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Abbreviations and acronyms

AHI  Animal Health Institute
AHLE  Animal Health Loss Envelope
aLIVE  A Livestock Information Vision for Ethiopia
API  Application Programming Interface
BMGF  Bill and Melinda Gates Foundation
CDC  Centre for Disease Control and Prevention
CGIAR  The Consultative Group on International Agricultural Research
CSIRO  Commonwealth Scientific and Industrial Research Organization
DALY  Disability Adjusted Life Years
ESS  Ethiopia Statistical Service
EPHI  Ethiopian Public Health Institute
ESAP  Ethiopian Society of Animal Production
EVA  Ethiopian Veterinary Association
FAO  Food and Agriculture Organization
FERG  Foodborne Disease Burden Epidemiology Reference Group
FMD  Foot-and-mouth disease
GBADs  Global Burden of Animal Diseases
GBD  Global Burden of Diseases
HEARD  Health of Ethiopian Animals for Rural Development
HH  Household
ILRI  International Livestock Research Institute
MoA  Ministry of Agriculture
NGOs  Non-Governmental Organizations
NVI  National Veterinary Institute
PPR  Peste des Petits Ruminants
TLU  Tropical Livestock Unit
VDFACA  Veterinary Drug and Feed Administration and Control Authority
WOAH  World Organization for Animal Health

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Executive summary

The GBADs Ethiopian case study second stakeholder workshop was held on May 11, 2023, at the International Livestock Research Institute (ILRI) campus, Addis Ababa, Ethiopia. Updates and progress of the GBADs analysis were reported and discussed, including how GBADs had responded to recommendations from the first stakeholder workshop (November 2022). The workshop also explored and prioritized future work and direction for GBADs Ethiopia in consultation with the national stakeholders.

GBADs has established methods for estimating livestock disease burden and applied them in Ethiopia. A key element consists of estimating the economic value of a livestock system in terms of its population and production output, then comparing Gross Margin over a year for a situation with ideal livestock health to the current reality. This animal health loss envelope has been estimated for Ethiopia for cattle (US$17 billion/yr), small ruminants (US$2.8 billion/yr) and poultry (US$2.5 billion/yr), with production and population estimates made for working equids and camelids. Overall, this loss equates to 20% of Ethiopian GDP (all 2021 figures). This represents all production losses arising from suboptimal animal health. In reality these losses cannot be eliminated in their entirety, but they give a measure of the full scale of livestock disease burden. For reference, livestock currently contribute nearly 20% of Ethiopian GDP. Spending on livestock disease control is currently negligible compared to losses in Ethiopia, making up less than 0.3% of this disease burden. In response to stakeholder requests, regional animal health loss estimates have also been made, as well as system specific estimates for Crop-Livestock Mixed and Pastoral systems.

Using expert elicitation, this total animal health loss envelope has then been attributed to broad disease categories; infectious disease, non-infectious disease and external forces (such as physical injury, predation, etc...). National disease burden is now being further broken down with burden estimates made for specific priority diseases; Peste des Petits Ruminants (PPR) burden (US$0.5 billion/yr) accounted for 6% of Ethiopian livestock infectious disease burden, which is about 10 times the burden estimate for Brucellosis in cattle.

Looking beyond producer impact, the wider economic benefits of improved animal health have also been assessed for small ruminants, accounting for an additional US$1.8 billion (2% GDP) in losses across society, mostly experienced by consumers and processors. To understand how livestock disease impacts at the household level in Ethiopia and how this differs for men, women and children a literature review with expert consultation was conducted. Women experience additional impacts of livestock disease compared to men, including loss of empowerment and well-being, and experience additional health risks from zoonoses. However, there is a lack of quantitative data on this topic, and the issues need to be given more attention in future livestock development research. Looking at the human health burden of animal diseases in Ethiopia, GBADs is conducting desk reviews for national priority diseases, Anthrax and Brucellosis. In tandem with this expanding body of GBADs evidence visualisation tools have been further enhanced according to the needs of end-users.

Looking to the future, beyond expanding the work described above, a key focus of the GBADs Ethiopian case study is to further embed the outputs, and their generation and maintenance, within the end-user institutions, principally the Ministry of Agriculture and related national research centres. Ideas on how this should be done were developed, including options for further capacitating the users to operate and maintain the GBADs Ethiopia platform, as well as providing training and support on the use of such data, and tools in routine policy and decision making, integrating with other livestock management tools and systems.
Stakeholder inputs
The timing of the workshop coincided with the delivery of major milestones of Phase II-B of the GBADs programme, largely related to validating the methodology and improving the value of the outputs for Ethiopian stakeholders. The results from the completed milestones have been presented to the Ministry of Agriculture and the quote below reflects the high level of acceptance and interest in GBADs:

Dr Wubishet, Director of Disease Prevention and Control Directorate, Ministry of Agriculture, noted that the GBADs initiative should gradually be integrated into the relevant government institutions and be sustained to generate updated, timely information for animal health planning. He elaborated on the ongoing effort by the ministry to ensure interoperability of the various livestock information systems and the ministry’s commitment to further foster greater coordination, and collaboration with GBADs and ensure the gradual integration of its outputs into this system.

After presentation of the results and outcomes of the GBADs Ethiopia analysis and visualisation tools there was a participatory session to explore what is missing and where work needs to be strengthened. There was also discussion on how the information and data generated could be best used to influence policy and improve animal health decision making.

The main conclusions reached in the workshop were: the GBADs data and information will be a critical resource for informed policymaking at all administrative levels, from the federal to the local level, and should be refined, expanded and continued. Besides its use for planning and programme design, the information will be used to inform policy change and improvement, for strategy and project development, for resource mobilization, for institutional development, for knowledge management and Monitoring and Evaluation.

Three areas of stakeholder feedback emerged (listed in more detail below) – how to make GBADs information useful for decision makers? how to enhance its technical validity? and how to prepare for sustained roll-out? Comments and recommendations within these areas of feedback are listed below. These recommendations need to be triaged and actions to address them prioritised. This will be done in partnership with the Ethiopia case study Advisory Group (AG, made up of public and private sector stakeholders). Collectively the workshop findings will be used to guide the process of embedding and institutionalising a systematic means of assessing the burden of animal disease in Ethiopia, and using the information generated to make informed animal health policy.
**GBADs use for decision-making:**

1. GBADs estimates and dashboard are useful and can be used by relevant government agencies for decision making, advocacy and evaluation of investment decisions in animal health.
2. Cause specific attribution work needs to be expanded. So far, this analysis is limited to PPR and brucellosis and this must be further expanded to include other priority diseases including zoonosis (note FMD is in process).
3. In addition to the assessment of the burden of diseases, it is also important to assess the impact of interventions and cost benefit analysis of potential interventions which is of great interest to decision and policy makers.
4. Some diseases might be less significant in terms of morbidity and mortality, but have serious impacts when it comes to international trade; this should be further incorporated.
5. Findings from GBADs analysis need to be summarized for policy makers in a very brief way through policy briefs, infographics, 2-page summaries, etc.
6. The GBADs Animal Health Loss Envelope dashboard needs to be even more user-friendly to further enhance the power and operability of these analytical tools. Solutions should be explored that support use of the dashboard in situations where internet speed is variable.

**Suggested technical developments:**

1. There is need to integrate further data to make revised, more robust estimates.
2. The estimate for animal health expenditure in the Animal Health Loss Envelope is very small. Besides the cost of pharmaceuticals, including vaccines, all other expenditures such as running costs, staff salaries etc should be captured to obtain a more comprehensive expenditure estimate.
3. There is extremely limited data on intra household disease risk and management. More research is needed on intra household disease exposure risk and intra household impact of diseases.
4. Different farming systems are affected differently by disease and the gender study on intra household disease impact, and risk should consider these variations.
5. The urban and peri-urban livestock system, though small, is becoming increasingly important in Ethiopia. Therefore, on top of the production systems addressed so far in the GBADs analysis (Pastoral system and Crop-Livestock Mixed system), the urban and peri-urban livestock system should be included.
6. So far GBADs analysis is limited to cattle, small ruminant, poultry, and equids. Camels have enormous economic significance in various forms of services in the pastoral areas of Ethiopia. Camels should be included in GBADs analysis (note – a GBADs scoping study of camels in Ethiopia has been done and subnational populations of camels in Ethiopia is available here: [https://gbadske.org/dashboards/ethiopia-population/](https://gbadske.org/dashboards/ethiopia-population/)).
7. Different units of measurement are used to estimate biomass such as kg and TLU. Ethiopian stakeholders utilize the information in TLU. It is suggested to use a harmonized approach in all GBADs estimates.

**Preparing for sustained implementation in Ethiopia:**

1. Capacity building and training on how to use the GBADs dashboard should be developed, including through videos, written instructions, a virtual training portal, etc. Wider training on decision-making and animal health economics is also recommended.
2. Foster close collaboration and cooperation with Ethiopian research institutes, universities and public health organizations such as EPHI, as well as with ongoing projects such as aLIVE.
3. GBADs should identify focal persons in research institutes and universities as has been done for the MoA.
4. Ensure engagement of higher officials to enhance visibility of GBADs output and future uptake. Involve institutions such as Ministry of Finance, Ministry of Trade and Regional Integration and regional offices in future stakeholder meetings.

5. The GBADs initiative should gradually be integrated into the relevant government institutions and sustained to generate updated, timely information for animal health planning.

6. At the global level GBADs needs to include more case studies to enable comparison and experience sharing.

**Pre-workshop meetings on 10th May**

Selected participants of the GBADs Ethiopia second stakeholder case study workshop were invited to take part in a day of pre-meetings on 10 May 2023, at the International Livestock Research Institute (ILRI) campus, Addis Ababa, Ethiopia. In the morning session, updated GBADs dashboards were demonstrated and used. A large amount of detailed feedback was obtained. Previously, feedback has been acted on in isolation from the Ethiopian stakeholders, and then presented back to them on completion. An important distinction made in this meeting was the need for direct stakeholder involvement in the implementation of changes determined by feedback – this will be actioned in the second half of 2023.

In the afternoon a panel session and discussion explored what stakeholders need to successfully implement GBADs’ vision for a disseminated implementation network. The output of this session was a semi-structured list of considerations that GBADs collaborators should address in order to achieve this. Further analysis focusing on rationalising and prioritising these factors will take place during preparations of the concept note and proposal for Phase III.

Full details of these meetings are available in the Annex.
Introduction

GBADs is a research programme measuring and understanding the Global Burden of Animal Diseases. The GBADs program has a mission of “measure to improve” animal health at a local, national, and global level. It is intended to create information on the economic burden of livestock diseases to support animal health decision-making focused on the Sustainable Development Goals. GBADs has been initiated by the University of Liverpool, with support from WOAH, ILRI and a group of international collaborating institutions and organizations. GBADs current phase is supported by the Bill and Melinda Gates Foundation (BMGF) and the United Kingdom’s Foreign, Commonwealth and Development Office.

Expected outcomes of GBADs include:

1. Provide information for evidence-based investment plans in animal health systems
2. Allow allocation of resources to key social, economic, and environmental problems
3. Support high quality evaluation of existing animal health investments demonstrating the value of animal health systems

Ethiopia has been selected as one of the first GBADs case study countries and will serve as a natural staging post for GBADs to expand its reach in subsequent phases of the program. The work in Ethiopia consists of specific case-studies exploring animal disease burden in the country and disease burden prioritisation methodologies with wider, global relevance. Work in Ethiopia is led by ILRI and implemented with local partners.

The GBADs Ethiopia case study team held the first stakeholders’ workshop in November 2022 to review the work done on GBADs in Ethiopia. Stakeholders came from a range of relevant government Ministries and agencies, researcher organisations (Ethiopian and international) and the private sector companies and bodies concerned with livestock in Ethiopia. During this workshop participants made valuable comments, identified and prioritized possible follow-up work of value to national stakeholders. Since November 2022, the GBADs team has been working on this feedback to address the recommendations of stakeholders. This second workshop was planned to provide updates on progress made since the November recommendations were made. Specific objectives of the second stakeholders’ workshop were to:

1. Provide Ethiopian stakeholders with an update on the data and information GBADs has generated since November in response to the requests made, including providing:
   a. Information over time (years)
   b. Information at sub-national level (Ethiopian regions)
   c. Attribution by disease (PPR and brucellosis)
   d. Zoonotic burdens
2. Consider how GBADs information and data will feed into policy and decision making, and lead to a positive impact in terms of improved animal and human health and improved livestock productivity and livelihoods.
Workshop proceedings

Hosted at ILRI Addis Ababa campus the workshop was chaired by Dr Wondwosen Asfaw and Dr Theo Knight-Jones. A range of relevant government Ministry and Agency representatives were present, such as the Ministry of Agriculture (MoA), particularly the veterinary services, the Ethiopian Statistical Service (ESS), and the aLiVE programme; Ethiopian livestock private sector organisations were also present, including various livestock sector bodies and Ethiochicken; research institutes participated, including the Animal Health Institute (AHI), the Ethiopian Institute for Agricultural Research (EIAR), Addis Ababa University (AAU) plus the various universities and research institutes that form the GBADs consortium, as well as the World Organisation for Animal Health (WOAH) and Brooke Ethiopia; as well as representatives of GBADs donors BMGF and UK Gov FCDO. Some of the international participants joined online.

Welcoming and opening remarks

Welcoming remarks by Prof Jonathon Rushton: The Director of GBADs programme welcomed everybody participating in this important workshop. Particularly he thanked Dr Wubishet for being able to make time to open and attend the workshop despite the busy schedule he has with the concurrent high level agricultural symposium and panel discussion. His presence is important in terms of context, direction and further engagement. Jonathan also thanked the GBADS Ethiopian Team on their enormous contribution and the amazing work they are doing in pulling data into the analysis.

Dr Samuel Wakusama, WOAH Regional Representative for Eastern Africa: He noted that his sub-regional office covers 14 countries in Eastern Africa and expressed his happiness to be able to attend the second stakeholder workshop of GBADs Ethiopia case study. He also introduced Laure Weber-Vintzel - Head of WOAH Data Integration Department and Edna Massay Kallon, WOAH GBADs programme lead. He noted that WOAH played a key role in operationalization of the programme in 2016 and feeding it into the seventh strategic plan of the organization. The interest to GBADs was further conveyed in the WOAH regional meeting held in last February at Gaborone that brought together the heads of veterinary services in Africa. During this meeting the GBADs Ethiopia case study was presented by Wudu and Wondwosen and the Honourable state minster and delegate of Ethiopia made an opening remark and mentioned the importance of GBADs.

He stated that Ethiopia played a critical role in the programme as the country is helping in the development of the programme, producing a product that benefits the veterinary services. The GBADs team has been busy in the last few months addressing the comments and concerns raised during the first workshop in November. He mentioned that the progress made since last November will be presented in the workshop and WOAH looks forward for the feedback. He emphasised that the utility of GBADs is vital for the success of the programme and the views and ideas on how to strengthen the outcomes of the programme are very much appreciated. He urged stakeholders to feel free to open up and say what they feel from the bottom of their heart. He assured that the GBADs team will look at feedback critically and make improvements.

Lastly, he stated that in addition to this workshop the GBADs programme and the progress from the Ethiopia workshop will be presented at the upcoming WOAH general session to be held from May 21-25, 2023.

Opening remark by Dr Wubishet, Director of Disease Prevention and Control Directorate, Ministry of Agriculture: Dr Wubishet noted that despite the enormous potential of Ethiopia’s livestock resource, the sector is poorly exploited and the benefit derived from the sector is far below the potential. One of the major constraints being the wide range of livestock diseases prevalent in the country. These diseases have a massive impact on our food systems affecting food safety, food security through diminishing livelihoods, and the health, and wellbeing of people, and their animals.
He stated that there is no adequate system in place to determine the economic burden of these diseases and to make informed decision. He emphasised the role GBADs can play in addressing this. He assured workshop participants that the GBADs data and information will be a critical resource for informed policymaking at all administrative levels from the federal to the local level. Besides its use for plan and programme design, the information will be used for policy change and improvement, for strategy and project development, for resource mobilization, for institutional development, for knowledge management and Monitoring, and Evaluation.

He also noted that the GBADs initiative should gradually be integrated into the relevant government institutions and sustained to generate updated, timely information for animal health planning. He elaborated on the ongoing effort by the ministry to ensure interoperability of the various livestock information systems and the ministry’s commitment to further foster greater coordination and collaboration with GBADs, and ensure the gradual integration of its outputs into this system.

He also introduced to the participants the new Ethiopian government initiative “Yeletam Terufat” launched in October 2022 to ensure food and nutrition security, promote livestock and livestock products exports, and enhance import substitution for livestock products. Dr Wubishe트 finally thanked the donors and various players in GBADs for funding the project and selecting Ethiopia as a case study country.

Technical presentations

All presentations can be viewed at this link.

The Global Burden of Animal Disease (GBADs) - Prof Rushton
This presentation aimed to share background information and overarching objectives of GBADs. The presentation highlighted the paucity of data in animal health decision making and the role GBADs plays in addressing this void. The GBADs analytical structure and the interactive dashboard for information provision was described.

The main points and messages of the presentation:
- The role of animals in society
  - Including that agricultural production and marketing are dependent on animal power for ploughing and transport
- Data is crucial to improve how we make decisions
- The scale of investments on animal health is based on gut feelings at best, guesses at worst, relying on perceptions to allocate resources
- There is no systematic way to capture data and information to evaluate our success or failure
- GBADs aims to fill the void of data and information for animal health and One Health
- GBADs analytical structure was described (livestock population, animal health loss envelope, attribution by disease, health problems and accidents, and impact on the economy)
- Information provision- interactive dashboards. Three levels of prototype dashboards are being developed
  - Global level burden estimation
  - Sector level estimation based on major producers of key commodities
  - Country level estimation across all species

Questions raised and explained:
Nutrition element: GBADs are working with the Institute of Health Metrics and Evaluation on the flow of micronutrients. These micronutrients are mostly coming from animals. When animals are affected by disease the production of these micronutrients, and human development, is also affected.

Ethiopian livestock biomass and value - Dr Yin Li
This presentation shared Ethiopian livestock biomass and value estimation, and the classification of livestock systems in the country. The outputs of the biomass and value study will be used as a baseline in GBADs analysis.

The main points and messages of the presentation were:
- The objective is to estimate livestock biomass and value which will subsequently be used as a base line for analysis within GBADs
- The information will be used in GBADs to compare the outputs and losses between species, production systems and countries
- Biomass and value estimation for Ethiopia has been done for cattle and small ruminant
- Production system included are mixed crop livestock, pastoral, agropastoral and dairy
- GBADs dashboard offers data on livestock biomass and value for Ethiopia
- The dashboard is a handy tool to use and make one’s own analysis
- The mixed crop livestock system accounts for most of the livestock biomass (11.3 billion kg) followed by pastoral and dairy systems
- Total outputs and their economic value for Ethiopian cattle were estimated and presented
- The small ruminant biomass and value was also estimated and presented.

The burden of animal diseases in working equids – Dr Girma Birhan
The presentation on the burden of animal diseases in working equids presented the results so far produced by a PhD study. The initial stage of the study covered the estimation of the equid population, and their biomass and economic value. Subsequent stages of the study will look into the AHLE and attribution of disease burden to specific causes.

The main points and messages of the presentation were:
- Working equids are very important in farming and farming activities
- Their role in the transport of agricultural inputs and outputs is critical
- Ethiopia Statistical Service (ESS) data is used to estimate population, with details of their economic activities and value obtained from literature
- In the last 15 years there has been a significant increase in the equine population, almost double, especially that of donkeys.
- The national distribution of equids in the various production systems in the country has also been estimated
- Transportation and draft services of equids has been estimated
- Equids biomass in TLU was estimated to be around 7.4 million, stock economic value in USD around 1.3 billion and their service value around 1.4 billion USD
- The study is still underway and the results presented are preliminary on population, biomass and economic value
- The study will continue using the GBADs analytic structure to estimate the Animal Health Loss Envelop with attribution of the burden to diseases.

GBADs Ethiopia case study analytical progress update on the Animal Health Loss Envelope – Prof Wudu Temesgen
The presentation provided background information on the GBADs Ethiopia case study, described the progress made on the GBADs analytical pathway and the Ethiopian case study, updated on the animal health loss envelope estimates and lastly elaborated on the implications and limitations of the results. The main points and messages of the presentation were:

- Ethiopia was selected as the first GBADs case study country
- The Ethiopian case study is led by ILRI and implemented since January 2021
- Major activities include livestock disease burden related analytics, stakeholder engagement and capacity building in animal health economics.
- The animal health loss envelop is estimated by species, by production systems, by sex and age category
- The AHLE has been estimated longitudinally over a period of time and sub nationally by regional states is estimated for cattle
- All outputs are incorporated in GBADs interactive dashboard https://gbadske.org/dashboards/ahle/
- In all species the estimated disease burden is very high
- Animal health expenditure is very small as compared to production and mortality losses
- There is a big scope for reducing the burden by increasing investment in animal health
- All the estimates are done within the context of limited data availability and quality
- There is a need to revise the estimates as better data become available and to collect further data for more robust estimates

Questions raised and explained on the three presentations:

- Districts were assigned as pastoral or crop livestock mixed systems based on MoA records. For national data we used ESS data, but for parameters such as mortality we used surveys and published literature.
- To estimate animal health expenditure, we used farm survey data on animal health expenditure and national data on drug import and vaccine production and distribution. Public and private expenditure was captured.
- Biomass is presented in Kg and TLU. Stakeholders from MoA use mostly TLU.
- For the pastoral system there is a scarcity of data. Sometimes we used data from crop livestock system when specific data was missing for the pastoral system as a proxy indicator.
- The increase of donkey number in the last 15 years could be due to actual population increase and inclusion of more pastoral areas in ESS national survey which were not included previously. There are few mules and horses in pastoral areas and the population increase is more observed on donkeys.
- In the AHLE we estimated overall mortality and we did not attribute to specific causes. Attribution for few selected diseases will be shown in subsequent presentation.
- The data on sex ratio of the livestock population is obtained from the national ESS data. It is difficult to state the ideal male to female ratio.
- The animal health expenditure so far is very small and an increase by several factors may not bring much change on AHLE. It would take 4-5 years to see changes.
- Data on drug and vaccines imported was obtained from VDFACA and Local vaccine production and distribution from NVI. Also, data from the farm expenditure survey were used. It is suggested to also consider other expenses such running costs of animal health programmes, currently not considered.
Attribution to specific Causes – Dr Mieghan Bruce
The presentation highlighted the different stages the attribution exercise has passed through. The first stage, presented in November, was broader and stakeholders commented on the need for more disease specific attribution to help in policy and investment decisions. Based on this comment, the attribution exercise has gone deeper and looked at cause specific burden for selected diseases identified during the first stakeholder workshop.

The main points and messages of the presentation were:

- In the first stage of estimating the attribution, the AHLE was divided into infectious, non-infectious and external causes
- At this stage the analysis goes deeper and investigated cause specific attribution based on stakeholders comment last November
- In the models presented last November, the mortality due to PPR in adult female small ruminants had problems and this time the data and the model is refined based on stakeholders’ feedback
- Cause specific attribution estimates due to PPR and Brucellosis in small ruminants have been made
- The AHLE for small ruminant from infectious causes is about 46% of the total loss
- The AHLE for PPR is estimated to be 5.7% of the all species infectious causes burden, and 0.5% for brucellosis
- For cattle level 1 attribution is done and 48 percent of losses are assigned to infectious causes
- Despite being a smaller overall proportion of the population, peri-urban dairy has a large proportion of the loss due to brucellosis.
- The recent drought which killed 1.3 million animals is noted and the need to take into account extreme weather and mass mortality events in the AHLE is emphasized

Informatics response to stakeholder feedbacks – Dr Kassy Raymond
The presentation recapped what the stakeholders workshop reviewed last November, and the feedback obtained. It also highlighted the changes made since then on data availability, the data dashboard, and general feedback. Primarily improvements have been made to the population and biomass dashboard and improvements on the AHLE dashboard are underway.

The main points and messages of the presentations on attribution and informatics were:

- For Ethiopian, data largely came from ESS, expert elicitation and international organizations such as WOAH and FAO
- Significant work was done in data scraping and cleaning from PDF reports from the Ethiopian Statistical Services
- Data was structured and digitized, and the databases and application programming interface used to create the dashboard have been made available.
- The loading time of the dashboard has been made faster
- A landing page to access the dashboard has been created
- Major changes have been made in the design of the dashboard to make it more user-friendly and enhance its functionality
- The dashboard is now able to plot Ethiopia sub-national population data
- There is improvement also in access to the underlying data. Previously it was available primarily through the API, but now it can be accessed through the GBADS data portal and Amazon s3 buckets
In the future, other aspects of ESS data such as breed and sex distribution will be incorporated.

Questions raised and explained on the attribution and informatics presentations:

- Data standardization is an important area. Meta data standards that are best for GBADs are being considered. We do not have private data, but our infrastructure does provide protection of private and sensitive data.
- Brief comments were made on how best to make the dashboard less complicated and easy to work with.
- The data scraping function would be extremely useful for Indonesia where there is reliance on PDF data and converting that takes much time.
- PPR is a priority disease, but questions were asked on why brucellosis was selected as a disease for attribution. Bovine TB might have a much bigger zoonotic burden in Ethiopia. It is important to consider all of the most important zoonotic diseases in the country. Parasitic diseases are very important in Ethiopia and cause a big economic loss. Brucellosis was identified as something for GBADs to assess by stakeholders during the Nov 2022 stakeholder workshop. Also, there is better data on brucellosis both for animal and human health. This is ongoing work and over time other diseases will also be included.
- Human health impact will be considered in GBADs. Participants echoed the importance of One Health and analyzing the impact of zoonotic diseases both on humans and animals.

**Wider economic impact, who is burdened by how much? - Prof Dustin Pendell**

The presentation covered the wider economic impact of moving from the current status to ideal animal health equilibrium for sheep and goat producers, processors and consumers.

The main points and messages of the presentation:

- The aim of the wider economic impact study is to identify and initiate an information platform using both private and public data, identify a modelling framework and consistent protocols to establish standardized money metrics over time and space and, estimate wider impacts for Ethiopia.
- The study translates animal health loss envelop (AHLE) estimates into equilibrium models that yield metrics of economic welfare ($)
- The move from current animal health status to ideal animal equilibrium with zero mortality results in
  - Economic welfare increases of $ USD 1,787 million (1.8% of GDP in Ethiopia)
  - Consumers are predominantly better off
  - Processors are predominantly better off
  - Mixed results for sheep and goat producers

**Introduction to GBADs gender framework – Dr Ellie Balchin**

The presentation aims to share the result of a study to assess the gender disaggregated impact and risk of exposure to livestock diseases. Moreover, areas of research needed to fill existing gaps were identified.

The main points and messages of the presentation were:

- Key informant interviews and scoping review of existing literature were carried out
- Key informants were asked:
  - How are household members differently impacted by animal disease?
  - How do household members risk of exposure to disease differ?
  - What is needed to fill research gaps and improve interventions?
- Key informants generally believe women are the most impacted by disease
- Women are more at risk of exposure of disease due to their role in handling and managing livestock
- Key research areas were identified by key informants and from existing literature

**Human Health Burden of Zoonotic Diseases**

The presentation shared available zoonotic disease burden estimates for Ethiopia and their data sources. It looked in detail at the burden of anthrax and brucellosis in Ethiopia and limitations of the available data and identified next steps to improve human disease burden estimates in Ethiopia. The main points and messages of the presentation:

- Human and animal health are not separate issues— they are inseparable
- We cannot protect the health of one without also protecting the health of the other
- By embracing the interconnectedness of these systems, we can work together to prevent and control diseases, protect our communities, and build a healthier, more sustainable future for all
- Ethiopia prioritized 26 diseases in 2019 in collaboration with CDC
- DALY estimates for Ethiopia are mainly from international studies (FERG or GBD)
- Anthrax is a mandatory reportable disease in Ethiopia. There are limitations in the reporting system
- Brucellosis in humans is a neglected zoonotic disease. There were only a few well-structured epidemiological studies on human brucellosis
- 27 studies reported seroprevalence in humans. Overall seroprevalence: 5.8% (95% CI 3.8-8.8%)
- To produce national DALY estimates data should be collected more concisely and the available data would need to be better integrated into existing burden studies

**Questions raised and explained on the gender, attribution and informatics presentations:**

- The importance of training women on awareness creation around animal disease and zoonotic risks was emphasized.
- Brucellosis is now included in the list of public health reportable diseases in Ethiopia.
- HPAI information was not from literature but was from the key informant interviews which included other East African countries.
- In the gender presentation, the limited number of women animal health practitioners came out as a barrier. It would be better to include women in the animal health care system as professionals and para professionals.
- In the presentation of the wider impact, small ruminant producers will benefit or lose as we move from the current to the ideal equilibrium. If the rise in production is met by a rise in domestic demand and increase in international trade then producers benefit. Otherwise, there will be a drop in price and producers will lose.
- On the public health presentation, anthrax is a reportable disease in humans and animals.
- On gender analysis, production systems were not considered in the analysis, however, men and women’s roles might vary between production system.
- The ministry of agriculture noted that Ethiopia in 2016 prioritized 15 diseases including zoonotic ones such anthrax, brucellosis and rabies. Moreover, the country has 22 notifiable diseases under Animal Disease Notification System (ADNIS) to be reported in real time.
- Comment was made on the repeatability and robustness of existing multi criteria prioritization tools currently in use globally. There is lot of subjectivity in these tools, and they are producing different results which are misleading decision makers and standardized tools for prioritization are needed.
Group Work and Plenary Discussion

During this afternoon session, facilitated by Ben Huntington and Theo Knight-Jones, participants were divided into three groups (1. Government, 2. Research centers and universities, 3. Privates, professionals and trade associations group) to discuss each of the following three questions.

1. Are the GBADs data, analytics and information as you expected? What is missing? Are the updates what was needed? Is there anything else needed?
2. What do you need in the next 12-18 months to improve decision-making? What are the challenges/issues you are dealing with that need this sort of data/information?
3. In the next 12-18 months what sorts of data do you need for economic decisions around animal health? What additional data would you want? What capacities are missing other than data?

Responses from each group on each of the questions is depicted below

1. Are the data, analytics and information as you expected? What is missing? Are the updates what was needed is there anything else needed?

1.1-Government

- We need to differentiate the data for lowland and highland (current classification is based on pastoral and agropastoral)
- Camel should be included in the analysis
- Urban and peri urban data should be included

1.2-Research centers, universities

- Be clearer on how we choose the diseases for analysis
- Collect data from the field
- Collaborate with university and research centers
- Include more case studies to compare
- Include impact of animal disease on public health

1.3-Private sector, professionals and trade associations

- ESS has data gaps for chickens- it would be useful to incorporate other primary data sources
- Look into unexpected trends in data related to donkeys
- Surprises by animal health expenditure- services in surveys not included
- What is the way forward for calculation of DALYS?
- Create synergy with other projects
- For disease attribution parallel with GBADs project to fill data gaps

2. What do you need in the next 12-18 months to improve decision-making? What are the challenges/issues you are dealing with that need this sort of data/information?

2.1-Government

- The scope should be representative and data coming from various sources need to be triangulated
The coverage and the data for policy makers should be concrete
The disaggregation of the results by gender
The impact on trade should be shown in the dashboard
Capacity building
Data collection (support stakeholders in data collection)
Ensure Ministry of Agriculture and Ethiopian Statistical Service work together
Ensure engagement of higher officials

2.2-Research centers, universities

- Analysis on interventions include impact analysis
- Improve data quality (more sources)

2.3-Private sector, professionals and trade associations

- Key issues for gender questions/findings to be addressed
- Findings summarized for policy makers- policy brief, infographic, 2 pager summaries
- What are the impacts of the findings? Need to make clear
- Quantify data for policy makers is key going forward so data has impact
- Collaborating with diverse partners (outside livestock/disease/economics) to have impacts in different disciplines
- Different resources for different stakeholders

3. In the next 12-18 months what sorts of data do you use for economic decisions around animal health? What additional data would you want? What capacities are missing other than data?

3.1-Government

- Try to give for the regions/zones the privilege to use the tools
- Training/advocacy for policy makers (navigation, use of the tools)
- Dashboard training portal
- Lok into disaggregation of more variables such as breed and others
- Rather than high profile diseases with limited data start with low profile diseases with adequate data as show case for policy makers. Rabies might be a good example.

3.2-Research centers, universities

- Capacity building on how to use the dashboard
- Conduct C/B analysis
- Find more data on animal health expenditure to fill the data gap
- Provide user guide on how to use the dashboard

3.3-Private sector, professionals and trade associations

- Improved capacity for understanding communicating analytical tools such as dashboards, using tutorials, educational materials
- Sharing tools with partners- improve findability of resources through search engine optimization (having the dashboards come up on google search)
• Need explanation of attribution
• Insure that GBADs is considering the Ethiopian context (beyond 12-18 months S.R.)
• Incorporate other species (chicken, poultry, camels)

Workshop closure remarks

Concluding remarks for the workshop were made by Shannon Mesenhowski (BMGF), Kassaw Amsalu (MoA) and Jonathan Rushton (GBADs programme). Shannon in her closing remark thanked stakeholders for their active participation in the workshop and GBADs participants including the Liverpool Team and WOAH for working hard over multiple years. She articulated why BMGF is interested in something like GBADs. As a private agricultural development programme at the foundation, BMGF’s goal is country-led private sector-driven inclusive agricultural transformation. They are trying to do is make sure Ethiopia is equipped to realize the economic value of its livestock and the need for better evidence to drive decision and resource allocation.

As a reflection on the workshop, she very much appreciated the ownership felt by stakeholders and their level of engagement in the workshop and the progress made by GBADs since last November. She mentioned that BMGF was tremendously honored by the visit of Honorable Dr Girma Amente, Minister of Agriculture to the BMDG Seattle office. During this visit the Gates team briefed Dr Girma on the GBADs initiative creating high level visibility for GBADs. She lastly stated that BMGF will continue to work to link GBADs with other ongoing initiatives supported by BMGF and appreciated the existing collaboration with the aLIVE project.

Dr Kassaw assured the participants of the commitment of his ministry to collaborate with GBADs to ensure full realization of its objective.

Prof Rushton stated that GBADs are trying to develop a system and long-term project in parallel to the human Global Burden of Diseases (GBDs). He mentioned some of the challenges in implementing such a complex programme that would provide benefits to the country, producers and consumers. He briefly mentioned ongoing efforts in developing phase III of the programme. He also mentioned the upcoming WOAH annual meeting of CVOs in which the progress made so far by the GBADs programme will be presented and discussed. He finally thanked all including the workshop participants, GBADs Ethiopia team and the various organizations that funded GBADs.
### Workshop program

**11th May 2023**

<table>
<thead>
<tr>
<th>Time (Addis)</th>
<th>Topic</th>
<th>How</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Registration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td>Welcome and Introduction</td>
<td></td>
<td>Jonathan Rushton (Uni of Liverpool) Samuel Wakhusama (WOAH) Wubeshet Zewde (Ethiopia DoA) Wondwosen Awoke (GBADs Ethiopia)</td>
</tr>
<tr>
<td></td>
<td>Introductions</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Session 2 - Progress since feedback from November stakeholder meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>09:30</td>
<td>GBADs Background</td>
<td>Presentation (10 minutes) Discussion (10 min max)</td>
<td>Jonathan Rushton</td>
</tr>
<tr>
<td>09:50</td>
<td>Livestock Population, Biomass &amp; Total Economic Value – and Equids</td>
<td>Presentation (15 minutes)</td>
<td>Yin Li (CSIRO) (10mins) Girma Birhan (Uni of Liverpool) (5 mins)</td>
</tr>
<tr>
<td>10:05</td>
<td>Animal Health Loss Envelope</td>
<td>Presentation (10 minutes)</td>
<td>Wudu Temesgen (ILRI)</td>
</tr>
<tr>
<td>10:15</td>
<td>Buzz on tables – Talk on tables about comments and questions from last 3 talks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:35</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:55</td>
<td>Attribution to specific Causes</td>
<td>Presentation (10 minutes)</td>
<td>Mieghan Bruce (Murdoch)</td>
</tr>
<tr>
<td>11:05</td>
<td>Informatics</td>
<td>Presentation (10 minutes)</td>
<td>Kassy Raymond (Uni of Guelph)</td>
</tr>
<tr>
<td>11:15</td>
<td>Buzz on tables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:35</td>
<td>Wider Economic Impact</td>
<td>Presentation (10 minutes)</td>
<td>Dustin Pendell (Kansas State Uni)</td>
</tr>
<tr>
<td>11:45</td>
<td>Introduction to GBADs gender framework</td>
<td>Presentation (10 minutes)</td>
<td>Ellie Balchin (Uni of Liverpool)</td>
</tr>
<tr>
<td>11:55</td>
<td>Human Health Burden of Zoonotic Diseases</td>
<td>Presentation (10 minutes)</td>
<td>Carlotta di Bari (Sciensano)</td>
</tr>
<tr>
<td>12:05</td>
<td>Buzz on tables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:30</td>
<td>Photo and Lunch</td>
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<td></td>
</tr>
</tbody>
</table>

**ONLINE PARTICIPANTS REJOIN AT 15:10**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session 3 - Feedback session - Groupwork</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Ben Huntington (Uni of Liverpool)/Wondwosen Asfaw (GBADs) to manage the session</td>
</tr>
<tr>
<td></td>
<td>Work in table groups</td>
</tr>
<tr>
<td></td>
<td>Each group to assign a scribe and rapporteur – document concise points and key points – use flip charts</td>
</tr>
<tr>
<td></td>
<td>Go through the 3 questions – working in groups – then break</td>
</tr>
<tr>
<td>14:50</td>
<td>break</td>
</tr>
<tr>
<td>15:10</td>
<td>presentations</td>
</tr>
<tr>
<td></td>
<td>Table spokesperson to present group responses (top 1 or 2 points per question – no need to repeat if point already made)</td>
</tr>
<tr>
<td>16:15</td>
<td>Closing</td>
</tr>
<tr>
<td></td>
<td>Round up of the meeting, identify any next steps</td>
</tr>
<tr>
<td></td>
<td>Shannon Mesenhowski (BMGF) Jonathan Rushton Ethiopian Gov Rep</td>
</tr>
<tr>
<td>16:30</td>
<td>Close</td>
</tr>
</tbody>
</table>

1) Data/Analytics
- Are the data, analytics and information as you expected? What is missing? Are the updates what was needed is there anything else needed?
- Introduce data, What can GBADs provide in the future? What do the stakeholders want?

2) Utility of GBADs
- What do you need in the next 12-18 months to improve decision-making? What are the challenges/issues you are dealing with that need this sort of data/information?
- How to ensure that GBADS resources are useful to and routinely used by the national system? What is needed for advocacy, Decision making and evaluation. What can GBADs contribute and how?

3) Future improvement of GBADs tools, information and data
- In the next 12-18 months what sorts of data do you use for economic decisions around animal health? What additional data would you want? What capacities are missing other than data?
## List of participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yesmashe Wogayehu</td>
<td>Ministry of Agriculture (MoA)</td>
</tr>
<tr>
<td>Kassaw Amssalu</td>
<td>Ministry of Agriculture (MoA)</td>
</tr>
<tr>
<td>Yimer Gubena</td>
<td>Ministry of Agriculture (MoA)</td>
</tr>
<tr>
<td>Gashaw Beyene</td>
<td>Ministry of Agriculture (MoA)</td>
</tr>
<tr>
<td>Dr Asnake Worku Negash</td>
<td>Ethiopian Public Health Institute (EPHI)</td>
</tr>
<tr>
<td>Selam Abraham</td>
<td>aLive program, Ministry of Agriculture</td>
</tr>
<tr>
<td>Beverley Hatcher-Mbu</td>
<td>aLive program, Ministry of Agriculture</td>
</tr>
<tr>
<td>Edna Massay Kallon</td>
<td>World Organization for Animal Health (WOAH)</td>
</tr>
<tr>
<td>Nyak Ilham Abdullah</td>
<td>GBADs Indonesian case team</td>
</tr>
<tr>
<td>Riyandini Putri</td>
<td>GBADs Indonesian case team</td>
</tr>
<tr>
<td>Jonathan Rushton</td>
<td>University of Liverpool</td>
</tr>
<tr>
<td>Ben Huntington</td>
<td>University of Liverpool</td>
</tr>
<tr>
<td>Girma Birhan</td>
<td>University of Liverpool</td>
</tr>
<tr>
<td>Lian Thomas</td>
<td>University of Liverpool/ILRI</td>
</tr>
<tr>
<td>Yin Li</td>
<td>Commonwealth Scientific and Industrial Research Organization (CSIRO)</td>
</tr>
<tr>
<td>Mieghan Bruce (virtual)</td>
<td>Murdoch University</td>
</tr>
<tr>
<td>Kassy Raymond</td>
<td>University of Guelph</td>
</tr>
<tr>
<td>Dustin Pendell</td>
<td>Kansas State University</td>
</tr>
<tr>
<td>Carlotta di Bari</td>
<td>Sciensano</td>
</tr>
<tr>
<td>Dominic Smith</td>
<td>Griffith Uni</td>
</tr>
<tr>
<td>Sara Lysholm</td>
<td>Swedish University of Agricultural sciences, National Veterinary Institute (SVA)</td>
</tr>
<tr>
<td>Paul Torgerson</td>
<td>University of Zurich</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Theo Knight-Jones</td>
<td>International Livestock Research Institute (ILRI)</td>
</tr>
<tr>
<td>Wudu Temesgen</td>
<td>International Livestock Research Institute (ILRI)</td>
</tr>
<tr>
<td>Wondwosen Asfaw</td>
<td>Independent Consultant</td>
</tr>
</tbody>
</table>

**Online Participants**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golam Saroare Shakil</td>
<td>University of Washington</td>
</tr>
<tr>
<td>Violeta Muñoz</td>
<td>Zurich University</td>
</tr>
<tr>
<td>Takesure Tozooneyi</td>
<td>Kansas State University</td>
</tr>
<tr>
<td>Lucie Kelleher</td>
<td>UK Gov FCDO</td>
</tr>
<tr>
<td>Peggy Schrobback</td>
<td>CSIRO</td>
</tr>
<tr>
<td>Ellie Balchin</td>
<td>University of Liverpool</td>
</tr>
<tr>
<td>Theresa Bernardo</td>
<td>University of Guelph</td>
</tr>
<tr>
<td>Gemma Chaters</td>
<td>University of Liverpool</td>
</tr>
<tr>
<td>Dr Mathioro Fall</td>
<td>Senegal</td>
</tr>
<tr>
<td>Klara Saville</td>
<td>The Brooke</td>
</tr>
<tr>
<td>Tom Marsh</td>
<td>University of Washington</td>
</tr>
<tr>
<td>Mike Cooper</td>
<td>University of Liverpool</td>
</tr>
</tbody>
</table>
Annex – May 10th Pre-workshop meetings

Executive summary

Selected participants of the GBADs Ethiopia second stakeholder case study workshop were invited to take part in a day of pre-meetings on 10 May 2023, at the International Livestock Research Institute (ILRI) campus, Addis Ababa, Ethiopia. In the morning session, updated GBADs dashboards were demonstrated and used. A large amount of detailed feedback was obtained. Previously, feedback has been acted on in isolation from the Ethiopian stakeholders, and then presented back to them on completion. An important distinction made in this meeting was the need for direct stakeholder involvement in the implementation of changes determined by feedback – this will be actioned in the second half of 2023.

The morning session consisted of three parts:

1. Dashboard walkthrough
   a. Kassy provided a live demo of the Ethiopian Sub-National Population and Biomass dashboards.
   b. Wudu provided a live demo of the Ethiopian AHLE dashboard
   c. Mieghan (virtual) provided a live demo of the Attribution section of the AHLE dashboard.
2. Users in the group were asked to do a series of tasks for each of the dashboards to determine the general usability of the dashboards and have the opportunity to play with them. During the workshop we decided to take up how to complete the tasks for AHLE and Attribution because of difficulties with completion.
3. Users were provided with three small group discussion questions about how they envision using the dashboard and the utility of the dashboards for their work.

In the afternoon a panel session and discussion explored what stakeholders need to successfully implement GBADs’ vision for a disseminated implementation network. The output of this session was a semi-structured list of considerations that GBADs collaborators should address in order to realise a vision of successful disseminated implementation. Further analysis focusing on rationalising and prioritising these factors will take place during preparations of the concept note and proposal for Phase III.

The afternoon session also consisted of three parts:

1. Presentations from three invited speakers, with each being tasked to share learnings from similar efforts, and to explore what synergies their work has across the GBADs programme:
   a. Dr Asnake Worku Negash, Coordinator of NDMC and Senior Researcher, Ethiopian Public Health Institute (EPHI); National Data Management Center for Health (NDMC)
   b. Ryandini Putri, National Research and Innovation Agency, GBADs Indonesian Case Study
   c. Beverley Hatcher-Mbu, ALIVE programme
2. A panel discussion on the above topic, also including Jonathan Rushton, Wudu Temesgen and Laure Weber-Vintzel.
3. Feedback from all the participants using an interactive Miro board tool. Information was provided on what documentation is currently available, what improvements are needed, how will the information be used and what else is needed alongside documentation or tools for successful implementation (e.g. capacity building).
The remainder of the document outlines the results that were obtained during these sessions. A list of participants is provided at the end of this document.

**Results 1 – Dashboard Review**

Table 1 outlines the questions that were asked for each dashboard. This section provides specific feedback acquired through users trying to answer questions using the dashboard. While users were using the dashboards they also provided feedback on the dashboard landing page and general usage.

*Table 1: Questions for user groups*

<table>
<thead>
<tr>
<th>Dashboard</th>
<th>Questions</th>
<th>Time allocated for task</th>
</tr>
</thead>
</table>
2. Download the data  
3. Map the populations of goats in 2014 and download the result. | 10 minutes              |
| Ethiopia AHLE                          | 1. What is the AHLE for small ruminants in 2021?  
2. Which region has the highest AHLE for cattle in 2021?  
3. In which year was AHLE for cattle the highest? | 15 minutes              |
| Ethiopia Attribution                   | 1. What is the production and mortality loss due to brucellosis in adult peri-urban dairy cattle in Ethiopia in 2021?  
2. What is the mortality loss due to PPR in pastoral systems in adult small ruminants in Ethiopia in 2021?  
3. What is the total loss due to brucellosis in adult pastoral cattle systems in Ethiopia in 2021? | 15 minutes              |
Feedback from landing page for dashboards

“Why are there different versions?” The Ethiopian user groups were confused by the difference between “Population” and “Sub-National Population” on the landing page (Figure 1). Some users entered the “Population” dashboard instead of “Sub-National Population”

Figure 1: Landing page for the dashboards. Blue boxes are used to outline the population dashboards which caused confusion for users.

Feedback from Population dashboards

Since some users entered the Population dashboard instead of the Ethiopia Sub-National dashboard, we also gathered feedback about the Population dashboard.

- Users would like to be able to see national-level statistics from the CSA on the national population dashboard. They would like to compare the estimates from CSA to other sources.
- The border on the map for the lower region of Ethiopia should have a border and should indicate that there is no data available for that region (Figure 2).
- Dr. Gashaw wondered whether we would be able to provide training on the development of dashboards.

There were no complaints of loading for the populations dashboards produced by the GBADs Informatics theme. These worked over Wi-Fi and at all times of the day (Kassy tested them multiple times). Sometimes the maps were slow to load, but only when they were first loaded. Loading time
between changes to the options selections was fast. Users were able to answer all questions within 10 minutes (they finished early).

![Cattle Population in 2020](image)

**Figure 2:** Choropleth map from the Ethiopia Subnational dashboard displaying cattle population in 2020. The red circle outlines were there should be a border.

**Feedback from activities for Animal Health Loss Envelope dashboards**

**Loading and updating**

- There were major loading issues when all the users tried to access the dashboard at the same time.
- The buttons were disabled for species and over time
- Problems with updating of dashboards when radio buttons. Users would select ‘over time’ (when they were reactive and not disabled) and the graphs would not update.
- It was difficult to assess how easy it was to actually do the tasks/if the users were able to understand what was going on because of the issues with loading

![Selections that were disabled on the AHLE dashboard](image)

**Figure 3:** Selections that were disabled on the AHLE dashboard. The selections that were disabled are outlined in red.
Interpreting visualizations and making selections

When viewing the AHLE over time (Figure 4) 2 users found the confidence interval difficult to interpret. Questions included: “Why are the error bars so large? What do the error bars mean?” One user recommended that the error bars be a different colour than the plot.

“The single year selection is not intuitive; it is slow to change. Is the greying out to indicate this?” It is unclear whether the confusion was due to the dashboard in general or the loading issues.

“Many choices, a bit confusing” – (from a user Ben spoke to).

The AHLE attribution over time and gross margin over time are different numbers (see 2021 – Figure 4). They should be the same.
Figure 5A and 5B: Selection pane and waterfall chart for Animal Health Loss Envelope visualisations

- The waterfall chart is confusing, particularly when comparing the side by side. The term 'side-by-side' (Figure 5A) is confusing because the user (Gashaw) was expecting the plots to appear side-by-side, not on top of each other.
• The current scenario (Figure 5B) is confusing because the x axis labels do not line up with the bars.
• The y axis needs to be clearer. It took a while to realize that it referred to the cumulative value since the hover also provides information for just ‘Value’.
• Users were concerned that if you printed the chart in Figure 5B you don’t really get any information; it takes a while to interpret the plot since the user relies so much on the hover and the selections to understand what is going on.
• “We asked for better clarification on the waterfall chart in November”
• The overall feel was that this was extremely confusing, the user had a hard time moving on to the Attribution exercise because they seemed frustrated with the waterfall chart and didn’t want to move on until they understood it. They emphasized that the information was useful but we really need a better way to visualize it and interpret it without the interactive form.
• They wanted to see the value of the bars without hover.

![Animal Health Loss Envelope in Birr Per kg biomass by subnational state | Overall Cattle, All Production Systems in 2021](image)

*Figure 6: Choropleth map from AHLE dashboard*

• The users liked the map in Figure 6 but sometimes found it annoying that the map would zoom out. We need to consider turning the zooming off for improved usability.

**Attribution**

• You can’t easily find brucellosis in the treemap – users were confused and had to learn that they had to click the box (once they could find it) to see the mortality
• The production system dropdown system is in a separate box and when selected the treemap looks pretty messy – it is confusing that the upper box tells what the treemap does
• “This dashboard will indirectly help us see whether interventions in PPR have been effective because we can see the change over time in the attribution component of the dashboard”
## Section 3: Small Group Discussion Questions

<table>
<thead>
<tr>
<th>Group Participants</th>
<th>Question 1: What role could these dashboards have in your work?</th>
<th>Question 2: What information/graphics would you capture and use?</th>
<th>Question 3: What would you want to improve about the dashboard in the next 12-18 months?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Agriculture</td>
<td></td>
<td>Information that is disaggregated</td>
<td>“The dashboard is very interesting and very updated”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biomass, AHLE, population numbers disaggregated</td>
<td>Graphics for AHLE – it is tough to understand the graphics – simplify so it is understandable for all users</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data visualizations</td>
<td>Provide ability to compare CSA data at national data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time period – need AHLE available over time</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Time for loading</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Include more attribution – breed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Integration of this dashboard with different systems – interoperable with different systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Different pages for different visualizations on AHLE rather than everything being on the same tab</td>
</tr>
<tr>
<td>Ministry of Agriculture ALIVE program Ethiopia Animal Health Institute Research Section</td>
<td>Knowing population as a denominator for disease burden estimates (mortality and morbidity) Disease epidemiology and monitoring animal health interventions – based on the production systems</td>
<td>“On the population dashboard we will use the maps” AHLE graphs Disease attribution is very important</td>
<td>Easy to access the disease attribution Easier visualization of AHLE Integration of the national livestock surveillance system, LMIS</td>
</tr>
</tbody>
</table>
Results 2 – GBADs’ Disseminated Implementation

Factors needed for successful ‘Disseminated implementation’ (as identified from Panel Discussion)

Notes taken during the panel session, and subsequent discussions with participants, were captured in the form of the mind map below. A readout is provided of the main nodes and subsequent ideas that flow from these. An analysis to rationalise and prioritise next steps will take place over the
coming months and feed into a co-designed concept note and proposal for GBADs Phase III including further work on the Ethiopian case study.

• **Technical Tools**
  - Methods, models and processes
    - Methods and data are open access
    - Data management plan
      - Dashboards
      - Appropriate data security
    - Meaningful, equitable data
    - Communication plans
  - Utilization
    - Accessibility
      - Open access repository and publications
      - Simple presentation
      - Third party sharing agreements
    - Simple formats
      - Infographics
      - Two-page briefs
    - Incorporate feedback from users
    - Interoperability

• **Capacity Strengthening**
  - Human
    - Workshops
    - Exchanges between “headquarters” and “satellite” projects
    - Communication plan
  - Infrastructure
    - Dashboards
    - Repositories – data security (see tools above)

• **Values**
  - Everyone adds value
  - Empowerment
  - Strong teams
  - Collaboration
  - Trust

• **Ownership**
  - Governance
    - Data standards
    - Advisory groups
    - Governance committee
  - Team building
    - Communication
      - Feedback
      - Review process before publication
    - Learning from best practice
    - Appropriate engagement driven by in-country teams
• Embedded in the right institution
  • Workplan buy-in
  • Integrate with existing systems
  • Permanent commitment from institution

• Co-creation
  • Acknowledge local expertise

• Resource mobilization
  • Demonstrate the value of the data
    • Endorsements from users
    • Data to action
    • Evidence of demand
    • Data locally validated
  • Partner mapping
    • Reduces partner burnout or apathy
  • Collaborative working to joint goals

---

Figure 7: Diagram showing b

What is needed by GBADs collaborators across the analytical pathway?
### Technical Tools

<table>
<thead>
<tr>
<th>Population &amp; Biomass</th>
<th>Economic Value</th>
<th>AHLE</th>
<th>Wider Economy</th>
<th>Human Health</th>
<th>Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>In place</td>
<td>Publications for Ethiopia National population and biomass for Indonesia produced</td>
<td>Value of small ruminants (Ethiopia) published Indonesia value livestock 2017-21</td>
<td></td>
<td></td>
<td>Published on website</td>
</tr>
<tr>
<td>Needs improvement</td>
<td>Methods are clear but need review and depositing as open access SOPs</td>
<td>Sub-national estimated for Indonesia</td>
<td>Indonesia – secondary output value needs improvement</td>
<td>Indonesia has cattle model but not data</td>
<td>Methodology developed for Indonesia</td>
</tr>
<tr>
<td>Needs development</td>
<td>Sub-national estimated for Indonesia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-cutting</td>
<td>Systems needed to allow online collaborative working Improved connection with data sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Capacity Strengthening

<table>
<thead>
<tr>
<th>In place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia team provided with AH economics training – needs rolling out Finalise instructions for downloading dashboard for off-line use</td>
</tr>
<tr>
<td>Needs improvement</td>
</tr>
<tr>
<td>Ethiopia team provided with AH economics training – needs rolling out Finalise instructions for downloading dashboard for off-line use</td>
</tr>
<tr>
<td>Needs development</td>
</tr>
<tr>
<td>Training on interpretation of results – decision support tools, knowledge translation Communication training Online tutorials/learning platform Epi training Support for dashboard use MoA needs to establish a dedicated analytics unit</td>
</tr>
</tbody>
</table>

### Ownership/Governance Issues

<table>
<thead>
<tr>
<th>In place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia – ministry has assigned a focal person &amp; advisory group is active There is a feeling of belonging New ideas have been raised by collaborators</td>
</tr>
<tr>
<td>Needs improvement</td>
</tr>
<tr>
<td>Coherence between different teams Actively engage stakeholders in design of dashboard &amp; upgrades Awareness creation at local level</td>
</tr>
<tr>
<td>Needs development</td>
</tr>
<tr>
<td>Integrate with routine surveillance work</td>
</tr>
</tbody>
</table>
### Global Burden of Animal diseases dashboard review workshop 10th May 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td>Registration</td>
<td>Yodit Girma</td>
<td></td>
</tr>
<tr>
<td>09:00-9:15</td>
<td>Welcome and introduction</td>
<td>Wudu Temesgen</td>
<td></td>
</tr>
<tr>
<td>09:15-9:30</td>
<td>Dashboard walk-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subnational livestock population and biomass dashboards</td>
<td>Kassy Raymond</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal Health Loss Envelope (AHLE) Dashboard</td>
<td>Wudu Temesgen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attribution Dashboard</td>
<td>Mieghan Bruce</td>
<td></td>
</tr>
<tr>
<td>9:30-10:15</td>
<td>Dashboard exploration based on three predefined questions for each dashboard</td>
<td>Participants</td>
<td>Participants work on pair and support by facilitators</td>
</tr>
<tr>
<td>10:15-10:45</td>
<td>Coffee break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:45-11:30</td>
<td>Group discussion on the utility and improvement needs of the Dashboards</td>
<td>Participants</td>
<td>Participants will form groups and discuss on the utility and improvement needs of the dashboard based on three prompting questions</td>
</tr>
<tr>
<td>11:30-12:00</td>
<td>Presentation of group discussion results and short Q and A after each group presentation</td>
<td>Group representatives</td>
<td></td>
</tr>
</tbody>
</table>

The Global Burden of Animal Diseases Workshop on Disseminated Implementation 10 May 2023

<table>
<thead>
<tr>
<th>Time (Addis)</th>
<th>Session</th>
<th>What</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00-14:10</td>
<td>1</td>
<td>Welcome</td>
<td>Jonathan Rushton, Ben Huntington</td>
</tr>
<tr>
<td>14:10-14:20</td>
<td></td>
<td>Invited presentation</td>
<td>Asnake Worku Negash</td>
</tr>
<tr>
<td>14:20-14:30</td>
<td>2</td>
<td>Invited presentation</td>
<td>Beverley Hatcher-Mbu</td>
</tr>
<tr>
<td>14:30-14:40</td>
<td></td>
<td>Invited presentation</td>
<td>Riyandini Putri</td>
</tr>
<tr>
<td>14:40-15:10</td>
<td></td>
<td>Panel Discussion</td>
<td>Ben Huntington (facilitator), Jonathan Rushton, Asnake Worku Negash, Beverley</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td>Presenter</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------</td>
<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td>15:10-15:40</td>
<td><strong>BREAK</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:40-15:50</td>
<td>Summarise panel discussion back to the room</td>
<td>Using mind map on Miro board</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lian Thomas</td>
<td></td>
</tr>
<tr>
<td>15:50-16:00</td>
<td>Introduction to the analytical framework</td>
<td>PowerPoint slides</td>
<td></td>
</tr>
<tr>
<td>16:00-16:50</td>
<td>Feedback from all</td>
<td>Miro board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>All participants add information on to the Miro board about:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>i) what documentation is available?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) what improvements are needed?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) how will it be used?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv) what else is needed alongside documentation/tools for the implementation?</td>
<td></td>
</tr>
<tr>
<td>16:50-17:00</td>
<td>Closing remarks</td>
<td>Laure Weber-Vintzel, Jonathan Rushton</td>
<td></td>
</tr>
</tbody>
</table>