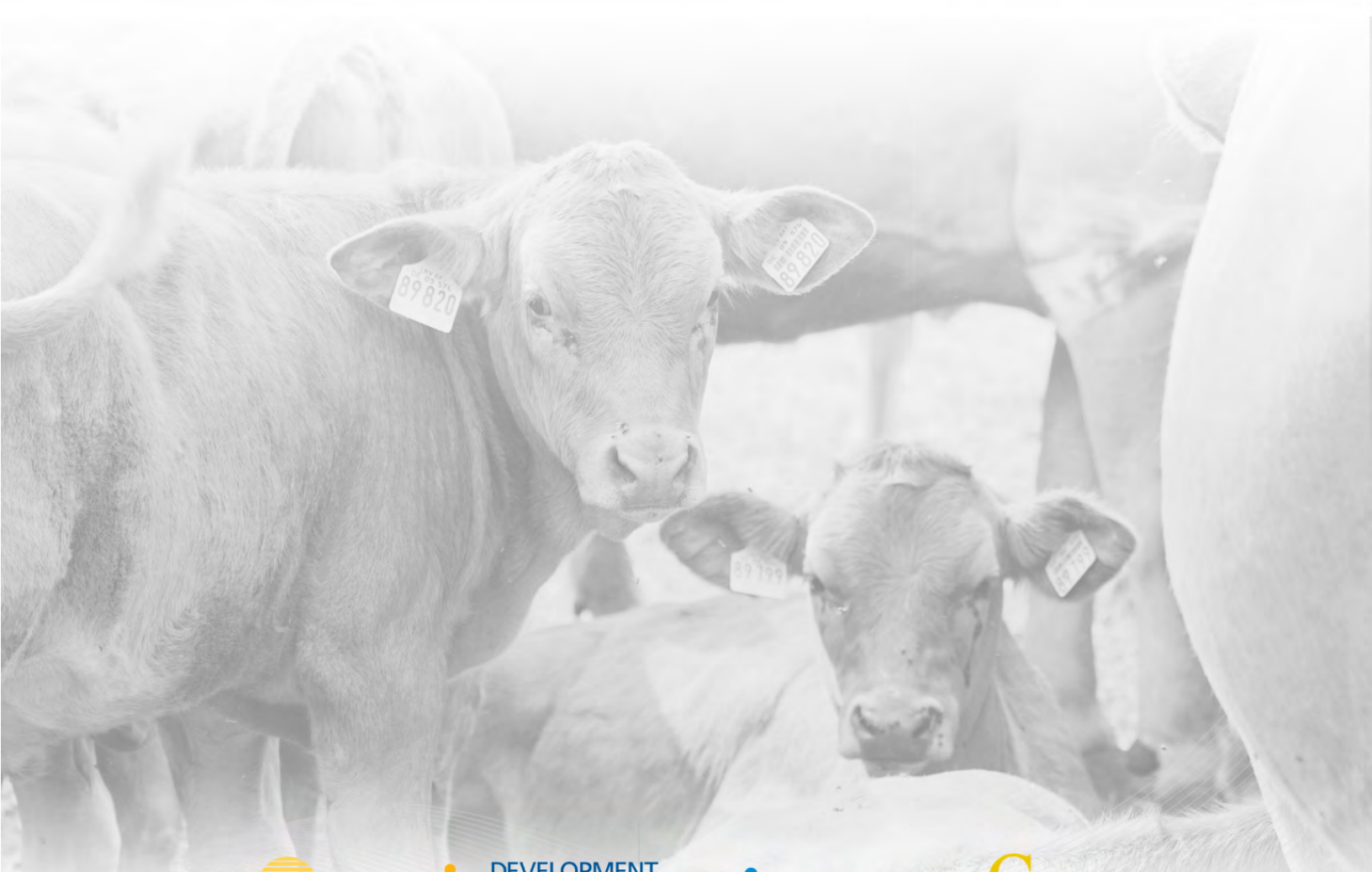
Strengthening Livestock Data Use through Capacity Building



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Executive Summary

The Ethiopian Ministry of Agriculture (MoA), Ministry of Regional Trade & Integration (MoTRI), and Livestock Development Institute (LDI) manage significant volumes of livestock data across five key systems. This data ranges from disease outbreaks to market trends and genetics. However, limited technical capacity among system owners and data users has hindered effective data management, analysis, and use in decision-making.

To address this gap, Development Gateway (DG)'s a Livestock Information Vision for Ethiopia (aLIVE), funded by the Gates Foundation (GF), launched a data use training program in 2023. The initiative targeted system owners and experts from five key national systems:

- Animal Disease Notification and Investigation System (ADNIS)
- Disease Outbreak and Vaccination Report (DOVAR) system
- Ethiopian Livestock Identification and Traceability System (ET–LITS)
- African Asian Dairy Genetic Gains (AADGG) system
- National Livestock Market Information System (NLMIS)

The training program aimed to:

- Build practical skills in data cleaning, validation, analysis, and visualization
- Encourage the use of tools such as Excel and Power BI for robust and efficient reporting
- Foster a sustainable, data–driven culture within the MoA and other institutions working on livestock

Key successes of the training program include:

Enhanced Data Use Efficiency:

Trainees now complete tasks that once took days in just hours using new data use skills. This has drastically reduced manual work and improved report quality.

Improved data quality:

System owners have adopted automated methods for identifying duplicates, validating entries, and

standardizing data – replacing previously error-prone, manual processes. These improvements have increased the reliability of system data and reports generated for decision-makers.

Tool Adoption and Confidence:

Trainees have embraced new tools in their daily work, reporting greater confidence in handling large datasets. Data use trainings conducted at the regional level demonstrate this.

Early Signs of a Strengthened Culture of Data Use:

Encouragement from high-level leadership, most notably from Dr. Fikru of the MoA, helps to reinforce the importance of data in strategic decision-making. His instruction to include visualizations on all reports generated has shown trainees the need to implement new data skills.

To build on the progress made, the report recommends:

- Expanded training coverage
- Enhanced training quality and practical application
- Promoting a culture of data use
- Establishment of post–training support mechanisms
- Encouragement of regular data–driven reporting

The aLIVE program has made meaningful progress in building data use capacity and is contributing to livestock data use at the federal level in Ethiopia. While technical skills have been improved, sustained impact will depend on continued leadership support, long-term mentoring and resourcing, and a shift toward a stronger institutional culture of data use and thus evidence-based decision-making.

Introduction

The Ethiopian Ministry of Agriculture (MoA)'s Livestock and Fisheries Development Sector governs vast amounts of agricultural data related to animal health, market trends, traceability, and genetics. However, professionals across the sector – including epidemiologists, veterinary experts, and other data users – face persistent challenges in effectively managing, analyzing, and visualizing this data. These challenges have resulted in inefficiencies and difficulties in decision-making, ultimately impacting policy formulation and service delivery.

To address these issues, Development Gateway (DG)'s a Livestock Information Vision for Ethiopia (aLIVE) project introduced a structured data-use training program in 2023. The program was designed to equip system managers and users of five key livestock data systems with practical skills in data handling, processing, and visualization. These systems include the Animal Disease Notification and Investigation System (ADNIS), Disease Outbreak and Vaccination Report (DOVAR) system, Ethiopian Livestock Identification and Traceability System (ET-LITS), African Asian Dairy Genetic Gains (AADGG) system, and National Livestock Market Information System (NLMIS).

Through this initiative, system owners have gained hands-on experience with tools such as Excel and Power BI which empower them to make data-driven decisions in their day-to-day activities.

Training Objectives

The primary objective of the data use training program is to enhance the capacity of key system owners and other experts in the livestock sector by equipping them with practical data quality and analysis skills, and providing the opportunity to practice these skills. The training program focuses on improving data quality by introducing trainees to systematic data cleaning and data processing methods and enhancing their data visualization capabilities using tools such as Excel and Power BI.

The training aims not only to build data use skills but also to foster a data-driven culture. The training should enable and encourage system owners and data users to make more data-informed decisions, streamline workflows, and improve the efficiency of data handling and reporting within their respective roles.

Additionally, the training seeks to instill greater confidence in their data use skills and support them in transitioning from manual data processing methods to more advanced, automated techniques that increase accuracy and reliability. Ultimately, the trainees will be entrusted with maintaining the dashboards put in place by aLIVE beyond the program's lifespan. They will actively utilize the data generated from the systems to inform their own day-to-day decision-making processes while also contributing valuable insights to support evidence-based decisions made by higher-level officials.

Training Program Overview

The aLIVE program has conducted a series of structured and hands-on training in essential data management and visualization techniques. In November 2023 and January 2024, a total of 35 federal system owners received training with a focus on practical application in real-world scenarios utilizing their own data generated from their databases. Participants learned how to clean and manage datasets, apply Excel formulas and functions, use PivotTables and PivotCharts for data summarization, and develop interactive visualizations with Power BI. A critical component of the training emphasized key data quality principles, such as validity, integrity, precision, reliability, and timeliness, ensuring that system owners could produce reliable and accurate reports. Many trainees had prior theoretical knowledge but lacked hands-on experience, which this training effectively addressed by allowing them to work with live datasets from their own database. Building on this foundational knowledge, the same participants will continue on to intermediate-level training, which will help the trainees further strengthen their data visualization skills using Power BI.

Assessment Methodology

To assess the impact of the data use training provided to the system owners, a mixed-methods approach was used. Data was collected through pre-training and post-training assessments to gauge the participant's immediate skills gain, and surveys were designed and distributed to capture the trainees' initial feedback and levels of satisfaction.

To gain a deeper understanding of the training effectiveness, particularly regarding the application of acquired skills in day-to-day activities and its influence on fostering a culture of data use, additional qualitative methods were incorporated. The aLIVE team conducted semi-structured interviews with eight selected participants of the data use training, including system owners. Two additional interviews were conducted with decision-makers at the MoA. These interviews examined how the training influenced daily job performance and perceptions of data use culture, and gathered insights on how the training could be improved to better meet the needs of participants. The findings from these interviews are discussed in the following sections

Key outcomes achieved

Key Outcome 1 : Enhanced Data Use Efficiency

Following training, the efficiency of using livestock data for various reports and decision-making has been increased. The trainees reported that data tasks which previously took them several days to complete could now be done in hours or even minutes. The use of PivotTables and advanced filtering, in particular, reduced their manual workload.

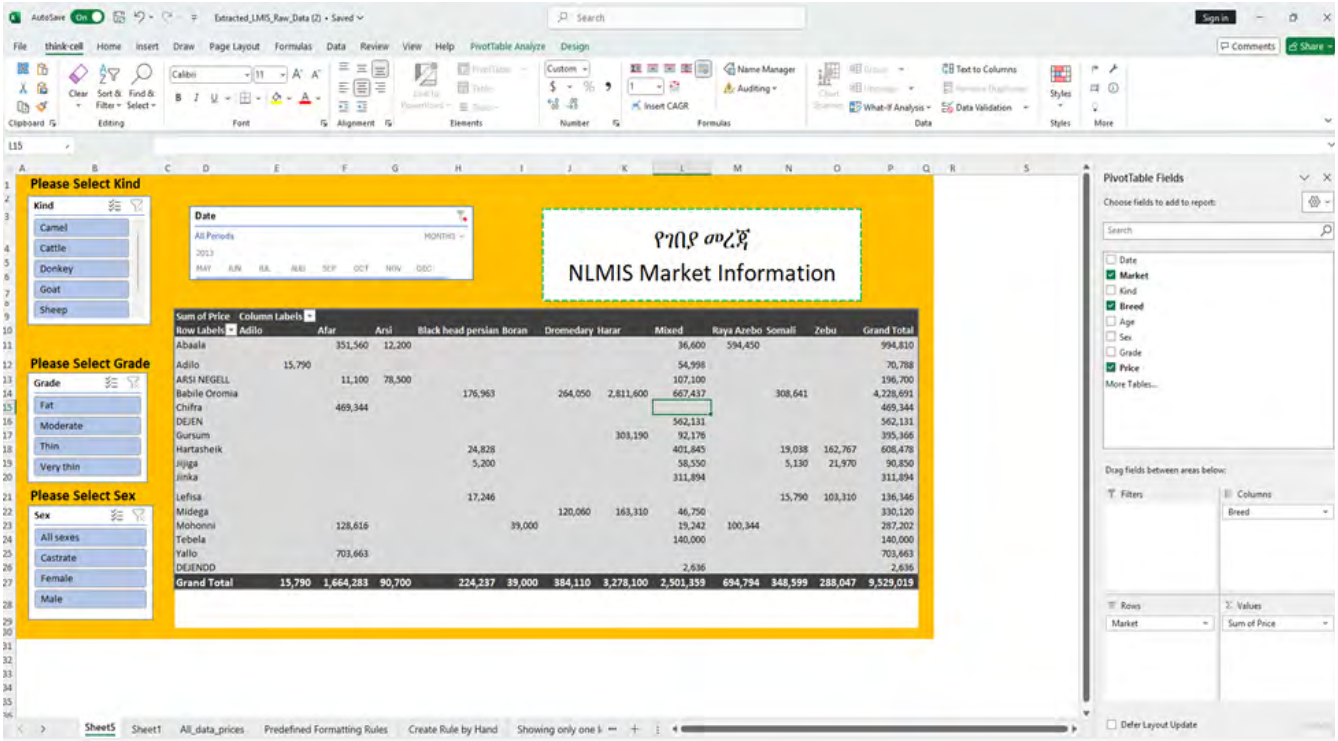
> "When we receive national export data from the Customs Commission, it comes as unstructured, raw data with everything mixed together. We use the tools to filter out the information relevant to us, making the data more usable. Before, we did this work manually, and preparing the required monthly report took a week or more. Now, we can complete it in half a day at most, sometimes even in hours. The tools allow us to sort data by multiple variables including export destination, breed (goat, sheep, cattle, or camel), quantity, market value, and price. For example, we now can easily determine which destination, such as Saudi Arabia, Yemen, or Oman, offers better market prices. Once sorted, the data is sent to the Prime Minister's office every month, and we also use it to generate quarterly, biannual, and annual reports."
>
> – Livestock Export Expert, Ministry of Trade & Regional Integration (MoTRI)

The Livestock Export Expert cited above manages NLMIS and would previously spend a week at a time compiling monthly, quarterly, bi-annual, and annual reports manually. He would prepare the reports by counting and tallying data from a list to make a summary table. Now, this expert, and other trainees, automate calculations using Excel formulas, filters, and PivotTables. These skills reduced report preparation time to just a few hours. The reports below demonstrate the improvements in pre-training reports and post-training reports utilizing newly acquired data skills.

Example of a pre-training report:

Date	Market	Kind	Breed	Age	Sex	Grade	Price
1/1/2013	DEJEN	Cattle	Mixed	Immature	Male	Fat	2,010
1/1/2013	DEJEN	Cattle	Mixed	Immature	Male	Moderate	1,444
1/1/2013	DEJEN	Cattle	Mixed	Mature	Female	Moderate	4,340
1/1/2013	DEJEN	Cattle	Mixed	Mature	Female	Thin	2,900
1/1/2013	DEJEN	Cattle	Mixed	Mature	Male	Fat	9,400
1/1/2013	DEJEN	Cattle	Mixed	Mature	Male	Moderate	7,660
1/1/2013	DEJEN	Cattle	Mixed	Mature	Male	Thin	4,660
1/1/2013	DEJEN	Cattle	Mixed	Young	Female	Fat	3,534
1/1/2013	DEJENDD	Cattle	Mixed	Young	Female	Moderate	2,636
1/1/2013	DEJEN	Cattle	Mixed	Young	Male	Fat	8,930
1/1/2013	DEJEN	Cattle	Mixed	Young	Male	Moderate	5,620
1/1/2013	DEJEN	Goat	Mixed	Immature	Female	Fat	516

Post-training report using PivotTable:



Key Outcome 2 : Improved Data Quality

Trainees from the MoA, MoTRI, and Livestock Development Institute (LDI) regularly utilize data-cleaning techniques in their day-to-day tasks. These techniques are aimed at ensuring data quality and targeting the standardization of data entries at the data collection and collation stage, detection of duplicate data, and management of outliers and inconsistencies in livestock data. In conjunction with an improved data cleaning skill set, the trainees now also demonstrate an improved understanding of data quality dimensions, such as validity, integrity, precision, reliability, and timeliness following their participation in the data use training series. This improved foundational knowledge supports and encourages the use of newly acquired and improved data skills.

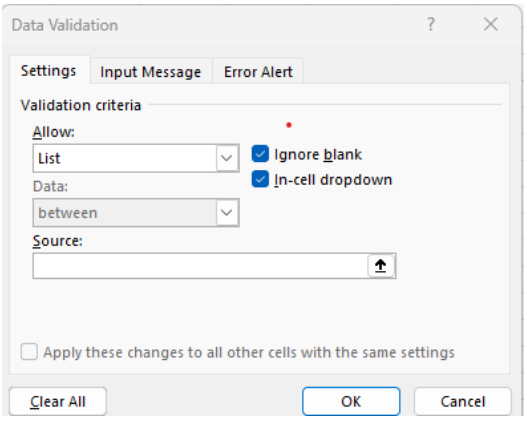
Pre-training, manual data cleaning methods required the participants to scan data and sort it in ascending or descending order to identify and count duplicate values. This was a time-consuming process vulnerable to error. One of the major challenges that the trainees emphasized was the difficulty in accurately identifying duplicate values. The method they used involved a two-step process – sorting the data and then visually detecting duplicates. This was a tedious methodology that frequently resulted in errors.

After participating in data use training sessions, the trainees adopted more efficient techniques such as conditional filtering to identify duplicate values. During our assessment, trainees described this new skill as “miraculous,” saying that it significantly simplifies their data management tasks.

> “One of the benefits of the training is quality. There is no doubt that using software makes a big difference compared to a manual approach. It helps me to avoid repetition, and if editorial errors occur, they can easily be fixed. On the contrary, when doing things manually, many things can be distorted, and sorting this out would require redoing the whole process. But now I can easily spot errors.”

In addition to improved data cleaning skills, trainees now demonstrate improved advanced data validation skills. Previously, manual data validation was conducted following data collection by applying filtering. After participating in data use training, the trainees now standardize data entries at the data collection stage and use Excel functions for data validation.

Example of post-training data validation:

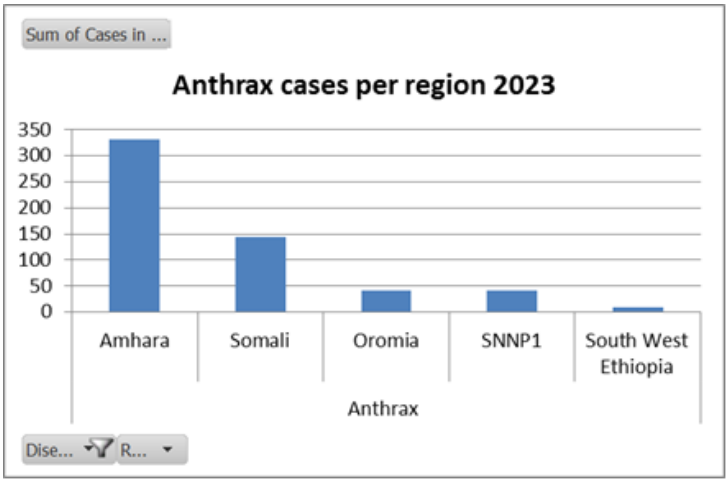


One of the trainees – the DOVAR system manager – offers an example of these improved data validation techniques in practice. This system manager is tasked with regularly preparing a national disease report to the World Organisation for Animal Health (WOAH) but encounters inconsistencies in the data submitted by regional data points. Using the data validation techniques learned from the training, the system manager is now better equipped to prepare this report. To prepare the most recent national disease report, the trainee implemented an automated data validation method by creating a dropdown list for the data collected from the regions and used conditional filters and pivots to ensure accurate and consistent reporting across all regions. The system owner then visualized this data using Pivot charts, as shown below and included this in the report.

Pivot Table of Anthrax Distribution:

	Values		
Disease	Sum of Cases in the month	Sum of Deaths in the month	Sum of Infected Units
African Horse Sickness	915	512	86792
Anthrax	1667	364	626203
Babesiosis	23	3	9950
Black quarter	487	103	161250
Botulism	7	4	9900
Brucellosis	153	21	6573
Camel Pox	93	11	10860
Coccidiosis	38	2	7450
Contagious Bovine Pleuro-pneumonia	2648	903	395708
Contagious Caprine Pleuro-pneumonia	1949	419	386773
Contagious Echtyma/Orf/	276	0	26618
Equine Herpes Virus	165	31	1650
Foot and mouth disease	43503	533	2940146
Heamorrhagic Septicaemia	6099	631	645477
Infectious Bursal Disease (Gumboro)	1225	1225	5000
Lumpy Skin Disease	1759	171	782130
Malignant Cataral Fever	7	6	1950
Newcastle Disease	14516	6610	458512
Peste des Petits Ruminants	8003	1863	1795688
Rabies	514	443	143380

Pivot Chart of Anthrax Distribution:



Overall, the data use trainees reported that the practical skills acquired from the training helped them to address the data quality issues they encountered in their day-to-day work. Employing PivotTables, advanced filtering, and advanced data validation techniques has helped them to reduce errors generated using manual methods.

Key Outcome 3 : Adoption of Tools & Increased Confidence

Success in achieving the previous three outcomes discussed in this case study, along with observations by the aLIVE team and our post-training assessment, indicate that not only have the participants learned new skills and attained greater foundational knowledge on data use but that they have adopted the tools they have learned in data use trainings and applied them in their day-to-day practice. Examples discussed throughout this study support this finding.

System owners have been introduced to advanced data visualization tools such as Pivot Chart and Power BI for the first time through the data use training series. They are now better capacitated to integrate these tools into their daily workflows, and their improved efficiency in generating data visualizations encourages them to do so. The enthusiasm felt by the trainees is summarized by one below:

> "To be honest, there are many things [we learned]. There were features that we thought we knew in Excel. We used to click shift + down arrow to select, which would take much time. But now, we can do it easily thanks to the training. These kinds of things sound simple but their utility is highly valuable. We have thousands of pieces of data. By simply pressing control + shift + down, we can select and

manipulate thousands of items. We also use the tools to detect duplications. We didn't do conditional formatting a lot before. We used to use removing, but this is irreversible. Now we can detect if there are duplicates in conditional formatting. Then we remove any. The other technique we learned from the training was converting one data type to another from text. We can simply convert daily data to monthly and adjust patterns for time series analysis. But before, we had to look at things one by one. The other is we can sort dates out using the tool."

This enthusiasm translates into the adoption of skills. The above-quoted expert went on to use Power BI to create dynamic dashboards that visualized breeding trends in his work on a livestock genetics project, aiding policymakers in making informed decisions.

Additionally, trainees reported an increase in confidence in handling large datasets and using analytical tools effectively, further reinforcing adoption of these skills on the job. An expert from the MoTRI reported that, before undergoing training, he struggled with summarizing big livestock market data. Following the training, he has been able to reduce his manual efforts by applying new data processing techniques. This improved competency has translated into a more confident mindset when working with data and the confidence to teach the skills learned, as expressed in the interviews conducted with the trainees. Multiple interviewees discussed that they now "better understand what data quality means."

In practice, this confidence has translated into regional-level data use training conducted by federal-level system owners who participated in aLIVE's training. These regional-level data use trainings were successfully conducted by these system owners without the aLIVE team's presence. Since then, these systems have continued to organize their own data management training at regional level. This progress demonstrates that data use skills are now spreading from the national Ministry of Agriculture to livestock system staff across the country.

Lessons Learned

From our experience and the feedback we collected, we find three key features that have made the data use training series successful:

1. **Use real data:** when the trainee practices on their own data, the tasks feel useful and interesting.

2. **Give follow-up sessions:** provide regular on-the-job refreshers and advanced follow-up sessions after the initial short training so trainees can practice and build on their new skills without losing them.

3. **Show leadership support:** when managers and senior leaders ask for reports with clear charts and numbers, the trainees keep using the new skills every day.

These features enhance the practicality and applicability of the training, sustaining the use of the new skills and fostering a culture of data use.

Challenges

Different challenges have been observed during the training and post-training that could limit the effectiveness and long-term impacts of the skills acquired. These issues stemmed not only from logistical constraints but also from organizational shortcomings related to data culture and accountability. Addressing these challenges is crucial to ensure future training initiatives lead to sustainable improvements in data management and usage.

Key Challenges Identified During the Training:

- Insufficient Training Duration: The time allocated in the first round of training was inadequate to thoroughly cover the necessary content and allow for in–depth learning. Learning from this experience, we increased the length of the second round training.
- Inadequate Equipment: In the first round training, the computers the trainees used for the training were insufficient, hindering participants' ability to engage and practice effectively and was improved in the second round training.
- Limited Post–Training Application: While participants found the skills useful and applicable to their daily work, application of these skills is limited by their availability. Trainees are frequently overburdened with different tasks due to urgent operational demands, a lack of a dedicated data analyst role in the sector, and limited demand for data–driven reporting. Therefore, participants had limited opportunities to apply their newly acquired skills, reducing retention and practical impact.
- Lack of Accountability for Poor Data Practices: The absence of accountability mechanisms allows poor data management to go unaddressed.
- Low Demand for Data–Driven Reports: Management rarely requests reports based on data, signaling that data insights are not a regular part of decision–making processes.
- Weak Data–Informed Decision–Making: High–level decisions are often made without relying on data, which discourages the development of a data–driven culture.

Recommendations and Future Plans

Drawing on the outputs of this assessment and our observations, some future actions are proposed to capitalize on the recent training efforts and address the key challenges identified. These actions should be implemented by the MoA in the future and are designed to strengthen data management capacity, enhance data utilization, and foster a culture of evidence-based decision-making.

The training program will be strategically expanded to include a broader range of system owners and data users across all relevant systems and regions. This expansion aims not only to enhance individual data use skills but also to promote a ministry-wide shift toward a data-driven culture. A key objective is to embed data as a critical asset in daily operations and strategic planning.

This transformation will require strong leadership engagement and active buy-in from management, ensuring that data utilization becomes a standard component of decision-making processes. Such alignment at the leadership level is essential for driving institutional change and sustaining improvements in data practices.

Additionally, trainees have expressed a demand for further training sessions. While this is a gap to fill, it is also a positive sign that the trainees view the data use sessions as useful.

> I would like advanced training to be offered to us. Of course, most big companies use R, but basic and intermediate tools would be enough for us."

To achieve these goals, the following key actions are planned:

1. Expand Training Coverage: In collaboration with the Ministry of Agriculture and other projects, reach more system owners and data users across related departments and regions to ensure inclusive capacity-building.

2. Enhance Training Quality and Practical Application: Increase the duration of training and incorporate hands-on, scenario-based exercises to reinforce learning and ensure practical application.

3. Promote a Culture of Data Use: Work with the leadership about the value of data and embed data-driven thinking into the Ministry's operations and strategic initiatives.
Establish Post-Training Support Mechanisms: Implement follow-up activities such as refresher training, mentoring, and on-the-job support to sustain their skill development.

4. Encourage Regular Data-Driven Reporting: Work with higher officials and demonstrate the benefits of evidence-based reporting to encourage consistent demand for routine, data-driven reports, thereby reinforcing the value of accurate and timely data

Implementing these steps will require action from the MoA, as the aLIVE program aims to put in place foundations that can be carried forward by the Ministry beyond the program's lifespan. In order to support this, the aLIVE team has collaborated with the MoA – and Dr. Fikru specifically – to strategize on how to mobilize additional resources.

This comprehensive approach will not only enhance technical competencies but also foster a robust institutional culture where data is consistently used to drive performance, transparency, and impact across the livestock sector at the MoA, MoTRI, and LDI, and beyond.

Conclusions

Overall, the team has successfully instilled highly valuable, time-saving skills to different staff across the Ministry of Agriculture and beyond. The trainees have provided largely positive feedback, indicating that the skills learned make a difference in their everyday work. Therefore, we are making good progress towards the primary goal of this training program – which is to improve the data use capacity of the trainees, including system owners.

The second objective, which is to strengthen a culture of data use, is more difficult to measure. We can conclude based on this assessment that there has been an adoption of data skills at the system owner and expert level. However, while system owners and other trainees express excitement about their new skills, and are observed utilizing these in their day-to-day work, it will only be in the long run that we can accurately gauge how these skills permeate decision-making at the MoA. Data use must not only occur at the system level, but at higher levels among decision-makers.

We believe that there is some promise here. The last training session in February 2025 was attended by Dr. Fikru, who gave the closing remarks. During these remarks – later echoed in a one-on-one interview about aLIVE's impact – Dr. Fikru expressed his expectation that data visualizations be included in all reports he received. Attending the training session and viewing the results produced by the trainees utilizing their new skills impressed upon him the value of these data use trainings. Dr. Fikru was also able to directly connect these skills to strengthened decision-making at the leadership level.

> "I went to the training session. [The trainees] showed me how they [used their data skills to analyze the data] and they showed me the results. It is what I also want for me to make life easy and to really be confident in making decisions."
>
> – Dr. Fikru, MoA

Dr. Fikru found that the analyses conducted by the trainees using their new skills helped to make the data usable:

> "You might have the data but you may not know how to use it or make sense of its meaning. If you cannot give this data meaning, you can't use it to make decisions. The visualizations put together by the trainees help me to detect problems and to know how and why the problem is a problem. These visualizations help me to know to focus, for example, on District X rather than District Y. The visualizations also showed me trends. Trend analysis is also something that you would like to know about when you are making decisions. It can show you whether you are on the right track."

The closing remarks offered by Dr. Fikru were reported by trainees as having motivated them to generate such visualizations, and capacitated with the skills to do so through aLIVE's data use training. We are hopeful that this high-level encouragement will promote the continued use of data skills and foster a data-driven culture among decision-makers.

Finally, to sustain the progress that has so far been achieved, ongoing support, mentorship, and follow-up will be essential. Embedding these skills into regular workflows and day today activities, integrating data use expectations into reporting structures, and encouraging leadership to model data-informed decision-making can help solidify a lasting culture of data use within the Ministry. Looking ahead, we recommend continuing investment in both refresher training and peer learning opportunities to maintain momentum and deepen impact across all levels of the MoA.