

# Fodder and feed in livestock value chains in Ethiopia: Final report of the Ethiopian Livestock Feeds project



RESEARCH  
PROGRAM ON  
Livestock and Fish

ILRI PROJECT REPORT



Amhara Regional Agricultural Research Institute



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# Fodder and feed in livestock value chains in Ethiopia: Final report of the Ethiopian Livestock Feeds project

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## Foreword

This report is an output of a six-month project ‘Fodder and feed in livestock value chains in Ethiopia – trends and prospects’ commissioned by the Australian Centre for International Agricultural Research. The project was led by ILRI together with the Ethiopian Institute for Agricultural Research, the Amhara Regional Agricultural Research Institute and the International Center for Research in the Dry Areas.

The project aimed to develop a preliminary understanding of how feed components of intensifying livestock production systems in Ethiopia are changing as systems intensify and how this is reflected in the feed-related elements of focal value chains. The project outputs included three synthesis reports along with a series of field reports that can be accessed via links in the synthesis reports. This report presents an overall synthesis of project findings.

Information on the project is online at <http://elfproject.wikispaces.com>

## Background

The Ethiopian Livestock Feeds (ELF) project, funded by ACIAR and led by ILRI, was designed to contribute to our understanding of how effective feed-based interventions can be developed to improve the livelihoods of smallholder households. A long history of animal nutrition research, feed assessment and development interventions that promote “improved” feeding technologies for smallholders, has given meagre returns, whether across the South (Owen et al, 2012) or specifically in Ethiopia (Adugna et al, 2012). Increasing domestic and export demand for livestock products, particularly meat, is an important opportunity for Ethiopia’s smallholders to improve their livelihoods if effective interventions can address the feed scarcity that limits the productivity and profitability of smallholder livestock production (Adugna et al, 2012).

Livestock are integral to rural livelihoods in Ethiopia. Pastoral and agro-pastoral systems sustain the people in the arid and semi-arid areas. In the highlands, where crop-livestock systems dominate and the majority of Ethiopians live, production of staple food crops is dependent upon draught oxen, dairy products are important both for subsistence and as saleable commodities and small ruminant sales earn income and buffer shocks to household economies. As the growing population demands more livestock products, the pressure on land is intensifying, particularly in the crop-livestock systems in the highlands. Therefore, understanding how feed components of crop-livestock systems are changing as systems intensify is central to the challenges of increasing agricultural productivity, improving rural livelihoods and mitigating the environmental impacts of Ethiopia’s livestock.

The Ethiopian Government and its partners are investing heavily in addressing these challenges. Example investments include the establishment of the Agricultural Transformation Agency (ATA) and the multi-donor funded Agricultural Growth Program (AGP) within the Ministry of Agriculture, the CIDA-funded Livestock Value Chain Enhancement (LIVES) project, the Gates-funded East Africa Dairy Development Project (Phase 2: EADD2) and the CGIAR Research Program ‘More milk, meat and fish, for and by the poor’ (Livestock and Fish). The latter will involve research for development to upgrade the small ruminant value chain. The Ethiopia Institute for Agricultural Research (EIAR), the Regional Agricultural Research Institutes (RARI) and their university counterparts are key partners in these initiatives. Refining and making available to these organisations and programs methods and tools that assess feed resources in smallholder systems and help identify effective feed intervention strategies that support intensification to the benefit of smallholders, was the goal of the ELF project

## Project objective and outputs

In the context of seeking to understand how feed components of livestock production systems in Ethiopia are changing as systems intensify and how this is reflected in the feed-related elements of focal value chains, the **Purpose** of the ELF project was to:

- Develop a preliminary understanding of how feed components of intensifying livestock production systems in Ethiopia are changing as systems intensify and how this is reflected in the feed-related elements of focal value chains.

In practical terms the project aimed to:

- Develop refined tools for rapid assessment of feed resources to allow effective feed intervention strategies to support intensification of livestock production in value chains benefiting smallholder producers.

To achieve that objective, the project produced six **Outputs**:

- Refined tools for feed resource assessment ([FEAST](#)), rapid market appraisal and value chain analysis ([value chain assessment](#); VCA), and feed technology prioritization ([Techfit](#));
- Targeted value chain assessment of feed elements of dairy, beef and sheep value chains;
- Data base of price, quality and volume data on a seasonal basis for key feeds associated with the target value chains;
- Synthesis of experiences with successful small ruminant feeding strategies from elsewhere and their local applicability;
- Assessment of feed availability and demand for small ruminant production in Menz area;
- Synthesis workshop.



## How the outputs were delivered

The planning and the reporting of the activities that delivered the Outputs were facilitated by the use of a wiki-space <http://elfproject.wikispaces.com> through which the project's processes and results were shared with the implementing partners and others interested in the project. The content of the Project's Inception Workshop, the full report of the end-of-Project [Synthesis Workshop](#) (Output 6) and the other Project reports can be found on the wiki.

Staff of the EIAR, the Amhara Regional Agricultural Research Institute (ARARI) and ICARDA were the key partners with whom the activities were implemented. The field testing and refinement of the VCA, FEAST and Techfit tools and its reports (Outputs 1 and 2) were complemented by the three other Outputs: the "Feed data base study" (3); the "Desk study of small ruminant feeding strategies" (4) and, the "Feed resources assessment in the Menz area" (5). Along with the tools these three Outputs were designed to inform the development of feed intervention strategies in value chains benefiting smallholder producers, with a focus on sheep and goats (small ruminants; SR). The sixth Output was the end-of-Project [Synthesis Workshop](#).

With support from ILRI staff and national consultants, the EIAR and ARARI staff led the field testing of the tools (Outputs 1 and 2); a national consultant with support from ILRI staff prepared the Feed data base (output 3); an international consultant supported by ILRI and ICARDA staff prepared the desk study (Output 4); and ILRI staff carried out the Menz feed assessment (Output 5).

**Feed dataset study:** The study addressed Project Output 3: "Data-base of price, quality and volume on a seasonal basis for key feeds associated with the target value chains". The draft dataset is [here](#). During the end-of-Project Workshop the [presentation](#) of the study highlighted the dynamics of smallholder livestock production in Ethiopia, its emerging market orientation, the increasing use of purchased feed and the need for information on feed quality and prices for making decisions to purchase feed ingredients and to formulate balanced diets. The proposed dataset showed how it better organized and refined the information on nutritive value of feeds and on price variability and trends. It was noted that the data set needed further enriching and that it will require updating regularly with current market information that captures seasonal variability. Analysis of the dataset is planned to assess price quality relationships for different nutrients, temporal trends in feed prices and comparison with other similar datasets, e.g. from ILRI's India program.

The discussion during the end-of-Project Workshop asked how the dataset format could be integrated into the existing [Ethiopia market information system](#) and what practical mechanisms could capture the wide variability in feed quality and prices amongst locations and seasons. The challenge was to develop the dataset in a tabular format to support decision-making at kebele, farm and enterprise levels. The on-going USAID-funded, ILRI-led [Quick Feeds Project](#) will continue the development of the dataset and it will explore the operational issues of maintaining an effective service within Ethiopia's emerging market information system.

**Desk study of small ruminant feeding strategies:** The study ([link to report](#)) addressed Project Output 4: “Synthesis of experiences with successful small ruminant feeding strategies from elsewhere and their local applicability”. It took a three-pronged approach which combined the authors’ knowledge of current & past R&D activities, an electronic search of global literature and feedback from key informants in the South. The conclusions were consistent with those from the recent FAO electronic conference “*Successes and failures with animal nutrition practices and technologies in developing countries*” in that while there were many theoretical options for improved feeding strategies for small ruminant meat production, there had been limited uptake by smallholders. This highlighted the need for farmer participatory, action-research like that in CIAT’s SE Asia program. Understanding both livelihood systems -including gender and labour issues and coping and risk management strategies- and small ruminant value chains, will be important. Possible entry-points in the production cycle and interactions with, e.g., disease constraints, were discussed. Promising ways of improving SR-based livelihoods through feed interventions were enhancing fattening/finishing and improving reproductive rates. Given current production systems and feed scarcities in Ethiopia and the increasing use of crop residues, it was suggested that “smart feeding” (ration formulation) to improve the efficiency of utilization of available feeds, community-based management of common property resources, food-feed crop improvement and planted forages for stall-feeding, would be important strategies provided that they were well targeted. The study concluded that close collaboration of research and development staff working with smallholders to prioritize interventions using the participatory approaches and tools tested in ELF and related projects, was needed if the previous lack of R&D impact was to be reversed.

**Feed resources assessment in the Menz area:** The study addressed Project Output 5: “Assessment of feed availability and demand for small ruminant production in Menz area”. The report ([link to report](#)) describes the study area, its extensive sheep production systems and the study’s objectives of estimating at the meso-scale feed demand, availability and management, and their potential implications for feed-based interventions. The analysis considered two woredas with livelihood systems based respectively on “Barley, legume, sheep” and “Cereals, legumes, livestock”. The estimates of feed supply and demand drew on land use/cover and livestock data from GIS and other secondary data sources. The discussion centred on the large negative estimate of feed balance and the high estimate of “over-stocking”, which probably resulted from the imprecision of the data (especially feed supply), errors in biomass and livestock coefficients and issues related to seasonal variation. Estimates more in line with field reality may be possible by estimating available feed supply from current livestock production. It was suggested that a scenario (rather than a feed-balance) approach will be more useful for informing land use and other agricultural policies and strategies.

**Table 1:** The woredas and kebeles and their crop-livestock (CL) characteristics for testing the VCA, FEAST and Techfit tools

Value Chain	Woreda <sup>1</sup>	Kebele <sup>2</sup>	CL Characteristics <sup>3</sup>
BEEF	Adama*	Kechema	Teff, wheat, maize, barley, beans and peas; planted forages; local cattle <sup>4</sup> ; SR <sup>5</sup> ; donkeys; some beef fattening; some labour income
		Wonji Kuriftu	Some irrigation; teff, wheat, maize, barley, beans; planted forages; local cattle <sup>4</sup> ; some beef fattening; some dairy crosses; SR; donkey
	Arsi Negelle	Ali-Wayo	Teff, wheat, maize, barley; vetch; local cattle <sup>4</sup> ; SR; donkey; half HH <sup>6</sup> beef fattening; some business income
		Kersa-Ilala	Teff, wheat, maize, potato; local cattle <sup>4</sup> ; some beef fattening; few SR; donkey; some labour income; livestock main income
DAIRY (fluid milk)	Wolmera*	Berfeta Tokofa	Teff, wheat, chick & grass peas, lentils; irrigated potato, cabbage, carrots; local cattle, donkeys & horse; main income horticulture.
		Rob Gebeya	Teff, wheat, beans; dairy crosses, local cattle; horses; main income dairy.
	Wuchale	Mechela Wertu	40% landless HHs; wheat, teff, oats, common beans; irrigated potato, cabbage, carrots; local cattle – cows & fattening; some dairy crosses; horses; fattening cattle main income source.
		Bosoqa Jate	15% landless HHs; wheat, teff, barley, common beans, chickpea, lentils, grass pea; no irrigation; dairy crosses, sheep, donkeys, local cattle; dairy cattle main income source.
SHEEP MEAT	Angolela-Tera*	Chefanen	Some irrigation; barley, broad/faba beans, wheat, lentils, linseed; sheep, local cattle (some fattening), some dairy crosses; livestock main income.
		Chacha	
	Menz-Gera	Dargegene	Barley, broad/faba beans, wheat, oats, lentils; sheep, some local cattle; sheep main income source.
		Sina Amba	

1 VCA for the livestock product and for feed was carried out in the woreda (district) shown with \*;

2 FEAST and Techfit were applied in both kebeles (villages) in a district; 3 All rain-fed cropping unless stated otherwise;

4 Draught and milk production; 5 SR small ruminants; 6 HH Households.

**Testing the tools:** The core of the Project was the field testing and refinement of the three tools: VCA (value chain assessment) for the rapid market appraisal and value chain analysis; FEAST for the appraisal of livestock production systems and the feed resource assessment; and Techfit for prioritization of feed technologies. The templates are available through the links on the wiki. As was explained in the Project documentation, FEAST and Techfit were developed and had undergone preliminary testing in on-going programs by ILRI in partnership with CIAT and national organizations in Asia and East Africa. The VCA checklist built upon recent experiences of value chain analysis in Ethiopia and the survey instrument from EADD Phase I.

In order to field test and refine the VCA, FEAST and Techfit tools, six districts/woredas, two for each of the dairy, beef and sheep meat value chains, were selected by the partners during the Project Inception Workshop in February. In each VC two districts, with variation in production systems, were selected and, within each district, two villages/ kebeles, one close to and the other more distant from urban markets. The design, which captured variation in final products, their production systems and market access and participation, was expected to provide an effective test of the sensitivity and robustness of the three tools.

**Table I** describes the testing sites.

Working closely with field staff of the Ministry of Agriculture, Debre Berhan Agricultural Research Center (ARC) applied and reported the testing of the three tools in the sheep meat value chain, Debre Zeit ARC was responsible for the testing in the beef value chain and Holetta ARC for testing in the fluid milk chain. Their presentations at the end-of-Project Workshop ([synthesis workshop](#)) and the detailed VCA, FEAST and Techfit reports for each of the livestock value chains and their feed chains are available on the wiki (FEAST and Techfit reports [here](#) and VCA reports [here](#))

During the Workshop the field testing was discussed in breakout groups by tool –VCA, FEAST and Techfit, and in a group addressing their integration and synergies. The groups were asked to list the strengths and weaknesses of the tools, which were discussed and revised in plenary and the results presented in the [Synthesis Workshop](#) report. In addition, during the final session of the Workshop, potential clients for the tools, drawn from national and international agricultural R&D organizations in Ethiopia, were invited to give their feedback on the utility of the tools and their application in wider contexts.

## Lessons learned

The lessons from the field-testing, the feedback from the breakout groups and the plenary discussion in the [Synthesis Workshop](#) highlighted the positive responses from the application of the three tools and how their use had informed the assessment of available feed resources and the options for feed-based interventions. An important contribution was how the use of the tools served to stimulate productive interactions amongst livestock producers, other actors in the three livestock-product value chains and the R&D staff. The Workshop discussants noted how the tools should be further strengthened and refined and pointed out the challenges faced in incorporating their use as an integral part of R&D activities supporting smallholder livestock development and feed-based interventions.

In his closing remarks to the Workshop Alan Duncan, the Project Leader, reflected on the importance of context specificity resulting from the contrasting characteristics amongst kebeles/villages in a woreda/district (Table I), and the variation amongst households within kebeles/ villages, that emerged from the field exercises. The context specificity highlighted the need for more engagement by R&D agencies with farmers and the other actors in livestock-product value chains and for a systematic approach to these interactions. While the field-testing had confirmed that the suite of tools, [VCA](#), [FEAST](#) and [Techfit](#) provided a useful diagnostic approach that can lead to action through the better targeting of feed-based interventions, the immediate challenges were to establish ways of institutionalizing the application of the tools and to ensure that their refinement is a continuing dynamic process. Furthermore, there is a need to look at ways of turning the proposed interventions emerging from application of the tools into tangible activities on the ground for the benefit of livestock keepers.

Specific issues and topics to address include:

- Scale of applicability of the results –using agro-ecological zones rather than administrative boundaries as recommend domains, yet the difficulty arising from the apparent large variation amongst and within villages/kebeles;
- Within the structure and content of the tools, how to better take account of the seasonality of feed supply (especially related to cropping patterns and crop residue/by-product management) and the seasonality of demand for livestock products;
- How to capture (and disseminate) the related variation in prices of feed inputs and livestock products;

- 
- Within the tools, how to better assess water as a possible limiting nutrient in the production of crops and livestock;
  - How to learn from past R&D successes and failures, whether in a region, zone, woreda or kebele, and capture the lessons in VCA and FEAST and build upon the experiences when applying Techfit;
  - Be inclusive by working with: men and women; large and small-scale producers; public and private sectors, NGOs; crop and livestock specialists; input and output market agents; processors of crop and livestock products;
  - Building knowledge and strengthening skills: identify and train those who will be the key users of [VCA](#), [FEAST](#) and [Techfit](#) for the systematic diagnosis of feed constraints and the identification and better targeting of effective feed-based interventions;
  - How can this investment in knowledge and skills for improving feeding strategies be integrated into, or be complementary to, on-going development programs/projects like ATA, AGP, LIVES and EADD2?

## How the project helped refine livestock feed assessment tools

As the project was implemented one of the original objectives rose to considerable prominence:

- To test and refine emerging tools for feed resource and demand assessment, value chain analysis, rapid market appraisal and feed technology prioritization for subsequent application in wider CGIAR Research Program (and other) contexts.

We tested three tools:

- FEAST
- Techfit
- VCA

The following is a brief account of what we learned through testing and developing these tools and how things are being taken forward.

### FEAST

FEAST was already reasonably well developed at the outset of the project having been tried in a number of contexts. ELF confirmed that the tool is relatively useful in its current form. One of the key strengths of FEAST is that it encourages technical researchers to talk to farmers. Comments from our national partners suggested that they had found this to be a useful discipline. Because of the technical mandate of many NARS centres opportunities to engage directly with farmers and begin to see things from their angle are too scarce. But we need a lot more direct farmer engagement if the technologies developed in research centres are to be useful and appropriate to farmers' needs. For FEAST, as with the other tools, our emerging view is that the **process** of applying the tool is as important as the outputs of the exercise themselves. The simple discipline of asking the right questions to farmers about feed in a broader context proved enlightening to those involved. The other positive feedback we received from partners was about the readymade outputs. Having a simple readymade Excel template to input the data and produce charts and tables proved to be popular. This allowed the rapid generation of informative reports based on real (if approximate) data. Report

writing is something that some national researchers find challenging and to have clear guidance about what kind of data to include along with some readymade charts was a real plus.

## Techfit

Development of Techfit is at a much earlier stage. We did make some progress in developing aspects of the tool. One key area of progress was the development of a simple checklist to guide users to scores for the five context attributes. This was then applied and modified in the field.

The core excel sheet in Techfit is relatively simple but we realised through testing the tool that the core sheet requires some substantial modification in two main respects:

- The list of generic technologies requires some thought. It is useful to have an inventory of possible technologies but it is difficult to know how specific to make them. Some technologies are really only applicable in particular locations (e.g. feeding leaves of Enset would only really be applicable in Ethiopia). The technology descriptions need to be sufficiently specific to make any suggested priorities emerging from use of the tool useful but sufficiently generic to make the tool applicable in different contexts.
- The scores we developed for each of the five technology attributes need further thought. Some of the short-listed technologies arising from application of the tool were clearly unhelpful. The scores need to be revised by a group of experts who really understand what each technology involves.

The other aspect that needs further work is the development of a simple cost-benefit assessment method for working out whether particular technologies make financial sense. One difficulty is the fact that many technologies only contribute part of the diet, and attributing improved performance to the technology can prove challenging. Our national partners did make some attempt at a cost-benefit assessment but this aspect requires much more effort.

With all this in mind, we plan a further expert workshop in January 2013 with the following objectives:

- Develop the list of technologies to be sufficiently generic to apply to a range of contexts but to be sufficiently specific to generate useful suggestions
- Refine technology scores to be more realistic and justify each score with a few words of explanation.
- Develop a methodology for cost-benefit analysis of individual technologies.



## Value chain assessment

Our aim in the project was to develop a value chain assessment tool that was sufficiently light and practicable to be applied by non-specialists. We engaged a value chain expert as consultant and he offered orientation on the methodology to national researchers during our training event. We had to considerably adjust the expectations of the value chain expert since what he proposed was relatively cumbersome and beyond the capacity of the project to support. We worked with the consultant to simplify the checklists partly based on insights from similar checklists developed by the Improving Productivity and Market Success (IPMS) project of ILRI. The emphasis was very much on identifying problems as perceived by market chain actors rather than collecting detailed and quantitative data. The checklists were certainly not perfect when we proceeded to implementation. The implementation itself also left some gaps. For example, one key element that was missing was information on volume of product passing through different market channels to give an idea of the importance of different market channels. However, the VCA did provide a reasonable overview of the three value chains that we studied and raised some key issues. For example, for the sheep VCA the study showed the very different requirements of the domestic and export markets in terms of size and condition of animals. As with the application of FEAST and Techfit, the **process** of applying the tool was very valuable for researchers. For some of the technical researchers it was their first experience of thinking beyond technology issues. The development of simple VCA checklists has been useful in the context of the Livestock and Fish CRP and the same consultant has been engaged to help with assessment of small ruminant value chains in its seven sites in Ethiopia. The experiences in ELF provide a strong foundation for this ongoing work.

## Institutional context

In addition to the technical points summarized above, the field testing and refining of the three tools led to important results regarding how the tools could better catalyze the development process. The key result was that the value-chain approach and, within that the application of the VCA, TEAST and Techfit tools, engages simultaneously researchers, extension/development agents, VC agents and livestock/feed producers in the knowledge exchange loop. The engagement, facilitated by the application of the tools, ensured the sharing of ideas, reservations and insights within and amongst the R4D community and its various primary and secondary clients which, in turn, led to identifying and prioritizing potential interventions, whether technical, institutional or policy-related,

The subsequent challenge is how to develop for each specific local context ways of institutionalizing the application of the tools and their continuous refinement. And, within that process, how best to turn the proposed interventions emerging from application of the tools into tangible activities on the ground for the benefit of resource-poor livestock keepers and their value-chain partners.

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## Way forward

As mentioned earlier, the immediate route for building upon the outputs of ELF is through the complementary activities of the on-going USAID-funded, ILRI-led Quick Feeds Project. The project benefits from the same leadership as ELF and strong links to EADD2 and the Livestock and Fish CRP. In addition there is good potential for the integration of the 'ELF' tools and approaches within LIVES and the possibility of contributing significantly to AGP.

Therefore, subject to its receiving adequate support from MoA, EIAR and the RARIs, there is good reason to be optimistic about achieving the widespread application of the [VCA](#), [FEAST](#) and [Techfit](#) tools within Ethiopia. The experiences of the ELF Project show that the application of the tools should lead to more effective feed intervention strategies and improvements in the productivity and profitability of smallholder livestock production and of rural livelihoods.

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