

Characterization of the farming and livestock production systems and the potentials to enhance productivity through improved feeding in Lemo district, Ethiopia

Ashenafi Mekonnen¹, Fikadu Tessema¹, Melse Mulugeta¹, Shimelis Mengistu¹, Shewangizaw Wolde¹ and Tasfaye Abiso¹

¹Southern Agricultural Research Institute






September 2014

2014



This publication is licensed for use under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported Licence. To view this licence, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>. Unless otherwise noted, you are free to copy, duplicate, or reproduce and distribute, display, or transmit any part of this publication or portions thereof without permission, and to make translations, adaptations, or other derivative works under the following conditions:

-  **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by the publisher or the author(s).
-  **NON-COMMERCIAL.** This work may not be used for commercial purposes.
-  **SHARE ALIKE.** If this work is altered, transformed, or built upon, the resulting work must be distributed only under the same or similar license to this one.

ilri.org
better lives through livestock
ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: +254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

Introduction

Livestock production is an important source of livelihood for smallholder farmers in Ethiopia and plays a significant role in the national economy. Although the country has the largest livestock population in Africa, its productivity is much below the potential. The poor performance of the livestock sector in the country is due to different reasons such as insufficient quantity and quality feeds and seasonal availability of feed resources, low production performance of local livestock breeds, animal health problems and inadequate health services, inefficient management of livestock, poor infrastructure, poor marketing and credit facilities, inadequate knowledge of integrated mixed farming systems and insufficient attention given to the livestock sector in the past. Among the aforementioned problems, feed scarcity is often cited as the primary and major constraint to livestock productivity in crop-livestock mixed farming systems (Legesse, et al, 2008).

Lemo district is one of the four Africa RISING project sites in the country, where livestock feed shortage was raised as one of impeding factors for the improvement of livestock production and productivity (Ellis-Jones Jim and et al., 2013). Thus, tackling this problem through proper and strategic intervention is expected to bring certain improvement in livestock productivity in the area. Lemo district also acts as a Field Site for the CGIAR Research Programme Humidtropics.

The Feed Assessment Tool (FEAST) is a systematic method to assess local feed resource availability and use. It offers a systematic and rapid methodology to assess feed resources at site level with a view to developing a site-specific intervention strategy to improve and optimize feed supply, utilization and animal production through technical or organizational interventions. FEAST differs from conventional feed assessment approaches that focus on the feeds, their nutritive value, and ways to improve them. FEAST broadens this assessment to account for the importance of livestock in local livelihoods, the relative importance of feed problems locally, and the local situation related to labour, input availability, credit, seasonality, and markets (Duncan et al., 2012).

The objective of the study was to provide an overview of the farming system and identify the major livestock production challenges, opportunities and possible potential interventions with special emphasis on livestock feed and related aspects for the improvement of livestock production and productivity in the target district.

Materials and methods

Description of the study area

This feed assessment study was conducted in Jawe and Layignaw (Upper) Gana kebeles (villages) of Lemo district in of Hadiya Zone, Southern Nations, Nationalities and Peoples Regional State, south western Ethiopia. Hosaina town, the capital of the zone and Lemo district, is located 230km southwest of Addis Ababa. Jawe and Gana are about 9 and 13 km to the southwest and west of Hosaina town, respectively. Hadiya Zone in general and Lemo district in particular are among the most intensively cultivated and densely populated areas of Ethiopia. Enset based mixed crop-livestock production is the main agricultural production system. The major crops produced in the area include enset, wheat, barley, tef, faba bean and potato. The farmers also keep different types of livestock including cattle, sheep, goats, equine and poultry.

Sampling method

The two study villages, Jawe and Upper Gana, were selected as they are the operational sites of the Africa RISING Project. Farmers for the study were selected based on wealth status (land holding), gender, age and education status. Both male and female farmers, farmers of different age groups and different educational status were involved in the study to represent different segments of the farming community in the respective villages. Land holding was taken as a proxy to determine wealth status of the farmers and farmers with relatively small, medium and large land holdings were involved in the study. A total of 17 farmers (12 male and 5 female) farmers were selected from Jawe, whereas 19 farmers (12 male and 7 female) were selected from Upper Gana. The farmers who participated in the study were selected by the Development Agents in each kebele and experts at the district level based on guidance given by the team of researchers from Areka and Werabe Agricultural Research Centres, Debre Zeit Agricultural Research Centre and resource persons from ILRI and ICARDA.

All selected farmers participated in group discussions using the participatory rural appraisal (PRA) approach to provide an overview of the farming system and to identify constraints and opportunities for improving livestock production in each *kebele*. Key informant farmers were selected from each category of land holding for individual interview to provide quantitative information on livestock production, feed resources availability and utilization. Accordingly, 9 farmers, 3 from each category of land holding, were purposively selected and individually interviewed from each kebele.

Data analysis

Information collected during PRA was summarized thematically. The FEAST excel macro program (www.ilri.org/feast) was used to analyse data collected from individual interviews of FEAST.

The Feed Assessment Tool (FEAST) is a systematic method to assess local feed resource availability and use. It helps in the design of intervention strategies aiming to optimize feed utilization and animal production. More information and the manual can be obtained at www.ilri.org/feast

FEAST is a tool in constant development and improvement. Feedback is welcome and should be directed feast@cgiar.org. The International Livestock Research Institute (ILRI) is not responsible for the quality and validity of results obtained using the FEAST methodology.

Results and discussion

General farming system

Enset based mixed crop-livestock production is the dominant production system in Lemo district and the two study kebeles. Agriculture by its nature requires three basic resources; land, labour and capital. The availability of these resources varies from place to place. This report discusses the availability of these basic agricultural resources as well as that of material inputs and knowledge/skills.

Land holding

Land is the first and primary resource for agricultural production. The average land holding of the farmers in both kebeles is generally low. Most farmers have medium-sized land holdings (Figure 1). About 25%, 55% and 20% of the respondents in Jawe kebele reported that they have small (<1 ha), medium (1-2 ha) and large (>2 ha) land holdings, respectively. Similarly about 60% of the farmers in Gana kebele have medium size of land holding (1-2 ha) whereas farmers that have small and large land holding constitute about 20% each. The results are consistent with the land holdings of smallholder farmers in Jeldu district of West Shewa, Zone of Oromia Regional State, (Andnet et al., 2014). Such small land holdings are typical of the densely populated areas of the Ethiopian highlands. None of the respondents from either kebele was landless.

Labour availability

The second resource in agriculture is labour. Farmers in the area use human and animal labour to support their agriculture. Availability of labour in the area is not a major problem. Farmers need labour throughout the year for various agricultural activities such as planting, weeding/cultivating, harvesting and threshing. However, the peak labour requirement is during harvesting. The average family size is 6, with the minimum and maximum being 4 and 10, respectively, whereas the average family size in Gana was reported to be 8 persons per household. Farmers primarily use family labour in their agricultural activities. When family labour is not enough, farmers hire in labour. In Gana kebele, land preparation and harvesting of crops is mechanized. Thus, the requirement for daily labourers is not a critical problem for the majority of the farmers. However, labour is required during planting (especially for farmers using oxen to plough their farm land), weeding and crop residue collection from the farm.

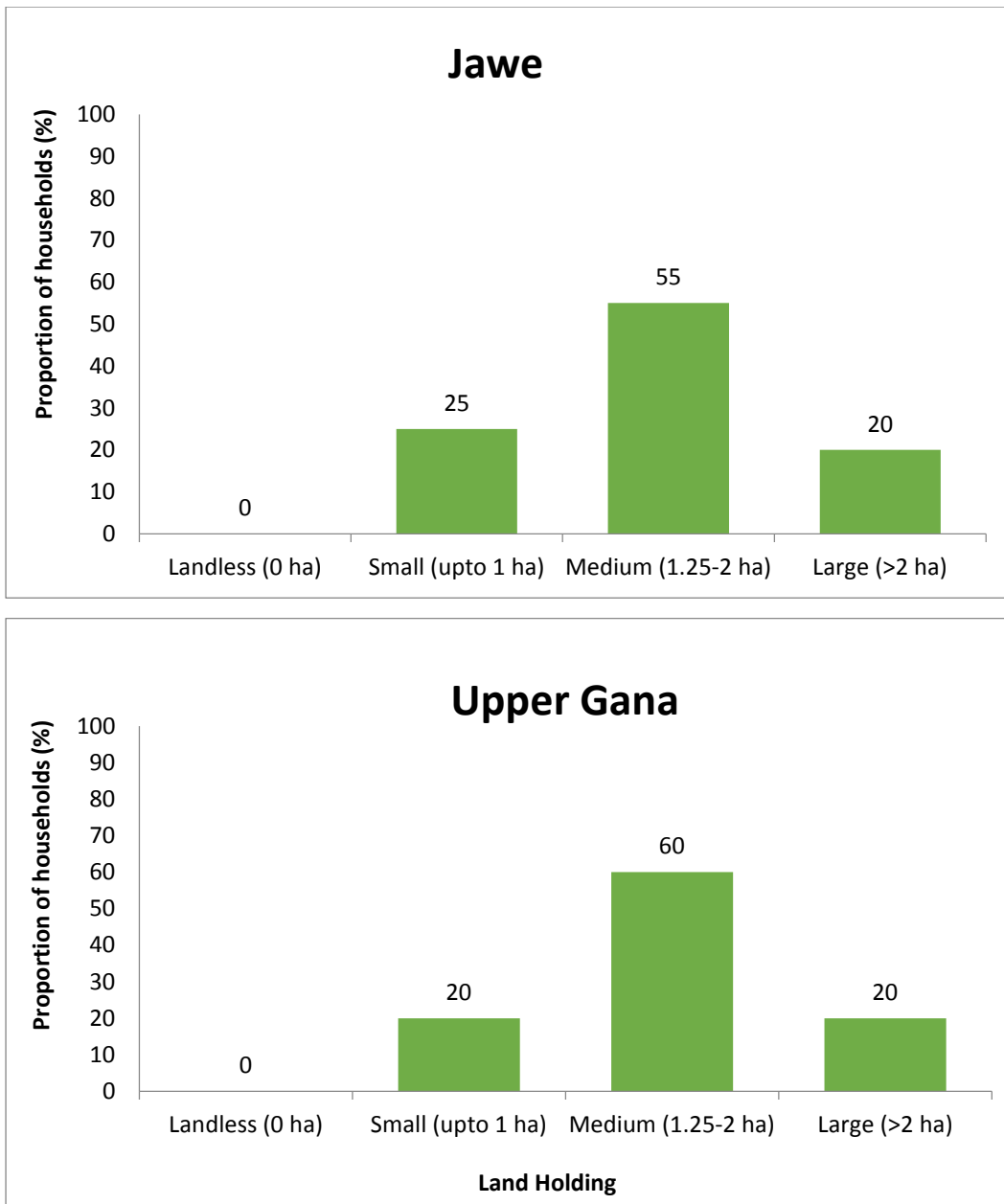


Figure 1. Range of landholding sizes of farmers in Jawe and Gana kebeles

The cost of hired labour varies by activity. For example, during peak labour time the price was reported to be 50 Birr per man-day in Jawe whereas it was reported to be approximately 40 Birr (SD 2.22) per day in Gana. It was indicated that many farmers use contract labour, i.e., they pay 350 – 400 Birr per 0.25 ha (locally 1 timad) area of land for harvesting (especially for wheat and tef). In addition to cash, the farmers also incur other costs in the form of food and drinks. It is a norm to provide food to the hired labourers. Some people leave the area for work and education. Hadiya zone in general and Lemo district in particular are known for having very high numbers of migrant workers in foreign countries particularly in South Africa.

Credit services

Farmers need cash to properly manage their farm. Most farmers face cash shortages. When farmers face cash shortage they look for credit, but access to credit is very limited. Credit service is provided by Omo Micro-Finance Institute and by the government. This micro-finance institute gives credit to

farmers for fertilizer which is arranged by the office of agriculture/government. However, when farmers need credit by themselves it becomes difficult as it requires pre-conditions. In order to get credit, farmers must first save some money (>1000 Birr) and form a group (group collateral). For this reason farmers face some barriers in obtaining credit.

Household income

Cereals are the main source of income contributing to about 31% of the household income. Cash crop production, particularly chat, is also an important livelihood activity contributing about 16% of the total household income. Labouring, remittance, beekeeping, draft animals and animal fattening are also a means of income generation for the farmers (Figure 3).

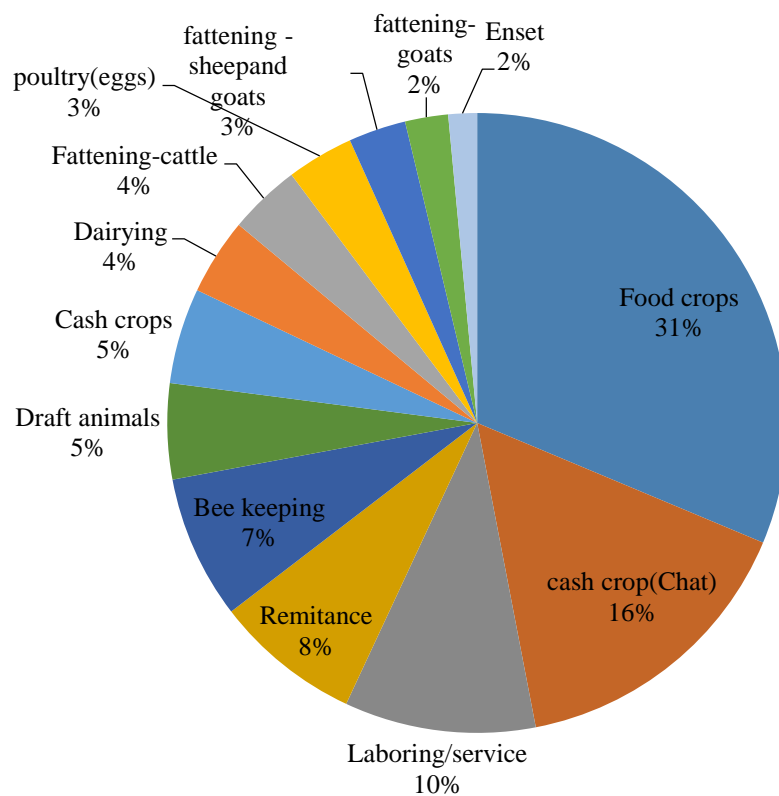


Figure 3. Contribution (%) of different livelihood activities to household income in Upper Gana

Crop production

In the area there are two cropping seasons, the long cropping season (*meher*) and the short cropping season (*belg*). The *meher* season is more important for crop production because of the long duration and higher intensity of rainfall. The *meher* seasons extends from June to October while the *belg* season covers the period from February to May. During the period from October to February the area receives no rainfall. The *belg* rains begin in February and continue until the beginning of the *meher* season at the end of May. The two study areas receive the highest rainfall during July followed by August, June and September in decreasing order. During dry season only very few (1%) farmers use irrigation at individual household level. Thus, the farmers mainly depend on rainfall for

agricultural production. The respondents from Gana kebele indicated that water for irrigation is available in the area, hence crop production can be both rain-fed and irrigation based.

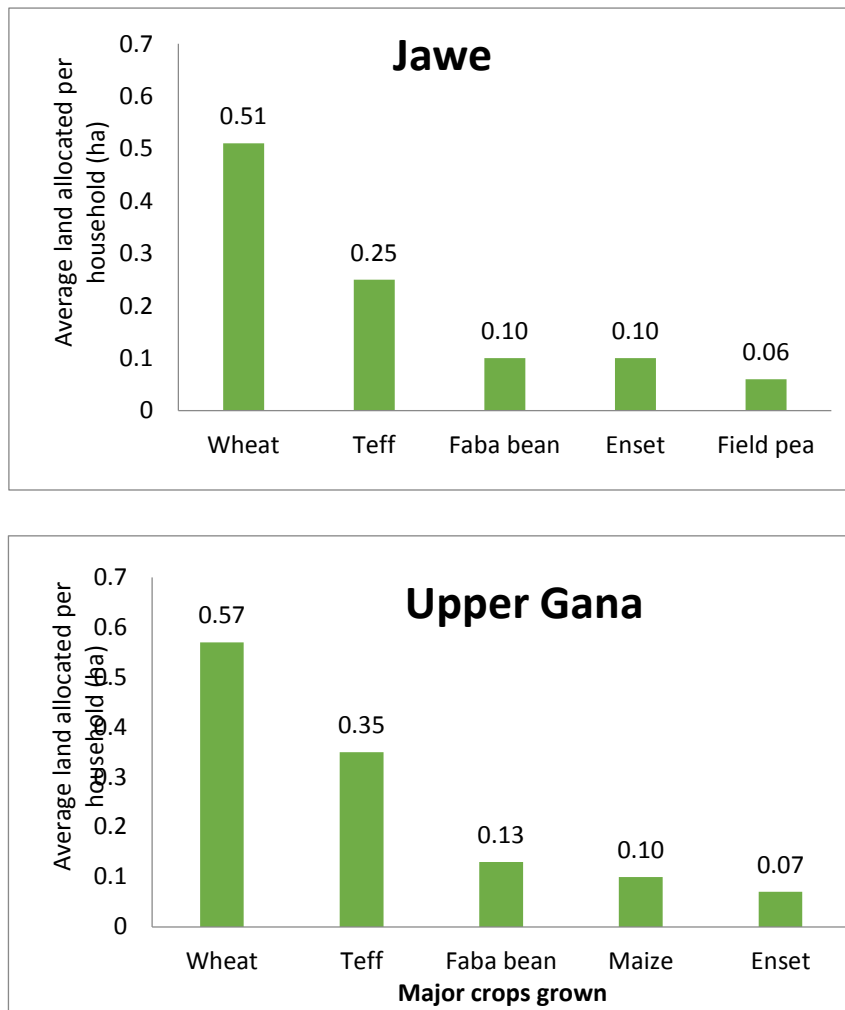


Figure 2. Major crops grown and their average land coverage per household in Jawe and Upper Gana kebeles

Major crops grown in Jawe kebele include wheat, tef, faba bean, enset, and field pea (Figure 2). Other crops such as sorghum, barley and maize are also grown in the area to a lesser extent. Similarly, the dominant crops grown in Upper Gana kebele were reported to be cereals (wheat, tef and maize), highland pulses (faba bean) and enset as shown in Figure 2. Most of the farmers use their farm land for cultivating cereal and pulse crops alternatively in the two cropping seasons. No fodder crops are grown in Gana. The crops grown are mainly used as a means of income generation whereas crop residues are the major source of livestock feed. Crop residues are also used for income generation, mulching to improve the soil and as raw material for wall construction of local houses.

In general land for cultivation in the kebele is in short supply. Thus, land is cultivated without rest, i.e., it is used for more than one crop per year. For this reason there is no experience of fallowing. As indicated by farmers in the PRA, the supply of agricultural inputs (urea, plastic sheeting, forage seed, etc) particularly for livestock is very limited. Neither the government nor the private sector supply these inputs.

Livestock production system

In addition to crop production, farmers rear different types of livestock. Farmers in the Jawe kebele rear cattle, sheep, goat, equines and poultry. Table 1 summarizes the type, number and use of livestock in Jawe kebele. As indicated in Table 1 more than 80% of households in the kebele own local dairy cows, draught cattle, donkeys and indigenous poultry. Sheep and goats are owned by half of the households in the kebele.

The majority of the farm households in Jawe kebele owned small numbers of livestock as a result of shortage of grazing land. The average livestock holding was reported to be 4.78 tropical livestock unit (TLU) per household. Farmers in Jawe keep mostly fattening and draught cattle followed by local dairy cattle, donkeys, improved dairy cattle and mules in decreasing order of importance. In the case of Upper Gana, the number of local dairy cattle was reported to be the highest followed by fattening and draught cattle, donkeys, sheep, improved dairy cattle, goats and horses. Overall, local dairy cattle, fattening and draught cattle and donkeys were found to be the most widely kept animals in both kebeles (Figure 3). Although the number is low, improved dairy cattle are also important in both kebeles. The relatively higher number of draught cattle and equines, particularly donkeys, is a reflection of the importance of livestock as sources of draught power for farm operations and for transporting goods and agricultural produce from place to place. This is consistent with the findings of previous studies in mixed crop-livestock production systems of the Ethiopian highlands (Tsegaye et al., 2008; Abate et al., 2012). The relatively high number of dairy cattle shows the importance of dairy products to complement starchy foods in the enset based production system.

Table 1: Type, use and average number of livestock owned by typical household in Jawe kebele

Livestock species	Use	% HHs keeping the animals	Average number of animals per HH
Local dairy cow	Milk, manure (fertilizer/fuel)	90	1
Improved dairy cow	Milk, manure (fertilizer/fuel)	2	1
Draught cattle	Draught, sale, manure (fertilizer/fuel)	80-85	2
Fattening cattle	Sale, manure/fire	2	1
Sheep	Cash and home consumption	50	2
Goat	Cash and home consumption	60	2
Poultry-village	Cash and home consumption	90	2
Horse	Draught power and manure	3	1
Donkey	Draught power and manure	85	1
Mule	Draught power and manure	5	1

Management of livestock

Livestock management is an important factor that affects the productivity of livestock. Management of livestock includes housing, feeding, health care and breeding. Animals in most of the households are housed in one quarter of the family dwellings. Only a few (20%) farmers keep animals in separate housing. Farmers use different styles of feeding; they mostly use tethering followed by stall feeding. Use of open grazing is limited as there is a shortage of communal grazing lands. Style of feeding in the area varies from village to village. For example, some farmers use tethering and stall feeding whereas other farmers have access to open grazing lands. Some farmers chop maize and enset before they feed to their animals. Even though farmers are aware of urea treatment, they do not use it. Some farmers use wheat bran in the form of mixture; they first dilute it and mix with different crop residue (wheat, barley and tef).

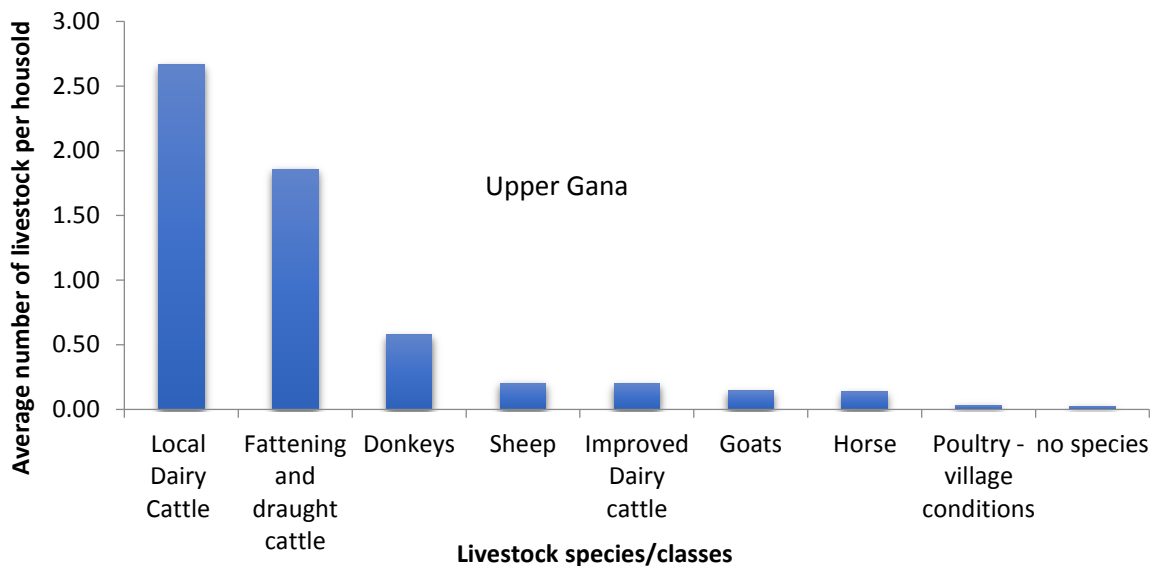
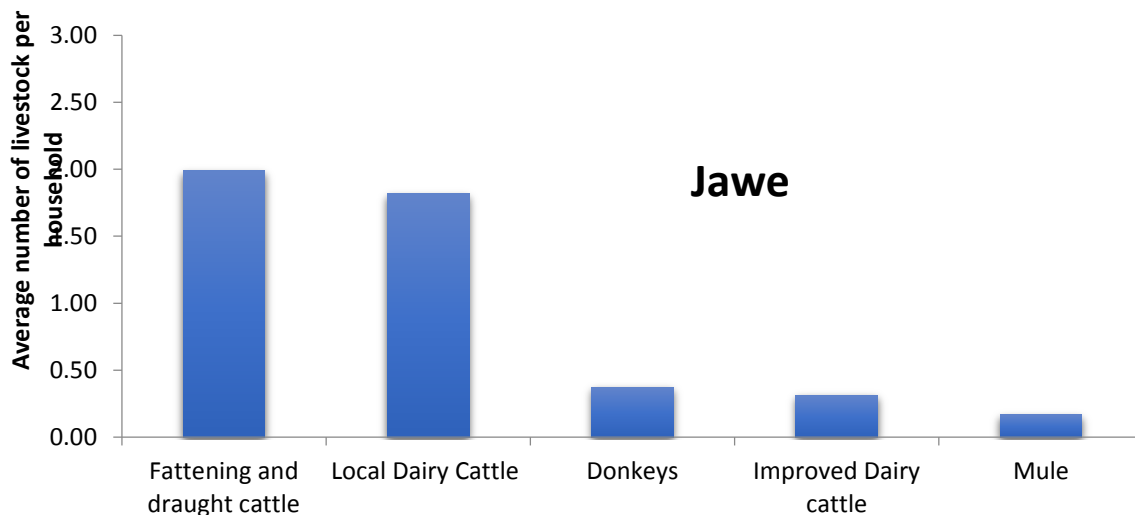


Figure 3: Average number (TLU) of major livestock species/classes owned by farmers in Jawe and Upper Gana kebeles

Feed resources: availability, quality and seasonality

Fodder crop production is very limited in the kebele (Jawe) primarily because of limited forage seed/planting material supply, land shortage and awareness problem. As indicated in Figure 4, Desho grass is the dominant improved forage produced under different forage development options including soil and water conservation structures. Farmers also allocate small portions of crop land for production of oats (*Avena sativa*) which is the second most dominant fodder produced in Jawe kebele.

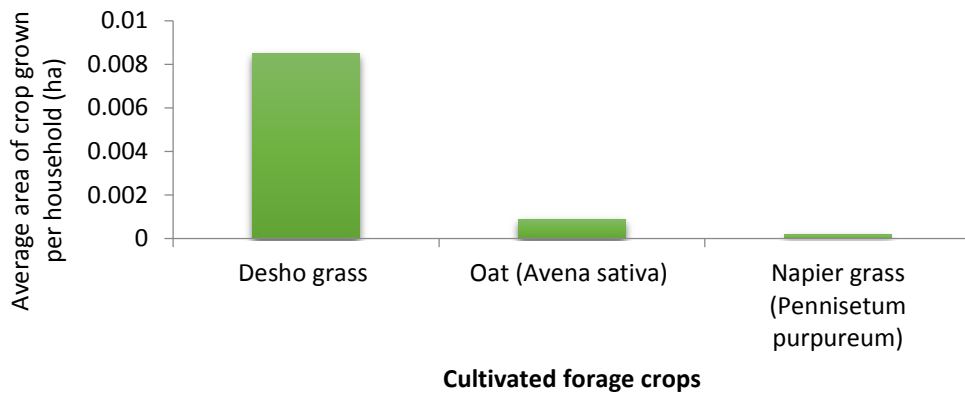


Figure 4. The dominant fodder crops grown in the area

Quantity of feed purchased over a 12 month period

The type of feeds purchased over a year in the two kebeles is shown in Figure 5. Farmers in Jawe have been accustomed to purchasing feeds for livestock in different seasons of the year. Wheat bran is the most important purchased feed followed by naturally occurring pasture (green fodder). Wheat bran is purchased mostly during dry season whereas green fodder (natural pasture) is purchased around the end of the wet season. In the Upper Gana kebele farmers buy only crop residues and natural pasture. Pasture is purchased in the form of paddocks of different land size, which are used for both direct grazing and cut and carry feeding. One timad (0.25 hectare) of land costs about 400 ETB per year and yields an average for cut and carry of 10 donkey loads (one donkey load is approximately 60 kg).

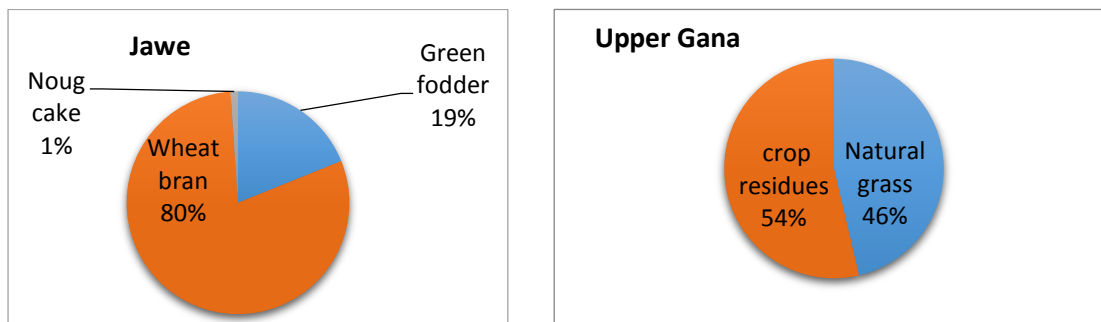


Figure 5. Quantity of feed purchased over a 12 months period in Jawe and Upper Gana kebeles

Crop residues and grazing are the greatest contributors to the dry matter content of the total diet. These two feed sources have comparable contributions in terms of metabolizable energy content of the total diet. Purchased feed, crop residue and grazing contribute 28 %, 34 % and 37 % of crude protein content of the total diet, respectively, in Jawe kebele (Figure 6).

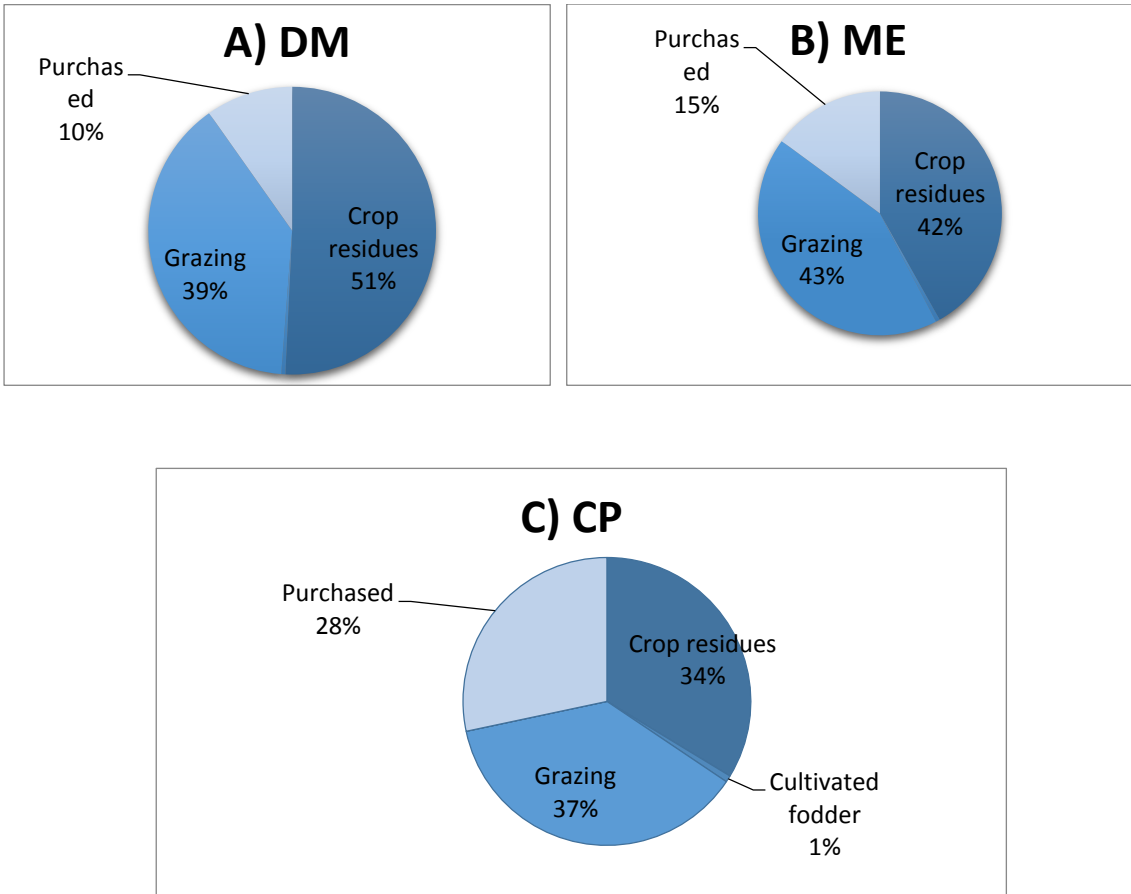


Figure 6: The contribution of feed resources to dry matter (A), metabolizable energy (B) and crude protein (C) content of the total diet in Jawe kebele

Unlike Jawe, farmers in Upper Gana kebele do not use purchased feed due to the cost and/or lack of easy access to purchased concentrates. Thus, the annual feed DM, ME and CP supply in the kebele is based on grazing, naturally occurring collected fodder and crop residues (Figure 7).

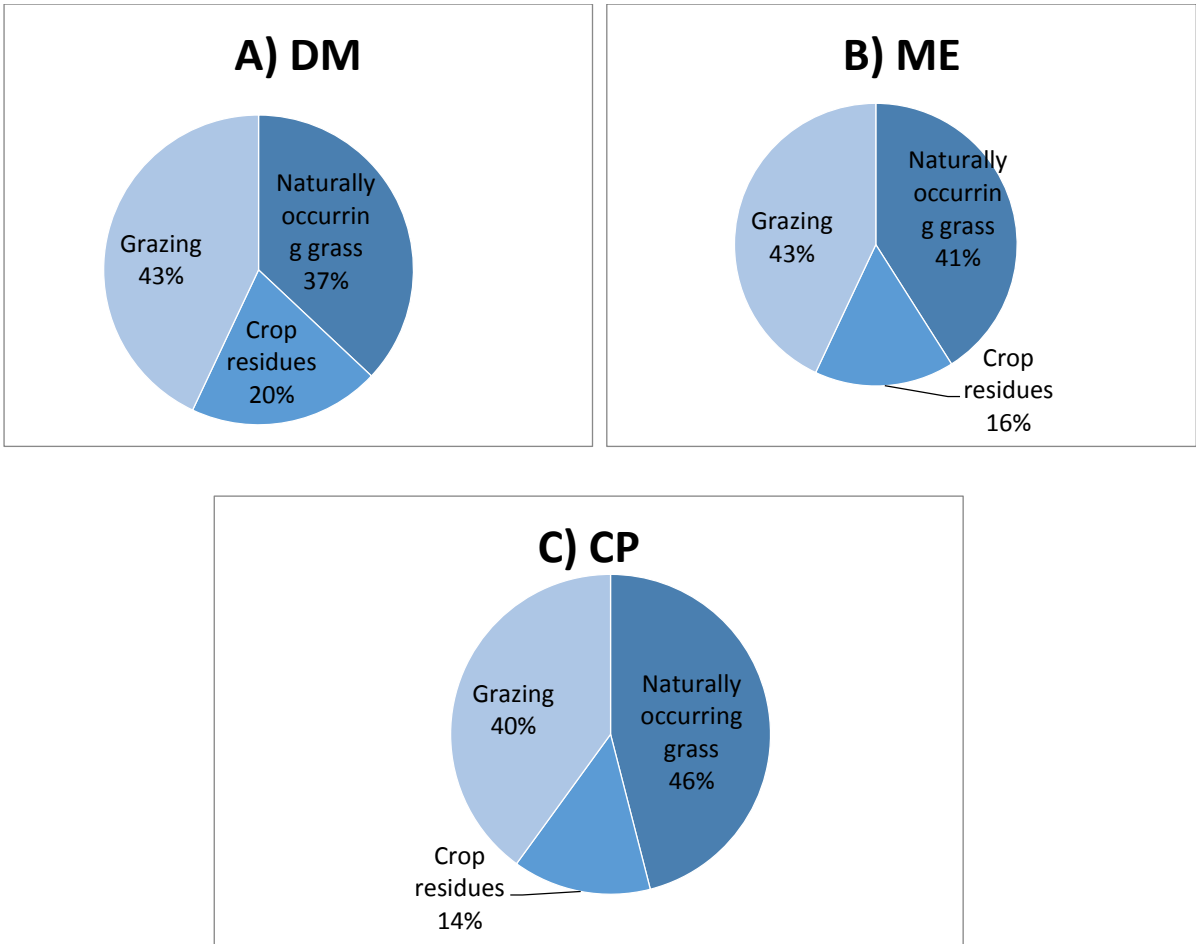


Figure 7. The contribution of feed resources to dry matter (A), metabolizable energy (B) and crude protein (C) content of the total diet in Upper Gana kebele

The availability of feed over the different seasons is shown in Figure 8. The feed supply reaches its peak from June to October when rain or moisture availability is very good. Through November to January, the feed availability starts to decline and reaches its lowest abundance during the months February to May.

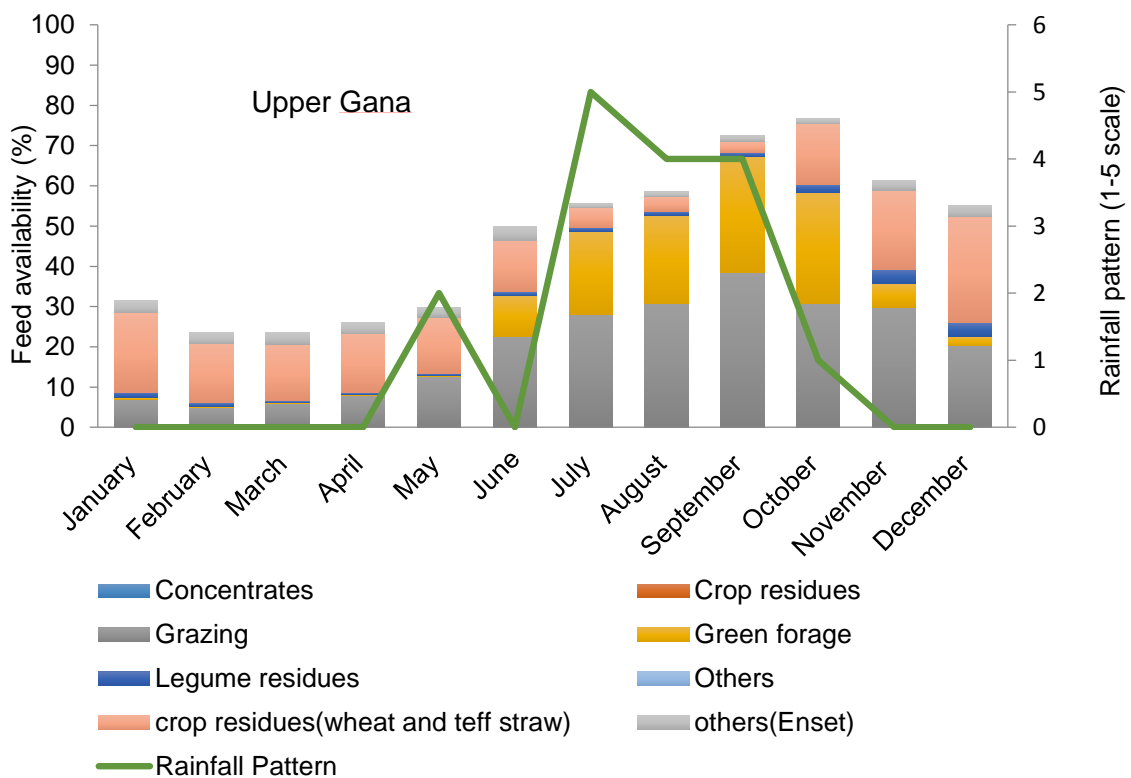
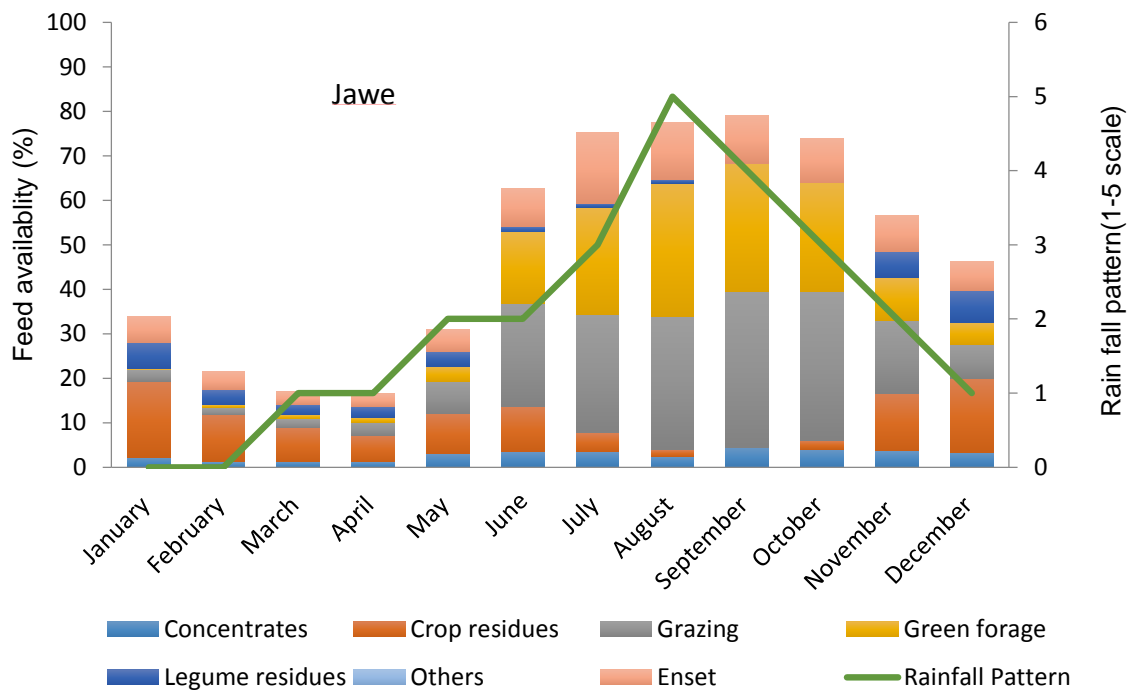


Figure 8. Seasonality of feed resources availability in Jawe and Upper Gana kebeles of Lemo district, Haidiya Zone

Farmers access veterinary services from the nearest town, Hossana, which is about 9 km away. One vet technician is assigned for the kebele, but he cannot reach all farmers in the kebele. Farmers

mostly use private sources due to ease of access. They believe they get quality and cheap service from government but due to accessibility problem they go for private sources, thus, more than 60% of farmers use private vet services. The price of treatment varies with the type of health problem; however, the respondents indicated that they often pay 40 to 100 Birr per head for treatment of cattle.

Farmers in the area use both bull and AI service to multiply their animals. Farmers travel to Hossana town to get both AI service and bull service. So far AI service has not been provided in the kebele, but recently the district started the service at kebele level. Thus, the majority of the farmers use selected local bull services. Cost of AI service is 5 Birr per service; some unethical government workers illegally collect 100 Birr per service but this problem has been solved. Farmers sometimes experienced 2 to 3 repeat services before successful conception.

Problems, issues, opportunities within the livestock system

At the end of the PRA, farmers were asked to list the five most important problems that hinder the production and productivity of livestock. Tables 2 and 3 show the five most important problems with their score and rank. During FGD in addition to mentioning livestock production problems farmers also indicated their coping strategies and the possible proposed solutions to the respective problems. Water shortage followed by feed shortage and limited access to veterinary services were found to be the main constraints affecting livestock production according to the PRA participants from Jawe Kebele. In the case of Upper Gana kebele, animal health problem (incidence of diseases and parasites) followed by water shortage and feed shortage were identified to be the main constraints. The respondents also described their coping strategies to the problems and also suggested measures that need to be taken in order to alleviate the problems. The PRA participants from both kebeles indicated that they have to travel long distance fetch water both for human and livestock use. In addition, it was indicated that some farmers in Jawe kebele dig bore holes as a source of water supply. The farmers reserve and use crop residues for feeding their animals to overcome the feed shortage problems in both kebeles. In addition, the farmers also use by-products of the enset crop (such as leaves) and some purchased feeds to overcome the feed shortage and quality problems.

Table 2. Livestock -related problems identified by farmers in Upper Gana and the coping strategies and solutions

List of problems in order of importance	Coping strategies	Proposed solutions
Feed shortage	<ul style="list-style-type: none"> • Allocate land for grazing • Reserving crop residues • Use of food crops (enset) • Purchasing feed 	<ul style="list-style-type: none"> • Improved supply of improved forage • Skill development on livestock feed
Cash/credit service	<ul style="list-style-type: none"> • Cash generating farm activities (poultry, eucalyptus) • Retail trading 	<ul style="list-style-type: none"> • Improve access to credit service • Promote cash generating activities such as horticulture farming
Water shortage	<ul style="list-style-type: none"> • Travelling to distant water points • Digging borehole 	<ul style="list-style-type: none"> • Government should construct water structures
Lack of improved breeds	<ul style="list-style-type: none"> • Use of selected local bulls • Purchase of better breeds 	<ul style="list-style-type: none"> • Improve AI service
Limited vet service	<ul style="list-style-type: none"> • Use of traditional medicine • Travelling to distant veterinary service centres 	<ul style="list-style-type: none"> • Employing sufficient veterinary technicians • Improve supply of drugs

Table 3. Livestock-related problems identified by farmers in Upper Gana and the corresponding suggested coping strategy and solutions

List of problems in order of importance	Coping strategy	Proposed solution by the farmers
Incidence of disease and parasites	Use traditional treatments like girawa and tobacco	<ul style="list-style-type: none"> • Establishing veterinary clinics with manpower and drug supplies
Inadequate source of clean water	Walking about 6km to fetch water for human and animal drink from farmers' residence.	<ul style="list-style-type: none"> • Better management of the existing water resources, collecting rain water for dry periods and extracting the ground water with the assistance of government and non-government organizations.
Shortage of feed in quantity and quality	Use crop residues, ensen leaves and purchasing natural grasses	<ul style="list-style-type: none"> • Proper utilization of the existing feed resource • Allocate land for feed production • Keep few improved and productive animals
Insufficient supply of improved breed	Use local and improved bulls	<ul style="list-style-type: none"> • Increased coverage and timely AI service delivery Improving access to improved animal breeds

Conclusions

Lemo district and the two study kebeles, Jawe and Gana, are predominantly characterized by a mixed crop-livestock production system. Farmers rear different types of animals even though size of livestock holding per household is minimal. Water shortage followed by feed shortage were identified to be the most important problems in Jawe whereas the animal health problems ranked first in Gana followed by water shortage and feed shortage, which ranked 2nd and 3rd, respectively. Farmers use different types of feed for their animals, but there are limitations in the availability and quality of feed resources. Feed problems are mainly attributed to land shortage, lack of improved forage technologies and awareness problem. Introduction of improved forage technologies that can fit into the existing land use system coupled with improved feeding systems would be necessary to resolve the feed related problems. At the same time other problems affecting livestock production in the area should be addressed simultaneously in order to realize the potential benefits to be accrued from livestock.

References

- Abate, D., Belete, S., Wegi, T., Usman, S., Wamatu, J. And Duncan A., 2012. Characterization of the livestock production systems and the potential of feed-based interventions for improving livestock productivity in Sinana district, Bale highlands, Ethiopia. International Livestock Research Institute, Addis Ababa, Ethiopia.
- Wondatir, Z., Derese, A., Assefa, T., Seifu, T., Negewo, J., Adie, A. and Tolera, A., 2014. Assessment of livestock production system and feed resources availability at Melka watershed of Jeldu district, West Shewa Zone of Oromia Regional State, western Ethiopia. International Livestock Institute, Addis Ababa, Ethiopia. Unpublished draft report
- Duncan, A., York, L., Lukuyu, B., Samaddar, A. and Stúr, W. 2012. Feed Assessment Tool (FEAST). www.ilri.org/feast.
- Ellis-Jones Jim, Kindu Mekonnen, Solomon Gebreselassie and Steffen Schulz, 2013. Participatory Community Analysis: Challenges and Opportunities identified with Local Communities. Africa- Rising: Intensification of Farming Systems in the Highlands of Ethiopia. CIP-ILRI report
- FAOSTAT (Food and Agricultural Organization of the United Nations Database), 2004. Country time series for Ethiopia. FAO: Rome
- Legese G., Abebe G., Siegmund-Schultze M. and Valle Zárate A. 2008. Small ruminant production in two mixed-farming systems of southern Ethiopia: Status and prospects for improvement. *Experimental Agriculture*. 44(3):399-412.
- Tsegaye, B., Tolera, A. and Berg, T., 2008. Livestock production and feed resources constraints in Akaki and Lume districts, central Ethiopia. *Outlook on Agriculture*, 37(1): 15-21