

**Providing/Developing/Setting up Regional Livestock  
Market Information System (LMIS) at IGAD  
Center for Pastoral Areas and Livestock  
Development (ICPALD), Nairobi**

**Training Report**

**Prepared for Intergovernmental Authority on Development  
Center for Pastoral Areas and Livestock  
Development**

**From**

**Texas A&M AgriLife Research  
Blackland Research and Extension Center  
Temple, Texas USA**

**April 2019**

## **Introduction**

The International Governmental Authority on Development (IGAD) currently coordinates the Regional Pastoral Livelihoods Resilience Project (RPLRP) that is currently operational in Ethiopia, Kenya and Uganda. The objectives of RPLRP are to enhance livelihood resilience of pastoral and agro-pastoral communities in cross-border areas that are prone to drought and improve their capacity to respond promptly and effectively to an eligible crisis or emergency. RPLRP has five main components which are: 1) Natural Resources Management; 2) Market Access and Trade; 3) Livelihood Support; 4) Pastoral Risk Management; and 5) Project Management and Institutional Support. In each of the 3 countries, RPLRP is managed through the government ministries and activities associated with the components listed above are being implemented in the targeted counties/districts. As part of this effort, one of the activities related to the Market Access and Trade component is the development of a livestock market information system to provide a means for timely livestock market information system to be reported digitally, and then made available to the public and stakeholders for use in decision making. The livestock market information system will be designed to allow data collected from primary, secondary, and terminal livestock markets from the three countries to be entered into the system at the country level via short messaging service (SMS) messages from cellular telephones. Pastoralists, livestock traders, and other interested stakeholders can then request the price and volume information for specific markets using SMS and Internet. In addition, another goal is to link the systems from each of the countries to form a regional livestock market information system to support and enhance cross-border trade and enterprise development.

In July 2018, Texas A&M AgriLife Research (TALR) entered into an agreement with IGAD to support development and deployment of software in the project countries to support national livestock market information systems (NLMIS). It was agreed to as part of this effort, that TALR would conduct training workshops for NLMIS system administrators on installation of the system and maintaining the system over time. In addition, sessions for training of trainers would be conducted in each of the countries to build capacity for training market monitors on field data collection and in quality control for data. During the period from August 2018 to November 2018, the initial training events were conducted in each of the countries. During February and March 2019, backstopping and refresher trainings were held in each country. The training events and summaries of the events are each described below.

### **System Administrator Training – August 2018**

The NLMIS System Administrators Training was held in Nairobi, Kenya on 22nd -25th August 2018. In attendance were system administrators from Ethiopia (Bethelhem Tigistesellassie, Desta Almaz Chernet), Kenya (Mugambi Githinji, Pius Cheruiyot), and Uganda (Vanessa Namayanja, Amos Mpungu, along with IT professionals from IGAD (Oliver Salehe, Jemal Mensur). The objectives of the training were as follows:

- Learn about the procedures for installing the livestock market information system (LMIS) software onto Windows servers.

- Provide hands-on training for installing the software, connecting the modem, and testing the communications with SMS.
- Provide an overview of the LMIS coding and LMIS database structure, relationships, tools for backup and restore of database.
- Demonstrate the LMIS Administration web pages for data entry to populate the LMIS database for use and for updating.
- Discuss best practices for data quality control, data corrections, and develop framework for a plan to establish quality control procedures and documentation.
- Discuss harmonization of codes for regional LMIS.

The intended outcomes of the training were: 1) administrators should understand how to install the different components of the LMIS software onto a Windows Server; 2) have an understanding of the LMIS database structure, relationships, and coding; 3) be able to backup and restore the LMIS database; and 4) have a basic protocol for quality control of LMIS data sent to the server from the markets.

The first day of training began with general overview of the livestock market information system software. The main goals of the were described which included integrating the system into the current livestock market data streams, taking advantage of the digital technologies to transfer data rapidly from the field, and to improve and expand the analytical, reporting, and geographical relevance of the market data.

The trainees were then walked through the LMIS methodology. A graphic of the general framework of the system's information and dataflow was described. Points in the data flow where quality control issues could be evaluated and corrected were discussed. The SMS modules for parsing data and how the various parts of the SMS string were decoded and stored in the database were conferred. The trainees were then provided with a schematic of the livestock market information system database structure that included a listing of database tables, primary keys, foreign keys and table relationships. Linkages between the tables were discussed and look-up functions for turning codes into text for markets, animal kinds, breeds, ages and grades were shown. The need for harmonization of codes among countries was also discussed for improving the merging of data for the regional market information system.

The trainees were provided with hands-on training for installing the LMIS software onto a server, using their laptops as a proxy. First, the trainees were shown how to install the PostgreSQL database software that is needed for storing the LMIS data. After installation of the database software, the trainees were shown how to restore the LMIS database and how the database could be backed up once restored or for periodic back-up on another system. After database installation, demonstrations were provided for installing the Java software and Apache Tomcat web server packages. Once the web server was installed, the trainees were provided with the steps for installing the LMIS web and LMIS administration software applications. These installations were tested, and information given on how to troubleshoot problems in case the software would not load or if the web page had errors. The trainees were then walked through the process of installing the drivers for connecting the modem and testing the communications with SMS messaging.

Database tables, relationships among tables, and data entry into the database tables were discussed. The LMIS administration tool was introduced and each of the modules of the tool were demonstrated. Data entry for languages, countries, animal kinds, breeds, age groups, sex of animal, and grades were conferred, as well as information provided on the structure of these items that were in previous versions of the LMIS in Kenya and Ethiopia. Development of unique codes for markets and users were discussed and the linkages that need be made between markets and users so that data sent from markets could be entered into the database via SMS.

An overview of the LMIS website was then given. Dr. Angerer demonstrated to the team how the main page of the LMIS could be used to get quick summaries of the market data. He showed how the market data on the Google map could be used to view market data changes, and how the market summary table could be used to get quick reports on market conditions. He also discussed the options for changing the language and the currency for the website. The LMIS menu items were then demonstrated. The usage of the Livestock Market Trend, Volume Trend, Market Chain, and Livestock Volume Composition tools was shown. The team then discussed the development of market reports and the interfaces for producing market reports for livestock and livestock products were demonstrated. Lastly, the email and SMS subscription options for push messages was demonstrated.

To close out the training for the system administrators, quality control measures for data collection and reporting were discussed. Dr. Angerer showed the group how to set the anomaly detection functions within the LMIS Administration software so that daily reports could be produced highlighting data that was sent to the server that exceed specified thresholds for change in price or volume. The goals of a quality control program for the LMIS were given. These included: 1) development of a plan and procedure for maintaining quality of LMIS data from point of collection to a query by LMIS stakeholders; 2) measures to insure that data from the LMIS are as accurate and timely as possible; and 3) development of a culture among the LMIS team to produce a quality product and to implement quality control procedures to insure the highest quality and most accurate market data. The development of the quality control manual that describes the roles and responsibilities of each group involved in sending in or reviewing data was also discussed. An example quality control manual was also provided to the team.

The training was concluded on 25th August 2018. Each of the teams was provided with a cellular modem to use in setting up the server in their respective country. Documents and PowerPoint slides were provided to the participants. The documents and presentations can be accessed here:

[https://www.dropbox.com/s/nov9y8rfkq85yxh/LMIS\\_sys\\_admin\\_docs.zip?dl=0](https://www.dropbox.com/s/nov9y8rfkq85yxh/LMIS_sys_admin_docs.zip?dl=0)

### **Ethiopia LMIS Installation and Training of Trainer Training – August 2018**

Dr. Angerer traveled to Addis Ababa, Ethiopia on August 27, 2018 to work with the system administrators with the Ministry of Agriculture and Natural Resource (MoANR) to install the LMIS software on the new server housed and the Ministry. He first met with Sertse Sebu, the Ethiopia RPLRP National Coordinator, to discuss the outcome of the system administrator training in Nairobi and

to discuss the plan for installation of the software and the training that would be held later in the week for trainers. He then met with Dr. Sebu and the other members of the Ethiopia LMIS team to discuss the plans for the week.

For the installation of the LMIS software, Dr. Sebu had made arrangements to transfer the old server that was housed at the International Livestock Research Institute (ILRI) to MoANR. The LMIS data were removed from the old system and prepared for upload to the new system. Dr. Angerer and the LMIS system administrators (Bethelhem Tigistesellassie, Desta Almaz Chernet, Mehari Negash) installed the software onto the server located in the secured server room at MoANR. After the software was installed, the data from the old server was restored onto the new server. The modem software was installed on the system and the modem was tested. Initially, the SIM card in the modem would not register with the cellular, and the connection would be lost immediately. The problem with the connection of the modem was determined to be related to the SIM card. Since the SIM card being used was from the modem used on the old server, the SIM card was at least 7 years old. Therefore, it was suggested by Dr. Angerer that the system administrators contact Ethiopia Telecom and replace the SIM card with a new version that could easily switch between 4G, 3G, and 2G protocols. For the interim, the team was able to provide a temporary SIM card from one of the Ministry's employees and this was used to test whether the modem and system were working correctly. When the modem was tested with a different, newer SIM card, the system was able to connect to the SMS modem.

After the software implementation and testing was completed, Dr. Angerer provided the team with additional training on the use of the LMIS Administration component. The age classes, animal kinds, breeds, grades, and other characteristic data for Ethiopia were reviewed. The user list and market list were also reviewed. A database dump of names and markets were provided to the administrators for review to remove people from the "active" state to "non-active" in the user data table. Dr. Angerer also demonstrated how to link users to specific markets so that the users could send in data to the system via SMS. Dr. Angerer downloaded the updated tables to include in the "Training of Trainers" PowerPoint presentations.

On Wednesday, August 30, Dr. Angerer traveled with the MoANR team to Adama to conduct the Training of Trainer Sessions for personnel who would be training market monitors on how to collect market information in the various livestock producing regions of Ethiopia. The objectives of the training were to: 1) provide an overview and demonstration of the livestock market information system (LMIS) software that will be used for Ethiopia livestock markets; 2) discuss and provide training on the market information system coding system for sending market data to LMIS server; 3) practice sending data to the server and discuss troubleshooting problems with messages; 4) discuss best practices for data quality control and data corrections, and 5) discuss harmonization of LMIS codes for aggregation to regional LMIS.

Approximately 50 people attended the training. During the first day, the first three objectives were met. Participants were provided training on the coding system and were given the opportunity to practice sending data to the LMIS server. If trainees had issues with coding or in sending data, these problems

were discussed as a group and resolved. On the second day of training, the group traveled to a camel market (Figure 1) and a livestock fattening operation (Figure 2) outside of Adama to practice livestock grading protocols and to discuss data collection procedures. The group also visited two cattle markets, but these were inaccessible due to heavy rainfall the previous day.

On the third day of training, the trainees were convened to discuss quality control procedures for the LMIS data. This training focused on the process and protocols that need to be implemented to ensure that the LMIS data collected are of the highest quality and free of errors. Dr. Angerer discussed the development of a quality control document that would provide a plan and procedure for maintaining quality of livestock market information system data from point of collection to query of the data by LMIS stakeholders. It would define the roles and responsibilities of each person or group involved in data collection and storage and would describe actions for correcting erroneous data.

The Ethiopia LMIS team and Dr. Angerer provided a timeline for implementation of the data collection at markets and for completion of training of trainers and quality control manuals. Immediate next steps that were discussed included: 1) Identification of markets that will be collecting data; 2) Identification of market monitors who will collect data at each market; 3) providing national IT personnel with list of markets and market monitors for each market; 4) conducting training of market monitors and provide datasheets for data collection; and 5) begin data collection and evaluation of data accuracy. Steps that would need to be implemented during the next 6 months included: 1) production of monthly bulletins/reports of price and volume; 2) market monitors, market supervisors, and regional supervisors to provide feedback on system and website; 3) provide information on markets that would be included in the regional LMIS; 4) identification of any quality control issues; 5) development of a quality control manual; and 6) update and finalize the training manuals.

Dr. Angerer and the LMIS national team returned to Addis on August 31. Dr. Angerer worked with the national IT team on September 1 to provide guidance on adding markets and market monitors to the system and to ensure that the LMIS software was working properly on the server. The group also discussed provisioning of a public IP address so that the LMIS website could be made public.

A copy of the PowerPoints used for the Ethiopia training can be accessed here:

[https://www.dropbox.com/s/y1xm8lya75t104r/Ethiopia\\_LMIS\\_powerpoints.zip?dl=0](https://www.dropbox.com/s/y1xm8lya75t104r/Ethiopia_LMIS_powerpoints.zip?dl=0)

### **Kenya LMIS Installation and Training of Trainer Training – October 2018**

Dr. Angerer traveled to Nairobi, Kenya on October 30, 2018 to install the LMIS software on servers at the Kenya Ministry of Agriculture, Livestock, Fisheries, and Irrigation (MoALFI) and to conduct training of trainers for LMIS implementation. Dr. Angerer first met with Maurice Ouma, the Kenya RPLRP Coordinator to discuss the agenda for the week and meetings that were planned, in addition to discussions on the software installation and the training.

Dr. Angerer then met with MoALFI IT staff (Mugambi Githinji and Pius Cheruiyot) to extract the data from the previous LMIS server and to prepare it for the new server. The LMIS software was then



Figure 1. Camels at a market near Adama. These camels were under a quarantine to ready them for export out of Ethiopia.



Figure 2. Cattle being fattened at a livestock fattening operation outside Adama.

installed on a server housed at MoALFI and the data from the old server was uploaded to the system. The modem software was installed on the system and the modem was tested. After the software

implementation and testing of the software were completed, Dr. Angerer provided IT staff who would be administering the system with a walk-through of the system administration. This included data entry procedures for editing or adding age classes, animal kinds, breeds, grades, and other characteristic data for Kenya system. Since much of this data had already been transferred from the old system, time was spent reviewing the data to ensure that it was still needed or if additional data needed to be added for the new system. The user list and market list were also reviewed. Dr. Angerer provided a demonstration on how to link users to specific markets so that the users could send in data to the system via SMS.

The LMIS software and server were tested to ensure that everything was working properly. The MoALFI IT staff procured a domain name and it was linked to the public IP of the system. The system was then brought online publicly and made available at the following web address: <http://www.lmiske.go.ke>.

Training of Trainers for the Kenya markets was held on November 1 and 2 at the 67 Hotel in Machakos county. The Kenya LMIS team (Maurice Ouma, Harrison Mugo, Mugambi Githinji and Pius Cheruiyot Pius) and 50 trainees from counties across Kenya attended the training. The objectives of the training were: 1) provide an overview and demonstration of the livestock market information system (LMIS) software that will be used for Kenya livestock markets; 2) discuss and provide training on the market information system coding system for sending market data to LMIS server; 3) practice sending data to the server and discuss troubleshooting problems with messages; 4) discuss best practices for data quality control and data corrections, and 5) discuss harmonization of LMIS codes for aggregation to regional LMIS.

During the first day, the first three objectives were met. Participants were provided training on the coding system and were given the opportunity to practice sending data to the LMIS server. If trainees had issues with coding or in sending data, these problems were discussed as a group and resolved. On the second day of training, the trainees discussed quality control procedures for the LMIS data. The development of a quality control document that would provide a plan and procedure for maintaining quality of livestock market information system data from point of collection to query of the data by LMIS stakeholders was also discussed. This document would also define the roles and responsibilities of each person or group involved in data collection and storage and would describe actions for correcting erroneous data.

The Kenya LMIS team and Dr. Angerer provided a timeline for implementation of the data collection at markets and for completion of training of trainers and quality control manuals. Immediate next steps that were discussed included: 1) Identification of markets that will be collecting data; 2) Identification of market monitors who will collect data at each market; 3) providing national IT personnel with list of markets and market monitors for each market; 4) conducting training of market monitors and provide datasheets for data collection; and 5) begin data collection and evaluation of data accuracy. Steps that would need to be implemented during the next 6 months included: 1) production of monthly bulletins/reports of price and volume; 2) market monitors, market supervisors, and regional supervisors to provide feedback on system and website; 3) provide information on markets that would be included



in the regional LMIS; 4) identification of any quality control issues; 5) development of a quality control manual; and 6) update and finalize the training manuals.

The Training of Trainers session was completed, and participants were given a test on the topics and procedures covered during the training. The participants did well on the test, especially on the questions regarding livestock grading. The training ended on the afternoon of November 2.

A copy of the PowerPoints used for the Kenya training can be accessed here:

[https://www.dropbox.com/s/iib7m17efk1xajj/kenya\\_lmisis\\_training\\_powerpoints.zip?dl=0](https://www.dropbox.com/s/iib7m17efk1xajj/kenya_lmisis_training_powerpoints.zip?dl=0)

### **Uganda LMIS Installation and Training of Trainer Training – November 2018**

Dr. Angerer traveled to Entebbe, Uganda on November 4, 2018. On November 5, he met with the Uganda LMIS team (Martin Kasyrie and Vanessa Namayanja) and IT staff (Amos Mpungu, Andrew Namilanga) to install the LMIS software on the server at the Uganda Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and to conduct training of trainers for LMIS implementation. The LMIS software was installed on a server housed in MAAIF's secure server room. The modem software was installed on the system and the modem was tested. After the software implementation and testing of the software was completed, Dr. Angerer met with IT staff who would be administering the system to demonstrate the system administration and to discuss what markets needed to be added to the system and what age classes, animal kinds, breeds, grades, and other characteristic data should be added to the Uganda system. It was decided that the age classes, animal kinds, breeds, and grades would match that used in Kenya to allow better harmonization at the regional level. Six markets from the Karamoja region were added to the system. The user list was also discussed, and it was decided that the initial list of users would be requested at the training of trainers training event. Dr. Angerer provided a demonstration on how to link users to specific markets so that the users could send in data to the system via SMS.

The LMIS software and server were tested to ensure that everything was working properly. The MoALFI IT staff procured a domain name and it was linked to the public IP of the system. The system was then brought online publicly and made available at the following web address:

<http://lmis.agriculture.go.ug/lmis>.

The Uganda LMIS team (Martin Kasyrie, Vanessa Namayanja and Andrew Namilanga) and Dr. Angerer traveled to Soroti on November 7 to conduct the Training of Trainers for the Uganda LMIS. The training started on November 8 and approximately 45 people from the Karamoja region attended. The objectives of the training were to: 1) provide an overview and demonstration of the livestock market information system (LMIS) software that will be used for the livestock markets; 2) discuss and provide training on the market information system coding system for sending market data to LMIS server; 3) practice sending data to the server and discuss troubleshooting problems with messages; 4) discuss best practices for data quality control and data corrections, and 5) discuss harmonization of LMIS codes for aggregation to regional LMIS.

During the first day, the first four objectives were met. Participants were provided training on the coding system and were given the opportunity to practice sending data to the LMIS server. If trainees had issues with coding or in sending data, these problems were discussed as a group and resolved. Quality control procedures for the LMIS data were also discussed. This included the development of a quality control document that would provide a plan and procedure for maintaining quality of livestock market information system data and define the roles and responsibilities of each person or group involved in data collection and storage.

The following day the trainees, the LMIS team and Dr. Angerer traveled to a market outside of Soroti and livestock grading was conducted and discussed for the animals present at the market. Approaching buyers and collection of the price and volume information was also discussed.

The group returned to Soroti to close out the training. The participants were given a test on the topics covered during the training. The participants were also provided with a timeline for implementation of the data collection at markets, and for completion of training of trainers and quality control manuals. Immediate next steps that were discussed included: 1) Identification of the livestock markets that will be collecting data; 2) Identification of market monitors who will collect data at each livestock market; 3) providing national IT personnel with list of markets and market monitors for each market; 4) conducting training of market monitors and provide datasheets for data collection; and 5) begin data collection and evaluation of data accuracy. Steps that would need to be implemented during the next 6 months included: 1) production of monthly bulletins/reports of price and volume; 2) market monitors, market supervisors, and regional supervisors to provide feedback on system and website; 3) provide information on markets that would be included in the regional LMIS; 4) identification of any quality control issues; 5) development of a quality control manual; and 6) update and finalize the training manuals.

The training ended on the afternoon of November 8. The Uganda LMIS Team and Dr. Angerer returned to Entebbe.

A copy of the PowerPoints used for the Uganda training can be accessed here:

[https://www.dropbox.com/s/bhzi5f94897xa15/Uganda\\_livestock\\_market\\_information\\_system\\_TOT.zip?dl=0](https://www.dropbox.com/s/bhzi5f94897xa15/Uganda_livestock_market_information_system_TOT.zip?dl=0)

### **Kenya Backstopping and Reinforcement Training – February 2019**

Dr. Angerer traveled to Nairobi, Kenya on February 25, 2019 and met with the Kenya LMIS team (Maurice Ouma, Harrison Mugo, and Mugambi Githinji, and Pius Cheruiyot) to discuss the status of the LMIS system and to resolve any outstanding problems. Dr. Angerer provided the team with an overview of the additions that had been made to the LMIS system since the visit in October 2018. These included: 1) dual modem capabilities; 2) ability to change the logos and banner from LMIS Administrative page; 3) ability to change text content on front page; 4) ability to control public downloads – administrator download only; 5) linked language and currency defaults throughout website; 6) capabilities for state/province and county/districts for markets reports; 7) Fully encrypted passwords; 8) currency synchronization fixed; 9) ability to check modem status added and 10) improvements to market reports

formats. The LMIS team mentioned problems they were having with messages being sent from markets which were not showing up in the database. Dr. Angerer demonstrated how to access the server logs for incoming and outgoing messages and how to search for missing messages. It was discovered that for some of the messages that had been sent, the market monitor was not registered or linked with the market that he/she was sending data from. Dr. Angerer demonstrated to the team on how these could be corrected in the database and how messages that were rejected could be entered into the system via the batch mode capabilities. The group discussed issues with the website and administrative functions. The team provided a list of items for suggested fixes and enhancements that Dr. Angerer logged and provided to the programmer (Mousumi Deb) at Texas A&M AgriLife Research.

On the second day of the mission, Dr. Angerer traveled with Harrison Mugo and Mugambi Githinji to the Lodwar market. There, the group met with the market director and market monitors from the area (Figure 3) to discuss issues they were having with the data collection and sending data into the LMIS server. The majority of these issues were related to linking the appropriate market monitor to the appropriate market so that messages sent in would be accepted by the server. These issues were resolved on site and the market monitors verified that the system would accept data they were sending by resending messages that had been reject. The LMIS team also demonstrated some of the capabilities of the website and the ability of the system to generate market reports (Figure 4).



Figure 3. LMIS team and market monitors at the Lodwar market in Kenya.



Figure 4. Market monitors testing the SMS and LMIS software with the Kenya LMIS team at the Lodwar market in Kenya.

After demonstrating the system, the LMIS team toured the market facilities (Figure 5) and discussed with the market monitors about data collection. The market director explained that the Lodwar market was a daily market that received cattle, sheep, goats and camels. Although it is a daily market, one day of the week has the largest volume (Wednesday) and this is also the time that buyers come for regional transport of the livestock purchased at the market. After the tour of facilities, the group had lunch and Angerer, Mugo, and Githinji returned to Nairobi.

On the third day of the visit, Dr. Angerer met with Oliver Salehe from IGAD and worked with him to install the LMIS software for the Regional LMIS server at the IGAD offices in Nairobi. The system installation was completed. However, some issues were discovered with connection of the SMS modem related to the Virtual Machine software which will require some additional software to correct the problem. In addition, the regional server was not yet connected to a public IP address due to an impending move of the IGAD offices to another location in Nairobi. Once the move is completed, Dr. Angerer will work with Mr. Salehe to bring the system online.

Dr. Angerer met with Maurice Ouma to close out the backstopping mission. The selection of markets for the regional system was discussed and Mr. Ouma said that the Kenya team would meet to come up with the list. The quality control procedures manual was also discussed. Dr. Angerer provided an example document that could be used as a template for developing the Kenya document.



Figure 5. Examining the livestock and market facilities at the Lodwar market in Kenya.

### **Ethiopia Backstopping and Reinforcement Training – February/March 2019**

Dr. Angerer traveled to Addis Ababa on February 28, 2019 and met with the Ethiopia LMIS team (Wondimagegnehu Shibru, Bethelhem Tigistesellassie, Mehari Negash) to discuss the status of the LMIS system and to resolve any outstanding problems. Dr. Angerer provided the team with an overview of the additions that had been made to the LMIS system since the visit in September 2018. Several of these were suggested by Ethiopia LMIS team. These included: 1) dual modem capabilities; 2) ability to change the logos and banner from LMIS Administrative page; 3) ability to change text content on front page; 4) ability to control public downloads – administrator download only; 5) linked language and currency defaults throughout website; 6) capabilities for state/province and county/districts for markets reports; 7) Fully encrypted passwords; 8) currency synchronization fixed; 9) ability to check modem status added and 10) improvements to market reports formats.

Mr. Shibru provided an overview of the progress that had been made and provided an update on the status of the program. He also stated that the Ministry was actively involved in developing a short number, bulk SMS system that would be used by several groups in the Ministry for distributing information. He stated that Dr. Angerer should meet with the IT contractor that was working on the bulk SMS system to discuss how to integrate it with the LMIS SMS messaging. Mr. Shibru also stated that a meeting had been arranged with the State Minister of Agriculture, Aynalem Nigussie, for Monday March 4 to provide an overview of the LMIS and to discuss progress.

The LMIS team indicated that issues related to problems with the modem SIM card had been resolved with the update to the modem software that Dr. Angerer had completed in early February 2019. Dr. Angerer worked with the team to go over any problems they were having and to demonstrate some of the new features of the LMIS software. The IT team provided a list of issues that required attention and went through each of these with Dr. Angerer. The team then asked questions about fixing messages with errors and proper procedures for using the batch mode tool. The group discussed issues with the website and administrative functions. Dr. Angerer took notes on problems and suggested fixes/enhancements and these were combined with the list that the IT staff provided. These issues were sent to the programmer (Mousumi Deb) at Texas A&M AgriLife Research for incorporating into the next software update.

On Monday, March 4, Dr. Angerer met with the Ethiopia LMIS team and Oliver Salehe (IGAD IT) to go through the presentation that would be made later in the day for the State Minister of Agriculture. Suggested corrections were documented and included into the presentation. During the afternoon, the Dr. Angerer and the team met with Her Excellency Aynalem Nigusie, State Minister of Agriculture. The Ethiopia LMIS team was introduced along with member of the Advisory Committee that is providing oversight and suggestions for development of the Ethiopia LMIS. Dr. Angerer presented an overview of the LMIS system along with information on the progress to date in implementing the LMIS. Issues that have occurred with regard to data collection and availability of the system were also presented and discussed. Questions from the advisory committee to Dr. Angerer related to the issues with the SMS modem, as well as issue with the public availability of the LMIS server. It was agreed at the meeting that the LMIS team would develop a timeline of activities that needed to be completed in order for the State Minister to present the system to the public in late April in order to meet promises to the Prime Minister regarding deployment of the system. Wondimagegnehu Shibru indicated to the group that he would put this together and so that the work could be communicated to those involved and so that the deadline would be met.

On Tuesday, March 5, Dr. Angerer met with the Ethiopia LMIS team to discuss the timeline of activities and to transfer all documents and PowerPoints that had been developed to date to the Ethiopia team. The quality control manual development was also discussed and Dr. Angerer provided the team with a template document that could be used to start development and documentation of the quality control protocols and procedures.

A copy of the PowerPoint presentation given to the State Minister can be downloaded here:

[https://www.dropbox.com/s/n88rfa591wshod8/ET\\_livestock\\_market\\_information\\_system\\_update\\_03042019\\_small.pptx?dl=0](https://www.dropbox.com/s/n88rfa591wshod8/ET_livestock_market_information_system_update_03042019_small.pptx?dl=0)

### **Uganda Backstopping and Reinforcement Training – February 2019**

Dr. Angerer traveled to Entebbe, Uganda on March 5, 2019. On the morning of March 6, Dr. Angerer met Uganda LMIS team (Vanessa Namayanja, Amos Mpungu, Andrew Namilanga) and Oliver Salehe (IGAD IT) to travel to Soroti, Uganda to conduct refresher training for the LMIS to market trainers. Upon arrival in Soroti, the team met for a short time to discuss the training the following morning.

For the refresher training, approximately 40 people were in attendance (Figure 6). Dr. Angerer provided the team with an overview of the additions that had been made to the LMIS system since the visit in November 2018. Dr. Angerer then gave an overview of improvements that had been made to the LMIS system and demonstrated to the trainers some of the capabilities of the LMIS website. The floor was then opened to the trainees for them to ask specific questions about problems they were having with sending messages and using the system. The majority of problems were related to market monitors sending data for a market in which they were not registered in the system. The majority of the afternoon was spent adding market monitors names to the system and then linking these users to the correct markets. Discussions were also held about additional markets that needed to be added to the system. The new markets were agreed upon among the trainers and the LMIS team and these markets were added into the system along with the names of the associated market monitors. Dr. Angerer then



showed the trainees on how to spot problems in messages and how these should be corrected.

**Figure 6. Refresher training conducted for market trainers in Soroti, Uganda.**

Time was spent discussing the quality control measures that needed to be implemented for ensuring that data was accurate and timely. The quality control manual development was also discussed and Dr. Angerer provided the team with a template document that could be used to start development and documentation of the quality control protocols and procedures. The LMIS team asked the trainees to work with their monitors to have data collection begin immediately and to send in any data that had not already been captured into the system. The training ended and the LMIS team, Dr Angerer, and Mr. Salehe returned to Entebbe.

## **Remaining Tasks to Be Completed and Ongoing Tasks**

For all 3 countries, the following tasks remain:

1. Finalize selection of the regional markets for each country and complete software code to upload data from country servers to regional server.
2. Bring Regional server online for public use.
3. Test the Virtual Private Server platform as a means for serving the Regional LMIS data.
4. Complete of the quality control procedures/protocols document.
5. Completion of the System Administration, System Installation, and System User's guide for the LMIS. These will contain the country specific information and protocols for data collection.
6. Continued evaluation of errors and system performance along with recommendations for improvement.
7. Producing monthly bulletins/reports of price and volume.
8. Backstopping mission to each country in July 2019 by Dr. Angerer