THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

ICAR PROFICIENCY TEST - MARCH 2024

Raw cow milk

“Reference” Methods

THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

FRAME OF ACTIVITY :

ICAR MILK ANALYSES SUB-COMMITTEE (MA SC)

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

Email: pt@icar.org

THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

Raw cow milk

“Reference” Methods

THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Table of contents

1. Introduction

Dear Participant,

Thank you for participating in the ICAR Proficiency Test (PT) March 2024 !

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

The samples preparation and statistical elaboration have been done by ICAR with Sub-contractors Actalia and Lactanet for fatty acids. Both subcontractors are accredited ISO 17025 and ISO 17043.

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

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

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

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

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

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

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

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

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

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

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

D) It is the ranking of your laboratory. The values of table 1 for each parameter are reported. In table F the ranking of your lab will be green if the mean of difference and standard deviation of difference value are in the box of figure 2 of each parameter. Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation. ICAR Milk Analyses Sub Committee is monitoring these limits and eventually will update the limit of the box to evaluate the accuracy.

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

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

G) In table G the results of your Z-Score$_{PT}$ (standard deviation calculated on this proficiency test) and the Z-Score$_{FIX}$ (standard deviation of the standard method) are summarized.

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

If you have obtained all the -2<Z-Score results<+2 the cell will be filled in green. If you have obtained one or more results in the moderate or poor performance range the cells will be filled in yellow or red respectively.

Control Charts and tables

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

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

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

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

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

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

For the new parameter fatty acids, the statistical elaboration is done for each fatty acid. In case we did not receive enough results the data are reported in the complete report without any statistic.

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

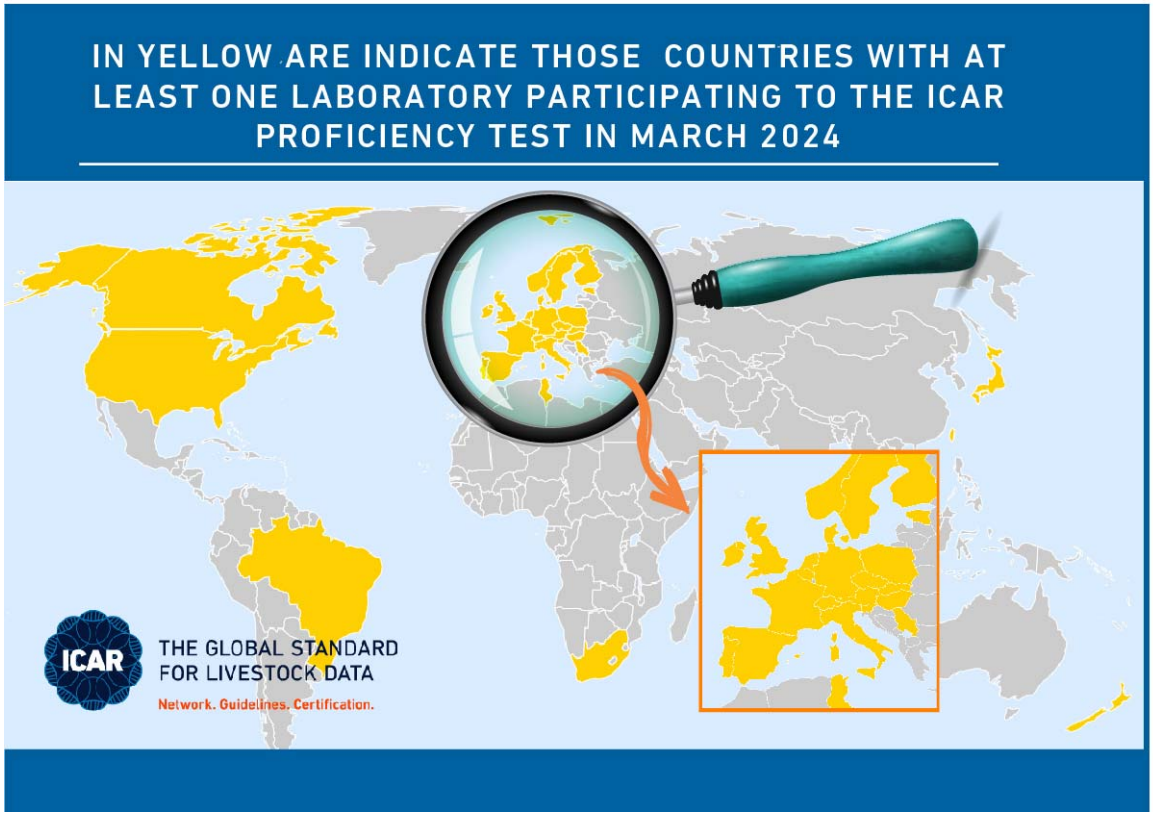
We are sure with your support and contribution it will grow to benefit all!

The list of laboratories that participated in ICAR PT March 2024 with at least one parameter is reported below

Table 1. Participating milk laboratories to the ICAR Proficiency Test (March 2024).

Country	Laboratory
Austria	Pruefstelle Labor Rotholz
Belgium	Comite du Lait ASBL
Belgium	Department of Agricultural products of Walloon Agricultural Research Centre
Brazil	Clinica do Leite Ltda
Canada	Laboratory Service division Univ. of Guelph
Canada	Lactanet
Canada	Lactanet Guelph
Czech Rep.	Laborator pro rozbor mleka Brno, Ceskomoravská spolecnost chovatelu a.s.
Czech Rep.	MILCOM a.s Dairy Research Institute
Denmark	Eurofins Milk Testing Denmark
Denmark	Foss Analytical A/S
Denmark	LVK
Estonia	Eesti Pollumajandusloomade Joudluskontrolli AS, Milk Analysing Laboratory
Finland	Valio Oy, Regional laboratory
France	ACTALIA / ACTILAIT / CECALAIT
France	Bentley Instruments
Germany	Milchprüfring Bayern e.V.
Hungary	Hrvatska Agencija za poljoprivredu i hranu
Ireland	Dale Farm Dairy Co Operative
Ireland	Teagasc
Israel	Central Milk Laboratory – ICBA

Country	Laboratory
Italy	Associazione Italiana Allevatori, Laboratorio Standard Latte (LSL-AIA)
Italy	Federazione Latterie Alto Adige Soc. Agr. Coop.
Japon	Japan Dairy Technical Association
New Zealand	MilkTestNZ
Norway	Tine Ramelklaboratoriet Heimdal
Poland	Instytut Innowacji Przemyslu Mleczar
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	LRV-LABORATORIO REGIONAL DE VETERINARIA
Portugal	Serclat Terceira
Serbia	Laboratorija za ispitivanje kvaliteta mleka, Poljoprivredni fakultet Novi Sad
Slovakia	Plemenárske služby SR, š.p., Centrálne laboratórium rozboru mlieka
Slovenia	KGZS Zavod Ptuj
Slovenia	University of Ljubljana, Biotechnical Faculty, Department of Animal Science, Institute of Dairy Science and Probiotics
Slovenia	Veterinary faculty NVI U Kranj
South Africa	Aspirata
South Africa	Mérieux NutriSciences Cape Town
Spain	CICAP
Sweden	DeLaval International AB
Sweden	Eurofins Milk Testing Sweden AB
Switzerland	Agroscope
Switzerland	Nestlè R&D Konolfingen
Switzerland	Nestle research/Lipidomics-Soc. des Produits Nestle S.A. Nestle research
Switzerland	Suisselab AG
Taiwan	Council of Agriculture, Executive Yuan, Taiwan Animal Germplasm Center of TLRI
The Netherlands	Friesland Campina LQS Business Support
The Netherlands	NQAC
The Netherlands	Qlip B.V.
Tunisia	Office de l'Elevage et des Pasturages, Laboratoire de Controle Laitier
UK	National Milk Records plc_ Glasgow
UK	National Milk Records plc_ Wolverhampton
UK	The Cattle Information Service
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

Chemical Reference Methods
Laboratory participation codes and Performance analyses

ICAR PT RF0324

Laboratory Name	

A

Your participation Codes					
Subscription	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	Yes	Yes	No	Yes	Yes
Participation Codes	1	1			59
Are all the sample results received?	Yes	Yes		Yes	Yes

B

Data results received on time					
	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Results reception date	21/03/2024	21/03/2024		21/03/2024	21/03/2024

C

Have you sent the data with the correct units of measurements?					
	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
	Yes	No		Yes	Yes
** It was requested to report the value in total nitrogen*					

D

Ranking of your lab					
	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
Code	1	1			59
%	93	100			92
d	0.009	-0.177			6%
Sd	0.032	0.019			10%
D	0.033	0.178			11%
Limits					
d	<= 0.020	<= 0.025	<= 0.10	-2.5 <= d <= 2.5	-10% <= d <= 10%
Sd	<= 0.030	<= 0.020	<= 0.10	<= 1.5	<= 10%

E

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

F

Repeatability

Your "r" performance

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
	g/100g	nitrogen g/100g *	g/100g	mg/dl	SCC*1000/ml
Sample 1	0.000	0.000			0
Sample 2	0.000	0.000			0
Sample 3	0.000	0.000			0
Sample 4	0.000	0.000			0
Sample 5	0.000	0.000			0
Sample 6	0.000	0.000			0
Sample 7	0.000	0.000			0
Sample 8	0.000	0.000			0
Sample 9	0.000	0.000			0
Sample 10	0.000	0.000			0

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

Limits

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

G

Your Z-Score PT

	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Sample 1	1.65	-9.46			-1.85
Sample 2	1.62	-6.81			1.97
Sample 3	0.98	-6.31			2.19
Sample 4	6.36	-6.99			1.25
Sample 5	1.11	-11.20			8.32
Sample 6	1.66	-4.99			1.50
Sample 7	0.75	-5.55			4.30
Sample 8	0.72	-7.10			0.05
Sample 9	-6.34	-6.93			-3.07
Sample 10	-0.14	-5.75			2.44

Your Z-Score Fix

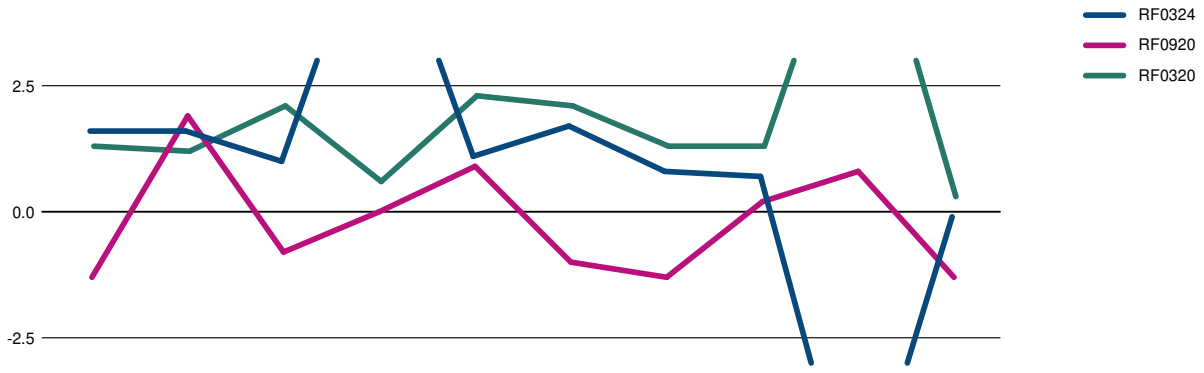
	Fat ref	Protein ref	Lactose ref	Urea ref	SCC ref/alt
Sample 1	1.40	-11.11			-0.97
Sample 2	0.84	-8.85			1.95
Sample 3	0.61	-8.80			1.87
Sample 4	2.83	-9.34			1.10
Sample 5	0.82	-10.38			5.06
Sample 6	0.60	-8.16			1.75
Sample 7	0.41	-9.56			2.93
Sample 8	0.47	-10.00			0.05
Sample 9	-3.47	-11.11			-2.25
Sample 10	-0.13	-10.84			1.75

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

Interpretation Z-Score

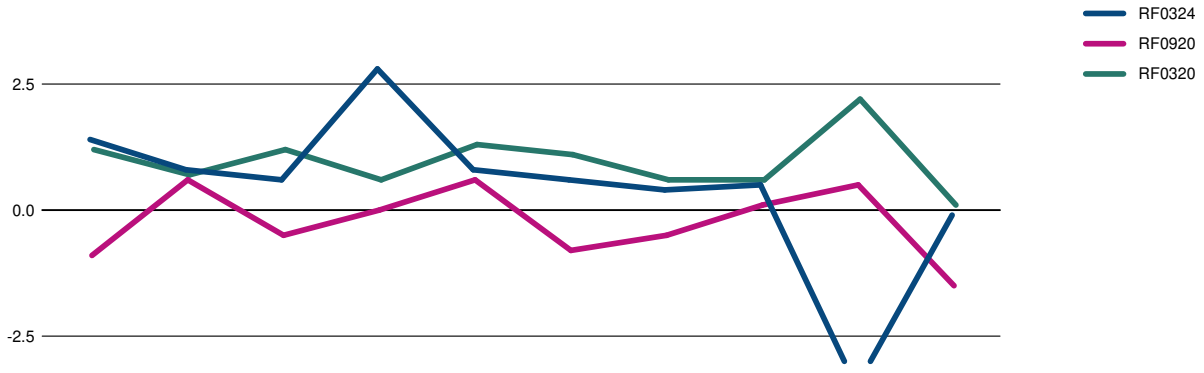
Z-Score < -3	-3 <= Z-Score < -2	-2 <= Z-Score <= 2	2 < Z-Score <= 3	Z-Score > 3
Poor	Moderate	Good	Moderate	Poor

ZSCORE-PT - FAT reference



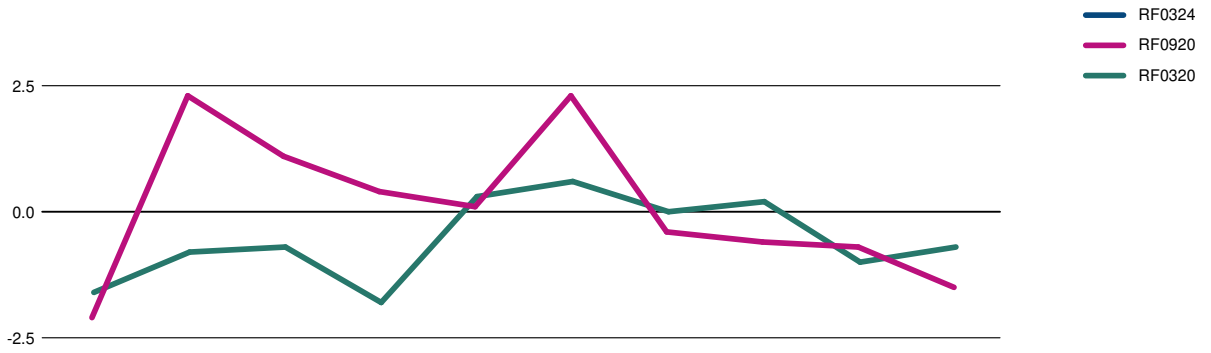
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
1	RF0324	1.6	1.6	1.0	6.4	1.1	1.7	0.8	0.7	-6.3	-0.1	0%	20%	80%
1	RF0920	-1.3	1.9	-0.8	0.0	0.9	-1.0	-1.3	0.2	0.8	-1.3	0%	0%	100%
1	RF0320	1.3	1.2	2.1	0.6	2.3	2.1	1.3	1.3	6.8	0.3	30%	10%	60%
1	RF0319	0.3	0.6	0.7	1.1	1.0	0.0	1.3	0.7	1.6	2.2	10%	0%	90%
1	RF0918	0.1	0.6	0.9	-0.3	1.5	-0.1	1.1	-0.4	-0.1	0.4	0%	0%	100%
1	RF0318	0.2	0.3	0.2	0.8	0.1	-0.2	-0.3	-0.2	0.6	0.2	0%	0%	100%
1	RF0917	-1.9	0.8	1.6	1.2	50.9	-0.7	0.8	0.9	2.6	0.7	10%	10%	80%
1	RF0317	0.7	0.4	0.3	0.3	0.5	0.2	0.9	0.6	-0.5	0.3	0%	0%	100%
1	RF0916	1.4	-1.1	-0.3	-0.7	-0.9	3.7	-0.4	0.5	0.0	-0.5	0%	10%	90%
1	RF0316	1.8	1.8	1.8	0.8	1.7	1.0	1.5	1.6	0.8	0.6	0%	0%	100%

ZSCORE-FIX - FAT reference



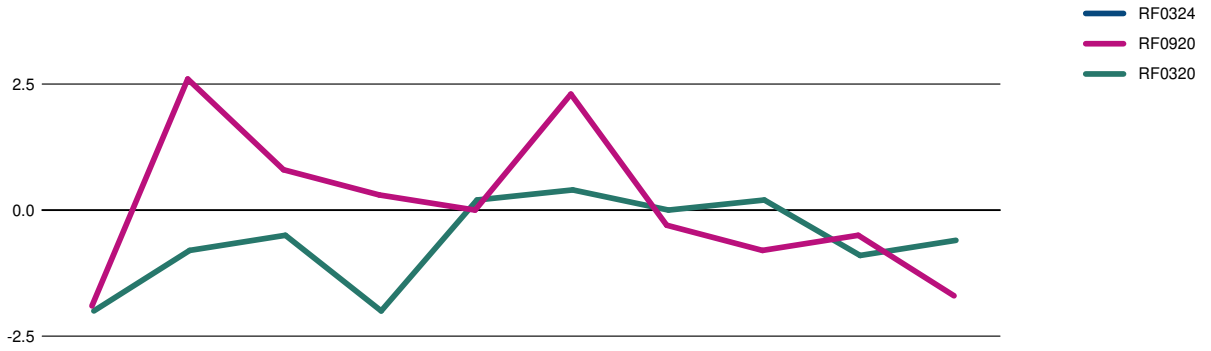
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
1	RF0324	1.4	0.8	0.6	2.8	0.8	0.6	0.4	0.5	-3.5	-0.1	10%	10%	80%
1	RF0920	-0.9	0.6	-0.5	0.0	0.6	-0.8	-0.5	0.1	0.5	-1.5	0%	0%	100%
1	RF0320	1.2	0.7	1.2	0.6	1.3	1.1	0.6	0.6	2.2	0.1	10%	0%	90%
1	RF0319	0.2	0.4	0.3	0.8	0.7	0.0	0.6	0.4	0.5	0.7	0%	0%	100%
1	RF0918	0.1	0.5	0.6	-0.3	1.0	0.0	0.5	-0.3	-0.1	0.4	0%	0%	100%
1	RF0318	0.2	0.2	0.1	1.0	0.1	-0.1	-0.4	-0.1	0.4	0.1	0%	0%	100%
1	RF0917	-0.8	0.9	0.6	0.7	25.6	-0.3	0.6	0.5	1.4	0.6	0%	10%	90%
1	RF0317	0.8	0.2	0.2	0.2	0.3	0.1	0.7	0.5	-0.2	0.1	0%	0%	100%
1	RF0916	0.6	-0.5	-0.2	-0.5	-0.8	2.2	-0.2	0.4	0.0	-0.3	10%	0%	90%
1	RF0316	1.8	1.2	1.1	0.5	1.1	0.5	1.2	0.8	0.7	0.7	0%	0%	100%

ZSCORE-PT - PROTEIN reference



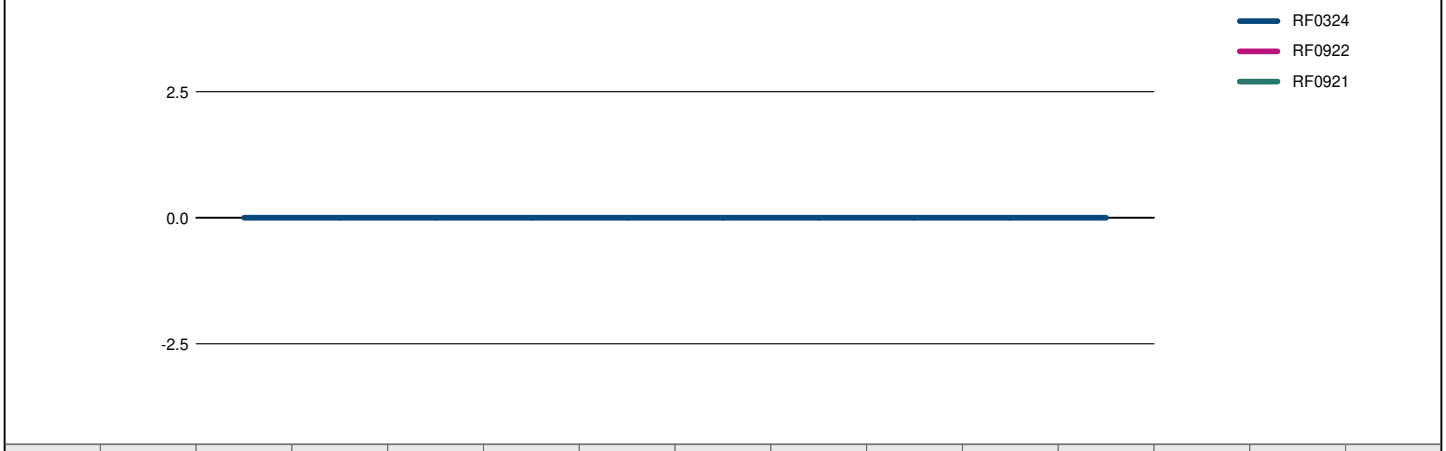
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
1	RF0324	-9.5	-6.8	-6.3	-7.0	-11.2	-5.0	-5.5	-7.1	-6.9	-5.8	0%	100%	0%
1	RF0920	-2.1	2.3	1.1	0.4	0.1	2.3	-0.4	-0.6	-0.7	-1.5	30%	0%	70%
1	RF0320	-1.6	-0.8	-0.7	-1.8	0.3	0.6	0.0	0.2	-1.0	-0.7	0%	0%	100%
1	RF0319	-1.4	-0.1	-1.2	-2.3	-0.3	-1.5	-0.2	-1.7	-0.9	0.6	10%	0%	90%
1	RF0918	-5.8	-2.3	-1.8	-1.9	1.9	-2.0	-1.9	-0.4	0.0	-1.1	10%	10%	80%
1	RF0318	-1.5	-0.4	-1.0	-1.7	0.7	-0.8	-1.1	-0.2	-0.6	-0.8	0%	0%	100%
1	RF0917	1.0	-0.7	-0.4	1.1	1.4	0.4	-0.7	0.4	-1.5	0.6	0%	0%	100%
1	RF0317	-0.7	-0.8	0.0	1.8	1.5	0.3	4.9	1.4	1.9	0.0	0%	10%	90%
1	RF0916	-9.7	-11.8	-12.0	-13.7	-9.9	-10.5	-16.9	-15.3	-12.6	-9.2	0%	100%	0%
1	RF0316	-4.3	-1.6	-1.9	-2.1	-0.1	-3.7	-0.8	-1.8	-0.6	-8.8	10%	30%	60%

ZSCORE-FIX - PROTEIN reference



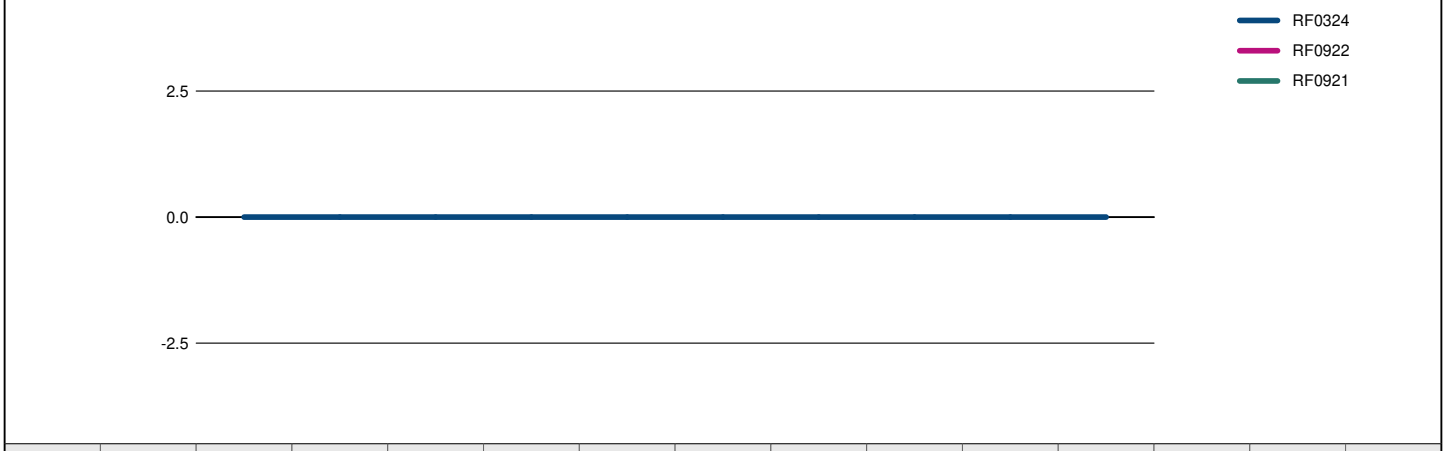
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
1	RF0324	-11.1	-8.9	-8.8	-9.3	-10.4	-8.2	-9.6	-10.0	-11.1	-10.8	0%	100%	0%
1	RF0920	-1.9	2.6	0.8	0.3	0.0	2.3	-0.3	-0.8	-0.5	-1.7	20%	0%	80%
1	RF0320	-2.0	-0.8	-0.5	-2.0	0.2	0.4	0.0	0.2	-0.9	-0.6	0%	0%	100%
1	RF0319	-1.7	-0.2	-1.4	-2.9	-0.4	-2.5	-0.2	-1.9	-1.4	0.7	20%	0%	80%
1	RF0918	-4.6	-1.5	-1.7	-3.4	2.9	-2.6	-1.9	-0.4	0.0	-1.0	20%	20%	60%
1	RF0318	-1.8	-0.6	-1.1	-3.2	0.8	-1.8	-1.5	-0.2	-0.7	-1.0	0%	10%	90%
1	RF0917	1.3	-0.7	-0.5	1.1	1.3	0.3	-0.6	0.6	-2.5	0.7	10%	0%	90%
1	RF0317	-0.7	-0.7	0.0	1.8	1.6	0.3	5.6	1.3	2.1	0.0	10%	10%	80%
1	RF0916	-8.7	-12.1	-12.7	-12.2	-11.5	-11.7	-11.9	-11.8	-12.6	-11.7	0%	100%	0%
1	RF0316	-4.1	-1.7	-2.2	-2.6	-0.1	-4.4	-0.9	-1.5	-0.6	-13.3	20%	30%	50%

ZSCORE-PT - UREA reference



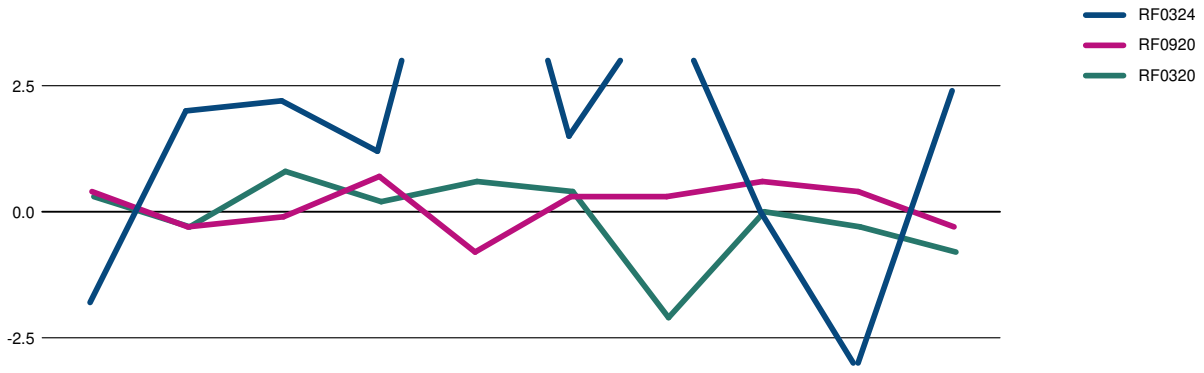
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
	RF0324													
1	RF0922	-7.2	-13.1	-8.1	-12.3	-14.3	-16.3	-12.4	-24.1	-17.1	-14.3	0%	100%	0%
1	RF0921	-10.4	-7.0	-12.1	-11.7	-9.0	-11.1	-6.3	-10.7	-11.3	-11.2	0%	100%	0%
1	RF0321	0.2	1.1	1.2	0.5	1.8	1.0	0.7	1.6	1.8	1.3	0%	0%	100%
1	RF0320	-23.7	-15.2	-8.1	-8.5	-16.5	-19.6	-8.2	-7.7	-8.5	-7.3	0%	100%	0%
1	RF0319	-6.3	-7.6	-6.8	-8.1	-5.1	-7.6	-5.8	-6.9	-8.9	-8.9	0%	100%	0%
1	RF0918	1.3	0.6	-0.1	-0.3	-0.9	-0.2	-0.2	0.4	0.2	-0.2	0%	0%	100%
1	RF0317	2.0	2.4	2.3	0.1	1.1	1.4	2.1	1.1	1.2	1.9	30%	0%	70%
1	RF0916	0.3	0.4	-0.2	0.1	0.2	0.5	0.3	-0.1	-0.2	-0.2	0%	0%	100%
1	RF0316	0.3	0.5	0.0	0.4	-1.3	-1.3	-0.2	-0.7	-0.9	-0.2	0%	0%	100%

ZSCORE-FIX - UREA reference



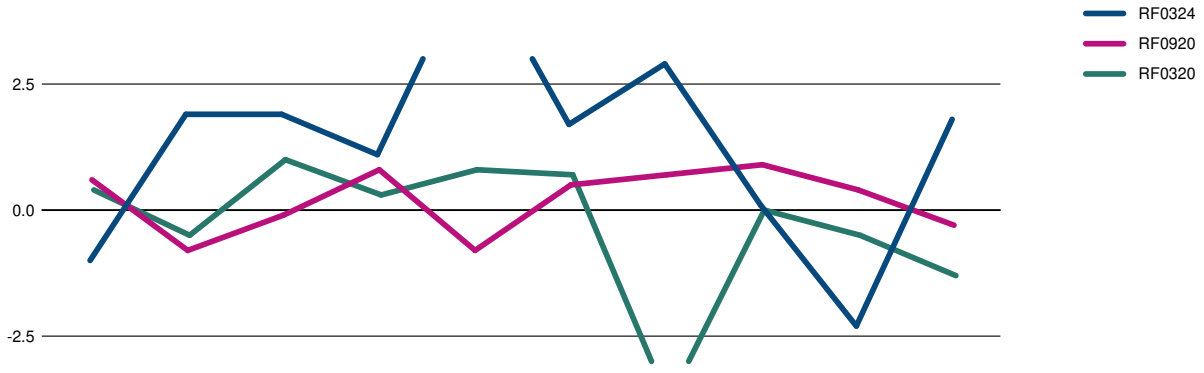
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
	RF0324													
1	RF0922	-5.7	-12.7	-8.4	-10.2	-11.3	-14.2	-6.9	-15.8	-17.5	-18.7	0%	100%	0%
1	RF0921	-9.0	-6.3	-11.9	-13.3	-7.6	-16.1	-4.8	-10.4	-14.4	-17.3	0%	100%	0%
1	RF0321	0.1	0.8	0.3	0.3	0.8	0.5	0.1	1.3	1.4	1.1	0%	0%	100%
1	RF0320	-15.1	-17.6	-9.5	-8.0	-10.9	-13.5	-6.7	-5.5	-16.2	-12.5	0%	100%	0%
1	RF0319	-5.8	-12.7	-8.9	-9.8	-11.2	-14.1	-7.1	-14.7	-16.4	-17.9	0%	100%	0%
1	RF0918	0.4	0.2	-0.1	-0.1	-0.1	-0.2	0.0	0.1	0.2	-0.3	0%	0%	100%
1	RF0317	1.5	1.7	1.5	0.8	1.0	0.8	1.4	0.9	1.1	1.5	0%	0%	100%
1	RF0916	0.3	0.3	-0.2	0.1	0.1	0.4	0.2	0.0	-0.1	-0.1	0%	0%	100%
1	RF0316	0.2	0.2	0.0	0.2	-0.8	-1.0	-0.1	-0.9	-0.9	-0.2	0%	0%	100%

ZSCORE-PT - SCC



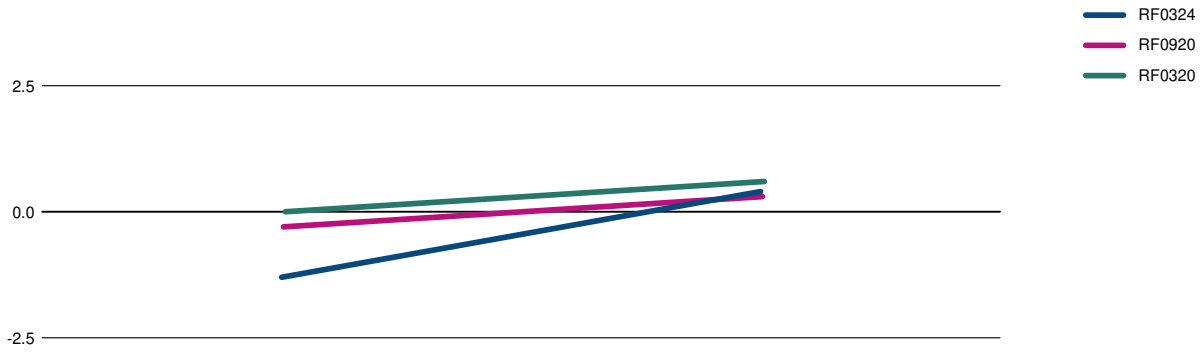
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
59	RF0324	-1.8	2.0	2.2	1.2	8.3	1.5	4.3	0.0	-3.1	2.4	20%	30%	50%
1	RF0920	0.4	-0.3	-0.1	0.7	-0.8	0.3	0.3	0.6	0.4	-0.3	0%	0%	100%
1	RF0320	0.3	-0.3	0.8	0.2	0.6	0.4	-2.1	0.0	-0.3	-0.8	10%	0%	90%
1	RF0319	-0.9	-0.6	-0.3	-0.3	0.1	0.0	0.0	0.0	-0.5	0.9	0%	0%	100%
1	RF0918	-0.7	-0.5	-0.3	-0.4	0.1	-0.2	0.0	0.0	-0.2	-0.1	0%	0%	100%
1	RF0318	-0.1	0.0	0.5	-0.1	0.0	-0.3	-0.2	-0.7	0.0	0.4	0%	0%	100%
1	RF0917	-0.3	-0.6	-0.4	-0.6	-0.5	-0.6	-0.5	-0.6	-0.6	-0.6	0%	0%	100%
1	RF0317	-1.2	-1.0	-1.2	-0.6	-0.8	-0.5	-0.7	-1.0	-1.2	-0.5	0%	0%	100%
1	RF0916	0.9	0.0	0.5	-0.8	-0.5	-0.3	0.0	-0.1	0.2	-0.1	0%	0%	100%
1	RF0316	-0.6	-0.5	-1.0	-0.7	-0.4	-0.7	-0.8	-0.5	-0.4	-0.7	0%	0%	100%

ZSCORE-FIX - SCC



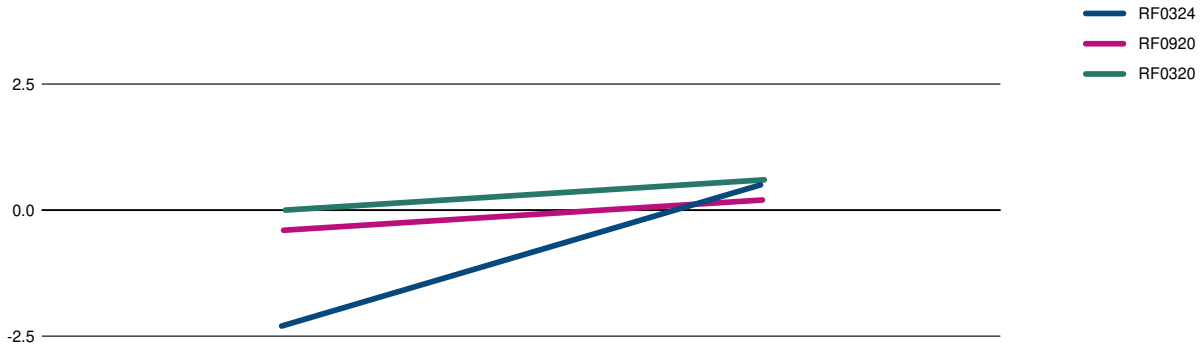
Part. code	Round	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	Yellow	Red	White
59	RF0324	-1.0	1.9	1.9	1.1	5.1	1.7	2.9	0.1	-2.3	1.8	20%	10%	70%
1	RF0920	0.6	-0.8	-0.1	0.8	-0.8	0.5	0.7	0.9	0.4	-0.3	0%	0%	100%
1	RF0320	0.4	-0.5	1.0	0.3	0.8	0.7	-3.8	0.0	-0.5	-1.3	0%	10%	90%
1	RF0319	-1.4	-0.9	-0.5	-0.4	0.1	-0.1	0.0	-0.1	-1.1	2.0	0%	0%	100%
1	RF0918	-1.8	-1.0	-0.6	-0.7	0.3	-0.5	0.0	0.0	-0.4	-0.1	0%	0%	100%
1	RF0318	-0.3	0.0	0.8	-0.4	0.1	-0.5	-0.4	-1.3	0.0	1.0	0%	0%	100%
1	RF0917	-0.7	-2.1	-1.2	-1.5	-1.5	-2.1	-1.7	-2.3	-1.5	-2.1	40%	0%	60%
1	RF0317	-1.7	-1.3	-1.6	-1.2	-1.3	-0.8	-1.3	-1.2	-2.4	-1.0	10%	0%	90%
1	RF0916	1.3	0.0	0.8	-1.2	-0.8	-0.5	0.0	-0.1	0.3	-0.3	0%	0%	100%
1	RF0316	-1.2	-0.9	-1.1	-0.9	-0.5	-1.2	-1.1	-0.6	-0.5	-1.0	0%	0%	100%

ZSCORE-PT - SCC - Sample A and B



Part. code	Round	Sample A	Sample B	Yellow	Red	White
59	RF0324	-1.3	0.4	0%	0%	100%
1	RF0920	-0.3	0.3	0%	0%	100%
1	RF0320	0.0	0.6	0%	0%	100%
1	RF0319	0.0	0.0	0%	0%	100%
1	RF0918	0.0	0.0	0%	0%	100%
1	RF0318	0.0	0.0	0%	0%	100%
1	RF0917	0.0	0.0	0%	0%	100%
1	RF0317	0.0	0.0	0%	0%	100%
1	RF0916	0.0	0.0	0%	0%	100%
1	RF0316	0.0	0.0	0%	0%	100%

ZSCORE-FIX - SCC - Sample A and B



Part. code	Round	Sample A	Sample B	Yellow	Red	White
59	RF0324	-2.3	0.5	10%	0%	90%
1	RF0920	-0.4	0.2	0%	0%	100%
1	RF0320	0.0	0.6	0%	0%	100%
1	RF0319	0.0	0.0	0%	0%	100%
1	RF0918	0.0	0.0	0%	0%	100%
1	RF0318	0.0	0.0	0%	0%	100%
1	RF0917	0.0	0.0	0%	0%	100%
1	RF0317	0.0	0.0	0%	0%	100%
1	RF0916	0.0	0.0	0%	0%	100%
1	RF0316	0.0	0.0	0%	0%	100%

ICAR
PROFICIENCY TESTING SCHEME

March 2024

Raw Milk

Determination of FAT CONTENT
Röse Gottlieb method

Repe
Repr

Sending date of statistical treatment : 29th March 2024

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

Proficiency test accreditated ISO 17043

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

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

Nb	%	N°	d	Sd	D	Method
1	7	8	+ 0,002	0,004	0,005	A
2	14	7	- 0,003	0,005	0,006	C
3	21	11	+ 0,004	0,004	0,006	A
4	29	13	+ 0,003	0,008	0,008	A
5	36	6	+ 0,005	0,008	0,010	A
6	43	2	- 0,010	0,005	0,011	A
7	50	12	+ 0,006	0,010	0,011	A
8	57	9	- 0,012	0,006	0,013	A
9	64	10	+ 0,013	0,008	0,015	A
10	71	5	- 0,013	0,007	0,015	A
11	79	4	+ 0,009	0,015	0,017	B
12	86	3	- 0,003	0,019	0,019	A
13	93	1	+ 0,009	0,032	0,033	A
14	100	14	- 0,085	0,220	0,236	A

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

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

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

A ISO 1211|IDF 1 Röse Gottlieb Method
B ISO 2446|IDF 226 Gerber method
C ISO 23318|IDF 249

(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.

eatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,007
oducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,013

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

Sample/Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
2	0,002	0,001	0,002	0,000	0,019	0,003	0,003	0,003	**	**	0,005	16
3	0,017	0,019	0,010	0,014	0,024	0,005	0,003	0,003	0,011	**	0,010	18
4	0,030 *	0,000	0,010	0,000	0,000	0,010	0,020	0,030	**	**	0,012	16
5	0,003	0,003	0,005	0,009	0,008	0,008	0,025	0,007	**	**	0,008	16
6	0,002	0,000	0,001	0,003	0,001	0,000	0,000	0,001	**	**	0,001	16
7	0,012	0,014	0,000	0,010	0,006	0,002	0,004	0,026	0,003	0,001	0,008	20
8	0,004	0,004	0,008	0,013	0,006	0,006	0,001	0,008	**	**	0,005	16
9	0,016	0,003	0,003	0,008	0,022	0,003	0,008	0,010	**	**	0,008	16
10	0,011	0,000	0,016	0,001	0,002	0,009	0,012	0,007	0,002	0,005	0,006	20
11	0,001	0,018	0,017	0,005	0,010	0,003	0,007	0,018	**	**	0,008	16
12	0,005	0,002	0,004	0,012	0,003	0,009	0,002	0,001	0,014	0,017 *	0,006	20
13	0,000	**	0,020	**	0,000	**	0,000	**	0,000	**	0,006	10
14	0,001	0,000	0,002	0,002	0,005	0,000	0,003	0,003	**	**	0,002	16
Sr	0,008	0,006	0,007	0,006	0,008	0,004	0,007	0,009	0,005	0,006		236
NE	28	26	28	26	28	26	28	26	12	8		
L	0,021	0,022	0,025	0,020	0,029	0,015	0,026	0,034	0,016	0,005		

Sr : repeatability standard deviation of each laboratory limit 0,016 g/100g

NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

r : limit of repeatability, absolute difference betwen two replicates=0,043 according ISO 1211 IDF 1D 2010

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	4,520	2,170	3,490	2,870 *	4,160	2,440	3,820	3,110	5,930 *	8,070
2	4,479	2,148	3,466	2,799	4,144	2,416	3,798	3,091		
3	4,457	2,165	3,501	2,810	4,115	2,430	3,820	3,100	5,999	
4	4,485	2,140	3,495	2,820	4,170	2,425	3,830	3,125		
5	4,484	2,151	3,464	2,804	4,117	2,416	3,793	3,087		
6	4,516	2,163	3,479	2,814	4,145	2,427	3,817	3,103		
7	4,494	2,141	3,475	2,816	4,139	2,421	3,804	3,095	5,997	8,076
8	4,493	2,164	3,476	2,813	4,145	2,429	3,817	3,103		
9	4,477	2,147	3,463	2,803	4,132	2,422	3,803	3,077		
10	4,514	2,160	3,488	2,819	4,151	2,432	3,825	3,110	6,022	8,099
11	4,495	2,161	3,480	2,818	4,150	2,436	3,808	3,110		
12	4,503	2,162	3,484	2,830	4,149	2,433	3,825	3,114	5,998	8,055
13	4,490		3,490		4,140		3,810		6,010	
14	4,486	2,142	3,463	2,184 *	4,134	2,431	3,810	3,089		
M	4,492	2,155	3,479	2,813	4,142	2,427	3,813	3,101	6,005	8,075
REF.	4,492	2,153	3,478	2,813	4,144	2,428	3,812	3,101	5,999	8,073
SD	0,017	0,010	0,013	0,009	0,015	0,007	0,011	0,013	0,011	0,018

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 12 laboratories using the reference method ISO 1211 | IDF 1, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	**1**	**2**	**2**	**4**	**3**	**6**	**4**	**8**	**5**	**#**	**6**	**7**	**4**	**8**	**6**	**9**	**8**	**10**	**#**
Outliers Cochran	4																	12	
Outlier Grubbs							1;14									1			
sr	0,006		0,006		0,007		0,006		0,008		0,004	0,007		0,009		0,006		0,002	
SR	0,018		0,011		0,013		0,010		0,016		0,008	0,012		0,015		0,012		0,015	

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	+ 0,028	+ 0,017	+ 0,012	+ 0,057	+ 0,016	+ 0,012	+ 0,008	+ 0,009	- 0,069	- 0,003	+ 0,009	0,032	0,88
2	- 0,013	- 0,006	- 0,012	- 0,014	- 0,000	- 0,012	- 0,014	- 0,010			- 0,010	0,005	5,80
3	- 0,035	+ 0,011	+ 0,023	- 0,003	- 0,029	+ 0,002	+ 0,008	- 0,001	- 0,001		- 0,003	0,019	0,45
4	- 0,007	- 0,013	+ 0,017	+ 0,007	+ 0,026	- 0,003	+ 0,018	+ 0,024			+ 0,009	0,015	1,64
5	- 0,008	- 0,003	- 0,014	- 0,010	- 0,027	- 0,012	- 0,019	- 0,014			- 0,013	0,007	5,25
6	+ 0,024	+ 0,010	+ 0,001	+ 0,000	+ 0,001	- 0,001	+ 0,005	+ 0,002			+ 0,005	0,008	1,79
7	+ 0,002	- 0,012	- 0,003	+ 0,003	- 0,005	- 0,007	- 0,008	- 0,006	- 0,003	+ 0,003	- 0,003	0,005	2,22
8	+ 0,001	+ 0,011	- 0,002	- 0,001	+ 0,001	+ 0,001	+ 0,005	+ 0,002			+ 0,002	0,004	1,71
9	- 0,015	- 0,007	- 0,015	- 0,010	- 0,012	- 0,006	- 0,009	- 0,024			- 0,012	0,006	6,05
10	+ 0,022	+ 0,007	+ 0,010	+ 0,005	+ 0,007	+ 0,004	+ 0,013	+ 0,009	+ 0,023	+ 0,026	+ 0,013	0,008	4,97
11	+ 0,003	+ 0,008	+ 0,002	+ 0,004	+ 0,006	+ 0,008	- 0,004	+ 0,009			+ 0,004	0,004	2,85
12	+ 0,010	+ 0,009	+ 0,006	+ 0,017	+ 0,005	+ 0,005	+ 0,013	+ 0,013	- 0,001	- 0,018	+ 0,006	0,010	1,88
13	- 0,002		+ 0,012		- 0,004		- 0,002		+ 0,011		+ 0,003	0,008	0,92
14	- 0,006	- 0,011	- 0,015	- 0,629	- 0,010	+ 0,003	- 0,002	- 0,012			- 0,085	0,220	1,10
d	+ 0,000	+ 0,002	+ 0,002	- 0,000	- 0,001	- 0,001	+ 0,001	+ 0,000	+ 0,006	+ 0,002	- 0,005	0,060	
Sd	0,017	0,010	0,013	0,009	0,015	0,007	0,011	0,013	0,011	0,018	0,013		

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

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

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

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

Sample/Lab code	1	2	3	4	5	6	7	8	9	10
1	+1,65	+1,62	+0,98	+6,36	+1,11	+1,66	+0,75	+0,72	-6,34	-0,14
2	-0,76	-0,54	-0,93	-1,61	-0,00	-1,70	-1,29	-0,77		
3	-2,09	+1,09	+1,86	-0,37	-1,93	+0,22	+0,71	-0,08	-0,07	
4	-0,41	-1,26	+1,38	+0,75	+1,79	-0,40	+1,66	+1,86		
5	-0,50	-0,25	-1,13	-1,10	-1,79	-1,63	-1,74	-1,07		
6	+1,41	+0,94	+0,06	+0,02	+0,06	-0,12	+0,48	+0,15		
7	+0,12	-1,16	-0,22	+0,30	-0,31	-0,95	-0,70	-0,43	-0,26	+0,16
8	+0,06	+1,04	-0,14	-0,09	+0,10	+0,15	+0,43	+0,18		
9	-0,88	-0,64	-1,21	-1,16	-0,78	-0,88	-0,79	-1,80		
10	+1,26	+0,66	+0,82	+0,58	+0,50	+0,49	+1,20	+0,68	+2,08	+1,43
11	+0,15	+0,75	+0,14	+0,47	+0,44	+1,04	-0,38	+0,72		
12	+0,62	+0,85	+0,50	+1,87	+0,33	+0,6	+1,2	+0,98	-0,1	-0,99
13	-0,12		+0,98		-0,24		-0,2		+1,0	
14	-0,38	-1,07	-1,17	-70,66	-0,68	+0,4	-0,2	-0,92		

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

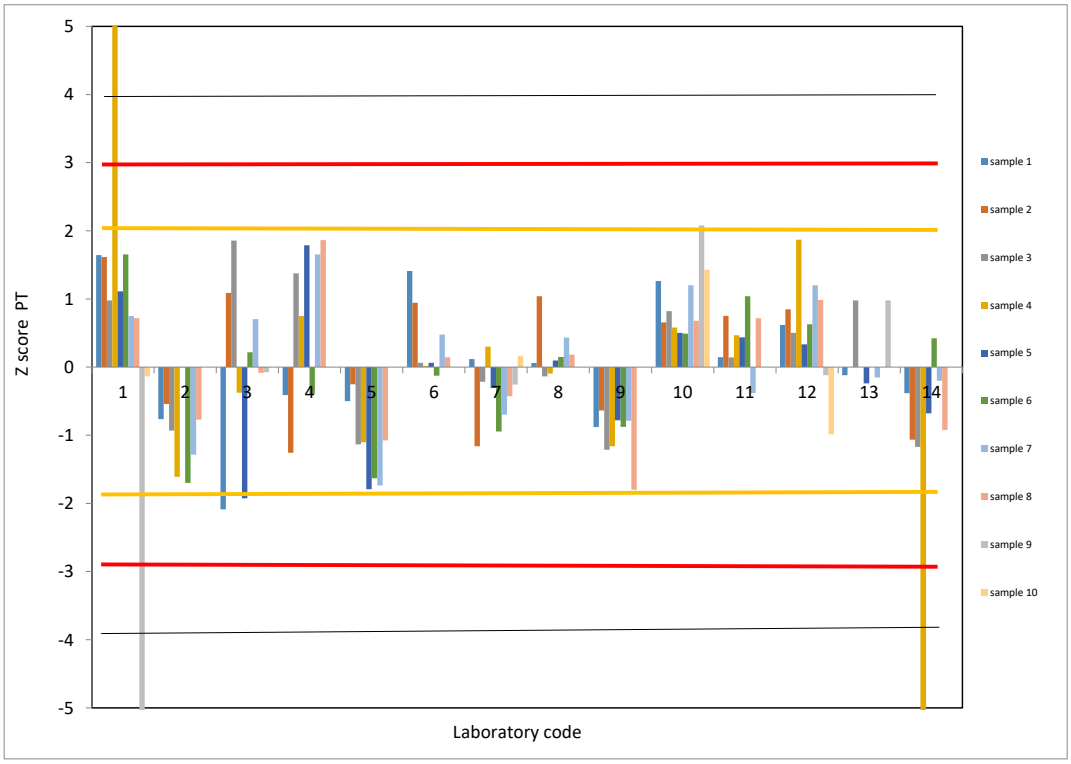


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample/Lab code	1	2	3	4	5	6	7	8	9	10
1	+1,40	+0,84	+0,61	+2,83	+0,82	+0,60	+0,41	+0,47	-3,47	-0,13
2	-0,65	-0,28	-0,59	-0,72	-0,00	-0,62	-0,71	-0,50		
3	-1,77	+0,57	+1,16	-0,17	-1,43	+0,08	+0,39	-0,05	-0,04	
4	-0,35	-0,66	+0,86	+0,33	+1,32	-0,15	+0,91	+1,22		
5	-0,42	-0,13	-0,71	-0,49	-1,33	-0,60	-0,96	-0,70		
6	+1,20	+0,49	+0,04	+0,01	+0,05	-0,05	+0,26	+0,10		
7	+0,10	-0,61	-0,14	+0,13	-0,23	-0,35	-0,39	-0,28	-0,14	+0,15
8	+0,05	+0,54	-0,09	-0,04	+0,07	+0,05	+0,24	+0,12		
9	-0,75	-0,33	-0,76	-0,52	-0,58	-0,32	-0,44	-1,18		
10	+1,08	+0,34	+0,51	+0,26	+0,37	+0,18	+0,66	+0,45	+1,14	+1,30
11	+0,13	+0,39	+0,09	+0,21	+0,32	+0,38	-0,21	+0,47		
12	+0,52	+0,44	+0,31	+0,83	+0,25	+0,23	+0,7	+0,65	-0,07	-0,90
13	-0,10		+0,61		-0,18		-0,1		+0,53	
14	-0,32	-0,56	-0,74	-31,47	-0,50	+0,15	-0,1	-0,60		

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

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

Figure 3 :

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

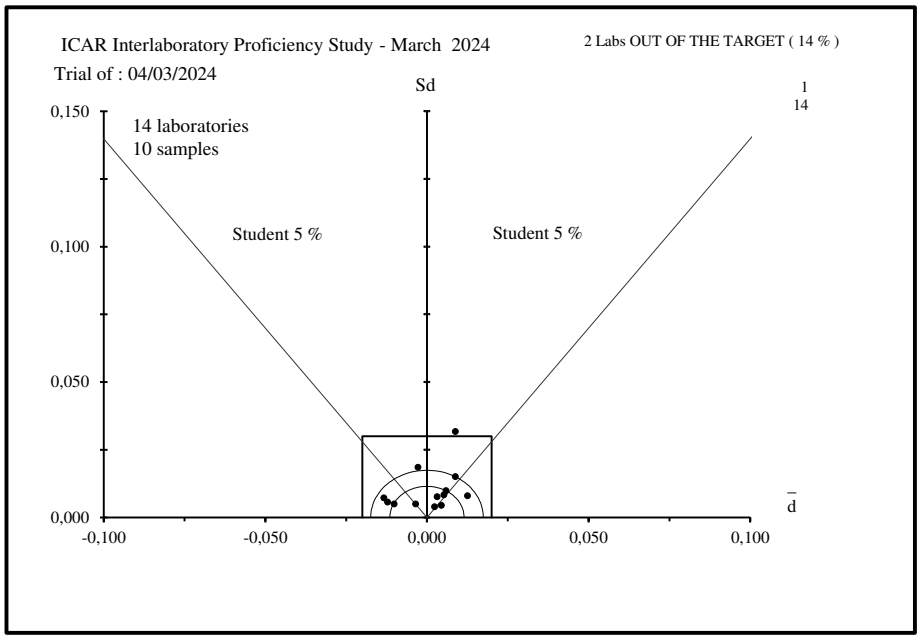


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

March 2024

Raw Milk

Determination of CRUDE PROTEIN CONTENT
KJELDAHL Method

Sending date of statistical treatment : 29th March 2024

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

Proficiency test accreditated ISO 17043

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

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

Nb	%	N°		d	Sd	D	Method
1	7	11	-	0,002	0,005	0,005	ISO 8968-1 | IDF 20-1
2	14	2	+	0,001	0,006	0,007	ISO 8968-1 | IDF 20-1
3	21	9	-	0,004	0,007	0,008	ISO 8968-3 | IDF 20-3
4	29	7	+	0,006	0,009	0,010	ISO 8968-3 | IDF 20-3
5	36	6	+	0,004	0,010	0,011	ISO 8968-1 | IDF 20-1
6	43	13	-	0,010	0,005	0,011	ISO 8968-1 | IDF 20-1
7	50	14	+	0,002	0,015	0,015	ISO 8968-1 | IDF 20-1
8	57	5	+	0,013	0,006	0,015	ISO 8968-1 | IDF 20-1
9	64	8	+	0,028	0,007	0,029	ISO 8968-1 | IDF 20-1
10	71	3	-	0,028	0,025	0,037	ISO 8968-1 | IDF 20-1
11	79	4	-	0,035	0,029	0,045	ISO 8968-1 | IDF 20-1
12	86	12	-	0,065	0,012	0,066	ISO 8968-1 | IDF 20-1
13	93	10	+	0,060	0,088	0,107	ISO 8968-3 | IDF 20-3
14	100	1	-	0,177	0,019	0,178	ISO 8968-1 | IDF 20-1

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

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 13 laboratories using the reference method (ISO 8968-1|IDF 20-1 and ISO 8968-3|IDF 20-3), after outlier discarging using Grubbs test at 5% risk level

N.B. : N° 7, 9 and N° 10 : ISO 8968-3|IDF 20-3

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

(Nb : laboratory rank; % : relative rank)

(N° : laboratory identification number)

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

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

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

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,007
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,027

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10	Sr	NL
1	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	20
2	0,002	0,001	0,005	0,002	0,006	0,002	0,004	0,010	0,003	0,001	0,003	20
3	0,005	0,001	0,013	0,020	0,008	0,006	0,029	0,017	0,022	0,033 *	0,013	20
4	0,013	0,006	0,006	0,006	0,179 *	0,000	0,013	0,000	0,006	0,013	0,040	20
5	0,022	0,005	0,013	0,009	0,035	0,004	0,008	0,001	0,007	0,002	0,010	20
6	0,003	0,002	0,001	0,003	0,002	0,001	0,001	0,004	0,007	0,001	0,002	20
7	0,011	0,005	0,005	0,006	0,003	0,001	0,009	0,004	0,010	0,010	0,005	20
8	0,005	0,005	0,011	0,001	0,008	0,004	0,010	0,013	0,009	0,001	0,006	20
9	0,006	0,006	0,000	0,013	0,006	0,000	0,013	0,013	0,006	0,006	0,006	20
10	0,029	0,009	0,006	0,001	0,031	0,006	0,016	0,000	0,013	0,095 *	0,024	20
11	**	0,002	0,001	0,011	0,006	0,001	0,011	0,003	0,004	**	0,005	16
12	0,010	0,001	0,003	0,005	0,004	0,004	0,004	0,006	0,011	0,006	0,004	20
13	0,006	**	0,001	**	0,026	**	0,020	**	0,009	**	0,011	10
14	0,004	0,003	0,001	0,001	0,002	0,002	0,003	0,003	0,004	0,001	0,002	20
Sr	0,009	0,003	0,005	0,006	0,035	0,002	0,009	0,006	0,007	0,021		266
NE	26	26	28	26	28	26	28	26	28	24		
L	0,031	0,012	0,017	0,021	0,040	0,008	0,033	0,021	0,025	0,014		

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

NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

r : limit of repeatability, absolute difference betwen two replicates=0,040 accordingISO 8968-1 | IDF 20-1

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

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	3,500 *	2,610 *	3,160 *	2,770 *	3,430 *	2,700 *	3,330 *	2,950 *	3,110 *	3,500 *
2	3,706	2,772	3,323	2,941	3,607	2,852	3,502	3,120	3,312	3,704
3	3,664	2,749	3,293	2,922	3,589	2,791	3,431	3,149	3,305	3,659
4	3,675	2,740	3,302	2,912	3,503 *	2,820	3,490	3,094	3,276	3,662
5	3,704	2,782	3,325	2,955	3,627	2,861	3,515	3,142	3,336	3,715
6	3,724	2,771	3,322	2,932	3,618	2,841	3,512	3,126	3,306	3,711
7	3,695	2,781	3,336	2,941	3,617	2,860	3,508	3,122	3,314	3,709
8	3,728	2,800	3,350	2,972	3,636	2,872	3,527	3,148	3,351	3,719
9	3,684	2,778	3,318	2,941	3,608	2,845	3,496	3,126	3,302	3,691
10	3,721	2,789	3,352	2,961	3,650	2,881	3,555	3,168	3,346	4,004 *
11		2,771	3,319	2,935	3,605	2,852	3,500	3,127	3,307	
12	3,610 *	2,714	3,255	2,879	3,546 *	2,786	3,452	3,072	3,239	3,623
13	3,682		3,309		3,607		3,493		3,307	
14	3,711	2,760	3,304	2,932	3,621	2,838	3,511	3,130	3,310	3,732
M	3,699	2,767	3,316	2,935	3,617	2,842	3,499	3,127	3,309	3,692
REF.	3,700	2,769	3,318	2,938	3,617	2,847	3,502	3,130	3,310	3,695
SD	0,021	0,023	0,025	0,024	0,017	0,029	0,031	0,025	0,029	0,034

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 13 laboratories using the reference method ISO 8968-1 | IDF 20-1 and ISO 8968-3 | IDF 20-3, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	1	2	2	4	3	6	4	8	5	#	6	7	4	8	6	9	8	10	#
Outliers Cochran									4									3;10	
Outlier Grubbs	1;12		1		1		1		1;4 12		1	1		1		1		1;10	
sr	0,009		0,003		0,005		0,006		0,012		0,002	0,009		0,006		0,007		0,004	
SR	0,022		0,024		0,025		0,024		0,019		0,029	0,032		0,026		0,029		0,034	

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	- 0,200	- 0,159	- 0,158	- 0,168	- 0,187	- 0,147	- 0,172	- 0,180	- 0,200	- 0,195	- 0,177	0,019	29,80
2	+ 0,006	+ 0,003	+ 0,004	+ 0,003	- 0,010	+ 0,005	- 0,000	- 0,011	+ 0,002	+ 0,008	+ 0,001	0,006	0,53
3	- 0,036	- 0,021	- 0,025	- 0,016	- 0,028	- 0,056	- 0,072	+ 0,019	- 0,005	- 0,036	- 0,028	0,025	3,45
4	- 0,025	- 0,029	- 0,017	- 0,026	- 0,114	- 0,027	- 0,012	- 0,036	- 0,034	- 0,033	- 0,035	0,029	3,88
5	+ 0,004	+ 0,013	+ 0,006	+ 0,017	+ 0,010	+ 0,014	+ 0,013	+ 0,012	+ 0,026	+ 0,020	+ 0,013	0,006	6,63
6	+ 0,024	+ 0,001	+ 0,004	- 0,006	+ 0,001	- 0,006	+ 0,010	- 0,004	- 0,004	+ 0,016	+ 0,004	0,010	1,09
7	- 0,005	+ 0,012	+ 0,018	+ 0,002	+ 0,000	+ 0,014	+ 0,006	- 0,008	+ 0,004	+ 0,014	+ 0,006	0,009	2,06
8	+ 0,028	+ 0,030	+ 0,031	+ 0,034	+ 0,019	+ 0,025	+ 0,025	+ 0,018	+ 0,041	+ 0,024	+ 0,028	0,007	12,57
9	- 0,016	+ 0,009	- 0,001	+ 0,003	- 0,009	- 0,001	- 0,006	- 0,004	- 0,008	- 0,004	- 0,004	0,007	1,71
10	+ 0,021	+ 0,019	+ 0,033	+ 0,023	+ 0,033	+ 0,034	+ 0,053	+ 0,038	+ 0,036	+ 0,309	+ 0,060	0,088	2,15
11		+ 0,001	+ 0,000	- 0,003	- 0,011	+ 0,005	- 0,002	- 0,003	- 0,003		- 0,002	0,005	1,18
12	- 0,090	- 0,055	- 0,063	- 0,059	- 0,071	- 0,060	- 0,050	- 0,058	- 0,071	- 0,072	- 0,065	0,012	17,83
13	- 0,018		- 0,009		- 0,010		- 0,009		- 0,003		- 0,010	0,005	4,19
14	+ 0,011	- 0,009	- 0,015	- 0,006	+ 0,004	- 0,009	+ 0,009	+ 0,000	- 0,000	+ 0,036	+ 0,002	0,015	0,46
d	- 0,001	- 0,002	- 0,003	- 0,003	- 0,000	- 0,005	- 0,003	- 0,003	- 0,001	- 0,003	- 0,015	0,061	
Sd	0,021	0,023	0,025	0,024	0,017	0,029	0,031	0,025	0,029	0,034	0,026		

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

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

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

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

Sample/Lab code	1	2	3	4	5	6	7	8	9	10
1	-9,46	-6,81	-6,31	-6,99	-11,20	-4,99	-5,55	-7,10	-6,93	-5,75
2	+0,28	+0,13	+0,17	+0,12	-0,59	+0,18	-0,00	-0,42	+0,05	+0,25
3	-1,70	-0,89	-1,00	-0,68	-1,68	-1,91	-2,31	+0,74	-0,16	-1,06
4	-1,19	-1,25	-0,67	-1,06	-6,84	-0,91	-0,39	-1,41	-1,17	-0,97
5	+0,19	+0,55	+0,25	+0,69	+0,59	+0,48	+0,42	+0,49	+0,92	+0,58
6	+1,14	+0,05	+0,16	-0,27	+0,06	-0,21	+0,32	-0,15	-0,15	+0,47
7	-0,24	+0,50	+0,70	+0,10	+0,00	+0,46	+0,18	-0,33	+0,15	+0,41
8	+1,32	+1,29	+1,24	+1,42	+1,15	+0,87	+0,81	+0,72	+1,44	+0,71
9	-0,73	+0,39	-0,03	+0,13	-0,54	-0,04	-0,19	-0,15	-0,29	-0,13
10	+0,99	+0,83	+1,33	+0,96	+1,99	+1,15	+1,70	+1,51	+1,26	+9,11
11		+0,05	+0,02	-0,14	-0,69	+0,16	-0,06	-0,10	-0,09	
12	-4,26	-2,35	-2,51	-2,44	-4,24	-2,05	-1,61	-2,29	-2,45	-2,13
13	-0,85		-0,36		-0,61		-0,29		-0,11	
14	+0,52	-0,39	-0,59	-0,27	+0,25	-0,29	+0,28	+0,01	-0,00	+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

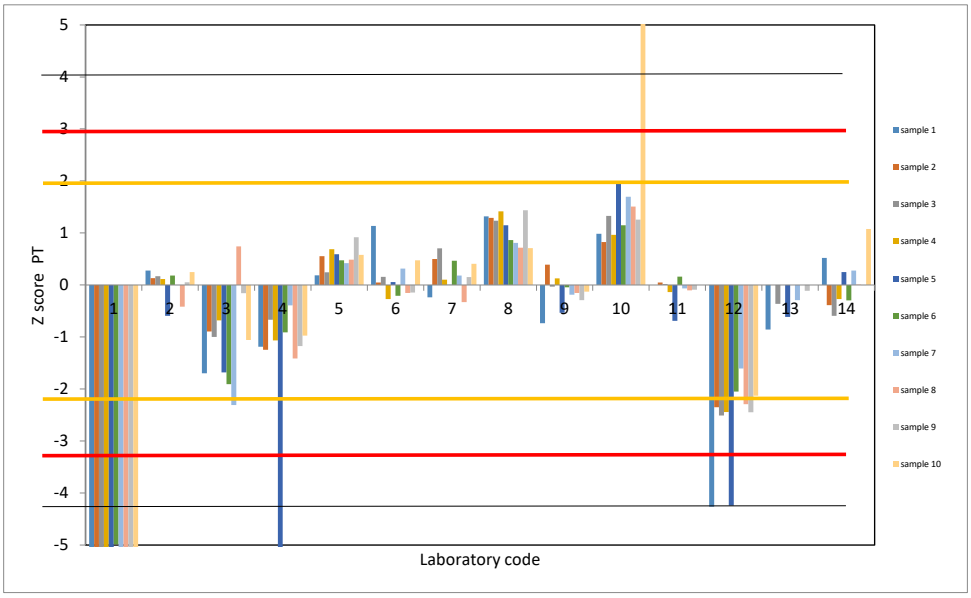


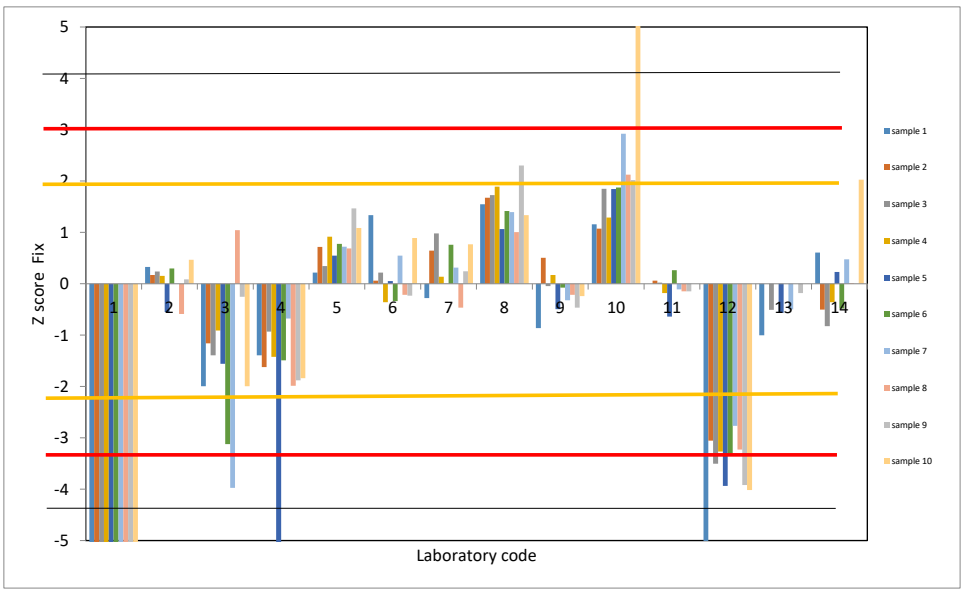
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample / Lab code	1	2	3	4	5	6	7	8	9	10
1	-11,11	-8,85	-8,80	-9,34	-10,38	-8,16	-9,56	-10,00	-11,11	-10,84
2	+0,33	+0,17	+0,24	+0,15	-0,55	+0,30	-0,00	-0,59	+0,09	+0,47
3	-2,00	-1,16	-1,39	-0,91	-1,56	-3,12	-3,97	+1,04	-0,25	-2,00
4	-1,39	-1,62	-0,93	-1,42	-6,34	-1,49	-0,68	-1,99	-1,88	-1,84
5	+0,22	+0,72	+0,34	+0,92	+0,55	+0,78	+0,72	+0,69	+1,47	+1,09
6	+1,34	+0,06	+0,22	-0,36	+0,05	-0,34	+0,55	-0,22	-0,23	+0,89
7	-0,28	+0,65	+0,98	+0,14	+0,00	+0,76	+0,32	-0,46	+0,25	+0,77
8	+1,55	+1,68	+1,73	+1,89	+1,06	+1,42	+1,40	+1,01	+2,30	+1,34
9	-0,86	+0,51	-0,05	+0,17	-0,50	-0,07	-0,32	-0,22	-0,46	-0,24
10	+1,16	+1,07	+1,85	+1,29	+1,84	+1,88	+2,92	+2,12	+2,02	+17,18
11		+0,06	+0,02	-0,18	-0,64	+0,26	-0,11	-0,14	-0,14	
12	-5,01	-3,06	-3,50	-3,27	-3,93	-3,35	-2,77	-3,23	-3,92	-4,02
13	-1,00		-0,51		-0,57		-0,50		-0,18	
14	+0,61	-0,50	-0,83	-0,36	+0,23	-0,48	+0,48	+0,01	-0,00	+2,03

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

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

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



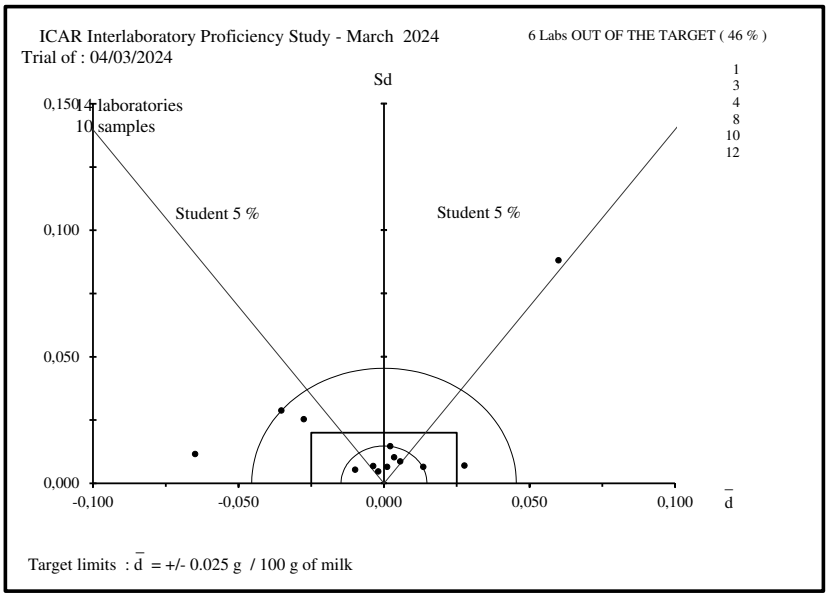


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

Table VIII : Relative recovery of nitrogen on pure solutions

N°	TRYP	GLY	SO4
1	104,4	246,2	99,1
2	98,9	100,1	98,3
3			100,3
4	98,6	99,4	100,4
5	100,2	100,9	101,0
6	97,2	99,1	100,4
7	99,4	100,1	100,3
8	98,3	101,2	101,3
9	99,3	100,4	100,3
10	100,4	101,0	100,9
11	99,1	99,6	99,6
12			
13			
14	98,3	99,2	112,5

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

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

ICAR
PROFICIENCY TESTING SCHEME

March 2024

Raw Milk

Determination of LACTOSE CONTENT

Sending date of statistical treatment : 29th March 2024

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

ACTALIA CECALAIT

cofrac 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	14	3	+ 0,015	0,024	0,028	Lane-Eynon method
2	29	1	+ 0,019	0,021	0,029	HPLC
3	43	6	- 0,003	0,035	0,035	enzymatic
4	57	2	+ 0,036	0,020	0,041	ISO 22662 / IDF 198
5	71	4	+ 0,036	0,028	0,046	ISO 22662 / IDF 198
6	86	5	- 0,095	0,021	0,097	Enzymatic method in house
7	100	7	- 0,257	0,068	0,266	LC-PAD

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

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

the limits of which are :

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 7 laboratories , after outliers discarging using Grubbs test at 5 % risk level.

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

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,011
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,062

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

Sample / Lab code	11	12	13	14	15	16	17	18	19	20	Sr	NL
1	0,001	0,016	0,001	0,011	0,018	0,015	0,005	0,013	0,005	0,009	0,008	20
2	0,001	0,002	0,005	0,002	0,001	0,007	0,000	0,004	0,004	0,019	0,005	20
3	0,013	0,001	0,011	0,001	0,015	0,009	0,014	0,005	0,004	0,004	0,007	20
4	0,006	0,006	0,006	0,006	0,013	0,015	0,021	0,007	0,024	0,032	0,011	20
5	0,026	0,020	0,006	0,010	0,017	0,033	0,003	0,015	0,034	0,001	0,014	20
6	0,006	0,010	0,013	0,023	0,017	0,016	0,015	0,014	0,014	0,008	0,010	20
7	0,048	0,032	0,070 *	0,002	0,001	0,023	0,049 *	0,076 *	0,011	0,010	0,029	20
Sr	0,015	0,011	0,019	0,008	0,010	0,013	0,015	0,021	0,012	0,011		140
NE	14	14	14	14	14	14	14	14	14	14		
L	0,048	0,036	0,017	0,024	0,031	0,042	0,026	0,023	0,039	0,035		

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

NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

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

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

Sample / Lab code	11	12	13	14	15	16	17	18	19	20	LACT
1	4,987	5,120	5,060	4,823	4,908	4,884	4,856	5,211	4,797	4,763	4,894
2	5,000	5,153	5,079	4,839	4,925	4,898	4,870	5,226	4,815	4,773	4,930
3	5,016	5,163	5,032	4,809	4,885	4,867	4,839	5,241	4,793	4,723	4,862
4	4,992	5,101	5,053	4,840	4,929	4,896	4,896	5,262	4,812	4,795	4,889
5	4,870	5,028	4,939	4,699	4,801	4,794	4,730	5,094 *	4,669 *	4,641	4,745
6	4,971	5,130	5,082	4,785	4,885	4,851	4,848	5,202	4,756	4,674	
7	4,735	4,864 *	4,836	4,553	4,644 *	4,611 *	4,667	4,915 *	4,450 *	4,364 *	4,498
M	4,939	5,116	5,011	4,764	4,888	4,865	4,815	5,228	4,795	4,728	
REF.	4,952	5,121	5,020	4,779	4,897	4,869	4,818	5,228	4,799	4,728	**4,912**
SD	0,102	0,048	0,091	0,105	0,047	0,039	0,084	0,024	0,024	0,060	

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 1352 of 7 laboratories, after outliers discarging using Grubbs test at 5 % risk level.

Table IV : Outlier identification

Sample	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Outliers Cochran			7				7	7		
Outlier Grubbs		7			7	7		5;7	5;7	7
sr	0,015	0,008	0,006	0,008	0,010	0,013	0,009	0,007	0,009	0,011
SR	0,102	0,049	0,053	0,105	0,048	0,040	0,058	0,024	0,024	0,061

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

Sample / Lab code	11	12	13	14	15	16	17	18	19	20	d	Sd_{lab}	t
1	+ 0,034	- 0,001	+ 0,039	+ 0,043	+ 0,011	+ 0,015	+ 0,037	- 0,018	- 0,003	+ 0,035	+ 0,019	0,021	2,86
2	+ 0,047	+ 0,032	+ 0,058	+ 0,060	+ 0,028	+ 0,029	+ 0,052	- 0,002	+ 0,016	+ 0,045	+ 0,036	0,020	5,82
3	+ 0,063	+ 0,041	+ 0,011	+ 0,029	- 0,012	- 0,002	+ 0,021	+ 0,012	- 0,006	- 0,005	+ 0,015	0,024	2,01
4	+ 0,040	- 0,020	+ 0,033	+ 0,061	+ 0,032	+ 0,027	+ 0,077	+ 0,033	+ 0,013	+ 0,067	+ 0,036	0,028	4,07
5	- 0,082	- 0,093	- 0,081	- 0,080	- 0,096	- 0,075	- 0,089	- 0,135	- 0,130	- 0,087	- 0,095	0,021	14,47
6	+ 0,019	+ 0,009	+ 0,061	+ 0,005	- 0,012	- 0,018	+ 0,029	- 0,026	- 0,043	- 0,054	- 0,003	0,035	0,27
7	- 0,217	- 0,257	- 0,184	- 0,226	- 0,253	- 0,259	- 0,152	- 0,313	- 0,350	- 0,364	- 0,257	0,068	11,90
d	- 0,014	- 0,005	- 0,009	- 0,015	- 0,008	- 0,004	- 0,003	- 0,000	- 0,005	+ 0,000	- 0,035	0,106	
Sd	0,102	0,048	0,091	0,105	0,047	0,039	0,084	0,024	0,024	0,060	0,069		

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

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

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

Sample / Lab code	11	12	13	14	15	16	17	18	19	20
1	+0,34	-0,02	+0,43	+0,41	+0,24	+0,37	+0,45	-0,74	-0,12	+0,57
2	+0,47	+0,66	+0,64	+0,57	+0,59	+0,73	+0,62	-0,09	+0,67	+0,74
3	+0,62	+0,86	+0,12	+0,28	-0,26	-0,06	+0,25	+0,52	-0,27	-0,08
4	+0,39	-0,41	+0,36	+0,58	+0,68	+0,68	+0,92	+1,40	+0,54	+1,11
5	-0,81	-1,92	-0,89	-0,76	-2,05	-1,93	-1,06	-5,66	-5,54	-1,45
6	+0,19	+0,18	+0,67	+0,05	-0,26	-0,46	+0,35	-1,10	-1,84	-0,89
7	-2,14	-5,31	-2,02	-2,16	-5,38	-6,61	-1,81	-13,16	-14,86	-6,02

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

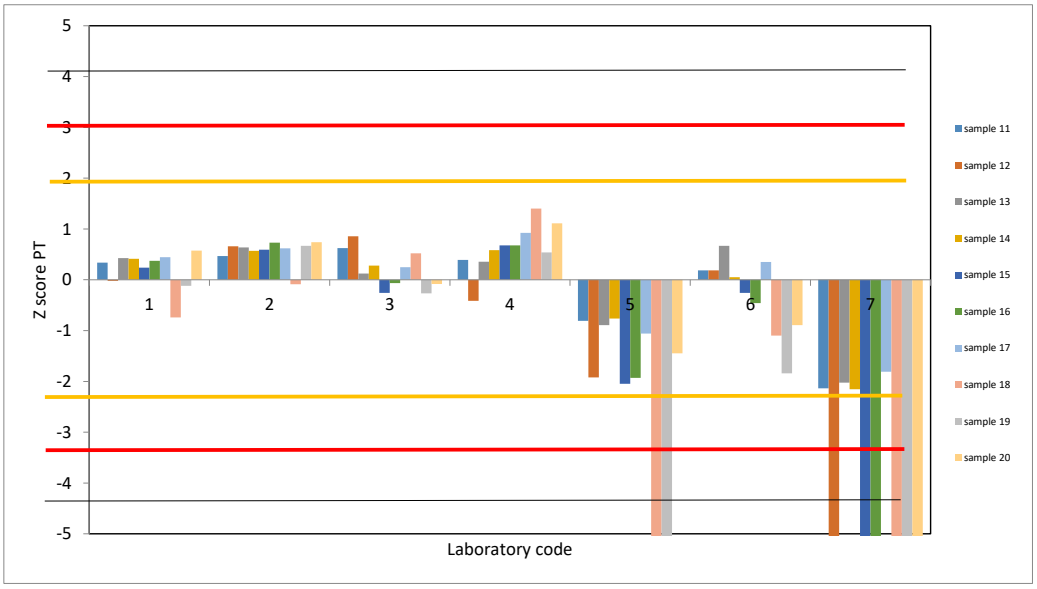


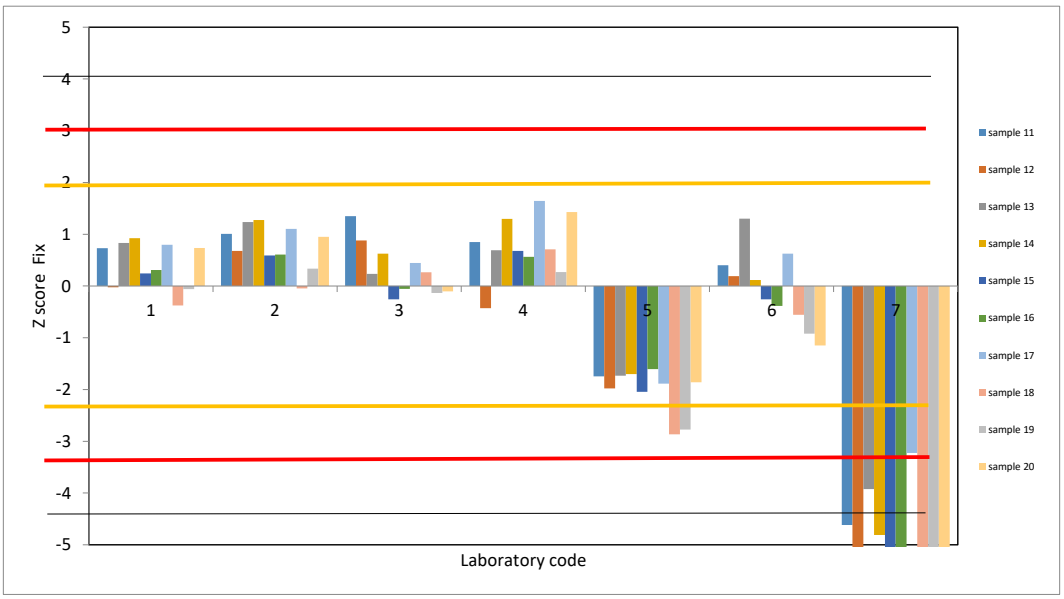
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

Sample / Lab code	11	12	13	14	15	16	17	18	19	20
1	+0,73	-0,02	+0,83	+0,92	+0,24	+0,31	+0,79	-0,37	-0,06	+0,74
2	+1,01	+0,68	+1,24	+1,28	+0,59	+0,61	+1,10	-0,04	+0,33	+0,95
3	+1,35	+0,88	+0,24	+0,63	-0,26	-0,05	+0,44	+0,26	-0,13	-0,10
4	+0,85	-0,43	+0,69	+1,30	+0,68	+0,56	+1,65	+0,71	+0,27	+1,43
5	-1,75	-1,98	-1,73	-1,70	-2,05	-1,61	-1,89	-2,86	-2,77	-1,86
6	+0,40	+0,19	+1,30	+0,12	-0,26	-0,38	+0,62	-0,56	-0,92	-1,15
7	-4,62	-5,47	-3,92	-4,81	-5,39	-5,50	-3,23	-6,66	-7,44	-7,74

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

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

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



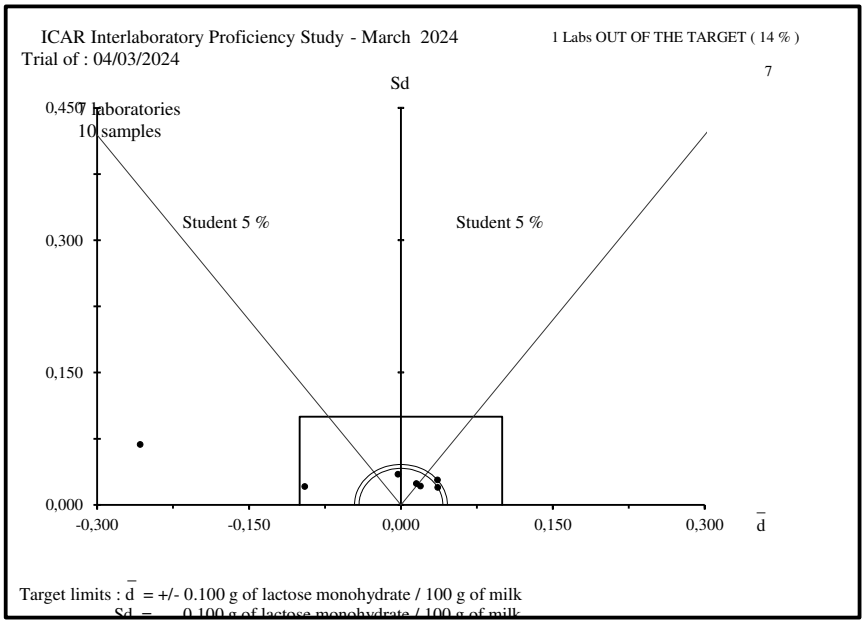


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

March 2024

Raw Milk

Determination of UREA CONTENT

Sending date of statistical treatment : 29th March 2024

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

ACTALIA CECALAIT

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

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

Nb	%	N°	d	Sd	D	**Method**
1	13	8	+ 0,40	0,43	0,59	ISO 14637 / IDF 195
2	25	3	+ 0,50	0,55	0,74	Skalar
3	38	4	- 0,74	0,37	0,83	ISO 14637 / IDF 195
4	50	2	- 0,37	1,64	1,68	enzimatico
5	63	1	- 1,80	0,28	1,83	ISO 14637 / IDF 195
6	75	5	+ 2,15	0,56	2,22	ISO 14637 / IDF 195
7	88	6	- 2,25	1,04	2,48	Enzymatic method in house
8	100	7	+ 4,48	0,40	4,50	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 :

+/- 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 4 laboratories using reference method (ISO 14637|IDF 195 or V 04-217), after outlier discarging using Grubbs test at 5% risk level

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

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

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

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	0,32
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	2,27

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

Sample / Lab code	21	22	23	24	25	26	27	28	29	30	Sr	NL
1	0,250	0,390	0,430	0,240	0,250	0,330	0,120	0,240	0,180	0,150	0,19	20
2	0,530	0,380	0,220	0,600	0,320	1,250	0,190	0,960	0,120	0,420	0,43	20
3	0,630	0,610	0,170	0,450	0,690	0,610	0,180	0,480	0,230	0,340	0,34	20
4	0,350	0,020	0,070	0,140	0,060	0,520	0,200	0,000	0,260	0,070	0,16	20
5	1,300	0,100	0,200	0,300	0,200	0,800	0,900	0,600	0,500	0,000	0,44	20
6	0,460	0,680	0,370	0,050	0,670	0,300	0,040	0,220	0,980	0,950	0,40	20
7	0,700	0,600	1,400 *	0,500	0,300	0,100	0,700	0,200	0,500	0,400	0,45	20
8	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,00	20
Sr	0,45	0,31	0,39	0,25	0,28	0,44	0,30	0,32	0,32	0,29		160
NE	16	16	16	16	16	16	16	16	16	16		
NE	1,49	1,01	0,57	0,82	0,91	1,44	0,98	1,06	1,05	0,97		

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

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

Table III : **Means of the replicates in mg / dl**

Sample / Lab code	21	22	23	24	25	26	27	28	29	30
1	18,19	41,20	27,51	32,50	37,16	47,34	23,33	51,56	56,91	61,26
2	20,43	43,57	30,29	34,46	38,79	51,80	23,49	50,22	56,79	61,48
3	19,86	44,41	30,09	34,69	39,37	48,72	24,91	54,49	59,22	64,22
4	19,37	42,76	29,47	34,23	38,33	47,74	23,64	52,59	57,64	61,82
5	22,25	45,05	31,80	35,95	41,60	51,60	27,65	56,40	59,65	64,50
6	18,64	42,79	27,78	32,35	36,87	45,81	23,27	49,81	55,99	59,13
7	23,55	47,40	34,50	39,25	43,45	53,75	29,35	57,90	63,05	67,60
8	19,95	44,19	30,03	34,96	39,68	49,12	24,67	53,41	58,77	64,14
M	20,28	43,92	30,18	34,80	39,40	49,48	25,04	53,30	58,50	63,02
REF.	19,94	43,30	29,70	34,41	39,19	48,95	24,82	53,49	58,24	62,93
SD	1,80	1,85	2,23	2,17	2,21	2,67	2,27	2,86	2,24	2,62

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 4 laboratories using the reference method ISO 14637 | IDF 195 or V 04-2017, after outliers discarging using Grubbs test 5% risk level

Table IV : Outlier identification

Sample	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Outliers Cochran			7							
Outlier Grubbs										
sr	0,45	0,31	0,18	0,25	0,28	0,44	0,30	0,32	0,32	0,29
SR	1,83	1,86	1,50	2,18	2,22	2,69	2,28	2,87	2,25	2,63

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

Sample / Lab code	21	22	23	24	25	26	27	28	29	30	d	Sd_{lab}	t
1	- 1,75	- 2,10	- 2,20	- 1,91	- 2,04	- 1,61	- 1,49	- 1,93	- 1,33	- 1,67	- 1,80	0,28	20,46
2	+ 0,49	+ 0,27	+ 0,59	+ 0,05	- 0,40	+ 2,85	- 1,34	- 3,27	- 1,45	- 1,45	- 0,37	1,64	0,71
3	- 0,08	+ 1,11	+ 0,39	+ 0,27	+ 0,17	- 0,23	+ 0,09	+ 1,00	+ 0,97	+ 1,29	+ 0,50	0,55	2,88
4	- 0,57	- 0,54	- 0,23	- 0,18	- 0,86	- 1,21	- 1,18	- 0,90	- 0,60	- 1,11	- 0,74	0,37	6,28
5	+ 2,31	+ 1,75	+ 2,10	+ 1,54	+ 2,41	+ 2,65	+ 2,83	+ 2,91	+ 1,41	+ 1,57	+ 2,15	0,56	12,18
6	- 1,30	- 0,51	- 1,93	- 2,07	- 2,33	- 3,14	- 1,55	- 3,68	- 2,25	- 3,80	- 2,25	1,04	6,83
7	+ 3,61	+ 4,10	+ 4,80	+ 4,84	+ 4,26	+ 4,80	+ 4,53	+ 4,41	+ 4,81	+ 4,67	+ 4,48	0,40	35,57
8	+ 0,01	+ 0,89	+ 0,33	+ 0,55	+ 0,49	+ 0,17	- 0,15	- 0,08	+ 0,53	+ 1,21	+ 0,40	0,43	2,88
d	+ 0,34	+ 0,62	+ 0,48	+ 0,39	+ 0,21	+ 0,53	+ 0,22	- 0,19	+ 0,26	+ 0,09	+ 0,29	2,19	
Sd	1,80	1,85	2,23	2,17	2,21	2,67	2,27	2,86	2,24	2,62	2,31		

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

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

ISO 14637|IDF 195 : Precision of the method : Sr = 0.54 mg / dl

SR = 1.81 mg / dl

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

Sample/Lab code	21	22	23	24	25	26	27	28	29	30
1	-0,97	-1,14	-0,98	-0,88	-0,92	-0,60	-0,66	-0,67	-0,60	-0,64
2	+0,27	+0,15	+0,26	+0,02	-0,18	+1,07	-0,59	-1,14	-0,65	-0,55
3	-0,05	+0,60	+0,17	+0,13	+0,08	-0,09	+0,04	+0,35	+0,43	+0,49
4	-0,32	-0,29	-0,11	-0,08	-0,39	-0,45	-0,52	-0,31	-0,27	-0,42
5	+1,28	+0,95	+0,94	+0,71	+1,09	+0,99	+1,25	+1,02	+0,63	+0,60
6	-0,72	-0,28	-0,86	-0,95	-1,05	-1,18	-0,68	-1,29	-1,01	-1,45
7	+2,00	+2,22	+2,15	+2,23	+1,92	+1,80	+2,00	+1,54	+2,15	+1,79
8	+0,01	+0,48	+0,15	+0,25	+0,22	+0,06	-0,07	-0,03	+0,24	+0,46

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

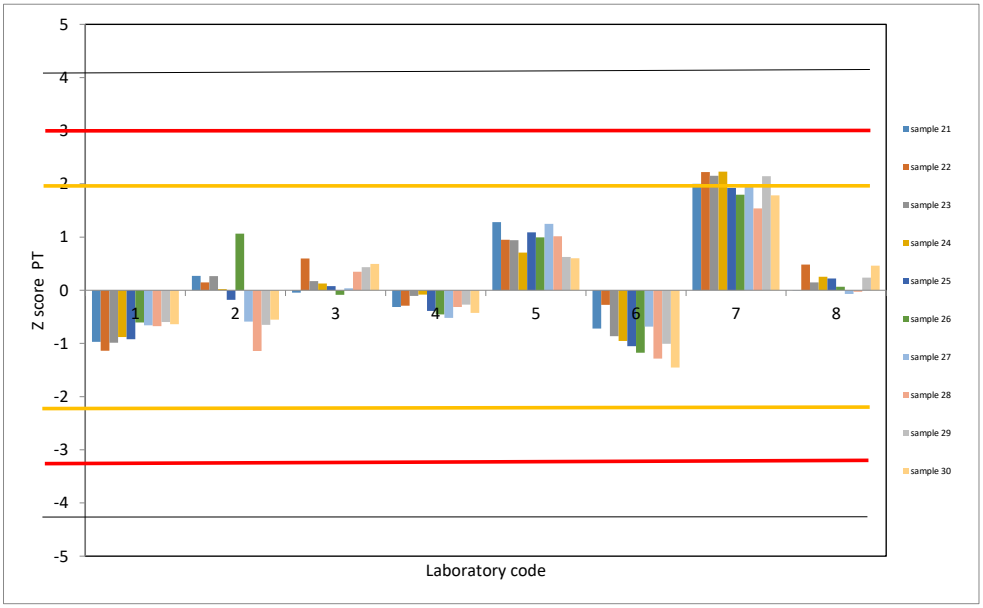


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on the standard deviation of reproducibility of the method

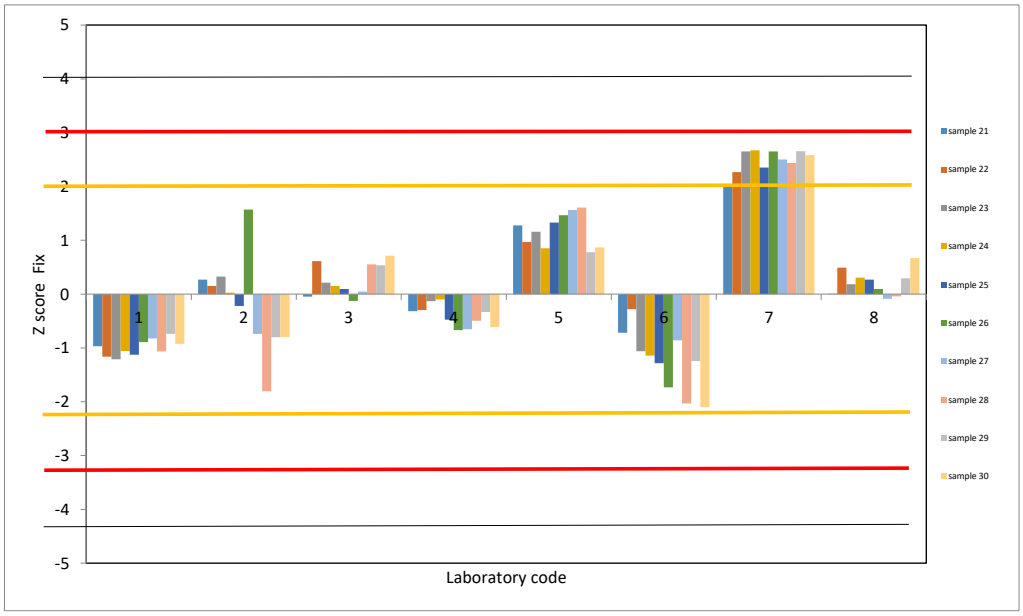
Sample / Lab code	21	22	23	24	25	26	27	28	29	30
1	-0,97	-1,16	-1,21	-1,06	-1,13	-0,89	-0,82	-1,07	-0,74	-0,92
2	+0,27	+0,15	+0,33	+0,03	-0,22	+1,57	-0,74	-1,81	-0,80	-0,80
3	-0,05	+0,61	+0,21	+0,15	+0,10	-0,13	+0,05	+0,55	+0,54	+0,71
4	-0,32	-0,30	-0,13	-0,10	-0,48	-0,67	-0,65	-0,50	-0,33	-0,61
5	+1,28	+0,97	+1,16	+0,85	+1,33	+1,46	+1,56	+1,61	+0,78	+0,87
6	-0,72	-0,28	-1,06	-1,14	-1,29	-1,73	-0,86	-2,03	-1,24	-2,10
7	+2,00	+2,27	+2,65	+2,67	+2,35	+2,65	+2,50	+2,44	+2,66	+2,58
8	+0,01	+0,49	+0,18	+0,31	+0,27	+0,09	-0,09	-0,04	+0,29	+0,67

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

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

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

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



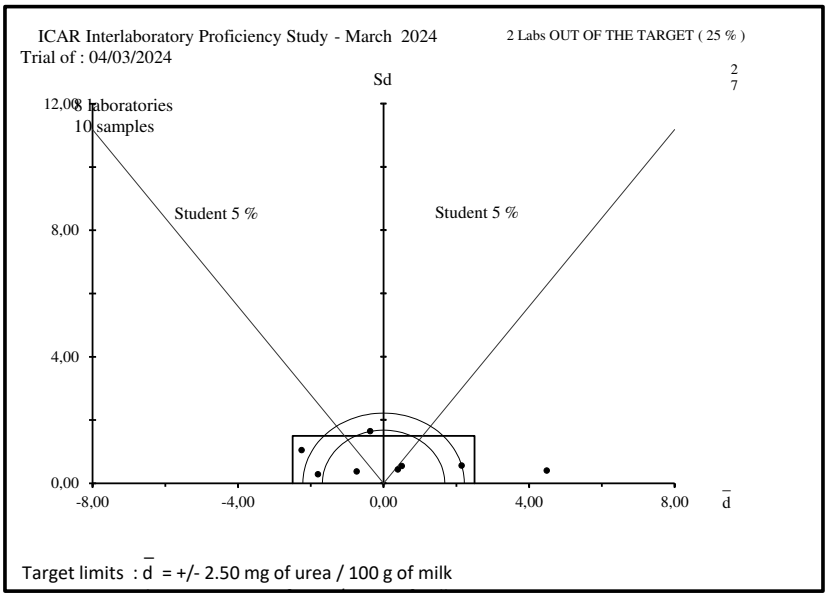


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

ICAR
PROFICIENCY TESTING SCHEME

March 2024

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 29th March 2024

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

Proficiency test accreditated ISO 17043

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

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

Nb	%	N°	d	Sd	D	Method
1	2	20	- 0%	1%	1%	B
2	3	11	+ 0%	1%	1%	B
3	5	29	+ 1%	1%	1%	B
4	7	54	+ 1%	1%	1%	B
5	8	16	- 0%	1%	1%	B
6	10	53	- 0%	1%	1%	B
7	12	13	+ 1%	1%	2%	B
8	14	25	+ 1%	1%	2%	B
9	15	5	- 1%	2%	2%	B
10	17	35	- 1%	2%	2%	B
11	19	10	+ 0%	2%	2%	B
12	20	43	- 2%	2%	2%	B
13	22	28	+ 1%	2%	2%	B
14	24	22	- 2%	2%	3%	B
15	25	39	- 2%	2%	3%	B
16	27	19	- 2%	2%	3%	B
17	29	40	- 2%	2%	3%	B
18	31	14	+ 2%	2%	3%	B
19	32	6	- 2%	2%	3%	B
20	34	23	- 2%	2%	3%	B
21	36	48	+ 2%	3%	3%	B
22	37	15	+ 0%	3%	3%	B
23	39	32	+ 1%	3%	3%	B
24	41	37	+ 1%	3%	3%	B
25	42	50	+ 2%	2%	3%	B
26	44	46	+ 3%	2%	3%	B
27	46	3	+ 2%	3%	4%	B
28	47	27	+ 3%	3%	4%	B
29	49	24	- 3%	2%	4%	B
30	51	47	+ 2%	3%	4%	B
31	53	21	+ 3%	3%	4%	B
32	54	9	+ 3%	3%	4%	B
33	56	51	- 3%	3%	4%	B
34	58	30	- 3%	3%	4%	B
35	59	12	- 3%	3%	4%	B
36	61	8	+ 3%	3%	4%	B
37	63	34	- 1%	4%	4%	B
38	64	55	+ 2%	4%	5%	B
39	66	31	- 3%	4%	5%	B
40	68	7	+ 3%	3%	5%	B
41	69	26	- 1%	5%	5%	B
42	71	18	+ 4%	4%	5%	B
43	73	2	- 3%	4%	5%	B
44	75	17	- 3%	4%	5%	B
45	76	1	+ 5%	3%	6%	B
46	78	33	+ 6%	4%	7%	B
47	80	52	- 5%	5%	7%	B
48	81	36	+ 5%	5%	7%	B
49	83	38	+ 6%	5%	8%	B
50	85	44	- 6%	5%	8%	B
51	86	4	- 7%	6%	9%	B
52	88	56	+ 7%	6%	10%	C
53	90	58	- 6%	9%	11%	B
54	92	59	+ 6%	10%	11%	A
55	93	49	- 7%	9%	12%	B
56	95	57	- 0%	15%	15%	B
57	97	45	+ 7%	15%	16%	B
58	98	41	- 12%	14%	19%	C
59	100	42	- 20%	29%	35%	B

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

(Nb : laboratory rank; % : relative rank)

(N° : laboratory identification number)

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

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

A ISO 13366-1 | IDF 148-1
B ISO 13366-2 | IDF 148-2
C Other method

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

+/- 10% for $\bar{d}$ and 10% for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 57 laboratories using reference metod ISO 13366-1|IDF 148-1 and alternative method ISO 13366-2|IDF 148-2 after outlier discarging using Grubbs test at 5% risk level

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	13	2%
Rep Note : Limits are only indicative and so far do not constitute standard values; they indicate what is normally reachable by labs for their self evaluation.	SR_{PT}	33	5%

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	Sr	NL
1	38	6	18	1	2	7	23	3	2	14	11	20
2	22	20	17	0	2	35	1	27	4	2	13	20
3	35	0	13	0	14	56	50	10	3	6	19	20
4	37	19	24	5	0	20	13	6	8	5	12	20
5	12	7	9	8	19	3	2	16	5	10	7	20
6	23	35	3	23	1	66	10	26	3	11	19	20
7	49	21	2	28	21	64	63	11	1	12	25	20
8	5	13	12	7	3	31	19	3	3	1	9	20
9	9	23	5	9	2	1	5	9	2	1	6	20
10	38	44	22	9	1	39	8	6	2	7	17	20
11	20	11	10	18	3	7	3	1	8	2	7	20
12	6	2	5	10	3	28	8	1	2	2	7	20
13	4	0	14	11	2	7	1	14	1	0	5	20
14	37	14	19	11	2	7	43	35	0	4	16	20
15	18	54	19	17	0	29	51	6	10	11	19	20
16	13	6	13	3	3	47	21	9	4	16	13	20
17	16	2	36	14	6	2	8	5	6	9	10	20
18	4	7	2	5	5	7	6	4	5	2	4	20
19	10	2	2	2	4	3	12	1	1	3	4	20
20	28	9	10	5	1	9	21	2	1	6	9	20
21	3	16	3	2	4	10	24	15	0	7	8	20
22	10	17	15	12	7	5	14	4	3	4	7	20
23	4	13	1	6	5	2	10	30	2	8	8	20
24	7	32	23	8	18	28	20	0	0	6	13	20
25	6	1	2	11	6	3	23	26	3	4	8	20
26	66	12	14	14	1	14	1	55 *	6	6	20	20
27	10	6	6	8	4	19	12	4	7	1	6	20
28	1	19	5	2	2	21	14	15	1	0	8	20
29	3	17	2	1	1	5	1	14	2	0	5	20
30	20	30	0	21	3	36	3	15	2	1	13	20

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	Sr	NL
31	50	44	1	9	4	28	12	13	3	4	17	20
32	42	35	5	5	5	13	2	2	0	12	13	20
33	22	24	12	0	2	16	5	5	1	5	9	20
34	8	10	3	5	7	7	16	18	1	0	7	20
35	25	1	12	4	8	30	17	27	3	3	12	20
36	2	0	3	8	1	7	10	7	1	1	4	20
37	10	9	6	16	3	33	10	5	0	4	9	20
38	14	47	13	18	8	51	54	16	5	3	21	20
39	10	49	7	5	6	75	10	30	2	1	21	20
40	3	30	4	28	6	21	6	0	2	6	11	20
41	5	32	6	18	10	9	21	12	3	1	10	20
42	23	32	1	1	2	36	26	10	2	0	13	20
43	6	19	19	6	16	56	22	14	7	6	16	20
44	4	17	2	3	4	38	5	21	0	2	11	20
45	118 *	17	58 *	11	23	73	18	18	19 *	9	35	20
46	98 *	128 *	40	17	13	142 *	49	25	3	4	51	20
47	6	43	17	50 *	1	7	41	14	1	1	18	20
48	4	30	12	13	6	20	15	8	10	11	10	20
49	7	7	6	6	6	10	12	11	5	1	5	20
50	11	60	16	8	6	11	9	12	3	0	15	20
51	31	14	8	10	5	18	6	9	2	4	10	20
52	6	48	4	3	8	36	6	21	2	2	15	20
53	11	16	12	6	12	43	5	11	5	2	12	20
54	13	1	30	12	36 *	8	31	4	1	1	13	20
55	96 *	24	26	15	2	47	9	8	8	6	26	20
56	18	18	7	8	7	10	3	3	1	1	7	20
57	9	18	3	1	8	32	21	11	0	6	10	20
58	11	9	0	36	15	82	41	22	9	7	23	20
59	0	0	0	0	0	0	0	0	0	0	0	20
Sr	22	21	11	10	6	26	16	11	3	4		1180
r	126	126	42	50	42	126	126	63	25	25		
NE	118	118	118	118	118	118	118	118	118	118		
L	68	78	44	38	25	103	71	46	13	19		

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

NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

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

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

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
1	1113	1326	313	451	200	1577	826	606	43	97
2	1039	1238	283	416	183	1434	757	565	41	88
3	1101	1287	296	438	185	1569	797	595	40	93
4	988	1189	283	397	173	1399	737	546	45	86
5	1079	1251	280	410	185	1520	790	573	40	88
6	1037	1265	285	422	187	1495	767	550	43	84
7	1117	1308	287	445	189	1574	816	593	43	94
8	1087	1307	302	439	194	1582	805	592	46	87
9	1102	1323	299	437	193	1551	806	603	43	93
10	1098	1293	302	414	189	1492	786	577	42	88
11	1078	1273	292	430	189	1509	795	561	43	95
12	1047	1236	295	420	185	1456	769	563	40	84
13	1081	1276	298	444	190	1532	791	595	41	89
14	1072	1312	291	430	195	1545	796	598	40	86
15	1022	1274	289	449	195	1544	780	582	47	90
16	1083	1263	301	418	188	1504	794	569	43	89
17	999	1215	285	409	182	1491	768	581	45	82
18	1104	1323	295	448	199	1586	808	584	45	93
19	1081	1266	277	423	167	1500	755	575	20 *	68 *
20	1064	1281	286	424	182	1515	785	578	41	91
21	1095	1309	301	437	191	1559	821	593	40	89
22	1031	1262	281	427	185	1496	789	571	41	83
23	1046	1252	279	417	188	1472	782	562	38	93
24	1050	1237	276	409	173	1485	753	555	38	81
25	1096	1285	294	445	185	1525	783	583	39	88
26	1071	1285	287	420	187	1423	769	594	46	87
27	1097	1316	297	445	193	1556	794	592	39	91
28	1104	1292	292	433	184	1537	797	591	38	84
29	1085	1278	292	429	195	1510	802	573	43	93
30	1051	1227	279	424	185	1462	776	566	39	89

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

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 57 laboratories using the reference method ISO 13366 | IDF 148-1 and alternative method ISO 13366-2 | IDF 148-2, after outlier discarging using Grubbs test at 5% risk level

Table IV : Outlier identification

Sample	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Outliers Cochran	45;46 55	46	45	47	54	46		26	45	
Outlier Grubbs	45	41			59	41;42	41;42 57;59	38;42 57	19	19;41 42
sr	15	17	10	9	6	23	16	10	3	4
SR	46	56	15	18	10	60	29	20	4	5
sr %	1%	1%	3%	2%	3%	2%	2%	2%	7%	5%
SR %	4%	4%	5%	4%	5%	4%	4%	3%	10%	6%

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	1085	1235	289	418	175	1454	740	566	41	80
32	1102	1241	301	432	196	1555	798	589	39	88
33	1135	1347	308	457	197	1574	833	620	48	97
34	1033	1207	286	429	175	1543	796	570	46	88
35	1049	1273	296	421	185	1514	762	588	44	91
36	1137	1334	304	454	194	1611	827	596	42	98
37	1090	1321	281	425	192	1480	794	592	40	90
38	1129	1331	307	453	199	1611	839	643 *	45	95
39	1064	1240	284	422	191	1491	770	559	37	87
40	1058	1247	283	418	191	1482	772	557	37	86
41	952	1072 *	287	396	165	1298 *	640 *	524	41	110 *
42	950	1240	260	382	168	921 *	537 *	443 *	30	71 *
43	1058	1249	291	424	178	1509	765	553	42	85
44	1006	1219	269	403	169	1405	736	558	38	88
45	1328 *	1436	323	433	193	1475	804	585	49	85
46	1110	1298	309	447	190	1548	795	604	39	83
47	1088	1276	301	447	190	1578	798	600	41	92
48	1096	1306	288	431	192	1557	789	581	37	95
49	1076	1114	266	378	168	1383	714	577	38	88
50	1114	1299	294	439	188	1540	818	594	40	92
51	1058	1237	285	422	183	1454	767	574	38	86
52	1000	1195	271	407	170	1449	742	558	41	87
53	1062	1261	297	435	189	1496	791	576	46	88
54	1081	1285	296	422	184	1512	795	596	41	92
55	1114	1343	292	439	185	1543	782	580	37	84
56	1178	1361	314	449	202	1617	843	610	45	95
57	1047	1270	283	430	189	1528	579 *	782 *	43	93
58	1038	1142	250	427	182	1370	769	573	44	96
59	990	1380	320	450	260 *	1600	900 *	580	30	100
M	1069	1275	291	428	186	1513	786	579	41	89
REF.	1072	1274	290	429	187	1514	786	579	41	89
SD	44	54	14	17	9	57	27	18	4	5
AVT	1051	1236	277	417	179	1448	765	578	39	86

M = mean per sample REF. = reference values

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

AVT = Assign value traceable to the ERM BD001

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 57 laboratories using the reference method ISO 13366 | IDF 148-1 and alternative method ISO 13366-2 | IDF 148-2, after outlier discarging using Grubbs test at 5% risk level

Table IV : Outlier identification

Sample	**31**	**2**	**32**	**4**	**33**	**6**	**34**	**8**	**35**	**#**	**36**	**37**	**4**	**38**	**6**	**39**	**8**	**40**	**#**
Outliers Cochran	45;46 55		46		45		47		54		46			26		45			
Outlier Grubbs	45		41						59		41;42	41;42 57;59		38;42 57		19		19;41 42	
sr	15		17		10		9		6		23	16		10		3		4	
SR	46		56		15		18		10		60	29		20		4		5	
sr %	1%		1%		3%		2%		3%		2%	2%		2%		7%		5%	
SR %	4%		4%		5%		4%		5%		4%	4%		3%		10%		6%	

SR Method for AVT values	63	74	23	30	16	87	46	38	4	8	

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	d	Sd_{lab}	t
1	+ 4%	+ 4%	+ 8%	+ 5%	+ 7%	+ 4%	+ 5%	+ 5%	+ 5%	+ 9%	+ 5%	3%	4,69
2	- 3%	- 3%	- 3%	- 3%	- 2%	- 5%	- 4%	- 3%	- 0%	- 1%	- 3%	4%	2,82
3	+ 3%	+ 1%	+ 2%	+ 2%	- 1%	+ 4%	+ 1%	+ 3%	- 4%	+ 4%	+ 2%	3%	2,60
4	- 8%	- 7%	- 3%	- 8%	- 7%	- 8%	- 6%	- 6%	+ 10%	- 4%	- 7%	6%	3,27
5	+ 1%	- 2%	- 4%	- 4%	- 1%	+ 0%	+ 1%	- 1%	- 4%	- 1%	- 1%	2%	1,45
6	- 3%	- 1%	- 2%	- 2%	- 0%	- 1%	- 2%	- 5%	+ 4%	- 6%	- 2%	2%	3,32
7	+ 4%	+ 3%	- 1%	+ 4%	+ 1%	+ 4%	+ 4%	+ 2%	+ 4%	+ 6%	+ 3%	3%	3,05
8	+ 1%	+ 3%	+ 4%	+ 2%	+ 4%	+ 4%	+ 2%	+ 2%	+ 11%	- 3%	+ 3%	3%	2,81
9	+ 3%	+ 4%	+ 3%	+ 2%	+ 3%	+ 2%	+ 3%	+ 4%	+ 5%	+ 4%	+ 3%	3%	3,72
10	+ 2%	+ 2%	+ 4%	- 4%	+ 1%	- 1%	+ 0%	- 0%	+ 2%	- 2%	+ 0%	2%	0,41
11	+ 1%	- 0%	+ 1%	+ 0%	+ 1%	- 0%	+ 1%	- 3%	+ 5%	+ 7%	+ 0%	1%	0,09
12	- 2%	- 3%	+ 1%	- 2%	- 1%	- 4%	- 2%	- 3%	- 3%	- 6%	- 3%	3%	2,75
13	+ 1%	+ 0%	+ 3%	+ 3%	+ 2%	+ 1%	+ 1%	+ 3%	- 1%	- 0%	+ 1%	1%	3,56
14	- 0%	+ 3%	+ 0%	+ 0%	+ 4%	+ 2%	+ 1%	+ 3%	- 3%	- 3%	+ 2%	2%	2,24
15	- 5%	+ 0%	- 1%	+ 5%	+ 4%	+ 2%	- 1%	+ 0%	+ 14%	+ 1%	+ 0%	3%	0,14
16	+ 1%	- 1%	+ 3%	- 3%	+ 0%	- 1%	+ 1%	- 2%	+ 5%	- 0%	- 0%	1%	0,41
17	- 7%	- 5%	- 2%	- 5%	- 2%	- 2%	- 2%	+ 0%	+ 10%	- 8%	- 3%	4%	2,51
18	+ 3%	+ 4%	+ 2%	+ 4%	+ 6%	+ 5%	+ 3%	+ 1%	+ 8%	+ 4%	+ 4%	4%	3,10
19	+ 1%	- 1%	- 5%	- 1%	- 11%	- 1%	- 4%	- 1%	- 52%	- 24%	- 2%	2%	3,66
20	- 1%	+ 1%	- 2%	- 1%	- 3%	+ 0%	- 0%	- 0%	- 1%	+ 2%	- 0%	1%	1,23
21	+ 2%	+ 3%	+ 3%	+ 2%	+ 2%	+ 3%	+ 5%	+ 2%	- 3%	- 1%	+ 3%	3%	3,34
22	- 4%	- 1%	- 3%	- 0%	- 1%	- 1%	+ 0%	- 1%	- 1%	- 7%	- 2%	2%	2,41
23	- 2%	- 2%	- 4%	- 3%	+ 0%	- 3%	- 0%	- 3%	- 7%	+ 4%	- 2%	2%	2,98
24	- 2%	- 3%	- 5%	- 5%	- 7%	- 2%	- 4%	- 4%	- 7%	- 9%	- 3%	2%	6,00
25	+ 2%	+ 1%	+ 1%	+ 4%	- 1%	+ 1%	- 0%	+ 1%	- 6%	- 1%	+ 1%	1%	2,10
26	- 0%	+ 1%	- 1%	- 2%	- 0%	- 6%	- 2%	+ 2%	+ 12%	- 2%	- 1%	5%	0,97
27	+ 2%	+ 3%	+ 2%	+ 4%	+ 3%	+ 3%	+ 1%	+ 2%	- 6%	+ 2%	+ 3%	3%	3,19
28	+ 3%	+ 1%	+ 0%	+ 1%	- 1%	+ 1%	+ 1%	+ 2%	- 9%	- 6%	+ 1%	2%	2,29
29	+ 1%	+ 0%	+ 1%	- 0%	+ 4%	- 0%	+ 2%	- 1%	+ 5%	+ 4%	+ 1%	1%	1,66
30	- 2%	- 4%	- 4%	- 1%	- 1%	- 3%	- 1%	- 2%	- 5%	- 1%	- 3%	3%	2,81

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

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

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

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

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40	d	Sd_{lab}	t
31	+ 1%	- 3%	- 1%	- 3%	- 6%	- 4%	- 6%	- 2%	- 1%	- 10%	- 3%	4%	2,48
32	+ 3%	- 3%	+ 3%	+ 1%	+ 5%	+ 3%	+ 2%	+ 2%	- 5%	- 1%	+ 1%	3%	1,26
33	+ 6%	+ 6%	+ 6%	+ 7%	+ 6%	+ 4%	+ 6%	+ 7%	+ 16%	+ 8%	+ 6%	4%	4,50
34	- 4%	- 5%	- 2%	- 0%	- 6%	+ 2%	+ 1%	- 2%	+ 11%	- 1%	- 1%	4%	1,07
35	- 2%	- 0%	+ 2%	- 2%	- 1%	- 0%	- 3%	+ 1%	+ 6%	+ 2%	- 1%	2%	1,14
36	+ 6%	+ 5%	+ 4%	+ 6%	+ 4%	+ 6%	+ 5%	+ 3%	+ 1%	+ 10%	+ 5%	5%	3,35
37	+ 2%	+ 4%	- 3%	- 1%	+ 3%	- 2%	+ 1%	+ 2%	- 3%	+ 1%	+ 1%	3%	0,65
38	+ 5%	+ 4%	+ 6%	+ 6%	+ 7%	+ 6%	+ 7%	+ 11%	+ 8%	+ 6%	+ 6%	5%	3,98
39	- 1%	- 3%	- 2%	- 2%	+ 2%	- 2%	- 2%	- 3%	- 10%	- 3%	- 2%	2%	3,23
40	- 1%	- 2%	- 3%	- 2%	+ 2%	- 2%	- 2%	- 4%	- 10%	- 3%	- 2%	2%	3,60
41	- 11%	- 16%	- 1%	- 8%	- 12%	- 14%	- 19%	- 10%	- 1%	+ 23%	- 12%	14%	2,83
42	- 11%	- 3%	- 11%	- 11%	- 10%	- 39%	- 32%	- 24%	- 27%	- 20%	- 20%	29%	2,21
43	- 1%	- 2%	+ 0%	- 1%	- 5%	- 0%	- 3%	- 5%	+ 1%	- 4%	- 2%	2%	3,38
44	- 6%	- 4%	- 7%	- 6%	- 9%	- 7%	- 6%	- 4%	- 7%	- 1%	- 6%	5%	3,53
45	+ 24%	+ 13%	+ 11%	+ 1%	+ 3%	- 3%	+ 2%	+ 1%	+ 18%	- 5%	+ 7%	15%	1,55
46	+ 4%	+ 2%	+ 6%	+ 4%	+ 2%	+ 2%	+ 1%	+ 4%	- 6%	- 7%	+ 3%	2%	3,39
47	+ 2%	+ 0%	+ 3%	+ 4%	+ 2%	+ 4%	+ 2%	+ 4%	- 1%	+ 3%	+ 2%	3%	2,49
48	+ 2%	+ 3%	- 1%	+ 0%	+ 3%	+ 3%	+ 0%	+ 0%	- 10%	+ 6%	+ 2%	3%	2,16
49	+ 0%	- 13%	- 8%	- 12%	- 10%	- 9%	- 9%	- 0%	- 9%	- 2%	- 7%	9%	2,51
50	+ 4%	+ 2%	+ 1%	+ 2%	+ 1%	+ 2%	+ 4%	+ 3%	- 4%	+ 3%	+ 2%	2%	3,33
51	- 1%	- 3%	- 2%	- 2%	- 2%	- 4%	- 2%	- 1%	- 7%	- 3%	- 3%	3%	2,66
52	- 7%	- 6%	- 7%	- 5%	- 9%	- 4%	- 6%	- 4%	- 0%	- 2%	- 5%	5%	3,74
53	- 1%	- 1%	+ 2%	+ 1%	+ 1%	- 1%	+ 1%	- 1%	+ 11%	- 1%	- 0%	1%	0,77
54	+ 1%	+ 1%	+ 2%	- 2%	- 1%	- 0%	+ 1%	+ 3%	- 1%	+ 3%	+ 1%	1%	1,79
55	+ 4%	+ 5%	+ 1%	+ 2%	- 1%	+ 2%	- 1%	+ 0%	- 10%	- 6%	+ 2%	4%	1,73
56	+ 10%	+ 7%	+ 8%	+ 5%	+ 8%	+ 7%	+ 7%	+ 5%	+ 8%	+ 6%	+ 7%	6%	3,55
57	- 2%	- 0%	- 3%	+ 0%	+ 1%	+ 1%	- 26%	+ 35%	+ 5%	+ 4%	- 0%	15%	0,06
58	- 3%	- 10%	- 14%	- 0%	- 3%	- 10%	- 2%	- 1%	+ 6%	+ 7%	- 6%	9%	2,12
59	- 8%	+ 8%	+ 10%	+ 5%	+ 39%	+ 6%	+ 15%	+ 0%	- 27%	+ 12%	+ 6%	10%	1,82
d	- 0%	+ 0%	+ 0%	- 0%	- 0%	- 0%	+ 0%	- 0%	- 0%	+ 0%	- 0%	7%	
Sd	4%	4%	5%	4%	5%	4%	3%	3%	9%	5%			

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

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

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

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

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

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
1	+0,93	+0,97	+1,67	+1,28	+1,52	+1,09	+1,50	+1,46	+0,54	+1,78
2	-0,74	-0,67	-0,59	-0,74	-0,41	-1,41	-1,09	-0,81	-0,01	-0,22
3	+0,65	+0,24	+0,37	+0,54	-0,18	+0,96	+0,43	+0,88	-0,43	+0,89
4	-1,91	-1,59	-0,55	-1,88	-1,54	-2,01	-1,84	-1,84	+1,10	-0,78
5	+0,16	-0,43	-0,81	-1,09	-0,24	+0,09	+0,17	-0,34	-0,43	-0,22
6	-0,80	-0,17	-0,44	-0,42	-0,01	-0,33	-0,70	-1,62	+0,40	-1,22
7	+1,01	+0,63	-0,25	+0,95	+0,21	+1,04	+1,13	+0,74	+0,40	+1,11
8	+0,33	+0,61	+0,86	+0,57	+0,78	+1,17	+0,71	+0,68	+1,24	-0,56
9	+0,67	+0,90	+0,60	+0,46	+0,72	+0,63	+0,75	+1,29	+0,54	+0,78
10	+0,59	+0,36	+0,86	-0,89	+0,21	-0,40	+0,02	-0,12	+0,26	-0,33
11	+0,14	-0,02	+0,12	+0,08	+0,21	-0,10	+0,34	-1,03	+0,54	+1,33
12	-0,56	-0,70	+0,30	-0,51	-0,24	-1,01	-0,62	-0,92	-0,29	-1,11
13	+0,21	+0,04	+0,56	+0,87	+0,38	+0,30	+0,19	+0,88	-0,15	-0,00
14	-0,01	+0,71	+0,00	+0,05	+0,95	+0,53	+0,38	+1,02	-0,29	-0,67
15	-1,13	+0,00	-0,14	+1,16	+0,95	+0,51	-0,23	+0,16	+1,65	+0,11
16	+0,24	-0,20	+0,75	-0,66	+0,10	-0,19	+0,30	-0,59	+0,54	-0,00
17	-1,65	-1,09	-0,40	-1,15	-0,52	-0,40	-0,66	+0,07	+1,10	-1,66
18	+0,73	+0,90	+0,34	+1,10	+1,35	+1,24	+0,85	+0,27	+0,96	+0,89
19	+0,21	-0,15	-0,99	-0,33	-2,22	-0,26	-1,15	-0,26	-5,99	-4,77
20	-0,18	+0,12	-0,33	-0,30	-0,58	+0,01	-0,04	-0,06	-0,15	+0,44
21	+0,51	+0,65	+0,75	+0,49	+0,50	+0,78	+1,33	+0,74	-0,29	-0,11
22	-0,92	-0,23	-0,74	-0,10	-0,24	-0,33	+0,13	-0,45	-0,15	-1,33
23	-0,58	-0,42	-0,88	-0,69	+0,10	-0,74	-0,13	-0,95	-0,85	+0,89
24	-0,50	-0,68	-1,11	-1,15	-1,54	-0,51	-1,22	-1,34	-0,85	-1,78
25	+0,55	+0,20	+0,26	+0,92	-0,18	+0,18	-0,11	+0,21	-0,71	-0,22
26	-0,02	+0,21	-0,25	-0,51	-0,01	-1,59	-0,64	+0,79	+1,38	-0,44
27	+0,57	+0,78	+0,49	+0,95	+0,72	+0,72	+0,32	+0,71	-0,71	+0,33
28	+0,72	+0,33	+0,08	+0,25	-0,30	+0,39	+0,43	+0,63	-0,99	-1,11
29	+0,29	+0,07	+0,12	-0,01	+0,89	-0,08	+0,60	-0,34	+0,54	+0,89
30	-0,47	-0,87	-0,85	-0,30	-0,24	-0,91	-0,38	-0,76	-0,57	-0,11

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

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

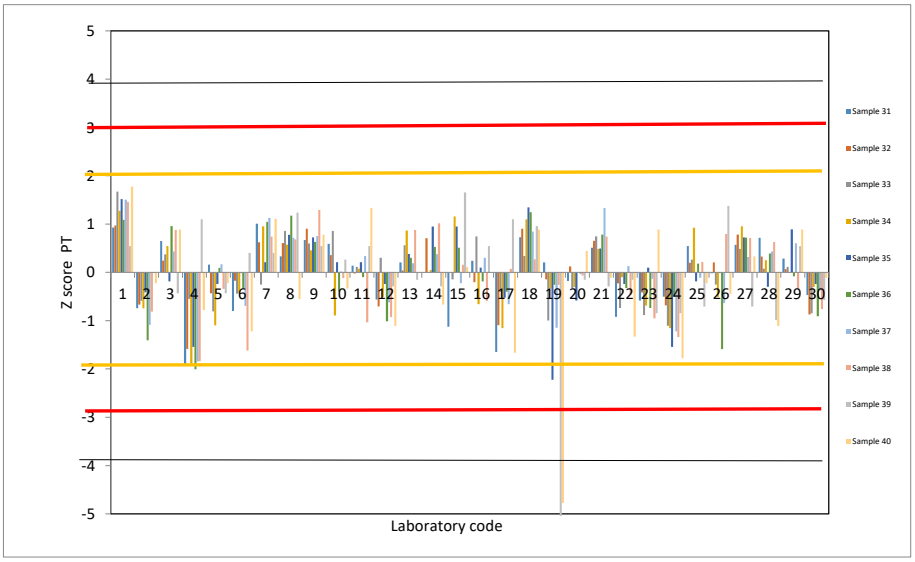


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	+0,30	-0,72	-0,14	-0,66	-1,32	-1,05	-1,71	-0,76	-0,15	-2,00
32	+0,68	-0,62	+0,75	+0,16	+1,01	+0,70	+0,47	+0,55	-0,57	-0,22
33	+1,43	+1,36	+1,30	+1,66	+1,18	+1,04	+1,77	+2,24	+1,79	+1,66
34	-0,88	-1,24	-0,37	-0,01	-1,37	+0,49	+0,39	-0,51	+1,24	-0,22
35	-0,53	-0,02	+0,41	-0,45	-0,18	-0,00	-0,90	+0,46	+0,68	+0,33
36	+1,47	+1,12	+0,97	+1,48	+0,78	+1,68	+1,56	+0,91	+0,13	+1,89
37	+0,41	+0,87	-0,70	-0,22	+0,55	-0,60	+0,32	+0,68	-0,29	+0,22
38	+1,29	+1,05	+1,19	+1,42	+1,40	+1,68	+2,01	+3,54	+0,96	+1,22
39	-0,18	-0,64	-0,51	-0,42	+0,50	-0,41	-0,58	-1,12	-1,13	-0,56
40	-0,32	-0,50	-0,55	-0,63	+0,50	-0,57	-0,51	-1,23	-1,13	-0,67
41	-2,72	-3,75	-0,25	-1,91	-2,45	-3,78	-5,49	-3,06	-0,15	+4,55
42	-2,76	-0,63	-2,29	-2,76	-2,11	-10,35	-9,34	-7,55	-3,07	-4,00
43	-0,31	-0,47	+0,00	-0,28	-0,98	-0,09	-0,77	-1,45	+0,13	-0,89
44	-1,49	-1,03	-1,59	-1,53	-2,00	-1,90	-1,88	-1,20	-0,85	-0,22
45	+5,79	+3,00	+2,41	+0,22	+0,67	-0,69	+0,69	+0,32	+2,07	-1,00
46	+0,86	+0,45	+1,37	+1,04	+0,33	+0,59	+0,34	+1,35	-0,71	-1,33
47	+0,37	+0,03	+0,75	+1,07	+0,33	+1,10	+0,45	+1,16	-0,15	+0,55
48	+0,55	+0,60	-0,18	+0,11	+0,61	+0,75	+0,11	+0,10	-1,13	+1,22
49	+0,08	-2,98	-1,81	-2,97	-2,11	-2,29	-2,69	-0,15	-0,99	-0,33
50	+0,94	+0,47	+0,26	+0,60	+0,16	+0,44	+1,20	+0,82	-0,43	+0,67
51	-0,32	-0,68	-0,40	-0,39	-0,47	-1,05	-0,70	-0,31	-0,85	-0,67
52	-1,62	-1,47	-1,44	-1,30	-1,88	-1,14	-1,63	-1,20	-0,01	-0,44
53	-0,23	-0,24	+0,49	+0,37	+0,27	-0,33	+0,19	-0,20	+1,24	-0,22
54	+0,20	+0,20	+0,41	-0,39	-0,30	-0,04	+0,34	+0,93	-0,15	+0,55
55	+0,95	+1,29	+0,12	+0,57	-0,18	+0,49	-0,15	+0,05	-1,13	-1,11
56	+2,40	+1,62	+1,71	+1,19	+1,69	+1,79	+2,14	+1,68	+0,96	+1,22
57	-0,57	-0,07	-0,59	+0,05	+0,27	+0,24	-7,78	+11,22	+0,54	+0,89
58	-0,78	-2,46	-2,99	-0,10	-0,58	-2,51	-0,64	-0,34	+0,68	+1,44
59	-1,85	+1,97	+2,19	+1,25	+8,32	+1,50	+4,30	+0,05	-3,07	+2,44

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

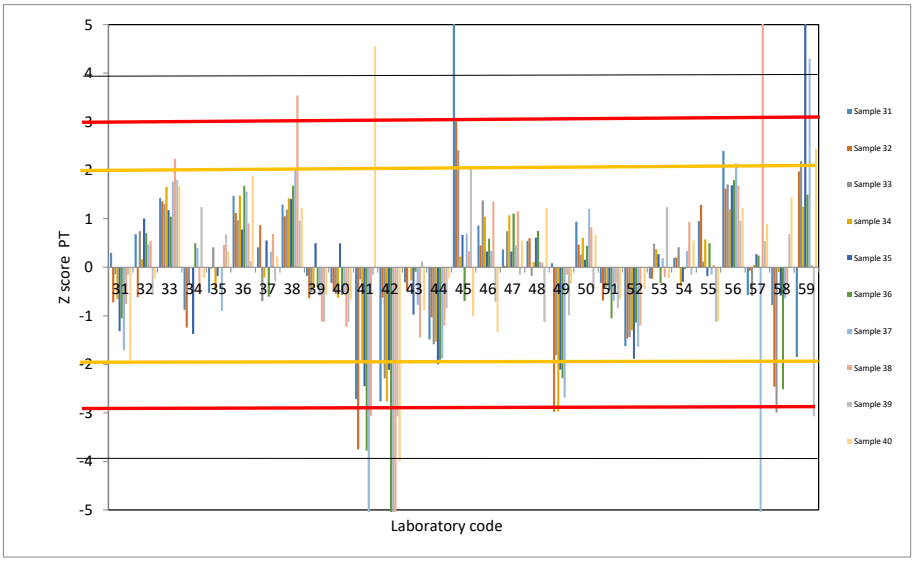


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on AVT and standard deviation of reproducibility of the method

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
1	+0,98	+1,22	+1,57	+1,12	+1,31	+1,48	+1,32	+0,72	+1,00	+1,38
2	-0,19	+0,03	+0,24	-0,03	+0,25	-0,17	-0,18	-0,36	+0,50	+0,25
3	+0,79	+0,69	+0,80	+0,70	+0,38	+1,39	+0,70	+0,45	+0,13	+0,88
4	-1,01	-0,64	+0,26	-0,68	-0,38	-0,56	-0,62	-0,84	+1,50	-0,06
5	+0,44	+0,20	+0,11	-0,23	+0,34	+0,82	+0,54	-0,13	+0,13	+0,25
6	-0,23	+0,39	+0,33	+0,15	+0,47	+0,54	+0,04	-0,74	+0,88	-0,31
7	+1,04	+0,97	+0,43	+0,93	+0,59	+1,45	+1,10	+0,38	+0,88	+1,00
8	+0,56	+0,95	+1,09	+0,72	+0,91	+1,53	+0,86	+0,36	+1,63	+0,06
9	+0,80	+1,17	+0,93	+0,65	+0,88	+1,18	+0,88	+0,64	+1,00	+0,81
10	+0,75	+0,77	+1,09	-0,12	+0,59	+0,50	+0,46	-0,03	+0,75	+0,19
11	+0,43	+0,49	+0,65	+0,43	+0,59	+0,70	+0,64	-0,46	+1,00	+1,13
12	-0,06	+0,00	+0,76	+0,10	+0,34	+0,09	+0,09	-0,41	+0,25	-0,25
13	+0,48	+0,54	+0,91	+0,88	+0,69	+0,96	+0,55	+0,45	+0,38	+0,38
14	+0,33	+1,03	+0,59	+0,42	+1,00	+1,11	+0,66	+0,51	+0,25	+0,00
15	-0,46	+0,51	+0,50	+1,05	+1,00	+1,10	+0,32	+0,11	+2,00	+0,44
16	+0,50	+0,36	+1,02	+0,02	+0,53	+0,64	+0,62	-0,25	+1,00	+0,38
17	-0,83	-0,28	+0,35	-0,27	+0,19	+0,49	+0,07	+0,07	+1,50	-0,56
18	+0,84	+1,17	+0,78	+1,02	+1,22	+1,58	+0,93	+0,16	+1,38	+0,88
19	+0,48	+0,41	+0,00	+0,20	-0,75	+0,59	-0,22	-0,09	-4,88	-2,31
20	+0,21	+0,60	+0,39	+0,22	+0,16	+0,76	+0,42	+0,00	+0,38	+0,63
21	+0,69	+0,99	+1,02	+0,67	+0,75	+1,28	+1,22	+0,38	+0,25	+0,31
22	-0,32	+0,34	+0,15	+0,33	+0,34	+0,55	+0,52	-0,18	+0,38	-0,38
23	-0,08	+0,21	+0,07	+0,00	+0,53	+0,28	+0,37	-0,42	-0,25	+0,88
24	-0,02	+0,01	-0,07	-0,27	-0,38	+0,43	-0,26	-0,61	-0,25	-0,63
25	+0,71	+0,66	+0,74	+0,92	+0,38	+0,88	+0,38	+0,13	-0,13	+0,25
26	+0,32	+0,66	+0,43	+0,10	+0,47	-0,29	+0,08	+0,41	+1,75	+0,13
27	+0,73	+1,08	+0,87	+0,93	+0,88	+1,24	+0,63	+0,37	-0,13	+0,56
28	+0,83	+0,75	+0,63	+0,53	+0,31	+1,02	+0,70	+0,33	-0,38	-0,25
29	+0,53	+0,56	+0,65	+0,38	+0,97	+0,71	+0,79	-0,13	+1,00	+0,88
30	+0,00	-0,12	+0,09	+0,22	+0,34	+0,16	+0,23	-0,33	+0,00	+0,31

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

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

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

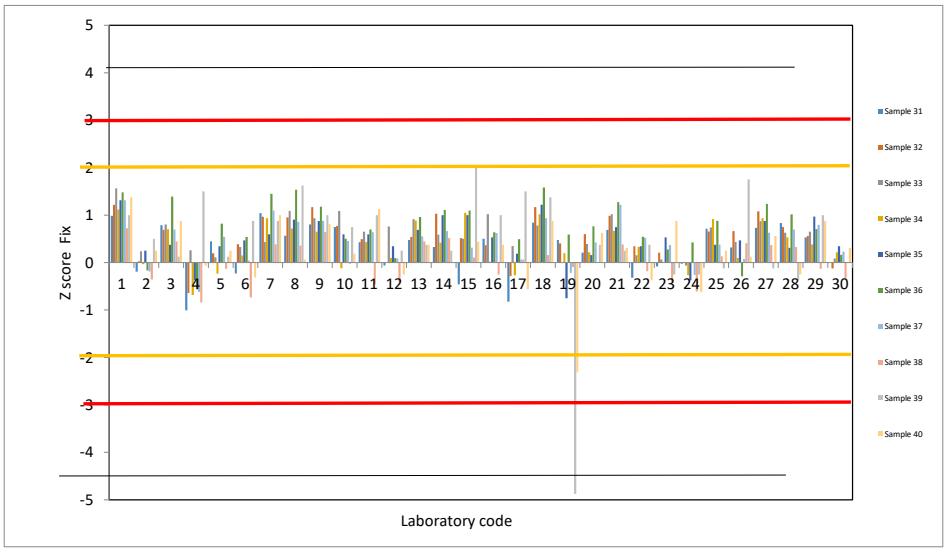


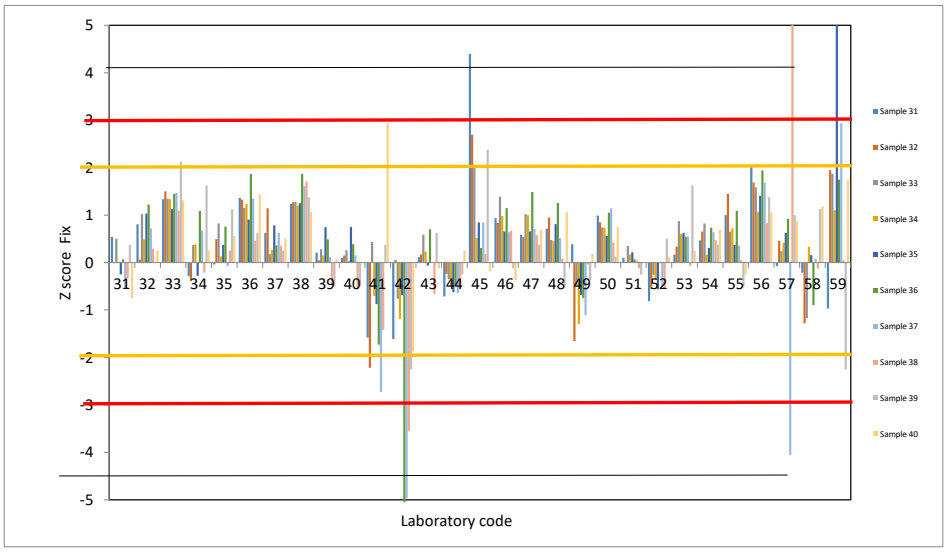
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on AVT and standard deviation of reproducibility of the method

Sample / Lab code	31	32	33	34	35	36	37	38	39	40
31	+0,54	-0,01	+0,50	+0,02	-0,25	+0,07	-0,54	-0,33	+0,38	-0,75
32	+0,81	+0,06	+1,02	+0,48	+1,03	+1,22	+0,72	+0,29	+0,00	+0,25
33	+1,33	+1,50	+1,35	+1,33	+1,13	+1,45	+1,47	+1,09	+2,13	+1,31
34	-0,29	-0,39	+0,37	+0,38	-0,28	+1,09	+0,67	-0,21	+1,63	+0,25
35	-0,04	+0,49	+0,83	+0,13	+0,38	+0,76	-0,08	+0,25	+1,13	+0,56
36	+1,37	+1,32	+1,15	+1,23	+0,91	+1,87	+1,35	+0,46	+0,63	+1,44
37	+0,62	+1,14	+0,17	+0,27	+0,78	+0,36	+0,63	+0,36	+0,25	+0,50
38	+1,24	+1,28	+1,28	+1,20	+1,25	+1,87	+1,61	+1,71	+1,38	+1,06
39	+0,21	+0,05	+0,28	+0,15	+0,75	+0,49	+0,11	-0,50	-0,50	+0,06
40	+0,10	+0,15	+0,26	+0,03	+0,75	+0,39	+0,15	-0,55	-0,50	+0,00
41	-1,58	-2,22	+0,43	-0,70	-0,88	-1,73	-2,73	-1,42	+0,38	+2,94
42	-1,61	+0,05	-0,76	-1,18	-0,69	-6,06	-4,96	-3,55	-2,25	-1,88
43	+0,11	+0,17	+0,59	+0,23	-0,06	+0,70	+0,00	-0,66	+0,63	-0,13
44	-0,71	-0,24	-0,35	-0,48	-0,63	-0,49	-0,64	-0,54	-0,25	+0,25
45	+4,40	+2,70	+2,00	+0,52	+0,84	+0,30	+0,85	+0,18	+2,38	-0,19
46	+0,94	+0,84	+1,39	+0,98	+0,66	+1,15	+0,64	+0,67	-0,13	-0,38
47	+0,59	+0,53	+1,02	+1,00	+0,66	+1,49	+0,71	+0,58	+0,38	+0,69
48	+0,71	+0,95	+0,48	+0,45	+0,81	+1,25	+0,51	+0,08	-0,50	+1,06
49	+0,39	-1,66	-0,48	-1,30	-0,69	-0,75	-1,11	-0,04	-0,38	+0,19
50	+0,99	+0,85	+0,74	+0,73	+0,56	+1,05	+1,14	+0,42	+0,13	+0,75
51	+0,10	+0,01	+0,35	+0,17	+0,22	+0,07	+0,04	-0,12	-0,25	+0,00
52	-0,81	-0,55	-0,26	-0,35	-0,56	+0,01	-0,50	-0,54	+0,50	+0,13
53	+0,17	+0,34	+0,87	+0,60	+0,63	+0,55	+0,55	-0,07	+1,63	+0,25
54	+0,47	+0,66	+0,83	+0,17	+0,31	+0,74	+0,64	+0,47	+0,38	+0,69
55	+1,00	+1,45	+0,65	+0,72	+0,38	+1,09	+0,36	+0,05	-0,50	-0,25
56	+2,02	+1,69	+1,59	+1,07	+1,41	+1,94	+1,68	+0,83	+1,38	+1,06
57	-0,07	+0,46	+0,24	+0,42	+0,63	+0,92	-4,05	+5,36	+1,00	+0,88
58	-0,21	-1,28	-1,17	+0,33	+0,16	-0,90	+0,08	-0,13	+1,13	+1,19
59	-0,97	+1,95	+1,87	+1,10	+5,06	+1,75	+2,93	+0,05	-2,25	+1,75

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

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

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



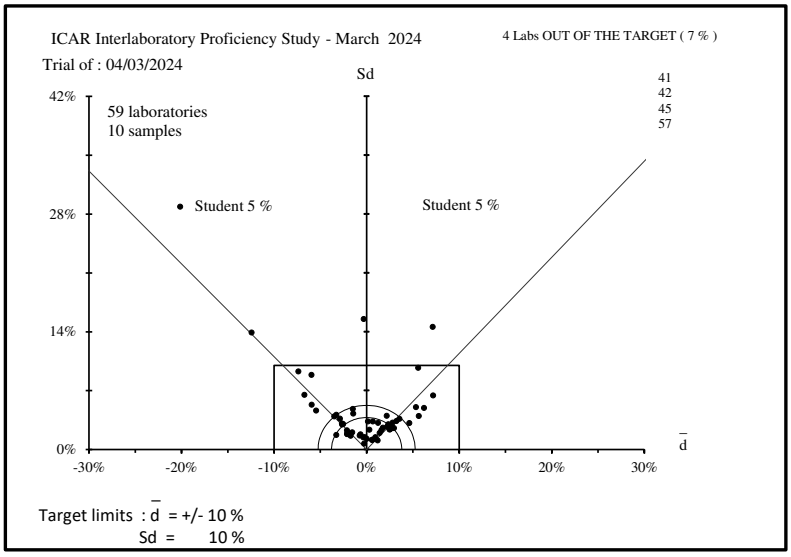


Figure 1 : ACCURACY - Evaluation of the individual performances (to see table I).

ICAR
PROFICIENCY TESTING SCHEME

March 2024

Raw Milk

Enumeration of SOMATIC CELLS

Sending date of statistical treatment : 29th March 2024

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

Proficiency test accreditated ISO 17043

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

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

Nb	%	N°	d	Sd	D	Method
1	2	14	- 1%	0%	1%	B
2	5	19	- 1%	0%	1%	B
3	7	33	+ 1%	1%	1%	B
4	9	53	- 0%	2%	2%	B
5	11	28	+ 1%	1%	2%	B
6	14	47	+ 2%	1%	2%	B
7	16	54	+ 1%	2%	2%	B
8	18	18	- 0%	2%	2%	B
9	20	9	+ 1%	2%	3%	B
10	23	7	+ 0%	3%	3%	B
11	25	34	+ 2%	1%	3%	B
12	27	27	+ 1%	2%	3%	B
13	30	42	- 2%	2%	3%	B
14	32	13	+ 0%	3%	3%	B
15	34	51	- 0%	3%	3%	B
16	36	50	+ 3%	2%	3%	B
17	39	1	+ 2%	2%	3%	B
18	41	17	- 3%	2%	3%	B
19	43	10	- 3%	2%	3%	B
20	45	4	- 3%	1%	4%	B
21	48	48	+ 2%	3%	4%	B
22	50	11	+ 1%	4%	4%	B
23	52	35	+ 1%	4%	4%	B
24	55	52	+ 0%	4%	4%	B
25	57	59	- 0%	5%	5%	A
26	59	58	- 4%	4%	5%	B
27	61	49	+ 3%	5%	6%	B
28	64	26	- 3%	5%	6%	B
29	66	12	- 6%	1%	6%	B
30	68	2	+ 3%	5%	6%	B
31	70	43	- 3%	6%	7%	B
32	73	36	+ 5%	6%	8%	B
33	75	56	- 3%	8%	9%	C
34	77	31	- 2%	9%	9%	B
35	80	32	- 6%	8%	10%	B
36	82	41	- 10%	6%	12%	C
37	84	57	+ 7%	12%	14%	B
38	86	55	+ 3%	14%	14%	B
39	89	15	+ 14%	13%	19%	B
40	91	37	+ 21%	1%	21%	B
41	93	16	- 11%	18%	21%	B
42	95	44	- 14%	17%	22%	B
43	98	30	- 61%	91%	110%	B
44	100	8	+ 1%	184%	184%	B
N.C.		3				B
N.C.		5				B
N.C.		6				B
N.C.		20				B
N.C.		21				B
N.C.		22				B
N.C.		23				B
N.C.		24				B
N.C.		25				B
N.C.		29				B
N.C.		38				B
N.C.		39				B
N.C.		40				B
N.C.		45				B
N.C.		46				B

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

A ISO 13366-1|IDF 148-1
B ISO 13366-2|IDF 148-2
C Other method

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 :

$\bar{}$
+/- 10% for d and 10% for Sd

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 40 laboratories using reference metod ISO 13366-1|IDF 148-1 and alternative method ISO 13366-2|IDF 148-2 after outlier discarging using Grubbs test at 5% risk level

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

Repeatability standard deviation of this ICAR proficiency test (after Cochran elimination at 5 %)	Sr_{PT}	13	2%
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	34	6%

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

Sample / Lab code	A	B	Sr	NL
1	7	4	4	4
2	1	12	6	4
3	**	**		
4	22	28	18	4
5	**	**		
6	**	**		
7	20	59	31	4
8	2	2	1	4
9	7	44	22	4
10	1	64	32	4
11	3	60	30	4
12	1	0	1	4
13	6	0	3	4
14	11	10	7	4
15	11	47	24	4
16	1	8	4	4
17	8	8	6	4
18	9	8	6	4
19	5	15	8	4
20	**	**		
21	**	**		
22	**	**		
23	**	**		
24	**	**		
25	**	**		
26	3	0	2	4
27	4	30	15	4
28	5	0	3	4
29	**	**		
30	7	1	4	4

Sample / Lab code	A	B	Sr	NL
31	17	22	14	4
32	4	5	3	4
33	2	5	3	4
34	1	2	1	4
35	19	6	10	4
36	2	1	1	4
37	4	4	3	4
38	**	**		
39	**	**		
40	**	**		
41	12	24	13	4
42	10	9	7	4
43	15	12	10	4
44	1	48	24	4
45	**	**		
46	**	**		
47	0	0	0	4
48	0	0	0	4
49	8	3	4	4
50	7	12	7	4
51	7	3	4	4
52	7	40	20	4
53	6	17	9	4
54	3	14	7	4
55	4	16	8	4
56	1	12	6	4
57	17	16	12	4
58	8	38	19	4
59	0	0	0	4
Sr	6	17		176
r	42	126		
NE	88	88		
L	27	75		

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

NL : number of measurements per laboratory

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

SE : repeatability standard deviation per sample

NE : number of measurements per sample

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

** : missing data

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

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

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

Sample / Lab code	A		B	
1	193		895	
2	185		911	
3				
4	171		853	
5				
6				
7	179		885	
8	882	*	190	*
9	187		889	
10	181		851	
11	179		894	
12	159		838	
13	179		887	
14	185		870	
15	313	*	900	
16	194		748	
17	180		851	
18	180		881	
19	182		868	
20				
21				
22				
23				
24				
25				
26	191		839	
27	187		890	
28	190		884	
29				
30	206		207	*

Sample / Lab code	A		B	
31	212		831	
32	185		809	
33	195		876	
34	205		882	
35	210		863	
36	195		924	
37	295	*	985	
38				
39				
40				
41	154		796	
42	182		855	
43	195		835	
44	176		737	
45				
46				
47	194		885	
48	210		870	
49	185		907	
50	194		895	
51	200		862	
52	207		859	
53	180		878	
54	184		883	
55	153		944	
56	200		826	
57	269	*	867	
58	183		839	
59	170		890	
M	187		867	
REF.	188		874	
SD	14		44	
AVT	211		862	

M = mean per sample

SD = standard deviation per sample

AVT = Assign value traceable to the ERM BD001

REF : Assigned values are robust average values per sample according to algorithm A of standard ISO 13528, of 40 laboratories using the reference method ISO 13366 | IDF 148-1 and alternative method ISO 13366-2 | IDF 148-2, after outlier discarging using Grubbs test at 5% risk level

REF. = reference values

*: discarded data using the test of Grubbs 5 %

Table IV : Outlier identification

Sample	**A**	**2**	**B**	**4**
Outliers Cochran				
Outlier Grubbs	8;15 37;57		8;30	
sr	6		18	
SR	15		46	
sr %	3%		2%	
SR %	8%		5%	

SR Method for AVT values	18		52	

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

Sample / Lab Code	A	B	d	Sd_{lab}	t
1	+ 3%	+ 2%	+ 2%	2%	1,61
2	- 2%	+ 4%	+ 3%	5%	0,85
3					
4	- 9%	- 2%	- 3%	1%	9,13
5					
6					
7	- 5%	+ 1%	+ 0%	3%	0,12
8	+ 370%	- 78%	+ 1%	184%	0,01
9	- 1%	+ 2%	+ 1%	2%	0,88
10	- 4%	- 3%	- 3%	2%	1,90
11	- 5%	+ 2%	+ 1%	4%	0,39
12	- 15%	- 4%	- 6%	1%	9,84
13	- 5%	+ 2%	+ 0%	3%	0,22
14	- 2%	- 0%	- 1%	0%	11,70
15	+ 67%	+ 3%	+ 14%	13%	1,52
16	+ 3%	- 14%	- 11%	18%	0,91
17	- 4%	- 3%	- 3%	2%	2,00
18	- 4%	+ 1%	- 0%	2%	0,04
19	- 3%	- 1%	- 1%	0%	191,72
20					
21					
22					
23					
24					
25					
26	+ 2%	- 4%	- 3%	5%	0,84
27	- 0%	+ 2%	+ 1%	2%	0,94
28	+ 1%	+ 1%	+ 1%	1%	1,47
29					
30	+ 10%	- 76%	- 61%	91%	0,95
31	+ 13%	- 5%	- 2%	9%	0,28
32	- 1%	- 7%	- 6%	8%	1,08
33	+ 4%	+ 0%	+ 1%	1%	1,69
34	+ 9%	+ 1%	+ 2%	1%	2,97
35	+ 12%	- 1%	+ 1%	4%	0,35
36	+ 4%	+ 6%	+ 5%	6%	1,35
37	+ 57%	+ 13%	+ 21%	1%	55,60
38					
39					
40					
41	- 18%	- 9%	- 10%	6%	2,52
42	- 3%	- 2%	- 2%	2%	1,81
43	+ 4%	- 4%	- 3%	6%	0,69
44	- 6%	- 16%	- 14%	17%	1,19
45					
46					
47	+ 3%	+ 1%	+ 2%	1%	3,63
48	+ 12%	- 0%	+ 2%	3%	0,73
49	- 1%	+ 4%	+ 3%	5%	0,86
50	+ 3%	+ 2%	+ 3%	2%	1,78
51	+ 6%	- 1%	- 0%	3%	0,00
52	+ 10%	- 2%	+ 0%	4%	0,13
53	- 4%	+ 0%	- 0%	2%	0,31
54	- 2%	+ 1%	+ 1%	2%	0,40
55	- 18%	+ 8%	+ 3%	14%	0,34
56	+ 6%	- 5%	- 3%	8%	0,60
57	+ 43%	- 1%	+ 7%	12%	0,85
58	- 2%	- 4%	- 4%	4%	1,30
59	- 9%	+ 2%	- 0%	5%	0,03
d	- 0%	- 1%	- 4%	43%	
Sd	7%	5%			

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

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

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

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

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

Sample / Lab code	A	B
1	+0,36	+0,48
2	-0,22	+0,84
3		
4	-1,18	-0,46
5		
6		
7	-0,61	+0,25
8	+49,84	-15,42
9	-0,07	+0,35
10	-0,50	-0,51
11	-0,65	+0,46
12	-2,08	-0,80
13	-0,61	+0,30
14	-0,22	-0,08
15	+8,97	+0,58
16	+0,43	-2,83
17	-0,54	-0,51
18	-0,58	+0,17
19	-0,43	-0,14
20		
21		
22		
23		
24		
25		
26	+0,21	-0,78
27	-0,04	+0,37
28	+0,14	+0,24
29		
30	+1,29	-15,05

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

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

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

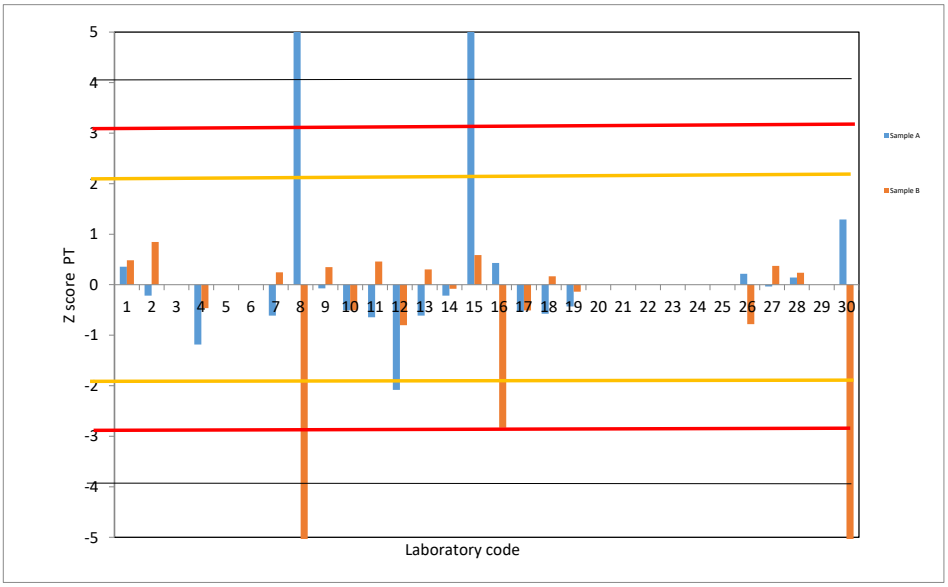


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample / Lab code	A	B
31	+1,72	-0,96
32	-0,18	-1,47
33	+0,54	+0,04
34	+1,22	+0,19
35	+1,58	-0,24
36	+0,54	+1,13
37	+7,71	+2,51
38		
39		
40		
41	-2,40	-1,75
42	-0,40	-0,43
43	+0,50	-0,87
44	-0,86	-3,08
45		
46		
47	+0,47	+0,26
48	+1,61	-0,08
49	-0,18	+0,74
50	+0,43	+0,48
51	+0,86	-0,27
52	+1,36	-0,33
53	-0,54	+0,09
54	-0,29	+0,21
55	-2,48	+1,59
56	+0,86	-1,07
57	+5,81	-0,15
58	-0,32	-0,78
59	-1,26	+0,37

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

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

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

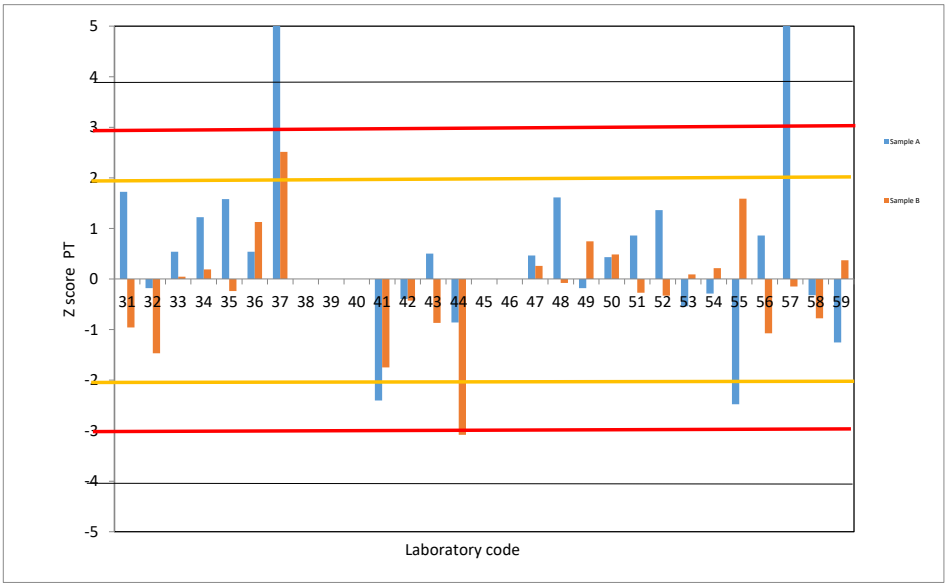


Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on AVT and standard deviation of reproducibility of the method

Sample / Lab code	A	B
1	-1,03	+0,63
2	-1,47	+0,94
3		
4	-2,22	-0,17
5		
6		
7	-1,78	+0,43
8	+37,28	-12,92
9	-1,36	+0,52
10	-1,69	-0,21
11	-1,81	+0,62
12	-2,92	-0,46
13	-1,78	+0,48
14	-1,47	+0,15
15	+5,64	+0,72
16	-0,97	-2,19
17	-1,72	-0,21
18	-1,75	+0,37
19	-1,64	+0,11
20		
21		
22		
23		
24		
25		
26	-1,14	-0,44
27	-1,33	+0,54
28	-1,19	+0,42
29		
30	-0,31	-12,61

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

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

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

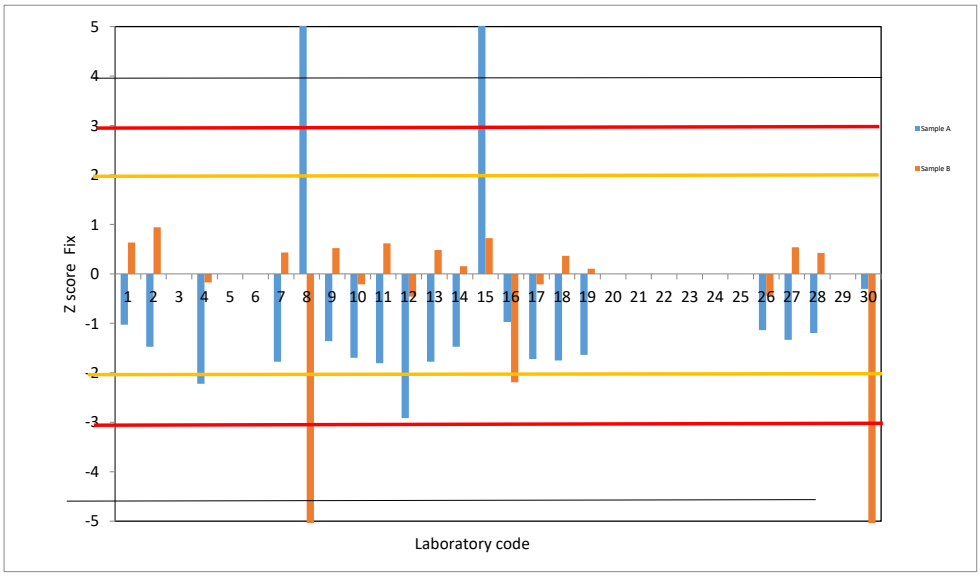


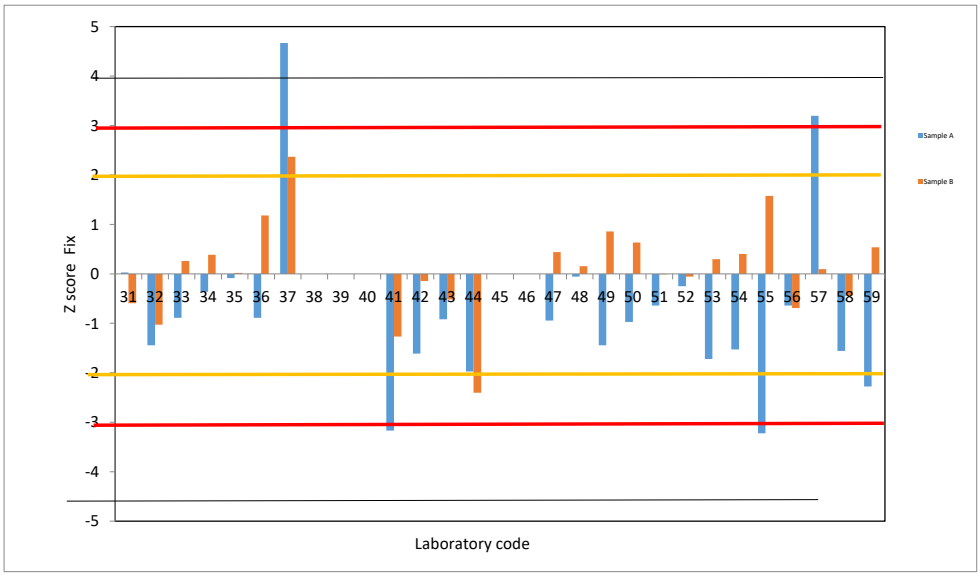
Table VII : **Zscore of the different laboratories for each sample.**
ZS calculated on AVT and standard deviation of reproducibility of the method

Sample / Lab code	A	B
31	+0,03	-0,60
32	-1,44	-1,03
33	-0,89	+0,26
34	-0,36	+0,38
35	-0,08	+0,02
36	-0,89	+1,18
37	+4,67	+2,37
38		
39		
40		
41	-3,17	-1,27
42	-1,61	-0,14
43	-0,92	-0,52
44	-1,97	-2,40
45		
46		
47	-0,94	+0,44
48	-0,06	+0,15
49	-1,44	+0,86
50	-0,97	+0,63
51	-0,64	-0,01
52	-0,25	-0,06
53	-1,72	+0,30
54	-1,53	+0,40
55	-3,22	+1,58
56	-0,64	-0,69
57	+3,19	+0,10
58	-1,56	-0,44
59	-2,28	+0,54

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

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

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



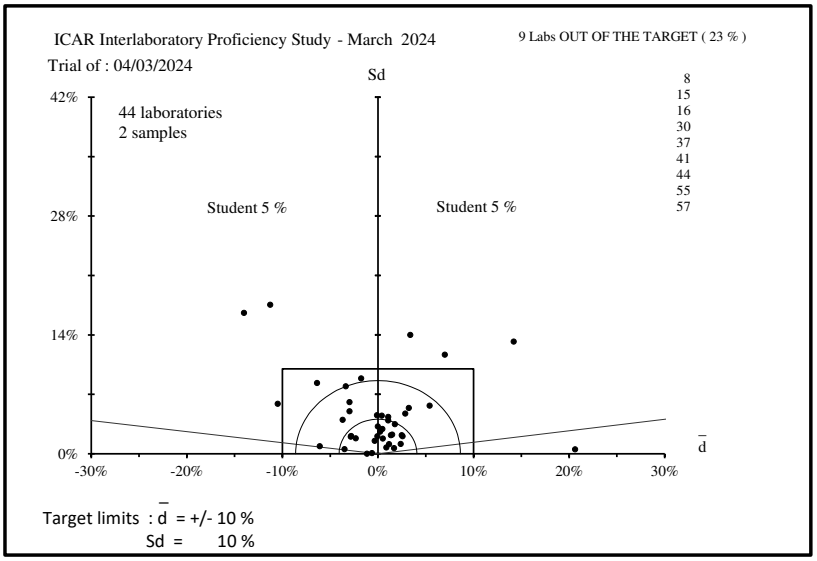


Figure 1 : **ACCURACY - Evaluation of the individual performances (to see table I).**

ICAR

March 2024

Raw MILK

Determination of Fatty Acids

Gas Cromatography

C4:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	4	4	+	0,005	0,002	0,005	ISO 16958 I IDF 231
2	7	5	-	0,009	0,003	0,010	ISO 15885| IDF 184
3	8	2	+	0,010	0,003	0,011	ISO 16958 I IDF 231
4	17	6	+	0,023	0,007	0,024	ISO 16958 I IDF 231
5	21	1	-	0,029	0,005	0,029	ISO 16958 I IDF 231
6	100	3	-	0,135	0,030	0,139	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,020

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

Sample Lab code	1		2		3		4		5		6		7		8			Sr	NL
1	0,000		0,003		0,005		0,001		0,004		0,002		0,001		0,006			0,002	16
2	0,001		0,001		0,001		0,001		0,001		0,002		0,001		0,000			0,001	16
3*	0,023		0,004		0,014		0,004		0,000		0,001		0,018		0,001			0,008	16
4	0,000		0,003		0,001		0,001		0,001		0,000		0,001		0,002			0,001	16
5	0,000		0,000		0,000		0,000		0,000		0,000		0,000		0,000			0,000	16
6	0,002		0,004		0,002		0,000		0,001		0,003		0,000		0,001			0,001	16
Sr	0,001		0,002		0,002		0,001		0,001		0,001		0,001		0,002				96
NE	12		12		12		12		12		12		12		12				
sL	0,019		0,023		0,014		0,020		0,023		0,023		0,014		0,023				

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**	
Outliers Cochran																
Outlier Grubbs	3		3		3		3		3		3		3		3	
sr	0,001	0,000	0,002	0,000	0,002	0,000	0,001	0,000	0,001	0,000	0,001	0,000	0,001	0,000	0,002	
SR	0,019		0,024		0,014		0,020		0,023		0,023		0,014		0,023	

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,12	0,15	0,09	0,13	0,15	0,16	0,09	0,16
2	0,15	0,20	0,11	0,16	0,19	0,21	0,12	0,21
3	0,02	0,03	0,01	0,03	0,03	0,03	0,02	0,03
4	0,15	0,19	0,11	0,16	0,19	0,20	0,12	0,20
5	0,14	0,18	0,10	0,15	0,17	0,18	0,11	0,18
6	0,17	0,22	0,12	0,18	0,21	0,22	0,12	0,22
M	0,124	0,161	0,092	0,134	0,155	0,166	0,098	0,165
REF.	0,145	0,188	0,107	0,156	0,180	0,194	0,114	0,192
SD	0,019	0,023	0,014	0,020	0,023	0,023	0,014	0,023

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

0,14

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

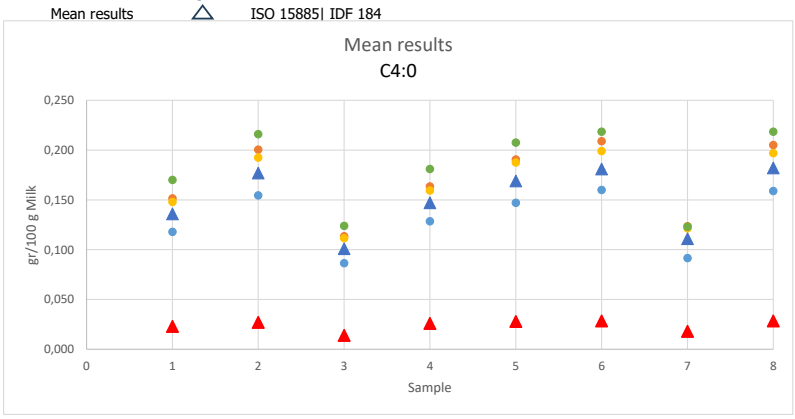


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,027	-0,034	-0,021	-0,027	-0,033	-0,034	-0,023	-0,033	-0,029	0,005
2	0,007	0,012	0,006	0,008	0,010	0,016	0,009	0,013	0,010	0,003
3	-0,122	-0,161	-0,093	-0,130	-0,152	-0,165	-0,096	-0,164	-0,135	0,030
4	0,003	0,004	0,004	0,004	0,007	0,005	0,007	0,005	0,005	0,002
5	-0,009	-0,011	-0,006	-0,009	-0,011	-0,013	-0,003	-0,010	-0,009	0,003
6	0,025	0,028	0,017	0,025	0,027	0,025	0,009	0,026	0,023	0,007
d	-0,020	-0,027	-0,016	-0,022	-0,025	-0,028	-0,016	-0,027	-0,023	0,008
Sd	0,053	0,069	0,040	0,056	0,066	0,071	0,041	0,070	0,058	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :

Difference from the ass.Value

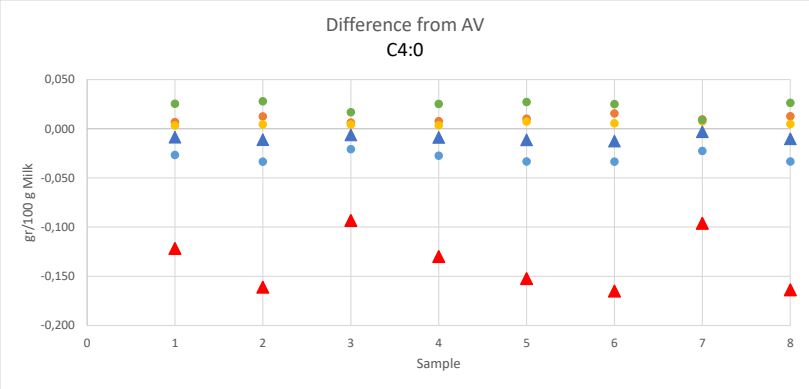


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-1,4	-1,4	-1,5	-1,4	-1,4	-1,4	-1,7	-1,5
2	0,4	0,5	0,4	0,4	0,4	0,7	0,7	0,6
3	-6,3	-6,9	-6,6	-6,6	-6,6	-7,1	-7,1	-7,2
4	0,2	0,2	0,3	0,2	0,3	0,2	0,5	0,2
5	-0,5	-0,5	-0,4	-0,5	-0,5	-0,5	-0,2	-0,5
6	1,3	1,2	1,2	1,3	1,2	1,1	0,7	1,1

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

Null sd=0 All the results under consideration are identical.

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

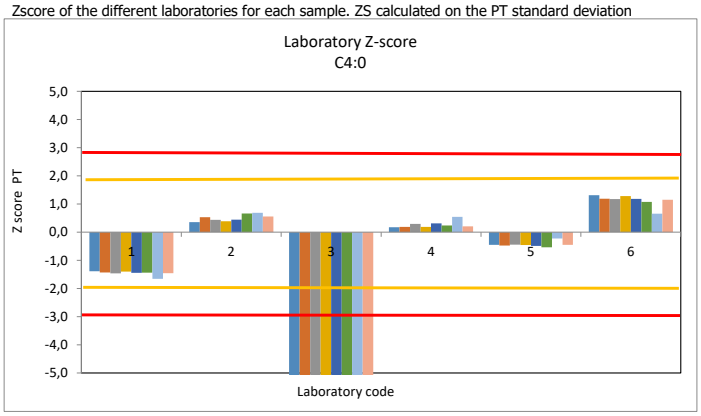
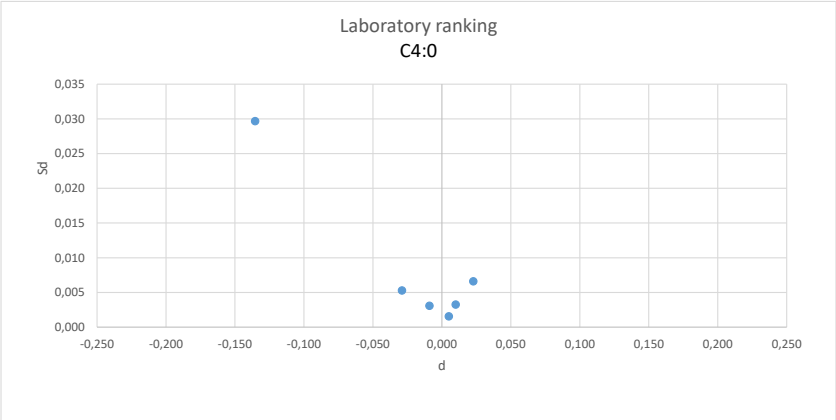


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C6:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

-1

Nb	%	N°	Sign	d	Sd	D2	Method
1	38	1	+	0,021	0,006	0,022	ISO 16958 I IDF 231
2	39	4	+	0,022	0,005	0,023	ISO 16958 I IDF 231
3	44	2	+	0,024	0,007	0,025	ISO 16958 I IDF 231
4	45	5	+	0,025	0,006	0,026	ISO 15885| IDF 184
5	66	6	-	0,036	0,012	0,038	ISO 15884/IDF 182
6	100	3	-	0,056	0,013	0,058	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,003
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,028

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

Sample Lab code	1		2		3		4		5		6		7		8			Sr	NL
1	0,002		0,000		0,001		0,004		0,001		0,007		0,001		0,001			0,002	16
2	0,000		0,001		0,000		0,002		0,000		0,002		0,001		0,001			0,001	16
3	0,016		0,003		0,010		0,003		0,000		0,000		0,013		0,001			0,006	16
4	0,000		0,001		0,000		0,000		0,000		0,001		0,000		0,001			0,000	16
5	0,000		0,000		0,000		0,000		0,000		0,000		0,000		0,000			0,000	16
6	0,001		0,015		0,015		0,003		0,010		0,012		0,006		0,007			0,007	16
Sr	0,001		0,005		0,005		0,002		0,003		0,004		0,002		0,002				96
NE	12		12		12		12		12		12		12		12				
sL	0,022		0,033		0,015		0,024		0,030		0,033		0,016		0,037				

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	1		2		3		4		5		6		7		8	
Cochran			6		6				6				6		6	
Grubbs	3;6		3;6		3;6		3;6		3;6		3;6		3;6		3;6	
sr	0,001		0,005		0,005		0,002		0,003		0,004		0,002		0,002	
SR	0,022		0,034		0,016		0,024		0,030		0,033		0,016		0,037	

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,09	0,12	0,06	0,09	0,10	0,12	0,06	0,11
2	0,09	0,12	0,06	0,09	0,11	0,13	0,07	0,11
3	0,02	0,02	0,01	0,02	0,02	0,02	0,01	0,02
4	0,09	0,12	0,06	0,09	0,11	0,12	0,07	0,11
5	0,09	0,12	0,06	0,10	0,11	0,13	0,07	0,12
6	0,04	0,04	0,03	0,04	0,04	0,05	0,03	0,03
M	0,067	0,089	0,048	0,071	0,081	0,093	0,053	0,083
REF.	0,077	0,103	0,056	0,081	0,093	0,107	0,061	0,096
SD	0,022	0,033	0,016	0,024	0,030	0,033	0,016	0,037

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

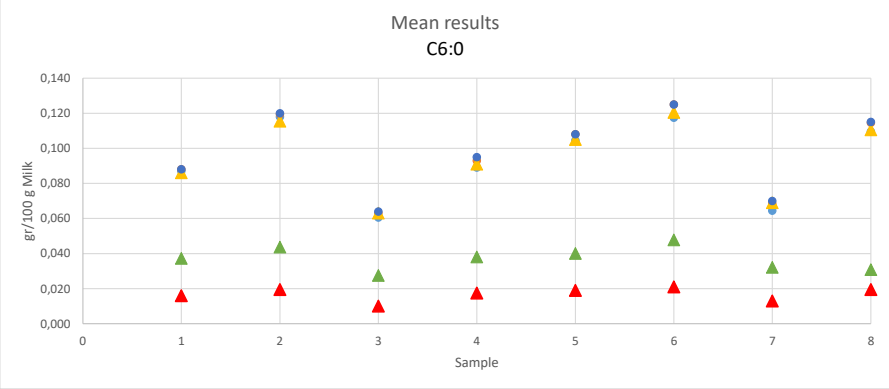


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,010	0,015	0,005	0,008	0,011	0,010	0,004	0,013	0,009	0,004
2	0,011	0,016	0,007	0,012	0,015	0,018	0,008	0,018	0,013	0,004
3	-0,061	-0,084	-0,046	-0,064	-0,074	-0,086	-0,048	-0,077	-0,067	0,015
4	0,009	0,012	0,007	0,010	0,012	0,013	0,008	0,014	0,011	0,003
5	0,011	0,017	0,008	0,014	0,015	0,018	0,009	0,019	0,014	0,004
6	-0,040	-0,060	-0,028	-0,043	-0,053	-0,059	-0,029	-0,065	-0,047	0,014
d	-0,010	-0,014	-0,008	-0,011	-0,012	-0,014	-0,008	-0,013	-0,011	0,007
Sd	0,032	0,045	0,023	0,034	0,040	0,046	0,024	0,045	0,036	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

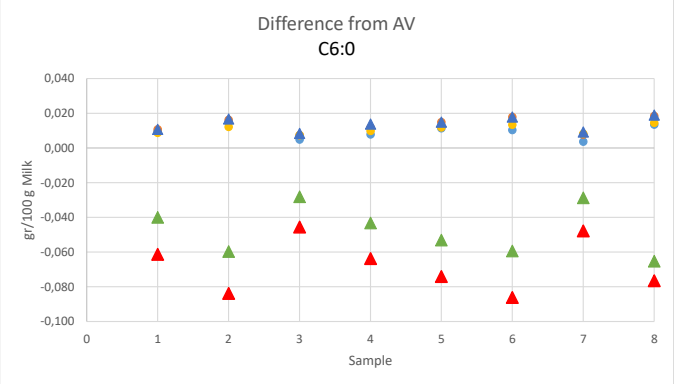


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	0,4	0,4	0,3	0,3	0,4	0,3	0,2	0,4
2	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
3	-2,7	-2,5	-2,9	-2,6	-2,5	-2,6	-3,0	-2,1
4	0,4	0,4	0,5	0,4	0,4	0,4	0,5	0,4
5	0,5	0,5	0,5	0,6	0,5	0,5	0,6	0,5
6	-1,8	-1,8	-1,8	-1,8	-1,8	-1,8	-1,8	-1,8

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

Null sd=0 All the results under consideration are identical.

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

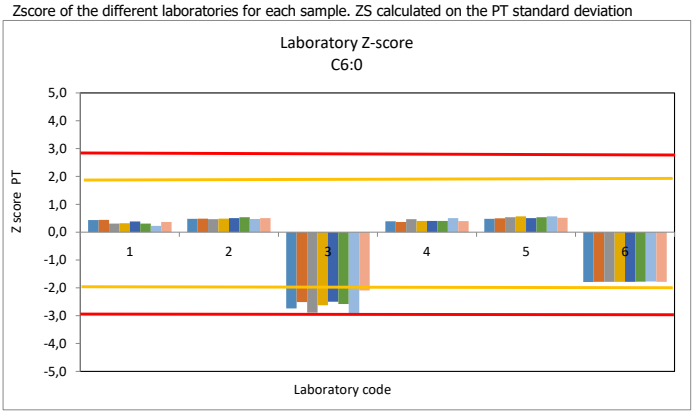
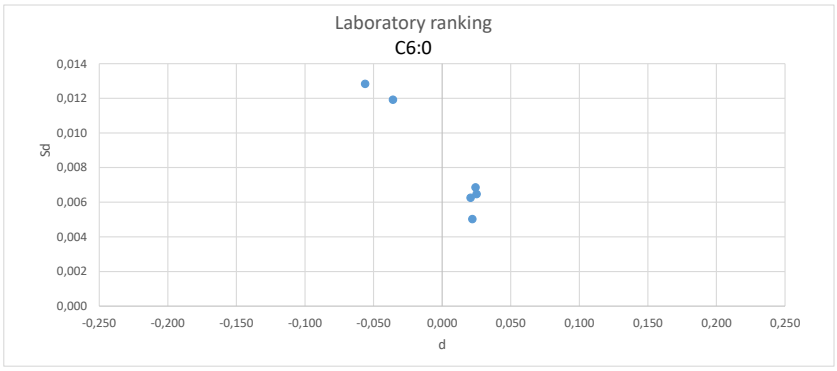


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids Gas Cromatography

C8:0

Sending date of statistical treatment : 20.04.20024

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

Proficiency test based on ISO 17043

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

-1

Nb	%	N°	ig	d	Sd	D	Method
1	32	1	+	0,011	0,004	0,012	ISO 16958 I IDF 231
2	32	4	+	0,011	0,003	0,012	ISO 16958 I IDF 231
3	37	2	+	0,013	0,004	0,013	ISO 16958 I IDF 231
4	40	5	+	0,014	0,004	0,015	ISO 15885| IDF 184
5	43	6	-	0,014	0,006	0,016	ISO 15884/IDF 182
6	100	3	-	0,035	0,008	0,036	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,002
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,002

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,002	0,000	0,001	0,000	0,003	0,004	0,000	0,001	0,001	16
2	0,003	0,005	0,003	0,004	0,004	0,004	0,002	0,003	0,003	16
3	0,010	0,002	0,006	0,002	0,000	0,001	0,008	0,001	0,004	16
4	0,000	0,001	0,000	0,001	0,000	0,000	0,001	0,001	0,001	16
5	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000	16
6	0,000	0,015	0,013	0,002	0,008	0,010	0,006	0,006	0,006	16
Sr	0,001	0,002	0,001	0,001	0,002	0,002	0,002	0,001		96
NE	12	12	12	12	12	12	12	12		
sL	0,000	0,001	0,001	0,001	0,001	0,001	0,000	0,002		

Sr outlier discarged

SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran			6					
Outlier Grubbs	3;6	3;6	3;6	3;6	3;6	3;6	3	3;6
sr	0,001	0,002	0,001	0,001	0,002	0,002	0,002	0,001
SR	0,001	0,002	0,001	0,002	0,002	0,002	0,002	0,002

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,05	0,07	0,04	0,05	0,06	0,08	0,04	0,07
2	0,05	0,07	0,04	0,06	0,06	0,08	0,04	0,07
3	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
4	0,05	0,07	0,04	0,05	0,06	0,08	0,04	0,07
5	0,05	0,08	0,04	0,06	0,07	0,08	0,04	0,07
6	0,03	0,04	0,02	0,03	0,03	0,04	0,03	0,03
M	####	####	####	####	####	####	####	####
REF.	0,052	0,074	0,037	0,055	0,063	0,077	0,041	0,067
SD	0,001	0,002	0,001	0,001	0,002	0,002	0,001	0,002

M = mean per sample

REF. = reference values

SD = standard deviation per sample

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

REF :

Figure 1 : ○ ISO 16958 I IDF 231

Mean results △ ISO 15885| IDF 184

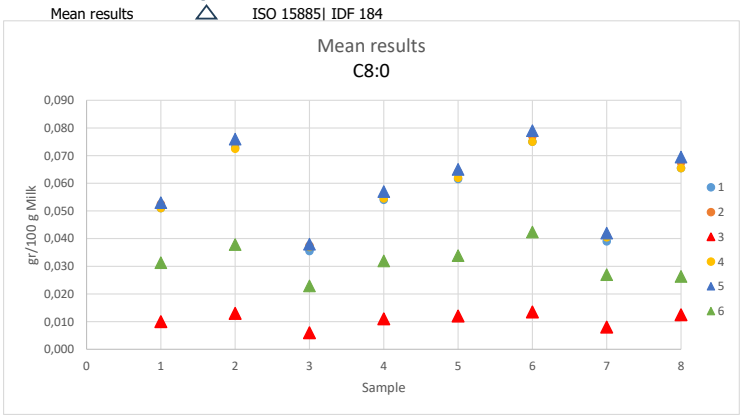


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,001	-0,001	-0,002	-0,001	-0,002	-0,002	-0,002	-0,002	-0,001	0,000
2	0,001	0,001	0,000	0,000	0,001	0,001	0,000	0,001	0,000	0,000
3	-0,042	-0,061	-0,031	-0,044	-0,051	-0,063	-0,033	-0,055	-0,047	0,012
4	-0,001	-0,002	0,000	-0,001	-0,001	-0,002	0,000	-0,002	-0,001	0,001
5	0,001	0,002	0,001	0,002	0,002	0,003	0,001	0,003	0,002	0,001
6	-0,021	-0,036	-0,014	-0,023	-0,029	-0,034	-0,014	-0,041	-0,026	0,010
d	-0,010	-0,016	-0,008	-0,011	-0,013	-0,016	-0,008	-0,016	-0,012	0,004
Sd	0,017	0,026	0,013	0,019	0,022	0,027	0,013	0,025	0,020	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

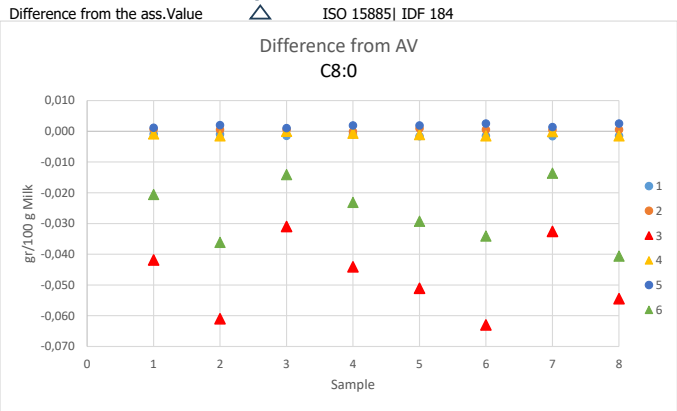


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,8	-0,6	-1,4	-0,9	-1,0	-0,8	-1,3	-0,8
2	0,6	0,3	0,5	-0,1	0,5	0,3	0,3	0,3
3	-40,6	-38,6	-28,7	-33,6	-30,9	-32,9	-26,1	-28,5
4	-0,8	-0,9	0,0	-0,5	-0,7	-0,8	-0,1	-0,8
5	1,1	1,3	0,9	1,4	1,1	1,3	1,1	1,3
6	-20,0	-22,9	-13,0	-17,6	-17,7	-17,8	-10,9	-21,2

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

Null sd=0 All the results under consideration are identical.

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

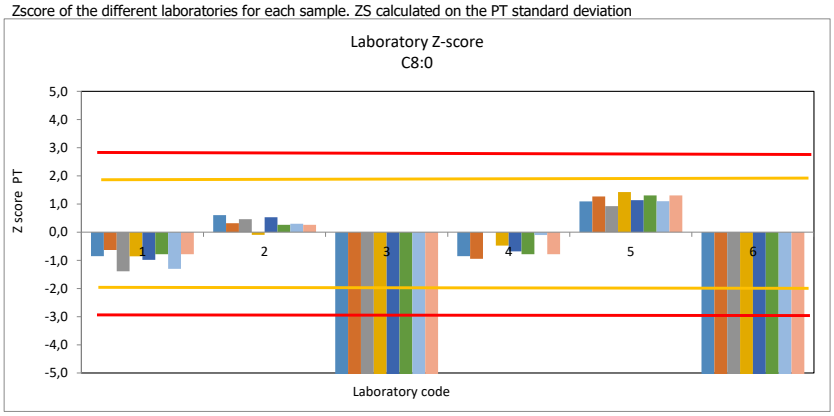
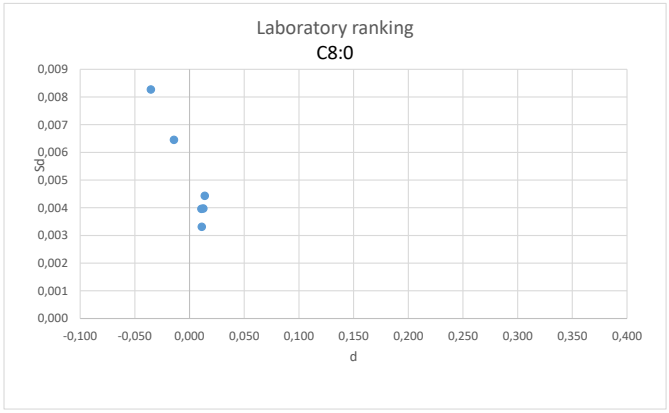


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C10:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	19	4	+	0,014	0,012	0,018	ISO 16958 I IDF 231
2	21	2	+	0,015	0,013	0,020	ISO 16958 I IDF 231
3	23	1	+	0,018	0,014	0,023	ISO 16958 I IDF 231
4	28	5	+	0,023	0,015	0,028	ISO 15885|IDF 184
5	32	6	-	0,029	0,013	0,031	ISO 15884|IDF 182
6	100	3	-	0,096	0,020	0,098	ISO 15584| IDF 182 & ISO 15585|IDF 184

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,009

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,003	0,003	0,003	0,002	0,004	0,002	0,001	0,001	0,002	16
2	0,001	0,002	0,000	0,000	0,001	0,001	0,000	0,001	0,001	16
3	0,025	0,005	0,014	0,005	0,001	0,001	0,019	0,002	0,009	16
4	0,000	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
5	0,001	0,000	0,000	0,000	0,001	0,000	0,001	0,000	0,000	16
6	0,001	0,048	0,036	0,006	0,022	0,032	0,017	0,016	0,019	16
Sr	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,001		96
NE	12	12	12	12	12	12	12	12		
sL	0,015	0,005	0,002	0,018	0,005	0,005	0,002	0,005		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran		6	6		6	6	6	6
Outlier Grubbs	3	3;6	3	3	3	3	3	3;6
sr	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,001
SR	0,015	0,005	0,002	0,018	0,005	0,006	0,002	0,005

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,13	0,19	0,09	0,13	0,15	0,19	0,10	0,16
2	0,12	0,18	0,08	0,13	0,15	0,19	0,09	0,16
3	0,03	0,03	0,01	0,03	0,03	0,03	0,02	0,03
4	0,12	0,18	0,09	0,13	0,15	0,19	0,10	0,15
5	0,13	0,19	0,09	0,14	0,16	0,20	0,10	0,17
6	0,09	0,11	0,07	0,09	0,10	0,13	0,08	0,08
M	0,103	0,147	0,071	0,109	0,121	0,155	0,080	0,123
REF.	0,119	0,184	0,086	0,126	0,150	0,192	0,096	0,158
SD	0,015	0,005	0,002	0,018	0,005	0,005	0,002	0,005

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

ISO 16958 I IDF 231
ISO 15885| IDF 184

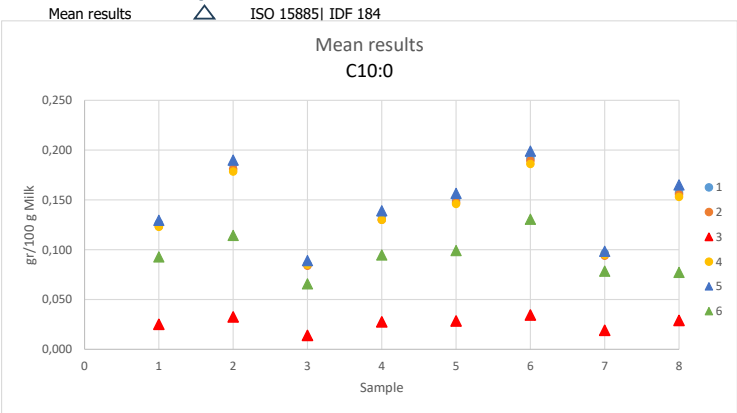


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,007	0,002	0,000	0,008	0,000	0,000	0,001	0,000	0,002	0,004
2	0,004	-0,003	-0,002	0,004	-0,003	-0,002	-0,002	-0,002	-0,001	0,003
3	-0,094	-0,151	-0,072	-0,098	-0,122	-0,157	-0,077	-0,129	-0,112	0,032
4	0,004	-0,005	-0,001	0,004	-0,004	-0,006	-0,001	-0,005	-0,002	0,004
5	0,010	0,006	0,003	0,013	0,007	0,007	0,003	0,007	0,007	0,004
6	-0,026	-0,069	-0,020	-0,031	-0,051	-0,061	-0,018	-0,081	-0,045	0,024
d	-0,016	-0,037	-0,015	-0,016	-0,029	-0,036	-0,016	-0,035	-0,025	0,012
Sd	0,041	0,063	0,029	0,043	0,050	0,064	0,031	0,056	0,047	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

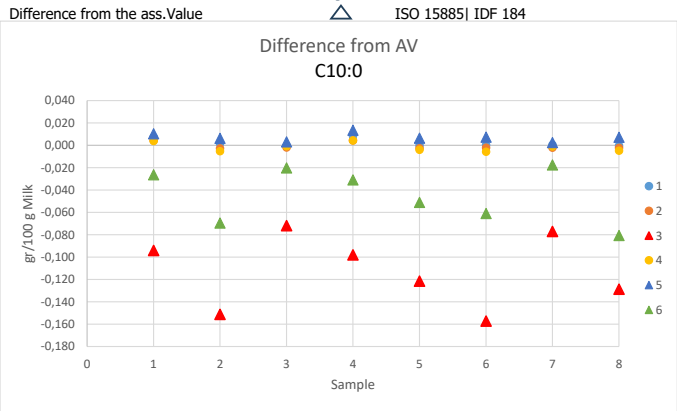


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	0,5	0,3	-0,2	0,5	0,0	0,1	0,3	0,0
2	0,3	-0,5	-0,9	0,3	-0,5	-0,4	-1,0	-0,4
3	-6,3	-29,8	-33,1	-5,6	-26,2	-28,6	-39,3	-24,9
4	0,3	-1,0	-0,4	0,3	-0,9	-1,0	-0,5	-0,9
5	0,7	1,2	1,4	0,8	1,4	1,3	1,3	1,4
6	-1,8	-13,7	-9,2	-1,7	-11,0	-11,1	-9,0	-15,6

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

Null sd=0 All the results under consideration are identical.

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

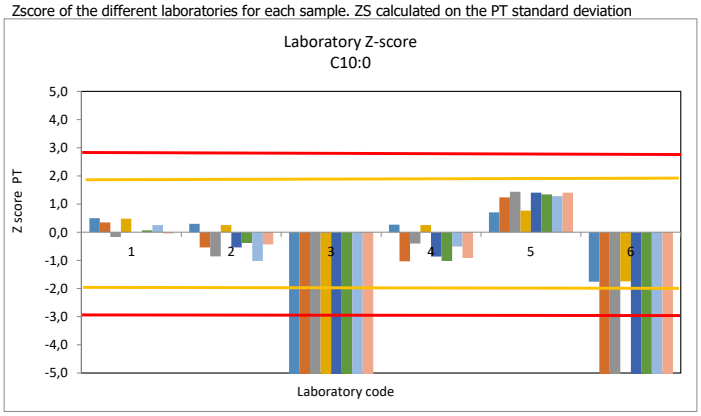
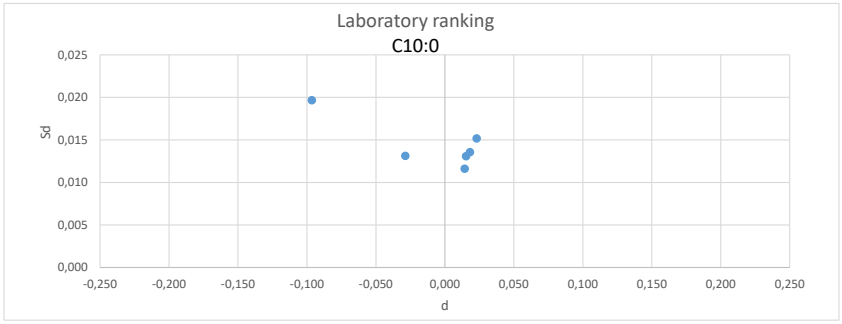


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C12:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

-1

Nb	%	N°	ig	d	Sd	D	Method
1	1	2	-	0,002	0,000	0,002	ISO 16958 I IDF 231
2	2	1	-	0,003	0,001	0,003	ISO 16958 I IDF 231
3	4	4	-	0,006	0,003	0,006	ISO 15584| IDF 182 & IS
4	8	5	+	0,010	0,003	0,011	ISO 16958 I IDF 231
5	100	3	-	0,136	0,040	0,142	ISO 15885| IDF 184

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,007

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,004	0,002	0,002	0,001	0,003	0,003	0,002	0,003	0,002	16
2	0,001	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000	16
3	0,030	0,006	0,016	0,005	0,000	0,001	0,023	0,001	0,010	16
4	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
5	0,000	0,001	0,000	0,000	0,001	0,000	0,001	0,000	0,000	16
Sr	0,001	0,001	0,001	0,000	0,001	0,001	0,001	0,001		80
NE	10	10	10	10	10	10	10	10		
sL	0,005	0,010	0,004	0,007	0,008	0,010	0,005	0,008		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,001	0,001	0,001	0,000	0,001	0,001	0,001	0,001
SR	0,005	0,010	0,004	0,007	0,008	0,010	0,005	0,009

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,15	0,22	0,10	0,15	0,17	0,23	0,11	0,18
2	0,15	0,22	0,10	0,16	0,18	0,23	0,11	0,18
3	0,03	0,04	0,02	0,03	0,03	0,04	0,02	0,03
4	0,14	0,22	0,10	0,15	0,17	0,22	0,11	0,18
5	0,16	0,24	0,11	0,17	0,19	0,25	0,12	0,20
M	0,124	0,187	0,083	0,132	0,148	0,194	0,095	0,155
REF.	0,147	0,224	0,100	0,157	0,177	0,233	0,113	0,186
SD	0,005	0,010	0,004	0,007	0,008	0,010	0,005	0,009

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 : Mean results

o ISO 16958 I IDF 231
Δ ISO 15885| IDF 184

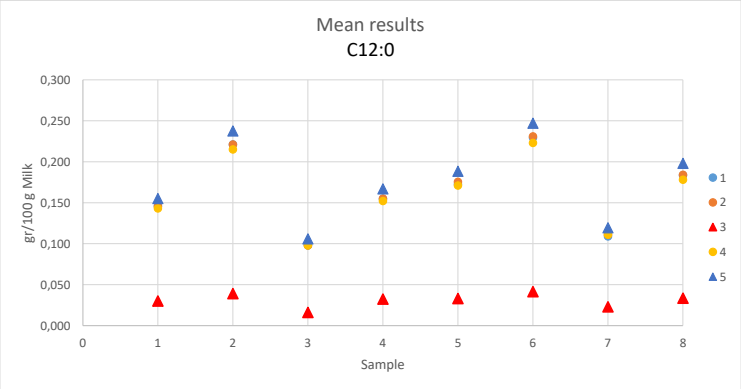


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,001	-0,003	-0,002	-0,003	-0,004	-0,003	-0,004	-0,002	-0,003	0,001
2	-0,002	-0,003	-0,002	-0,002	-0,001	-0,002	-0,002	-0,002	-0,002	0,000
3	-0,117	-0,185	-0,084	-0,125	-0,144	-0,191	-0,090	-0,152	-0,136	0,040
4	-0,004	-0,009	-0,002	-0,005	-0,006	-0,010	-0,002	-0,008	-0,006	0,003
5	0,008	0,014	0,006	0,010	0,012	0,014	0,007	0,012	0,010	0,003
d	-0,023	-0,037	-0,017	-0,025	-0,029	-0,038	-0,018	-0,030	-0,027	0,009
Sd	0,053	0,083	0,038	0,056	0,065	0,086	0,040	0,069	0,061	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

o ISO 16958 I IDF 231
Δ ISO 15885| IDF 184

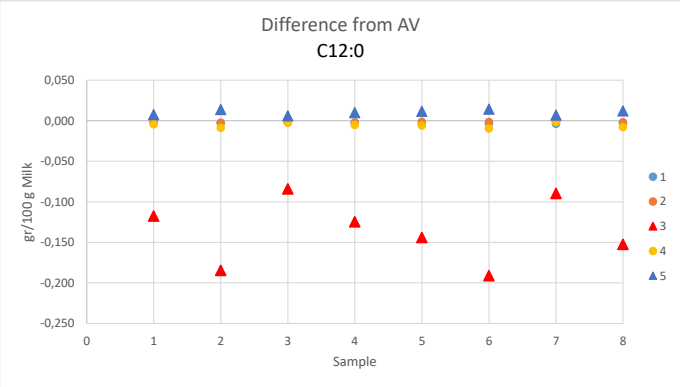


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,3	-0,3	-0,5	-0,4	-0,5	-0,3	-0,8	-0,3
2	-0,4	-0,3	-0,5	-0,3	-0,2	-0,2	-0,3	-0,2
3	-22,4	-19,1	-21,0	-18,6	-18,0	-18,8	-19,2	-17,9
4	-0,8	-0,9	-0,5	-0,8	-0,7	-0,9	-0,3	-0,9
5	1,5	1,4	1,5	1,5	1,5	1,4	1,5	1,4

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

Null sd=0 All the results under consideration are identical.

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

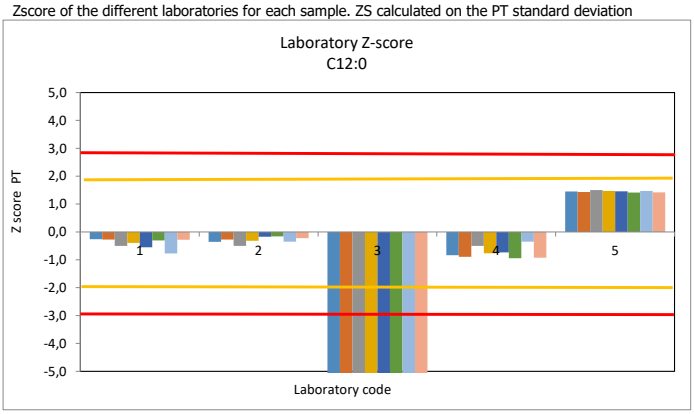
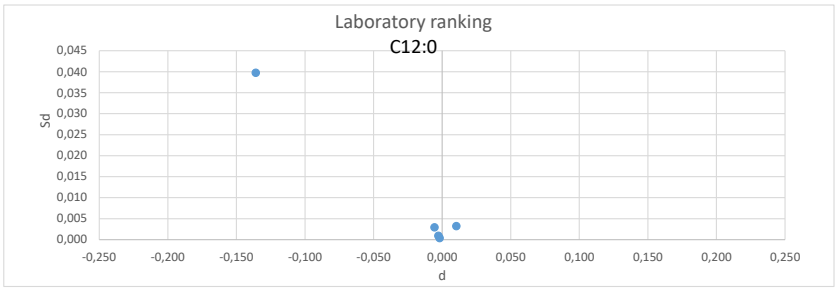


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C14:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	2	2	+	0,014	0,002	0,009	ISO 16958 I IDF 231
2	3	1	+	0,015	0,002	0,012	ISO 16958 I IDF 231
3	7	4	+	0,018	0,010	0,029	ISO 16958 I IDF 231
4	11	5	+	0,023	0,012	0,047	ISO 15885| IDF 184
5	17	6	+	0,029	0,070	0,072	ISO 15884/IDF 182
6	100	3	+	0,096	0,089	0,411	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,003
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	Sr	NL
1	0,001	0,002	0,005	0,002	0,011	0,010	0,009	0,006	0,005	16
2	0,001	0,002	0,001	0,000	0,004	0,002	0,002	0,002	0,001	16
3	0,087	0,016	0,048	0,016	0,001	0,003	0,069	0,004	0,031	16
4	0,000	0,002	0,000	0,001	0,001	0,000	0,000	0,000	0,001	16
5	0,001	0,000	0,001	0,000	0,001	0,000	0,000	0,001	0,001	16
6	0,001	0,155	0,197	0,025	0,115	0,146	0,087	0,081	0,084	16
Sr	0,001	0,001	0,002	0,001	0,004	0,004	0,003	0,002		96
NE	12	12	12	12	12	12	12	12		
sL	0,026	0,037	0,020	0,031	0,038	0,041	0,022	0,040		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran		6	6	6	6	6	6	6
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,001	0,001	0,002	0,001	0,004	0,004	0,003	0,002
SR	0,026	0,037	0,020	0,031	0,038	0,041	0,023	0,040

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,44	0,57	0,31	0,48	0,53	0,60	0,34	0,56
2	0,44	0,57	0,31	0,48	0,54	0,60	0,35	0,56
3	0,09	0,10	0,05	0,10	0,10	0,11	0,07	0,10
4	0,42	0,54	0,31	0,46	0,51	0,57	0,34	0,53
5	0,48	0,63	0,35	0,53	0,60	0,67	0,39	0,63
6	0,47	0,54	0,35	0,50	0,52	0,60	0,41	0,40
M	0,389	0,491	0,278	0,423	0,465	0,526	0,316	0,463
REF.	0,450	0,576	0,318	0,486	0,544	0,612	0,354	0,570
SD	0,026	0,037	0,020	0,031	0,038	0,041	0,022	0,040

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

ISO 16958 I IDF 231
ISO 15885| IDF 184

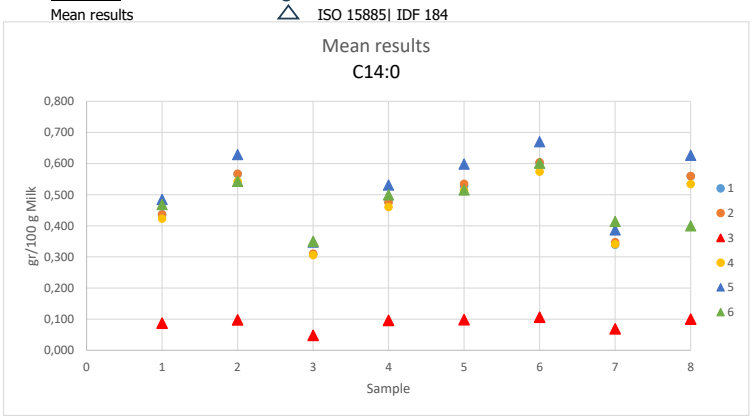


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,013	-0,010	-0,010	-0,009	-0,016	-0,011	-0,014	-0,011	-0,012	0,002
2	-0,013	-0,009	-0,007	-0,011	-0,009	-0,008	-0,007	-0,010	-0,009	0,002
3	-0,363	-0,478	-0,270	-0,390	-0,445	-0,506	-0,285	-0,470	-0,401	0,089
4	-0,027	-0,033	-0,012	-0,025	-0,030	-0,038	-0,013	-0,036	-0,027	0,010
5	0,035	0,053	0,030	0,045	0,055	0,058	0,033	0,057	0,046	0,012
6	0,018	-0,034	0,032	0,013	-0,028	-0,011	0,060	-0,170	-0,015	0,070
d	-0,060	-0,085	-0,040	-0,063	-0,079	-0,086	-0,037	-0,107	-0,070	0,031
Sd	0,150	0,195	0,115	0,162	0,182	0,208	0,125	0,193	0,164	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

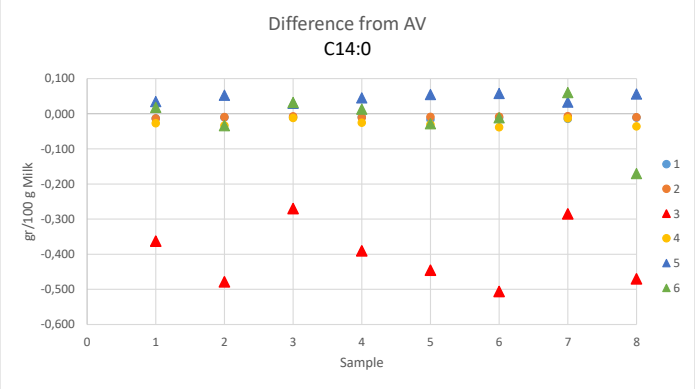


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,5	-0,3	-0,5	-0,3	-0,4	-0,3	-0,6	-0,3
2	-0,5	-0,3	-0,4	-0,4	-0,2	-0,2	-0,3	-0,2
3	-14,2	-13,0	-13,6	-12,6	-11,8	-12,4	-12,7	-11,9
4	-1,0	-0,9	-0,6	-0,8	-0,8	-0,9	-0,6	-0,9
5	1,4	1,4	1,5	1,5	1,5	1,4	1,5	1,4
6	0,7	-0,9	1,6	0,4	-0,7	-0,3	2,7	-4,3

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

Null sd=0 All the results under consideration are identical.

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

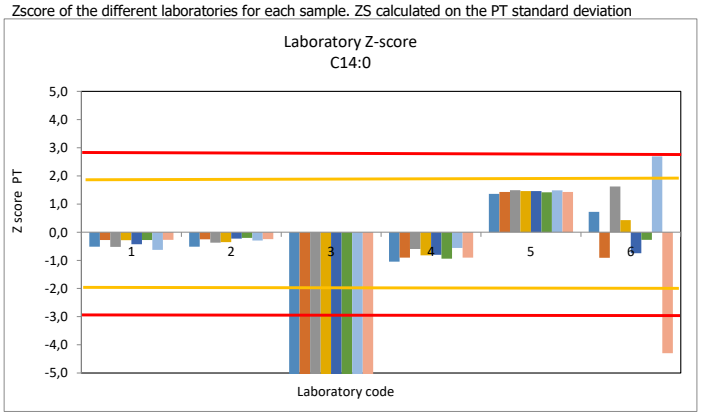
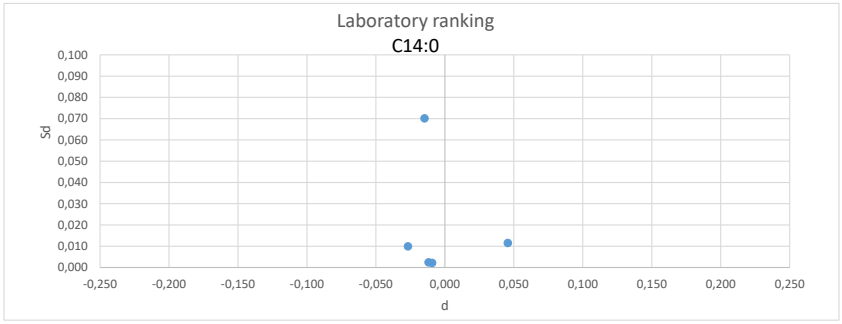


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C14:1 c9

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	4	5	+	0,001	0,000	0,001	ISO 15885| IDF 184
2	5	2	-	0,001	0,000	0,001	ISO 16958 I IDF 231
3	10	4	-	0,003	0,001	0,003	ISO 16958 I IDF 231
4	10	1	+	0,003	0,001	0,003	ISO 16958 I IDF 231
5	100	3	-	0,028	0,006	0,029	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,0005
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,003

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,000	0,000	0,000	0,001	0,002	0,002	0,000	0,001	0,001	16
2	0,001	0,001	0,000	0,001	0,001	0,001	0,000	0,000	0,001	16
3	0,016	0,003	0,009	0,002	0,001	0,000	0,013	0,000	0,006	16
4	0,000	0,001	0,000	0,000	0,001	0,000	0,000	0,000	0,000	16
5	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
Sr	0,000	0,000	0,000	0,001	0,001	0,001	0,000	0,000		80
NE	10	10	10	10	10	10	10	10		
sL	0,002	0,003	0,002	0,002	0,002	0,003	0,001	0,004		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran	2							1
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,000	0,000	0,000	0,001	0,001	0,001	0,000	0,000
SR	0,002	0,003	0,002	0,002	0,003	0,003	0,001	0,004

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,04	0,06	0,03	0,04	0,05	0,05	0,04	0,06
2	0,04	0,05	0,03	0,04	0,05	0,05	0,03	0,05
3	0,02	0,02	0,01	0,02	0,02	0,02	0,01	0,02
4	0,04	0,05	0,03	0,04	0,05	0,04	0,03	0,05
5	0,04	0,06	0,03	0,04	0,05	0,05	0,04	0,06
M	0,035	0,047	0,026	0,036	0,044	0,042	0,030	0,047
REF.	0,040	0,054	0,030	0,041	0,051	0,048	0,034	0,054
SD	0,002	0,003	0,002	0,002	0,002	0,003	0,001	0,004

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

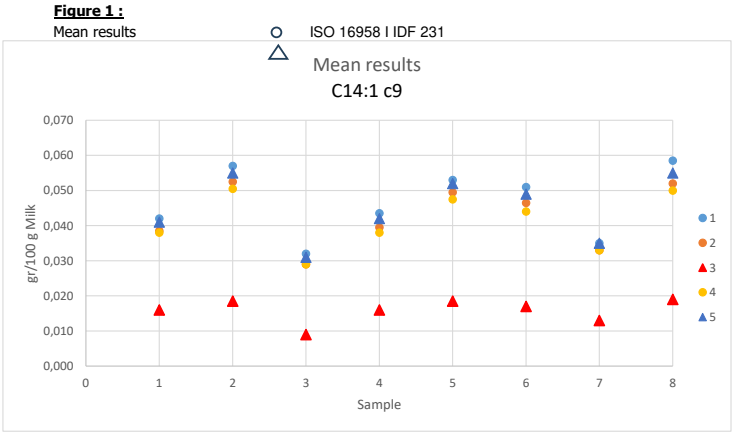


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,002	0,003	0,002	0,003	0,003	0,003	0,001	0,005	0,003	0,001
2	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,002	-0,001	0,000
3	-0,024	-0,035	-0,021	-0,025	-0,032	-0,031	-0,021	-0,035	-0,028	0,006
4	-0,002	-0,003	-0,001	-0,003	-0,003	-0,004	-0,001	-0,004	-0,003	0,001
5	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,000
d	-0,005	-0,007	-0,004	-0,005	-0,006	-0,006	-0,004	-0,007	-0,006	0,002
Sd	0,011	0,016	0,010	0,011	0,014	0,014	0,009	0,016	0,013	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

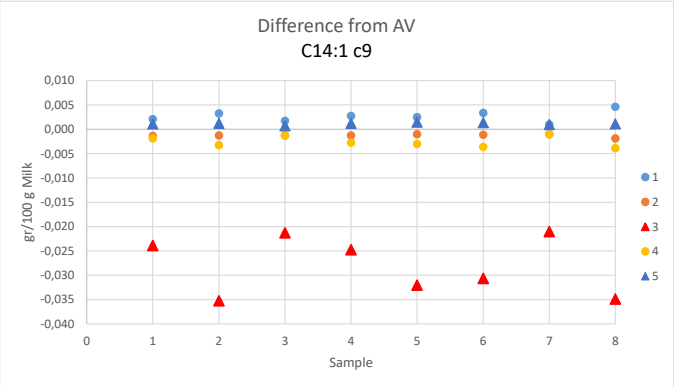


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	1,1	1,1	1,2	1,1	1,0	1,1	0,9	1,2
2	-0,7	-0,4	-0,8	-0,5	-0,4	-0,4	-0,9	-0,5
3	-12,4	-12,4	-14,2	-10,0	-12,9	-10,1	-18,2	-9,4
4	-1,0	-1,1	-0,8	-1,1	-1,2	-1,2	-0,9	-1,0
5	0,6	0,4	0,5	0,5	0,6	0,5	0,9	0,3

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

Null sd=0 All the results under consideration are identical.

Figure 3 : ○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184
Zscore of the different laboratories for each sample. ZS calculated on the PT standard deviation

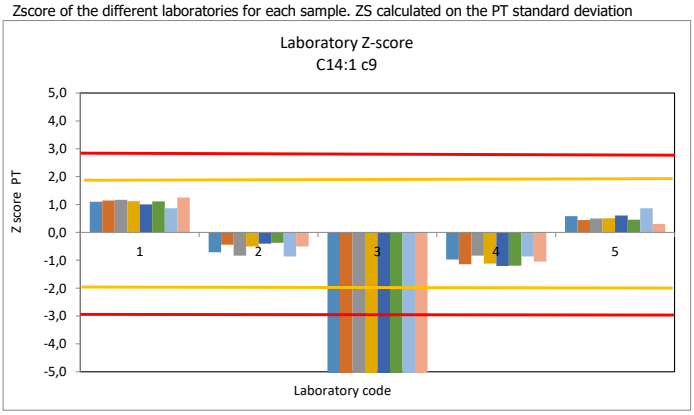
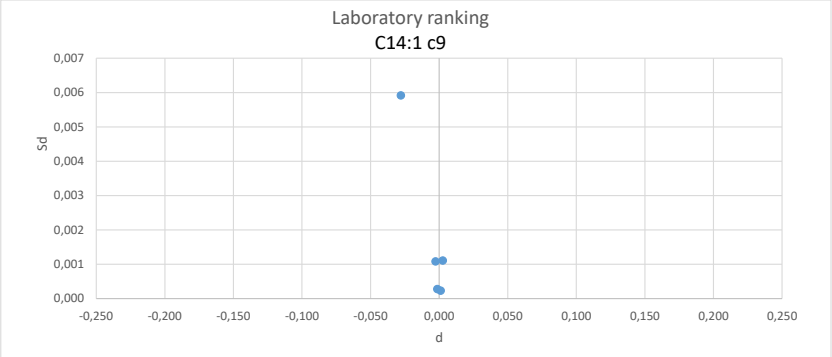


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C15:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	3	5	+	0,001	0,001	0,001	ISO 15885| IDF 184
2	4	1	-	0,001	0,001	0,001	ISO 16958 I IDF 231
3	7	2	+	0,002	0,001	0,002	ISO 16958 I IDF 231
4	9	4	-	0,003	0,001	0,003	ISO 16958 I IDF 231
5	23	6	+	0,001	0,008	0,008	ISO 15884/IDF 182
6	100	3	-	0,032	0,007	0,033	ISO 15584| IDF 182 & ISO 15585|IDF 184

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,003

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,002	0,000	0,001	0,000	0,001	0,004	0,001	0,000	0,001	16
2	0,000	0,000	0,001	0,000	0,000	0,000	0,000	0,000	0,000	16
3	0,020	0,004	0,010	0,004	0,000	0,000	0,015	0,001	0,007	16
4	0,000	0,000	0,000	0,001	0,001	0,000	0,000	0,000	0,000	16
5	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	16
6	0,000	0,005	0,020	0,004	0,013	0,015	0,010	0,009	0,008	16
Sr	0,000	0,000	0,001	0,000	0,001	0,001	0,000	0,000		96
NE	12	12	12	12	12	12	12	12		
sL	0,003	0,003	0,001	0,002	0,003	0,003	0,001	0,003		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran	1	6	6	6	6	6	6	6
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,000	0,000	0,001	0,000	0,001	0,001	0,000	0,000
SR	0,003	0,003	0,001	0,002	0,003	0,003	0,001	0,003

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,05	0,05	0,03	0,05	0,06	0,06	0,04	0,06
2	0,05	0,06	0,03	0,05	0,06	0,07	0,04	0,06
3	0,02	0,02	0,01	0,02	0,02	0,02	0,02	0,02
4	0,05	0,05	0,03	0,05	0,05	0,06	0,04	0,06
5	0,05	0,06	0,03	0,05	0,06	0,06	0,04	0,06
6	0,06	0,06	0,04	0,05	0,06	0,06	0,05	0,04
M	0,046	0,049	0,029	0,047	0,052	0,055	0,035	0,051
REF.	0,052	0,054	0,031	0,051	0,058	0,062	0,037	0,061
SD	0,003	0,003	0,001	0,002	0,003	0,003	0,001	0,003

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

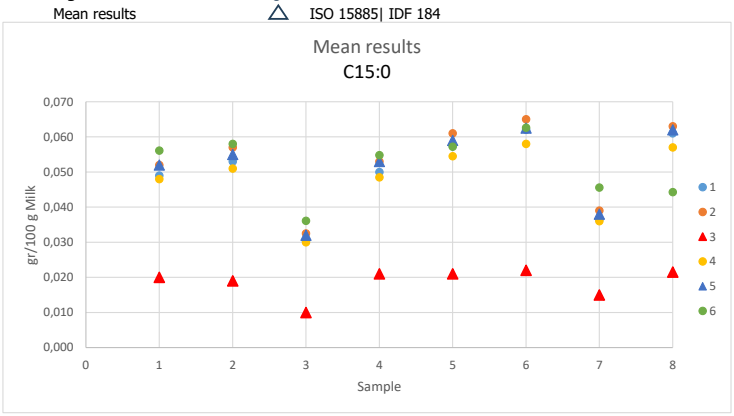


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,003	-0,001	-0,001	-0,001	0,000	0,000	-0,001	0,000	-0,001	0,001
2	0,000	0,003	0,001	0,002	0,003	0,003	0,002	0,002	0,002	0,001
3	-0,032	-0,035	-0,021	-0,030	-0,037	-0,040	-0,022	-0,039	-0,032	0,007
4	-0,004	-0,003	-0,001	-0,003	-0,004	-0,004	-0,001	-0,004	-0,003	0,001
5	0,000	0,001	0,001	0,002	0,001	0,001	0,001	0,001	0,001	0,001
6	0,004	0,004	0,005	0,004	-0,001	0,001	0,008	-0,016	0,001	0,008
d	-0,006	-0,005	-0,003	-0,004	-0,006	-0,007	-0,002	-0,009	-0,005	0,003
Sd	0,013	0,015	0,009	0,013	0,015	0,016	0,010	0,016	0,013	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

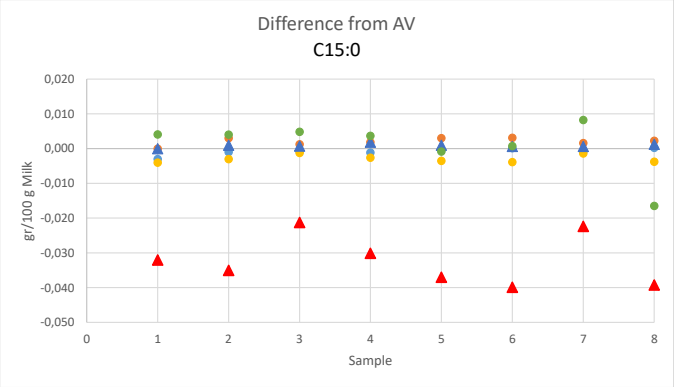


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,9	-0,4	-0,6	-0,5	-0,2	0,0	-0,6	0,1
2	0,0	1,2	1,1	0,8	1,1	1,1	1,2	0,9
3	-9,7	-13,6	-17,9	-13,4	-13,5	-13,8	-16,3	-14,9
4	-1,2	-1,2	-1,1	-1,2	-1,3	-1,3	-1,0	-1,4
5	0,0	0,4	0,6	0,8	0,4	0,2	0,5	0,5
6	1,2	1,6	4,1	1,6	-0,3	0,3	6,0	-6,3

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

Null sd=0 All the results under consideration are identical.

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

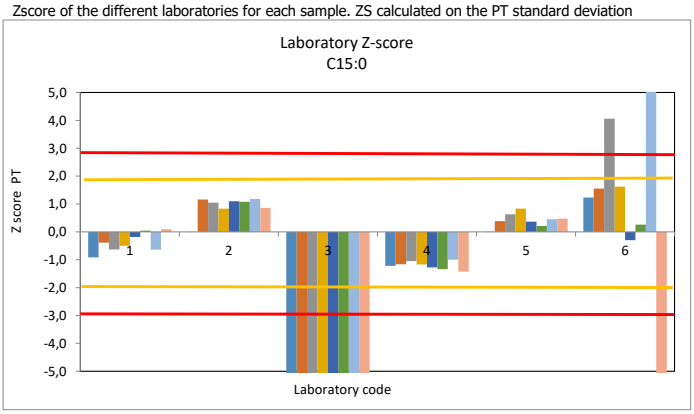
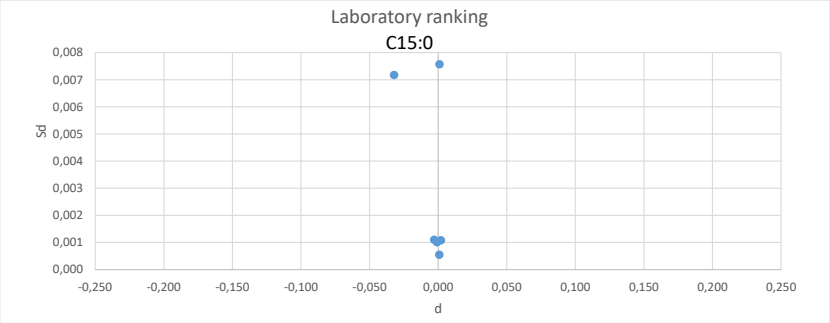


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C16

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	2	2	-	0,019	0,002	0,019	ISO 16958 I IDF 231
2	3	1	-	0,038	0,009	0,040	ISO 16958 I IDF 231
3	9	4	-	0,105	0,035	0,110	ISO 16958 I IDF 231
4	13	5	+	0,163	0,038	0,167	ISO 15885| IDF 184
5	100	3	-	1,247	0,273	1,276	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

\

(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}	0,0080
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,118

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,007	0,000	0,015	0,003	0,030	0,027	0,023	0,025	0,014	16
2	0,005	0,015	0,008	0,007	0,019	0,012	0,011	0,013	0,009	16
3	0,170	0,033	0,094	0,030	0,002	0,004	0,141	0,008	0,061	16
4	0,004	0,007	0,000	0,003	0,005	0,000	0,001	0,004	0,003	16
5	0,001	0,000	0,000	0,001	0,000	0,001	0,000	0,000	0,000	16
Sr	0,003	0,006	0,003	0,003	0,013	0,010	0,009	0,010		80
NE	10	10	10	10	10	10	10	10		
sL	0,099	0,140	0,073	0,104	0,139	0,137	0,082	0,144		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,003	0,006	0,003	0,003	0,013	0,010	0,009	0,010
SR	0,099	0,140	0,073	0,104	0,140	0,137	0,082	0,144

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

Sample Lab code	1	2	3	4	5	6	7	8
1	1,27	1,74	0,90	1,31	1,54	1,60	1,02	1,64
2	1,28	1,75	0,92	1,32	1,58	1,63	1,04	1,66
3	0,17	0,20	0,09	0,18	0,19	0,19	0,14	0,20
4	1,21	1,63	0,88	1,25	1,48	1,51	1,00	1,54
5	1,44	1,97	1,04	1,49	1,80	1,83	1,18	1,88
M	1,076	1,460	0,766	1,110	1,319	1,352	0,877	1,385
REF.	1,302	1,774	0,934	1,343	1,601	1,642	1,061	1,682
SD	0,099	0,140	0,073	0,104	0,140	0,137	0,082	0,144

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

REF :

Figure 1 : ISO 16958 I IDF 231
Mean results ISO 15885| IDF 184

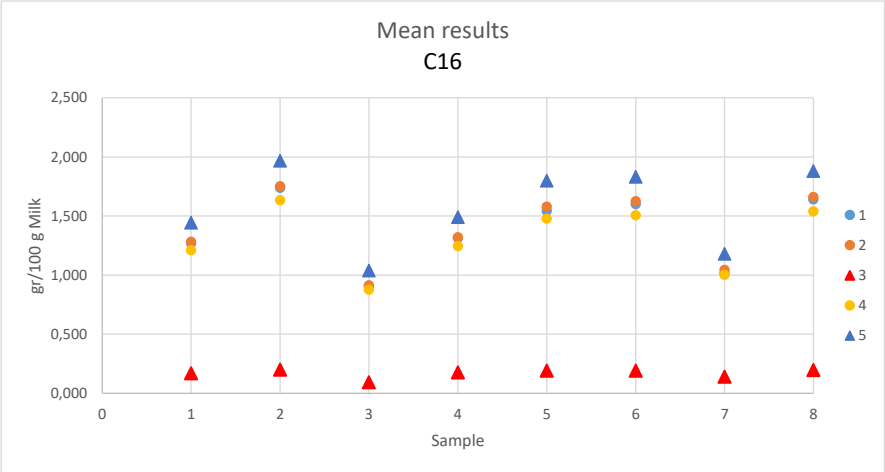


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,031	-0,034	-0,032	-0,029	-0,057	-0,040	-0,045	-0,040	-0,038	0,009
2	-0,020	-0,022	-0,019	-0,023	-0,020	-0,016	-0,017	-0,020	-0,019	0,002
3	-1,132	-1,573	-0,840	-1,166	-1,409	-1,450	-0,920	-1,485	-1,247	0,273
4	-0,091	-0,140	-0,056	-0,097	-0,122	-0,135	-0,059	-0,141	-0,105	0,035
5	0,141	0,195	0,106	0,148	0,200	0,191	0,120	0,201	0,163	0,038
d	-0,226	-0,315	-0,168	-0,233	-0,282	-0,290	-0,184	-0,297	-0,249	0,072
Sd	0,514	0,714	0,381	0,529	0,641	0,659	0,418	0,675	0,566	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

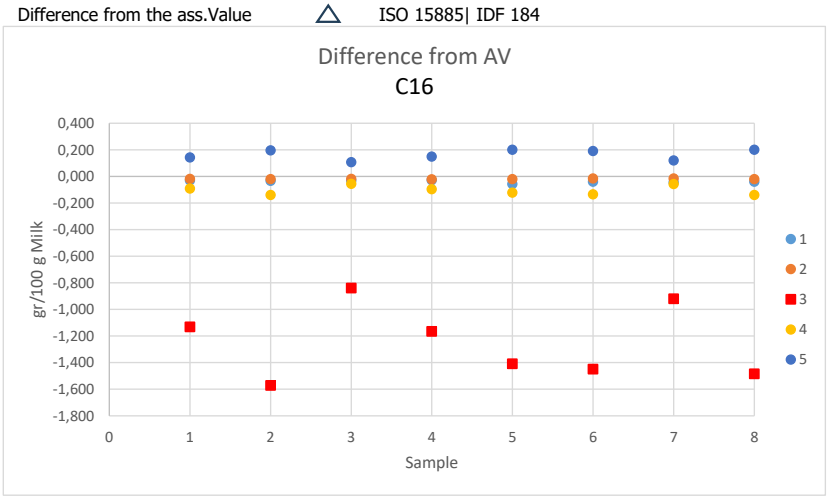


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,3	-0,2	-0,4	-0,3	-0,4	-0,3	-0,5	-0,3
2	-0,2	-0,2	-0,3	-0,2	-0,1	-0,1	-0,2	-0,1
3	-11,4	-11,2	-11,6	-11,2	-10,1	-10,6	-11,2	-10,3
4	-0,9	-1,0	-0,8	-0,9	-0,9	-1,0	-0,7	-1,0
5	1,4	1,4	1,5	1,4	1,4	1,4	1,5	1,4

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

Null sd=0 All the results under consideration are identical.

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

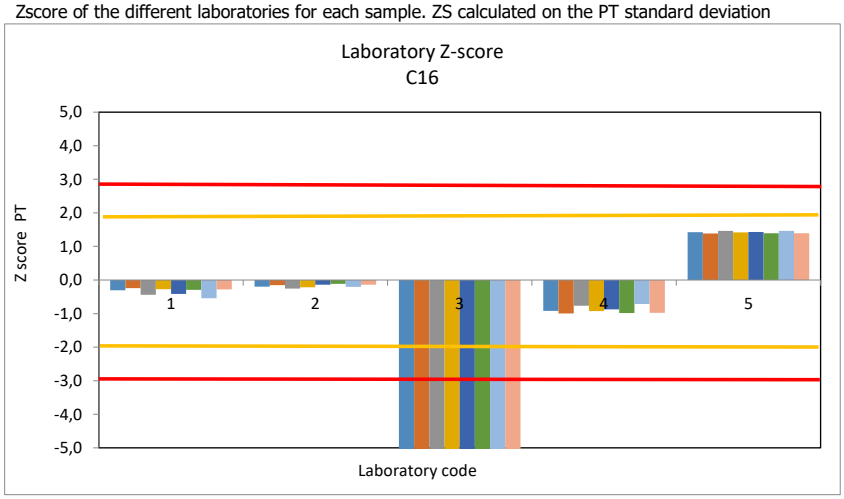
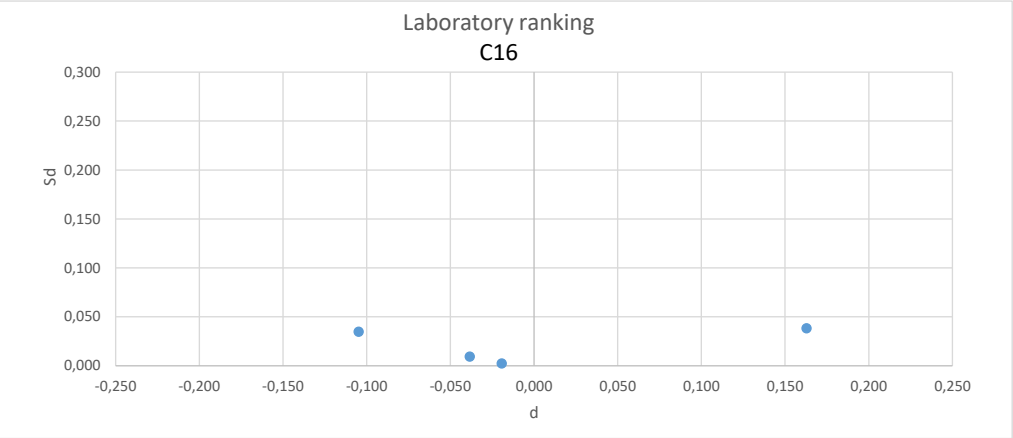


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C16:1 c9

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	30	2	-	0,006	0,012	0,014	ISO 16958 I IDF 231
2	32	4	-	0,009	0,012	0,015	ISO 16958 I IDF 231
3	34	5	+	0,006	0,014	0,015	ISO 15885| IDF 184
4	41	1	-	0,014	0,012	0,018	ISO 16958 I IDF 231
5	100	3	-	0,044	0,012	0,045	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,0003
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,008

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,002	0,003	0,002	0,004	0,000	0,000	0,000	0,001	0,001	16
2	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
3	0,026	0,005	0,015	0,004	0,000	0,000	0,021	0,001	0,009	16
4	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,000	16
5	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
Sr	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000		80
NE	10	10	10	10	10	10	10	10		
sL	0,009	0,009	0,005	0,008	0,010	0,008	0,007	0,011		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran		1	1	1				1
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000
SR	0,0087	0,0095	0,0049	0,0076	0,0099	0,0080	0,0066	0,0110

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,05	0,07	0,04	0,05	0,07	0,05	0,04	0,07
2	0,06	0,08	0,04	0,06	0,07	0,06	0,05	0,08
3	0,03	0,03	0,02	0,03	0,03	0,02	0,02	0,03
4	0,06	0,07	0,04	0,05	0,07	0,05	0,05	0,08
5	0,07	0,09	0,05	0,07	0,09	0,07	0,06	0,10
M	0,054	0,067	0,037	0,050	0,066	0,049	0,045	0,072
REF.	0,061	0,079	0,045	0,059	0,075	0,056	0,051	0,086
SD	0,009	0,009	0,005	0,008	0,010	0,008	0,007	0,011

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

REF :

Figure 1 : ○ ISO 16958 I IDF 231
Mean results △ ISO 15885| IDF 184

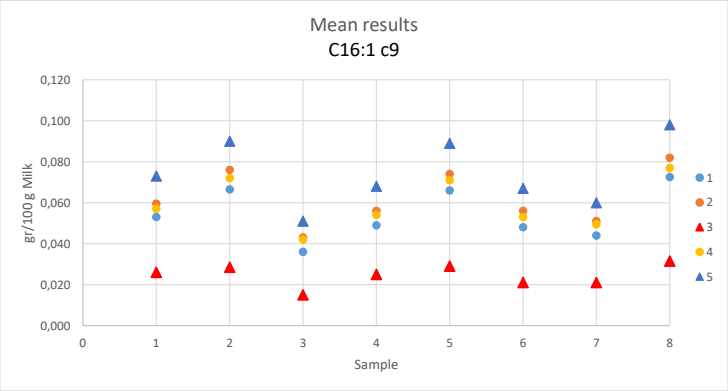


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,008	-0,013	-0,009	-0,010	-0,009	-0,008	-0,007	-0,013	-0,010	0,002
2	-0,001	-0,003	-0,002	-0,003	-0,001	0,000	0,000	-0,004	-0,002	0,001
3	-0,035	-0,051	-0,030	-0,034	-0,046	-0,035	-0,030	-0,054	-0,039	0,009
4	-0,004	-0,007	-0,003	-0,005	-0,004	-0,003	-0,002	-0,009	-0,005	0,002
5	0,012	0,011	0,006	0,009	0,014	0,011	0,009	0,012	0,010	0,003
d	-0,007	-0,013	-0,008	-0,009	-0,009	-0,007	-0,006	-0,013	-0,009	0,004
Sd	0,017	0,023	0,014	0,016	0,022	0,017	0,015	0,025	0,019	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

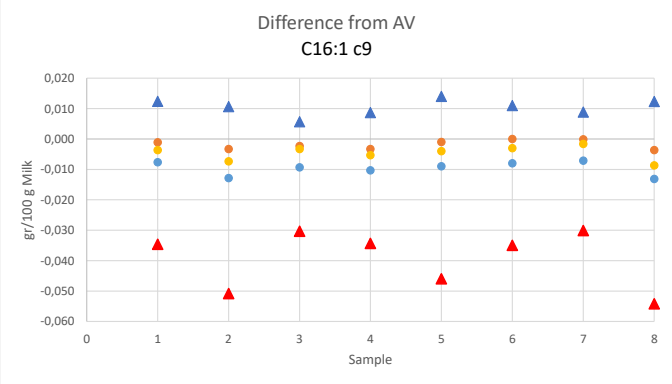


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,9	-1,4	-1,9	-1,4	-0,9	-1,0	-1,1	-1,2
2	-0,1	-0,4	-0,5	-0,4	-0,1	0,0	0,0	-0,3
3	-4,0	-5,4	-6,1	-4,5	-4,6	-4,4	-4,5	-4,9
4	-0,4	-0,8	-0,7	-0,7	-0,4	-0,4	-0,2	-0,8
5	1,4	1,1	1,1	1,1	1,4	1,4	1,3	1,1

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

Null sd=0 All the results under consideration are identical.

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

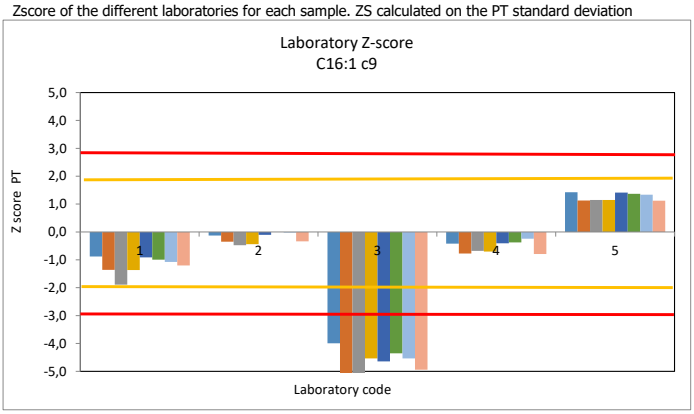
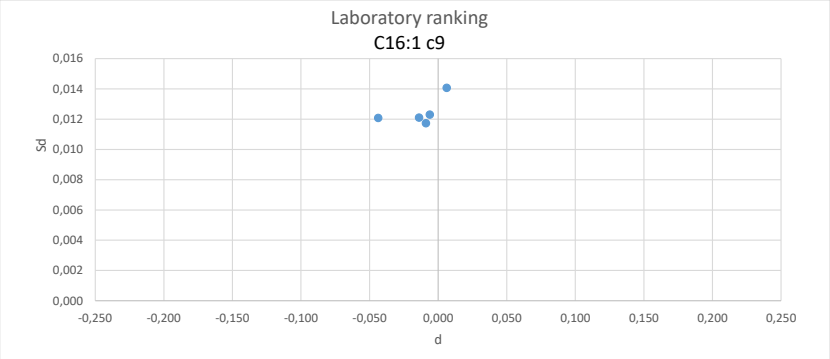


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C17:0

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	6	2	+	0,000	0,001	0,001	ISO 16958 I IDF 231
2	9	1	-	-0,001	0,000	0,001	ISO 16958 I IDF 231
3	15	4	-	-0,002	0,001	0,002	ISO 16958 I IDF 231
4	16	5	+	0,002	0,001	0,002	ISO 15885| IDF 184
5	38	6	+	0,004	0,003	0,005	ISO 15884/IDF 182
6	100	3	-	-0,013	0,003	0,013	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,002

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,001	0,001	0,000	0,001	0,001	0,001	0,001	0,001	0,001	16
2	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000	16
3	0,010	0,001	0,006	0,002	0,000	0,000	0,008	0,001	0,004	16
4	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
5	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,001	0,000	16
6	0,001	0,002	0,012	0,002	0,007	0,007	0,005	0,005	0,004	16
Sr	0,000	0,001	0,000	0,001	0,001	0,000	0,000	0,002		96
NE	12	12	12	12	12	12	12	12		
sL	0,002	0,002	0,001	0,003	0,002	0,002	0,001	0,002		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran			6		6	6	7	
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,000	0,001	0,000	0,001	0,001	0,000	0,000	0,002
SR	0,003	0,002	0,001	0,003	0,002	0,002	0,001	0,003

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,02	0,02	0,01	0,02	0,02	0,02	0,02	0,03
2	0,02	0,02	0,02	0,02	0,03	0,03	0,02	0,03
3	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
4	0,02	0,02	0,01	0,02	0,02	0,02	0,02	0,03
5	0,02	0,02	0,02	0,03	0,03	0,03	0,02	0,03
6	0,03	0,03	0,02	0,03	0,03	0,03	0,02	0,02
M	0,020	0,021	0,014	0,022	0,024	0,023	0,016	0,024
REF.	0,022	0,023	0,015	0,024	0,026	0,025	0,017	0,027
SD	0,003	0,002	0,001	0,003	0,002	0,002	0,001	0,002

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

ISO 16958 I IDF 231
ISO 15885| IDF 184

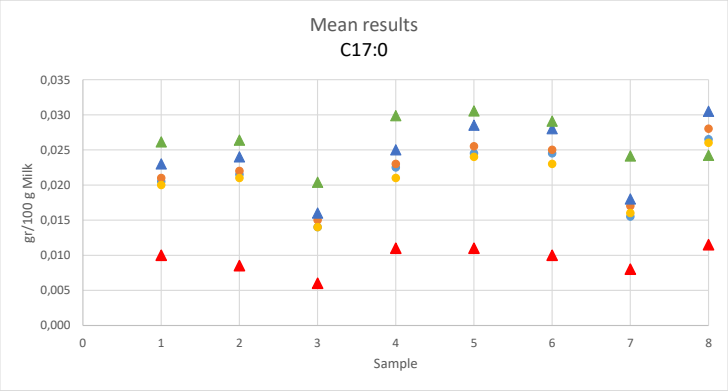


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,002	-0,001	-0,001	-0,002	-0,001	-0,001	-0,001	-0,001	-0,001	0,000
2	-0,001	-0,001	0,000	-0,001	0,000	0,000	0,000	0,001	0,000	0,001
3	-0,012	-0,014	-0,009	-0,013	-0,015	-0,015	-0,009	-0,016	-0,013	0,003
4	-0,002	-0,002	-0,001	-0,003	-0,002	-0,002	-0,001	-0,001	-0,002	0,001
5	0,001	0,001	0,001	0,001	0,003	0,003	0,001	0,003	0,002	0,001
6	0,004	0,003	0,006	0,006	0,005	0,004	0,007	-0,003	0,004	0,003
d	-0,002	-0,002	-0,001	-0,002	-0,002	-0,002	0,000	-0,003	-0,002	0,002
Sd	0,005	0,006	0,005	0,006	0,007	0,007	0,005	0,007	0,006	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

ISO 16958 I IDF 231
ISO 15885| IDF 184

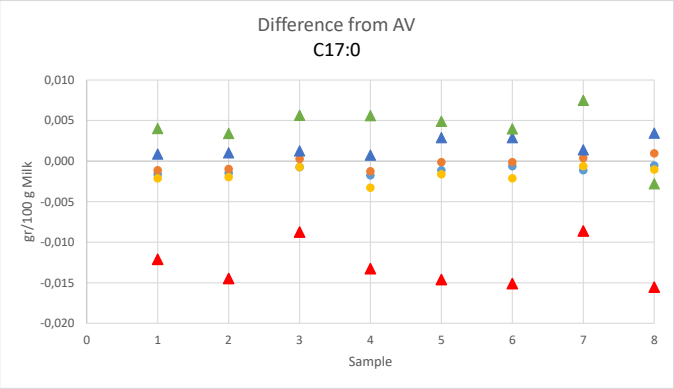


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,6	-0,7	-0,8	-0,5	-0,6	-0,3	-1,0	-0,2
2	-0,4	-0,4	0,3	-0,4	-0,1	-0,1	0,3	0,4
3	-4,8	-6,5	-9,1	-3,9	-7,3	-7,2	-7,8	-6,6
4	-0,8	-0,9	-0,8	-1,0	-0,8	-1,0	-0,6	-0,4
5	0,3	0,5	1,3	0,2	1,4	1,4	1,2	1,5
6	1,6	1,5	5,9	1,6	2,4	1,9	6,8	-1,2

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

Null sd=0 All the results under consideration are identical.

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

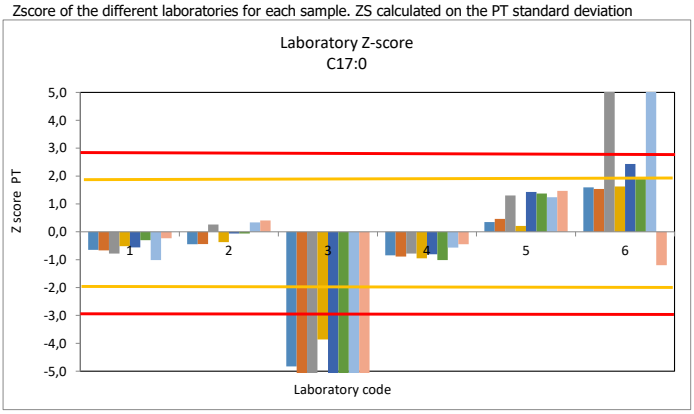
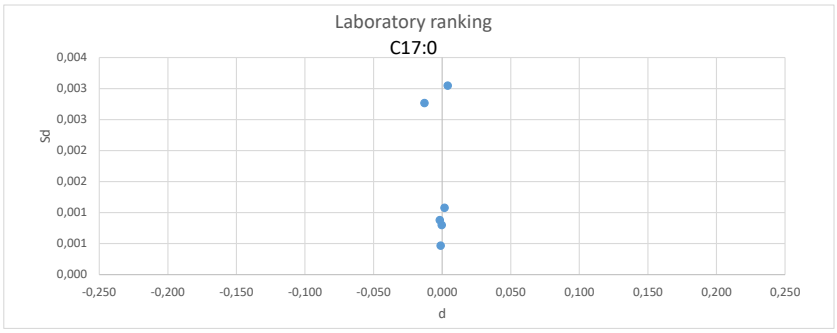


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C18

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	1	2	-	0,002	0,001	0,002	ISO 16958 I IDF 231
2	1	1	+	0,003	0,003	0,004	ISO 16958 I IDF 231
3	8	5	+	0,022	0,006	0,023	ISO 15885| IDF 184
4	8	4	-	0,023	0,008	0,024	ISO 16958 I IDF 231
5	100	3	-	0,285	0,063	0,292	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,0027
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,019

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,001	0,001	0,007	0,002	0,009	0,009	0,006	0,011	0,005	16
2	0,001	0,005	0,003	0,002	0,004	0,003	0,002	0,002	0,002	16
3	0,067	0,010	0,040	0,012	0,000	0,003	0,054	0,003	0,024	16
4	0,001	0,002	0,000	0,001	0,002	0,000	0,001	0,002	0,001	16
5	0,001	0,000	0,001	0,000	0,000	0,001	0,000	0,000	0,000	16
Sr	0,001	0,002	0,003	0,001	0,004	0,003	0,002	0,004		80
NE	10	10	10	10	10	10	10	10		
sL	0,016	0,019	0,011	0,019	0,022	0,024	0,010	0,025		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,001	0,002	0,003	0,001	0,004	0,003	0,002	0,004
SR	0,0157	0,0193	0,0111	0,0186	0,0226	0,0246	0,0107	0,0256

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,32	0,37	0,24	0,37	0,40	0,44	0,25	0,44
2	0,32	0,36	0,24	0,36	0,40	0,44	0,25	0,44
3	0,07	0,07	0,04	0,08	0,08	0,08	0,05	0,08
4	0,30	0,34	0,23	0,34	0,37	0,41	0,24	0,41
5	0,34	0,39	0,26	0,38	0,43	0,47	0,27	0,47
M	0,269	0,305	0,203	0,306	0,333	0,366	0,213	0,369
REF.	0,319	0,365	0,244	0,363	0,397	0,437	0,253	0,440
SD	0,016	0,019	0,011	0,019	0,022	0,024	0,011	0,025

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

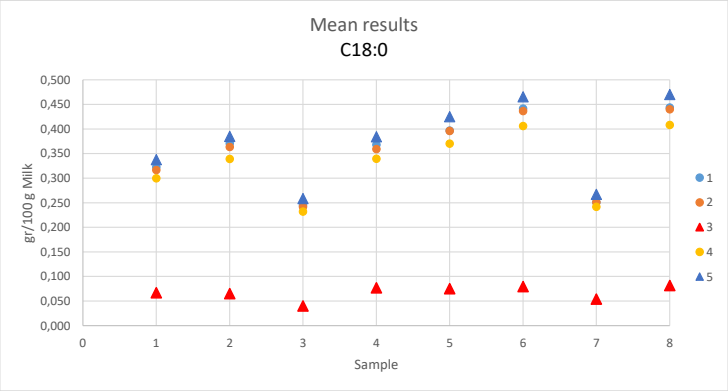


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,004	0,006	0,000	0,005	0,000	0,004	-0,002	0,003	0,003	0,003
2	-0,003	-0,001	-0,003	-0,004	-0,001	-0,001	-0,002	0,000	-0,002	0,001
3	-0,252	-0,300	-0,204	-0,286	-0,322	-0,358	-0,199	-0,359	-0,285	0,063
4	-0,020	-0,026	-0,012	-0,023	-0,027	-0,031	-0,011	-0,032	-0,023	0,008
5	0,019	0,021	0,014	0,021	0,028	0,028	0,014	0,030	0,022	0,006
d	-0,050	-0,060	-0,041	-0,057	-0,064	-0,072	-0,040	-0,072	-0,057	0,016
Sd	0,114	0,135	0,092	0,129	0,145	0,161	0,089	0,162	0,128	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

ISO 16958 I IDF 231
ISO 15885| IDF 184

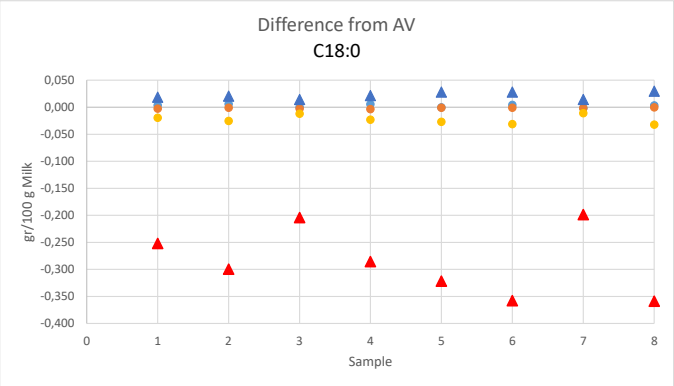


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	0,2	0,3	0,0	0,3	0,0	0,2	-0,2	0,1
2	-0,2	-0,1	-0,2	-0,2	0,0	0,0	-0,2	0,0
3	-16,0	-15,6	-18,6	-15,4	-14,3	-14,6	-18,8	-14,1
4	-1,2	-1,3	-1,1	-1,2	-1,2	-1,3	-1,1	-1,3
5	1,2	1,1	1,3	1,2	1,3	1,2	1,4	1,2

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

Null sd=0 All the results under consideration are identical.

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

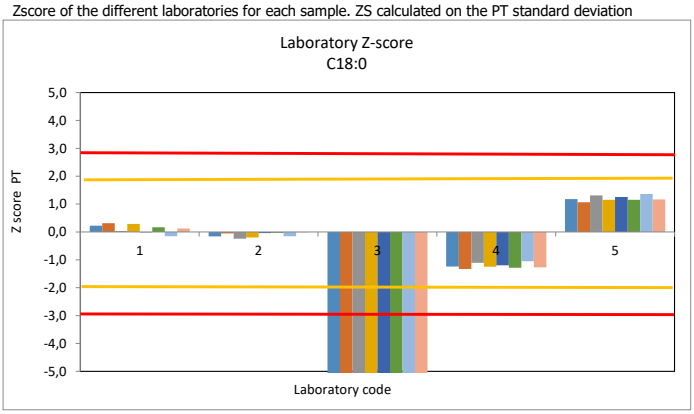
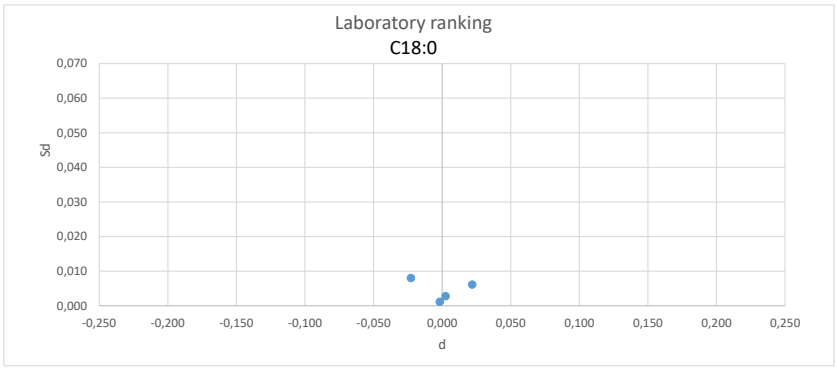
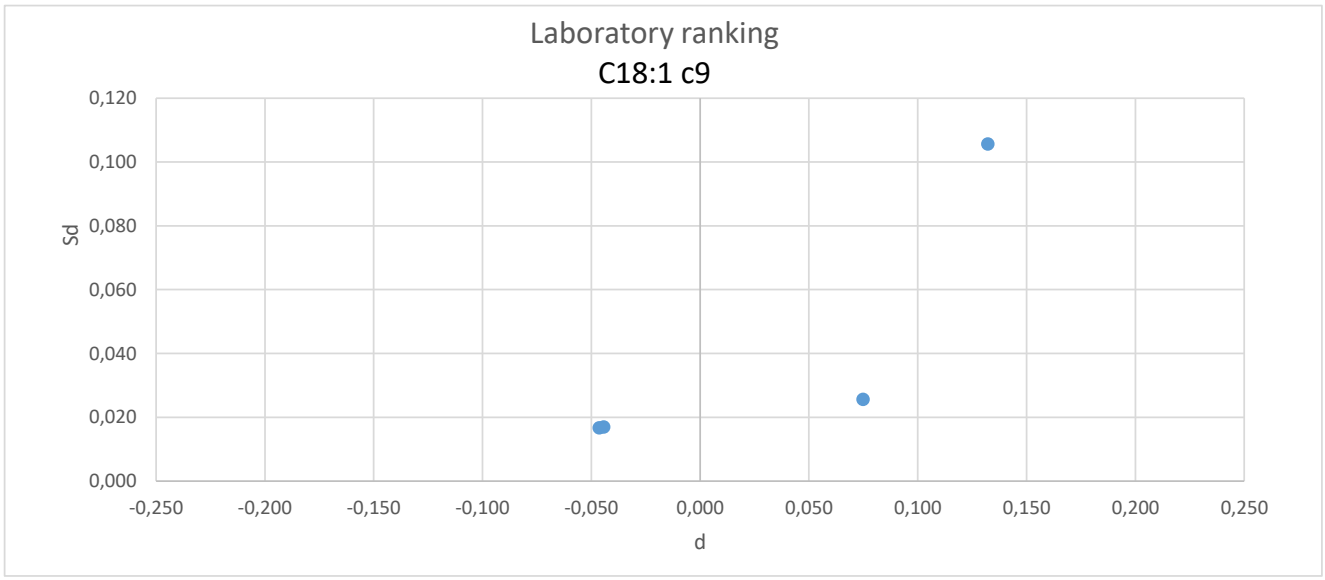


Figure 4 : Laboratory distribution (see table 1)




Laboratory ranking
C18:1 c9
0,120
0,100
0,080
0,060
0,040
0,020
0,000
Sd
-0,250
-0,200
-0,150
-0,100
-0,050
0,000
0,050
0,100
0,150
0,200
0,250
d

ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C18:1

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	5	1	+	0,030	0,010	0,032	ISO 16958 I IDF 231
2	7	2	+	0,040	0,012	0,042	ISO 16958 I IDF 231
3	12	4	-	0,070	0,022	0,073	ISO 16958 I IDF 231
4	100	3	-	0,606	0,123	0,618	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,0068
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,064

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,005	0,005	0,018	0,003	0,017	0,015	0,012	0,019	0,009	16
2	0,008	0,004	0,010	0,006	0,013	0,009	0,008	0,017	0,007	16
3	0,121	0,014	0,078	0,031	0,001	0,006	0,099	0,013	0,045	16
4	0,002	0,002	0,000	0,003	0,002	0,000	0,000	0,003	0,001	16
Sr	0,004	0,003	0,008	0,003	0,009	0,007	0,006	0,010		64
NE	8	8	8	8	8	8	8	8		
sL	0,053	0,084	0,038	0,055	0,068	0,064	0,037	0,087		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,004	0,003	0,008	0,003	0,009	0,007	0,006	0,010
SR	0,0528	0,0842	0,0384	0,0550	0,0689	0,0639	0,0377	0,0874

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,72	0,81	0,56	0,74	0,90	0,71	0,59	1,05
2	0,72	0,81	0,56	0,75	0,92	0,73	0,60	1,07
3	0,12	0,12	0,08	0,14	0,16	0,11	0,10	0,17
4	0,63	0,67	0,49	0,65	0,79	0,61	0,53	0,91
M	0,548	0,602	0,422	0,569	0,689	0,540	0,457	0,798
REF.	0,690	0,763	0,537	0,713	0,867	0,683	0,577	1,007
SD	0,053	0,084	0,038	0,055	0,069	0,064	0,037	0,087

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

REF :

Figure 1 :
Mean results
ISO 16958 I IDF 231
ISO 15885| IDF 184

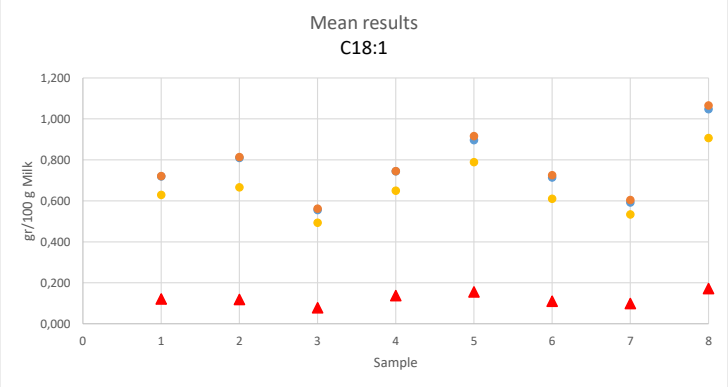


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,030	0,046	0,018	0,031	0,029	0,031	0,015	0,041	0,030	0,010
2	0,031	0,051	0,025	0,032	0,049	0,042	0,027	0,059	0,040	0,012
3	-0,569	-0,644	-0,459	-0,576	-0,712	-0,573	-0,478	-0,835	-0,606	0,123
4	-0,061	-0,097	-0,044	-0,064	-0,078	-0,073	-0,043	-0,100	-0,070	0,022
d	-0,142	-0,161	-0,115	-0,144	-0,178	-0,143	-0,119	-0,209	-0,151	0,042
Sd	0,288	0,329	0,231	0,291	0,360	0,291	0,241	0,424	0,307	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

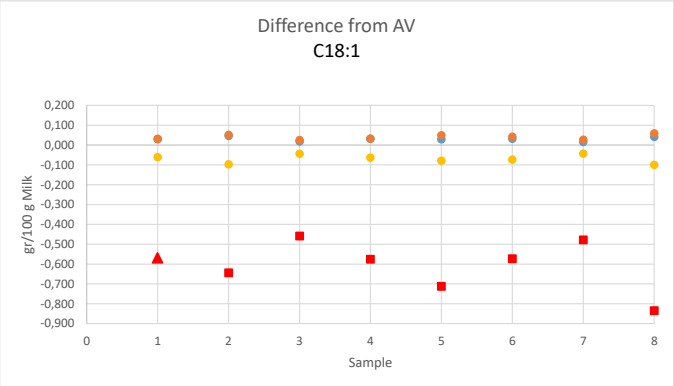


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	0,6	0,6	0,5	0,6	0,4	0,5	0,4	0,5
2	0,6	0,6	0,7	0,6	0,7	0,7	0,7	0,7
3	-10,8	-7,7	-12,1	-10,5	-10,4	-9,0	-12,8	-9,6
4	-1,2	-1,2	-1,1	-1,2	-1,1	-1,2	-1,1	-1,1

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

Null sd=0 All the results under consideration are identical.

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

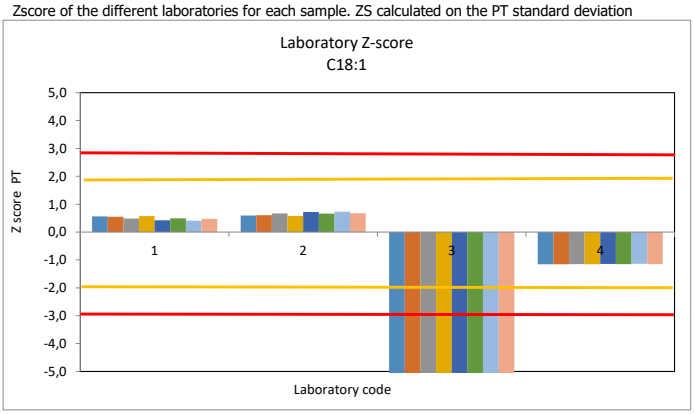
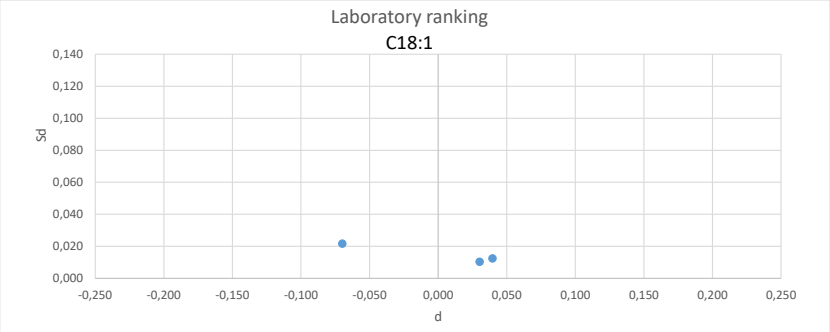


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C18:2 c9,c12

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	10	2	+	0,000	0,001	0,001	ISO 16958 I IDF 231
2	41	1	-	0,003	0,001	0,004	ISO 16958 I IDF 231
3	70	3	-	0,006	0,002	0,006	ISO 16958 I IDF 231
4	100	4	+	0,008	0,002	0,009	ISO 15885| IDF 184

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 : To be determined

(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}	0,0007
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,007

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,003	0,002	0,001	0,000	0,003	0,003	0,000	0,003	0,002	16
2	0,000	0,001	0,000	0,001	0,000	0,001	0,001	0,000	0,001	16
3	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000	16
4	0,000	0,000	0,000	0,000	0,001	0,001	0,000	0,000	0,000	16
Sr	0,000	0,001	0,000	0,000	0,001	0,001	0,000	0,001		64
NE	8	8	8	8	8	8	8	8		
sL	0,007	0,007	0,005	0,006	0,007	0,006	0,005	0,009		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran	1		1	2			2	
Outlier Grubbs								
sr	0,000	0,001	0,000	0,000	0,001	0,001	0,000	0,001
SR	0,0071	0,0070	0,0050	0,0064	0,0072	0,0064	0,0052	0,0094

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,07	0,09	0,05	0,06	0,09	0,07	0,05	0,10
2	0,07	0,09	0,06	0,07	0,09	0,08	0,06	0,11
3	0,07	0,08	0,05	0,06	0,08	0,07	0,05	0,10
4	0,08	0,10	0,06	0,07	0,10	0,08	0,06	0,12
M	0,073	0,089	0,057	0,065	0,089	0,075	0,056	0,107
REF.	0,074	0,089	0,058	0,065	0,089	0,075	0,056	0,107
SD	0,007	0,007	0,005	0,006	0,007	0,006	0,005	0,009

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

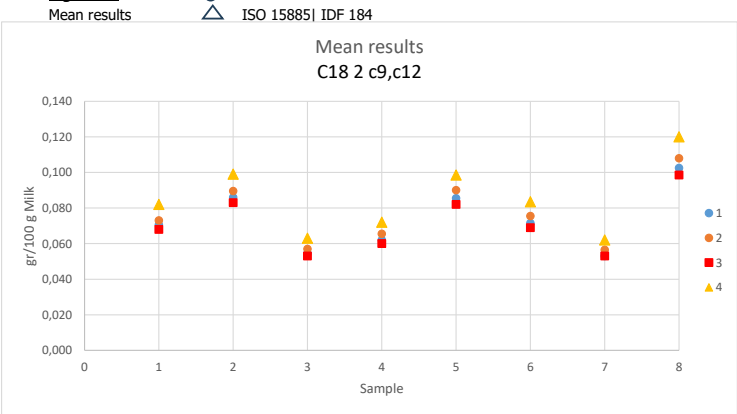


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	-0,004	-0,003	-0,003	-0,003	-0,004	-0,003	-0,003	-0,005	-0,003	0,001
2	-0,001	0,000	-0,001	0,001	0,001	0,001	0,001	0,001	0,000	0,001
3	-0,006	-0,006	-0,005	-0,005	-0,007	-0,006	-0,003	-0,009	-0,006	0,002
4	0,008	0,010	0,005	0,007	0,010	0,009	0,006	0,013	0,008	0,002
d	-0,001	0,000	-0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,001
Sd	0,006	0,007	0,004	0,005	0,007	0,006	0,004	0,009	0,006	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

ISO 16958 I IDF 231
ISO 15885| IDF 184

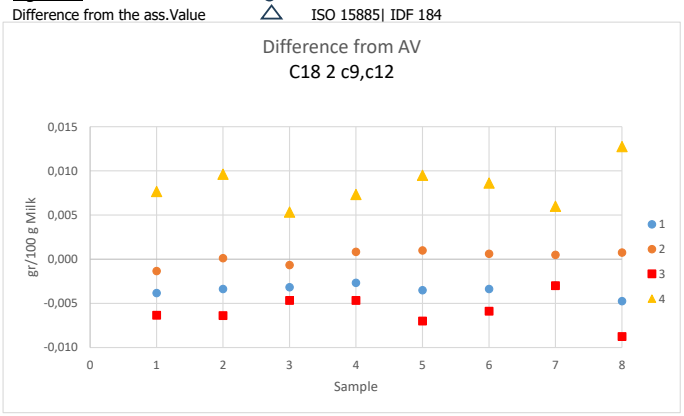


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,5	-0,5	-0,6	-0,4	-0,5	-0,5	-0,6	-0,5
2	-0,2	0,0	-0,1	0,1	0,1	0,1	0,1	0,1
3	-0,9	-0,9	0,0	-0,7	-1,0	-0,9	-0,6	-0,9
4	1,1	1,4	1,1	1,1	1,3	1,4	1,2	1,4

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

Null sd=0 All the results under consideration are identical.

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

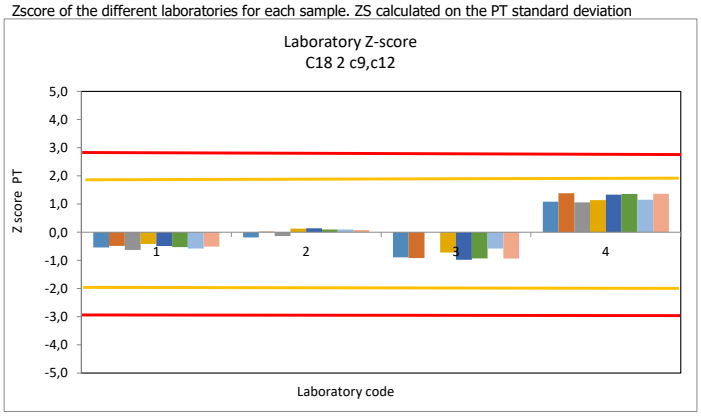
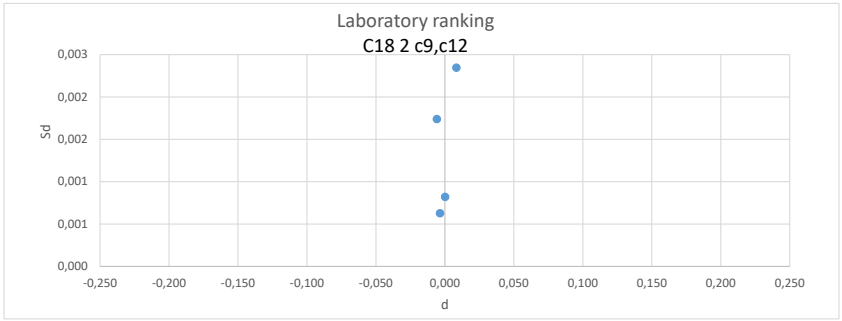


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C18:3 c6,c9,c12

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	76	2	-	0,001	0,000	0,001	ISO 16958 I IDF 231
2	78	3	-	0,001	0,000	0,001	ISO 16958 I IDF 231
3	100	1	+	0,001	0,001	0,001	ISO 16958 I IDF 231

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 : To be determined

(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}	0,0005
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,001	0,001	0,000	0,001	0,001	0,002	0,001	0,003	0,001	16
2	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
3	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000	16
Sr	0,000	0,000	0,000	0,000	0,001	0,001	0,000	0,001		48
NE	6	6	6	6	6	6	6	6		
sL	0,001	0,001	0,001	0,001	0,000	0,001	0,000	0,000		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs								
sr	0,000	0,000	0,000	0,000	0,001	0,001	0,000	0,001
SR	0,0009	0,0009	0,0009	0,0009	0,0006	0,0013	0,0004	0,0011

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,003	0,004	0,002	0,003	0,003	0,003	0,002	0,004
2	0,001	0,002	0,001	0,001	0,002	0,001	0,001	0,002
3	0,001	0,002	0,001	0,001	0,002	0,001	0,001	0,002
M	0,002	0,003	0,001	0,002	0,002	0,002	0,001	0,003
REF.	0,002	0,003	0,003	0,002	0,002	0,002	0,001	0,003
SD	0,001	0,001	0,001	0,001	0,001	0,001	0,000	0,001

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

REF :

Figure 1 : ISO 16958 I IDF 231
Mean results ISO 15885| IDF 184

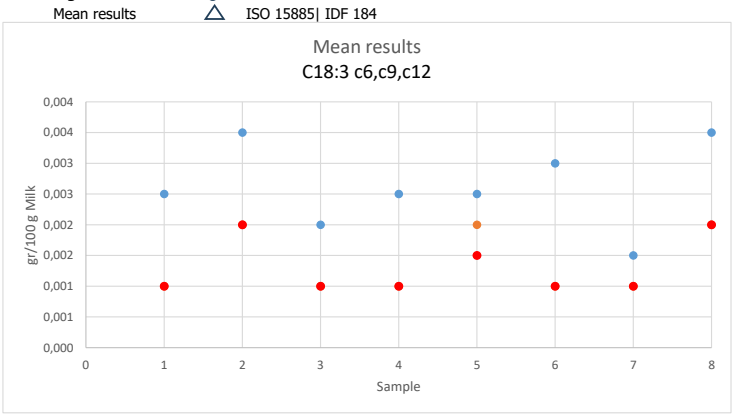


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,0010	0,0010	-0,0005	0,0010	0,0005	0,0013	0,0003	0,0010	0,001	0,001
2	-0,0005	-0,0005	-0,0015	-0,0005	0,0000	-0,0007	####	-0,0005	-0,001	0,000
3	-0,0005	-0,0005	-0,0015	-0,0005	-0,0005	-0,0007	####	-0,0005	-0,001	0,000
d	0,000	0,000	-0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Sd	0,001	0,001	0,001	0,001	0,001	0,001	0,000	0,001	0,001	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

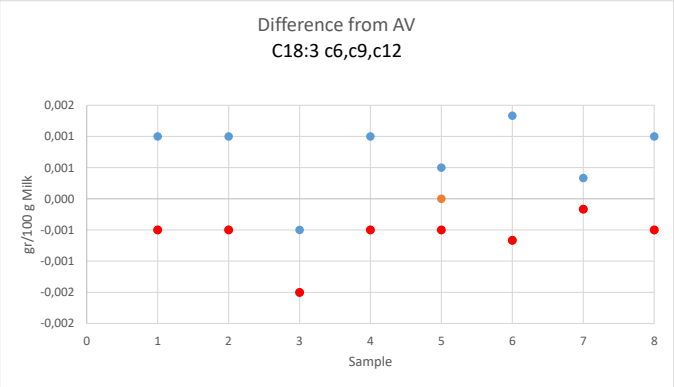


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	1,15	1,15	-0,58	1,15	1,00	1,15	1,15	1,15
2	-0,58	-0,58	-1,73	-0,58	0,00	-0,58	-0,58	-0,58
3	-0,58	-0,58	-1,73	-0,58	-1,00	-0,58	-0,58	-0,58

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

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

Null sd=0 All the results under consideration are identical.

Figure 3 :

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

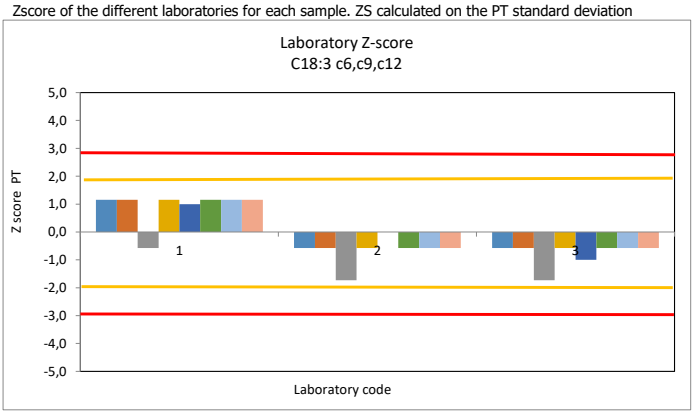
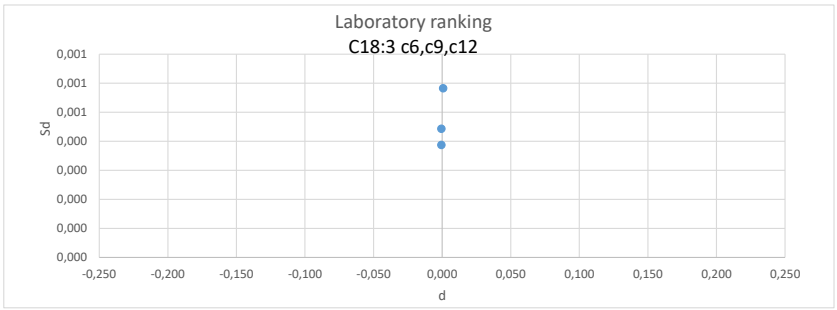


Figure 4 : Laboratory distribution (see table 1)



ICAR

March 2024

Determination of Fatty Acids

Gas Chromatography

C18:3 c9,c12,c15

Sending date of statistical treatment : 20.04.2024

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	80	1	+	0,0001	0,000	0,000	ISO 16958 I IDF 231
2	56	2	+	0,0001	0,000	0,000	ISO 16958 I IDF 231
3	84	3	-	0,0004	0,000	0,000	ISO 16958 I IDF 231
4	100	4	+	0,0002	0,000	0,001	ISO 15885| IDF 184

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,000	0,000	0,000	0,000	0,003	0,003	0,001	0,002	0,001	16
2	0,000	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
3	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
4	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000	16
Sr	0,000	0,000	0,000	0,000	0,001	0,001	0,000	0,001		64
NE	8	8	8	8	8	8	8	8		
sL	0,001	0,000	0,000	0,001	0,000	0,000	0,000	0,000		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in preliminary analyses because the sample have been delived in delay

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs								
sr	0,000	0,000	0,000	0,000	0,001	0,001	0,000	0,001
SR	0,0005	0,0005	0,0000	0,0005	0,0011	0,0011	0,0004	0,0007

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,01	0,01	0,01	0,02	0,02	0,02	0,01	0,02
2	0,01	0,01	0,01	0,02	0,02	0,02	0,01	0,02
3	0,01	0,01	0,01	0,02	0,02	0,01	0,01	0,02
4	0,01	0,01	0,01	0,02	0,02	0,01	0,01	0,02
M	0,010	0,011	0,012	0,016	0,019	0,015	0,011	0,020
REF.	0,010	0,011	0,012	0,016	0,019	0,015	0,011	0,020
SD	0,001	0,000	0,000	0,001	0,000	0,001	0,000	0,001

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

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

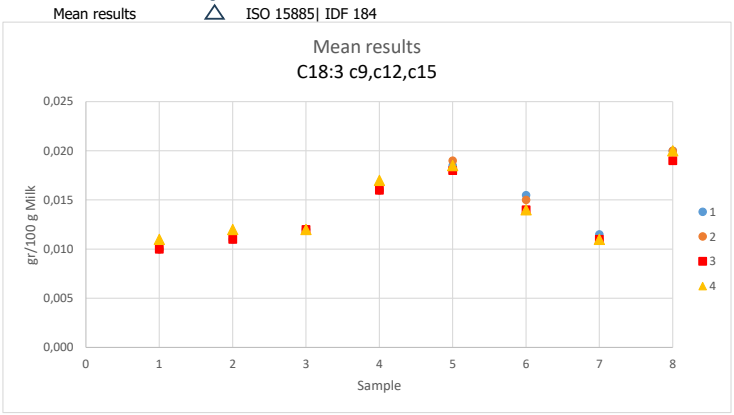


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000
2	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
3	0,000	0,000	0,000	0,000	-0,001	-0,001	0,000	-0,001	0,000	0,000
4	0,001	0,001	0,000	0,001	0,000	-0,001	0,000	0,000	0,000	0,000
d	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Sd	0,001	0,000	0,000	0,001	0,000	0,001	0,000	0,001	0,000	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

ISO 16958 I IDF 231
ISO 15885| IDF 184

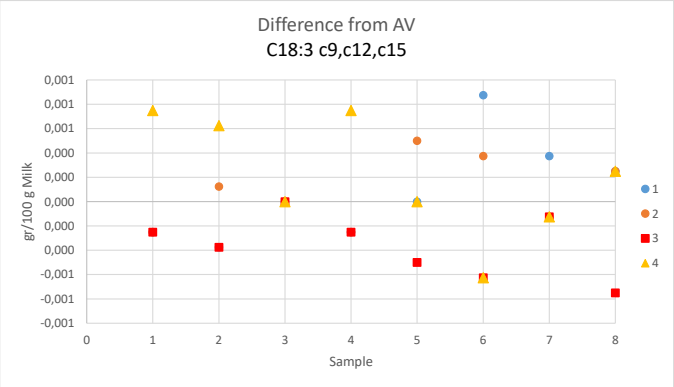


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	-0,5	-0,8	Null	-0,5	0,0	1,2	1,5	0,5
2	-0,5	0,3	Null	-0,5	1,2	0,5	-0,5	0,5
3	-0,5	-0,8	Null	-0,5	-1,2	-0,8	-0,5	-1,5
4	1,5	1,3	Null	1,5	0,0	-0,8	-0,5	0,5

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

Null sd=0 All the results under consideration are identical.

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

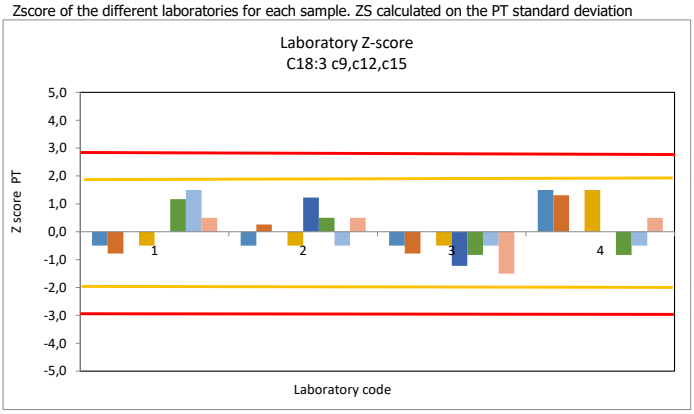
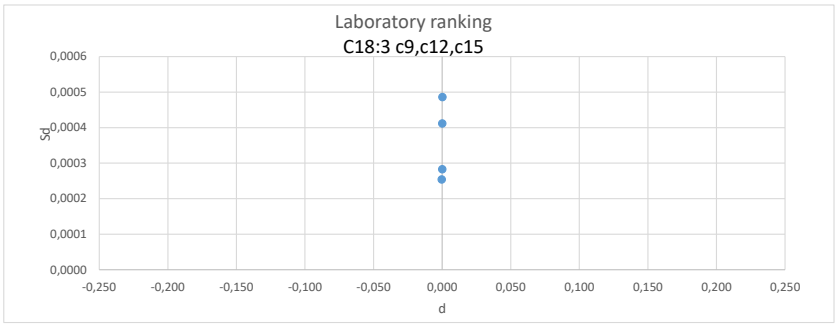


Figure 4 : Laboratory distribution (see table 1)



ICAR

Determination of Fatty Acids

Gas Chromatography

C20:0

Sending date of statistical treatment : 25.04.2024

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

Proficiency test based on ISO 17043

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

-1

Nb	%	N°	ig	d	Sd	D	Method
1	6	2	+	0,000	0,000	0,000	ISO 16958 I IDF 231
2	6	5	+	0,000	0,000	0,000	ISO 15885| IDF 184
3	14	4	-	-0,001	0,000	0,001	ISO 16958 I IDF 231
4	17	1	+	0,001	0,000	0,001	ISO 16958 I IDF 231
5	100	3	-	-0,005	0,001	0,005	ISO 15584/ IDF 182 & ISO 15585/IDF 184

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 : To be determined

(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}	0,000
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,001	0,001	0,000	0,000	0,000	0,001	0,000	0,001	0,001	16
2	0,001	0,001	0,000	0,001	0,001	0,001	0,000	0,000	0,001	16
3	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
4	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
5	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	16
Sr	0,001	0,001	0,000	0,000	0,000	0,001	0,000	0,000		80
NE	10	10	10	10	10	10	10	10		
sL	0,001	0,001	0,001	0,000	0,000	0,001	0,001	0,001		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in pre-scrutinization

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs	3	3	3	3	3	3	3	3
sr	0,001	0,001	0,000	0,000	0,000	0,001	0,000	0,000
SR	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,007	0,007	0,004	0,007	0,007	0,008	0,005	0,008
2	0,005	0,006	0,004	0,007	0,007	0,007	0,004	0,007
3	0,001	0,001	0,000	0,001	0,001	0,001	0,001	0,001
4	0,004	0,005	0,003	0,006	0,006	0,006	0,004	0,006
5	0,005	0,006	0,004	0,006	0,006	0,007	0,004	0,007
M	0,004	0,005	0,003	0,005	0,005	0,006	0,004	0,006
REF.	0,005	0,006	0,004	0,006	0,006	0,007	0,004	0,007
SD	0,001	0,001	0,001	0,000	0,000	0,001	0,001	0,001

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

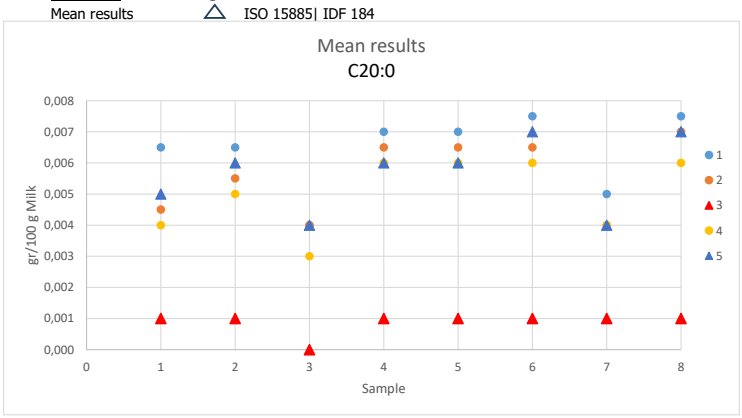


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,002	0,001	0,000	0,001	0,001	0,001	0,001	0,001	0,001	0,000
2	-0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
3	-0,004	-0,005	-0,004	-0,005	-0,005	-0,006	-0,003	-0,006	-0,005	0,001
4	-0,001	-0,001	-0,001	0,000	0,000	-0,001	0,000	-0,001	-0,001	0,000
5	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
d	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	0,000
Sd	0,002	0,002	0,002	0,002	0,002	0,003	0,002	0,003	0,002	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

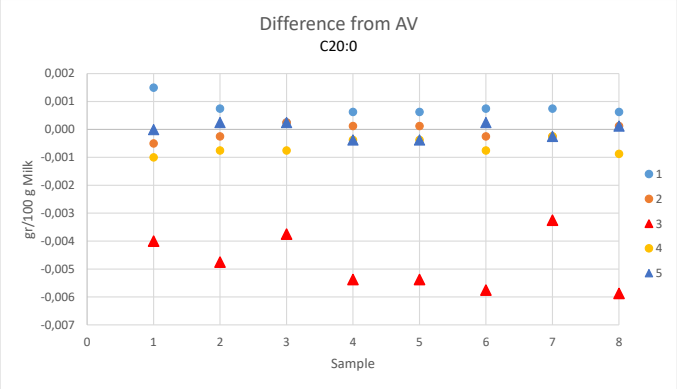


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	1,4	1,2	0,5	1,3	1,3	1,2	1,5	1,0
2	-0,5	-0,4	0,5	0,3	0,3	-0,4	-0,5	0,2
3	-3,7	-7,4	-7,5	-11,2	-11,2	-8,9	-6,5	-9,3
4	-0,9	-1,2	-1,5	-0,8	-0,8	-1,2	-0,5	-1,4
5	0,0	0,4	0,5	-0,8	-0,8	0,4	-0,5	0,2

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 PT standard deviation

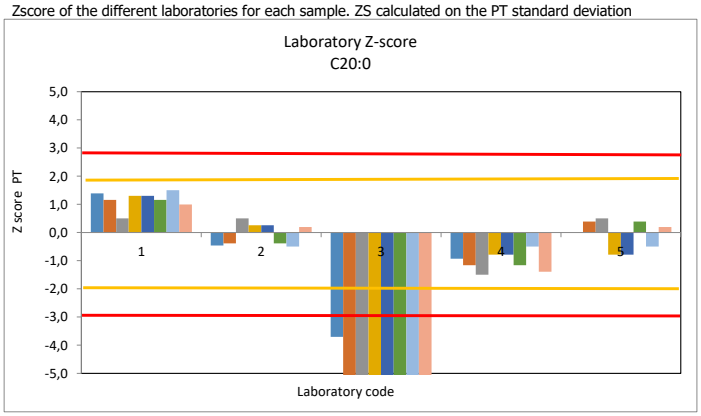
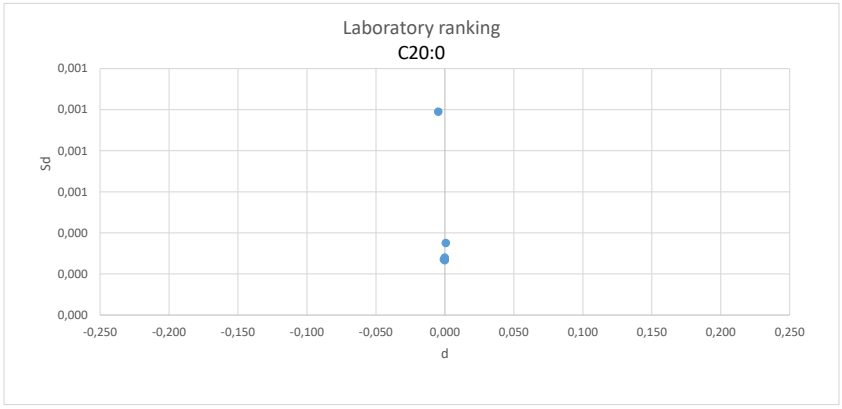


Figure 4 : Laboratory distribution (see table 1)



ICAR

Determination of Fatty Acids

Gas Chromatography

C20:1 c9

Sending date of statistical treatment : 24.04.24

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

Proficiency test based on ISO 17043

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

-1

Nb	%	N°	ig	d	Sd	D	Method
1	23	4	+	0,000	0,000	0,000	ISO 15885| IDF 184
2	42	3	-	0,001	0,000	0,001	ISO 16958 I IDF 231
3	57	2	-	0,001	0,000	0,001	ISO 16958 I IDF 231
4	100	1	+	0,002	0,001	0,002	ISO 16958 I IDF 231

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 : To be determined

(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}	0,000
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,002

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,0000	0,0010	0,0000	0,0000	0,0020	0,0010	0,0000	0,0010	0,001	16
2	0,0000	0,0010	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,000	16
3	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,000	16
4	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,000	16
Sr	0,0000	0,0005	0,0000	0,0000	0,0007	0,0004	0,0000	0,0004		64
NE	8	8	8	8	8	8	8	8		
sL	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,002		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in pre-scrutinization

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs								
sr	0,000	0,001	0,000	0,000	0,001	0,000	0,000	0,000
SR	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,002

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,004	0,005	0,003	0,005	0,006	0,004	0,004	0,006
2	0,001	0,002	0,001	0,001	0,001	0,001	0,001	0,002
3	0,001	0,002	0,001	0,002	0,002	0,001	0,001	0,002
4	0,002	0,003	0,002	0,002	0,002	0,003	0,002	0,003
M	0,002	0,003	0,002	0,003	0,003	0,002	0,002	0,003
REF.	0,002	0,003	0,002	0,003	0,003	0,002	0,002	0,003
SD	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,002

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

Figure 1 :
Mean results

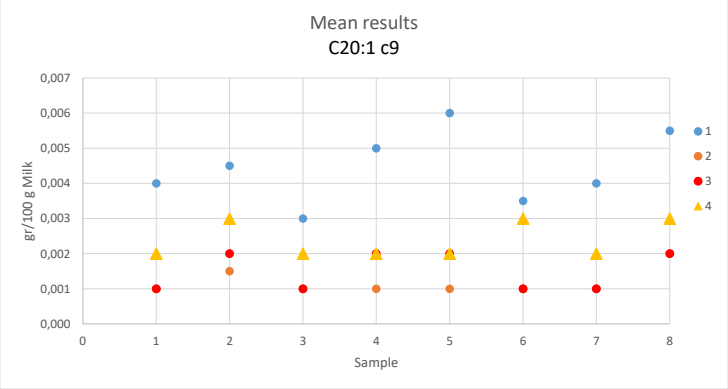


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,002	0,002	0,001	0,003	0,003	0,001	0,002	0,002	0,002	0,001
2	-0,001	-0,001	-0,001	-0,002	-0,002	-0,001	-0,001	-0,001	-0,001	0,000
3	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	-0,001	0,000
4	0,000	0,000	0,000	-0,001	-0,001	0,001	0,000	0,000	0,000	0,000
d	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Sd	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,002	0,001	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

ISO 16958 I IDF 231
ISO 15885| IDF 184

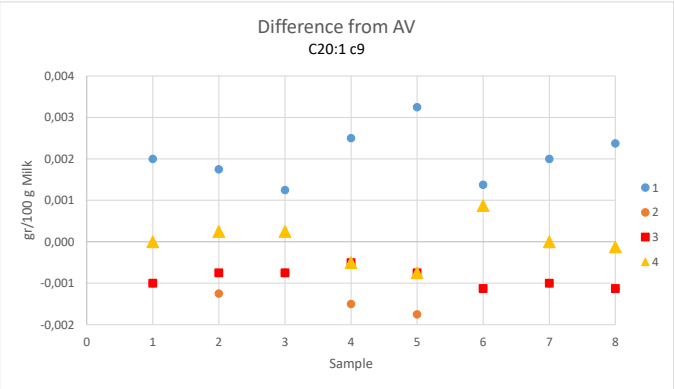


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	1,4	1,3	1,3	1,4	1,5	1,0	1,4	1,4
2	-0,7	-0,9	-0,8	-0,9	-0,8	-0,9	-0,7	-0,7
3	-0,7	-0,6	-0,8	-0,3	-0,3	-0,9	-0,7	-0,7
4	0,0	0,2	0,3	-0,3	-0,3	0,7	0,0	-0,1

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 PT standard deviation

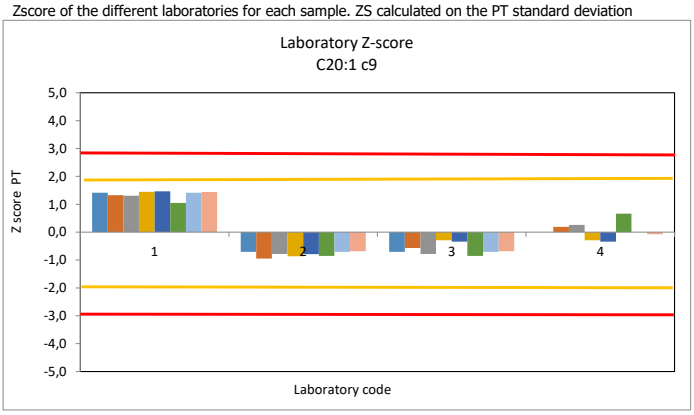
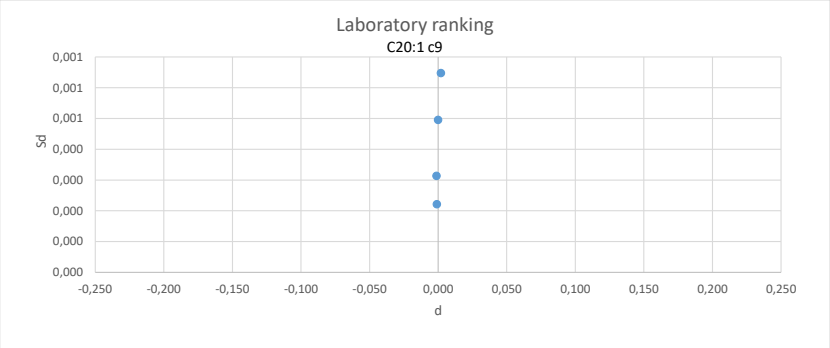


Figure 4 : Laboratory distribution (see table 1)



ICAR

Determination of Fatty Acids

Gas Chromatography

C22:0

Sending date of statistical treatment : 25.04.24

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

Proficiency test based on ISO 17043

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

Nb	%	N°	ig	d	Sd	D	Method
1	46	1	+	0,000	0,000	0,000	ISO 16958 I IDF 231
2	78	3	+	0,001	0,000	0,001	ISO 16958 I IDF 231
3	100	2	+	0,001	0,000	0,001	ISO 16958 I IDF 231

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 : To be determined

(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}	0,001
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,0010	0,0000	0,0000	0,0010	0,0000	0,0000	0,0010	0,0010	0,001	16
2	0,0010	0,0000	0,0000	0,0010	0,0030	0,0000	0,0010	0,0010	0,001	16
3	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,000	16
Sr	0,0005	0,0000	0,0000	0,0005	0,0011	0,0000	0,0005	0,0005		48
NE	6	6	6	6	6	6	6	6		
sL	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in pre-scrutinization

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs								
sr	0,001	0,000	0,000	0,001	0,001	0,000	0,001	0,001
SR	0,001	0,001	0,001	0,001	0,002	0,001	0,001	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,002	0,002	0,001	0,003	0,002	0,002	0,002	0,003
2	0,002	0,002	0,001	0,002	0,004	0,002	0,002	0,003
3	0,001	0,002	0,001	0,002	0,002	0,002	0,001	0,002
M	0,001	0,002	0,001	0,002	0,003	0,002	0,001	0,002
REF.	0,001	0,002	0,001	0,002	0,002	0,002	0,001	0,002
SD	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

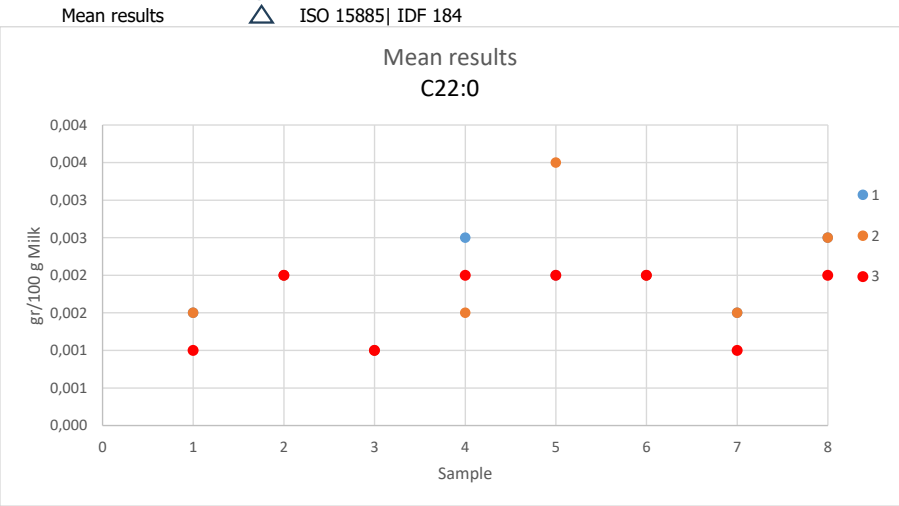


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,001	0,001	0,000	0,001	0,000	0,001	0,001	0,001	0,001	0,000
2	0,001	0,001	0,000	0,000	0,002	0,001	0,001	0,001	0,001	0,000
3	0,000	0,001	0,000	0,001	0,000	0,001	0,000	0,000	0,000	0,000
d	0,000	0,001	0,000	0,001	0,001	0,001	0,000	0,001	0,000	0,000
Sd	0,000	0,000	0,000	0,001	0,001	0,000	0,000	0,000	0,000	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

ISO 16958 I IDF 231
ISO 15885| IDF 184

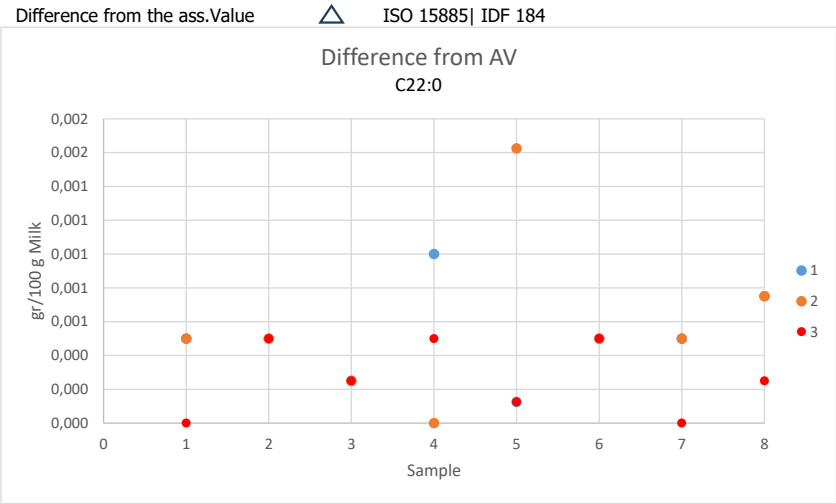


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	0,71	0,50	0,50	0,93	0,09	0,50	0,71	0,63
2	0,71	0,50	0,50	0,00	1,13	0,50	0,71	0,63
3	0,00	0,50	0,50	0,46	0,09	0,50	0,00	0,21

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 PT standard deviation

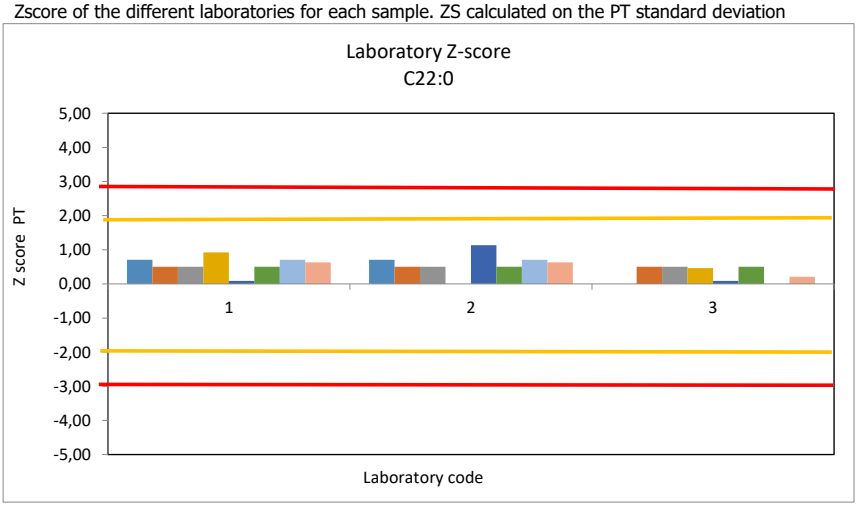
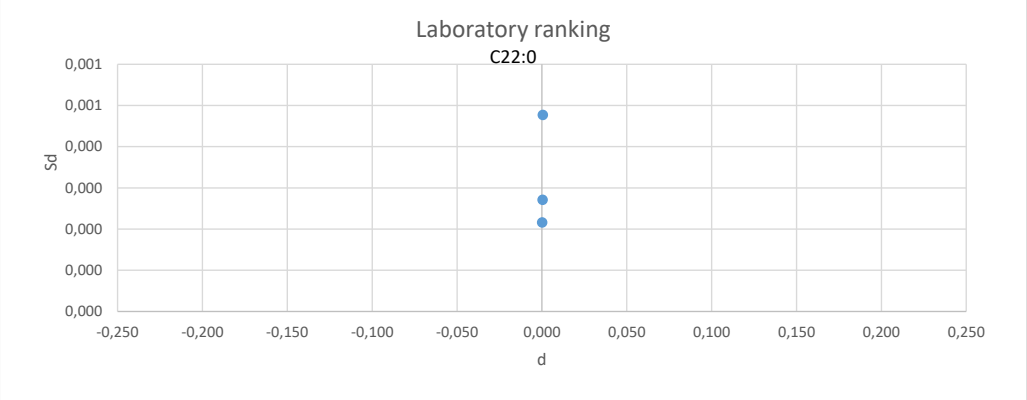


Figure 4 : Laboratory distribution (see table 1)



ICAR

Determination of Fatty Acids

Gas Chromatography

C24:0

Sending date of statistical treatment : 25.04.24

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

Proficiency test based on ISO 17043

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

-1

Nb	%	N°	ig	d	Sd	D	Method
1	55	2	+	0,0000	0,000	0,000	ISO 16958 I IDF 231
2	93	3	-	0,0004	0,000	0,000	ISO 16958 I IDF 231
3	100	1	+	0,0004	0,000	0,001	ISO 16958 I IDF 231

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 : To be determined

(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}	0,000
Reproducibility standard deviation of this ICAR proficiency test (after Cochran and Grubbs elimination at 5 %)	SR_{PT}	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8	Sr	NL
1	0,0010	0,0000	0,0010	0,0000	0,0000	0,0010	0,0000	0,0020	0,001	16
2	0,0000	0,0000	0,0000	0,0010	0,0000	0,0000	0,0010	0,0000	0,000	16
3	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,000	16
Sr	0,0004	0,0000	0,0004	0,0004	0,0000	0,0004	0,0004	0,0008		48
NE	6	6	6	6	6	6	6	6		
sL	0,000	0,001	0,000	0,000	0,001	0,001	0,000	0,000		

Sr outlier discarged
SL outlier discarged

Table IV : Outlier identification

Lab 3 discarged in pre-scrutinization

Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Outliers Cochran								
Outlier Grubbs								
sr	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001
SR	0,000	0,001	0,000	0,001	0,001	0,001	0,000	0,001

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

Sample Lab code	1	2	3	4	5	6	7	8
1	0,002	0,002	0,002	0,002	0,002	0,003	0,001	0,002
2	0,001	0,001	0,001	0,002	0,002	0,002	0,002	0,001
3	0,001	0,001	0,001	0,001	0,001	0,001	0,001	0,001
M	0,001	0,001	0,001	0,002	0,002	0,002	0,001	0,001
REF.	0,001	0,001	0,001	0,002	0,002	0,002	0,001	0,001
SD	0,000	0,001	0,000	0,001	0,001	0,001	0,000	0,001

M = mean per sample
SD = standard deviation per sample

REF. = reference values
*: discarded data using the test of Grubbs at 5 %

REF :

Figure 1 :
Mean results

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

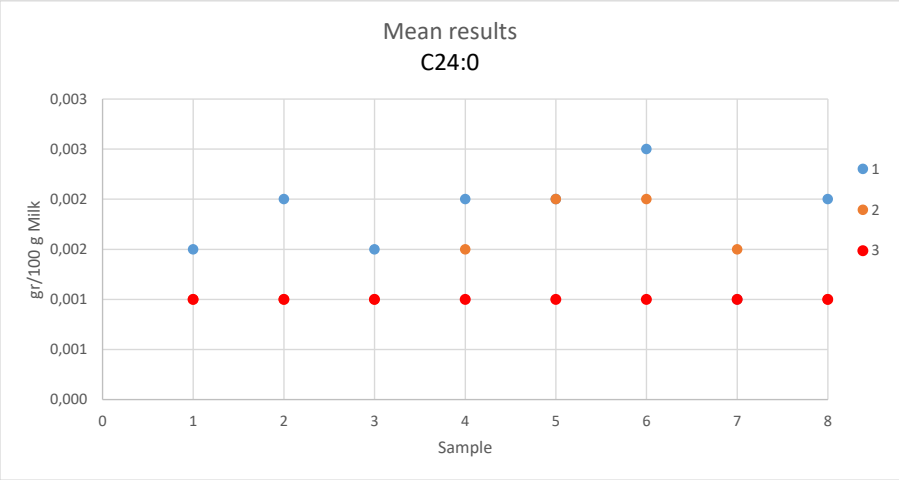


Table V : **ACCURACY - differences (laboratory - reference) in g / 100 g**

Sample Lab code	1	2	3	4	5	6	7	8	d	Sd_{lab}
1	0,000	0,001	0,000	0,001	0,000	0,001	0,000	0,001	0,000	0,000
2	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
3	0,000	0,000	0,000	-0,001	-0,001	-0,001	0,000	0,000	0,000	0,000
d	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Sd	0,000	0,001	0,000	0,001	0,001	0,001	0,000	0,001	0,000	

d = mean of differences Sd = standard deviation of differences

Upper limits :

Figure 2 :
Difference from the ass.Value

○ ISO 16958 I IDF 231
△ ISO 15885| IDF 184

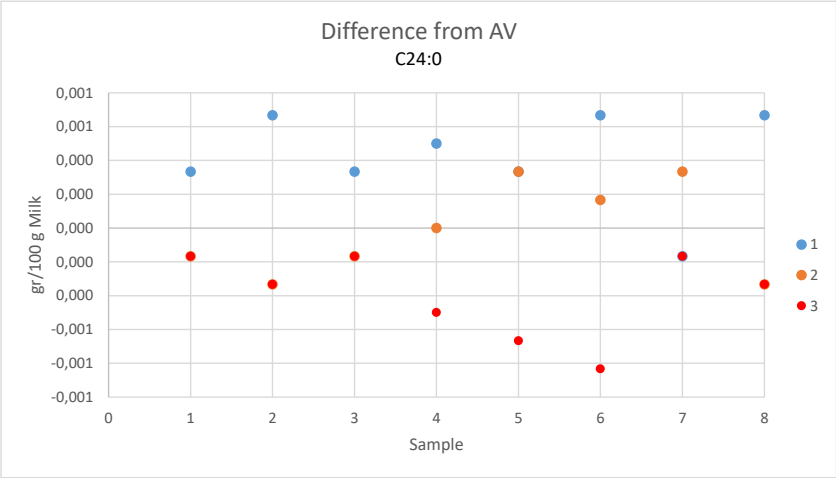


Table VI : **Zscore of the different laboratories for each sample.**
ZS calculated on the PT standard deviation

Sample Lab code	1	2	3	4	5	6	7	8
1	1,2	1,2	1,2	1,0	0,6	0,9	-0,6	1,2
2	-0,6	-0,6	-0,6	0,0	0,6	0,2	1,2	-0,6
3	-0,6	-0,6	-0,6	-1,0	-1,2	-1,1	-0,6	-0,6

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 PT standard deviation

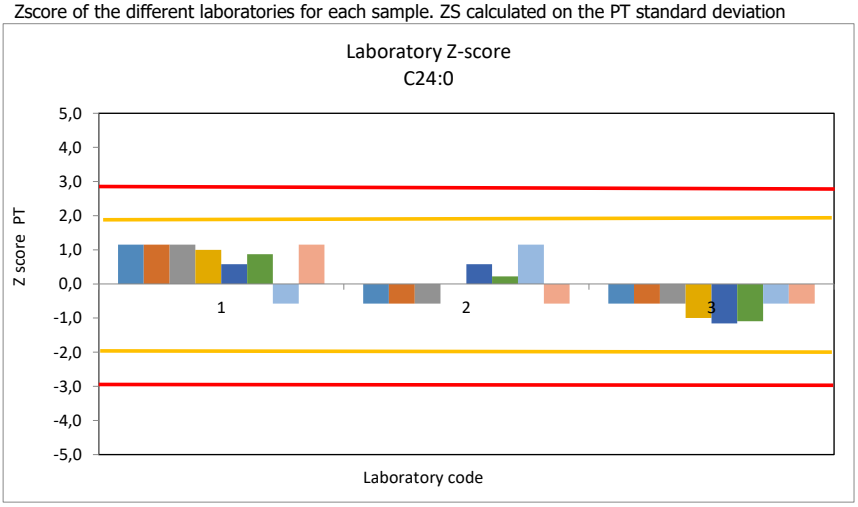


Figure 4 : Laboratory distribution (see table 1)