ICAR Reference Laboratory Network – Objectives & stage of progress in 2012

O. Leray

France Génétique Elevage, 149 rue de Bercy, F-75595 Paris cedex 12, France

Abstract

With the important development of dairy genetic trade worldwide and international genetic evaluation , assuring quality and comparability of measurements and recordings between countries has become of an utmost importance as the bases of fair and loyal commercial exchanges and the support for suitable confidence in genetic values estimation.
Since 1994 ICAR has been developing an analytical quality assurance system (AQA) in order to harmonised analytical data quality within ICAR. An international network of so-called reference laboratory network was created in 1996 as a platform to relay good laboratory practices, guidelines and standard and support routine milk testing laboratories with services.
ICAR has implemented a regular annual programme in order to provide network members with traceability and anchorage to an international reference. Complying with the ICAR AQA system has become a requirements to obtain the ICAR Certificate of Quality for milk analysis.
Progress of the ICAR Reference Laboratory Network development is regularly measured at the occasion of ICAR biennial session and orientation discussed for further beneficial developments. Extending the network membership to new member organisations is a major objective together with enhancing participation in international proficiency study programme managed by ICAR.

Keywords: milk analysis, reference laboratories, network, proficiency testing, analytical harmonisation

Introduction

For the two last decades, with the worldwide economic globalization, the international dairy genetic trade have increased dramatically while the genetic evaluation has evolved towards the international scale with processing data obtained in numerous different countries (re Interbul). In such a context comparable measurements and recordings are the bases of equivalent estimation of animal genetic values between countries and fair and loyal commercial exchanges. In order to support milk analysis and assure a harmonised quality of analytical data within ICAR, an analytical quality assurance system (AQA) was developed by ICAR from 1996 and an international network of so-called reference laboratory network was created as a platform to relay good laboratory practices, guidelines and standard and support routine milk testing laboratories with services. The AQA system managed and developed by the ICAR Sub-Committee on Milk Analysis (MASC) has taken place in a more general quality certification implemented by ICAR from 2006 in genetic recording activities. In order to obtain the ICAR Quality Certificate the applicant member organisations should meet the recommendations stated in ICAR guidelines with respect to milk analysis and analytical quality control, bring proof of regular participation in proficiency testing schemes and demonstrate precision traceability through an international anchorage.

To allow such an anchorage since 1996 ICAR has organised annual proficiency study programme on milk analysis methods used in milk recording (i.e. fat, protein, lactose, urea, somatic cell counting) twice a year using Actilait-Cecalait services (France). The quality control objectives and possible use of results for traceability and international anchorage were describes in former ICAR session in 2008 and 2010.

This is the occasion at ICAR biennial session to present the development progress of the ICAR Reference Laboratory Network , as already made in Niagara falls 2008 and Riga 2010, and to discuss on orientations and further beneficial development and orientation.

Evolution of network membership

Since it was created in 1996, ICAR reference laboratory network has progressively grown up to reach stabilisation in 2003. Then the membership was maintained stable - but a little decrease in 2005 and 2006 before recovery at 38 members - until 2010 where the network welcomed three new members:

- the Reference Laboratory for Milk and Dairy Science (Zagreb, Croatia),
- the Japan Dairy Technical Association (Tokyo, Japan)
- the Deutscher Verband für Leistungs und Qualitätsprüfungen e.V. (Bonn, Germany).

At the end of 2010, the network is composed of 41 laboratory members from 34 countries according to Table 1.

Table 1. Country composition of ICAR reference Laboratory Network.

Country	**n**	**Country**	**n**	**Country**	**n**	**Country**	**n**
Argentina	(1)	Austria	(1)	Belgium	(2)	Canada	(1)
Croatia	(1)	Cyprus	(1)	Czech Republic	(1)	Denmark	(1)
Estonia	(1)	Finland	(1)	France	(1)	Germany	(2)
Hungary	(1)	Ireland	(1)	Israel	(1)	Italy	(1)
Japan	(1)	Korea	(1)	Latvia	(2)	Lithuania	(1)
The Netherlands	(1)	New Zealand	(1)	Norway	(1)	Poland	(1)
Slovak Repub.	(1)	Slovenia	(1)	South Africa	(3)	Spain	(1)
Sweden	(1)	Switzerland	(1)	Tunisia	(2)	United Kingdom	(1)
U.S.A.	(2)	Zimbabwe	(1)				

(n) : number of member(s)

By referring to 52 countries of the whole of ICAR member organisations, the proportion of represented countries is 65 p. cent and although not the ICAR member organisations do not deal all with milk production there is still place for welcoming new member laboratories in the future according to the evolution of milk analysis organisation in those not yet represented countries. The Sub-Committee on Milk Analysis identified three areas where a larger representation is needed : Latin America, Asia and CIS, while in the others (Europe, Africa, Oceania) complementation would be needed (see figure 2).

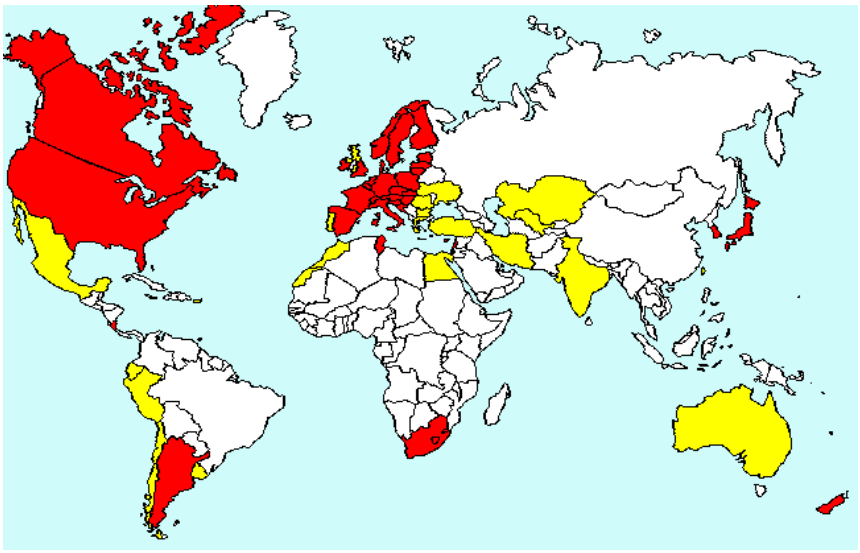

Figure 1. Distribution of member countries (Red = Network member countries; Yellow = ICAR member countries)

Eligibility criteria and evolution of competence within the network

A laboratory acquires the status of member of ICAR Reference Laboratory Network through its nomination by an ICAR member organisation of its country. The status of so-called reference laboratory implies as prerequisites well-defined competences and roles for the sake of milk analysis and milk testing laboratories of its country. They are the followings:

Roles and missions	**Abbreviation**
1- National ring test organizer	NRTO
2- Reference Material supplier	RMS
3- Master laboratory for centralized calibration	MLCC
4- Teaching / training in laboratory techniques	TLT
5- Information on analytical methods	IAM
6- Evaluation of analytical methods/instruments	EAMI
7- Research on analytical methods	RAM
8- National regulatory control of DHI analyses	NRCA

Exception to the rule may be made for countries that have but few routine laboratories, with no way to join a neighbour country system therefore need to link directly to the international level.

From the network launching the number of eligibility criteria met by laboratories has accompanied the membership increase (Figures 2 and 3) but for different levels. The most represented roles are ring test organizers, reference materials suppliers, information in analytical matter and training in laboratory techniques whereas evaluation of analytical methods / instruments, research in analytical methods and national regulatory control are represented in lower proportions in the network.

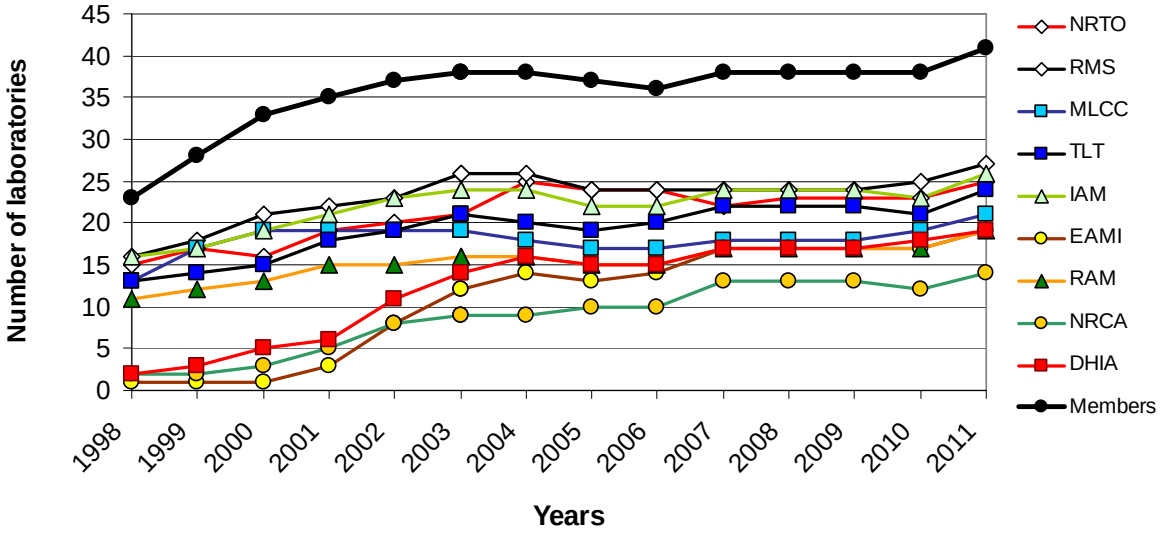

Figure 2. Evolution of membership and missions - Numbers

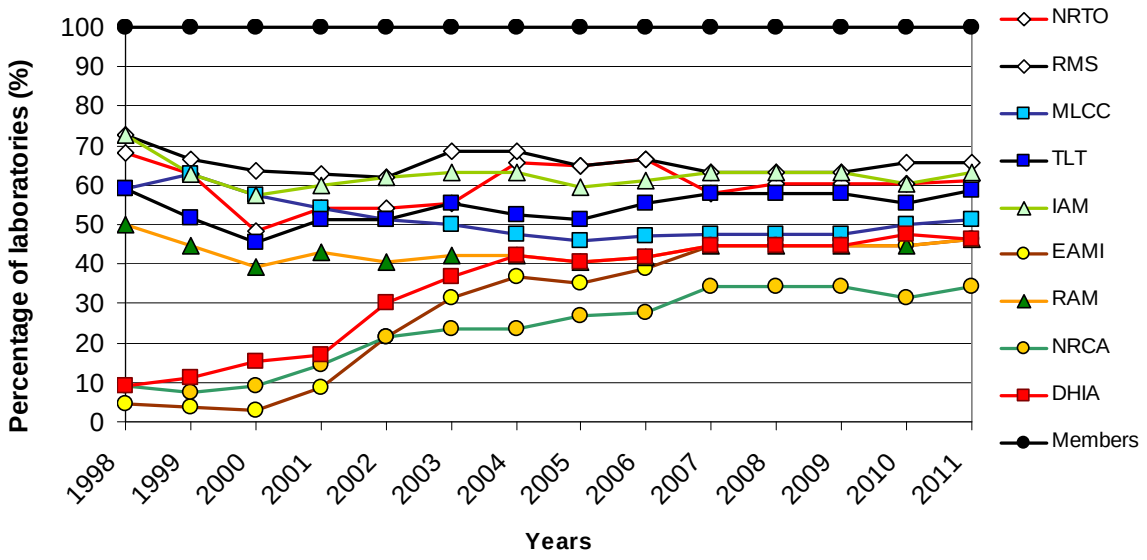

Figure 3. Evolution of membership and missions – Percentages

Table 2. Numbers and proportions of eligibility criteria of network members in 2011.

Criteria		with N		with at least N	
N	**%**	**Lab number**	**Lab %**	**Lab number**	**Lab %**
8	100%	7	17%	7	17%
7	88%	5	12%	12	29%
6	75%	4	10%	16	39%
5	63%	3	7%	19	46%
4	50%	7	17%	26	63%
3	38%	3	7%	29	71%
2	25%	2	5%	31	76%
1	13%	4	10%	35	85%
0	0%	6	15%	41	100%

The degree of qualification of the network is marked by the proportion of laboratories showing the largest number of eligibility criteria. The highest the proportion the greater the efficiency in playing the expected role for ICAR. By referring to Table 2, in 2011 more than 17 p. cent of labs show all the criteria requested, 40 p. cent at least 6 (75% of criteria) and 63 p. cent at least 4 (50% of criteria). 6 of laboratories (15%) are isolated milk testing laboratories directly anchored to the ICAR ref lab network.

Evolution of participation in annual proficiency study programmes

Participation in international ICAR PT trial has slightly reduced from 2009 in fat and protein and the level appears stabilized around 16 participants per trial. For lactose participation has been more fluctuant as moving back and forth between about 10 and 20 participants per trial. From 2010 this is about 15 labs participating. In somatic cell counting a similar trend can be noted - although from less time as trials started only in 1999 - with a last position at 15 participants, whereas participation in urea is relatively regular around 14.

In general the numbers of participant in trials on milk component that are used in genetic evaluation schemes (i.e. fat, protein, SCC) appears regularly about or slightly less than the half of the network membership number. This is the indication of that the implementation of the ICAR AQA system is not yet completed and still on-going within ICAR. The underway process should be continuously explained, promoted and come to concrete outcomes through practical analytical services to laboratories and member organisations.

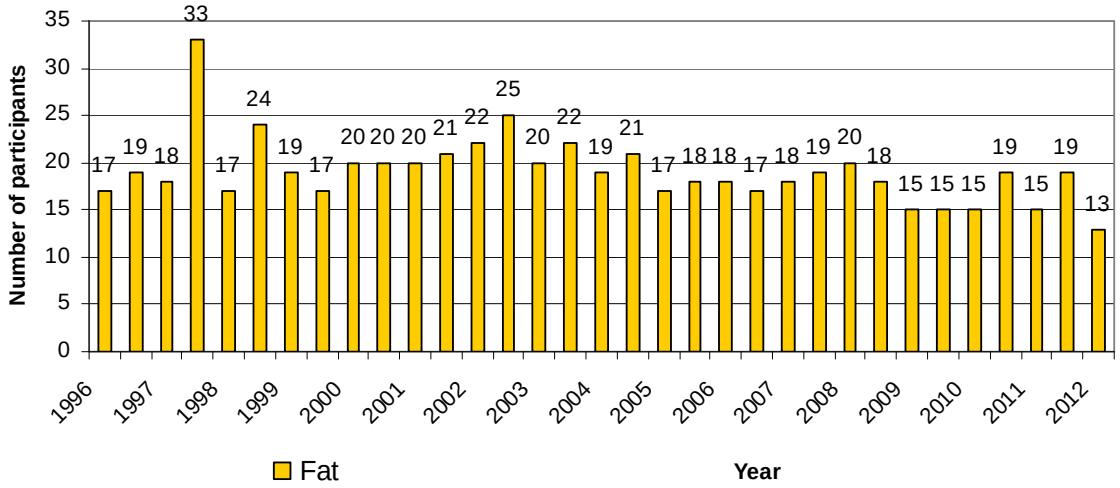

Figure 4. Evolution of participation in ICAR PTs for Fat.

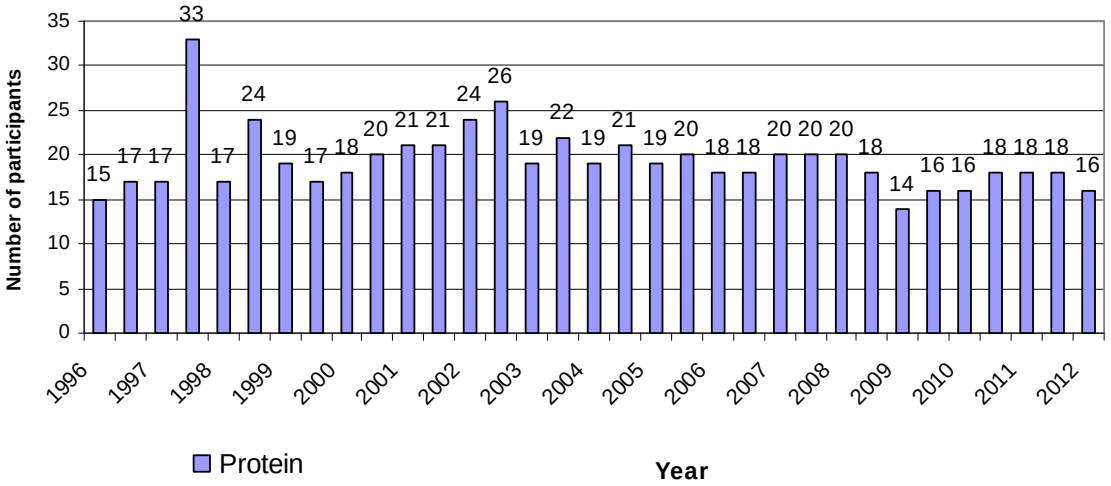

Figure 5. Evolution of participation in ICAR PTs for Protein.

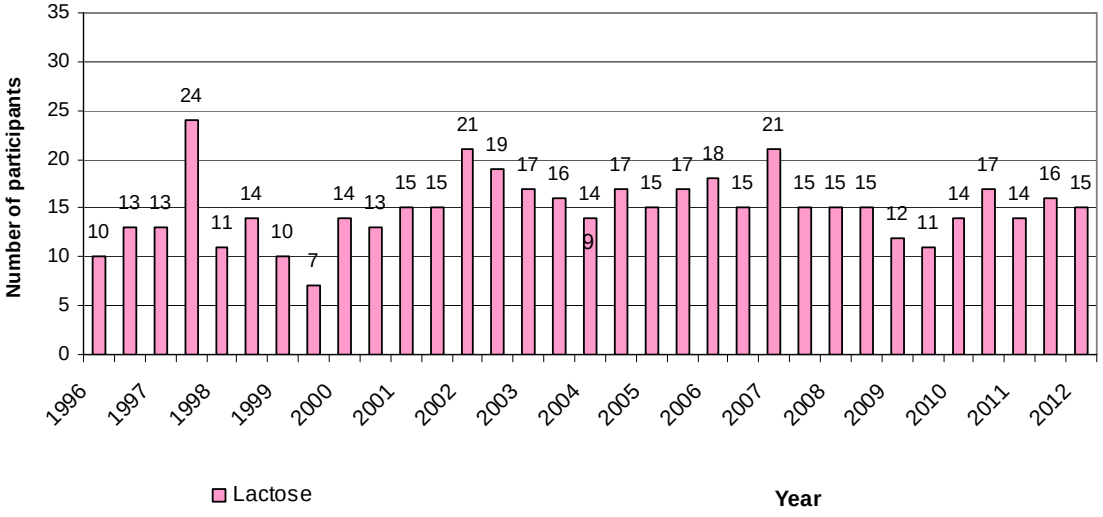

Figure 6. Evolution of participation in ICAR PTs for lactose.

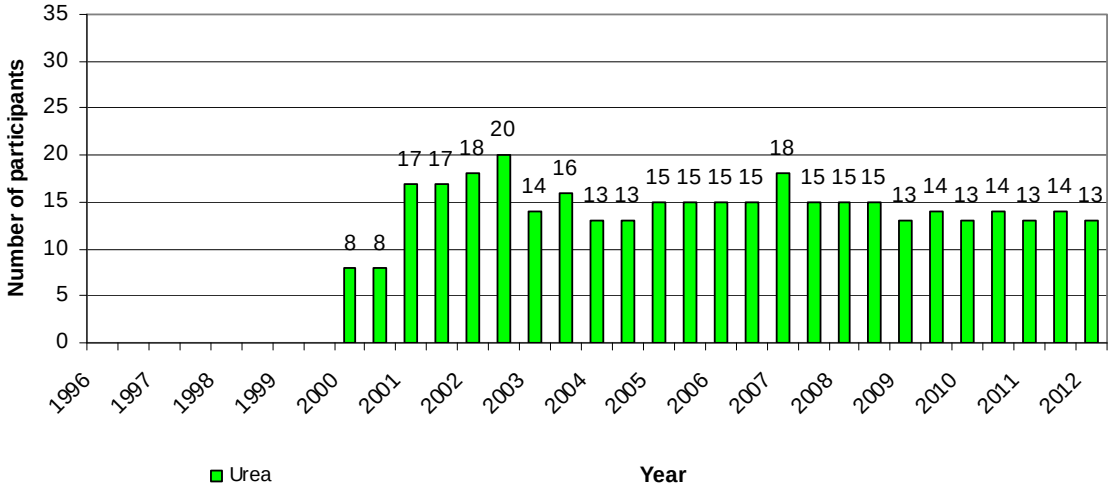

Figure 7. Evolution of participation in ICAR PTs for urea.

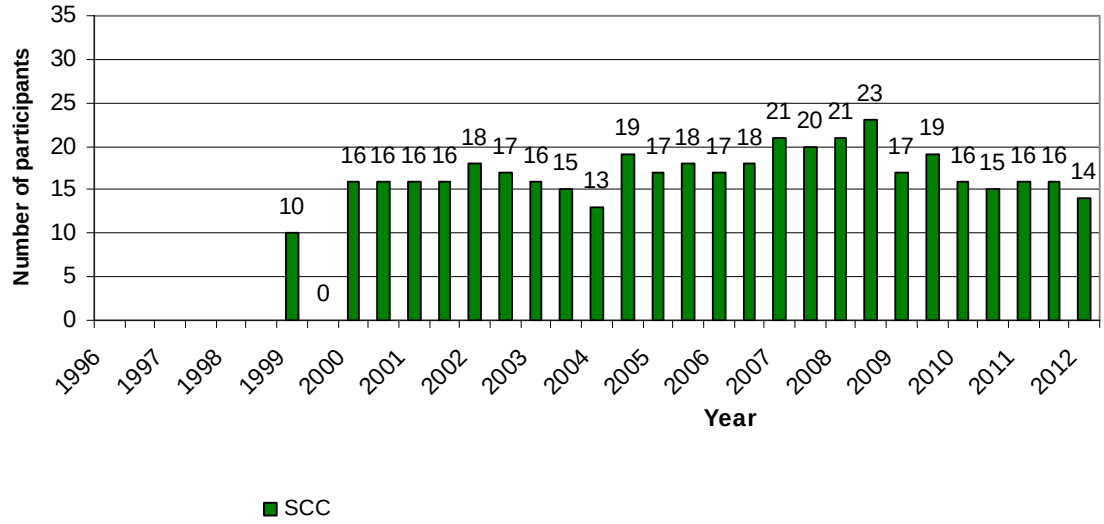

Figure 8. Evolution of participation in ICAR PTs for somatic cell counting.

Next evolution in the network activities and conclusion

International anchorage of routine labs through the reference laboratory participation in ICAR trials can result in the calculation of the overall uncertainty of analytical results produced individually by labs. This is one important issue for which MASC can develop guidelines for the sake of ICAR laboratories.

As well, beside the evaluation of labs performance in local or national PT schemes the member organisation can evaluate their labs virtually against the international reference produced in ICAR trials through the PT scheme anchorage system develop within MASC. Provided minimum cautions, such a system enables to compare performance with labs of other schemes without any participation in common. This system is explained more in depth in the next presentation and as well guidelines should be developed on that issue.

For the next future prospect is presently made to evaluate the possibility for international PT for routine methods and investigate on the overall accuracy and precision provided by applying centralised calibration using reference materials within ICAR. As well need is for guidelines to define the suitable characteristics of reference material used for calibration and the adequate process to validate and assign international reference values to RMs and with this respect reference can be made to presentations made in Niagara Falls 2008.

From 2009 ICAR Reference Laboratory Network and surrounding activities run by MASC are elected as the example and the starting base of an innovative IDF-ICAR programme on reference System for somatic cell counting presented in ICAR Session 2010 in Riga.

All these developments foreseen and already partially undertaken will require financial support and time and expertise of key persons. Therefore the organisation and financing of the development and activities must be thought through.

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