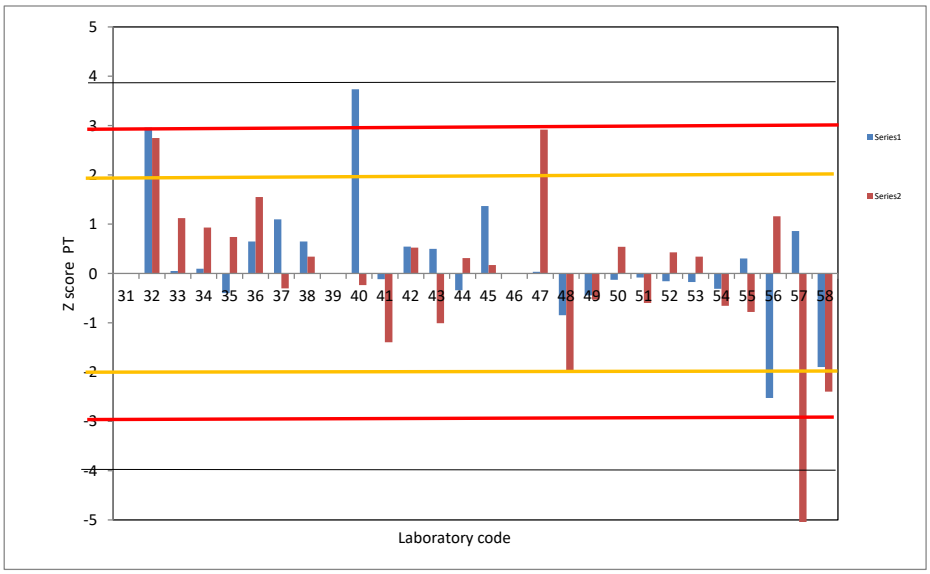


Table VII : **Zscore of the different laboratories for each sample. CRM and the standard deviation of reproducibility of the method**

Sample / Lab Code	A	B
1	-0,22	+0,33
2	-0,22	+0,33
3	-0,37	-0,21
4	-0,97	+0,28
5	-0,97	+0,28
6	+0,82	+0,31
7		
8		
9	+2,50	+0,90
10	+1,23	-0,28
11	-0,19	+1,02
12	+4,22	+0,65
13	+6,46	+0,07
14	+6,42	+0,58
15	+1,83	+1,46
16	+2,24	-1,00
17	+0,07	-0,70
18	+0,63	+0,51
19	+2,43	-0,04
20	+0,97	+0,46
21	+0,67	+0,61
22		
23		
24		
25		
26		
27		
28	+6,72	+2,10
29	+0,60	+0,80
30	-1,04	+0,39

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

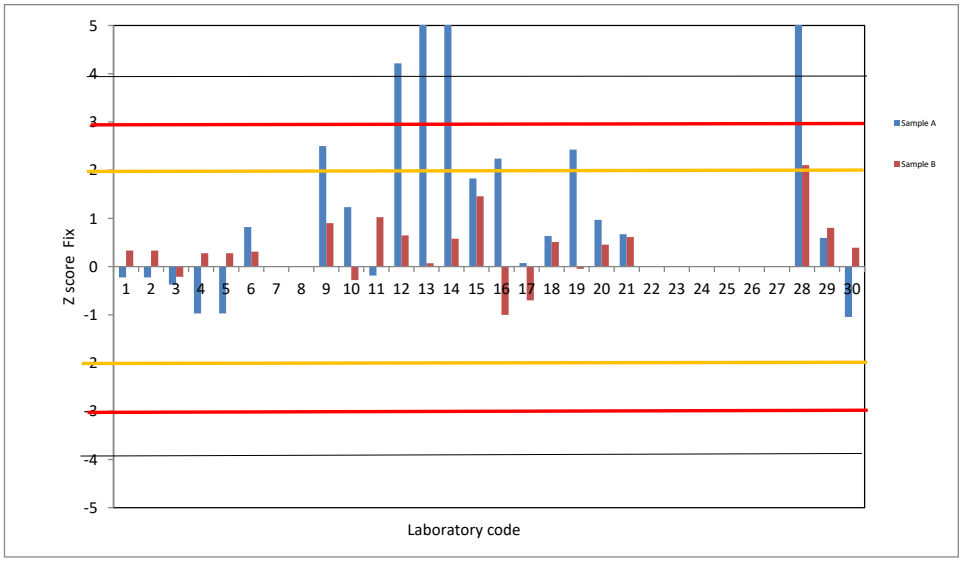


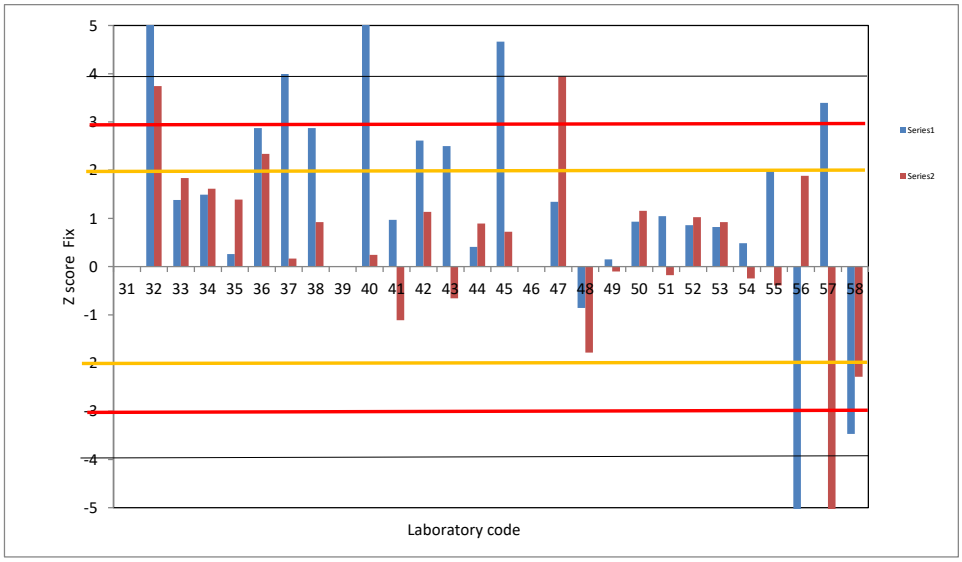
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on PT SAMPLES characterized with EU JRC CRM and the standard deviation of reproducibility of the method

Sample / Lab code	A	B
31		
32	+8,62	+3,74
33	+1,38	+1,84
34	+1,49	+1,61
35	+0,26	+1,39
36	+2,87	+2,34
37	+3,99	+0,17
38	+2,87	+0,92
39		
40	+10,56	+0,24
41	+0,97	-1,11
42	+2,61	+1,14
43	+2,50	-0,66
44	+0,41	+0,89
45	+4,66	+0,72
46		
47	+1,34	+3,94
48	-0,86	-1,78
49	+0,15	-0,10
50	+0,93	+1,16
51	+1,04	-0,18
52	+0,86	+1,02
53	+0,82	+0,92
54	+0,49	-0,24
55	+2,01	-0,39
56	-5,04	+1,88
57	+3,40	-6,28
58	-3,47	-2,28

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



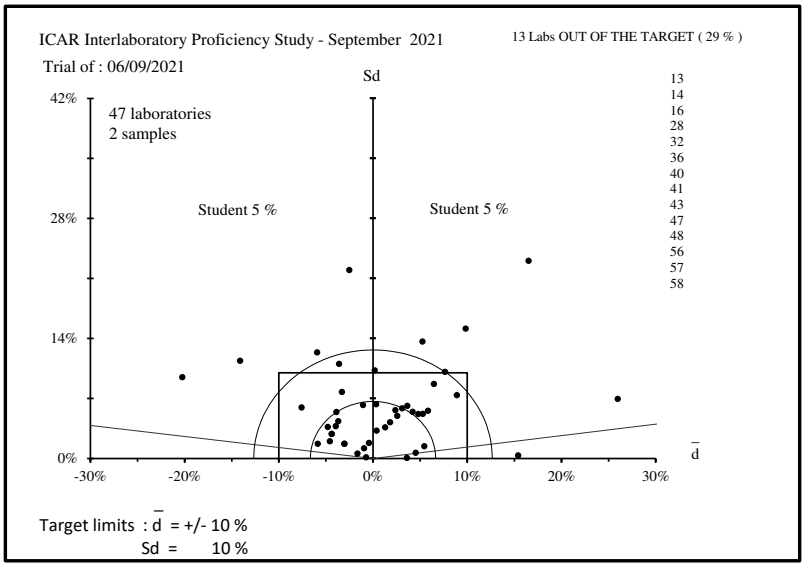


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**