MEDEA: "Metrology – Enabling Developing Economies in Asia"
Training Course on Traceability in Rice Moisture Measurement
- Beginner's Course -
Trainer's Report

Dates : 17-21 July, 2017

Venue:

National Metrology Institute of Malaysia (NMIM), SIRIM Berhad and
Nilai Springs Hotel in Sepang, Malaysia

Host :

National Metrology Institute of Malaysia (NMIM), SIRIM BerhandAPLMF (Asia-Pacific Legal Metrology Forum) APMP (Asia-Pacific Metrology Programme)

Trainers/Coordinators:

Mr. Phil Sorrell, APLMF Secretariat Representative, MBIE (Ministry of Business, Innovation and Employment), New Zealand

Dr. Tsuyoshi Matsumoto, NMIJ (National Metrology Institute of Japan), AIST / WG Chair

Mrs. Haslina bte Abdul Kadir, NMIM, SIRIM Berhad

Mr. Norihiro Yoshida, Kett Electric Laboratory Co.

Ms. Mihoko Yabe, Kett Electric Laboratory Co.

Mr. Rikiya Takahashi, Kett Electric Laboratory Co.

1 Objective of the Training

Grain moisture is an important area of measurement in legal metrology that is closely related to our confidence in international trade and quality of life. In order to improve skills in this field of measurement within the region, the APLMF Working Group Quality Measurement on Agricultural Products (QMAP) conducted eight training courses on traceability in rice moisture in 2001-2015, and three workshops for agricultural measurement in 2007-2009.

This follow-up program was aimed specifically for the beginners who started to learn about grain moisture measurement. Rice was selected as the primary product although other products were also covered in this program. This training course was composed of lectures and practical activities. The lectures covered: basic understanding of grain moisture; traceability in grain moisture measurement; understanding of related international standards / recommendations; outline of standard reference

method (drying method); and instructions for using rice moisture meters including calibration procedures. The practical component included the use of drying oven method, calibrations of primary and working standard meters, use/check of moisture meters and preparation of reference samples.

2 Target Group

The target group of this training course was officers and technical experts working in national/regional authorities or research institutes in metrology, who were involved in developing traceability system for moisture measurement or capacity building activities in their economy. On completion of this program, the participants were expected to lead the establishment of sound traceability systems within their economy by delivering training to their colleagues. Applicants needed to have at least one year of practical experience in the verification/calibration of measuring instruments.

3 Description of the Training Course

In this chapter, outline of the training course is described. See **Annex 1** for the final program, **Annex 2** for the final participants list, **Annex 3** for the summary of economy reports and **Annex 4** for summary of action plans.

3.1 Opening ceremony

On Monday 17th, the training course started off with an opening ceremony at a meeting room in Nilai Springs Hotel. On behalf of the host economy, Ms. Irene Safinaz Hassan (Deputy Director of NMIM) delivered an opening address. Mr. Phil Sorrell and Dr. Tsuyoshi Matsumoto followed and delivered addresses on behalf of APLMF and the WG on Quality Measurement of Agricultural Product, respectively.

3.2 Economy report

On Monday after the opening ceremony, one representative from each of the participating ten economies provided an economy report with presentation slides on the current situation in traceability and metrological control systems on grain moisture meters. Names of the representatives, who provided the report, are given below.

(1) Ms. Tashi Pelden (Bhutan)
(2) Mr. Rathanak Seng (Cambodia)
(3) Mr. Nugroho Budi Widodo (Indonesia)
(4) Mr. Norihiro Yoshida (Japan)
(5) Dr. Tsuyoshi Matsumoto (Japan as a lecture on Thursday)
(6) Mr. Ruslan bin Shamsudin (Malaysia)
(7) Ms. Haslina bte Abdul Kadir (Malaysia as a lecture on Monday)
(8) Mr. Lkhagvasuren Baasandorj (Mongolia)
(9) Mr. Shambhu Acharya (Nepal)
(10) Mr. Frederick Bueno (Philippines)
(11) Ms. Satanee Puruppa (Thailand)

(12) Ms. Mai Vo Thi Ngoc (Viet Nam)

3.3 Lectures

On Monday 17th, Ms. Haslina bte Abdul Kadir provided a lecture "Traceability and Metrological Control System on Grain Moisture Measurement in Malaysia" in the morning. In the afternoon, Dr. Matsumoto provided lectures on "Traceability and Outline of Grain Moisture Measurement" and "Uncertainty in legal metrology and grain moisture measurements". Ms. Yabe followed with lectures on "Air oven methods ISO 712" and "Air oven methods / Japanese (105˚C)".

On Tuesday 18th, Mr. Takahashi provided a lecture on "Electronic Moisture Testers for Grains: Principle of Operation".

On Wednesday 19th, Ms. Yabe provided a lecture on "Moisture Adjustment". Mr. Yoshida provided lectures on "Accuracy check for PM-450 series" and "Accuracy check for Riceter f-500 series".

On Thursday 20th, Dr. Matsumoto provided an additional report, "Economy report from Japan: Metrological control system and introduction of NMIJ/AIST".

As a result, more lectures were given than that of original plan due to the reason reported in 4.5.

3.4 Practical activity

In the morning on Tuesday 18th, a practical activity started in a laboratory in the chemical building in NMIM. Twenty-six participants were divided into three groups, named as A, B and C. Among the groups, Group C was composed of only the Malaysian observers. One observer attended from Myanmar at his own expense and he joined Group A. All observers also participated in the practical activity. The leader as well as the members of each group were selected and announced by the trainers on Monday. Ms. Adlina Adnan (Malaysia), Ms. Satanee Puruppa (Thailand) and Ms. Nurfadzlina Mohamad Rafdzi (Malaysia) served as the leaders of Group A, B and C, respectively. All trainers instructed the three groups.

An oven drying method based on ISO 712, which was used world-wide, was used in the practical activity. This method enables a determination of an absolute value of moisture content from mass measurement on a grain sample before and after drying at 130 ºC for two hours. In addition, participants had a practical training of calibrating primary moisture meters and working moisture meters (both in a capacitance type).

Firstly, the participants practiced on the oven drying method by sharing the two ovens using 10 reference samples of paddy rice at different moisture contents. During drying the samples, the participants practiced on calibration procedure of the primary standard meters in parallel using the same reference samples. After these practices, the participants conducted another practice for calibration working standard meters (capacitance type) using a meter-to-meter comparison method with 5 reference samples. The participants also practiced on how to use resistance-type meters for milled rice. Supplement practice on how to check the electrical performance of capacitance and resistance-type meters was added on Wednesday.

3.5 Presentation on the measurement results

In the afternoon on Thursday, the leaders of three groups reported the calibration/measurement results and all trainers chaired this session. All calibration results obtained by the groups showed a good agreement for the working standards meters. The results on the primary standards however showed significantly large deviations from the reference values obtained with the oven method. The trainers commented that the deviations were likely attributed to the difference in characteristics between the reference sample used for the present oven method and another sample used for calibrating the primary standard meters at the manufacturer in Japan. They also added that this result was a typical example when a meter is exported to another region, and therefore, re-calibration of a primary standard meter in each economy is necessary.

3.6 Summary discussion

On Thursday 20th, a summary discussion on the entire training course including future directions was held. Dr. Matsumoto highlighted the topics to be considered for the future training as follows.

(1) Appropriate selection of samples and types of meter to be used
(2) Training on other kinds of grain
(3) Practical lecture for evaluating uncertainty
(4) Lecture/practice to prepare reference samples
(5) Method to prevent a fraud (control of calibration curve)
(6) Appropriate total period of training (2 weeks or 2-3 days?)
(7) Revision of the guide document
(8) Need for an inter-comparison
(9) Preparation of equipment for training
(10) Training in each economy (a trainee should be a trainer).
(11) Proposal from APLMF to OIML TC17/SC1 & SC8
(12) Sound traceability system in a region
(13) Harmonization among international regulations

At the end of the discussion, Dr. Matsumoto provided an important announcement from WG. He told that NMIJ in Japan determined recently to finish the role of WG chair, and he was seeking for a candidate of the new chair among the APLMF economies. He also requested that each APLMF participant transfer this message to the director of the organization in metrology.

3.7 Technical tour to a rice processing factory

On Friday 21st, the host provided a technical tour to a rice processing factory (Kilang Beras Rakyat Sekinchan Sdn. Bhd.) in Sekinchan (130 km from the venue) surrounded by a huge rice field. The factory also provided a museum for the history and procedures of rice processing. The reference samples used in the training were the products of this area harvested in the same year. This visit assisted participants to understand practically what they learned in the past four days.

3.8 Action plans

Discussion on action plans was held during the lunch break after the technical tour on Friday 21st. Mr. Sorrell and Dr. Matsumoto chaired this session and each economy reported an action plan to be conducted after returning to home economy. Mr. Sorrell provided a summary of the action plans (see Annex 4).

3.9 Closing ceremony

On Friday 21st at the end of training course in the evening, a closing ceremony was held in the Nilai Springs Hotel before the farewell dinner. Dr. Zakaria, Mr. Sorrell and Dr. Matsumoto handed certificates of attendance to the 26 participants including the observers. The host printed the certificates and Dr. Matsumoto and Mr. Yoshida signed on them in advance. Dr. Zakaria, Mr. Sorrelland Dr. Matsumoto gave concluding remarks with deep gratitude to the MEDEA project.

3.10 Equipment, instruments, materials and samples

To enable the practical activity, the host (NMIM) provided necessary equipment and consumable materials in the laboratory of NMIM. They were; drying ovens (2 sets of Espec PH-102 shared by the 3 groups), moisture meters for primary standard (5 units), precise digital balances (3 units with a maximum capacity of 200 g and a resolution of 0.1 mg), conventional balances for moisture adjustment, a husker, a sample rotator, calibrated thermometers with a probe (3 units), desiccators, shelf boards and other consumable materials.

Kett Electric Laboratory Co. provided resistance-type grain moisture meters (18 units of f-512), capacitance-type grain moisture meters (18 units of PM-450), checker kits (standard resistors/capacitors), sample grinders (3 units), sample cans (120 units), sieves, brushes, spoons and other consumable materials. After the course, all moisture meters and a part of equipment were collected by the company for re-use.

A set of reference samples (60 kg in total) composed of paddy rice and milled rice was provided by NMIM. For paddy, fresh local samples harvested in June 2017 were brought from the rice field in Sekinchan. For milled rice, a small amount of sample harvested in the last year was utilized. The paddy was adjusted of moisture content and was homogenized in advance. It was separated into 12 levels of moisture content from 12 % to 24 %. On 14-15 July, the trainers and host staffs visited NMIM for final preparation of the samples.

3.11 Text books and documents

For the benefit of the participants, APLMF Secretariat provided an online storage ‘Google Drive’. All participants accessed the storage using private PCs and Wi-Fi (Wireless LAN) provided in the hotel and NMIM. All training materials (final program, lecture slides/documents, economy reports, worksheets with measurement results and photos) were then shared with the participants, observers, host staffs and the secretariats of PTB and APLMF.

3.12 Support by the host economy

With MEDEA's financial support, the host institute (NMIM) provided (1) venues/ accommodations (a hotel and a laboratory in NMIM), (2) equipment, instruments and consumable materials, (3) lunches, coffee/tea breaks and dinners from 17th to 21st July, (4) three official dinners on Monday, Thursday and Friday, (5) transportations by bus/taxi from/to; the Kuala Lumpur International Airport, NMIM and a rice processing factory.

4 Highlights/ Lessons Learned

4.1 Were the objectives of the training course met?

Yes. In the limited time frame of 5 days, most of the items in the objectives was explained and covered. Some of them were also demonstrated and / or practiced on.

4.2 Was the right target group attracted by the training?

Yes. Most of the foreign (non-Malaysian) participants worked for national institutes on scientific metrology and/or legal metrology. Some of the institutes already maintained a part of the traceability system on grain moisture measurement while others, including NMIM, were setting up a new system.

Total 10 local participants and observers were selected appropriately from the stakeholders in grain moisture measurement in Malaysia; (1) NMIM/SIRIM Berhad, (2) organizations under the Ministry of Agriculture and Agro-based Industry (MOA) and (3) Ministry of domestic Trade, Cooperatives and Consumerism (MTDCC). Such a participation from outside of a metrology organization is quite common in grain moisture measurement because a traceability and/or a verification system is sometimes maintained by two (or three) independent ministries.

It was impressive for the trainers to see all participants learned about and practiced on grain moisture measurement earnestly without a break. They worked hard also in the supplemental practice for using and checking moisture meters. Among them, there were several competent participants from Indonesia, Malaysia and Thailand. It seemed they could serve as trainers in the near future. On the other hand, some participants did not seem to have sufficient practical experience on grain moisture measurement because their economies just started planning of a new metrological control system in this field. Nevertheless, the trainers considered such a lack of experience was not critical for the present beginner's course. Among them, a Mongolian participant contributed actively regardless the original background outside of grain moisture measurement.

Regarding English conversation in, the trainers could communicate successfully with most of the participants.

4.3 What was the feedback of the participants?

On Tuesday, an instruction with a link to the feedback form using an online system 'Survey Monkey' was shared with all participants on Google Drive, and twenty-five participants replied to the form. All

participants provided favorable and appreciative comments, and they requested continuing such a training program. Scores and all comments were summarized as follows. As a result, some of these comments corresponded the topics in the summary discussion on Thursday (3.6).

4.3.1 Summary of scores

a) Organization and logistics:

- ✓ Preparation of advance information: Perfect 57 % / Good 43 %
- ✓ Logistics: Perfect 43 % / Good 57 %
- ✓ Time schedule & overall duration: Perfect 43 % / Good 52 % / Average 5 %
- ✓ Quality of information material: Perfect 38 % / Good 62 %

b) Program and contents:

- ✓ Quality of information material: Perfect 45 % / Good 55 %
- ✓ Relevance of topics for your work: Perfect 40 % / Good 60 %
- ✓ Overall satisfaction of your expectations: Perfect 55 % / Good 45 %

c) Group work:

- ✓ Topic was relevant: Perfect 55 % / Good 45 %
- ✓ Group discussions were helpful to gain a better understanding of the topic: Perfect 55 % / Good 45 %

d) Rating of the training on an overall basis:

- ✓ Overall rating: Perfect 43 % / Good 56 %

4.3.2 Summary of comments

Organization of the course:

(1) Extension of the total duration (even to two weeks).

(2) Importance of practical activities and group discussions to understand the contents of lectures practically.

(3) Need for a training using other agricultural products (wheat, corn, beans, coffee, etc.).

(4) Need for an advanced course for the prospective trainers.

Contents of the training:

(5) Importance of a traceability system.

(6) Importance of instructions on how to use and check meters.

(7) More contents with practice to prepare reference samples.

(8) Need for a content or a regional scheme for Inter-comparison.

(9) More contents on how to prevent fraud in measurement for transaction.

(10) More practical lecture for evaluating measurement uncertainty.

Outcomes and follow-up activities:

(11) Share the obtained knowledge and skills in each institute and economy.

(12) Conduct training in each economy for laboratory staffs, officers and users of the measuring instruments.

(13) Because of the title “beginner’s course”, there were many participants who were new in grain moisture measurement. Their economies were setting up a new control system in this field.

(14) Many participants planned to change the local calibration/verification procedure according to an international standard or a recommendation (ISO 712 & OIML R 59).

(15) The participants had valuable international communication among them and got knowledge in other economies.

Logistics and support:

(16) Dedicated support by the MEDEA project and the host institute.

(17) Online storage (Google Drive) was useful.

(18) Some participants preferred a venue/accommodation in an urban area.

4.4 What were the highlights of the course?

This training program on rice moisture is one of the matured ones organized by APLMF. From 2001, twelve events including workshops were conducted by WG on QMAP. The WG maintains many training materials and knowledge accumulated in the past 17 years. These materials were summarized as an APLMF guide document in May 2017.

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 the program, should be trainers in the home economy; and then, an international training activity should gradually be transferred to a reginal program. In this regard, there were discussions in APLMF that the training program on grain moisture could be transferred to a regional level. To promote this movement, Ms. Haslina of NMIM was employed as an assistant trainer. She already participated in many training courses on rice moisture in the past as a trainee.

Although not directly related to the contents of training, it might be the most remarkable highlight that Dr. Matsumoto announced an intention of stepping down from WG Chair and taking over the WG to another economy (see 3.6). He also expressed that he would support the new chair as a WG member even after taking over. His proposal met the new policy of APLMF President in which each WG should be maintained by a real group of experts (it was maintained by one person in many cases).

Regarding the logistics, the host organization, NMIM provided dedicated efforts. The host provided the venue and accommodation located conveniently near the international airport with necessary transportations by bus. The host also provided necessary equipment and reference samples. In addition, Kett Electric. Lab. Co. voluntarily provided many moisture meters, equipment and consumable materials.

The new system Google Drive realized a paper-less course, in which all electronical materials were shard 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.

4.5 Lessons Learned: What recommendations would you give to the MEDEA Coordination Committee and trainers of other courses?

The keyword in APLMF 'train the trainers course' is also an important objective of MEDEA project. The most important lesson learned from this training course is closely related to the two inquiries; (1) how to continue (or finish) a matured training program and (2) how to transfer such a program at each level of economy/region. The present MEDEA project ends in December 2017 and the next project has not been approved (as of August, 2017). We should not finish MEDEA as a one-time festival, and its training activities should be maintained voluntarily in each economy/region even after this project.

APLMF had a similar experience in which many training courses and seminars were conducted with support from APEC (Asia-Pacific Economic Cooperation) in 2003-2012. It became difficult afterward to continue to obtain the APEC fund because a simple repletion of similar training courses was deemed as an inappropriate investment by the donor organization. In connection with the announcement that WG on QMAP would be taken over to another economy (3.6), it might be a good time for MEDEA and APLMF to think about future directions of this training program on rice moisture measurement.

Another important objective of MEDEA is a synergy between the two fields; scientific metrology (APMP) and legal metrology (APLMF). Fortunately, we did not have much difficulty regarding these two fields because grain moisture measurement is mostly falls outside of (the framework of) scientific metrology. Instead, we had to face more complex circumstances in which such a measurement field was maintained by several ministries of government or another ministry in which metrology is not under their jurisdiction. Such circumstances also varied significantly among economies.

A synergy among different ministries in the government is another important lesson to be remembered when we organize a training course on grain moisture measurement. This time, NMIM coordinated preparation for the training course with other organization within the economy. As an important outcome, this course fortunately provided Malaysia a kick-off event to set up a new metrological control system with a synergy of different organizations (NMIM, MOA and MTDCC). An NMIM staff told that such a synergy would not begin without this training course.

This training course might be the longest one in the events organized by MEDEA. It is because grain moisture measurement strongly depends on practical skills in a laboratory. Practical experience using real instruments therefore are a core item to be learned. Some training courses until 2005 continued for two weeks to cover necessary practical sessions. In the present course, it seemed many participants realized the importance of practical experience. The trainers considered such a practical component is necessary and it should be continued in the future.

The support from Kett Elec. Lab. Co. is another lesson to be noted. If we transfer the WG to another economy and/or set up a regional training program, we cannot continue to rely on the voluntary support from one 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. The organizer, who belongs to a public organization in many cases, still needs support from a private sector for such items. We need to find a good compromise toward the future for continuing such a training program in cooperation with the private sectors.

Regarding the logistics, a paper-less operation with Google Drive worked well to lessen 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.

Regarding the schedule on Friday, we had to spend a total of six hours for travelling to the rice-processing factory although the visit was so helpful to the participants. We therefore arranged the closing ceremony in the evening. It was an inevitable arrangement for the host and it was simply because there was no factory near the venue. In the future, such a tour could be replaced with another program considering the travelling time.

Regarding the reference samples, most of them was provided in paddy because rice is usually traded in this form in the region. The trainers misunderstood the situation however and they planned the original schedule using both paddy and milled rice. They had therefore to change the schedule by adding other lectures to utilize the time prepared for the milled rice. The staffs were also required to adjust and increase the moisture levels of the paddy samples just before the training (see 3.10) because the prepared number of levels was not sufficient for the oven method. This procedure made the condition of some samples inhomogeneous and unstable and it might cause the deviations in the measurement results (see 3.5).

Above two issues on the tour and the samples, however, were not serious shortcomings of the training course. The trainers and the host staffs cooperated closely before and during the course and adjusted the schedule flexibly based on the real situation. As a lesson for the future, the trainers should communicate with the host more closely in details in the preparation phase. For such a training course, which closely depends on the facility and the samples, an advance visit to the host institute is requested ideally, regardless its practical feasibility.

5 Next Steps/ Follow-up

5.1 What are the agreed next steps after the training?

The transfer of the chair of the WG on QMAP to another economy is a priority for this training program to proceed to the next step. Dr. Matsumoto (WG Chair) discussed this issue with Mr. Sorrell during the training course. After consultation with Mr. Stephen O'Brien (President, APLMF) it was agreed that the Secretariat would manage the nomination process to appoint a new WG Chair. A call for nominations would be sent from the Secretariat to all APLMF member economies in due course.

Regardless of the imminent appointment of a new WG Chair, there is a strong need for continuing such a training program in grain moisture measurement. The contents of the training program including documents/materials are well matured and the WG has sufficient experience and knowledge. The transfer from the current Chair to a new Chair will therefore proceed carefully in order not to lose the WG's valuable assets. Besides the WG, it is encouraged to transfer the present

training activity into a regional level. The trainer considers ASEAN (Association of Southeast Asian Nations) could be an appropriate candidate organization for the reginal activity.

5.2 What are the suggested follow-up activities?

Many economies have not set up a reliable traceability system on grain moisture measurement. They still need practical knowledge on reference method and calibration/usage of moisture meters. It is recommended to continue a follow-up training program for the beginners.

In addition, an advanced course at a higher level for the trainers in the future is also requested. Coverage of other kind of grains (wheat, corn, beans, coffee…), evaluation of uncertainty in measurement and implementation of inter-compassions are requested for a long time but they have not been fully realized. To cover such items, planning of another training course aiming at a specific target or a longer course for two weeks may be considered.

The WG already received informal information that Thailand was seeking a possibility to host the next training course in 2018 to be planned as an advanced course. WG Chair would continue communication between Thailand until the new chair would be assigned officially.

6 Annex 1: Workshop program

Training Course on Traceability in Rice Moisture Measurement
17-21 July, 2017 in Sepang, Malaysia
Final Program

Day 1 17 July (Mon) Nilai Springs Hotel	8:30-9:00	*Registration*
	9:00-9:30	Opening ceremony (host, APLMF and WG) / Group photo
	9:00-9:50	*Coffee / tea break*
	9:50-11:50	Economy reports (Chairs: Matsumoto, Haslina & Yoshida)
	11:50-12:20	Traceability and metrological control system in Malaysia (Haslina)
	12:20-13:30	*Lunch break*
	13:30-15:00	Lecture on traceability in grain moisture measurement and outline of the training course (Matsumoto)
	15:00-15:30	*Coffee / tea break*
	15:30-16:20	Lectures on ISO 712 and Japanese 105 ºC Method (Yabe).
	16:30-17:00	Uncertainty in legal metrology & grain moisture meas. (Matsumoto)
	19:30-21:00	*Welcome dinner hosted by Kett at Restoran Tasik Idaman*
Day 2 18 July (Tue) NMIM	8:30	*Left the hotel by bus provided by the host.*
	9:00-10:00	Instruction and practice on oven method (ISO 712) in groups using two ovens (all trainers).
	10:30-11:00	*Coffee / tea break*
	11:00-12:20	Continued the oven method (ISO 712).
	12:20-13:30	*Lunch break in NMIM*
	13:30-14:00	Lecture on the principles of moisture meters (Takahashi)
	14:00-15:00	Continued the oven method / Instruction and practice on calibration of capacitance-type primary standard meters (all trainers)
	15:00-15:30	*Coffee / tea break*
	15:30-17:30	Finished the practice on primary standard meters (all trainers).
	17:50	*Returned to the hotel by bus.*
Day 3 19 July (Wed) NMIM	8:30	*Left the hotel by bus.*
	9:00-10:00	Review of the course / Repeated the oven method / Instruction & practice for calibrating working standard meters with comparison (all trainers)
	10:00-10:30	*Coffee / tea break*
	10:30-12:30	Finished the oven method and calibration of working standard.
	12:30-13:30	*Lunch break in NMIM*
	13:30-15:10	Lecture and demonstration on moisture adjustment of sample (Yabe)
	15:10-15:40	*Coffee / tea break*
	15:40-17:00	Instruction on how to use/check moisture meters (all trainers)
	17:30	*Returned to the hotel by bus.*
Day 4 20 July (Thu) NMIM	8:30	*Left the hotel by bus.*
	9:00-10:10	Review of the course / Introduction of Kett Electric Lab. (Yoshida)
	10:10-10:40	*Coffee / tea break*
	10:40-12:00	Introduction of metrological system of Japan & NMIJ (Matsumoto) / Instruction & practice with resistance-type moisture meters (all trainers).
	12:00-13:20	*Lunch break in NMIM*

	13:20-14:50	Summary of the measurement results in the groups (all trainers)
	14:50-15:20	*Coffee / tea break*
	15:20-16:10	Report of the measurement results by the groups using worksheets / Summary discussion (all trainers) / *Returned to the hotel*
	18:00-21:00	*Tour and cruise dinner in Putrajaya hosted by MEDEA*
Day 5 21 July (Fri)	8:30-11:40	*Trip by bus to Sekinchan, Selangor*
	11:40-12:40	Technical visit to a rice processing factory in Sekinchan
	13:00-14:50	*Lunch break at D'Menara Homestay with discussion on action plans*
	14:50-18:20	*Back to the hotel by bus*
	20:00-22:00	*Closing ceremony and farewell dinner at Nilai Springs Hotel*

7 Annex 2: List of participants

Name	Economy	Institution	Department
Participants invited by MEDEA (18)			
Ms. Tashi PELDEN	Bhutan	Bhutan Standards Bureau (BSB)	Metrology & Laboratory Services Division
Ms. Dema YANGCHEN			
Mr. Rathanak SENG	Cambodia	National Metrology Center (NMC)	Legal Metrology
Mr. Sophearath ING			
Mr. Nugroho Budi WIDODO	Indonesia	Ministry of Trade	Directorate of Metrology (DoM)
Ms. Layyinatul MUNAWAROH			
Ms. Adlina ADNAN	Malaysia	National Metrology Institute of Malaysia (NMIM), SIRIM Berhad	Chemical Group
Ms. Nurfadzlina MOHAMAD RAFDZI		Pusat Pertanian Sungai Burong (Burong River Agriculture Center)	Paddy, Industrial Crop and Floriculture Division
Mr. Ruslan bin SHAMSUDIN		Ministry of domestic Trade, Cooperatives and Consumerism (MTDCC)	Enforcement Division
Ms. Batkhishig TSEDEV	Mongolia	Mongolian Agency for Standardization and Metrology (MASM)	Physical and Chemical Laboratory
Mr. Lkhagvasuren BAASANDORJ			Mechanical Measurement
Mr. Bikash DHONJU	Nepal	Nepal Bureau of Standard and Metrology	Taxi Tempo Unit
Mr. Shambhu ACHARYA			Regional Bureau of Standards and Metrology, Nepalgunj
Mr. Frederick BUENO	Philippines	Industrial Technology Development Institute (ITDI)	National Metrology Laboratory
Ms. Satanee PURUPPA	Thailand	Department of Internal Trade, Ministry of Commerce	Central Bureau of Weights and Measures (CBWM)
Ms. Wannisa SOPTOMAT			Southern Weights and Measures Center (SWMC)

Mr. Duc Hien NGUYEN	Vietnam	Quality Assurance and Testing Centre 1 (QUATEST 1) in Ha Noi	Department of Temperature, Humidity and Chemical Metrology
Ms. Mai VO THI NGOC		Quality Assurance and Testing Centre 2 (QUATEST 2) in Da Nang	Technical Division 6
Observers participated training (8)			
Ms. Umi Jainab bt. Mohamad Supaih	Malaysia	Department of Agriculture (DOA), Ministry of Agriculture and Agro-based Industry (MOA)	Deputy Director, Division of Paddy, Industrial Plant & Floriculture
Mr. Ahmad Nasre Othman		Agriculture Research & Development Institute (MARDI)	Manager/Assistant Research Officer
Mr. Wahid Said			Assistant Research Officer
Ms. Suhaila Khairudin		National Metrology Institute of Malaysia (NMIM), SIRIM Berhad	Metrologist, Thermophysical Group
Mr. Mohd Nawawi b. HUSIN		Padiberas Nasional Berhad (BERNAS)	Head, Quality Management Unit
Mr. Othman b. Salim			Senior Manager, Quality Management Process Unit
Ms. Noorazlina bt. Zainal Abidin		Rice Seed Production Center, Sungai Burong Agriculture Department	Laboratory assistant
Mr. MYO Thura Aung	Myanmar	Pioneer Agrobiz Co., Ltd.	Director
Trainers/coordinators (6)			
Dr. Tsuyoshi MATSUMOTO	Japan	National Metrology Institute of Japan (NMIJ), AIST	International Cooperation Office
Ms. Mihoko YABE			
Mr. Norihiro YOSHIDA		Kett Electric Laboratory Co.	
Mr. Rikiya TAKAHASHI			
Ms. Haslina bte Abdul Kadir	Malaysia	National Metrology Institute of Malaysia (NMIM), SIRIM Berhad	Head, Chemical Group
Mr. Phil SORRELL	New Zealand	MBIE (Ministry of Business, Innovation and Employment)	APLMF Secretariat
Host of NMIM, SIRIM (4)			
Dr. Osman Hj. ZAKARIA	Malaysia	National Metrology Institute of Malaysia (NMIM), SIRIM Berhad	Senior Director
Ms. Irene Safinaz Hassan			Deputy Director (Metrology advisory)
Ms. Hfidzah OTHMAN			Deputy Director (Thermophysics)
Mr. Zainal Hj. MUSTAPA			Senior Executive
Observers (2)			
Mr. M. K. DEVAN	Malaysia	KNM Scientific Equipment (M) Sdn. Bhd.	

Dr. MYO Aung Kyaw	Myanmar	Pioneer Agrobiz Co., Ltd. / Myanmar Rice Federation (MRF)	Managing Director / Vice President of MRF

8 Annex 3: Summary of Economy reports

Economy	Legislation	Verification periods	OIML compliant	Issues	Other
Bhutan	Not currently in use	N/A			The aim is to establish a system and develop national standards and implementation.
Cambodia	Not currently in use	N/A		We have a laboratory set, not in use yet.	Awaiting legislative change to introduce and implement a system.
Indonesia	Order under statute	Annually	R 59		Set up a formal body to control.
Japan	Agricultural Products Inspection Law	Annually	R 59	Verification / inspection by the private sectors is in place.	Ministry of Agriculture Forestry and Fisheries (MAFF), supported by private sectors, controls moisture meters.
Malaysia	National measurement system act 2007 and W&M Act 1972	N/A	R 59	Voluntary verification is in place.	Decision will be made in this year on formal system of verification and type approval – *WMD publicity 2015.*
Mongolia		N/A		Metrological institute and verification departments have join responsibility for the verification of instruments	Wheat is the main food product therefore the traceability of moisture measurement is important for trade.
Nepal	Food Act 2022			Calibration and legal metrology function	Implementation of a W&M act is intended for 2025 to reflect OIML requirements. *Nepalese calendar is 57 years ahead of the western calendar.*
Philippines	National Metrology Act 2003 but not specific for grain moisture		R 59	National Food Authority is responsible for grain standardization program	
Thailand	Yes 1999 - specifically rice	Annually	R 59	ISO 712	
Vietnam	Yes	Annually		ISO 712	There is comprehensive validation of existing system. But new equipment is needed.

9 Annex 4: Summary of Action Plans

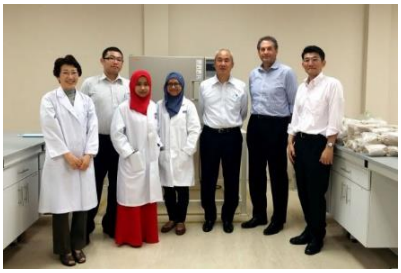
Economy	Title	Surname	First Name	Action Plans
Bhutan	Ms	PELDEN	Tashi	Write a detailed report for the director, legal metrology. Promote what has been learned in an awareness program for farmers. Promote the sampling into the lab system.
	Ms	YANGCHEN	Dema	
Cambodia	Mr	ING	Sophearath	Report to both director and minister responsible for legal metrology. Share knowledge within the legal metrology group. Compare with other economies and establish a common standard if possible.
	Mr	SENG	Rathanak	
Indonesia	Mr	WIDODO	Nugroho Budi	Make report to director, legal metrology. Cascade the training to others. Make laboratory ready for inter-comparison within the economy.
	Ms	MUNAWAROH	Layyinatul	
Malaysia	Ms	ADNAN	Adlina	Incorporate what has been learned into training for local industry. Establish reference samples on annual basis. Promote and increase local collaboration between: NMIM, MARDI and DoA. Improve the calibration of meters.
	Ms	MOHAMAD RAFDZI	Nurfadzlina	
	Mr	SHAMSUDIN	Ruslan bin	
Mongolia	Mr	BAASANDORJ	Lkhagvasuren	Include the lessons learned into a training course for trade and inspection staff. Establish reference sample (explore the possibility for wheat).
	Ms	TSEDEV	Batkhishig	
Nepal	Ms	ACHARYA	Shambhu	Report to the director general, responsible for legal metrology. Introduce lesson learned into the laboratory procedure. We will recommend calibration of other agencies meters using the methods learned.
	Mr	DHONJU	Bikash	
Philippines	Mr	BUENO	Frederick	Report to director, responsible for legal metrology. Recommend the use of a primary standard each year. Conduct training of peers and businesses. Carry out inter-comparisons within the economy.
Thailand	Ms	SOPTOMAT	Wannisa	Training course for all officers to share the lessons learnt.
	Ms	PURUPPA	Satanee	
Vietnam	Ms	NGOC	Mai Vo Thi	Share information within the group. Apply practical skills learned. Make presentation to boss.
	Mr	NGUYEN	Duc Hien	

10 Photographs

Group photo on 17th July at Nilai Springs Hotel

Opening ceremony and lectures on 17th July










Lunch break


Laboratory of NMIM on 18th – 20th July



Meeting room of NMIM on 20th July



Tour to Putrajaya on 20th July




Tour to a rice processing factory on 21st July



Lunch break with a meeting for action plans on 21st July



Dinners and closing ceremony