THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

ICAR PROFICIENCY TEST - MARCH 2020

Raw cow milk

“Routine” Methods

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FRAME OF ACTIVITY :

ICAR MILK ANALYSES SUB-COMMITTEE (MA SC)

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Table of contents

1. Introduction

Dear Participant,

Thank you for participating in the ICAR Proficiency Test (PT) March 2020 !

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

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

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.

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

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

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

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

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

A) In table A you find your participation codes 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 reference method) are summarized. 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.

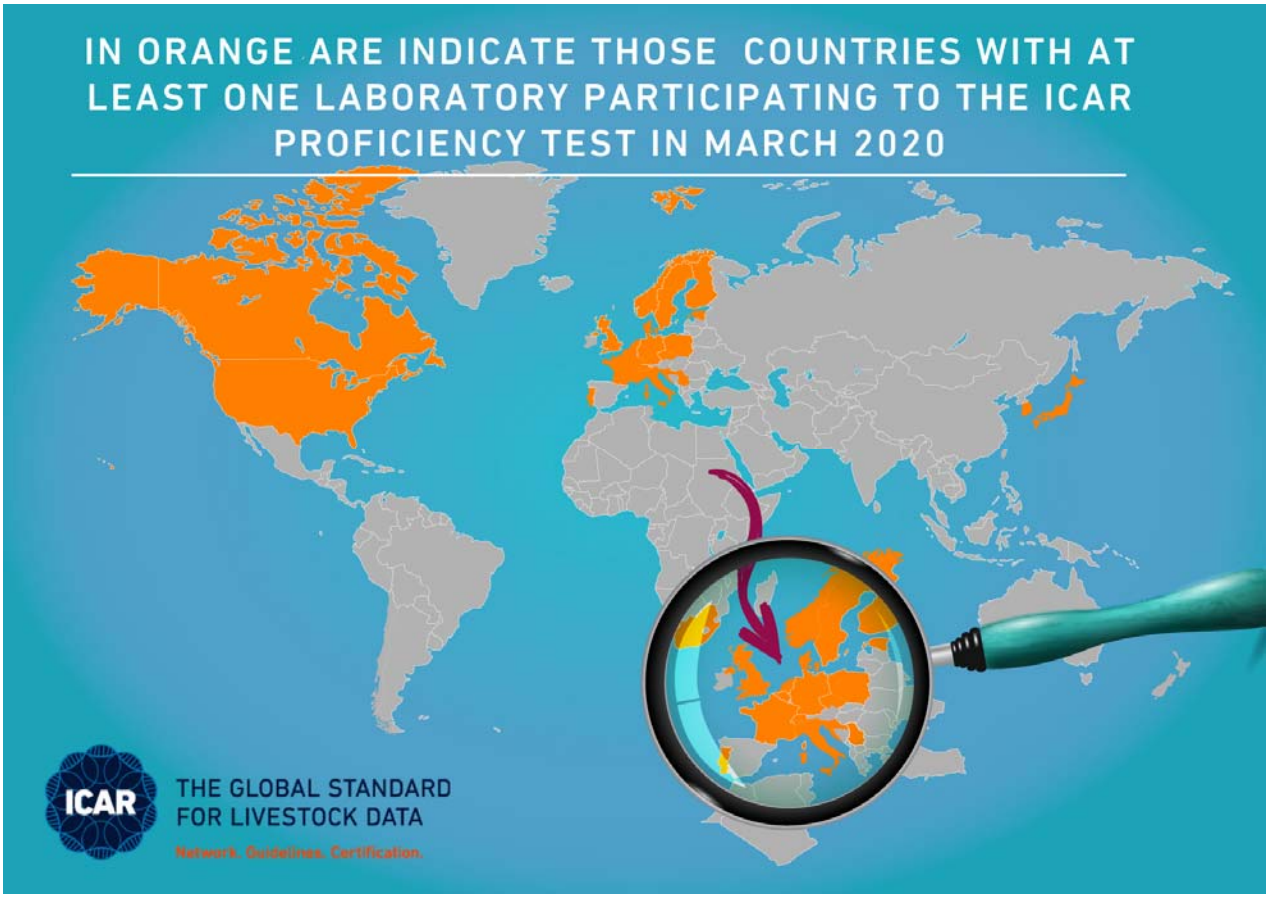
We are sure with your support and contribution it will grow to benefit all!

The list of all ICAR reference laboratories and those participated in ICAR PT 2019 with at least one parameter is reported below and upload on ICAR website (available here)

Table 1. Participating milk laboratories to the ICAR Proficiency Test (March 2020)

Country	Laboratory
Belgium	Comite du Lait ASBL
Belgium	Laboratory of milk analysis of the Valorisation of Agricultural Products, Department of Agricultural products of Walloon Agricultural Research Centre
Canada	Central Milk Testing Lab
Canada	Horizon Lab Ltd

Country	Laboratory
Canada	Lactanet Canada - Centre d'Expertise en Production Laitière du Québec
Canada	Pacific Milk Analysis
Croatia	Croatian Agency for Agriculture and Food, Central Laboratory for Milk Quality Control (Centar za kontrolu kvalitete stočarskih proizvoda)
Czech Republic	Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.
Czech Republic	MILCOM a.s Dairy Research Institute
Denmark	DNA Diagnostic
Denmark	Eurofins Milk Testing Denmark
Denmark	LVK
Estonia	Eesti Põllumajandusloomade Jõudluskontrolli AS, Milk Analysing Laboratory
Finland	Thermo Fisher Scientific
Finland	Valio Ltd, Regional laboratory
France	ACTALIA / ACTILAIT / CECALAIT
France	Labilait
Germany	Milchkontroll- und Rinderzuchtverband eG
Italy	Associazione Italiana Allevatori, Laboratorio Standard Latte (LSL-AIA)
Italy	Federazione Latterie Alto Adige Soc. Agr. Coop.
Japan	Japan Dairy Technical Association
Norway	Tine Ramelklaboratoriet Heimdal
Norway	Tine SA Mastittlaboratoriet i Molde
Poland	PFHBiPM Laboratorium w Bialymstoku zs.w jezewie Starym
Poland	PFHBiPM Laboratorium w Kobiernie
Poland	PFHBiPM Laboratorium w Parzniewie
Poland	PFHBiPM Region Oceny Bydgoszcz z/s w Minikowie
Portugal	Associação Interprofissional do Leite e Lacticínios
Portugal	Laboratorio Regional de Veterinaria (LRV)
Serbia	Laboratorija za ispitivanje kvaliteta mleka, Poljoprivredni fakultet Novi Sad
Slovak Republic	Plemenárske služby SR, š.p., Centrálne laboratórium rozboru mlieka (Milk Laboratory, Slovak Agricultural Research Centre)
Slovenia	KGZS Zavod Ptuj
Slovenia	University of Ljubljana, Biotechnical Faculty, Zootech. Dept., Laboratory for Dairying
South Africa	Merieux NutriScciences South Africa (Midrand)
South Africa	Mérieux NutriSciences South Africa
South Korea	Korea Animal Improvement Association
Sweden	DeLaval International AB
Sweden	Eurofins Milk Testing Sweden AB
Switzerland	Agroscope Institute for food Sciences IFS
The Netherlands	Qlip B.V.
United Kingdom	CIS
USA	CentralStar Cooperative WI Lab
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

ICAR THE GLOBAL STANDARD FOR LIVESTOCK DATA

Routine Methods
Laboratory participation codes and Performance analyses

ICAR PT RT0320

Laboratory Name	

A — Your participation Codes

	Fat$_{rout}$	Protein$_{rout}$	Lactose$_{rout}$	Urea$_{rout}$	BHB	PAG
Subscription	Yes	Yes	Yes	Yes	Yes	Yes
Participation Codes	2	2	2	2	1	
Are all the sample results received?	Yes	Yes	Yes	Yes	Yes	Yes

B — Data results received on time

Yes	21-03-2020

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

	Fat$_{rout}$	Protein*$_{rout}$	Lactose$_{rout}$	Urea$_{rout}$	BHB	PAG
	g/100g	nitrogen g/100g	g/100g	mg/dl	mmol/L	
	Yes	Yes	Yes	Yes	Yes	Yes

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

D — Ranking of your lab

	Fat$_{rout}$	Protein*$_{rout}$	Lactose$_{rout}$	Urea$_{rout}$	BHB	PAG
	g/100g	nitrogen g/100g	g/100g	mg/dl	mmol/L	
Code	2	2	2	2	1	
%	63	96	4	4	67	
d	-0.020	-0.060	0.009	0.458	-3.5	
Sd	0.046	0.039	0.007	0.996	1.1	
D	0.050	0.072	0.012	1.096	3.6	
Method	IR	IR	IR	IR	A	
Limits						
d	0,020	0,025	0,10	2,5	10	0,045
Sd	0,030	0,020	0,10	1,5	10	0,045

E — Outliers

	Fat$_{rout}$	Protein*$_{rout}$	Lactose$_{rout}$	Urea$_{rout}$	BHB	PAG
	g/100g	nitrogen g/100g	g/100g	mg/dl	mmol/L	
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	Protein	Lactose	Urea	BHB	PAG
	g/100g	nitrogen g/100g	g/100g	mg/dl	mmol/L	
Sample 1	0.020	0.030	0.032	0.000	0.010	
Sample 2	0.000	0.010	0.000	2	0.000	
Sample 3	0.010	0.020	0.011	0.000	0.010	
Sample 4	0.010	0.010	0.000	1	0.020	
Sample 5	0.010	0.010	0.000	1	0.000	
Sample 6	0.000	0.000	0.000	1	0.010	
Sample 7	0.000	0.000	0.000	1.900	0.010	
Sample 8	0.010	0.000	0.000	1	0.020	
Sample 9	0.020	0.010	0.011	0.000	0.010	
Sample 10	0.010	0.000	0.000	0.000	0.010	

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	Protein	Lactose	Urea	BHB	
	g/100g	g/100g	g/100g	mg/dl	mmol/L	
	ISO 1211 IDF 1D	ISO 8968 IDF 20	ISO 22662 IDF 198	ISO 14637 IDF 195	Indicative	
	0,043	0,038	0,06	1,52	0,03	

G

Your Z-Score PT

	Fat	Protein	Lactose	Urea	BHB
Sample 1	-0.7	-2.7	-0.0	0.1	-1.0
Sample 2	-1.5	-1.2	0.1	0.2	-1.0
Sample 3	0.3	-2.9	0.2	-0.2	-0.8
Sample 4	-1.5	-0.7	0.1	-0.1	-0.5
Sample 5	0.2	-2.2	0.1	0.1	-0.7
Sample 6	0.1	-2.4	0.1	0.1	-0.9
Sample 7	-0.1	-2.3	0.1	0.0	-1.2
Sample 8	-1.4	-0.4	0.2	-0.0	-0.6
Sample 9	1.7	-1.7	0.0	0.1	-0.9
Sample 10	-0.7	-1.0	0.3	0.1	-0.9

Your Z-Score Fix

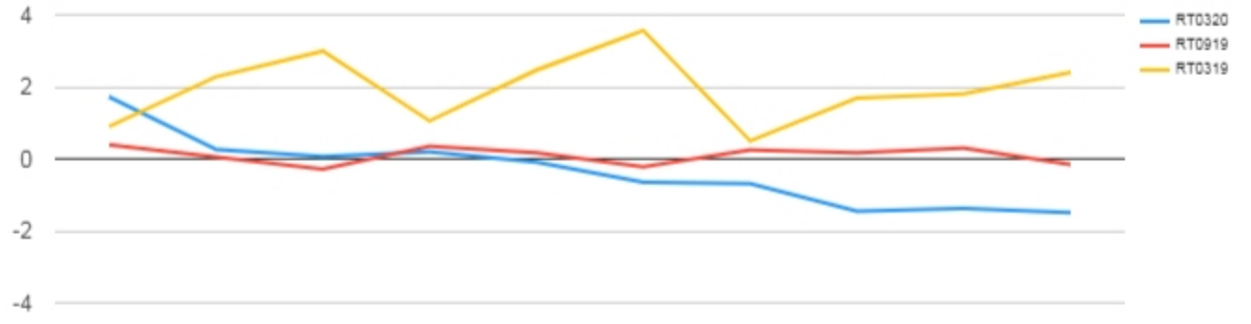
	Fat	Protein	Lactose	Urea	BHB
Sample 1	-0.6	-2.0	-0.1	0.6	
Sample 2	-1.8	-0.6	0.3	1.3	
Sample 3	0.3	-2.9	0.4	-0.8	
Sample 4	-1.7	-0.4	0.1	-0.2	
Sample 5	0.2	-2.2	0.2	0.3	
Sample 6	0.1	-2.7	0.2	0.4	
Sample 7	-0.1	-2.0	0.1	0.1	
Sample 8	-1.9	-0.3	0.4	-0.0	
Sample 9	1.7	-1.3	0.0	0.5	
Sample 10	-1.2	-0.6	0.5	0.2	

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

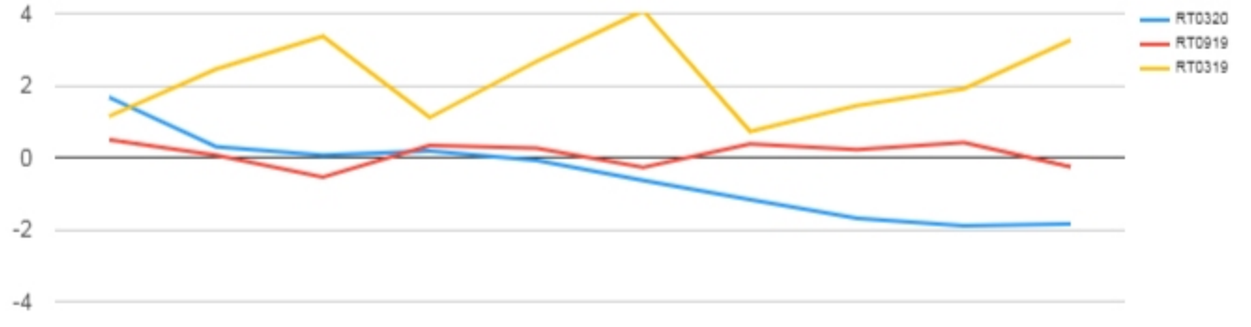
Z-Score<-3	-3<Z-Score<-2	-2<Z-Score<2	2<Z-Score<3	Z-Score>3
Poor	Moderate	Good	Moderate	Poor

ZSCORE-PT - fat_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-pt-fat_rout	-0.7	-1.5	0.3	-1.5	0.2	0.1	-0.1	-1.4	1.7	-0.7	0%	0%	100%
2	RT0919	Zscore-pt-fat_rout	-0.2	-0.2	0.1	0.2	0.3	-0.3	0.2	0.3	0.4	0.3	0%	0%	100%
3	RT0319	Zscore-pt-fat_rout	-0.3	-0.1	-0.0	-0.2	-0.1	-1.3	-0.1	-0.4	-0.1	-0.3	0%	0%	100%
4	RT0918	Zscore-pt-fat_rout	-0.1	0.2	0.3	-0.1	0.3	0.3	0.3	0.5	0.1	0.4	0%	0%	100%
3	RT0318	Zscore-pt-fat_rout	-1.0	-0.9	-0.7	-1.2	-1.0	-1.8	-1.3	-1.3	5.4	-0.7	0%	10%	90%
5	RT0917	Zscore-pt-fat_rout	0.7	0.7	0.0	0.4	0.2	-0.4	0.3	0.4	0.0	0.8	0%	0%	100%
4	RT0317	Zscore-pt-fat_rout	-0.7	-0.7	-0.7	-0.2	-0.8	-0.8	-0.8	-0.6	-0.3	-0.6	0%	0%	100%
5	RT0916	Zscore-pt-fat_rout	-0.1	-1.1	-0.5	-0.9	-2.3	-0.8	-1.3	-1.0	-2.4	-1.4	20%	0%	80%
4	RT0316	Zscore-pt-fat_rout	-0.4	-0.2	0.1	-0.1	0.4	1.1	0.6	0.1	0.3	0.9	0%	0%	100%

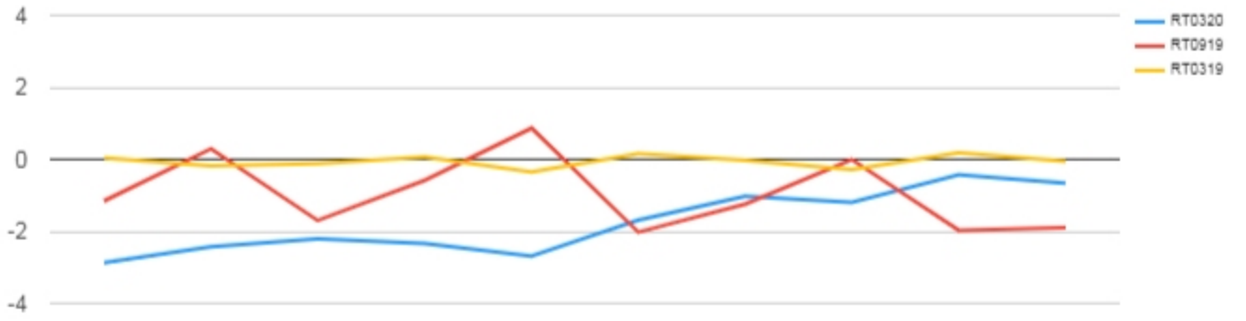
ZSCORE-FIX - fat_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-fix-fat_rout	-0.6	-1.8	0.3	-1.7	0.2	0.1	-0.1	-1.9	1.7	-1.2	0%	0%	100%
2	RT0919	Zscore-fix-fat_rout	-0.3	-0.3	0.1	0.2	0.3	-0.5	0.3	0.4	0.5	0.4	0%	0%	100%
3	RT0319	Zscore-fix-fat_rout	-0.3	-0.1	-0.0	-0.2	-0.1	-1.5	-0.1	-0.5	-0.1	-0.4	0%	0%	100%
4	RT0918	Zscore-fix-fat_rout	-0.1	0.2	0.4	-0.1	0.3	0.3	0.4	0.5	0.2	0.4	0%	0%	100%
3	RT0318	Zscore-fix-fat_rout	-1.1	-0.6	-0.6	-1.1	-1.2	-1.8	-1.3	-1.3	5.6	-1.0	0%	10%	90%

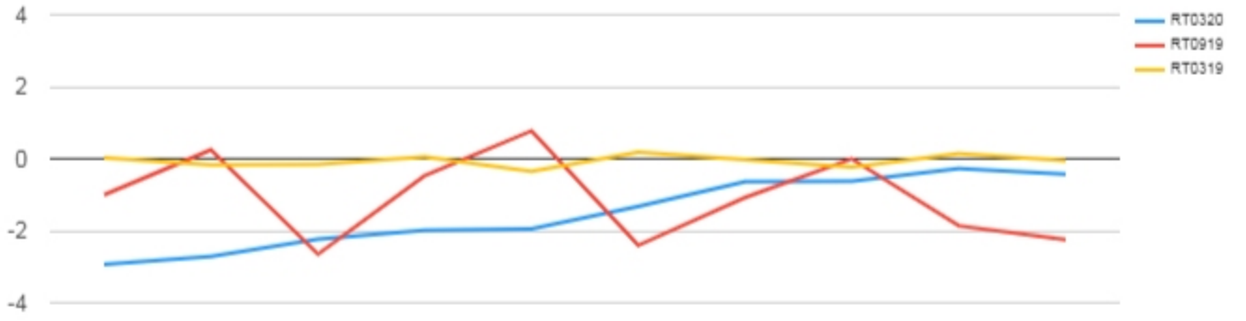
5	RT0917	Zscore-fix-fat_rout	0.8	0.5	0.0	0.3	0.2	-0.4	0.3	0.3	0.0	0.7	0%	0%	100%
4	RT0317	Zscore-fix-fat_rout	-0.9	-0.6	-0.5	-0.1	-0.6	-1.4	-0.7	-0.4	-0.3	-0.6	0%	0%	100%
5	RT0916	Zscore-fix-fat_rout	-0.1	-0.9	-0.4	-0.8	-2.0	-1.0	-1.1	-0.6	-2.1	-1.1	20%	0%	80%
4	RT0316	Zscore-fix-fat_rout	-0.3	-0.2	0.1	-0.0	0.3	0.4	0.5	0.1	0.3	0.6	0%	0%	100%

ZSCORE-PT - protein_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-pt-protein_rout	-2.7	-1.2	-2.9	-0.7	-2.2	-2.4	-2.3	-0.4	-1.7	-1.0	50%	0%	50%
2	RT0919	Zscore-pt-protein_rout	0.9	-0.0	-1.2	-1.9	-1.7	0.3	-0.6	-2.0	-2.0	-1.2	20%	0%	80%
3	RT0319	Zscore-pt-protein_rout	-0.2	-0.9	-1.9	-2.1	-1.6	-0.6	-1.2	-2.1	-1.8	-1.3	20%	0%	80%
4	RT0918	Zscore-pt-protein_rout	-0.6	-1.2	-1.3	-1.1	-1.7	-1.5	-1.4	-1.1	-0.9	-1.9	0%	0%	100%
3	RT0318	Zscore-pt-protein_rout	-1.0	-0.8	-1.1	-0.5	-0.4	-1.1	-0.8	-0.8	-0.5	-1.0	0%	0%	100%
5	RT0917	Zscore-pt-protein_rout	1.4	0.5	-0.5	-1.4	-1.7	0.9	0.4	-1.3	-0.5	-1.6	0%	0%	100%
4	RT0317	Zscore-pt-protein_rout	0.1	0.0	-0.7	-1.3	-1.7	0.0	-0.5	-1.1	-1.5	-0.7	0%	0%	100%
5	RT0916	Zscore-pt-protein_rout	-1.0	-0.8	-0.3	0.1	0.5	-0.5	-1.0	-0.9	-0.2	0.3	0%	0%	100%

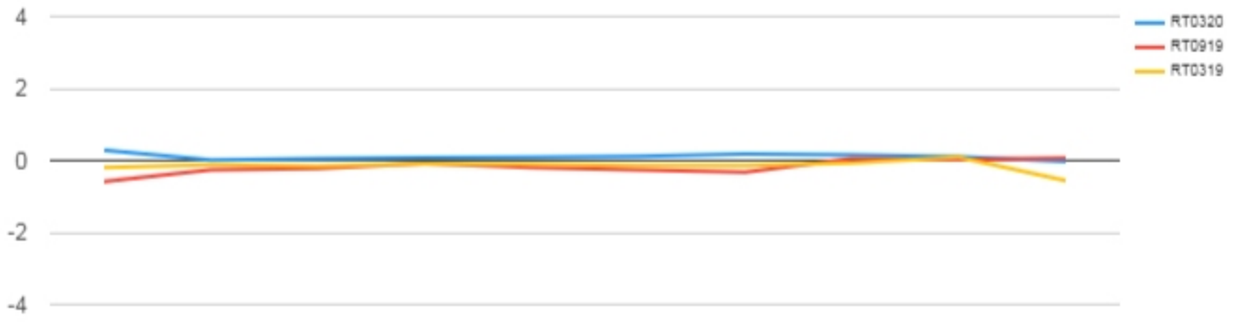
ZSCORE-FIX - protein_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-fix-protein_rout	-2.0	-0.6	-2.9	-0.4	-2.2	-2.7	-2.0	-0.3	-1.3	-0.6	50%	0%	50%
2	RT0919	Zscore-fix-protein_rout	0.8	-0.0	-1.0	-2.2	-2.7	0.2	-0.5	-1.9	-2.4	-1.1	30%	0%	70%
3	RT0319	Zscore-fix-protein_rout	-0.2	-0.7	-1.5	-2.0	-2.2	-0.5	-0.8	-1.6	-2.2	-1.1	30%	0%	70%
4	RT0918	Zscore-fix-protein_rout	-0.6	-1.3	-1.8	-0.8	-2.3	-1.1	-2.0	-1.6	-0.7	-1.6	20%	0%	80%
3	RT0318	Zscore-fix-protein_rout	-1.0	-0.6	-1.0	-0.5	-0.4	-1.0	-0.6	-0.6	-0.4	-0.8	0%	0%	100%

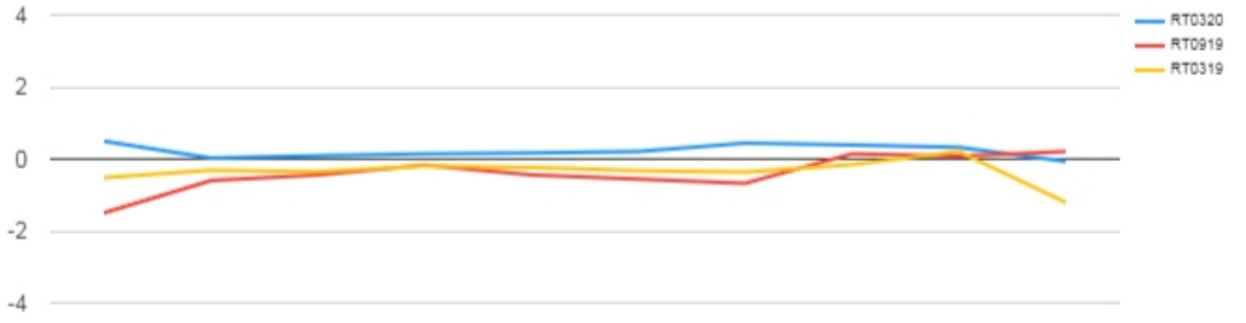
5	RT0917	Zscore-fix-protein_rout	0.9	0.3	-0.3	-1.1	-1.6	0.5	0.2	-0.9	-0.3	-1.5	0%	0%	100%
4	RT0317	Zscore-fix-protein_rout	0.1	0.0	-0.9	-1.6	-2.2	0.0	-0.5	-1.4	-1.9	-0.9	10%	0%	90%
5	RT0916	Zscore-fix-protein_rout	-2.0	-1.2	-0.5	0.1	0.8	-0.8	-1.5	-1.0	-0.2	0.4	10%	0%	90%

ZSCORE-PT - lactose_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-pt-lactose_rout	-0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.0	0.3	0%	0%	100%
3	RT0919	Zscore-pt-lactose_rout	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0%	0%	100%
3	RT0319	Zscore-pt-lactose_rout	-0.1	-0.2	-0.3	-0.3	-0.3	-0.3	-0.4	-0.3	-0.2	-0.4	0%	0%	100%
4	RT0918	Zscore-pt-lactose_rout	-0.6	-0.4	-0.3	-0.4	-0.3	-0.4	-0.4	-0.5	-0.5	-0.6	0%	0%	100%
4	RT0318	Zscore-pt-lactose_rout	0.2	0.1	-0.2	-0.2	-0.1	0.2	0.1	-0.1	-0.1	0.2	0%	0%	100%
5	RT0917	Zscore-pt-lactose_rout	-0.4	-0.5	-0.6	-0.4	-0.4	-0.4	-0.3	-0.4	2.1	-1.8	10%	0%	90%
5	RT0317	Zscore-pt-lactose_rout	-0.7	-0.7	-0.8	-0.7	-0.8	-0.9	-1.0	-0.9	-0.6	-0.9	0%	0%	100%
5	RT0916	Zscore-pt-lactose_rout	1.6	1.2	2.0	1.6	1.7	1.4	1.5	1.5	1.4	2.1	20%	0%	80%
4	RT0316	Zscore-pt-lactose_rout	0.3	0.5	0.5	-0.5	-0.1	-0.7	-0.9	0.8	-0.5	-1.1	0%	0%	100%

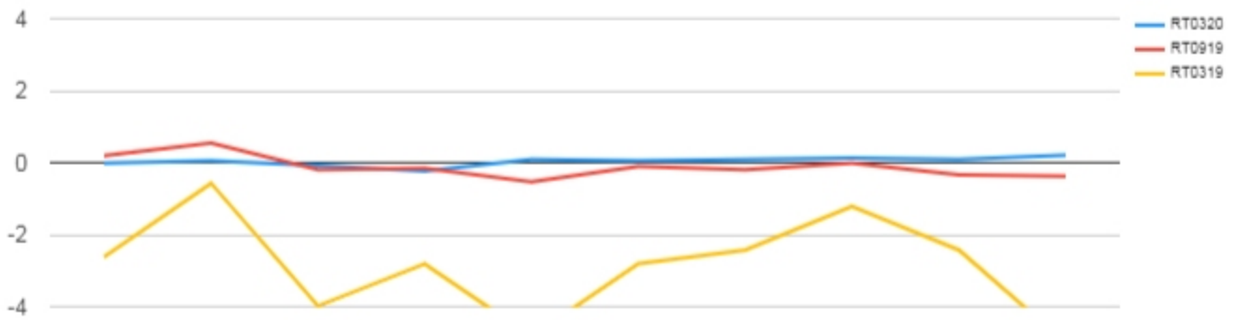
ZSCORE-FIX - lactose_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-fix-lactose_rout	-0.1	0.3	0.4	0.1	0.2	0.2	0.1	0.4	0.0	0.5	0%	0%	100%
3	RT0919	Zscore-fix-lactose_rout	0.7	1.0	0.7	0.6	0.5	0.6	0.4	0.2	0.1	0.4	0%	0%	100%
3	RT0319	Zscore-fix-lactose_rout	-0.2	-0.5	-0.7	-0.7	-0.7	-0.8	-0.8	-0.9	-0.6	-1.0	0%	0%	100%
4	RT0918	Zscore-fix-lactose_rout	-0.9	-0.6	-0.5	-0.4	-0.3	-0.5	-0.7	-0.6	-0.6	-0.7	0%	0%	100%

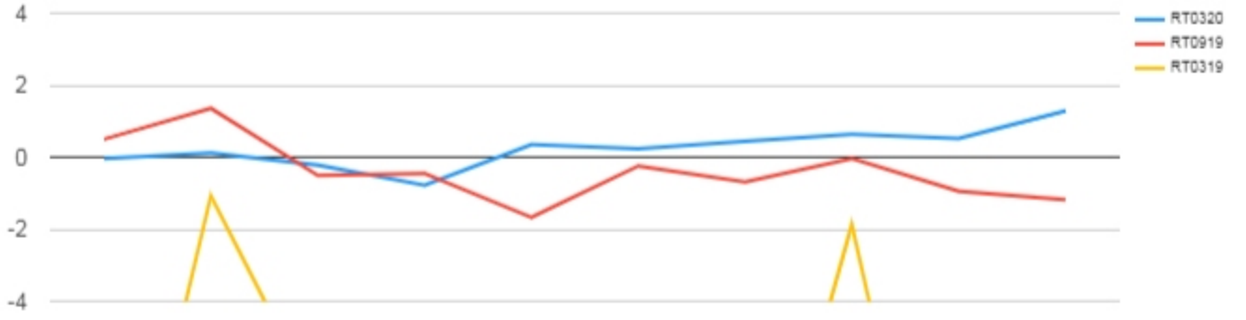
4	RT0318	Zscore-fix-lactose_rout	0.3	0.1	-0.5	-0.5	-0.1	0.3	0.3	-0.3	-0.2	0.3	0%	0%	100%
5	RT0917	Zscore-fix-lactose_rout	-0.8	-0.9	-1.0	-0.7	-0.6	-0.6	-0.5	-0.6	3.6	-4.1	0%	20%	80%
5	RT0317	Zscore-fix-lactose_rout	-1.5	-1.6	-1.5	-1.6	-1.6	-1.8	-2.1	-1.8	-1.3	-2.0	20%	0%	80%
5	RT0916	Zscore-fix-lactose_rout	4.8	6.2	4.1	4.2	4.7	4.2	4.1	5.1	5.2	4.2	0%	100%	0%
4	RT0316	Zscore-fix-lactose_rout	0.8	1.7	1.7	-1.5	-0.2	-1.4	-1.4	3.3	-1.8	-2.0	10%	10%	80%

ZSCORE-PT - urea_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-pt-urea_rout	0.1	0.2	-0.2	-0.1	0.1	0.1	0.0	-0.0	0.1	0.1	0%	0%	100%
1	RT0919	Zscore-pt-urea_rout	1.3	1.6	1.5	1.8	1.8	1.4	1.6	1.6	2.0	1.2	10%	0%	90%
2	RT0319	Zscore-pt-urea_rout	-1.2	-5.0	-2.8	-4.0	-4.8	-2.4	-0.6	-2.6	-2.4	-2.8	50%	30%	20%
3	RT0918	Zscore-pt-urea_rout	-0.1	0.1	-0.1	-0.1	-0.3	0.0	-0.2	-0.1	0.2	-0.1	0%	0%	100%
2	RT0318	Zscore-pt-urea_rout	-0.7	-1.0	-0.6	-1.1	-0.8	-1.0	-1.2	-1.2	-0.9	-0.2	0%	0%	100%
3	RT0917	Zscore-pt-urea_rout	-0.7	-1.1	-1.1	-0.7	-0.7	-0.6	-1.1	-0.4	-1.0	-0.6	0%	0%	100%
3	RT0317	Zscore-pt-urea_rout	0.4	-0.7	1.8	1.8	1.4	1.8	1.5	1.1	1.2	1.1	0%	0%	100%
4	RT0916	Zscore-pt-urea_rout	-0.2	-0.3	-0.3	-0.5	-0.3	-0.4	-0.4	-0.7	-0.4	-0.6	0%	0%	100%
1	RT0316	Zscore-pt-urea_rout	0.1	-0.3	-0.4	-0.9	-1.1	-1.3	-0.5	-0.5	-1.6	-1.3	0%	0%	100%

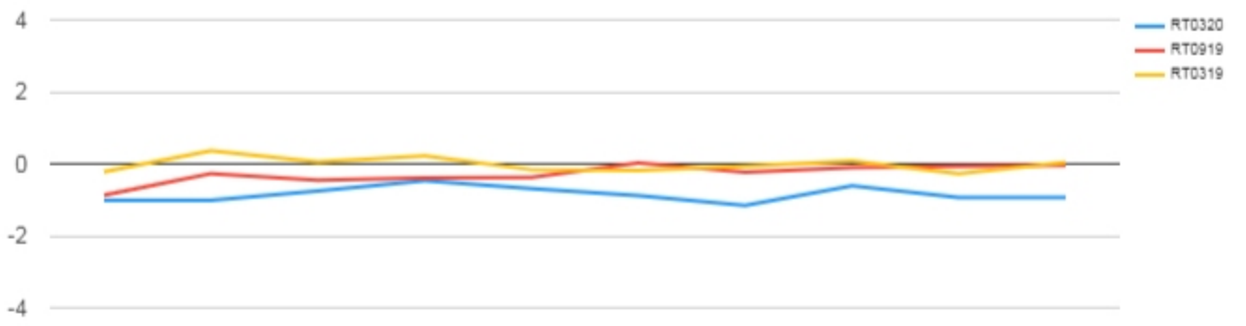
ZSCORE-FIX - urea_rout



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
2	RT0320	Zscore-fix-urea_rout	0.6	1.3	-0.8	-0.2	0.3	0.4	0.1	-0.0	0.5	0.2	0%	0%	100%
1	RT0919	Zscore-fix-urea_rout	3.6	5.0	4.2	4.7	5.7	5.0	4.0	4.2	5.5	2.8	10%	90%	0%
2	RT0319	Zscore-fix-urea_rout	-1.9	-12.9	-5.2	-6.9	-8.9	-12.5	-1.1	-13.6	-15.0	-17.5	0%	80%	20%
3	RT0918	Zscore-fix-urea_rout	-0.6	0.5	-0.7	-0.3	-1.7	0.1	-1.1	-0.5	1.6	-0.7	0%	0%	100%
2	RT0318	Zscore-fix-	-0.7	-1.7	-1.0	-1.8	-1.2	-1.2	-1.8	-1.1	-1.5	-0.3	0%	0%	100%

		urea_rout												
3	RT0917	Zscore-fix-urea_rout	-1.7	-2.6	-2.6	-1.9	-1.8	-1.6	-3.0	-1.2	-2.3	-1.8	30%	0%	70%
3	RT0317	Zscore-fix-urea_rout	0.7	-1.1	2.9	2.9	3.0	3.1	2.6	2.1	2.3	2.1	60%	10%	30%
4	RT0916	Zscore-fix-urea_rout	-0.4	-0.5	-0.7	-0.7	-0.6	-0.8	-0.7	-1.2	-0.7	-1.0	0%	0%	100%
1	RT0316	Zscore-fix-urea_rout	0.2	-0.3	-0.6	-1.4	-1.4	-2.2	-0.8	-2.2	-2.7	-2.2	40%	0%	60%

ZSCORE-PT - bhb



ICAR	Round	Type	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10	Yellow	Red	White
1	RT0320	Zscore-pt-bhb	-1.0	-1.0	-0.8	-0.5	-0.7	-0.9	-1.2	-0.6	-0.9	-0.9	0%	0%	100%
1	RT0919	Zscore-pt-bhb	-0.9	-0.3	-0.4	-0.4	-0.4	0.0	-0.2	-0.1	-0.1	-0.0	0%	0%	100%
1	RT0319	Zscore-pt-bhb	-0.2	0.4	0.1	0.2	-0.2	-0.2	-0.1	0.1	-0.3	0.0	0%	0%	100%
1	RT0918	Zscore-pt-bhb	-0.2	0.4	-0.3	0.3	-0.2	-0.2	-0.3	-0.2	0.0	-0.4	0%	0%	100%
1	RT0318	Zscore-pt-bhb	-0.8	1.5	-0.3	-0.2	-1.3	1.2	-0.1	-1.3	-1.2	-1.5	0%	0%	100%
1	RT0917	Zscore-pt-bhb	2.1	1.7	1.6	0.0	1.1	0.8	1.9	0.3	1.2	0.6	10%	0%	90%
2	RT0317	Zscore-pt-bhb	1.3	-1.6	-0.9	1.1	-1.5	-0.7	-1.6	2.3	-1.9	-1.6	10%	0%	90%

PAG					
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Method	IDEXX	IDEXX	IDEXX	IDEXX	IDEXX
Presence of PAG	Yes	No	Yes	Yes	No
Strains	Pregnant - Artificial insemination	Non pregnant	Pregnant - Artificial insemination	Pregnant - Artificial insemination	Non pregnant
Date	06-01-2020		19-09-2019	17-12-2019	
Laboratory accuracy	True	True	True	True	True

ICAR

PROFICIENCY TESTING SCHEME

March 2020

Raw Milk

Determination of FAT CONTENT

Routine method

Sending date of statistical treatment : 8th April 2020

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

ACTALIA CECALAIT

cofrac COMPARAISONS INTERLABORATOIRES

ACCRÉDITATION N° 1-2473 PORTÉE DISPONIBLE SUR WWW.COFRAC.FR

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

Nb	%	N°	d	Sd	D	Method
1	4	14	- 0,002	0,011	0,011	IR
2	7	5	+ 0,008	0,010	0,013	IR
3	11	6	+ 0,000	0,014	0,014	IR
4	15	16	- 0,016	0,007	0,017	IR
5	19	3	+ 0,016	0,009	0,018	IR
6	22	15	- 0,020	0,005	0,020	IR
7	26	12	+ 0,017	0,015	0,023	IR
8	30	13	+ 0,023	0,004	0,023	IR
9	33	19	+ 0,019	0,022	0,029	IR
10	37	1	+ 0,012	0,029	0,031	IR
11	41	20	+ 0,014	0,028	0,031	IR
12	44	25	+ 0,029	0,033	0,044	IR
13	48	21	+ 0,042	0,018	0,045	IR
14	52	24	+ 0,018	0,042	0,045	IR
15	56	18	- 0,038	0,025	0,046	IR
16	59	8	- 0,028	0,042	0,050	IR
17	63	2	- 0,020	0,046	0,050	IR
18	67	9	- 0,031	0,045	0,054	IR
19	70	17	+ 0,057	0,009	0,057	IR
20	74	27	+ 0,052	0,032	0,061	IR
21	78	22	+ 0,017	0,065	0,067	IR
22	81	4	- 0,071	0,011	0,072	IR
23	85	26	- 0,069	0,028	0,075	IR
24	89	23	- 0,051	0,074	0,090	IR
25	93	11	- 0,077	0,068	0,103	IR
26	96	10	+ 0,008	0,129	0,129	IR
27	100	7	- 0,041	0,196	0,201	IR

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 27 sets of results send by 27 laboratories using routine method ISO 9622|IDF 141, 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}	0,006
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,047

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	0,020	0,010	0,000	0,000	0,000	0,010	0,020	0,010	0,010	0,008	20
2	0,020	0,000	0,010	0,010	0,010	0,000	0,000	0,010	0,020	0,010	0,008	20
3	0,020	0,030	0,020	0,020	0,020 *	0,020	0,020	0,030	0,020	0,030 *	0,017	20
4	0,000	0,010	0,000	0,000	0,000	0,010	0,000	0,010	0,010	0,000	0,004	20
5	0,000	0,000	0,000	0,010	0,000	0,000	0,010	0,000	0,000	0,000	0,003	20
6	0,000	0,016	0,010	0,010	0,000	0,000	0,000	0,000	0,009	0,000	0,005	20
7	0,010	0,030	0,020	0,000	0,010	0,010	0,000	0,020	0,000	0,990 *	0,222	20
8	0,010	0,010	0,010	0,000	0,000	0,020	0,000	0,000	0,000	0,010	0,006	20
9	0,000	0,000	0,000	0,010	0,000	0,010	0,000	0,010	0,000	0,010	0,004	20
10	0,020	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,010	0,000	0,005	20
11	0,020	0,010	0,010	0,010	0,000	0,000	0,010	0,010	0,020	0,020	0,009	20
12	0,000	0,000	0,000	0,000	0,010	0,000	0,020	0,000	0,010	0,000	0,005	20
13	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,000	0,000	0,000	0,002	20
14	0,000	0,000	0,010	0,010	0,000	0,000	0,010	0,000	0,000	0,000	0,00	20
15	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,010	0,000	0,000	0,003	20
16	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,000	0,010	0,000	0,003	20
17	0,000	0,010	0,010	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,004	20
18	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
19	0,010	0,010	0,010	0,000	0,000	0,000	0,000	0,010	0,010	0,000	0,005	20
20	0,010	0,010	0,000	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,007	20
21	0,005	0,005	0,001	0,004	0,005	0,003	0,005	0,003	0,000	0,004	0,003	20
22	0,000	0,010	0,010	0,010	0,000	0,000	0,010	0,000	0,000	0,010	0,005	20
23	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
24	0,010	0,000	0,000	0,000	0,010	0,000	0,000	0,010	0,000	0,000	0,004	20
25	0,000	0,010	0,010	0,010	0,010	0,010	0,020	0,010	0,000	0,000	0,007	20
26	0,000	0,010	0,010	0,020	0,010	0,000	0,000	0,020	0,000	0,020	0,009	20
27	0,000	0,000	0,010	0,000	0,010	0,000	0,000	0,010	0,000	0,010	0,004	20
Sr	0,006	0,01	0,006	0,006	0,005	0,005	0,006	0,008	0,006	0,135		540
NE	54	54	54	54	54	54	54	54	54	54		
L	0,026	0,033	0,026	0,024	0,016	0,020	0,026	0,031	0,025	0,023		

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

NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

r : limit of repeatability, absolute difference betwen two replicates=0,040 according ISO 9622|IDF 141

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	3,570	4,700	2,265	4,110	2,920	2,470	3,165	4,540	1,635	3,885
2	3,540	4,650	2,235	4,045	2,905	2,440	3,150	4,495	1,640	3,835
3	3,590	4,735	2,240	4,130	2,920	2,460	3,170	4,565	1,580	3,905
4	3,500	4,635	2,160	4,030	2,830	2,375	3,080	4,485	1,515	3,820
5	3,570	4,720	2,240	4,115	2,910	2,450	3,165	4,560	1,590	3,900
6	3,567	4,731	2,230	4,096	2,877	2,449	3,158	4,558	1,599	3,878
7	3,565	4,765	2,250	4,130	2,915	2,465	3,180	4,620	1,550	3,285 *
8	3,535	4,725	2,215	4,090	2,880	2,440	3,140	4,570	1,520	3,745
9	3,530	4,710	2,220	4,065	2,880	2,445	3,150	4,565	1,530	3,735
10	3,620	4,910 *	2,095	4,240	2,870	2,340	3,160	4,730	1,365 *	3,890
11	3,480	4,745	2,095	4,095	2,800	2,340	3,085	4,595	1,410 *	3,720
12	3,590	4,740	2,250	4,140	2,925	2,460	3,130	4,580	1,595	3,900
13	3,590	4,740	2,240	4,140	2,920	2,460	3,175	4,590	1,600	3,910
14	3,560	4,710	2,225	4,105	2,900	2,440	3,145	4,550	1,590	3,890
15	3,540	4,700	2,200	4,090	2,880	2,420	3,135	4,545	1,560	3,870
16	3,550	4,700	2,200	4,100	2,880	2,420	3,135	4,550	1,565	3,880
17	3,630	4,775	2,285	4,165	2,960	2,500	3,200	4,610	1,640	3,940
18	3,520	4,650	2,210	4,060	2,870	2,420	3,110	4,500	1,580	3,840
19	3,595	4,755	2,225	4,150	2,920	2,440	3,170	4,595	1,545	3,930
20	3,585	4,765	2,210	4,145	2,915	2,435	3,175	4,595	1,525	3,925
21	3,601	4,735	2,279	4,145	2,949	2,492	3,201	4,584	1,634	3,938
22	3,560	4,695	2,415 *	4,095	2,900	2,470	3,155	4,550	1,600	3,865
23	3,550	4,720	1,970 *	4,090	2,870	2,370	3,120	4,540	1,520	3,880
24	3,565	4,740	2,210	4,120	2,895	2,430	3,160	4,635	1,560	4,000
25	3,610	4,795	2,215	4,165	2,915	2,435	3,170	4,635	1,550	3,940
26	3,500	4,595	2,185	4,050	2,835	2,380	3,090	4,470	1,540	3,800
27	3,630	4,820	2,245	4,190	2,935	2,460	3,200	4,655	1,570	3,955
M	3,565	4,721	2,217	4,115	2,895	2,434	3,151	4,573	1,573	3,876
REF.	3,565	4,724	2,223	4,113	2,898	2,437	3,153	4,571	1,573	3,882
SD	0,039	0,049	0,046	0,047	0,036	0,041	0,033	0,055	0,039	0,068

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 27 laboratories using the Routine method ISO 9622 | IDF 141 , after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran					3					3; 7
Outlier Grubbs		10	22;23						10;11	7
sr	0,006	0,008	0,006	0,006	0,004	0,005	0,006	0,008	0,005	0,006
SR	0,039	0,050	0,046	0,047	0,036	0,041	0,033	0,056	0,039	0,069

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	d	Sd_{lab}	t
1	+ 0,005	- 0,024	+ 0,042	- 0,003	+ 0,022	+ 0,033	+ 0,012	- 0,031	+ 0,062	+ 0,003	+ 0,012	0,029	1,34
2	- 0,025	- 0,074	+ 0,012	- 0,068	+ 0,007	+ 0,003	- 0,003	- 0,076	+ 0,067	- 0,047	- 0,020	0,046	1,40
3	+ 0,025	+ 0,011	+ 0,017	+ 0,017	+ 0,022	+ 0,023	+ 0,017	- 0,006	+ 0,007	+ 0,023	+ 0,016	0,009	5,27
4	- 0,065	- 0,089	- 0,063	- 0,083	- 0,068	- 0,062	- 0,073	- 0,086	- 0,058	- 0,062	- 0,071	0,011	20,29
5	+ 0,005	- 0,004	+ 0,017	+ 0,002	+ 0,012	+ 0,013	+ 0,012	- 0,011	+ 0,017	+ 0,018	+ 0,008	0,010	2,65
6	+ 0,002	+ 0,007	+ 0,007	- 0,017	- 0,021	+ 0,012	+ 0,005	- 0,013	+ 0,026	- 0,004	+ 0,000	0,014	0,09
7	- 0,000	+ 0,041	+ 0,027	+ 0,017	+ 0,017	+ 0,028	+ 0,027	+ 0,049	- 0,023	- 0,597	- 0,041	0,196	0,67
8	- 0,030	+ 0,001	- 0,008	- 0,023	- 0,018	+ 0,003	- 0,013	- 0,001	- 0,053	- 0,137	- 0,028	0,042	2,11
9	- 0,035	- 0,014	- 0,003	- 0,048	- 0,018	+ 0,008	- 0,003	- 0,006	- 0,043	- 0,147	- 0,031	0,045	2,18
10	+ 0,055	+ 0,186	- 0,128	+ 0,127	- 0,028	- 0,097	+ 0,007	+ 0,159	- 0,208	+ 0,008	+ 0,008	0,129	0,20
11	- 0,085	+ 0,021	- 0,128	- 0,018	- 0,098	- 0,097	- 0,068	+ 0,024	- 0,163	- 0,162	- 0,077	0,068	3,60
12	+ 0,025	+ 0,016	+ 0,027	+ 0,027	+ 0,027	+ 0,023	- 0,023	+ 0,009	+ 0,022	+ 0,018	+ 0,017	0,015	3,56
13	+ 0,025	+ 0,016	+ 0,017	+ 0,027	+ 0,022	+ 0,023	+ 0,022	+ 0,019	+ 0,027	+ 0,028	+ 0,023	0,004	17,02
14	- 0,005	- 0,0	+ 0,002	- 0,008	+ 0,002	+ 0,003	- 0,008	- 0,021	+ 0,017	+ 0,008	- 0,00	0,011	0,69
15	- 0,025	- 0,024	- 0,023	- 0,023	- 0,018	- 0,017	- 0,018	- 0,026	- 0,013	- 0,012	- 0,020	0,005	12,65
16	- 0,015	- 0,024	- 0,023	- 0,013	- 0,018	- 0,017	- 0,018	- 0,021	- 0,008	- 0,002	- 0,016	0,007	7,39
17	+ 0,065	+ 0,051	+ 0,062	+ 0,052	+ 0,062	+ 0,063	+ 0,047	+ 0,039	+ 0,067	+ 0,058	+ 0,057	0,009	20,23
18	- 0,045	- 0,074	- 0,013	- 0,053	- 0,028	- 0,017	- 0,043	- 0,071	+ 0,007	- 0,042	- 0,038	0,025	4,71
19	+ 0,030	+ 0,031	+ 0,002	+ 0,037	+ 0,022	+ 0,003	+ 0,017	+ 0,024	- 0,028	+ 0,048	+ 0,019	0,022	2,70
20	+ 0,020	+ 0,041	- 0,013	+ 0,032	+ 0,017	- 0,002	+ 0,022	+ 0,024	- 0,048	+ 0,043	+ 0,014	0,028	1,54
21	+ 0,035	+ 0,011	+ 0,055	+ 0,032	+ 0,051	+ 0,054	+ 0,047	+ 0,013	+ 0,061	+ 0,056	+ 0,042	0,018	7,25
22	- 0,005	- 0,029	+ 0,192	- 0,018	+ 0,002	+ 0,033	+ 0,002	- 0,021	+ 0,027	- 0,017	+ 0,017	0,065	0,81
23	- 0,015	- 0,004	- 0,253	- 0,023	- 0,028	- 0,067	- 0,033	- 0,031	- 0,053	- 0,002	- 0,051	0,074	2,18
24	- 0,000	+ 0,016	- 0,013	+ 0,007	- 0,003	- 0,007	+ 0,007	+ 0,064	- 0,013	+ 0,118	+ 0,018	0,042	1,33
25	+ 0,045	+ 0,071	- 0,008	+ 0,052	+ 0,017	- 0,002	+ 0,017	+ 0,064	- 0,023	+ 0,058	+ 0,029	0,033	2,76
26	- 0,065	- 0,129	- 0,038	- 0,063	- 0,063	- 0,057	- 0,063	- 0,101	- 0,033	- 0,082	- 0,069	0,028	7,74
27	+ 0,065	+ 0,096	+ 0,022	+ 0,077	+ 0,037	+ 0,023	+ 0,047	+ 0,084	- 0,003	+ 0,073	+ 0,052	0,032	5,12
d	- 0,001	- 0,003	- 0,006	+ 0,002	- 0,003	- 0,004	- 0,002	+ 0,002	+ 0,000	- 0,006	- 0,005	0,064	
Sd	0,039	0,049	0,046	0,047	0,036	0,041	0,033	0,055	0,039	0,068	0,046		

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 9622|IDF 141 : Precision of the method : Sr = 0.014 g / 100 g
SR = 0,04 g / 100 g

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

ZS calculated on the PT standard deviation

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,12	-0,48	+0,91	-0,06	+0,61	+0,80	+0,37	-0,56	+1,59	+0,05
2	-0,65	-1,49	+0,26	-1,45	+0,20	+0,07	-0,09	-1,37	+1,72	-0,69
3	+0,63	+0,23	+0,37	+0,37	+0,61	+0,56	+0,52	-0,10	+0,17	+0,34
4	-1,68	-1,80	-1,37	-1,78	-1,89	-1,52	-2,23	-1,55	-1,50	-0,91
5	+0,12	-0,08	+0,37	+0,05	+0,34	+0,31	+0,37	-0,19	+0,43	+0,27
6	+0,04	+0,15	+0,16	-0,36	-0,58	+0,29	+0,15	-0,23	+0,66	-0,06
7	-0,01	+0,84	+0,59	+0,37	+0,48	+0,68	+0,82	+0,89	-0,60	-8,76
8	-0,78	+0,03	-0,18	-0,49	-0,50	+0,07	-0,40	-0,01	-1,37	-2,01
9	-0,91	-0,28	-0,07	-1,02	-0,50	+0,19	-0,09	-0,10	-1,11	-2,15
10	+1,40	+3,77	-2,79	+2,74	-0,78	-2,38	+0,21	+2,88	-5,35	+0,12
11	-2,19	+0,43	-2,79	-0,38	-2,72	-2,38	-2,08	+0,44	-4,20	-2,37
12	+0,63	+0,33	+0,59	+0,59	+0,75	+0,56	-0,70	+0,17	+0,56	+0,27
13	+0,63	+0,33	+0,37	+0,59	+0,61	+0,56	+0,67	+0,35	+0,69	+0,41
14	-0,14	-0	+0,04	-0,16	+0,06	+0,07	-0,25	-0,37	+0,43	+0,12
15	-0,65	-0,48	-0,50	-0,49	-0,50	-0,42	-0,55	-0,47	-0,34	-0,17
16	-0,40	-0,48	-0,50	-0,27	-0,50	-0,42	-0,55	-0,37	-0,21	-0,03
17	+1,65	+1,04	+1,35	+1,13	+1,73	+1,54	+1,44	+0,71	+1,72	+0,85
18	-1,17	-1,49	-0,28	-1,13	-0,78	-0,42	-1,32	-1,28	+0,17	-0,61
19	+0,76	+0,63	+0,04	+0,80	+0,61	+0,07	+0,52	+0,44	-0,73	+0,71
20	+0,50	+0,84	-0,28	+0,70	+0,48	-0,05	+0,67	+0,44	-1,24	+0,63
21	+0,90	+0,22	+1,21	+0,70	+1,41	+1,33	+1,45	+0,23	+1,56	+0,83
22	-0,14	-0,58	+4,18	-0,38	+0,06	+0,80	+0,06	-0,37	+0,69	-0,25
23	-0,40	-0,08	-5,51	-0,49	-0,78	-1,64	-1,01	-0,56	-1,37	-0,03
24	-0,01	+0,33	-0,28	+0,16	-0,08	-0,18	+0,21	+1,16	-0,34	+1,74
25	+1,14	+1,44	-0,18	+1,13	+0,48	-0,05	+0,52	+1,16	-0,60	+0,85
26	-1,68	-2,61	-0,83	-1,35	-1,75	-1,40	-1,93	-1,82	-0,85	-1,20
27	+1,65	+1,95	+0,48	+1,66	+1,03	+0,56	+1,44	+1,53	-0,08	+1,08

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

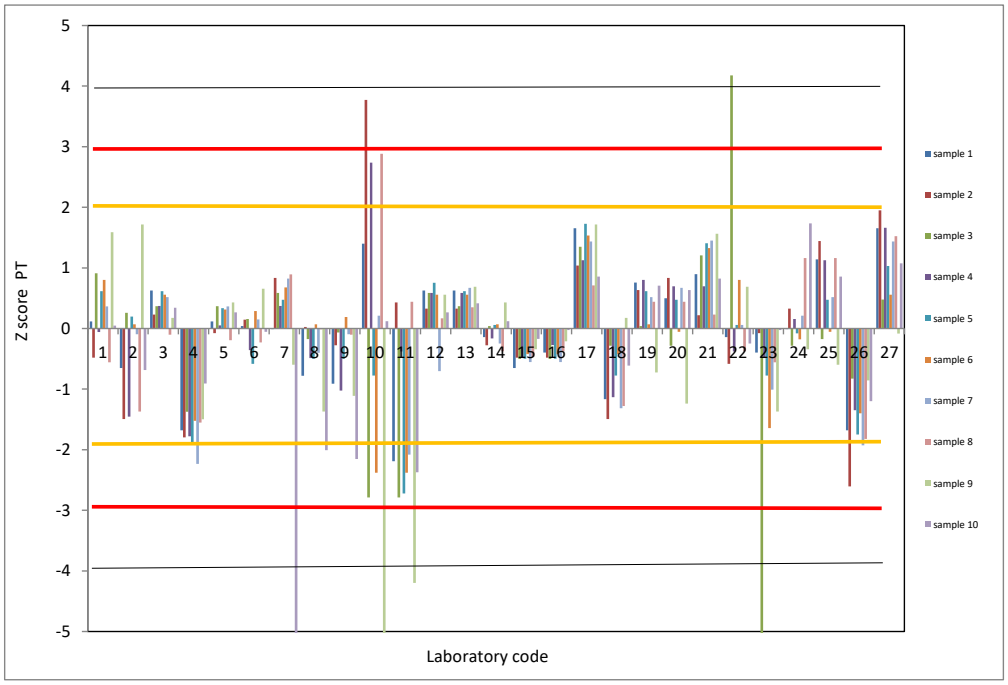


Table VII : Zscore of the different laboratories for each sample.

ZS calculated on the standard deviation of reproducibility of the method

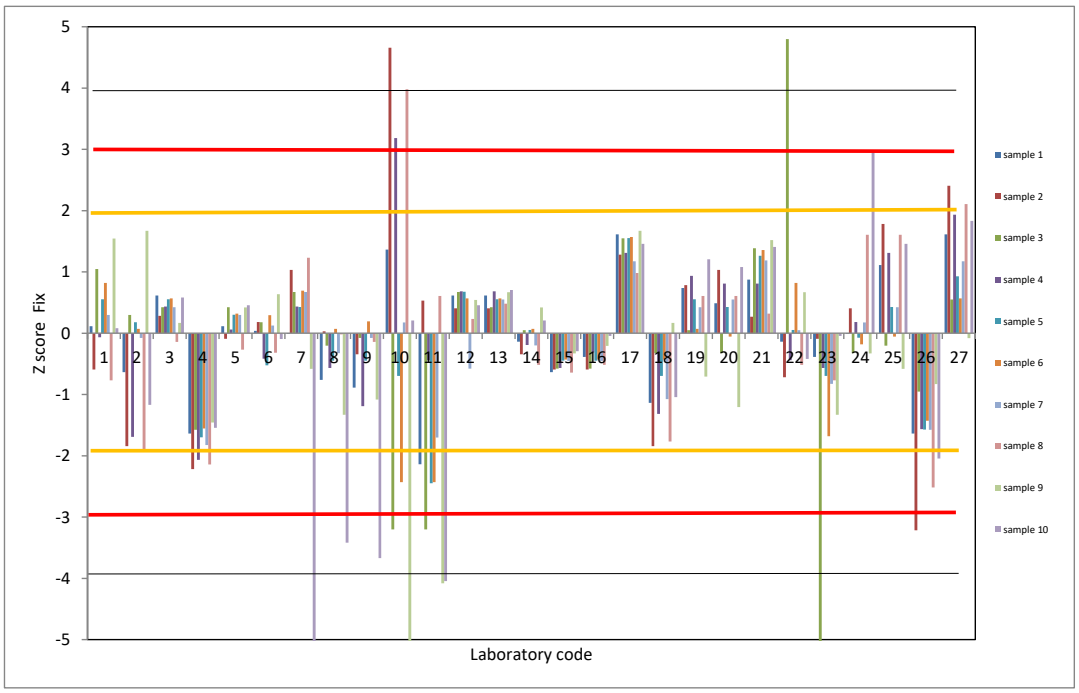
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	+0,11	-0,59	+1,05	-0,07	+0,55	+0,82	+0,30	-0,77	+1,54	+0,08
2	-0,64	-1,84	+0,30	-1,69	+0,18	+0,07	-0,08	-1,89	+1,67	-1,17
3	+0,61	+0,28	+0,42	+0,43	+0,55	+0,57	+0,42	-0,14	+0,17	+0,58
4	-1,64	-2,22	-1,58	-2,07	-1,70	-1,56	-1,83	-2,14	-1,46	-1,54
5	+0,11	-0,09	+0,42	+0,06	+0,30	+0,32	+0,30	-0,27	+0,42	+0,46
6	+0,04	+0,18	+0,18	-0,42	-0,52	+0,29	+0,12	-0,32	+0,64	-0,09
7	-0,01	+1,03	+0,67	+0,43	+0,43	+0,69	+0,67	+1,23	-0,58	-14,92
8	-0,76	+0,03	-0,20	-0,57	-0,45	+0,07	-0,33	-0,02	-1,33	-3,42
9	-0,89	-0,34	-0,08	-1,19	-0,45	+0,19	-0,08	-0,14	-1,08	-3,67
10	+1,36	+4,66	-3,20	+3,18	-0,70	-2,43	+0,17	+3,98	-5,21	+0,21
11	-2,14	+0,53	-3,20	-0,44	-2,45	-2,43	-1,70	+0,61	-4,08	-4,04
12	+0,61	+0,41	+0,67	+0,68	+0,68	+0,57	-0,58	+0,23	+0,54	+0,46
13	+0,61	+0,41	+0,42	+0,68	+0,55	+0,57	+0,55	+0,48	+0,67	+0,71
14	-0,14	-0	+0,05	-0,19	+0,05	+0,07	-0,20	-0,52	+0,42	+0,21
15	-0,64	-0,59	-0,58	-0,57	-0,45	-0,43	-0,45	-0,64	-0,33	-0,29
16	-0,39	-0,59	-0,58	-0,32	-0,45	-0,43	-0,45	-0,52	-0,21	-0,04
17	+1,61	+1,28	+1,55	+1,31	+1,55	+1,57	+1,17	+0,98	+1,67	+1,46
18	-1,14	-1,84	-0,33	-1,32	-0,70	-0,43	-1,08	-1,77	+0,17	-1,04
19	+0,74	+0,78	+0,05	+0,93	+0,55	+0,07	+0,42	+0,61	-0,71	+1,21
20	+0,49	+1,03	-0,33	+0,81	+0,43	-0,06	+0,55	+0,61	-1,21	+1,08
21	+0,88	+0,27	+1,39	+0,81	+1,26	+1,36	+1,19	+0,32	+1,52	+1,41
22	-0,14	-0,72	+4,80	-0,44	+0,05	+0,82	+0,05	-0,52	+0,67	-0,42
23	-0,39	-0,09	-6,33	-0,57	-0,70	-1,68	-0,83	-0,77	-1,33	-0,04
24	-0,01	+0,41	-0,33	+0,18	-0,07	-0,18	+0,17	+1,61	-0,33	+2,96
25	+1,11	+1,78	-0,20	+1,31	+0,43	-0,06	+0,42	+1,61	-0,58	+1,46
26	-1,64	-3,22	-0,95	-1,57	-1,57	-1,43	-1,58	-2,52	-0,83	-2,04
27	+1,61	+2,41	+0,55	+1,93	+0,93	+0,57	+1,17	+2,11	-0,08	+1,83

This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR=0,040

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

Figure 3 :

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



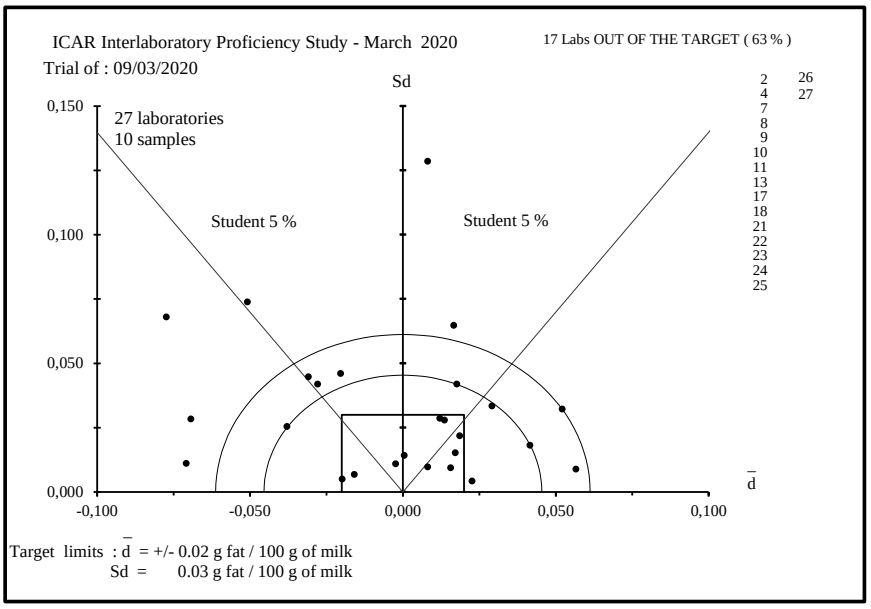


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST

RAW MILK
Fat Routine method
March 2020

Name	City	Country
Alip	Sousada	Portugal
Cattle Information Service (CIS)	Teiford	England
Comité du Lait ASBL	Battice	Belgium
Croatian Agricultural Agency, Central Laboratory for Milk Quality Control	Krizevci	Croatia
Eastern Lab services	Medina	USA
Eurofins Steins Laboratory A/B	Jönköping	Sweden
Eurofins Steins Laboratory A/S	Vejen	Denmark
Federazione Latterie Alto Adige Soc. Agr. Coop.	Bolzano	Italy
KGZS Zavod Ptuj	Ptuj	Slovenia
Korea Animal Improvement Association 111ho Green Dairy tech. Univ. HanKyong	Anseong	Korea
Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.	Brno	Czech Republi
Laboratorio Standard Latte	Maccarese (Roma)	Italy
Merieux NutriScience J Bay	Cape Town	South Africa
Merieux Nutriscience South Africa (Midrand)	Midrand	South Africa
Milchkontroll und Rinderzuchtverband eG	Güstrow	Germany
Plemenárske sluzby SR s.p.	Zilina	Slovakia
Tine Ramelklaboratoriet Heimdal	Heimdal	NO
Univ. of Ljubljana dept. of Animal Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia
Valio Oy, Regional laboratory	Seinajoki	Finland

ICAR

PROFICIENCY TESTING SCHEME

March 2020

Raw Milk

Determination of CRUDE PROTEIN CONTENT

Routine method

Sending date of statistical treatment : 8th April 2020

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

ACTALIA CECALAIT

cofrac COMPARAISONS INTERLABORATOIRES

ACCRÉDITATION N° 1-2473 PORTÉE DISPONIBLE SUR WWW.COFRAC.FR

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

Nb	%	N°	d	Sd	D	Method
1	4	20	+ 0,003	0,007	0,007	IR
2	7	25	- 0,000	0,008	0,008	IR
3	11	16	- 0,001	0,009	0,009	IR
4	15	15	+ 0,007	0,008	0,010	IR
5	19	27	- 0,008	0,006	0,011	IR
6	22	24	+ 0,005	0,011	0,012	IR
7	26	6	- 0,012	0,006	0,013	IR
8	30	26	+ 0,010	0,009	0,014	IR
9	33	5	+ 0,009	0,011	0,014	IR
10	37	4	+ 0,013	0,007	0,014	IR
11	41	17	+ 0,002	0,014	0,015	IR
12	44	23	+ 0,018	0,008	0,020	IR
13	48	1	- 0,013	0,019	0,023	IR
14	52	18	+ 0,021	0,009	0,023	IR
15	56	19	+ 0,027	0,003	0,027	IR
16	59	22	+ 0,026	0,011	0,028	IR
17	63	21	+ 0,029	0,008	0,030	IR
18	67	3	- 0,020	0,023	0,030	IR
19	70	13	- 0,029	0,009	0,031	IR
20	74	8	- 0,016	0,027	0,032	IR
21	78	10	+ 0,026	0,033	0,042	IR
22	81	7	- 0,036	0,027	0,045	IR
23	85	12	+ 0,041	0,022	0,046	IR
24	89	11	- 0,018	0,045	0,049	IR
25	93	14	- 0,045	0,025	0,052	IR
26	96	2	- 0,060	0,039	0,072	IR
27	100	9	- 0,062	0,061	0,087	IR

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 27 sets of results send by 31 laboratories using routine method ISO 9622|IIDF 141, 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}	0,007
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,033

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	0,010	0,000	0,010	0,010	0,004	0,000	0,000	0,010	0,010	0,010	0,006	20
2	0,030	0,010	0,020	0,010	0,010	0,000	0,000	0,000	0,010	0,000	0,009	20
3	0,020	0,020	0,030	0,020	0,020	0,020 *	0,010	0,020	0,020	0,030	0,015	20
4	0,010	0,010	0,010	0,010	0,000	0,010	0,000	0,000	0,010	0,010	0,006	20
5	0,000	0,010	0,010	0,000	0,000	0,010	0,000	0,010	0,010	0,000	0,005	20
6	0,000	0,000	0,000	0,010	0,009	0,000	0,010	0,010	0,020	0,009	0,007	20
7	0,020	0,010	0,020	0,010	0,010	0,000	0,000	0,010	0,010	0,020	0,009	20
8	0,000	0,000	0,000	0,010	0,010	0,000	0,000	0,020	0,000	0,010	0,006	20
9	0,010	0,000	0,010	0,000	0,010	0,000	0,010	0,010	0,010	0,020	0,007	20
10	0,000	0,000	0,010	0,010	0,010	0,000	0,000	0,010	0,000	0,000	0,004	20
11	0,040 *	0,010	0,010	0,020	0,010	0,000	0,010	0,010	0,010	0,010	0,012	20
12	0,010	0,000	0,000	0,010	0,000	0,010	0,030 *	0,000	0,010	0,000	0,008	20
13	0,000	0,000	0,010	0,000	0,010	0,000	0,010	0,000	0,000	0,000	0,004	20
14	0,000	0,010	0,010	0,000	0,020	0,000	0,000	0,010	0,000	0,000	0,006	20
15	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,010	0,004	20
16	0,000	0,010	0,000	0,000	0,000	0,010	0,000	0,000	0,010	0,000	0,004	20
17	0,000	0,010	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,004	20
18	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,003	20
19	0,000	0,010	0,000	0,000	0,010	0,010	0,000	0,010	0,000	0,010	0,005	20
20	0,010	0,010	0,000	0,000	0,010	0,010	0,000	0,000	0,010	0,010	0,005	20
21	0,007	0,006	0,005	0,004	0,003	0,003	0,007	0,003	0,004	0,006	0,004	20
22	0,010	0,030	0,020	0,050 *	0,010	0,000	0,010	0,000	0,000	0,000	0,014	20
23	0,010	0,030	0,000	0,010	0,010	0,000	0,020	0,000	0,010	0,010	0,009	20
24	0,010	0,010	0,000	0,000	0,000	0,010	0,000	0,000	0,010	0,010	0,005	20
25	0,010	0,010	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,020	0,006	20
26	0,020	0,010	0,010	0,000	0,010	0,010	0,010	0,010	0,020	0,000	0,008	20
27	0,000	0,000	0,000	0,010	0,000	0,000	0,010	0,000	0,000	0,010	0,004	20
Sr	0,009	0,008	0,008	0,009	0,006	0,005	0,006	0,006	0,007	0,008		540
NE	54	54	54	54	54	54	54	54	54	54		
L	0,031	0,034	0,032	0,024	0,026	0,016	0,020	0,024	0,028	0,033		

(*)

Sr : repeatability standard deviation of each laboratory limit 0,014 g /100g
NL : number of measurements per laboratory
L : Limit for difference between duplicates according Cochran test at 5% level.
SE : repeatability standard deviation per sample
NE : number of measurements per sample
*: discarded data using the test of Cochran at 5 %
** : missing data
r : limit of repeatability, absolute difference betwen two replicates=0,040 according ISO 9622|IDF 141

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

(*) : Data were to modify in right units.

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	3,260	3,629	2,728	3,653	2,914	2,808	3,065	3,629	3,270	3,447
2	3,195	3,635	2,600	3,675	2,815	2,690	2,990	3,650	3,235	3,440
3	3,260	3,620	2,725	3,650	2,900	2,810	3,065	3,610	3,260	3,425
4	3,295	3,665	2,735	3,695	2,920	2,815	3,090	3,670	3,295	3,475
5	3,290	3,655	2,735	3,690	2,920	2,825	3,080	3,655	3,295	3,470
6	3,265	3,654	2,702	3,688	2,882	2,779	3,066	3,649	3,275	3,455
7	3,240	3,665	2,640	3,685	2,845	2,730	3,020	3,645	3,255	3,440
8	3,260	3,680	2,660	3,705	2,865	2,750	3,040	3,670	3,270	3,465
9	3,225	3,670	2,565 *	3,700	2,785	2,670	2,975	3,665	3,215	3,440
10	3,290	3,640	2,785	3,685	2,955	2,860	3,110	3,645	3,340	3,480
11	3,230	3,675	2,635	3,730	2,845	2,730	3,025	3,675	3,315	3,485
12	3,305	3,680	2,780	3,725	2,960	2,865	3,115	3,680	3,355	3,470
13	3,250	3,620	2,695	3,650	2,885	2,780	3,045	3,620	3,260	3,430
14	3,230	3,585 *	2,705	3,620	2,880	2,790	3,040	3,595	3,230	3,400
15	3,290	3,655	2,730	3,690	2,920	2,810	3,080	3,660	3,295	3,465
16	3,280	3,645	2,720	3,680	2,910	2,805	3,070	3,650	3,295	3,460
17	3,290	3,675	2,695	3,700	2,890	2,790	3,060	3,680	3,290	3,475
18	3,300	3,685	2,720	3,720	2,920	2,810	3,090	3,690	3,310	3,495
19	3,300	3,685	2,740	3,720	2,935	2,825	3,100	3,685	3,310	3,495
20	3,265	3,655	2,720	3,690	2,915	2,805	3,080	3,660	3,295	3,475
21	3,307	3,677	2,743	3,714	2,938	2,832	3,104	3,691	3,307	3,507
22	3,315	3,695	2,730	3,725	2,925	2,810	3,095	3,700	3,300	3,490
23	3,295	3,685	2,730	3,715	2,925	2,800	3,080	3,690	3,305	3,485
24	3,285	3,655	2,730	3,690	2,920	2,815	3,080	3,650	3,295	3,455
25	3,275	3,645	2,715	3,680	2,910	2,800	3,080	3,660	3,290	3,470
26	3,270	3,665	2,715	3,700	2,915	2,805	3,085	3,675	3,310	3,490
27	3,270	3,640	2,710	3,675	2,900	2,800	3,065	3,650	3,280	3,455
M	3,272	3,660	2,712	3,691	2,900	2,793	3,066	3,659	3,287	3,464
REF.	3,273	3,660	2,717	3,692	2,904	2,799	3,070	3,661	3,288	3,465
SD	0,029	0,021	0,041	0,026	0,040	0,045	0,034	0,025	0,031	0,025

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 27 laboratories using the Routine method ISO 9622 | IDF 141, after outliers discargingd using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran	11			22		3	12			
Outlier Grubbs		14	9							
sr	0,008	0,008	0,008	0,006	0,006	0,004	0,005	0,006	0,007	0,008
SR	0,029	0,022	0,041	0,026	0,040	0,046	0,033	0,026	0,032	0,025

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	- 0,013	- 0,031	+ 0,011	- 0,039	+ 0,010	+ 0,009	- 0,005	- 0,032	- 0,018	- 0,019	- 0,013	0,019	2,18
2	- 0,078	- 0,025	- 0,117	- 0,017	- 0,089	- 0,109	- 0,080	- 0,011	- 0,053	- 0,025	- 0,060	0,039	4,86
3	- 0,013	- 0,040	+ 0,008	- 0,042	- 0,004	+ 0,011	- 0,005	- 0,051	- 0,028	- 0,040	- 0,020	0,023	2,86
4	+ 0,022	+ 0,005	+ 0,018	+ 0,003	+ 0,016	+ 0,016	+ 0,020	+ 0,009	+ 0,007	+ 0,010	+ 0,013	0,007	5,93
5	+ 0,017	- 0,005	+ 0,018	- 0,002	+ 0,016	+ 0,026	+ 0,010	- 0,006	+ 0,007	+ 0,005	+ 0,009	0,011	2,50
6	- 0,008	- 0,006	- 0,015	- 0,004	- 0,023	- 0,020	- 0,004	- 0,012	- 0,013	- 0,011	- 0,012	0,006	5,74
7	- 0,033	+ 0,005	- 0,077	- 0,007	- 0,059	- 0,069	- 0,050	- 0,016	- 0,033	- 0,025	- 0,036	0,027	4,28
8	- 0,013	+ 0,020	- 0,057	+ 0,013	- 0,039	- 0,049	- 0,030	+ 0,009	- 0,018	- 0,000	- 0,016	0,027	1,93
9	- 0,048	+ 0,010	- 0,152	+ 0,008	- 0,119	- 0,129	- 0,095	+ 0,004	- 0,073	- 0,025	- 0,062	0,061	3,23
10	+ 0,017	- 0,020	+ 0,068	- 0,007	+ 0,051	+ 0,061	+ 0,040	- 0,016	+ 0,052	+ 0,015	+ 0,026	0,033	2,51
11	- 0,043	+ 0,015	- 0,082	+ 0,038	- 0,059	- 0,069	- 0,045	+ 0,014	+ 0,027	+ 0,020	- 0,018	0,045	1,29
12	+ 0,032	+ 0,020	+ 0,063	+ 0,033	+ 0,056	+ 0,066	+ 0,045	+ 0,019	+ 0,067	+ 0,005	+ 0,041	0,022	5,79
13	- 0,023	- 0,040	- 0,022	- 0,042	- 0,019	- 0,019	- 0,025	- 0,041	- 0,028	- 0,035	- 0,029	0,009	10,01
14	- 0,043	- 0,075	- 0,012	- 0,072	- 0,024	- 0,009	- 0,030	- 0,066	- 0,058	- 0,065	- 0,045	0,025	5,70
15	+ 0,017	- 0,005	+ 0,013	- 0,002	+ 0,016	+ 0,011	+ 0,010	- 0,001	+ 0,007	- 0,000	+ 0,007	0,008	2,58
16	+ 0,007	- 0,015	+ 0,003	- 0,012	+ 0,006	+ 0,006	+ 0,000	- 0,011	+ 0,007	- 0,005	- 0,001	0,009	0,53
17	+ 0,017	+ 0,015	- 0,022	+ 0,008	- 0,014	- 0,009	- 0,010	+ 0,019	+ 0,002	+ 0,010	+ 0,002	0,014	0,34
18	+ 0,027	+ 0,025	+ 0,003	+ 0,028	+ 0,016	+ 0,011	+ 0,020	+ 0,029	+ 0,022	+ 0,030	+ 0,021	0,009	7,59
19	+ 0,027	+ 0,025	+ 0,023	+ 0,028	+ 0,031	+ 0,026	+ 0,030	+ 0,024	+ 0,022	+ 0,030	+ 0,027	0,003	26,94
20	- 0,008	- 0,005	+ 0,003	- 0,002	+ 0,011	+ 0,006	+ 0,010	- 0,001	+ 0,007	+ 0,010	+ 0,003	0,007	1,42
21	+ 0,033	+ 0,017	+ 0,025	+ 0,022	+ 0,033	+ 0,033	+ 0,034	+ 0,030	+ 0,019	+ 0,042	+ 0,029	0,008	11,68
22	+ 0,042	+ 0,035	+ 0,013	+ 0,033	+ 0,021	+ 0,011	+ 0,025	+ 0,039	+ 0,012	+ 0,025	+ 0,026	0,011	7,10
23	+ 0,022	+ 0,025	+ 0,013	+ 0,023	+ 0,021	+ 0,001	+ 0,010	+ 0,029	+ 0,017	+ 0,020	+ 0,018	0,008	7,05
24	+ 0,012	- 0,005	+ 0,013	- 0,002	+ 0,016	+ 0,016	+ 0,010	- 0,011	+ 0,007	- 0,010	+ 0,005	0,011	1,35
25	+ 0,002	- 0,015	- 0,002	- 0,012	+ 0,006	+ 0,001	+ 0,010	- 0,001	+ 0,002	+ 0,005	- 0,000	0,008	0,18
26	- 0,003	+ 0,005	- 0,002	+ 0,008	+ 0,011	+ 0,006	+ 0,015	+ 0,014	+ 0,022	+ 0,025	+ 0,010	0,009	3,43
27	- 0,003	- 0,020	- 0,007	- 0,017	- 0,004	+ 0,001	- 0,005	- 0,011	- 0,008	- 0,010	- 0,008	0,006	4,12
d	- 0,001	- 0,000	- 0,005	- 0,002	- 0,004	- 0,006	- 0,003	- 0,002	- 0,001	- 0,001	- 0,003	0,034	
Sd	0,029	0,021	0,041	0,026	0,040	0,045	0,034	0,025	0,031	0,025	0,033		

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 9622|IDF141 : Precision of the method : Sr = 0.014 g / 100 g
SR =0,04 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	-0,44	-1,49	+0,27	-1,51	+0,24	+0,20	-0,14	-1,28	-0,57	-0,76
2	-2,69	-1,19	-2,87	-0,66	-2,21	-2,43	-2,34	-0,43	-1,69	-1,03
3	-0,45	-1,91	+0,19	-1,62	-0,10	+0,25	-0,14	-2,01	-0,89	-1,64
4	+0,75	+0,24	+0,43	+0,10	+0,39	+0,36	+0,60	+0,36	+0,22	+0,39
5	+0,58	-0,24	+0,43	-0,09	+0,39	+0,59	+0,30	-0,23	+0,22	+0,19
6	-0,28	-0,29	-0,37	-0,16	-0,56	-0,44	-0,11	-0,47	-0,41	-0,44
7	-1,14	+0,24	-1,89	-0,28	-1,47	-1,54	-1,46	-0,63	-1,05	-1,03
8	-0,45	+0,95	-1,40	+0,49	-0,97	-1,09	-0,87	+0,36	-0,57	-0,02
9	-1,66	+0,48	-3,73	+0,30	-2,96	-2,88	-2,78	+0,16	-2,33	-1,03
10	+0,58	-0,95	+1,66	-0,28	+1,26	+1,37	+1,19	-0,63	+1,66	+0,59
11	-1,48	+0,71	-2,01	+1,44	-1,47	-1,54	-1,31	+0,56	+0,86	+0,80
12	+1,10	+0,95	+1,54	+1,25	+1,39	+1,48	+1,33	+0,75	+2,14	+0,19
13	-0,80	-1,91	-0,54	-1,62	-0,48	-0,42	-0,72	-1,61	-0,89	-1,43
14	-1,48	-3,58	-0,30	-2,76	-0,60	-0,20	-0,87	-2,60	-1,85	-2,65
15	+0,58	-0,24	+0,31	-0,09	+0,39	+0,25	+0,30	-0,03	+0,22	-0,02
16	+0,24	-0,72	+0,07	-0,47	+0,15	+0,14	+0,01	-0,43	+0,22	-0,22
17	+0,58	+0,71	-0,54	+0,30	-0,35	-0,20	-0,28	+0,75	+0,06	+0,39
18	+0,92	+1,19	+0,07	+1,06	+0,39	+0,25	+0,60	+1,15	+0,70	+1,20
19	+0,92	+1,19	+0,56	+1,06	+0,77	+0,59	+0,89	+0,95	+0,70	+1,20
20	-0,28	-0,24	+0,07	-0,09	+0,27	+0,14	+0,30	-0,03	+0,22	+0,39
21	+1,15	+0,81	+0,62	+0,83	+0,83	+0,73	+0,99	+1,17	+0,61	+1,69
22	+1,44	+1,67	+0,31	+1,25	+0,52	+0,25	+0,74	+1,54	+0,38	+1,00
23	+0,75	+1,19	+0,31	+0,87	+0,52	+0,03	+0,30	+1,15	+0,54	+0,80
24	+0,41	-0,24	+0,31	-0,09	+0,39	+0,36	+0,30	-0,43	+0,22	-0,42
25	+0,06	-0,72	-0,05	-0,47	+0,15	+0,03	+0,30	-0,03	+0,06	+0,19
26	-0,11	+0,24	-0,05	+0,30	+0,27	+0,14	+0,45	+0,56	+0,70	+1,00
27	-0,11	-0,95	-0,18	-0,66	-0,10	+0,03	-0,14	-0,43	-0,26	-0,42

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

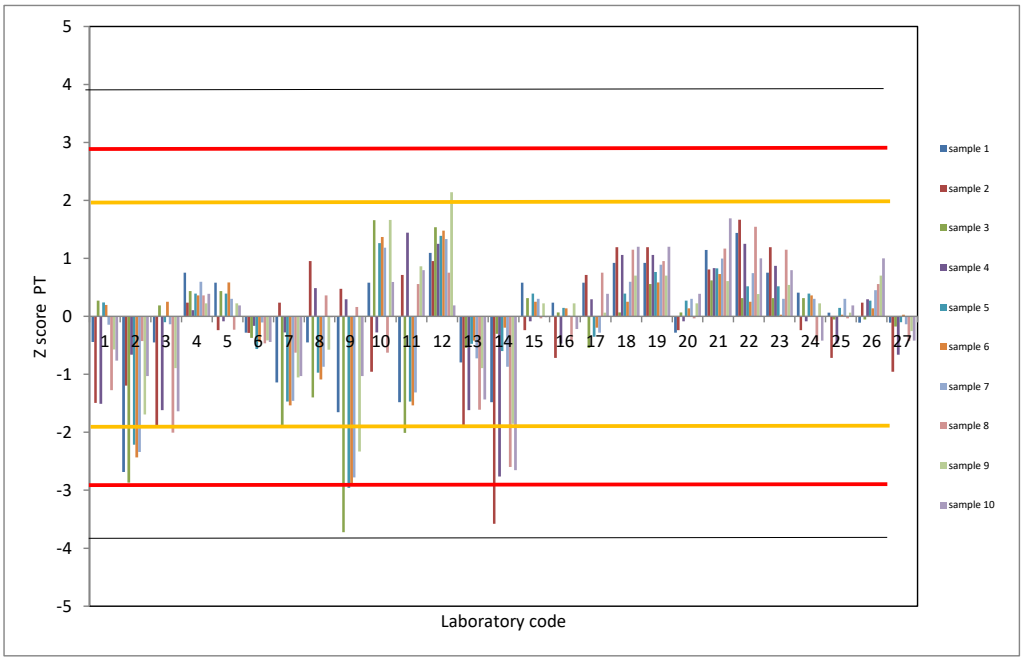


Table VII : Zscore of the different laboratories for each sample.

ZS calculated on the standard deviation of reproducibility of the method

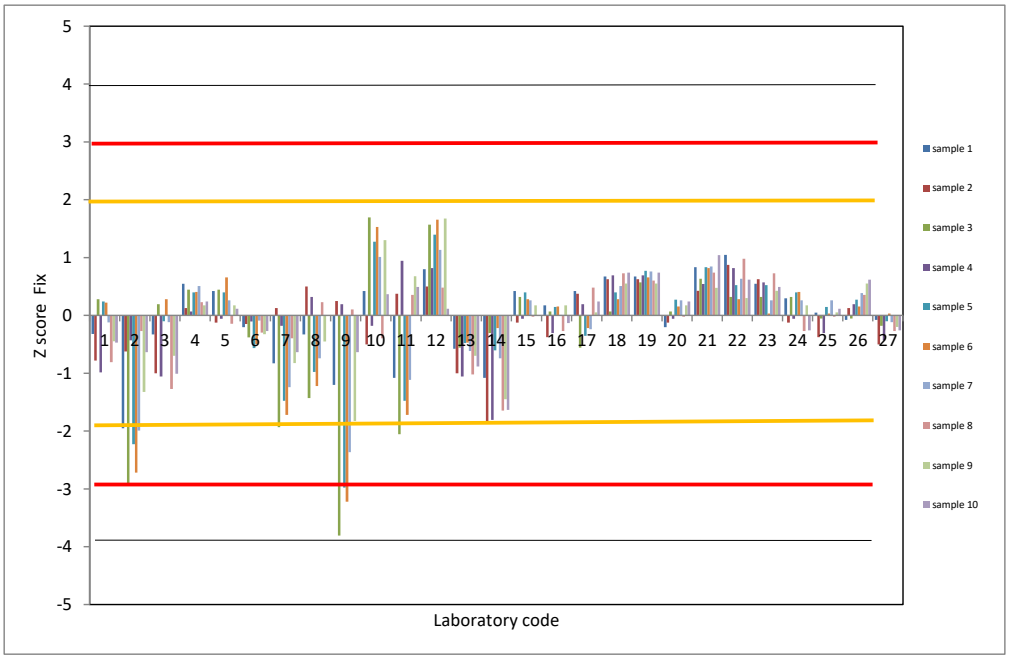
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-0,32	-0,78	+0,28	-0,99	+0,24	+0,22	-0,12	-0,81	-0,45	-0,47
2	-1,95	-0,63	-2,93	-0,43	-2,23	-2,72	-1,99	-0,27	-1,32	-0,63
3	-0,33	-1,00	+0,19	-1,06	-0,10	+0,28	-0,12	-1,27	-0,70	-1,01
4	+0,55	+0,12	+0,44	+0,07	+0,40	+0,41	+0,51	+0,23	+0,18	+0,24
5	+0,42	-0,13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

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=0,040

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



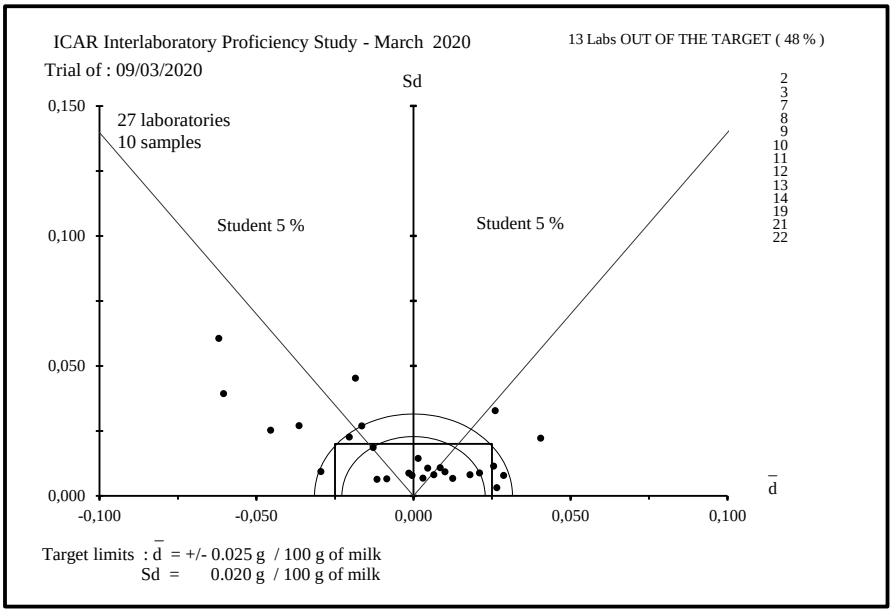


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR PROFICIENCY TEST

RAW MILK

Protein Routine method

March 2020

Name	City	Country
Alip	Sousada	Portugal
Cattle Information Service (CIS)	Teiford	England
Comité du Lait ASBL	Battice	Belgium
Croatian Agricultural Agency, Central Laboratory for Milk Quality Control	Krizevci	Croatia
Eastern Lab services	Medina	USA
Eurofins Steins Laboratory A/B	Jönköping	Sweden
Eurofins Steins Laboratory A/S	Vejen	Denmark
Federazione Latterie Alto Adige Soc. Agr. Coop.	Bolzano	Italy
KGZS Zavod Ptuj	Ptuj	Slovenia
Korea Animal Improvement Association 111ho Green Dairy tech. Univ. HanKyong	Anseong	Korea
Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.	Brno	Czech Republic
Laboratorio Standard Latte	Maccarese (Roma)	Italy
Merieux NutriScience J Bay	Cape Town	South Africa
Merieux Nutriscience South Africa (Midrand)	Midrand	South Africa
Milchkontroll und Rinderzuchtverband eG	Güstrow	Germany
Plemenárske sluzby SR s.p.	Zilina	Slovakia
Tine Ramelklaboratoriet Heimdal	Heimdal	NO
Univ. of Ljubljana dept. of Animal Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia
Valio Oy, Regional laboratory	Seinajoki	Finland

ICAR

PROFICIENCY TESTING SCHEME

March 2020

Raw Milk

Determination of LACTOSE CONTENT

Routine method

Sending date of statistical treatment : 8th April 2020

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

ACTALIA CECALAIT

cofrac COMPARAISONS INTERLABORATOIRES

ACCRÉDITATION N° 1-2473 PORTÉE DISPONIBLE SUR WWW.COFRAC.FR

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

Nb	%	N°	d	Sd	D	Method
1	4	2	+ 0,009	0,007	0,012	IR
2	8	21	+ 0,007	0,009	0,012	IR
3	12	20	- 0,010	0,008	0,012	IR
4	16	5	+ 0,017	0,003	0,018	IR
5	20	15	- 0,029	0,008	0,030	IR
6	24	14	- 0,031	0,006	0,032	IR
7	28	1	- 0,036	0,014	0,038	IR
8	32	4	- 0,043	0,011	0,044	IR
9	36	16	- 0,041	0,020	0,045	IR
10	40	3	- 0,043	0,022	0,048	IR
11	44	25	+ 0,057	0,020	0,061	IR
12	48	13	- 0,062	0,004	0,062	IR
13	52	22	- 0,063	0,006	0,063	IR
14	56	18	- 0,064	0,006	0,064	IR
15	60	11	- 0,077	0,012	0,078	IR
16	64	19	- 0,081	0,007	0,081	IR
17	68	12	- 0,085	0,007	0,085	IR
18	72	9	+ 0,093	0,037	0,100	IR
19	76	24	+ 0,106	0,022	0,109	IR
20	80	8	+ 0,111	0,039	0,118	IR
21	84	7	+ 0,127	0,026	0,130	IR
22	88	6	+ 0,143	0,028	0,146	IR
23	92	23	- 0,049	0,168	0,175	IR
24	96	10	+ 0,069	0,162	0,176	IR
25	100	17	- 0,260	0,005	0,260	IR

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

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 25 sets of results send by 25 laboratories using routine method ISO 9622|IDF 141, 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}	0,007
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,091

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	0,010	0,000	0,010	0,000	0,010	0,004	20
2	0,032	0,000	0,011	0,000	0,000	0,000	0,000	0,000	0,011	0,000	0,008	20
3	0,030	0,040 *	0,030 *	0,030 *	0,040 *	0,040 *	0,040 *	0,040 *	0,050 *	0,030 *	0,027	20
4	0,000	0,011	0,011	0,011	0,000	0,000	0,010	0,000	0,010	0,011	0,006	20
5	0,000	0,000	0,010	0,000	0,010	0,000	0,000	0,000	0,010	0,000	0,004	20
6	0,020	0,050 *	0,000	0,010	0,020	0,010	0,010	0,030 *	0,010	0,020	0,016	20
7	0,000	0,010	0,010	0,010	0,010	0,000	0,010	0,010	0,010	0,010	0,006	20
8	0,000	0,000	0,000	0,000	0,000	0,010	0,000	0,000	0,000	0,000	0,002	20
9	0,010	0,000	0,000	0,000	0,000	0,010	0,000	0,010	0,000	0,010	0,004	20
10	0,020	0,020	0,000	0,010	1,010 *	0,020	0,010	0,010	0,000	0,010	0,226	20
11	0,010	0,000	0,000	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,003	20
12	0,000	0,000	0,0	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,0	20
13	0,010	0,010	0,000	0,000	0,010	0,000	0,010	0,000	0,000	0,000	0,004	20
14	0,000	0,011	0,000	0,000	0,011	0,000	0,000	0,010	0,000	0,000	0,004	20
15	0,011	0,000	0,000	0,011	0,011	0,011	0,010	0,000	0,010	0,011	0,006	20
16	0,010	0,010	0,010	0,000	0,010	0,000	0,010	0,000	0,000	0,000	0,005	20
17	0,000	0,010	0,000	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,003	20
18	0,010	0,020	0,020	0,010	0,000	0,010	0,020	0,000	0,020	0,010	0,010	20
19	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,010	0,010	0,000	0,004	20
20	0,000	0,000	0,000	0,000	0,020	0,000	0,010	0,000	0,000	0,000	0,005	20
21	0,010	0,000	0,000	0,000	0,000	0,010	0,010	0,000	0,010	0,000	0,004	20
22	0,010	0,010	0,000	0,000	0,010	0,010	0,010	0,010	0,010	0,000	0,006	20
23	0,010	0,000	0,010	0,000	0,000	0,000	0,000	0,000	0,010	0,020	0,006	20
24	0,000	0,010	0,010	0,010	0,000	0,000	0,000	0,010	0,010	0,000	0,005	20
25	0,000	0,000	0,010	0,000	0,000	0,000	0,000	0,010	0,000	0,010	0,004	20
Sr	0,009	0,011	0,01	0,006	0,143	0,007	0,008	0,008	0,009	0,007		500
NE	50	50	50	50	50	50	50	50	50	50		
L	0,035	0,025	0,021	0,016	0,025	0,020	0,022	0,018	0,023	0,024		

Sr : repeatability standard deviation of each laboratory limit 0,014 g/100g
NL : number of measurements per laboratory
L : Limit for difference between duplicates according Cochran test at 5% level.
SE : repeatability standard deviation per sample
NE : number of measurements per sample
*: discarded data using the test of Cochran at 5 %
** : missing data
r : limit of repeatability, absolute difference betwen two replicates=0,040 according ISO 9622|IDF 141

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	5,120	5,070	5,010	4,830	4,890	4,855	4,800	4,935	4,760	4,705
2	5,181	5,134	5,066	4,860	4,923	4,892	4,829	4,986	4,782	4,766
3	5,175	5,100	5,025	4,805	4,870	4,820	4,750	4,940	4,715	4,705
4	5,124	5,067	5,004	4,815	4,872	4,841	4,783	4,925	4,741	4,731
5	5,200	5,140	5,065	4,870	4,935	4,900	4,840	4,990	4,795	4,770
6	5,370	5,315	5,200	4,975	5,050	5,015	4,935	5,125	4,905	4,870
7	5,360	5,285	5,195	4,955	5,035	5,000	4,935	5,095	4,885	4,855
8	5,360	5,280	5,190	4,940	5,030	4,975	4,900	5,100	4,850	4,820
9	5,335	5,260	5,170	4,930	5,010	4,965	4,890	5,075	4,850	4,775
10	5,360	5,280	5,200	4,955	4,535 *	4,990	4,925	5,105	4,870	4,805
11	5,115	5,050	4,980	4,780	4,835	4,800	4,750	4,900	4,710	4,640
12	5,100	5,040	5,0	4,770	4,830	4,790	4,730	4,890	4,690	4,670
13	5,125	5,055	4,990	4,790	4,855	4,820	4,755	4,910	4,720	4,690
14	5,145	5,087	5,019	4,830	4,888	4,851	4,799	4,940	4,757	4,704
15	5,140	5,082	5,019	4,835	4,888	4,856	4,804	4,935	4,762	4,720
16	5,175	5,105	5,025	4,800	4,875	4,830	4,765	4,940	4,720	4,690
17	4,920	4,855	4,790	4,600 *	4,655 *	4,620 *	4,570 *	4,710	4,530	4,480 *
18	5,115	5,050	4,990	4,785	4,850	4,815	4,760	4,910	4,720	4,695
19	5,100	5,045	4,970	4,770	4,830	4,800	4,740	4,895	4,695	4,680
20	5,170	5,110	5,040	4,840	4,910	4,870	4,805	4,970	4,770	4,750
21	5,175	5,120	5,050	4,870	4,920	4,895	4,835	4,980	4,805	4,750
22	5,125	5,055	4,990	4,790	4,855	4,825	4,765	4,905	4,725	4,670
23	4,865	4,820	4,915	4,850	4,910	4,920	4,900	4,840	4,945	4,880
24	5,260	5,215	5,145	4,975	5,020	4,990	4,950	5,065	4,935	4,840
25	5,260	5,200	5,125	4,900	4,980	4,940	4,870	5,045	4,820	4,765
M	5,175	5,113	5,046	4,855	4,916	4,886	4,826	4,964	4,778	4,748
REF.	5,184	5,121	5,050	4,854	4,915	4,885	4,825	4,969	4,781	4,746
SD	0,125	0,121	0,099	0,068	0,071	0,072	0,071	0,096	0,092	0,068

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 25 laboratories using the Routine method ISO 9622 | IDF 141 , after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran		3; 6	3	3	3; 10	3	3	3; 6	3	3
Outlier Grubbs				17	10;17	17	17			17
sr	0,009	0,006	0,005	0,004	0,006	0,005	0,006	0,004	0,006	0,006
SR	0,125	0,118	0,101	0,069	0,072	0,072	0,071	0,094	0,093	0,069

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	- 0,064	- 0,051	- 0,040	- 0,024	- 0,025	- 0,030	- 0,025	- 0,034	- 0,021	- 0,041	- 0,036	0,014	8,23
2	- 0,003	+ 0,013	+ 0,016	+ 0,006	+ 0,008	+ 0,007	+ 0,004	+ 0,017	+ 0,001	+ 0,020	+ 0,009	0,007	3,75
3	- 0,009	- 0,021	- 0,025	- 0,049	- 0,045	- 0,065	- 0,075	- 0,029	- 0,066	- 0,041	- 0,043	0,022	6,15
4	- 0,060	- 0,054	- 0,046	- 0,040	- 0,043	- 0,044	- 0,042	- 0,044	- 0,040	- 0,016	- 0,043	0,011	11,83
5	+ 0,016	+ 0,019	+ 0,015	+ 0,016	+ 0,020	+ 0,015	+ 0,015	+ 0,021	+ 0,014	+ 0,024	+ 0,017	0,003	16,44
6	+ 0,186	+ 0,194	+ 0,150	+ 0,121	+ 0,135	+ 0,130	+ 0,110	+ 0,156	+ 0,124	+ 0,124	+ 0,143	0,028	15,88
7	+ 0,176	+ 0,164	+ 0,145	+ 0,101	+ 0,120	+ 0,115	+ 0,110	+ 0,126	+ 0,104	+ 0,109	+ 0,127	0,026	15,32
8	+ 0,176	+ 0,159	+ 0,140	+ 0,086	+ 0,115	+ 0,090	+ 0,075	+ 0,131	+ 0,069	+ 0,074	+ 0,111	0,039	9,13
9	+ 0,151	+ 0,139	+ 0,120	+ 0,076	+ 0,095	+ 0,080	+ 0,065	+ 0,106	+ 0,069	+ 0,029	+ 0,093	0,037	7,92
10	+ 0,176	+ 0,159	+ 0,150	+ 0,101	- 0,380	+ 0,105	+ 0,100	+ 0,136	+ 0,089	+ 0,059	+ 0,069	0,162	1,36
11	- 0,069	- 0,071	- 0,070	- 0,074	- 0,080	- 0,085	- 0,075	- 0,069	- 0,071	- 0,106	- 0,077	0,012	21,00
12	- 0,084	- 0,081	- 0,1	- 0,084	- 0,085	- 0,095	- 0,095	- 0,079	- 0,091	- 0,076	- 0,09	0,007	39,93
13	- 0,059	- 0,066	- 0,060	- 0,064	- 0,060	- 0,065	- 0,070	- 0,059	- 0,061	- 0,056	- 0,062	0,004	45,27
14	- 0,039	- 0,034	- 0,031	- 0,024	- 0,027	- 0,034	- 0,027	- 0,028	- 0,024	- 0,042	- 0,031	0,006	16,14
15	- 0,044	- 0,039	- 0,031	- 0,019	- 0,027	- 0,029	- 0,022	- 0,034	- 0,019	- 0,027	- 0,029	0,008	11,16
16	- 0,009	- 0,016	- 0,025	- 0,054	- 0,040	- 0,055	- 0,060	- 0,029	- 0,061	- 0,056	- 0,041	0,020	6,53
17	- 0,264	- 0,266	- 0,260	- 0,254	- 0,260	- 0,265	- 0,255	- 0,259	- 0,251	- 0,266	- 0,260	0,005	153,79
18	- 0,069	- 0,071	- 0,060	- 0,069	- 0,065	- 0,070	- 0,065	- 0,059	- 0,061	- 0,051	- 0,064	0,006	31,99
19	- 0,084	- 0,076	- 0,080	- 0,084	- 0,085	- 0,085	- 0,085	- 0,074	- 0,086	- 0,066	- 0,081	0,007	38,67
20	- 0,014	- 0,011	- 0,010	- 0,014	- 0,005	- 0,015	- 0,020	+ 0,001	- 0,011	+ 0,004	- 0,010	0,008	3,97
21	- 0,009	- 0,001	+ 0,000	+ 0,016	+ 0,005	+ 0,010	+ 0,010	+ 0,011	+ 0,024	+ 0,004	+ 0,007	0,009	2,38
22	- 0,059	- 0,066	- 0,060	- 0,064	- 0,060	- 0,060	- 0,060	- 0,064	- 0,056	- 0,076	- 0,063	0,006	34,79
23	- 0,319	- 0,301	- 0,135	- 0,004	- 0,005	+ 0,035	+ 0,075	- 0,129	+ 0,164	+ 0,134	- 0,049	0,168	0,91
24	+ 0,076	+ 0,094	+ 0,095	+ 0,121	+ 0,105	+ 0,105	+ 0,125	+ 0,096	+ 0,154	+ 0,094	+ 0,106	0,022	15,44
25	+ 0,076	+ 0,079	+ 0,075	+ 0,046	+ 0,065	+ 0,055	+ 0,045	+ 0,076	+ 0,039	+ 0,019	+ 0,057	0,020	8,97
d	- 0,009	- 0,008	- 0,004	+ 0,001	+ 0,001	+ 0,000	+ 0,000	- 0,004	- 0,002	+ 0,001	- 0,009	0,098	
Sd	0,125	0,121	0,099	0,068	0,071	0,072	0,071	0,096	0,092	0,068	0,091		

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

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

ISO 9622|IDF141 : Precision of the method : Sr = 0.014 g / 100 g
SR =0,04 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	-0,51	-0,42	-0,40	-0,36	-0,35	-0,42	-0,36	-0,35	-0,23	-0,60
2	-0,02	+0,11	+0,16	+0,08	+0,12	+0,09	+0,05	+0,18	+0,01	+0,29
3	-0,07	-0,17	-0,25	-0,73	-0,63	-0,90	-1,06	-0,30	-0,72	-0,60
4	-0,48	-0,45	-0,47	-0,59	-0,60	-0,61	-0,60	-0,45	-0,43	-0,23
5	+0,13	+0,16	+0,15	+0,23	+0,28	+0,20	+0,21	+0,22	+0,16	+0,35
6	+1,49	+1,61	+1,51	+1,77	+1,91	+1,80	+1,55	+1,63	+1,36	+1,81
7	+1,41	+1,36	+1,46	+1,48	+1,70	+1,59	+1,55	+1,32	+1,14	+1,59
8	+1,41	+1,32	+1,41	+1,26	+1,63	+1,24	+1,05	+1,37	+0,76	+1,08
9	+1,21	+1,15	+1,21	+1,11	+1,34	+1,10	+0,91	+1,11	+0,76	+0,42
10	+1,41	+1,32	+1,51	+1,48	-5,36	+1,45	+1,41	+1,42	+0,97	+0,86
11	-0,55	-0,59	-0,71	-1,09	-1,13	-1,18	-1,06	-0,72	-0,77	-1,56
12	-0,67	-0,67	-1	-1,24	-1,20	-1,32	-1,35	-0,82	-0,99	-1,12
13	-0,47	-0,55	-0,60	-0,95	-0,84	-0,90	-0,99	-0,61	-0,66	-0,82
14	-0,31	-0,28	-0,31	-0,36	-0,38	-0,48	-0,38	-0,30	-0,26	-0,62
15	-0,35	-0,32	-0,31	-0,28	-0,38	-0,40	-0,31	-0,35	-0,21	-0,39
16	-0,07	-0,13	-0,25	-0,80	-0,56	-0,77	-0,85	-0,30	-0,66	-0,82
17	-2,11	-2,20	-2,62	-3,74	-3,67	-3,68	-3,61	-2,70	-2,73	-3,90
18	-0,55	-0,59	-0,60	-1,02	-0,91	-0,97	-0,92	-0,61	-0,66	-0,75
19	-0,67	-0,63	-0,81	-1,24	-1,20	-1,18	-1,21	-0,77	-0,93	-0,97
20	-0,11	-0,09	-0,10	-0,21	-0,07	-0,21	-0,29	+0,02	-0,12	+0,05
21	-0,07	-0,01	+0,00	+0,23	+0,07	+0,13	+0,14	+0,12	+0,27	+0,05
22	-0,47	-0,55	-0,60	-0,95	-0,84	-0,84	-0,85	-0,66	-0,61	-1,12
23	-2,55	-2,49	-1,36	-0,07	-0,07	+0,48	+1,05	-1,34	+1,79	+1,96
24	+0,61	+0,78	+0,96	+1,77	+1,48	+1,45	+1,76	+1,01	+1,68	+1,37
25	+0,61	+0,66	+0,76	+0,67	+0,92	+0,76	+0,63	+0,80	+0,43	+0,27

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

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

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

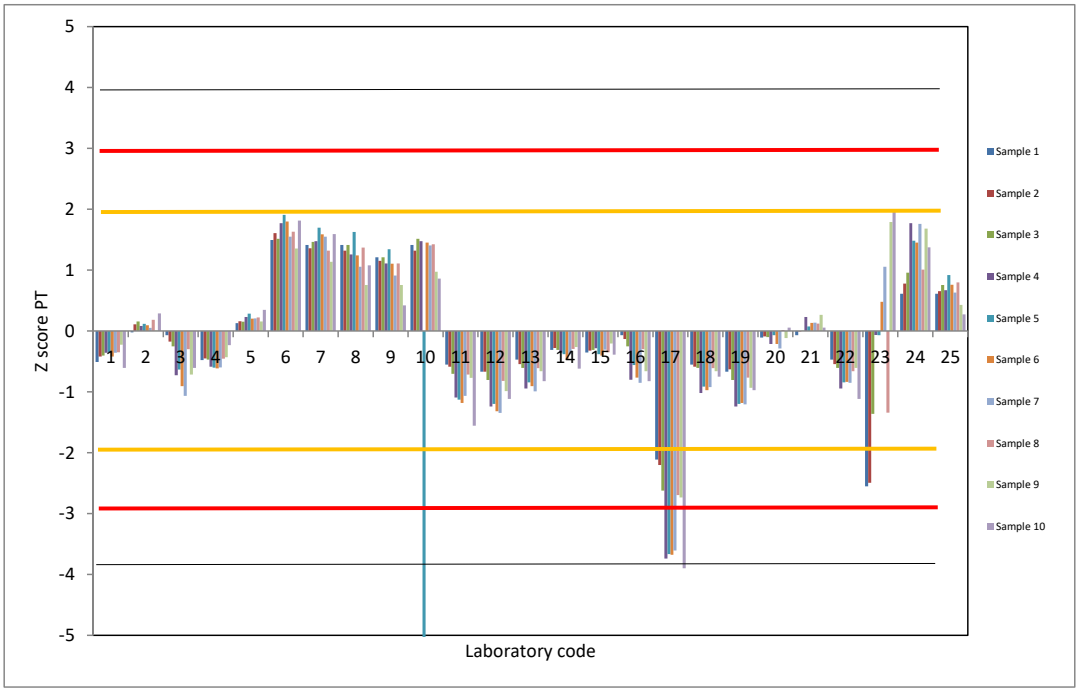


Table VII : Zscore of the different laboratories for each sample.

ZS calculated on the standard deviation of reproducibility of the method

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-1,59	-1,27	-1,00	-0,61	-0,62	-0,76	-0,63	-0,84	-0,52	-1,03
2	-0,07	+0,33	+0,39	+0,14	+0,20	+0,17	+0,09	+0,44	+0,02	+0,49
3	-0,22	-0,52	-0,62	-1,24	-1,12	-1,63	-1,88	-0,71	-1,64	-1,03
4	-1,49	-1,36	-1,16	-1,00	-1,07	-1,11	-1,06	-1,09	-0,99	-0,39
5	+0,41	+0,48	+0,38	+0,39	+0,50	+0,37	+0,37	+0,54	+0,36	+0,59
6	+4,66	+4,85	+3,75	+3,01	+3,38	+3,24	+2,74	+3,91	+3,11	+3,09
7	+4,41	+4,10	+3,63	+2,51	+3,00	+2,87	+2,74	+3,16	+2,61	+2,72
8	+4,41	+3,98	+3,50	+2,14	+2,88	+2,24	+1,87	+3,29	+1,73	+1,84
9	+3,78	+3,48	+3,00	+1,89	+2,38	+1,99	+1,62	+2,66	+1,73	+0,72
10	+4,41	+3,98	+3,75	+2,51	-9,50	+2,62	+2,49	+3,41	+2,23	+1,47
11	-1,72	-1,77	-1,75	-1,86	-2,00	-2,13	-1,88	-1,71	-1,77	-2,66
12	-2,09	-2,02	-2	-2,11	-2,12	-2,38	-2,38	-1,96	-2,27	-1,91
13	-1,47	-1,65	-1,50	-1,61	-1,50	-1,63	-1,76	-1,46	-1,52	-1,41
14	-0,97	-0,84	-0,77	-0,61	-0,68	-0,86	-0,67	-0,71	-0,60	-1,06
15	-1,10	-0,97	-0,77	-0,48	-0,68	-0,73	-0,54	-0,84	-0,47	-0,66
16	-0,22	-0,40	-0,62	-1,36	-1,00	-1,38	-1,51	-0,71	-1,52	-1,41
17	-6,59	-6,65	-6,50	-6,36	-6,50	-6,63	-6,38	-6,46	-6,27	-6,66
18	-1,72	-1,77	-1,50	-1,74	-1,62	-1,76	-1,63	-1,46	-1,52	-1,28
19	-2,09	-1,90	-2,00	-2,11	-2,12	-2,13	-2,13	-1,84	-2,14	-1,66
20	-0,34	-0,27	-0,25	-0,36	-0,12	-0,38	-0,51	+0,04	-0,27	+0,09
21	-0,22	-0,02	+0,00	+0,39	+0,13	+0,24	+0,24	+0,29	+0,61	+0,09
22	-1,47	-1,65	-1,50	-1,61	-1,50	-1,51	-1,51	-1,59	-1,39	-1,91
23	-7,97	-7,52	-3,37	-0,11	-0,12	+0,87	+1,87	-3,21	+4,11	+3,34
24	+1,91	+2,35	+2,38	+3,01	+2,63	+2,62	+3,12	+2,41	+3,86	+2,34
25	+1,91	+1,98	+1,88	+1,14	+1,63	+1,37	+1,12	+1,91	+0,98	+0,47

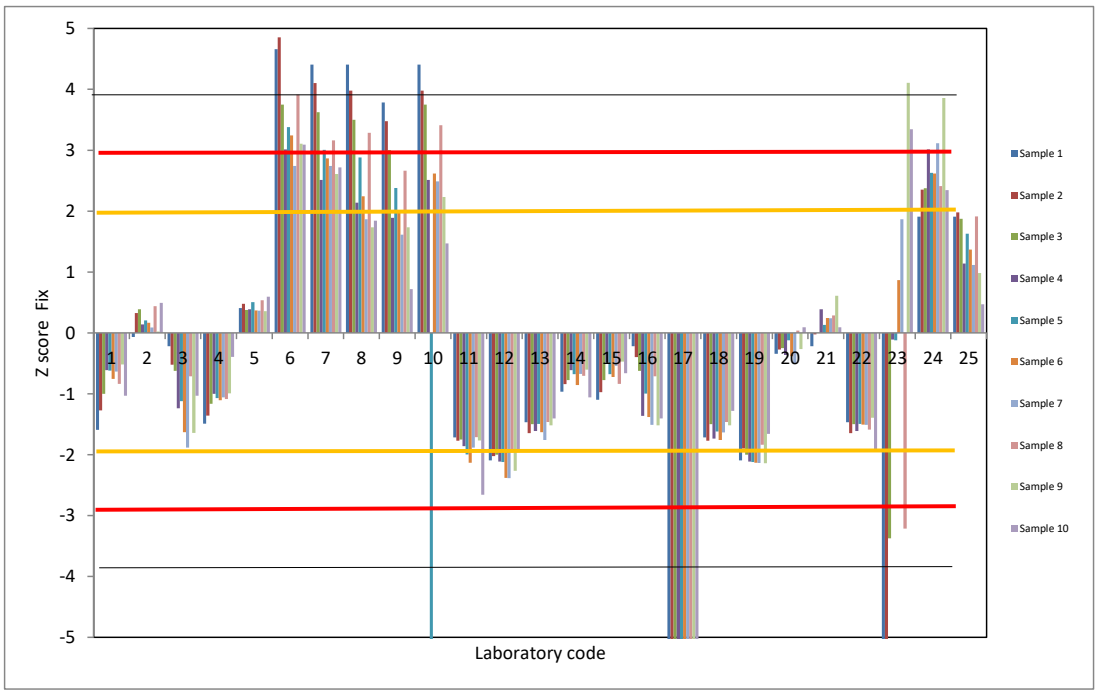
This table will allows to compare your ZSCORE from one PT to an other because the standard deviation has always the value of SR of the method SR=0,040

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

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

Figure 3 :

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



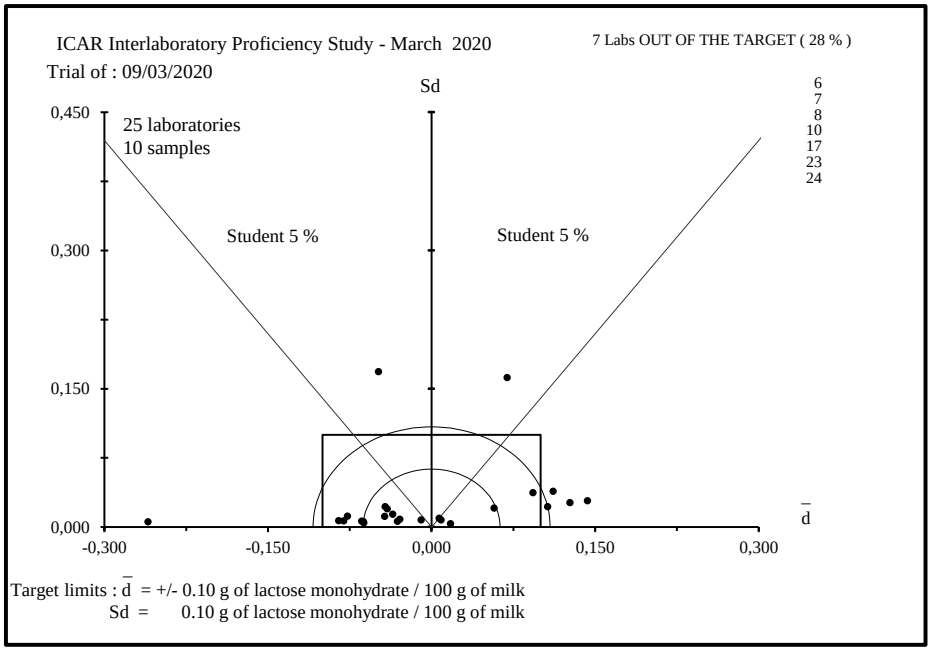


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST

RAW MILK
Lactose Routine method
March 2020

Name	City	Country
Alip	Sousada	Portugal
Cattle Information Service (CIS)	Teiford	England
Comité du Lait ASBL	Battice	Belgium
Croatian Agricultural Agency, Central Laboratory for Milk Quality Control	Krizevci	Croatia
Eastern Lab services	Medina	USA
Eurofins Steins Laboratory A/B	Jönköping	Sweden
Eurofins Steins Laboratory A/S	Vejen	Denmark
Federazione Latterie Alto Adige Soc. Agr. Coop.	Bolzano	Italy
KGZS Zavod Ptuj	Ptuj	Slovenia
Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.	Brno	Czech Republic
Laboratorio Standard Latte	Maccarese (Roma)	Italy
Merieux NutriScience J Bay	Cape Town	South Africa
Merieux Nutriscience South Africa (Midrand)	Midrand	South Africa
Milchkontroll und Rinderzuchtverband eG	Güstrow	Germany
Plemenárske sluzby SR s.p.	Zilina	Slovakia
Tine Ramelklaboratoriet Heimdal	Heimdal	NO
Univ. of Ljubljana dept. of Animal Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia
Valio Oy, Regional laboratory	Seinajoki	Finland

ICAR

PROFICIENCY TESTING SCHEME

March 2020

Raw Milk

Determination of UREA CONTENT

Routine method

Sending date of statistical treatment : 8th April 2020

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

ACTALIA CECALAIT

cofrac COMPARAISONS INTERLABORATOIRES

ACCRÉDITATION
N° 1-2473
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DISPONIBLE SUR
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Table I : Ranking of the laboratories Units : mg / dl

Nb	%	N°	d	Sd	D	Method
1	4	2	+ 0,46	1,00	1,10	IR
2	8	18	- 0,65	1,21	1,37	IR
3	12	15	+ 0,78	1,90	2,06	IR
4	16	10	+ 2,11	1,00	2,34	IR
5	20	5	+ 1,34	1,96	2,37	IR
6	24	9	+ 1,98	1,43	2,44	IR
7	28	7	+ 1,78	1,69	2,46	IR
8	32	22	+ 2,13	1,36	2,53	IR
9	36	19	- 2,66	1,23	2,93	IR
10	40	4	+ 2,89	0,69	2,97	IR
11	44	11	+ 2,14	2,52	3,31	IR
12	48	17	- 3,40	1,23	3,61	IR
13	52	6	+ 3,37	1,86	3,84	IR
14	56	21	+ 3,73	1,83	4,16	IR
15	60	20	- 4,25	1,27	4,44	IR
16	64	13	- 2,79	3,50	4,48	IR
17	68	16	- 4,31	1,82	4,68	IR
18	72	23	+ 4,86	1,85	5,20	IR
19	76	12	+ 4,89	1,88	5,24	IR
20	80	14	- 3,58	4,07	5,42	IR
21	84	3	+ 5,51	0,58	5,54	IR
22	88	8	+ 6,39	3,18	7,14	IR
23	92	24	- 15,57	6,71	16,95	IR
24	96	25	- 19,41	5,94	20,29	IR
25	100	1	- 19,36	6,58	20,45	IR

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

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 25 sets of results send by 25 laboratories using routine method ISO 9622|IDF 141, 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}	0,76
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	7,86

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	0,400	0,200	0,100	0,200	0,600	0,200	0,300	0,400	0,300	0,100	0,22	20
2	0,000	2,000	0,000	1,000	1,000	1,000	1,900	1,000	0,000	0,000	0,76	20
3	0,000	2,580	0,360	2,460	0,300	2,700	0,300	0,310	1,200	1,860	1,13	20
4	0,900	2,400	0,300	0,100	0,300	0,300	0,400	1,200	3,100	0,800	0,97	20
5	1,100	0,700	0,900	0,400	0,100	1,400	2,900	0,400	1,800	2,000	1,01	20
6	0,450	0,430	3,300	0,500	3,700 *	1,420	1,200	2,600	1,600	0,800	1,39	20
7	0,700	1,000	0,400	0,300	0,900	4,700 *	0,400	1,400	0,600	1,300	1,20	20
8	1,600	0,000	2,500	1,300	0,500	1,200	1,800	3,700 *	0,400	0,800	1,22	20
9	0,400	0,100	0,600	1,300	1,700	0,100	0,800	1,000	0,600	0,500	0,61	20
10	0,400	1,000	1,100	0,500	1,400	0,500	0,400	0,100	0,100	0,500	0,51	20
11	0,900	0,600	0,100	1,300	0,000	0,300	0,300	0,100	0,900	0,000	0,44	20
12	1,300	1,400	2,300	2,300	0,900	0,100	0,600	0,700	1,300	0,600	0,95	20
13	1,600	0,200	0,800	0,600	0,200	0,100	0,800	0,700	0,600	0,400	0,52	20
14	3,600 *	0,600	1,300	0,600	2,000	0,700	1,000	0,500	0,900	0,800	1,06	20
15	0,400	2,300	0,800	0,300	0,300	0,300	0,300	1,400	0,300	0,400	0,66	20
16	1,000	0,300	1,100	1,100	0,100	0,400	0,500	0,200	0,600	2,000	0,65	20
17	0,800	0,100	0,600	0,000	0,200	1,300	0,900	0,500	0,200	0,000	0,44	20
18	0,600	0,600	0,600	0,000	0,600	1,200	1,800	0,600	0,600	0,600	0,60	20
19	0,580	0,580	0,000	0,580	1,741	1,741	0,580	0,580	2,321	0,580	0,82	20
20	1,161	1,161	0,580	0,580	1,161	0,000	0,580	0,000	0,580	0,580	0,54	20
21	**	**	**	**	**	**	**	**	**	**		
22	**	**	**	**	**	**	**	**	**	**		
23	0,294	3,529	0,098	0,588	1,373	1,176	0,294	1,176	0,686	0,000	0,95	20
24	0,900	0,400	1,000	2,700	0,600	0,200	1,000	1,300	1,300	0,600	0,85	20
25	0,100	0,100	0,700	0,200	0,000	0,900	1,100	0,000	0,500	0,400	0,39	20
Sr	0,79	0,95	0,83	0,79	0,85	0,99	0,77	0,85	0,81	0,63		460
NE	46	46	46	46	46	46	46	46	46	46		
L	2,38	3,85	3,36	3,18	2,66	2,92	3,12	2,69	3,29	2,56		

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	24,40	28,90	15,85	14,00	18,50	22,70	12,05	11,20	26,95	20,55
2	50,50	60,20	31,10	27,70	37,40	46,10	24,25	19,90	54,40	41,70
3	55,98	63,03	38,14	32,76	42,73	50,30	29,94	25,14	59,28	46,52
4	52,65	61,60	36,05	30,65	40,05	48,35	25,50	22,40	56,75	43,60
5	52,25	62,65	33,15	27,80	35,85	47,60	24,05	18,90	56,60	43,20
6	53,48	63,19	35,55	28,65	41,25	50,31	24,70	21,70	59,00	44,50
7	51,85	61,90	33,20	27,75	38,85	48,85	23,30	20,20	56,30	44,25
8	59,30	68,30	34,55	34,15	43,75	53,10	28,30	21,15	62,80	47,20
9	53,50	61,75	33,90	29,25	37,85	47,35	25,20	19,80	57,10	42,75
10	50,80	58,20	34,05	29,75	38,90	47,15	27,40	23,75	55,75	44,05
11	54,85	63,10	34,05	27,65	38,60	48,25	23,45	18,35	58,25	43,50
12	53,05	65,70	35,25	31,35	41,95	50,25	27,70	23,45	61,35	47,50
13	44,10	49,90	31,20	28,40	34,60	40,25	25,10	22,75	47,00	37,50
14	41,80	48,80	30,85	27,50	32,30	40,15	25,00	23,35	45,65	37,50
15	48,10	55,75	35,30	30,65	37,65	45,45	26,55	23,20	52,55	41,30
16	43,90	50,75	28,65	25,35	33,05	40,10	21,65	18,70	47,50	35,90
17	45,90	52,75	29,90	25,20	33,10	40,95	21,75	18,95	48,80	37,40
18	47,70	55,50	32,10	28,20	36,30	44,40	24,90	21,30	51,30	40,50
19	48,45	57,16	29,01	25,24	33,95	42,65	20,02	15,38	51,07	39,17
20	45,84	55,13	28,14	23,50	31,92	41,20	18,86	13,35	51,36	36,85
21	52,00	64,00	38,00	33,00	40,00	50,00	26,00	20,00	58,00	45,00
22	52,00	63,00	34,00	29,00	39,00	48,00	26,00	20,00	55,00	44,00
23	55,93	64,71	37,40	32,06	41,96	50,29	25,74	22,06	60,64	46,47
24	29,75	32,10	21,20	16,85	21,00	25,60	16,30	14,95	30,25	25,00
25	25,25	29,65	16,05	13,70	18,10	22,85	11,45	9,50	27,25	20,80
M	47,73	55,91	31,47	27,20	35,54	43,69	23,41	19,58	51,64	39,87
REF.	49,36	57,87	32,51	28,10	36,78	45,29	24,04	19,97	53,47	41,28
SD	9,07	10,96	5,94	5,35	7,00	8,40	4,60	3,97	9,96	7,51

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 25 laboratories using the Routine method ISO 9622 | IDF 141, after discard outliers with Grubbs test at 5 %.

Table IV : Outlier identification

Sample	1	2	3	4	5	6	7	8	9	10
Outliers Cochran	14				6	7		8		
Outlier Grubbs										
sr	0,59	0,95	0,83	0,79	0,66	0,73	0,77	0,67	0,81	0,63
SR	9,52	11,21	6,03	5,45	7,27	8,74	4,77	4,25	10,30	7,72

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	- 24,96	- 28,97	- 16,66	- 14,10	- 18,28	- 22,59	- 11,99	- 8,77	- 26,52	- 20,73	- 19,36	6,58	9,30
2	+ 1,14	+ 2,33	- 1,41	- 0,40	+ 0,62	+ 0,81	+ 0,21	- 0,07	+ 0,93	+ 0,42	+ 0,46	1,00	1,46
3	+ 6,62	+ 5,16	+ 5,63	+ 4,66	+ 5,95	+ 5,01	+ 5,90	+ 5,17	+ 5,81	+ 5,24	+ 5,51	0,58	30,31
4	+ 3,29	+ 3,73	+ 3,54	+ 2,55	+ 3,27	+ 3,06	+ 1,46	+ 2,43	+ 3,28	+ 2,32	+ 2,89	0,69	13,22
5	+ 2,89	+ 4,78	+ 0,64	- 0,30	- 0,93	+ 2,31	+ 0,01	- 1,07	+ 3,13	+ 1,92	+ 1,34	1,96	2,16
6	+ 4,12	+ 5,32	+ 3,04	+ 0,55	+ 4,47	+ 5,02	+ 0,66	+ 1,73	+ 5,53	+ 3,22	+ 3,37	1,86	5,73
7	+ 2,49	+ 4,03	+ 0,69	- 0,35	+ 2,07	+ 3,56	- 0,74	+ 0,23	+ 2,83	+ 2,97	+ 1,78	1,69	3,32
8	+ 9,94	+ 10,43	+ 2,04	+ 6,05	+ 6,97	+ 7,81	+ 4,26	+ 1,18	+ 9,33	+ 5,92	+ 6,39	3,18	6,36
9	+ 4,14	+ 3,88	+ 1,39	+ 1,15	+ 1,07	+ 2,06	+ 1,16	- 0,17	+ 3,63	+ 1,47	+ 1,98	1,43	4,37
10	+ 1,44	+ 0,33	+ 1,54	+ 1,65	+ 2,12	+ 1,86	+ 3,36	+ 3,78	+ 2,28	+ 2,77	+ 2,11	1,00	6,67
11	+ 5,49	+ 5,23	+ 1,54	- 0,45	+ 1,82	+ 2,96	- 0,59	- 1,62	+ 4,78	+ 2,22	+ 2,14	2,52	2,68
12	+ 3,69	+ 7,83	+ 2,74	+ 3,25	+ 5,17	+ 4,96	+ 3,66	+ 3,48	+ 7,88	+ 6,22	+ 4,89	1,88	8,23
13	- 5,26	- 7,97	- 1,31	+ 0,30	- 2,18	- 5,04	+ 1,06	+ 2,78	- 6,47	- 3,78	- 2,79	3,50	2,52
14	- 7,56	- 9,07	- 1,66	- 0,60	- 4,48	- 5,14	+ 0,96	+ 3,38	- 7,82	- 3,78	- 3,58	4,07	2,78
15	- 1,26	- 2,12	+ 2,79	+ 2,55	+ 0,87	+ 0,16	+ 2,51	+ 3,23	- 0,92	+ 0,02	+ 0,78	1,90	1,30
16	- 5,46	- 7,12	- 3,86	- 2,75	- 3,73	- 5,19	- 2,39	- 1,27	- 5,97	- 5,38	- 4,31	1,82	7,49
17	- 3,46	- 5,12	- 2,61	- 2,90	- 3,68	- 4,34	- 2,29	- 1,02	- 4,67	- 3,88	- 3,40	1,23	8,76
18	- 1,66	- 2,37	- 0,41	+ 0,10	- 0,48	- 0,89	+ 0,86	+ 1,33	- 2,17	- 0,78	- 0,65	1,21	1,69
19	- 0,91	- 0,71	- 3,50	- 2,86	- 2,83	- 2,64	- 4,02	- 4,59	- 2,40	- 2,11	- 2,66	1,23	6,84
20	- 3,52	- 2,74	- 4,37	- 4,60	- 4,86	- 4,09	- 5,18	- 6,62	- 2,11	- 4,43	- 4,25	1,27	10,62
21	+ 2,64	+ 6,13	+ 5,49	+ 4,90	+ 3,22	+ 4,71	+ 1,96	+ 0,03	+ 4,53	+ 3,72	+ 3,73	1,83	6,46
22	+ 2,64	+ 5,13	+ 1,49	+ 0,90	+ 2,22	+ 2,71	+ 1,96	+ 0,03	+ 1,53	+ 2,72	+ 2,13	1,36	4,96
23	+ 6,57	+ 6,84	+ 4,89	+ 3,96	+ 5,19	+ 5,00	+ 1,70	+ 2,09	+ 7,17	+ 5,19	+ 4,86	1,85	8,29
24	- 19,61	- 25,77	- 11,31	- 11,25	- 15,78	- 19,69	- 7,74	- 5,02	- 23,22	- 16,28	- 15,57	6,71	7,33
25	- 24,11	- 28,22	- 16,46	- 14,40	- 18,68	- 22,44	- 12,59	- 10,47	- 26,22	- 20,48	- 19,41	5,94	10,34
d	- 1,63	- 1,96	- 1,05	- 0,90	- 1,23	- 1,60	- 0,63	- 0,39	- 1,83	- 1,41	- 1,26	7,48	
Sd	9,07	10,96	5,94	5,35	7,00	8,40	4,60	3,97	9,96	7,51	7,60		

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	-2,75	-2,64	-2,81	-2,64	-2,61	-2,69	-2,61	-2,21	-2,66	-2,76
2	+0,13	+0,21	-0,24	-0,08	+0,09	+0,10	+0,05	-0,02	+0,09	+0,06
3	+0,73	+0,47	+0,95	+0,87	+0,85	+0,60	+1,28	+1,30	+0,58	+0,70
4	+0,36	+0,34	+0,60	+0,48	+0,47	+0,36	+0,32	+0,61	+0,33	+0,31
5	+0,32	+0,44	+0,11	-0,06	-0,13	+0,27	+0,00	-0,27	+0,31	+0,26
6	+0,45	+0,49	+0,51	+0,10	+0,64	+0,60	+0,14	+0,44	+0,56	+0,43
7	+0,27	+0,37	+0,12	-0,07	+0,30	+0,42	-0,16	+0,06	+0,28	+0,40
8	+1,10	+0,95	+0,34	+1,13	+1,00	+0,93	+0,93	+0,30	+0,94	+0,79
9	+0,46	+0,35	+0,23	+0,21	+0,15	+0,24	+0,25	-0,04	+0,36	+0,20
10	+0,16	+0,03	+0,26	+0,31	+0,30	+0,22	+0,73	+0,95	+0,23	+0,37
11	+0,61	+0,48	+0,26	-0,08	+0,26	+0,35	-0,13	-0,41	+0,48	+0,30
12	+0,41	+0,71	+0,46	+0,61	+0,74	+0,59	+0,80	+0,88	+0,79	+0,83
13	-0,58	-0,73	-0,22	+0,06	-0,31	-0,60	+0,23	+0,70	-0,65	-0,50
14	-0,83	-0,83	-0,28	-0,11	-0,64	-0,61	+0,21	+0,85	-0,78	-0,50
15	-0,14	-0,19	+0,47	+0,48	+0,12	+0,02	+0,55	+0,81	-0,09	+0,00
16	-0,60	-0,65	-0,65	-0,51	-0,53	-0,62	-0,52	-0,32	-0,60	-0,72
17	-0,38	-0,47	-0,44	-0,54	-0,52	-0,52	-0,50	-0,26	-0,47	-0,52
18	-0,18	-0,22	-0,07	+0,02	-0,07	-0,11	+0,19	+0,34	-0,22	-0,10
19	-0,10	-0,06	-0,59	-0,53	-0,40	-0,31	-0,87	-1,16	-0,24	-0,28
20	-0,39	-0,25	-0,74	-0,86	-0,69	-0,49	-1,13	-1,67	-0,21	-0,59
21	+0,29	+0,56	+0,92	+0,92	+0,46	+0,56	+0,43	+0,01	+0,46	+0,50
22	+0,29	+0,47	+0,25	+0,17	+0,32	+0,32	+0,43	+0,01	+0,15	+0,36
23	+0,72	+0,62	+0,82	+0,74	+0,74	+0,60	+0,37	+0,53	+0,72	+0,69
24	-2,16	-2,35	-1,91	-2,11	-2,25	-2,34	-1,68	-1,26	-2,33	-2,17
25	-2,66	-2,58	-2,77	-2,69	-2,67	-2,67	-2,74	-2,64	-2,63	-2,73

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

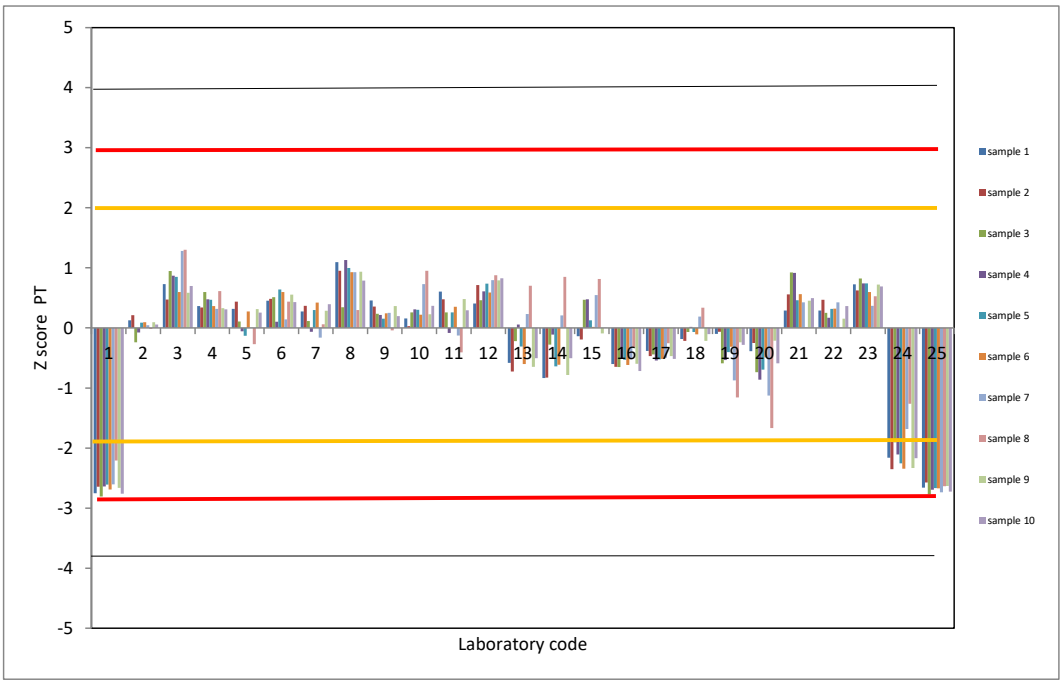


Table VII : Zscore of the different laboratories for each sample.

ZS calculated on the standard deviation of reproducibility of the method

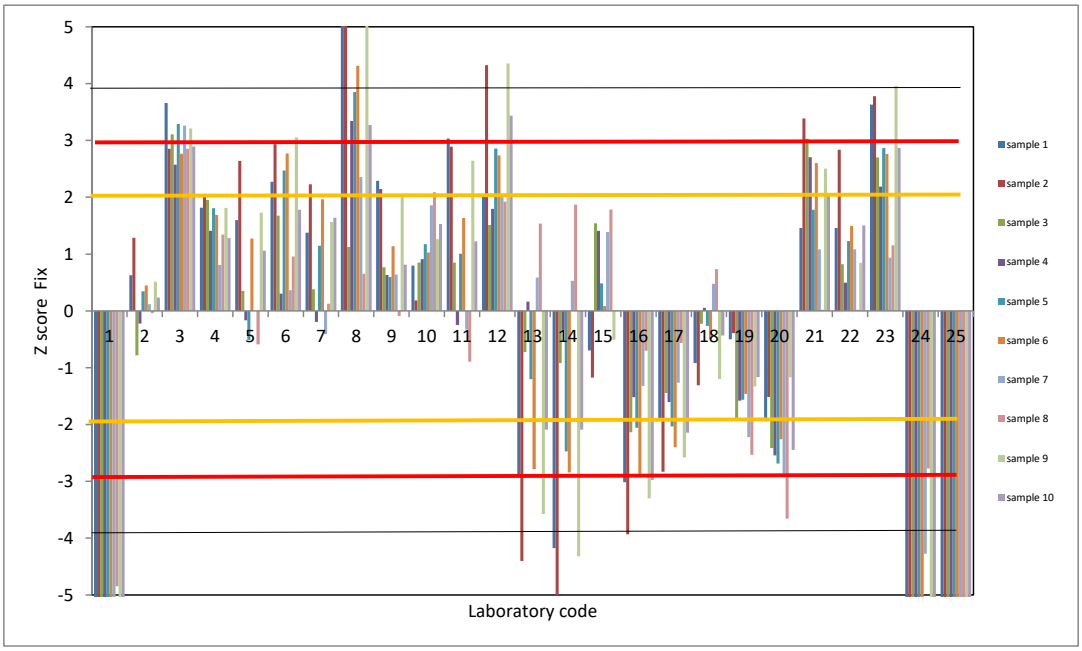
Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-13,79	-16,01	-9,21	-7,79	-10,10	-12,48	-6,62	-4,84	-14,65	-11,45
2	+0,63	+1,29	-0,78	-0,22	+0,34	+0,45	+0,12	-0,04	+0,51	+0,23
3	+3,66	+2,85	+3,11	+2,57	+3,29	+2,77	+3,26	+2,85	+3,21	+2,89
4	+1,82	+2,06	+1,95	+1,41	+1,81	+1,69	+0,81	+1,34	+1,81	+1,28
5	+1,60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

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

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

Figure 3 :

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



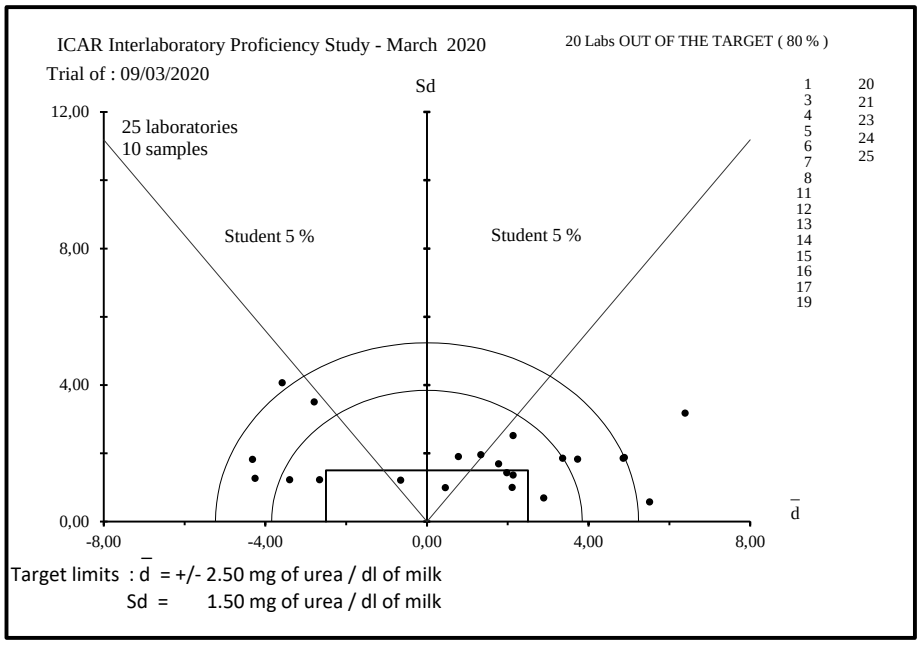


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST

RAW MILK
Urea Routine method
March 2020

Name	City	Country
Alip	Sousada	Portugal
Cattle Information Service (CIS)	Teiford	England
Comité du Lait ASBL	Battice	Belgium
Croatian Agricultural Agency, Central Laboratory for Milk Quality Control	Krizevci	Croatia
Eastern Lab services	Medina	USA
Eurofins Steins Laboratory A/B	Jönköping	Sweden
Eurofins Steins Laboratory A/S	Vejen	Denmark
Federazione Latterie Alto Adige Soc. Agr. Coop.	Bolzano	Italy
KGZS Zavod Ptuj	Ptuj	Slovenia
Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.	Brno	Czech Republic
LRV-LABORATORIO REGIONAL DE VETERINARIA	Azores	Portugal
Merieux NutriScience J Bay	Cape Town	South Africa
Merieux Nutriscience South Africa (Midrand)	Midrand	South Africa
Milchkontroll und Rinderzuchtverband eG	Güstrow	Germany
Plemenárske sluzby SR s.p.	Zilina	Slovakia
Tine Ramelklaboratoriet Heimdal	Heimdal	NO
Univ. of Ljubljana dept. of Animal Sc. Inst. of Dairy Sc. and Probiotics	Domzale	Slovenia
Valio Oy, Regional laboratory	Seinajoki	Finland

ICAR

PROFICIENCY TESTING SCHEME

March 2020

Raw Milk

BHB Beta-HydroxyButyrate

Sending date of statistical treatment : 8th April 2020

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

Table I : Ranking of the laboratories Units : milimole of BHB / liter of milk

Nb	%	N°	d	Sd	D	Method
1	7	6	+ 0,009	0,010	0,013	A
2	13	7	+ 0,002	0,013	0,014	A
3	20	8	+ 0,014	0,007	0,015	A
4	27	11	- 0,016	0,006	0,017	A
5	33	4	- 0,015	0,010	0,018	A
6	40	5	- 0,022	0,004	0,023	B
7	47	13	+ 0,024	0,013	0,027	A
8	53	12	+ 0,029	0,006	0,030	A
9	60	15	+ 0,033	0,008	0,034	A
10	67	1	- 0,035	0,011	0,036	A
11	73	2	- 0,041	0,011	0,043	A
12	80	14	- 0,045	0,010	0,046	A
13	87	10	- 0,066	0,010	0,067	A
14	93	3	+ 0,068	0,012	0,069	A
15	100	9	+ 0,068	0,016	0,070	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 :

$\bar{d}$ = +/- 0,045 milimole of BHB / liter of milk
Sd = 0,045 milimole of BHB / liter of milk

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 15 set of results send by 15 laboratories discarging using Grubbs test at 5 % risk level

A ISO 9622|IDF 141
B Continuous flow analyzer

(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))

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %) Sr_{PT} 0,010
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %) SR_{PT} 0,036

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.

Table II : REPEATABILITY - Absolute difference between replicates in milimole of BHB / liter of milk

Sample / Lab code	51	52	53	54	55	56	57	58	59	60	Sr	NL
1	0,010	0,000	0,010	0,020	0,000	0,010	0,010	0,020	0,010	0,010	0,008	20
2	0,031	0,023	0,003	0,026	0,028 *	0,004	0,028	0,004	0,001	0,017	0,014	20
3	0,020	0,030	0,030 *	0,030	0,040 *	0,040 *	0,000	0,040	0,050 *	0,040	0,024	20
4	0,000	0,000	0,020	0,010	0,010	0,010	0,010	0,020	0,010	0,000	0,008	20
5	0,010	0,000	0,000	0,010	0,000	0,010	0,000	0,000	0,000	0,000	0,004	20
6	0,020	0,000	0,010	0,000	0,000	0,010	0,000	0,010	0,010	0,030	0,009	20
7	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
8	0,020	0,000	0,000	0,010	0,010	0,010	0,020	0,010	0,020	0,010	0,009	20
9	**	**	**	**	**	**	**	**	**	**		
10	0,040	0,010	0,000	0,000	0,000	0,020	0,010	0,010	0,000	0,000	0,011	20
11	0,010	0,010	0,010	0,000	0,000	0,010	0,020	0,010	0,000	0,000	0,007	20
12	0,000	0,010	0,010	0,010	0,010	0,010	0,000	0,010	0,030	0,050	0,014	20
13	0,010	0,000	0,010	0,010	0,010	0,010	0,000	0,020	0,010	0,010	0,007	20
14	0,000	0,010	0,000	0,010	0,000	0,000	0,010	0,010	0,020	0,010	0,007	20
15	0,020	0,010	0,000	0,010	0,010	0,010	0,010	0,010	0,020	0,010	0,009	20
Sr	0,013	0,008	0,008	0,010	0,010	0,010	0,009	0,011	0,013	0,014		280
NE	28	28	28	28	28	28	28	28	28	28		
L	0,047	0,031	0,022	0,036	0,016	0,026	0,032	0,042	0,036	0,053		

Sr : repeatability standard deviation of each laboratory limit 0,011 milimole of BHB / liter of milk

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=0,030 milimole of BHB / liter of milk

Table III : Means of the replicates in milimole of BHB / liter of milk

Sample / Lab code	51	52	53	54	55	56	57	58	59	60
1	0,065	0,080	0,115	0,140	0,150	0,155	0,165	0,210	0,215	0,225
2	0,058	0,088	0,094	0,127	0,147	0,165	0,164	0,184	0,211	0,220
3	0,150	0,175	0,205	0,225	0,240	0,260	0,280	0,310	0,345	0,360
4	0,070	0,100	0,130	0,145	0,165	0,165	0,205	0,230	0,255	0,250
5	0,085	0,100	0,120	0,135	0,150	0,175	0,190	0,210	0,230	0,250
6	0,120	0,120	0,155	0,170	0,180	0,185	0,230	0,245	0,255	0,295
7	0,120	0,140	0,150	0,150	0,160	0,210	0,200	0,230	0,260	0,270
8	0,100	0,130	0,160	0,175	0,185	0,205	0,230	0,255	0,280	0,285
9	0,170	0,180	0,190	0,220	0,220	0,260	0,280	0,330	0,330	0,370
10	0,050	0,045	0,090	0,090	0,120	0,120	0,145	0,165	0,180	0,200
11	0,095	0,105	0,125	0,140	0,160	0,165	0,200	0,215	0,240	0,260
12	0,120	0,145	0,165	0,185	0,205	0,225	0,250	0,265	0,295	0,305
13	0,115	0,130	0,155	0,165	0,205	0,235	0,230	0,260	0,295	0,315
14	0,070	0,075	0,100	0,115	0,130	0,140	0,175	0,195	0,210	0,205
15	0,150	0,145	0,170	0,185	0,195	0,225	0,245	0,285	0,290	0,305
M	0,103	0,117	0,142	0,158	0,174	0,193	0,213	0,239	0,259	0,274
REF.	0,102	0,118	0,141	0,157	0,173	0,193	0,213	0,238	0,259	0,274
SD	0,037	0,037	0,035	0,037	0,034	0,043	0,041	0,046	0,047	0,052

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 15 laboratories , after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	51	52	53	54	55	56	57	58	59	60
Outliers Cochran			3		2; 3	3		3	3	
Outlier Grubbs										
sr	0,013	0,008	0,006	0,010	0,005	0,007	0,009	0,011	0,010	0,014
SR	0,034	0,035	0,028	0,035	0,028	0,036	0,039	0,041	0,038	0,047

Table V : ACCURACY - differences (laboratory - reference) in milimole of BHB / liter of milk

Sample / Lab code	51	52	53	54	55	56	57	58	59	60	d	Sd_{lab}	t
1	- 0,037	- 0,038	- 0,026	- 0,017	- 0,023	- 0,038	- 0,048	- 0,028	- 0,044	- 0,049	- 0,035	0,011	10,38
2	- 0,045	- 0,030	- 0,048	- 0,030	- 0,026	- 0,028	- 0,049	- 0,054	- 0,048	- 0,054	- 0,041	0,011	11,65
3	+ 0,048	+ 0,057	+ 0,064	+ 0,068	+ 0,067	+ 0,067	+ 0,067	+ 0,072	+ 0,086	+ 0,086	+ 0,068	0,012	18,52
4	- 0,032	- 0,018	- 0,011	- 0,012	- 0,008	- 0,028	- 0,008	- 0,008	- 0,004	- 0,024	- 0,015	0,010	5,05
5	- 0,017	- 0,018	- 0,021	- 0,022	- 0,023	- 0,018	- 0,023	- 0,028	- 0,029	- 0,024	- 0,022	0,004	17,25
6	+ 0,018	+ 0,002	+ 0,014	+ 0,013	+ 0,007	- 0,008	+ 0,017	+ 0,007	- 0,004	+ 0,021	+ 0,009	0,010	2,85
7	+ 0,018	+ 0,022	+ 0,009	- 0,007	- 0,013	+ 0,017	- 0,013	- 0,008	+ 0,001	- 0,004	+ 0,002	0,013	0,53
8	- 0,002	+ 0,012	+ 0,019	+ 0,018	+ 0,012	+ 0,012	+ 0,017	+ 0,017	+ 0,021	+ 0,011	+ 0,014	0,007	6,67
9	+ 0,068	+ 0,062	+ 0,049	+ 0,063	+ 0,047	+ 0,067	+ 0,067	+ 0,092	+ 0,071	+ 0,096	+ 0,068	0,016	13,56
10	- 0,052	- 0,073	- 0,051	- 0,067	- 0,053	- 0,073	- 0,068	- 0,073	- 0,079	- 0,074	- 0,066	0,010	20,45
11	- 0,007	- 0,013	- 0,016	- 0,017	- 0,013	- 0,028	- 0,013	- 0,023	- 0,019	- 0,014	- 0,016	0,006	8,75
12	+ 0,018	+ 0,027	+ 0,024	+ 0,028	+ 0,032	+ 0,032	+ 0,037	+ 0,027	+ 0,036	+ 0,031	+ 0,029	0,006	15,94
13	+ 0,013	+ 0,012	+ 0,014	+ 0,008	+ 0,032	+ 0,042	+ 0,017	+ 0,022	+ 0,036	+ 0,041	+ 0,024	0,013	5,76
14	- 0,032	- 0,043	- 0,041	- 0,042	- 0,043	- 0,053	- 0,038	- 0,043	- 0,049	- 0,069	- 0,045	0,010	14,45
15	+ 0,048	+ 0,027	+ 0,029	+ 0,028	+ 0,022	+ 0,032	+ 0,032	+ 0,047	+ 0,031	+ 0,031	+ 0,033	0,008	12,32
d	+ 0,000	- 0,001	+ 0,000	+ 0,000	+ 0,001	- 0,000	- 0,000	+ 0,001	+ 0,000	+ 0,001	+ 0,000	0,040	
Sd	0,037	0,037	0,035	0,037	0,034	0,043	0,041	0,046	0,047	0,052	0,041		

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

Upper limits : $\bar{d}$ = +/- 0,045 milimole of BHB / liter of milk
Sd = 0,045 milimole of BHB / liter of milk

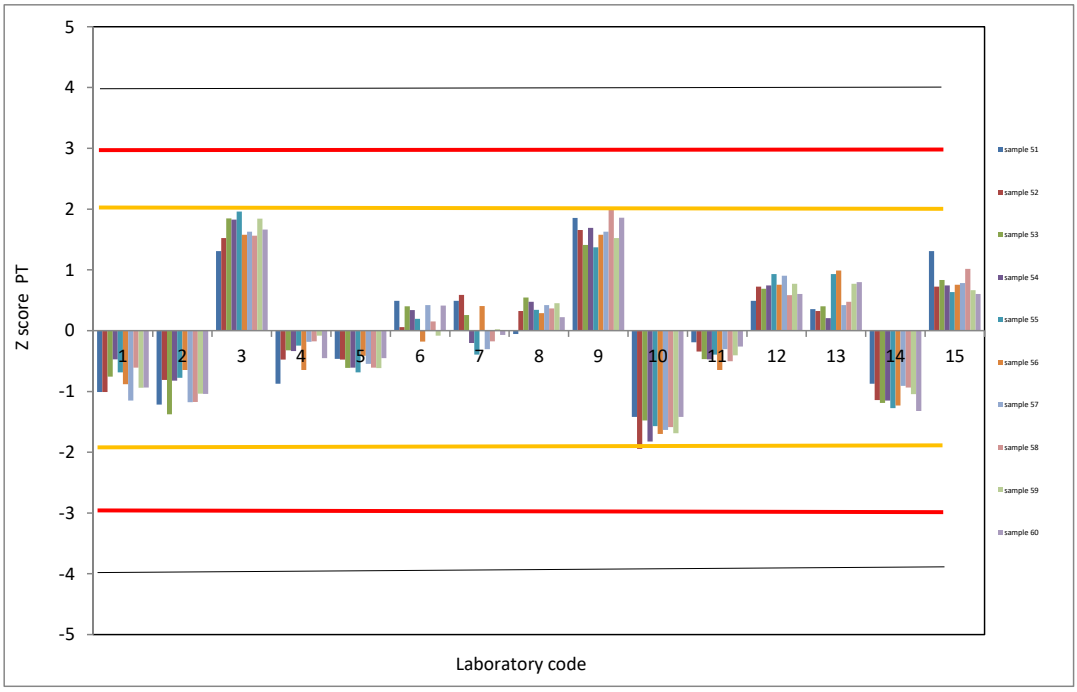
Table VI : Zscore of the different laboratories for each sample.
ZS calculated on the PT standard deviation

Sample / Lab code	51	52	53	54	55	56	57	58	59	60
1	-1,01	-1,01	-0,76	-0,47	-0,69	-0,88	-1,15	-0,61	-0,94	-0,94
2	-1,21	-0,81	-1,38	-0,82	-0,78	-0,65	-1,18	-1,17	-1,04	-1,04
3	+1,31	+1,52	+1,84	+1,83	+1,96	+1,58	+1,63	+1,56	+1,84	+1,66
4	-0,87	-0,48	-0,32	-0,34	-0,25	-0,65	-0,18	-0,18	-0,08	-0,45
5	-0,46	-0,48	-0,61	-0,61	-0,69	-0,41	-0,55	-0,61	-0,62	-0,45
6	+0,49	+0,06	+0,40	+0,34	+0,19	-0,18	+0,42	+0,15	-0,08	+0,41
7	+0,49	+0,59	+0,26	-0,20	-0,39	+0,41	-0,30	-0,18	+0,02	-0,07
8	-0,06	+0,32	+0,54	+0,47	+0,34	+0,29	+0,42	+0,37	+0,45	+0,22
9	+1,85	+1,66	+1,41	+1,69	+1,37	+1,58	+1,63	+2,00	+1,52	+1,86
10	-1,42	-1,94	-1,48	-1,83	-1,57	-1,70	-1,63	-1,59	-1,69	-1,42
11	-0,19	-0,34	-0,47	-0,47	-0,39	-0,65	-0,30	-0,50	-0,40	-0,26
12	+0,49	+0,72	+0,69	+0,75	+0,93	+0,76	+0,90	+0,58	+0,77	+0,61
13	+0,35	+0,32	+0,40	+0,20	+0,93	+0,99	+0,42	+0,48	+0,77	+0,80
14	-0,87	-1,14	-1,19	-1,15	-1,28	-1,23	-0,91	-0,94	-1,05	-1,32
15	+1,31	+0,72	+0,83	+0,75	+0,64	+0,76	+0,78	+1,02	+0,67	+0,61

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



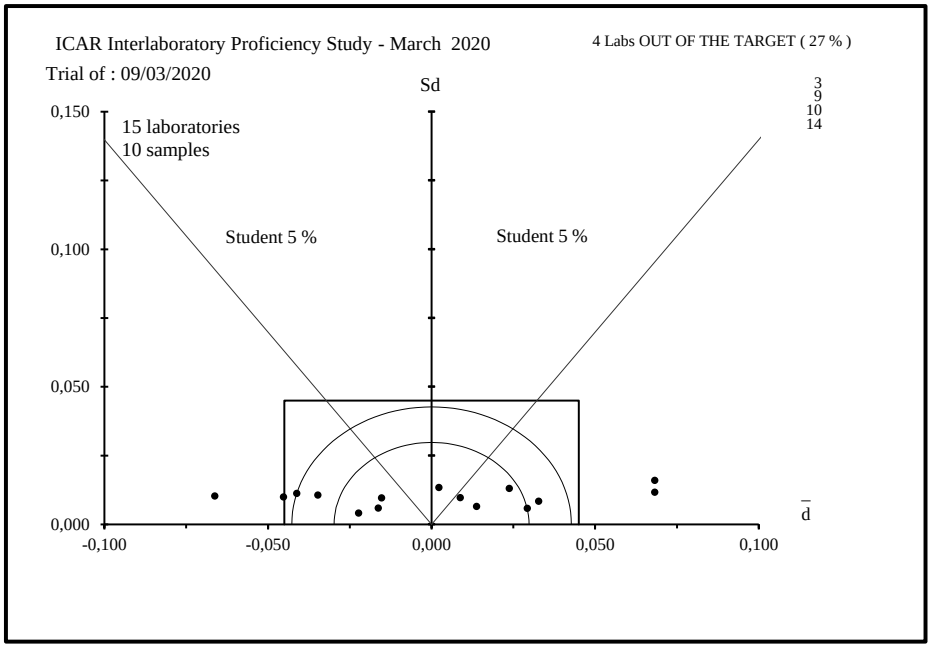


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST

RAW MILK
BHB
March 2020

Name	City	Country
Actalia	Poligny	France
Alip	Sousada	Portugal
Cattle Information Service (CIS)	Teiford	England
centar za controlu kvalitete stocarskih proizvoda	Krizevci	Croatia
Estonian Livestock Performance Recording Ltd	Tartu	Estonie
Eurofins Steins Laboratory A/S	Vejen	Denmark
Horizon Lab Ltd	Winnipeg	Canada
KGZS Zavod Ptuj	Ptuj	Slovenia
Korea Animal Improvement Association	Anseong	Korea
Lactanet	Quebec	Canada
LRV-LABORATORIO REGIONAL DE VETERINARIA	Azores	Portugal
Milchkontroll und Rinderzuchtverband eG	Güstrow	Germany
Pacific Milk Analysis	Chilliwack	Canada
Valio Oy, Regional laboratory	Seinajoki	Finland

ICAR

PROFICIENCY TESTING SCHEME

MARCH 2020

Cow Raw Milk

DETECTION of PAG (Pregnancy Associated Glycoproteins)

Sending date of statistical treatment : 8th April 2020

Frame of activity : ICAR Milk Analyses Sub Committee (MA SC)

Milk Analysis Certification Executive Silvia Orlandini pt@icar.org silvia@icar.org

ACTALIA CECALAIT

Table I: Methods

N°	METHOD USED
1	IDEXX
2	IDEXX
3	IDEXX
4	IDEXX
5	IDEXX
6	IDEXX
7	IDEXX
8	IDEXX
9	IDEXX
10	IDEXX
11	IDEXX
12	IDEXX
13	IDEXX
14	IDEXX

Table II : Laboratory results

N°	41	42	43	44	45
1	Y	N	Y	Y	N
2	Y	N	Y	Y	N
3	Y	N	Y	Y	N
4	Y	N	Y	Y	N
5	Y	N	Y	Y	N
6	Y	N	Y	Y	N
7	Y	N	Y	Y	N
8	Y	N	Y	Y	N
9	Y	N	Y	Y	N
10	Y	N	Y	Y	N
11	Y	N	Y	Y	N
12	Y	N	Y	Y	N
13	Y	N	Y	Y	N
14	Y	N	Y	Y	N
REF	Y	N	Y	Y	N

Answers : Y = YES; N = NO; to the questions: Presence of PAG (Pregnancy Associated Glycoproteins)

Table III :

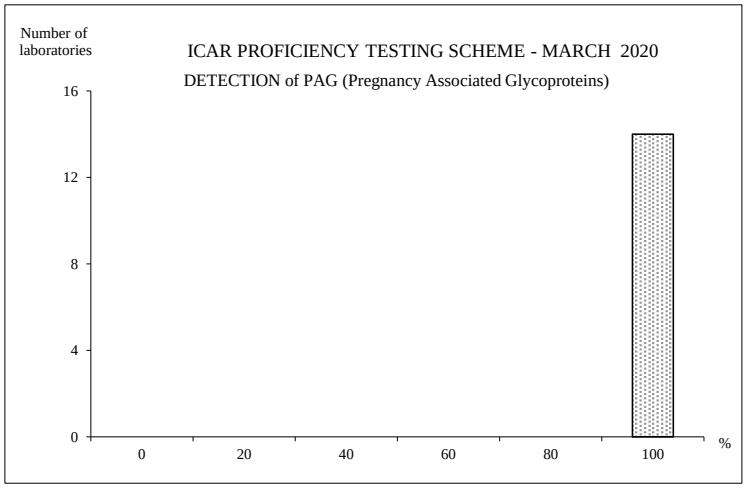
SAMPLES	STRAINS	Date
41	Pregnant - Artificial insemination	06/01/2020
42	Non pregnant	--
43	Pregnant - Artificial insemination	19.09.2019
44	Pregnant - Artificial insemination	17/12/2019
45	Non pregnant	--

Table IV : Laboratory accuracy with respect to correct results

N°	41	42	43	44	45	FLR%
1	T	T	T	T	T	100
2	T	T	T	T	T	100
3	T	T	T	T	T	100
4	T	T	T	T	T	100
5	T	T	T	T	T	100
6	T	T	T	T	T	100
7	T	T	T	T	T	100
8	T	T	T	T	T	100
9	T	T	T	T	T	100
10	T	T	T	T	T	100
11	T	T	T	T	T	100
12	T	T	T	T	T	100
13	T	T	T	T	T	100
14	T	T	T	T	T	100
NSR	14	14	14	14	14	
NS	14	14	14	14	14	
FSR%	100	100	100	100	100	

T : True F : False

NSR : number of right answers per sample and criterion
NS : total number of answers per sample and criterion
FSR% : frequency in right answers per sample and criterion
FLR% : relative frequency in right answers per laboratory



LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST
RAW MILK
PAG
March 2020

Name	City	Country
Alip	Sousada	Portugal
Cattle Information Service (CIS)	Teiford	England
Comité du Lait ASBL	Battice	Belgium
Croatian Agricultural Agency, Central Laboratory for Milk Quality Control	Krizevci	Croatia
Estonian Livestock Performance Recording Ltd	Tartu	Estonie
Eurofins Steins Laboratory A/S	Vejen	Denmark
Horizon Lab Ltd	Winnipeg	Canada
Laborator pro rozbor mléka Brno, Ceskomoravská spolecnost chovatelú a.s.	Brno	Czech Republic
Lactanet	Qubec	Canada
LRV-LABORATORIO REGIONAL DE VETERINARIA	Azores	Portugal
PFHBiPM Laboratorium w Bialymstoku zs.w jezewie Starym	Tykocin	Poland
PFHBiPM Laboratorium w Kobiernie	Kobierno	Poland
PFHBiPM Laboratorium w Parzniewie	Pruszkow	Poland
Valio Oy, Regional laboratory	Seinajoki	Finland

ICAR

PROFICIENCY TESTING SCHEME

MARCH 2020

Cow Raw Milk

MICROORGANISM DNA (PCR Technic)

Sending date of statistical treatment : 8th April 2020

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

Table I: Methods

N°	METHOD USED
1	PCR Method
2	PCR Method
3	PCR Method
4	PCR Method
5	PCR Method
6	PCR Method
7	PCR Method
8	PCR Method
9	PCR Method

Table II : Laboratory results

N°	46	47	48	49	50
1	+	+	+	+	+
2	+	+	+	+	+
3	+	+	+	+	+
4	+	+	+	+	+
5	+	+	+	+	+
6	+	+	+	+	+
7	+	+	+	+	+
8	+	+	+	+	+
9	+	+	+	+	+
10	+	+	+	+	+
11	+	+	+	+	+
12	+	+	+	+	+
MICROORGANISM DNA	Staphylococci aureus	Staphylococci aureus	Escherichia coli	Klebsiella oxytoca	Staphylococcus haemolyticus
CFU / ml	110.10^3 CFU/ml	110.10^3 CFU/ml	98.10^3 CFU/ml	130.10^3 CFU/ml	180.10^3 CFU/ml
MICROORGANISM DNA	Escherichia coli				
CFU / ml	98.10^3 CFU/ml				

Table III :

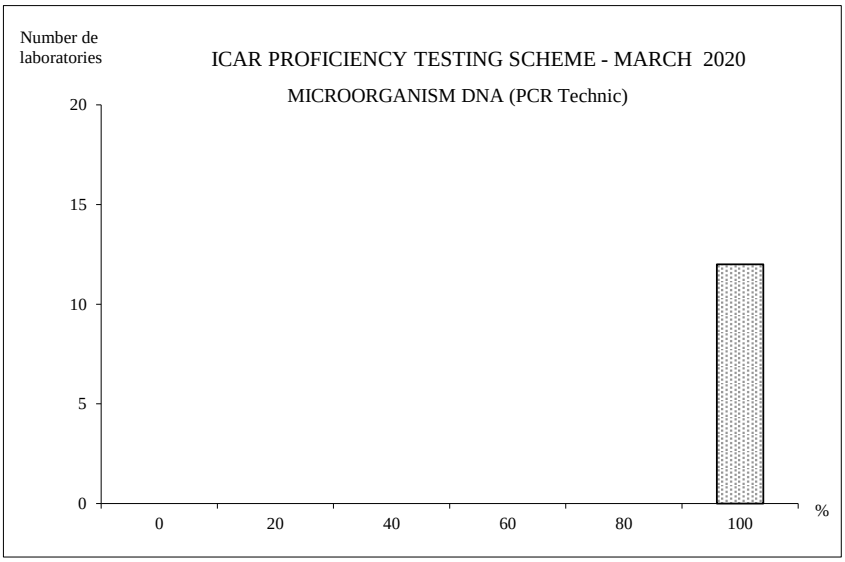
SAMPLES	STRAINS	LEVEL
46	Staphylococcus aureus Escherichia coli	110.10^3 CFU/ml 98.10^3 CFU/ml
47	Staphylococcus aureus	110.10^3 CFU/ml
48	Escherichia coli	98.10^3 CFU/ml
49	Klebsiella oxytoca	130.10^3 CFU/ml
50	Staphylococcus haemolyticus	180.10^3 CFU/ml

Table IV : Laboratory accuracy with respect to correct results

N°	46	47	48	49	50	FLR%
1	T	T	T	T	T	100
2	T	T	T	T	T	100
3	T	T	T	T	T	100
4	T	T	T	T	T	100
5	T	T	T	T	T	100
6	T	T	T	T	T	100
7	T	T	T	T	T	100
8	T	T	T	T	T	100
9	T	T	T	T	T	100
10	T	T	T	T	T	100
11	T	T	T	T	T	100
12	T	T	T	T	T	100
NSR	12	12	12	12	12	
NS	12	12	12	12	12	
FSR%	100	100	100	100	100	

T : True F : False

NSR : number of right answers per sample and criterion
NS : total number of answers per sample and criterion
FSR% : frequency in right answers per sample and criterion
FLR% : relative frequency in right answers per laboratory



LIST OF THE PARTICIPANTS ICAR
ICAR PROFICIENCY TEST
RAW MILK
DNA-PCR
March 2020

Name	City	Country
Central Star Cooperative WI Lab	Wisconsin	USA
Comité du Lait ASBL	Battice	Belgium
DNA Diagnostic	Risskov	Denmark
Estonian	Tartu	Estonie
Eurofins Milk Testing Sweden AB	Jönköping	Sweden
Eurofins Steins Laboratory A/S	Vejen	Denmark
Labilait	Aumale	France
LVK	Hobro	Denmark
Milchkontroll und Rinderzuchtverband eG	Güstrow	Germany
Thermo Fisher Scientific Lab Service International	Lissieu	France
Thermo Fisher Scientific Oy	Vantaa	Finland
Tine SA Mastittlaboratoriet i Molde	Molde	Norway