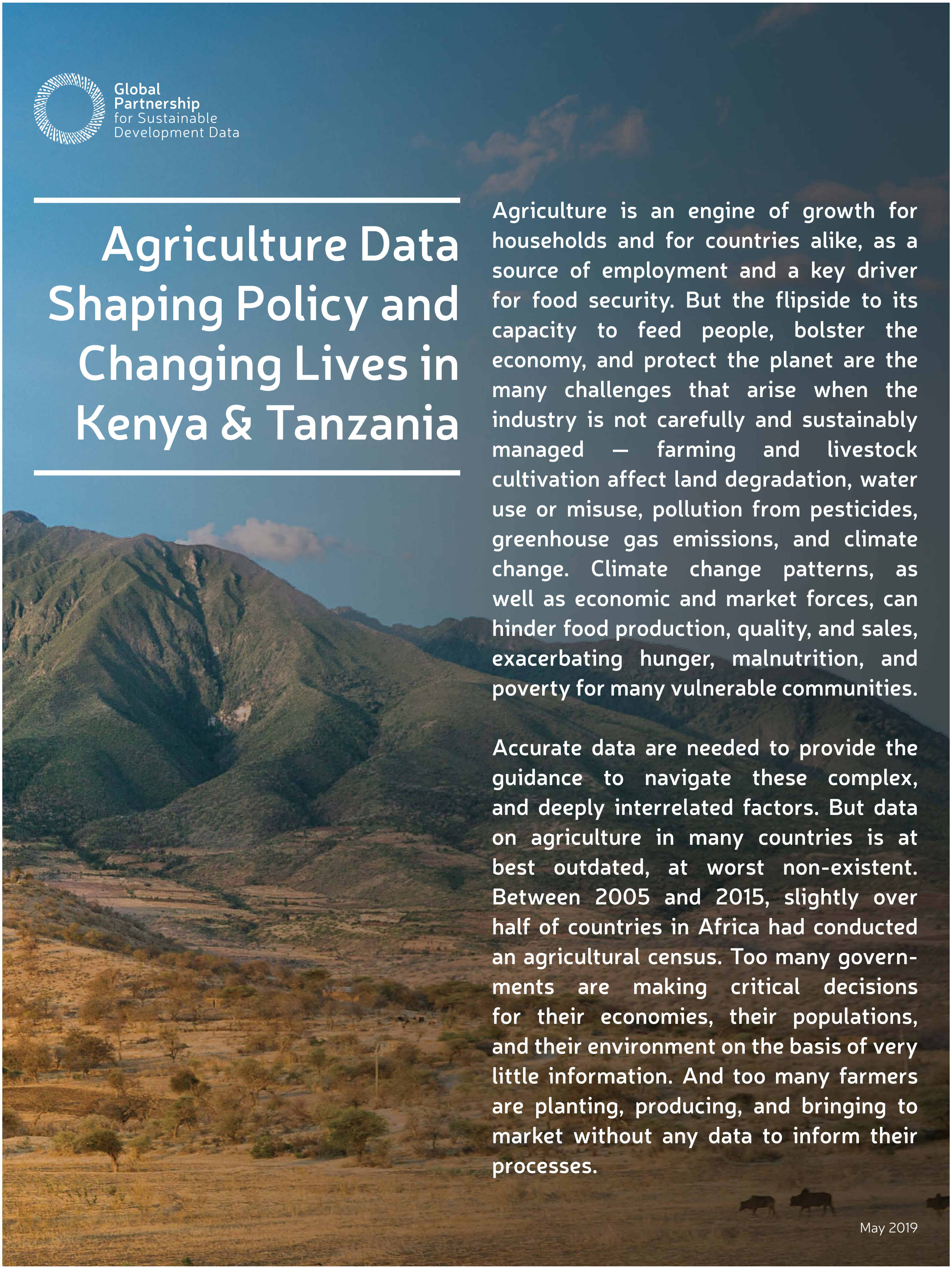


Global Partnership for Sustainable Development Data

Agriculture Data Shaping Policy and Changing Lives in Kenya & Tanzania

Agriculture is an engine of growth for households and for countries alike, as a source of employment and a key driver for food security. But the flipside to its capacity to feed people, bolster the economy, and protect the planet are the many challenges that arise when the industry is not carefully and sustainably managed — farming and livestock cultivation affect land degradation, water use or misuse, pollution from pesticides, greenhouse gas emissions, and climate change. Climate change patterns, as well as economic and market forces, can hinder food production, quality, and sales, exacerbating hunger, malnutrition, and poverty for many vulnerable communities.

Accurate data are needed to provide the guidance to navigate these complex, and deeply interrelated factors. But data on agriculture in many countries is at best outdated, at worst non-existent. Between 2005 and 2015, slightly over half of countries in Africa had conducted an agricultural census. Too many governments are making critical decisions for their economies, their populations, and their environment on the basis of very little information. And too many farmers are planting, producing, and bringing to market without any data to inform their processes.

May 2019

Better data can lead to better decisions. This case study shines a light on where data is being used effectively in the agriculture sector to support governments to provide better services to their people. It explores data use in Kenya – using survey and satellite data to protect pastoralists from the shocks of drought, and in Tanzania – using survey data to gather additional data and to test more efficient policies that are achievable at low costs.

These case studies from Kenya and Tanzania provide interesting and important lessons for data projects that are seeking to improve development outcomes, whether agriculture-related or otherwise. Data use is often limited by capacity – even when data exists, if policymakers do not have the skills to analyze the data, or do not have data presented to them in both human and machine-readable, interoperable formats, they are not able to use it for improved policy decisions. Traditional, foundational data sources such as surveys and censuses are necessary and critical. However, when combined with other new data sources such as satellite data or data collected by citizens – sources that often offer more granular and timely data – the two sources together become exponentially more useful and valuable, enabling governments to make accurate predictions for the sector. One case study will show a profound example of how data can be used to optimize resource allocation, leading to better outcomes without necessarily requiring more program resources.

Finally, throughout the text, it will become evident that data is a necessary input, but can't be the sole driver of decision-making – it must be present amongst an already strong and functioning data ecosystem paired with political will to implement change through inclusive, transparent processes.

Context: the state of agriculture information

Policymakers and farmers alike require timely, accurate, and up-to-date information such as weather data, seed and fertilizer availability, market prices, the best crop to plant for the soil type, best products to use, the quality and availability of agricultural services, or crop yields in different regions. This information is useful for planning investments, shaping innovation, and making policy decisions. For

many developing countries, this data does not exist. Weak agricultural statistical systems and limited availability of sound agriculture data hampers decision-makers' capacity to prioritize investments in agriculture, causing losses in productivity and agricultural income. Without improved data, countries will not be able to monitor or achieve SDG2 to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Why agriculture?

A source of employment and a key driver for food security, agriculture is recognized as a growth engine for many countries. In Sub-Saharan Africa, the agriculture industry employs 55 percent of the population.[1] It contributes an average of 15 percent of total GDP, ranging from as low as 3 percent in Botswana, 30 percent in Kenya and Tanzania, to more than 50 percent in Chad.[2] But agriculture also contributes to the environmental challenges our planet faces – affecting water use or misuse and causing land degradation and pollution from pesticides. Agriculture is also the second largest contributor[3] to global greenhouse gas emissions, all of which cause and exacerbate climate change.[4]

> **In low-income countries, 63 percent of workers were still employed in the agricultural sector in 2018.**
> ***— International Labor Organization (ILO), 2018***

These global challenges reinforce the urgent need for accurate, comprehensive, and timely data for decision-making. But for many countries, data on agriculture is at best outdated, and at worst non-existent. Between 2005 and 2015, slightly over half of countries in Africa had conducted an agricultural census.[5] Where data exists, it is often not available to the public, or it is hardly used for decision-making.

But this is starting to change. Governments are beginning to realize the value of data, and the importance of allocating resources to data collection and use. The **50x2030 Initiative** launched in 2018 aims to support countries to conduct surveys of farming households and then make the data available to enable governments to shape evidence-based policies. Foundational data such as these household surveys can help increase agricultural productivity in a sustainable manner and are also necessary prerequisites for adopting and incorporating new, complementary sources such as satellite data.

This case study, the 11th in a **Value of Data case study** series, shines a light on agricultural data and how it can be leveraged to help governments provide better services to their people. This case study highlights key lessons around agriculture data in two countries in East Africa, each with different agricultural priorities. In both cases, the data is leveraged for policymaking that results in improved, positive outcomes, further reinforcing the value of investing in agriculture data.

Kenya: Kenya Livestock Insurance Program (KLIP)'s Data-Driven Approach

The Context

Agriculture is the backbone of the Kenyan economy, directly employing 58 percent of the population as of 2018. However, agricultural productivity has not increased proportionately to population growth. In fact, in some instances productivity has decreased. This has been a result of the decreasing size in arable land, and farmers being pushed to marginal areas where they become more vulnerable to drought and the unpredictability of weather patterns resulting from climate change. For these reasons, Kenya is forced to rely too heavily on food imports to feed its people.[6]

Kenya is vulnerable to frequent and expensive[7] natural disasters. Drought occurs approximately every 2-4 years, seriously affecting livelihoods. It is estimated that between 2008 and 2011, the total loss to the economy as a result of drought was Kshs 968.6 billion (US$9.6 billion), reducing GDP by 2.8 percent each year.[8] Of this loss, 72 percent is related to livestock.

The areas most affected by drought are the Arid and Semi-Arid Lands (ASAL), which make up 89 percent of Kenya's land area and are home to Kenyan pastoralists. As such, pastoralists in Kenya are at the forefront of climate change, with extreme weather posing a potentially fatal threat to their livestock. The impacts of drought on livestock setback the overall economy and the livelihood of pastoralist communities, particularly if adequate protection and response measures are not taken.

The Solution

To address this challenge, from 2014, the Government of Kenya together with development partners, research institutions, and private insurance actors started implementing the Kenya Livestock Insurance Program (KLIP). While livestock insurance had been in existence since 2010, it was provided as a private facility through the International Livestock Research Institute (ILRI) in two ASAL counties.[9] ILRI has carried out continuous research on enhancing livestock insurance and together with the World Bank, provides the technical support to KLIP. In short, KLIP is a scaled up version of the ILRI livestock insurance.

KLIP is a livestock insurance program provided for free by the government to protect the most vulnerable pastoralists in the remote, arid, and drought-prone rangelands of Kenya from the impacts of extreme weather. KLIP is a data-driven initiative that harnesses traditional and new data sources to guide decision-making and optimize results. KLIP uses an algorithm that layers survey data on livestock mortality together with satellite data on vegetation cover to develop an index that predicts real-time livestock mortality.[11] When drought becomes particularly severe and there is forage scarcity, the index predicts livestock loss. If this prediction is above a certain level of loss (strike point), it triggers an insurance payout. The money is directly transferred to the pastoralists with the help of M-PESA mobile payment systems, allowing pastoralists to purchase water and fodder to sustain their livestock through the drought period.[12]

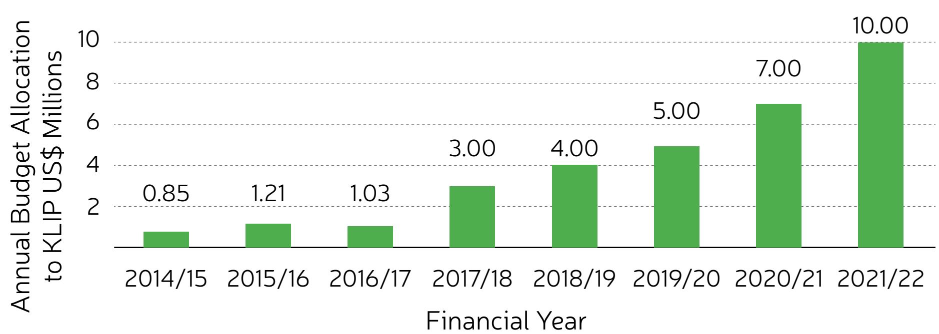
This livestock insurance initiative is an efficient financing tool, based on data inputs from both traditional and new sources, to support vulnerable communities – people who normally would not be able to afford insurance – to avoid catastrophic livelihood losses.

Funding for Kenya Livestock Insurance Program

Since its introduction in 2014, the government has increased its budget allocations to KLIP almost seven-fold. This has enabled increased coverage, which is estimated to increase from present 18,000 to 45,000 households by year 2020/21.[13]

This initiative has been popular in the ASAL region, but it is still limited by resources. The Government of Kenya is working to make the program financially sustainable – either through increased budget allocations or by introducing cost-sharing mechanisms with the pastoralists.

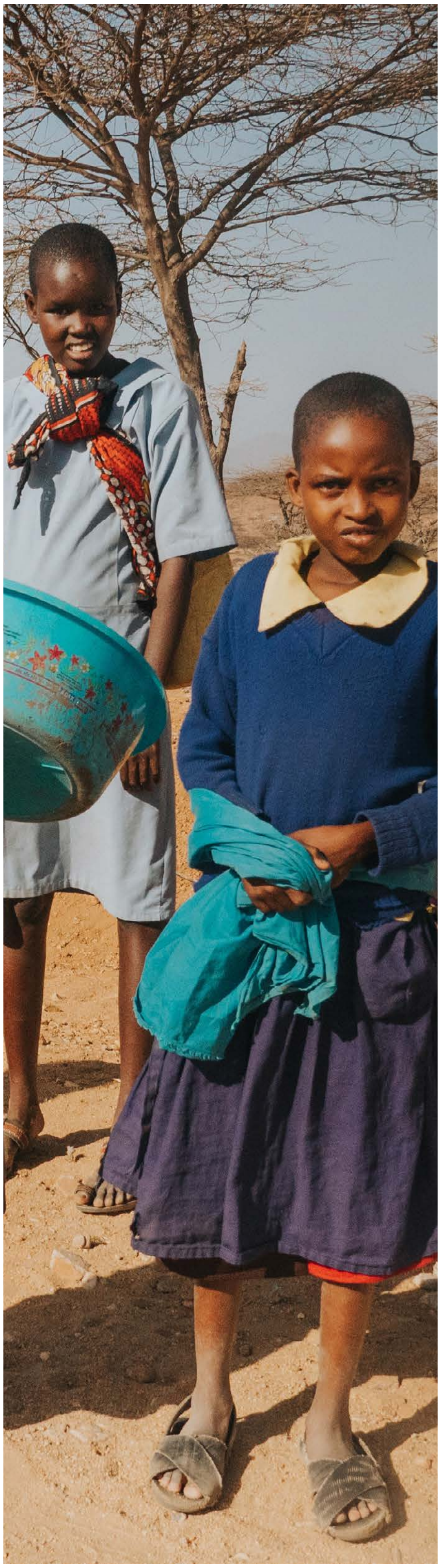
Figure 1: Government budget allocations to KLIP



Source: State Department of Livestock, Kenya

Impact

By early 2018, KLIP had made payouts of more than Kshs 700 million (US$7 million) to 32,000 pastoral households since its inception.[14] Furthermore, ILRI and GIZ have conducted evaluations on the impact these payouts have had on households.[15]



From a welfare perspective, households under KLIP appeared to be less food insecure compared to the non-KLIP households. The GIZ evaluation[15] at the end of 2017 showed that KLIP households scored lower in the Household Food Insecurity Access Scale (HFIAS) than the non-KLIP households. Specifically, KLIP beneficiaries reported to have more meals or were less likely to go to bed hungry because they could afford a meal. An evaluation of ILRI's index insurance in 2015 showed that households with insurance are 25 percent less likely to reduce meals, especially for small children.

Households reported high satisfaction with KLIP, with beneficiaries reporting that they use the payouts for needs such as food or school fees, and on their livestock needs such as feeds, veterinary services, water, and restocking. This indicates an early action behavior. There are also community spillover effects. In some instances, beneficiaries share the payouts with their friends and relatives or use it for community projects such as shared wells.

A phone survey conducted by ILRI in 2017 found that more than 50 percent of households who received KLIP payouts used the money to purchase food and pay debts. They also purchase fodder and water for their livestock, in that order. A significantly lower proportion of households spent their payouts on savings or on businesses.

An evaluation of the ILRI index-based insurance (from which KLIP evolved) has also shown some impact on households.[17] Households have experienced improved quantity and quality of milk production, as well as increased value of their products on the market. The increased financial security has reduced the need to sell or slaughter livestock to cover short-term expenses.

In terms of cost effectiveness, the index-based livestock insurance is seen to be more cost effective (a lower marginal cost for an additional beneficiary) compared to other household safety net programs in Northern Kenya, which are mainly administered through cash transfers. This is an important indicator of sustainability and the possibility to scale up livestock insurance, particularly in a situation where the insurance premium is highly subsidized by government (as is the case with KLIP).[18,19]

> **Households with livestock insurance coverage increase investments in livestock health services, reduce herd sizes, and experience a large increase in milk productivity and total milk income.**
> *— ILRI, 2014*

Contribution to the data ecosystem

The Government of Kenya is increasingly aware of the need for more available and usable agriculture data. In its Agriculture Sector Transformation and Growth Strategy (ASTGS) 2019-2029 the government has committed to ensuring that agriculture data is available, usable, timely, and interoperable. It recognizes the importance of having both traditional data such as censuses and surveys in addition to other innovative data sources. The 2019 Population and Housing Census will have questions on agriculture indicators and will form the basis for the agriculture census, which provides the country's foundational data on the sector disaggregated to lower administrative units. It will provide benchmark data to improve crop and livestock statistics and will also provide sampling frames for agricultural surveys.[20]

In addition to these traditional data sources, the ASTGS reinforces the country's continued interest in using satellite data for decision-making as an affordable option in designing interventions including index insurance. It recognizes the Africa Regional Data Cube (ARDC) as a critical tool for harnessing the latest Earth observation data and satellite imagery to help Kenya tackle challenges related to agriculture, food security, deforestation, water access, and urbanization.

New sources of data such as satellite data, and traditional data sources such as surveys, are most powerful when used together, as

they reinforce one another, adding context and nuance. For the KLIP project, traditional data is necessary to enable machine learning and to develop algorithms that make satellite data useful. Innovations such as this enable policymakers to utilize the data ecosystem to future-proof the agriculture sector. It makes the case for continued investment in traditional data for without it, we will not have the accurate ground data necessary to make innovative data sources valuable, context-specific, and usable.

The KLIP program also illustrates the value and feasibility of using non-traditional data sources to contribute to decision-making and to enhance the effectiveness of government programs. Satellite data, while necessary for decision-making, is not enough. Overlaying satellite imagery with crowdsourced data can increase data accuracy for development interventions. Through its index-based livestock insurance program, ILRI has tested this approach in Isiolo County. They trained citizens to collect data using a survey loaded onto mobile phones. The pilot results confirmed crowdsourcing as an effective means for collecting accurate, low-cost, and real time data on rangeland conditions to complement information on pastoralist management challenges, migration patterns, market information, and land cover dynamics.[21] In addition, crowdsourcing enables collecting data on beneficiary feedback.

Tanzania: why good data matter in the livestock sector

The problem

About 50 percent of households in Tanzania, mainly in rural areas, depend on livestock for their livelihoods. But in Tanzania, animal productivity is low. Very few livestock farmers sell live animals and surplus livestock products to the market, either formally or informally. The 2012/13 National Panel Survey (NPS) currently represents one of the largest data sets on livestock at household level throughout Africa.[22] According to the NPS, only 20 percent of farmers utilize extension services, which provide farmers with the knowledge, information, best practices, and technology to increase and sustain productivity.

The data from the National Panel Survey on utilization of extension services shows low uptake. However, the survey alone is not able to explain why, nor is it able to make policy recommendations to reverse these trends, increase productivity, and improve people's lives.

> **In Tanzania, extension services are the third largest government service in terms of staffing numbers, after education and health. Extension services are devolved to local government, and in 2012, there were a total of 10,891 extension agents, making up approximately 5 percent of all local government staff. However, livestock services account for just under a third of these, or less than 3,000 field officers.**
> ***— FAO, 2016*[23]**

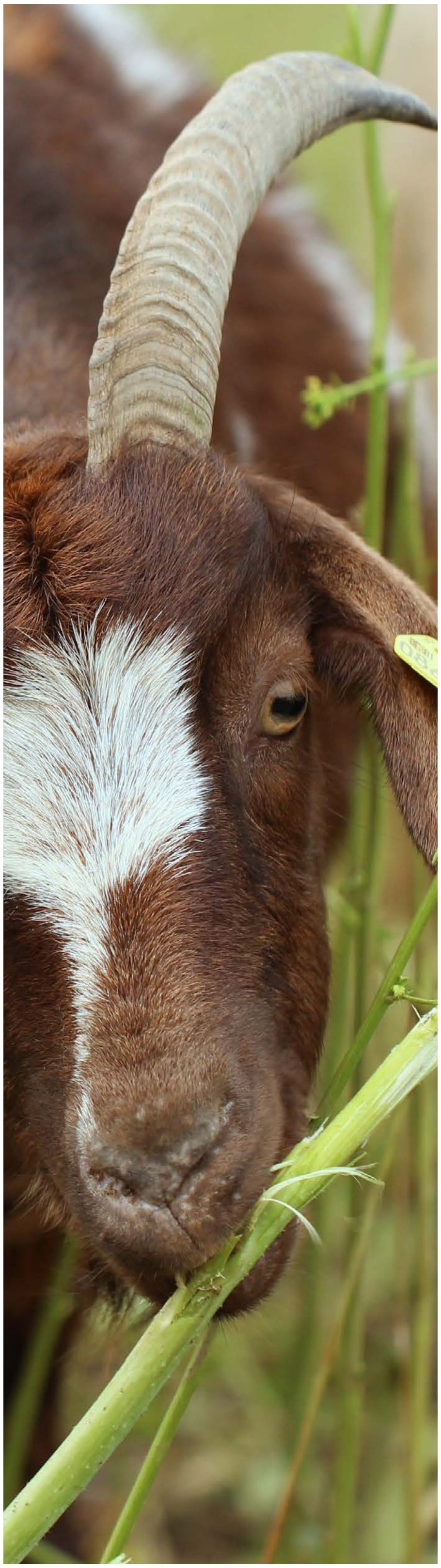
The Solution

Between 2014 and 2016, the Ministry of Agriculture, Livestock and Fisheries (MALF), the Tanzania National Bureau of Statistics (TNBS), and the Food and Agricultural Organization of the United Nations (FAO) came together for the second phase of the "Livestock in Africa: Better Data for Better Policies" Project, funded by the Bill & Melinda Gates Foundation (Gates Foundation).[24] An estimated US$299,631 was allocated to this project during that period.[25]

The project aimed to generate knowledge to improve the way livestock data and statistics are collected, disseminated, analyzed, and used by national and international stakeholders. The project took a nuanced approach to improving the data available for decision-making, depending on the nature of existing data and the likely users.

The project had three key outcomes:

1. **It increased use of existing data by simplifying and clarifying the presentation.** It requires strong technical statistical skills



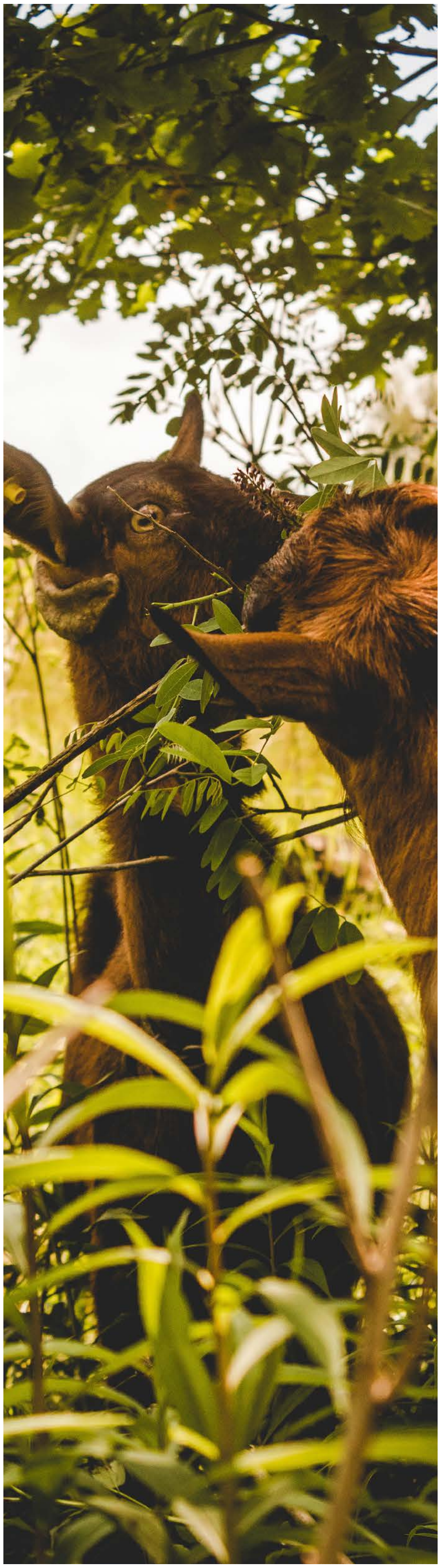
to analyze large data sets such as the NPS data. Government ministries often do not have this kind of human capacity, and MALF is no exception. This made it difficult for MALF to use the data. The TNBS identified this problem and came up with a solution: TNBS collaborated with MALF to identify a set of livestock-related variables of relevance for MALF. It then generated data sets on these variables and provided this data to MALF in Excel spreadsheets— a usable format for policymakers. MALF was therefore able to analyze the data, correct any ambiguities, and propose additional variables to inform policy decisions.

2. It collected new data from farmers and extension workers to shed light on policy problems and solutions. The NPS data highlighted that only 20 percent of farmers utilized extension services, but it did not explain the root causes. MALF undertook a new survey to understand the root causes of low uptake. It surveyed farmers and field officers to understand their limitations. The results were revealing. From the farmers' point of view, most extension service providers were physically too far away. When service providers were in closer proximity, farmers found their services too expensive. From the point of view of extension service providers, high transport costs and limited knowledge of livestock policies, among other barriers, limit their operations. To reverse these findings, MALF proposed policy changes to: (i) provide transportation support to livestock officers and extension workers; (ii) improve balance between administrative and technical duties and supervision of livestock officers to ensure they spend more of their time providing technical support to farmers; (iii) regulate livestock officers' service fees; and (iv) enhance training to make livestock officers better aware of livestock-related policies and acts.

These recommendations were made to fit within the existing national budget allocations and therefore would be easier to implement. After they were implemented, MALF conducted regular, randomized phone surveys with the farmers assessing quality of extension services, to enable frequent program evaluation.

3. It conducted data-driven experiments to inform policy design and implementation. MALF applied its policy recommendations to a new program, the Newcastle disease[26] vaccination campaign. Newcastle disease is an infectious and virulent disease that causes high mortality in poultry. It is endemic in areas of Central and South America, and widely spread in Asia, the Middle East, and Africa. The disease has no treatment, but it can be effectively controlled through vaccination. In Tanzania, the vaccine mostly used for Newcastle disease prevention is the I-2, produced by the Tanzania Veterinary Laboratory Agency (TVLA). I-2 vaccine campaigns occur every four months (January, May and September). MALF in partnership with TVLA tested the effects of regulating livestock officers' service fees, and assessed reduced transport costs by ensuring products were available at the district level, instead of only in regional offices. With these new interventions, the vaccination campaign was deemed successful. Livestock officers served 5% more households, and farmers paid 17% less. After the campaign, farmers reported that they felt they received better value for their money. MALF was now confident to make actionable policy recommendations to be scaled out throughout the country. The recommendations were also affordable, as they fit within MALF's existing budget allocations.

> **Almost 91 percent of the extension officers considered the Newcastle vaccination campaign either better or much better than traditional vaccination campaigns. Farmers were satisfied with the results of the campaign. Out of a sample of over 3,000 farmers, the average satisfaction reported was 9/10, regardless of the fee they had to pay.**
> *— FAO, 2016*



In the end, this resulted in scalable policies that yielded desired outcomes, while remaining within budget for the government. The data highlighted the need for government to avail vaccines nearer to the communities by supplying to the districts, and hence reducing the cost of transport to the extension workers – and the pilots proved it was feasible. The recommended maximum service fee was designed to ensure extension officers can purchase the subsidized vaccines from government offices and recover their transport costs, while remaining affordable for farmers.

The experiment further reinforced the importance of continuous data collection to keep track of the quality of services provided to farmers.

Impact and success factors

Awareness and use of vaccines among farmers increased after implementing this data program. It also increased the productivity of the Tanzania Veterinary Laboratory Agency (TVLA) and improved the reputation of the institution, as it had previously been criticized for the quality of its drugs.[27]

> **Vaccine production in Tanzania has increased by 20 percent.**
> ***— TVLA respondent***

The increase in vaccine productivity aligns well with the Tanzania Livestock Master Plan,[28] which among other priorities proposes expansion of vaccine production at TVLA in the years 2017/18 to 2019/20.

More importantly, this program enabled policymakers in MALF to utilize data for decision-making. Data was extracted from large data sets and moved into simple Excel tables, increasing ease of use and analysis, and enabling data-informed policy recommendations. The recommendations were calibrated to stay within the government's budget, ensuring the programs would be properly resourced –another factor contributing to the success of this project. The government didn't need *more* resources to reach its goals – in this case it simply needed more and better *data* to reconfigure its resource allocation for more effective, efficient programs. Lastly, this project succeeded because of the open, inclusive, and candid discussions between the Ministry of Agriculture, TNBS, and the farmers and extension workers. This was important for accurately identifying the problem and then building practical, realistic, context-specific solutions.

Lessons for agriculture data from these two case studies

As illustrated by the KLIP evaluation, data can sometimes tell us *what* is happening, but not sufficiently explain why. When further surveys were administered to understand the generally low knowledge about insurance and low awareness of the KLIP project among communities, the initial low uptake and low success became more clear. By using that new data to tackle the *why* of the problem, policymakers were able to reverse the trend and create positive results. The KLIP project was also an important example of the need for foundational data, plus the added value of innovative new sources of data – in this case satellite data – to complement traditional sources. Their use together yielded positive results.

In Tanzania, the Newcastle disease vaccine campaign was part of a larger effort to increase uptake of extension services and to improve the quality and outcome of the services. The vaccine campaign itself aimed to address issues identified in the survey data – transport barriers and regulated fees – and the intervention was conceptualized with input from all relevant stakeholders. But to start with, the large survey data set was difficult to process. In order for it to become useful to policymakers, data must be collected and presented in interoperable formats and government must have the capacity to process and analyze the information. TNBS' support on this project helped to enable the ministry to translate the data into targeted policies and strategies. The data was then used to conduct a pilot project, before taking the model to scale.

Importantly, the survey data in Tanzania helped to show that resources weren't being spent as effectively as they could be. The data allowed policymakers to realign priorities and optimize existing programs, while not requiring additional program resources.

Both projects made it abundantly clear that barriers to data use are often related to capacity and presentation. Having *more* data is meaningless if the data is not usable or being used. For this to happen, data must be collected and shared in formats that are human and machine-readable, and interoperable. Governments will need internal capacity for analyzing large data sets. Under these conditions, policymakers can then analyze, visualize, and pull detail as needed.

Conclusion

Data alone is a necessary but not sufficient driver of change. These data-driven programs highlighted the importance of a multi-stakeholder approach paired with whole-of-government participation. To increase the chances of development interventions succeeding, they must take into consideration a country's unique national political economy, and programs must be shaped through inclusive, transparent processes. This often means adopting a bottom-up approach, ensuring local civil society representatives are involved in identifying the problem and working together with government to shape the solutions. In Tanzania, the Newcastle disease vaccine campaign was part of a larger effort to increase uptake of extension services and to improve the quality and outcome of the services. The vaccine campaign itself aimed to address issues identified via the survey data – transport barriers and regulated fees – and the intervention was conceptualized with input from all relevant stakeholders. For survey data such as this to be useful to policymakers, it must be collected and presented in interoperable formats and government must have the capacity to process and analyze the information. This will enable governments to translate the data into targeted policies and strategies, as illustrated by the Tanzania case study.

Strong data ecosystems can greatly increase a project's likelihood for success in helping to increase agricultural productivity while maintaining environmental sustainability and producing positive outcomes for people. For both programs, this meant various government bodies and international development partners working together, levering new technological solutions, and aligning with various agricultural initiatives and strategies. This required political will at various levels, coordination, and partner support.

Finally, the process from data collection, to data use and analysis, to uptake by policymakers, to policy change and implementation, and eventually measuring the outcomes and return on investment takes time. For Tanzania, it took more than one year to identify the problems, build relationships and facilitate multi-stakeholder coordination, implement solutions, and see results. Sometimes it takes longer, particularly if the return on investment to be measured is on livestock productivity and government revenues. In Kenya, it took four years of running the ILRI insurance program before it could be scaled up into the KLIP program. While it has since rolled out in eight counties, it still requires additional funds to scale further while maintaining its sustainability.

Better agriculture data can lead to better decisions, which can greatly improve development outcomes, particularly those related to SDG2 for ending hunger. The KLIP project shows how agriculture data from surveys and satellites are used in Kenya to protect pastoralists from the shocks of drought. The 'Livestock in Africa: Better Data for Better Policies' project in Tanzania – where survey data informed further data collection efforts and helped shape a pilot project that was later scaled across the country, is another important example.

Endnotes

[1]ilo.org/ilostat/faces/oracle/webcenter/portalapp/pagehierarchy/Page3.jspx?MBI_ID=33 for Eastern Africa, it employs 66.2% of the population, Kenya-58%, Tanzania-66%.

[2]fao.org/3/a-BO092E.pdf

[3]wri.org/blog/2014/05/everything-you-need-know-about-agricultural-emissions, The sector contributes 13% of the global greenhouse gas emissions and comes second after the energy sector

[4]fao.org/fileadmin/templates/ess/documents/afcas23/DOC_-_3f__Eng_.pdf

[5] s.mo.ibrahim.foundation/u/2016/05/16162558/Strength-in-Numbers.pdf

[6] foodsecurityportal.org/kenya?print

[7] The high cost of the disaster risk can be measured by the amount of premium Kenya paid to the Africa Risk Capacity (ARC)- an insurance cover for countries against disasters like droughts. In two years the country paid a total of US$18 million http://iati.dfid.gov.uk/iati_documents/27847136.pdf

[8] State Department of Livestock, Kenya

[9] This continues to operate separately from KLIP.

[10] Normalized Difference Vegetation Index (NVDI) data is used which measures the level of greenness of each and every area on the surface of the earth. This data is collected every 10 days and is available freely from year 2000, at 250 meters' geometric resolution.

[11] The strike point is 20 percent of livestock loss. See more details arefiles.ucdavis.edu/uploads/filer_public/2014/06/19/ibli_design_paper_may2011_1.pdf.

[12]The insurance cover is available twice a year, and payouts are made twice a year- ideally before the start of the drought. Often, payouts delay due to logistical and transactional challenges.

[13] While this coverage is still far below the total number of households in these counties, estimated to be at 1 million in 2018 (Humanitarian Data Exchange estimates), it tries to prioritize those with the greatest need. In addition, there exists privately provided livestock insurance in the ASAL counties for households that can afford to pay, such as the ILRI livestock insurance.

[14] kilimo.go.ke/wp-content/uploads/2018/09/KLIP_Executive_Seminar_Report.pdf

[15] Less evaluations have been done on KLIP, but some of the findings from evaluating ILRI's index-based insurance provides lessons on the potential impact of a livestock insurance cover in ASAL Kenya.

[16] climate-risk-transfer.org/articles/presentation-klip-impact-study-min/

[17] slideshare.net/ILRI/mude-research-practiceimpact

[18] ibli.ilri.org/2015/07/13/ibli-partners-discuss-how-project-partnerships-are-shaping-livestock-insurance-policy-in-kenya/

[19] arefiles.ucdavis.edu/uploads/filer_public/4f/8a/4f8a8145-71ae-414a-8c88-ad507db22464/ibli_hsnp_2014_12_19.pdf

[20] The 50x2030 Initiative will allow the country to carry out a full agriculture census

[21] cgspace.cgiar.org/bitstream/handle/10568/89002/research_brief_84.pdf?sequence=1&isAllowed=y

[22] It includes information on livestock ownership and herd dynamics; on husbandry and production practices; on production and sale of meat, milk, eggs, and other livestock outputs and services, such as dung, draft power, and transport. Being the largest dataset means that it is also difficult to analyze without high technical skills

[23] Unpublished report from the FAO project- "Improving the system of livestock services: Actionable policy recommendations"

[24] Similar project rolled out in Uganda. See more details on the project fao.org/ag/againfo/programmes/en/Livestock_Africa_Data_Policies.html

[25] Project long description: 'to improve our understanding of the role of livestock in the smallholder farming sector and experiment with and identify effective approaches to provide policy assistance in the livestock sector'. Project purpose name 'Livestock/veterinary services'. As a build up to this project, between 2009 and 2013, Gates Foundation provided a total of US$1 million for FAO in Tanzania to monitor agricultural policies, and construct a statistical framework with an information technology solution to consolidate food and agricultural statistics into an integrated solution to support policy decisions and their monitoring. The total approximate allocations by the Gates Foundation to this cause of data and policy making can be estimated to be US$ 1.3 million. Data source OECD Creditor Reporting System- Private Philanthropy for Development database, accessed on March 5, 2019

[26] journals.plos.org/plosone/article?id=10.1371/journal.pone.0206058

[27] Key respondent

[28] cgspace.cgiar.org/bitstream/handle/10568/92405/livestockMasterPlan_Tanzania.pdf?sequence=1

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