ILRI policy brief

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Feed Base-Ethiopia: prototype database and decision-making tool for estimating supply and demand of livestock feed resources in Ethiopia

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Summary

Feed is a key constraint limiting the livestock sector in Ethiopia. Livestock productivity is low due to insufficient feed, seasonality of feed supply, high price of feed and low feed quality. These issues need to be resolved to commercialize the livestock production system.

Extension support—inputs, services, training, demonstrations—to smallholder farmers to enhance animal feed production has had limited impact to date. Communal grazing lands in the mixed crop-livestock production system and rangelands in the pastoral areas are overstocked resulting in degradation, loss of palatable grass and legume species from grazing lands and bush encroachment.

Determining the feed demand and supply balance at district level creates an opportunity to understand the resources and gaps for evidence-based decision making to plan for viable interventions in the feed value chain. Preliminary results from the application of the Feed Base approach in Ethiopia show a 42% deficit in metabolizable energy and highlight the ongoing risk of animal feed shortage especially during recurrent droughts.

Annual estimation of feed balance depends on the collection of the necessary district-based data. Adjusting the data collection and analysis system within the Central Statistical Authority or Ministry of Agriculture to allow accurate estimates of feed deficits will be helpful for evidence-based policy decisions.

Key messages

- Animal feed is in short supply to feed the large livestock population in Ethiopia resulting in low production and productivity of all species of livestock. Animal feed resources (grazing, crop residues, rangelands, browses, industrial byproducts, etc.) need to match feed demand to support sustainable livestock production to feed the growing human population.

- The Feed Base tool, originally developed for India, has been adapted to estimate feed balance for Ethiopia using data collected from 63 districts. The analysis indicated a metabolizable energy deficit of 42% in relation to demand, which warrants investment in improving the feed value chain.

- The reliability of evidence from the tool depends on the quality of data used as an input such as livestock census, crop production and land use. improving official data collection systems would greatly improve the strength of the tool as a decision support mechanism for the Ministry of Agriculture and other decision makers.

- Agricultural data from the Central Statistical Agency uses zone as a measurement unit, while the Feed Base tool uses district-based data. Thus, adjusting the data collection system or designing a separate data collection system for the Feed Base tool will improve the quality of information generated and enable more realistic estimation of feed demand and supply scenarios across the country.

- Knowledge of the feed balance will help policy makers to proactively identify available feed resources and plan for mitigation measures to enhance livestock production, productivity and feed use efficiency. It will also reduce cost of feeding.

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Background to feed supply and demand in Ethiopia

Ethiopia has a large and diverse livestock population. In developing counties, livestock play a key role in reducing poverty, improving nutrition and food security, increasing household income and foreign currency earnings. Livestock production depends on extensive grazing, browsing and consumption of crop residues. The livestock sector is constrained by lack of supply of enough feed throughout the year, resulting in high cost of production and unaffordable livestock products. Despite various reports on available feed resources in Ethiopia, there has been limited effort to properly estimate feed balance. Anecdotally, we know there is an apparent mismatch between available feed resources and livestock numbers, aggravated by rainfall seasonality, drought and deterioration of communal grazing lands. However, the extent of this shortfall and its geographic variation are not well understood.

Knowledge of the supply and demand of feed resources is a vital component in feed resource management, investment in feed business and informed decision making. The National Institute of Animal Nutrition and Physiology (NIANP) in Bangalore, India, developed "FeedBase-India", a methodology for assessment of the availability and requirement of animal feed resources in India. Realizing its importance, the Ministry of Agriculture, Ethiopian Agricultural Transformation Agency (ATA), Indian Council of Agricultural Research and the International Livestock Research Institute (ILRI) initiated a collaboration to contextualize and adopt the tool to estimate the Ethiopian feed supply-demand ratio and to turn the database into a decision-making tool with interactive features that would enable users to compare and prioritize feed and animal interventions for impact. The collaboration also aims to provide opportunities for assessing the environmental footprint of feed production by quantifying water requirements and carbon emissions associated with the choice of feed resources and feeding interventions. The tool will support researchers, development agencies, government, industry and farmers in better planning and decision making, which will result in higher livestock production and productivity, feed use efficiency and reduced cost of feeding.

Feed supply and demand estimation methodology

Preliminary feed supply and demand estimates have been established for 63 districts (woredas) across the Amhara, Oromia and Tigray regions of Ethiopia. Data was collected by trained enumerators deployed by ATA. After collecting field data, feed supply was estimated from cropping and land use patterns (Figure 1) based on crop yields and crop specific conversion factors such as harvest indices and brans after grain processing and cakes after oil extraction. Feed biomass yields from planted forages, common property resources, rangelands, road-side grasses, and forests were calculated based on region-specific research data.

Feed demand was calculated from livestock numbers, livestock species and herd structure. Minimum essential feed demand was calculated based on specific energy requirements of a livestock species for maintenance and production for each district. Feed quality was estimated based on ILRI and Ethiopian Institute of Agricultural Research (EIAR) feed libraries (Angadi et al. 2018). Data on all individual feed resources, their quantity and quality, livestock species, number and herd structures were organized in a pilot tool leading to a balance sheet where feed surplus or deficit is calculated and displayed in a flexible manner.

Figure 1. Schematic representation of FeedBase
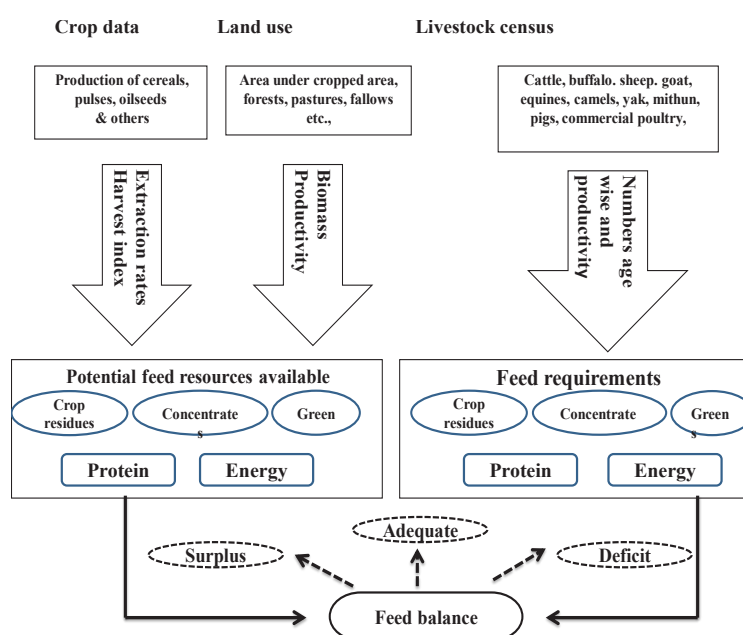
Across the 63 districts, preliminary results indicate that feed supply only provides for around 42% of the metabolizable energy required by livestock for maintenance and production (Figure 2). Only six districts (Ofla and Atsbi Womberta from Tigray; Teltele from Oromia; and Kalu, Farta and Denbiya from Amhara) show a feed surplus in that more feed metabolizable energy was calculated as being available than required. The result is comparable to the FAO (2018) report which looked at the issue at a coarser resolution. According to FAO (2018), the total annual potential biomass available for animal feeding in Ethiopia is 144.48 million tons with feed deficits of 9% for dry matter, 45% metabolizable energy and 42% crude protein in all regions except Benishangul-Gumuz and Gambela. Thus, calculations of substantial deficits are not unique to the present study of feed demand and supply. However, finer resolution and more reliable data is needed for effective decision making. The low feed balance availability could be attributed to either underestimation of feed supply or overestimation of feed demand (or overestimation of the livestock population), or a combination of both which requires further refinement of the tool by collecting more district-based data and ground truthing with the support of satellite imagery and GIS.

Figure 2. Availability of estimated metabolizable energy in feed as a percentage of the estimated requirement for maintenance and production of livestock across districts (preliminary data)
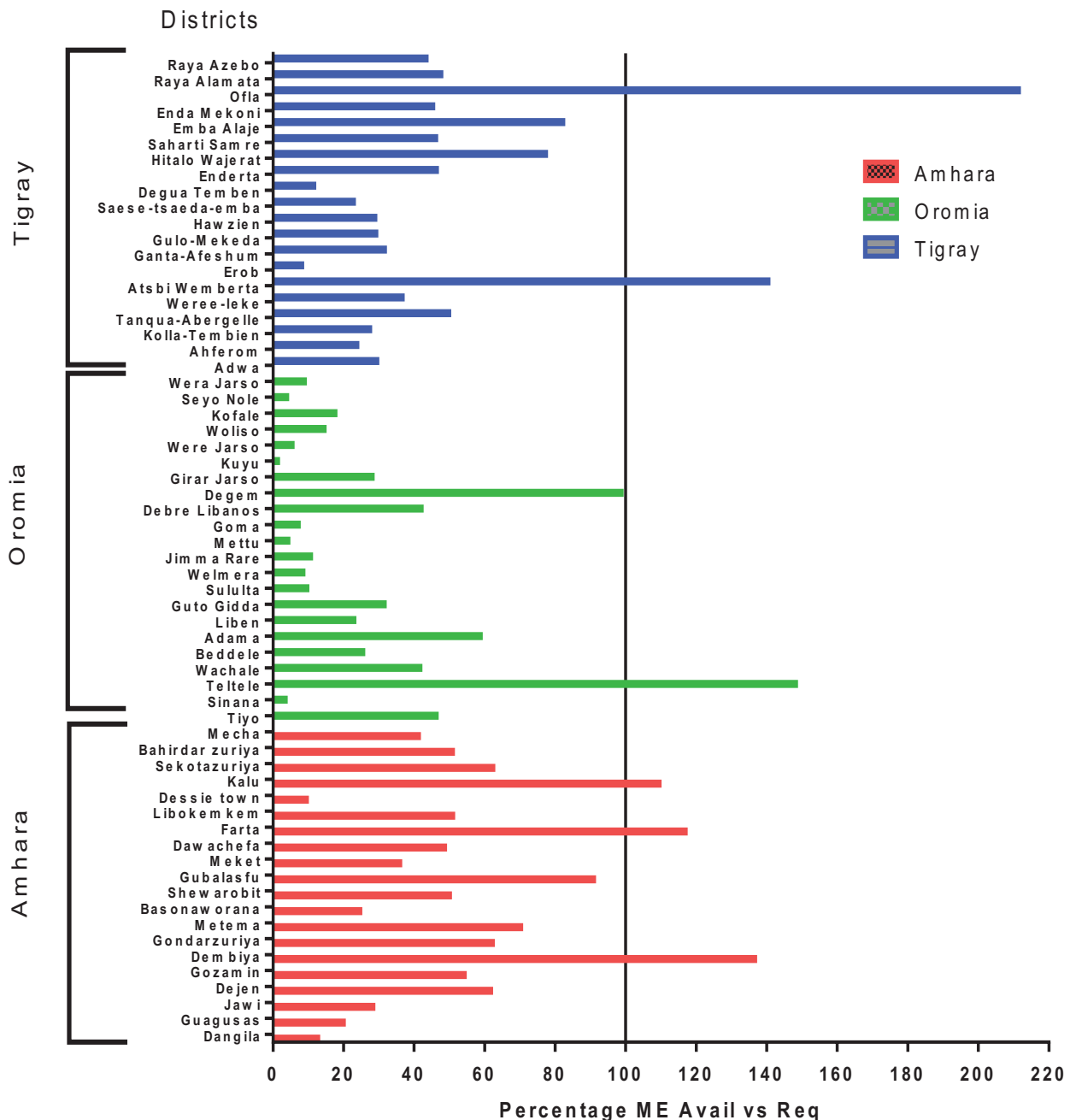
Ways forward

- The Feed Base tool shows strong potential for use in decision support provided necessary data is collected at the district level. Some of the drawbacks observed in this piloting could be solved with an improvement in quality, reliability and resolution of the data collected.

- Livestock census data collected by the Central Statistical Agency (CSA) is zonal data which is not appropriate for the Feed Base tool to make calculations of feed balance. Thus, modifying the CSA measurement unit from zone to district or designing a district-based data collection system within the Ministry of Agriculture would provide an opportunity for improvement and scaling up. In this regard high-level discussions between the Ministry and CSA would be important.

- This piloting exercise and the recent study by FAO both showed a significant gap in feed availability. To ensure continuous supply of feed and improved livestock productivity, the feed sector must be commercialized by supporting smallholder farmers and private investment in the feed value chain. A functional Feed Base tool would support this process.

- Feed and forage production are not currently considered as enterprises that require strong value chain development. Success in the livestock sector cannot be realized without having a vibrant, sustainable and strong feed value chain and developing tools such as Feed Base could help to support decision making for investors.

Acknowledgement

References

Angadi, U.B., Animut, G., Anandan, S., Blümmel, M., Moyo, S. et al. 2018. *FeedBase-Ethiopia: Database and decision-making tool for supply and demand of livestock feed resources in Ethiopia.* Paper submitted at the South-South Cooperation: India-Africa partnerships for food security and capacity building, 23–24 January 2018. Mumbai, India.

FAO. 2018. *Ethiopia: Report on feed inventory and feed balance.* Rome, Italy. 160

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