ICAR Reference Laboratory Network - Objectives and stage of progress in 2010

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Abstract

A policy for quality assurance on milk recording analysis has been developed from sixteen years by ICAR according to the orientation proposed in Ottawa in 1994. So called analytical quality assurance system has been based on the adoption and use by laboratories of same technical guidelines produced by ICAR and a structuring model based on national networks for laboratory monitoring at country levels and an international network of reference laboratories. The latter network is the corner stone of the system as it allows to anchor countries to common reference values defined internationally through proficiency testing programmes and offer a adequate framework to characterize reference materials well made to distribute analytical trueness. The efficiency of the system, as depending on general recognition, requires the largest participation of member organisation of ICAR.

Keywords: Milk analysis, reference laboratories, network, proficiency testing, analytical harmonisation.

1.0 History

A policy for analytical quality assurance (AQA) was introduced at the 29th ICAR Session in Ottawa in 1994 so as, with covering every aspect of milk recording analysis, provide confidence to stakeholders, ensure equivalence of genetic evaluation and enable analytical system recognition between countries.

That policy was implemented and handled by the Working Group on Milk Testing Laboratories of ICAR until 2006. then was continued by the enlarged permanent working party, the Sub-Committee on Milk Analysis.

From 1994 the working group has defined essential guidelines in order to assure the minimum needed precision in milk recording analysis and in 1996 created a network of expert laboratories expected to become the basis of an international analytical quality assurance system for milk recording, the ICAR Reference Laboratory Network.

The international reference laboratory network has become an essential piece of the AQA system aiming at analytical harmonisation as its members are entrusted to be intermediaries between national levels and the international level where optimum methods and practices are defined (IDF/ISO guides and standards, ICAR guidelines) to transmit adequate information to milk testing laboratories.

2.0 Structure and architecture

The network is built on a hierarchical centralized model for the sake of vertical forth and back communication for harmonisation and provision of standard technical information and offers of services from the coordinating committee, the ICAR MA SC. Horizontal communication and collaboration between laboratories is encouraged and made possible thanks to a member list regularly updated. This is an organisation in two (possibly three) levels of network implementation as national (or regional) and international.

A third layer can exist for instance in federal countries where as well regions can organise labs in network or be a prospective challenge for the future to monitore on-farm analysis from regional laboratories.

2.1 National level

National networks gather the milk recording laboratories of the country (or the organisation) and establish a national (or local) coordination based on international standards and guidelines, Good Laboratory Practices, as mentioned in the ICAR guidelines. It is expected the coordination is made by a

laboratory with high competence in every aspects of milk analysis, so-called "reference laboratory", so as to be able to run the missions needed to assure analytical quality. This is to monitor routine laboratories, teach and train lab technicians, evalutate and implement new techniques, methods or instruments, advise laboratories as well as milk recording organisations by which it is commissioned.

The reference laboratory is also requested to establish concrete tools to assess laboratory performances so as to assure confidence nationally to stakeholders. This is mostly attained by the organisation of national proficiency testing schemes. Beside the provision of technical tools in the form of reference materials to check reference methods or calibrate routine methods is highly recommended by ICAR for the ease in the laboratory work and analytical result security every day.

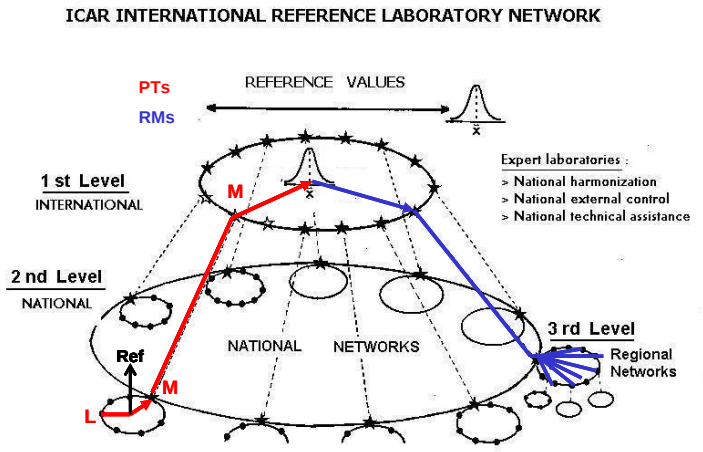

Figure 1. Structure of ICAR networking model with bottom-to-top/top-to-bottom circulation of information.

2.2 International level

The reference laboratories are invited in an international coordination by ICAR and can become member of the ICAR Reference Laboratory Network. This is made through the nomination of the national ICAR member organisation and under the condition the candidate laboratory and the national organisation adopt the model of functioning, as far as the local situation permits so, and comply to the ICAR guidelines. Such reference laboratories may have been existing for other purposes prior to the ICAR Reference Laboratory Network implementation but however in a number of case the reference laboratory must have been created and competence acquired so as to cover the largest panel as promoted by ICAR.

3.0 Roles

3.1 Analytical traceability and anchorage

The international network constitutes a structure through which, thanks to interlaboratory studies, it becomes possible to provide an international anchorage to routine laboratories and estimating overall accuracy of milk recording measurement and absolute measurement uncertainty in individual laboratories.

The national reference laboratories operate as bridges to transmit the precision traceability from the international level to national levels thanks to interlaboratory studies carried out regularly at both national and international levels. Interlaboratory studies allow to measure laboratory bias to the reference laboratory which relays to the international absolute reference through its own bias to the international reference values. Elements of trials reports allow laboratories to calculate the uncertainty related to its practice with the method.

Beside every member of the reference laboratory network can be invited to participate in international collaborative studies to characterize certified reference materials (golden standard) and establish reference values for every reference laboratory of the network therefore can contribute to provide tools to routine laboratories to measure the trueness of results and perform adjustment according to their needs.

3.2 Interlaboratory proficiency studies

Since 1996 an annual interlaboratory proficiency scheme has been regularly run twice a year for methods used as reference to calibrate routine methods for fat, protein and lactose in cow milk. It was complemented from 1999 with methods for methods for urea and somatic cell counting. From 2009 participant number has significantly decreased and in the first round of 2010 it is 15 for fat, 16 for protein, 14 for lactose, 13 for urea and 16 for SCC.

However significant improvement of analytical performances was noted throughout years and today the overall precision observed within the network appears fit to standard precision values stated in respective international method standards.

4.0 Membership

Any laboratory commissioned to monitor routine testing laboratories should be invited by their national organisation to join the network. Competence and expertise requested as eligibility criteria to belong to the network are one or more of the followings :

1- National ring test organizer
2- Reference Material supplier
3- Master laboratory for centralized calibration
4- Teaching and training in laboratory techniques
5- Information on analytical methods
6- Evaluation of analytical methods/instruments
7- Research on analytical methods
8- National regulatory control of DHI analyses

and the ideal situation is where the reference laboratory covers every competence item and therefore can ensure consistency and continuity in missions to routine laboratories. In some situation competence and expertise may be in several laboratories which may allows more laboratories per country.

For specific situation where only few laboratories with no national co-ordination, individual routine laboratories may also join the network so as to benefit to a direct anchorage to the international level whereas, in well structured local situations, so-called reference laboratories can establish the junction between routine labs and the international level.

5.0 Stage of progress

from 1996 to 2003 and moved to stabilisation attained in 2007 (Figure 2). In mid 2010 there are 38 of 32 countries involved in cow milk analysis, of which as well 17 work for goat milk and 14 for sheep milk.

Table 1. Worldwide representative-ness and of member number per country in 2010.

Argentina	(1) Austria	(1) Belgium	(2) Canada	(1)
Cyprus	(1) Czech Republic	(1) Denmark	(1) Estonia	(1)
Finland	(1) France	(1) Germany	(1) Hungary	(1)
Ireland (1)	Israel (1)	Italy (1)	Korea (1)	
Latvia	(2) Lithuania	(1) 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)	UK (1)	U.S.A.	(2) Zimbabwe	(1)

(n) : number of member(s).

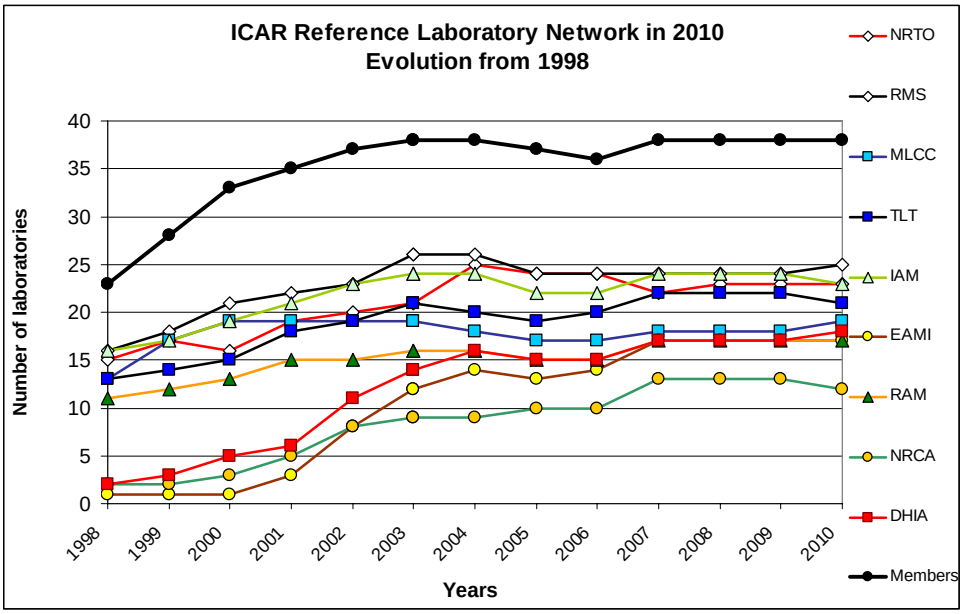

Figure 2. Evolution of membership and expertise in ICAR Reference Laboratory Network from 1998 to 2010.

In 2010, with regard to the number of eligibility criteria declared by laboratories 75% of competence items are realized by 39% of members, and 50% by 63% (Table 2).

Table 2. Numbers and proportions of eligibility criteria of network members in 2010.

Criteria number N	Proportion (%)	Lab number with N	Lab % with N	Lab number with at least N	Lab % with at least N
8	100%	5	13%	5	13%
7	88%	5	13%	10	26%
6	75%	5	13%	15	39%
5	63%	3	8%	18	47%
4	50%	6	16%	24	63%
3	38%	3	8%	27	71%
2	25%	2	5%	29	76%
1	13%	4	11%	33	87%
0	0%	5	13%	38	100%

6.0 Conclusion

A stable membership of the ICAR Reference Laboratory Network is observed from 2003 but in parallel it is noted the progressive increase of the number of individual members competence. Such increase improve the potential efficiency of the AQA system developed by ICAR from 1996 through more AQA services and expertise proposed to routine testing laboratories in ICAR countries. Nevertheless participation in international proficiency testing schemes organized by ICAR is only the fact of about a half of the network members with a decrease from 2009.

Promotion of the PT programme and technical improvement in the organizing should help to reverse that trend as all the members should be convinced that the most numerous participation in ICAR PTs, the best the quality of performance estimates then the highest the confidence in testing results used to harmonise laboratories and calibration in ICAR member organisations.

7.0References

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