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Working Group Report - 2019

Working Group on Quality Measurement of Agricultural Products (QMAP)

As of 1 November 2019

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SECTION 1 – Details of the membership of the Working Group

1.1. Brief history

In 1996, the 3rd Forum Meeting proposed establishment of a new WG to study rice moisture meters with a coordinator of Australia. In 1997, it was re-established as a WG on Rice Moisture Meters. In 2001, Mr. Issei Akamastu of NMIJ (National Metrology Institute of Japan in AIST) took the chair, then Mr. Hiroshi Kitano (2005-2007) and Dr. Tsuyoshi Matsumoto (after 2007) took over the chair. In 2007, the name of WG was changed as present to cover a

wide range of grains. A private company in Japan has supported the chair since its establishment.

This WG has conducted eleven training courses on traceability in rice moisture measurement and three workshops on agricultural measurement since 2001. More than 330 participants attended these events. In the recent seven years, five large training courses were conducted in Indonesia (May 2012), Thailand (November 2013), Cambodia (November 2015), Malaysia (July 2017) and Thailand (December 2018).

The training courses/workshops until 2009 were partly supported by the fund of APEC (Asia-Pacific Economic Cooperation). The two training courses in 2012-2013 were supported by the host economies. The courses after 2015 were supported by MEDEA (Metrology: Enabling Developing Economies within Asia) project.

* *'Grains'* is used to indicate any target products in general. *'Rice'* is used to indicate a narrower target because this WG has sufficient knowledge/experiences on rice. The WG considers however that WG should target any kinds of grain, which are produced/traded in the APLMF region.

1.2 Membership

Membership of this WG consist of the following:

(1) **Mr Surachai SUNGZIKAW (Chair)**

CBWM (Central Bureau of Weights and Measures, Department of Internal Trade),
Thailand

(2) **Ms Haslina bte Abdul KADIR (Deputy Chair)**

NMIM (National Metrology Institute of Malaysia) SIRIM in Sepang, Malaysia (Deputy-Chair)

(3) **Dr Tsuyoshi MATSUMOTO**

NIMJ (National Metrology Institute of Japan), AIST in Tsukuba, Japan (former Chair)

(4) **Mr SOPHEARATH Ing**

NMC (National Metrology Center of Cambodia) in Phnom Penh, Cambodia

(5) **Ms Eri WIJAYANTI**

DoM (Direktorat Metrologi) in Bandung, Indonesia

(6) **Mr THUC HA Thanh**

STAMEQ (Directorate for Standards, Metrology and Quality) in Hanoi Vietnam

SECTION 2 – Key activities of 2018/19

2.1. Training courses on grain / rice moisture measurement

The latest large training course for rice moisture measurement was hosted by CBWM (Central Bureau of Weights and Measures), DIT (Department of Internal Trade) in Pattaya, Thailand

from 3 to 7 December, 2018. Total of 24 trainees plus 6 observers attended this training course from the following twelve economies; Bhutan, Cambodia, Indonesia, Kiribati, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam. In addition, Thailand, Malaysia, Cambodia, Indonesia and Japan (Kett Electric Laboratory Co. Ltd.) provided eight trainers/co-trainers.

A round table discussion was also held to determine the future directions for the work of QMAP. Data was collected about what products each economy monitors as a legal measurement. Moisture measurement of corn, coffee and other quality measurements including brix refractometer for sugarcane were proposed in the discussion.

2.2. APLMF guide document on rice moisture measurement

APLMF Guide Document on Rice Moisture Measurement was published on the APLMF Website in May 2017. This document aims to provide practical procedures to establish a regional traceability system and calibrate/test grain moisture meters, which are not covered by OIML recommendations or ISO documents. Materials used in the previous training courses on rice moisture measurement are used as the basis of this guide document. This guide is under review by the QMAP WG members.

2.3. Test procedure of rice moisture meters

In September 2019, the first draft of a new test procedure of rice moisture meters was proposed by this WG. The test procedure aims to provide a uniform protocol for testing/verifying rice moisture meters by using a “meter-to-meter” comparison method. This procedure is used to maintain the traceability chain from the primary standard meter to the working/in-service meters according to the APLMF Guide Document. It relies on the reference method (drying method) for calibrating the primary standard meter. It seems that it will be the first procedure for meter-to-meter comparisons in the international/regional organizations.

The first draft was provided based on the method used in Thailand and it needs to be revised to be a regional procedure acceptable for the APLMF member economies. Therefore, this draft version requires recommendations from the WG members before it is released as an official procedure.

2.4. Contribution to the technical committees of OIML

The WG chair participated in OIML TC 17/SC 1 (humidity), and plans to participate in TC 17/SC 2 (saccharimetry) and TC 17/SC 8 (instruments for quality analysis of agricultural products). The Chair will actively be involved in these committees to develop metrological and technical requirements that support the APLMF Guide Document and the test procedure for verification of rice moisture meters.

2.5. Cooperation with BIPM and APMP on moisture measurement

The chairperson realized that grain moisture is one of the common topics of concern for both scientific metrology and legal metrology. The former WG chair exchanged information regarding the grain moisture measurement with the experts in metrology in NMIJ and APMP

(Asia-Pacific Metrology Programme). The present WG chair, as a representative of the national legal metrology authority, cooperates with National Institute of Metrology, Thailand (NIMT), and participated in a local working group to improve quality of milled rice for the consumers. This activity supports the National Quality Infrastructure (NQI) which is also concerned with the measurement of moisture content of rice. As a remarkable outcome, several representatives from NIMT participated in the latest training course on rice moisture measurement in Thailand in 2018 as observers.

NMIM has participated in pilot comparisons in the field of measuring of the mass fraction of moisture in the grain organized by Ural Scientific Research Institute for Metrology, ROSSTANDART, Ekaterinburg (UNIIM), Russia under TC 1.8 COOMET.

SECTION 3 – Future focus - Recommendations

Future viability of the working group

- If you believe the WG should continue – what are the key changes that need to be made to the Terms of Reference to support its continuance?

- If you believe there is still work to be done on this topic, but that the work should be continued as a project – detail the project brief, timeline and skills required for an effective project team .

- If you believe the working group has run its course, who is the individual who should be named as the 'expert' on this topic

- Proposed programme for further work (for next year and out years)

3.1. Transfer of training programs to a regional level (key change 1)

The main concept of APLMF training programs has been “train the trainers” course’ for a long time. It means that the trainees, who participated in training courses, should become trainers in their home economy; and then, an international training activity should gradually be transferred to a regional program. Considering the well-established contents of this training program developed over a long period of time, it is encouraged to transfer training activities to a regional level.

WG encourages competent trainees to plan and conduct regional training courses in each economy as the trainers, particularly in the regional level of South East Asia represented by ASEAN. The WG already contacted the chair of WG3 (Working Group on Legal Metrology) under ASEAN ACCSQ (Consultative Committee on Standard and Quality) and submitted a proposal to include the activities of WG on QMAP into WG3.

According to the main concept “train the trainers” of APLMF training programs, the Training Course on Verification of Rice Moisture Meters was conducted in December 2018 (see 2.1). The co-trainers as well as the trainees gained knowledge for support and transfer training activities to a regional or national level for further developments of their economies.

3.2. Continue of training courses (and / proposed program)

Many participants in the training courses requested to continue a training program in this field. Many economies have not set up a reliable traceability system on grain moisture

measurement and still need practical knowledge on reference method and calibration/usage of moisture meters. It is strongly recommended therefore to continue the training program in this field. The WG should also keep calling for host economies of training course in the future.

An advanced course at a higher level for the trainers in the future is also requested from several economies. Coverage of other kind of grains such as wheat, corn, beans, coffee, etc., evaluation of measurement uncertainty and implementation of inter - comparisons are requested for a long time but they have not been fully realized. To cover such work items, WG plans another kind of training courses aiming at a specific target of product other than rice. The WG already started seeking host economies for the future training courses in 2020 or later.

3.2.1 Proposed Training Program

During the rice moisture training in Pattaya, a round table discussion was also held to determine the future directions for the work of QMAP. Data was collected about what products each economy monitors as a legal measurement. The following table describes the main products and their measurement parameters within the region:

Economy	Product	Parameter
Thailand	Sugar cane	Sucrose content
	Cassava	Starch content
	Rubber	Density
	Corn	Moisture
	Palm oil	Viscosity
Cambodia	Black Pepper	Moisture
	Rubber	
	Corn	Moisture
	Cassava	Starch content
	Sugar cane	Sucrose content
	Palm oil	Viscosity
Malaysia	Coffee beans	Moisture
	Rubber	
	Honey	Moisture

	Black pepper	Moisture
	tea	Moisture
	Sugar cane	Sucrose content
	Palm oil	Viscosity
Sri Lanka	Rubber	
	Corn	Moisture
Indonesia	Wood	Moisture
	Corn	Moisture
	Coffee bean	Moisture
	Clove	Moisture
	Sugar cane	Sucrose content
	Soy bean	Moisture
	Rubber	
Laos	Corn	Moisture
	Coffee beans	Moisture
	Sugar cane	Sucrose content
	Rubber	
Vietnam	Corn	Moisture
	Black pepper	Moisture
	Coffee beans	Moisture
	Rubber	
	Palm oil	Viscosity
	Sugar cane	Sucrose content
Myanmar	Sesame seed	Moisture
	Peas	Moisture
	Coffee beans	Moisture
	Corn	Moisture

Philippines	Sugar cane	Sucrose content
	Coffee beans	Moisture

The working group will analyse the products in the table and will target a new product for the next series of workshops. This will be based on the availability of an expert to provide input, and a host who might have sufficient facilities to allow for training to occur. It's most likely the next step will be to deliver a workshop with a visiting expert in the chosen field.

3.3. Experts on this topic (for training program on grain moisture)

Among the economies which participated in training courses in the past, the WG recommends individuals from the metrology institutes of Bhutan, Cambodia, Indonesia, Kiribati, Malaysia, Mongolia, Myanmar, Philippines, PR. China, Thailand and Vietnam. Among them, Thailand already established a sound national traceability system and a framework for controlling moisture meters with type evaluation and verification.

3.4. Revision of the APLMF guide document and test procedure (to be continued)

The WG continues to review and update the present *APLMF Guide Document on Rice Moisture Measurement* to improve the contents and to catch up with recent developments in technology and social systems. The term 'rice' in the title should ideally be replaced with 'grain' to accommodate wider range of products and to make this guide more versatile which will be utilized by all grain-producing economies.

In the workshop on QMAP in Working Group Meetings on 6 November 2019 in the Ha Long City, Quang Ninh Province, Vietnam, WG will discuss revision of the APLMF guide document particularly regarding the moisture adjustment method and uncertainty of grain moisture measurement. The first draft of test procedure needs to be updated jointly with this guide document and it could finally be included in the guide document as an informative annex. WG will improve the guide document and the test procedure based on the participant's suggestions and comments at this workshop. If necessary, a small meeting or a seminar, which is participated by the WG members, may be arranged in 2020 to update these documents.

3.5. Contribution to the technical committees of OIML (to be continued)

The WG aims to contribute to harmonize between the activities of OIML and APLMF in agricultural measurements. The WG continues to contribute to OIML TC 17/SC 1 and TC 17/SC 8 even after the new R 59 and R 146 were published. The WG will also monitor the activity of TC17/SC2 that recently proposed a new project to revise OIML R 142: 2008 (automated refractometers: methods and means of verification)..

3.6. Monitoring activities of BIPM and APMP (to be continued)

The WG continues to monitor activities in scientific metrology including BIPM and APMP, regarding the traceability and uncertainty in grain moisture measurements. These

organizations recognize the importance of grain moisture measurement as an important application of scientific metrology.

SECTION 4 – Future focus – emerging issues

Identify emerging issues, risks, resourcing issues, engagement etc., and any proposed solutions for APLMF Executive or members to consider

4.1. Taking over the assets of WG (resourcing / engagement / risks)

As it is mentioned in Clause 3, there is a strong need from the member economies for continuing such a training program on grain moisture measurement. This program also has a long history and it may be one of the matured ones organized by APLMF/MEDEA. The WG has sufficient experience and knowledge and maintains many training materials accumulated over the 19 years. One important lesson learned from the experience is continuation or transfer of such a matured program.

The current WG activities should be maintained in APLMF and/or in each economy. The transfer of the WG to a regional level and next generation shall proceed carefully in order not to lose the WG's valuable assets. Management of the new WG with a group of experts could be an effective solution.

In the future, uniform test procedures for verification will likely be an important work item of APLMF for all kinds of measurement. The training courses of this WG should include a session for the test procedure to be used to verify rice moisture meters by the legal metrology authorities.

4.2. Special remarks on grain moisture measurement (resourcing / risks/proposed solutions)

Training courses on rice moisture measurement have a long history in the events organized by APLMF / MEDEA. This is because grain moisture measurement strongly depends on practical skills in a laboratory which are transferred through a training program continued for a long time. Practical experience using real instruments therefore is a core element to be learned. Until 2005, some training courses lasted even for two weeks to cover necessary practical sessions, while the length of recent training courses are less than a week long. Many participants realized the importance of practical experience and expressed this needs for future improvement, however. The WG considered such a practical component is still necessary and it should be continued.

A set of reference samples of grain is the core item to be prepared for setting up a traceability system as well as conducting a training course. There is a critical difference between a grain sample and another measurement standard used for fundamental physical quantities such as mass. Grain samples inherently do not have either stability or homogeneity, and their characteristics change unpredictably depending on variety, storage condition and time. Fresh samples shall therefore be collected locally where a training course is conducted or a traceability system is established.

The preparation phase of a training course for grain moisture measurement, including procedures for providing reference samples, plays an important role. Such procedures are however conducted by the host staffs without a supervision by the trainers or the WG. The quality of a training course also depends on facility, equipment, tools and materials prepared in the laboratory.

As another important lesson obtained in the experience, the WG and trainers should communicate with the host staffs more closely in the preparation phase. For such a training course, which closely depends on facility and samples, it would be ideal to have a prior visit to the host institute, if circumstances allow.

4.3. Synergy among the stakeholders (emerging / risks)

An important objective of MEDEA is a synergy between the two fields; scientific metrology (APMP) and legal metrology (APLMF). This object has not been achieved however, because grain moisture measurement usually falls outside of the framework of scientific metrology. Instead, WG faced even more complex circumstances; the measurement field of grain moisture was maintained by several ministries of government or another ministry in which metrology was not under their jurisdiction. Such circumstances also varied significantly among the member economies. A synergy among different ministries in the government is another important issue to be remembered when we organize a training course on grain moisture measurement.

For successful implementation of the procedures proposed in the guide document, WG should closely cooperate and exchange information with the manufacturers that develop suitable moisture meters for trade purposes. It is because the traceability in rice moisture measurement relies significantly on the quality and stability of the meters.

4.4. Cooperation with the private sectors (resourcing / engagement)

The support from a private company (manufacturer) is another issue to be noted. When WG plans future trainings and/or a regional training program, we should not continue to rely on the voluntary support from a specific company. As a contradictory factor, however, such a training program essentially connected closely to the facility, equipment, measuring instruments and practical knowledge on the instruments. In fact, the organizer, who belongs to a public organization in many cases, still needs support from a private sector for such items. We need to compromise with the private sectors successfully when we continue training programs. Therefore, this WG should provide even opportunities for all eligible private sectors to participate in (or support) the training programs either as observers and/or co-trainers.

4.5. IT technologies supporting training course (resourcing / solutions)

In the training courses after 2015, a new online storage system, such as Google Drive, realized a paper-less course, in which all electronical materials were shared online. The materials were uploaded at least one week before the course. It gave the participants sufficient time to print them by themselves in advance. Another online system 'Survey Monkey' provided by PTB facilitated collection of feedback comments from the participants. Most of the participants

brought their own PCs which enabled usage of such new systems. Such an operation lessened the workload of the host as well as the pressure of trainers for submitting a complete set of documents in advance. We encourage continuing such an operation using IT technologies.