Assessment of livestock production and feed resources at Robit Bata, Bahir Dar, Ethiopia

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Background

Robit Bata is a kebele in Bahir Dar Zuria Woreda, Amhara National Regional State. It is located approximately 20 kms from western part of Bahir Dar town, the capital town of the region. It is situated at 11o41'02'' N and 37o27'19'' E. The area has an average elevation of 1848 masl. According to some reports a total of 8900 people are living in the kebele. Mixed farming is the major farming system in the area. Major crops grown in the area include maize, finger millet, tef, rice and chick pea. Livestock are an essential part of the agricultural production in the area. Among the available feed resources crop residues are the major feed resource in the dry season. However the contribution of crop residues and other available feed resources to livestock and their seasonal availability is not well investigated in the area. Thus, this study was carried out with the aim of rapidly assessing the prevailing farming and livestock production system, feed resources availability and livestock production constraints of the area in order to identify potential intervention strategies for the development of livestock feed resources.

Methodology

From Robit Bata kebele three sub-villages namely Deri Gedel, Jimma Midir and Terara Gichamintola were selected for the survey. The three sub-villages were purposively selected based on their representation of the ILSSI project area. In addition, in the study sites ground water is not available due to the hard rock pan, ground water is not easily accessible. A total of 45 farmers (15 from each sub-village) were selected for focused group discussion. All the farmers were selected based on wealth category (small, medium and large landholdings). Again out of the 15 farmers in each sub-village, 9 farmers (6 male and 3 female) representing the three wealth categories were interviewed to collect quantitative data on livestock production, feed resource availability and livestock and livestock products marketing. FEAST software was used to analyse quantitative data while qualitative data obtained through focused discussion were summarized. FEAST is a systematic method for assessing local feed resource availability and is used with a view to designing intervention strategies aimed at optimizing feed utilization (Duncan et al., 2012).

Data analysis

The FEAST excel macro program (www.ilri.org/feast) was used for data summary and analysis. Narrative responses collected during the group discussions were examined and reported in a qualitative manner.

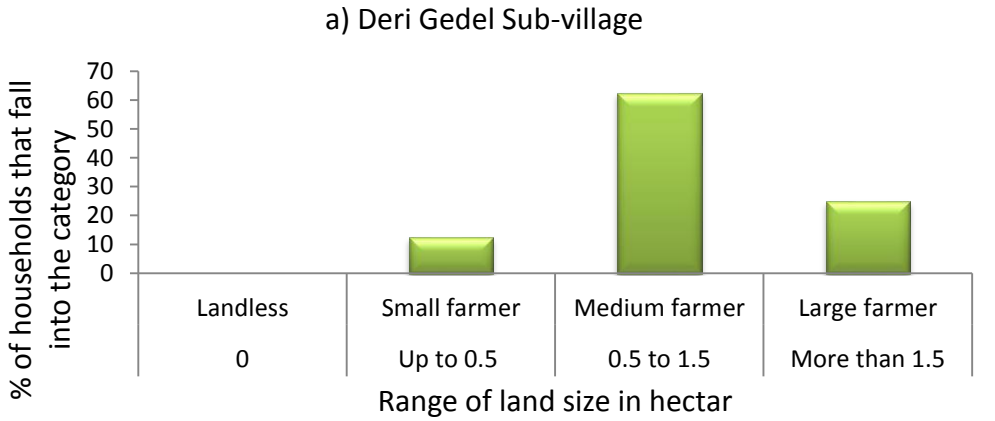
Results and discussion

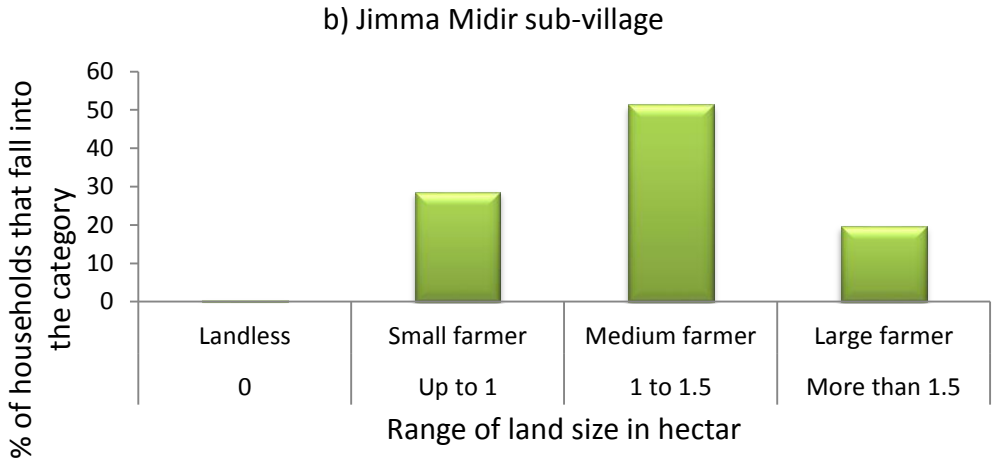
General overview of the study villages

Mixed crop-livestock production is the major production system in the three sub villages. In the study villages ground water is hardly available due to the hard rock pan. The number of households in Deri Gedel, Jimma Midir and Terara Gichamintola were reported to be 400, 876 and 707, respectively. The average family size per house hold at Deri Gedel, Jimma Midir and Terara Gichamintola were reported to be 6, 6 and 5 persons, respectively.

Landholdings

The average land holding per household for various wealth groups is indicated in Figure 1 (a-c). According to the definition of land holding size category developed by the respondents from each sub-village, most households in the three sub-villages have medium size of land holding. At Deri Gedel sub-village 25% of the households have large landholdings compared to 20 % of the households in Jimma Mdir and Terara Gichamintola sub-villages. In none of the three study sub-villages are landless farmers encountered. In Derei Gedel sub-village, farmers who had half a hectare of landholding were considered to be small farmers where as small farmers at Jimma Midir and Terara Gichmintola had an average land size of 1 ha.





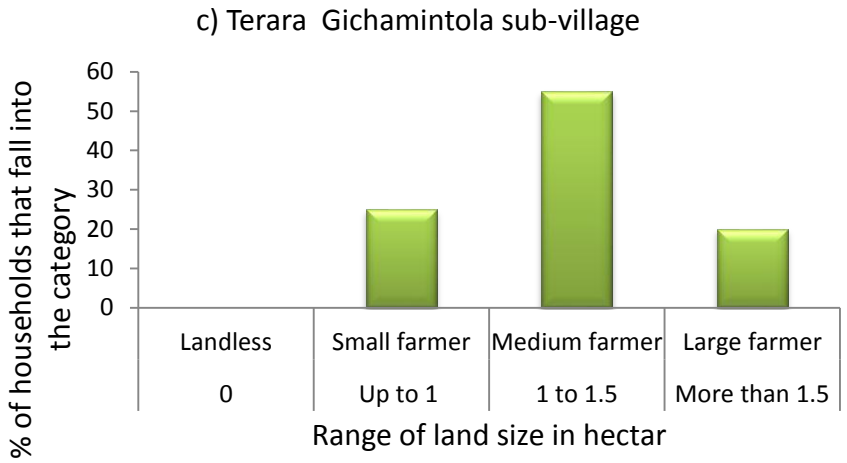


Figure 1. Land holding size of the study sub-villages

Crop production

In the Robit Bata kebele, mixed crop livestock production is the predominant production system and crops are grown using both rain and irrigation water. Two major cropping seasons were identified in the three sub-villages selected for the study. The two seasons are known as *Kiremt* and *Bega*. *Kiremt* covers the months from June to October while *Bega* covers the months from December to the end of May. *Kiremt* is the main rainy season where major field crops are grown. *Bega* is the dry season where crop harvesting, collection, land preparation and irrigation activities are carried out.

In *Kiremt,* major crops grown include maize, finger millet and tef. Similarly in the *Bega* cropping season, most crops are grown by irrigation. Crops such as tomato, grass pea, chick pea, wheat, maize, onion, cabbage, green pepper, khat, mango and coffee are grown by irrigation in the *Bega* season. About 90% of the households in the three sub-villages had access to irrigation.

The main source of water for irrigation is well water. The interviewed households in the sub-villages reported that water could not percolate into the ground and hence a single water well may not serve throughout the dry period. As a result many of the households have more than one water well. Despite the many rivers available, their contribution to irrigation is limited due to their short duration (June to December).

Major crops grown and their area coverage in the three sub-villages are indicated in Figure 2 (a-c). The dominant crops grown at Deri Gedel and Terara Gichamintola sub-villages are maize (*Zea mays)* followed by finger millet (*Eleusine coracana*) and teff (*Eragrostis tef*), respectively. Barley (*Hordeum vulgare*) and rice (*Orayza sativa*) are also additional crops grown at Deri Gedel sub-village. However, at Jimma Midir sub-village, teff (*Eragrostis tef*) is the major crop grown while maize (*Zea mays)* and finger millet (*Eleusine coracana*) are the second and third important crops grown in the area. Maize (*Zea mays),* finger millet (*Eleusine coracana*) and teff (*Eragrostis tef*) are mainly consumed by the households in each sub-village. Interestingly, Khat (*Catha edulis*) has been recently introduced into the farming system and becomes the main cash crop and means of income source for almost all households in the three sub-villages. Coffee and mango are other income sources next to kaht.

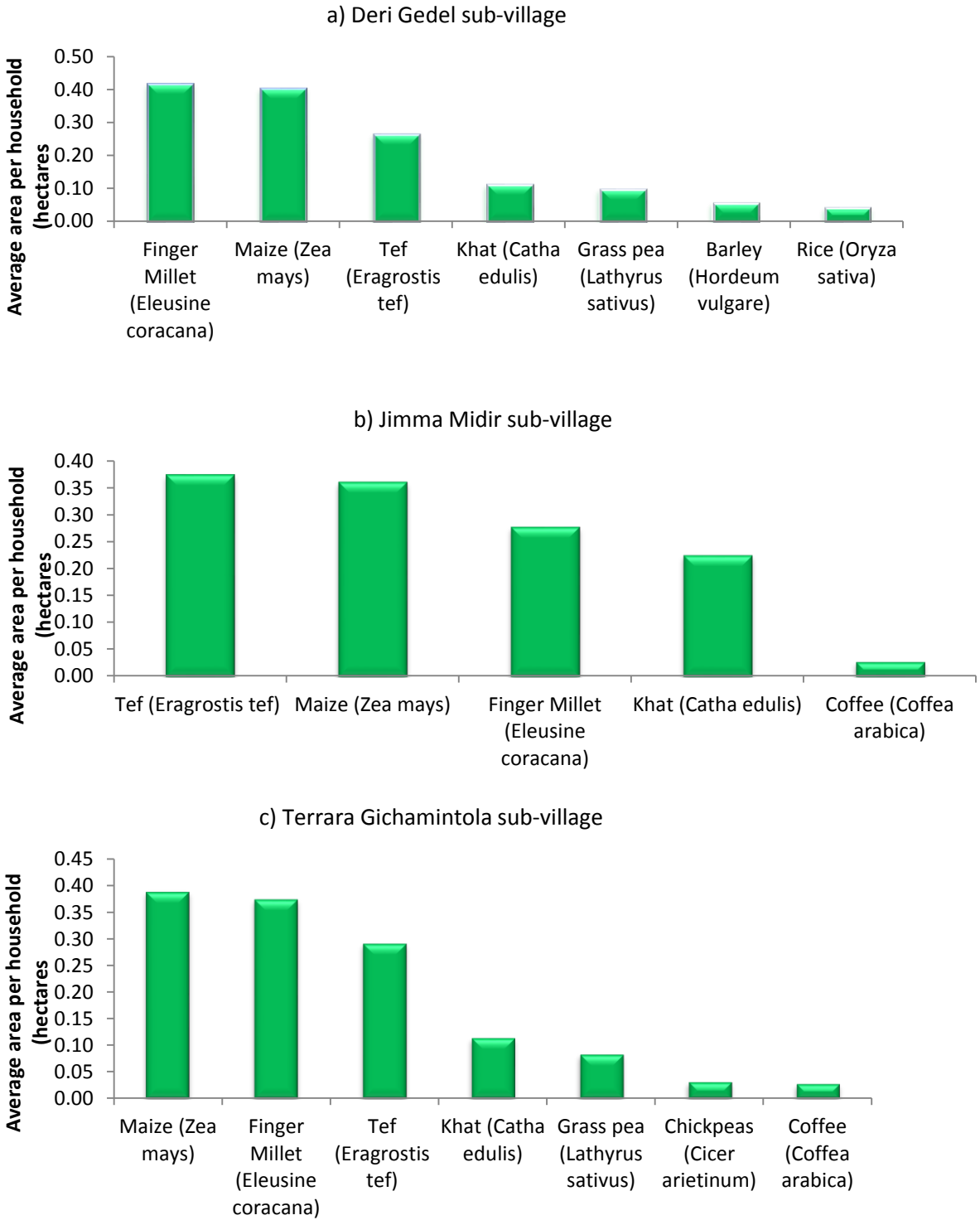


Figure 2. Major crops grown in the three study sub-villages

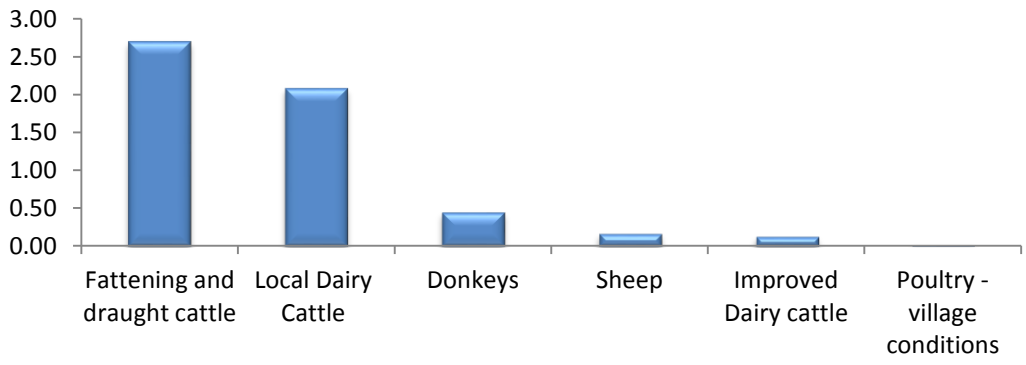
Livestock production and management

Livestock are considered as a backbone for crop agriculture in Robit Bata village. The type of livestock production system found in the three sub-villages is extensive where during *Kiremt* cattle are kept around the homestead and fed using a cut and carry system. The existing grazing lands are small in size. Livestock are mainly kept using fodder from roadsides, border plots, communal lands and swampy and wet areas. The main cattle breed found in the area is mixed highland Zebu. The cattle breeding system is open natural mating where selection of superior animals is not favored.

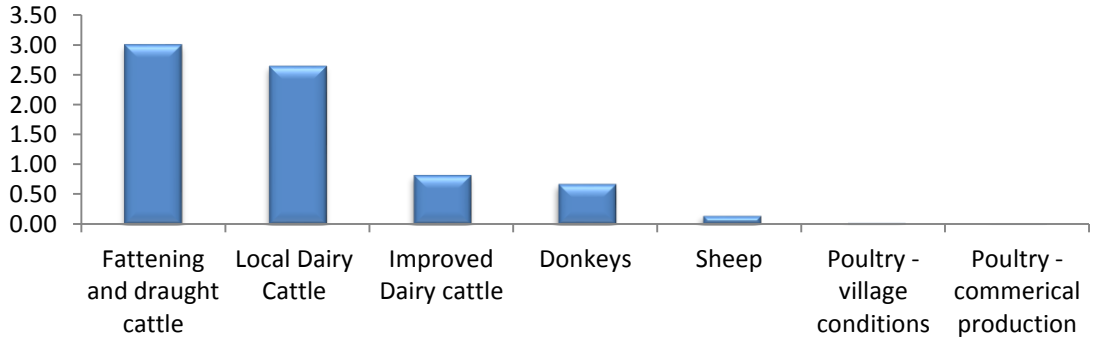
Participating farmers in the group discussion have shown strong interest for crossbred animals. Artificial insemination (AI) service is hardly available in the kebele. All livestock species owned by the households in the study sub-villages are housed during the night throughout the year. Except sheep and young suckling calves, the rest of the animal groups/species are housed together at night in the same barn. In all cases, barns have no feed troughs. As indicated by the participants, most barns at Deri Gedel and Terara Gichamintola have stone bedding floors while in Jimma Midir soil bedding is predominant. Most households keep cattle, small ruminants, equids and poultry. Cattle are basically reared to meet draught power requirements while milk, meat, manure, dung cake, breeding replacement stock and income sources are of secondary importance. Equids particularly donkeys are mainly kept for transporting goods. Small ruminants (sheep) are reared for mutton and as an income source for the family.

Average livestock species holdings per household for the three sub-villages are indicated in Figure 3 (a-c). In Deri Gedel and Jimma Midir, the main livestock species holding per household are fattening and draught cattle. Likewise, local dairy cattle represent numbers per household are relatively high in Terara Gichamintola sub-villages. Limited numbers of crossbred dairy cattle are kept by the households in study sub-villages. In Jimma Midir the cows produce about 2 liters of milk per day while in Deri Gedel and Terara Gichamintola the cows produce 0.5 and 1.4 liters of milk per day, respectively. The majority of the milk produced is retained for home consumption. However, some milk is processed into butter for sale and family consumption. In spite of the stronger demand for milk in the surrounding market, the volume of milk produced by the households is not sufficient to meet local requirements. Scavenging chickens are raised by the households in the three sub-villages. In addition some exotic layer hens are also kept by some households in Jimma Midir sub-village.

a) Deri Gedel sub-village



b) Jimma Midir sub-village



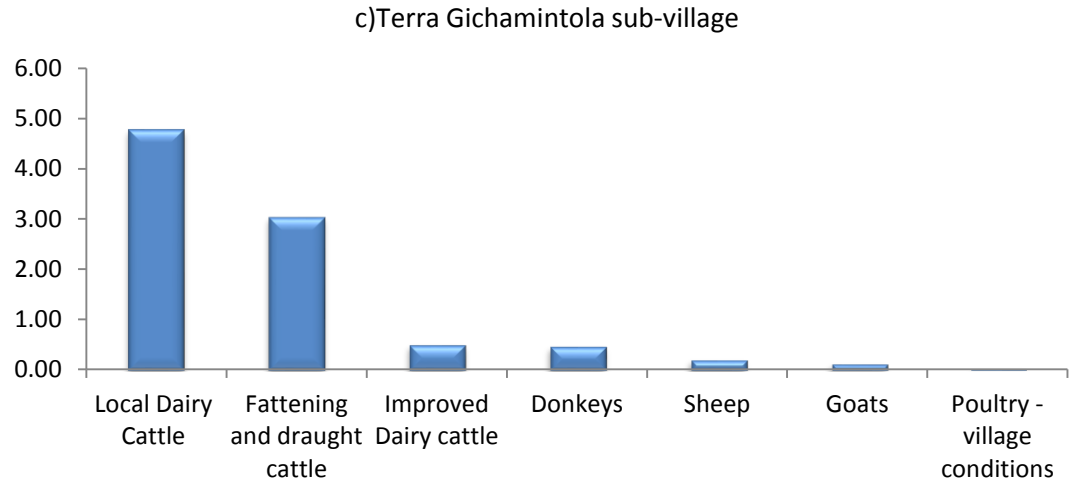


Figure 3. Average livestock species holdings per household in Tropical Livestock Units (TLU)

Animal health and artificial insemination (AI) services

The respondents in the study sub-villages indicated that veterinary services are provided by private animal health professionals/technicians. Public animal health services are not yet available in the kebele. The private animal health service providers communicate by mobile phone. According to the call, they could travel to the farmer's home with motor bike to provide the service. However the farmers in the discussion underlined that the service is costly and not affordable by them. The service charge per animal per treatment was reported to be Ethiopian birr 40. AI service is not available when required. Some attempt has been made to inseminate local cows with the use of estrous synchronization hormone. However, the farmers reported that the attempt was not successful for unknown reasons.

Labour availability

The respondents from all the three sub-villages indicated that labour is not readily available throughout the year but varies from season to season. It is critically required during planting, weeding and harvesting seasons (beginning of June to end of December). Besides family labour, some of the farmers hire additional labour from the surrounding area. Regardless of seasonal variation of labour, the average daily wage payment per individual is around 50 Ethiopian birr. In addition, the farmers provide meal and local drink to the workers, which could cost around 25 Ethiopian Birr/day for each worker. The payment is same for both male and female workers. Except ploughing, females are involved in planting, weeding and harvesting of crops. The farmers mentioned that labour cost is somewhat affordable in relation to the different advantages attained. Farmers prefer to work on their farms than to leave and look for jobs in other areas.

Land availability for cultivation

Land is an important asset for households to operate different activities related to livestock and crop production. In the kebele as reported by the respondents, land for cultivation is becoming scarce. Increasing human population, declining land productivity associated with poor soil fertility and the recent investment ventures such as expansion of floriculture farms are mentioned as the principal factors underlying scarcity of land in the kebele. Planting two crops per cropping year is commonly practiced. For instance after harvesting maize and rice, the same land is planted with grass pea and lentil. The cost to contracting in/out land in the three villages is estimated to be Ethiopian birr 4800/ha/year.

Agricultural inputs

Inputs such as improved seed, fertilizer, pesticides, insecticides, irrigation facilities, livestock feed and improved cattle breeds were mentioned as key factors to increase production and productivity of livestock and crops in the kebele. Improved seed and fertilizer are supplied by the farmers' cooperatives. It was indicated that agricultural inputs such as improved animal breeds are not readily available. According to the respondents, irrigation equipment is readily available in the Bahir Dar market although most farmers are unable to purchase the required quantity because of its high price.

Credit services

In the kebele, farmers have alternative sources of credit services for livestock and crop production. The different sources of credit include *Amhara* Credit and Savings Institution, *Ediget Lerobit* Credit and Savings Association and *Debretsion* Cooperative. The respondents indicated that the households have access to at least one of the credit sources at any time as needed. Moreover, the credit services provided by these institutions are group based collateral systems and based on the business plans of farmers. This makes individual farmers accountable to group members for repayment of loans.

Household income sources

The various income sources for households in the study sub-villages are indicated in Figure 4 (a-c). In the three sub-villages, the largest share of household income comes from sale of cash crops particularly khat. In Deri Gedel sub-village 20% of household income is derived from sale of food crops such as maize and finger millet whereas 14% of the income is obtained from livestock and livestock products. In Jimma Midir sub-village, the second most important income sources are food crops and business such as casual work. Livestock and livestock products contribute to 17% of the income of the households in Terara Gichamintola sub-village.

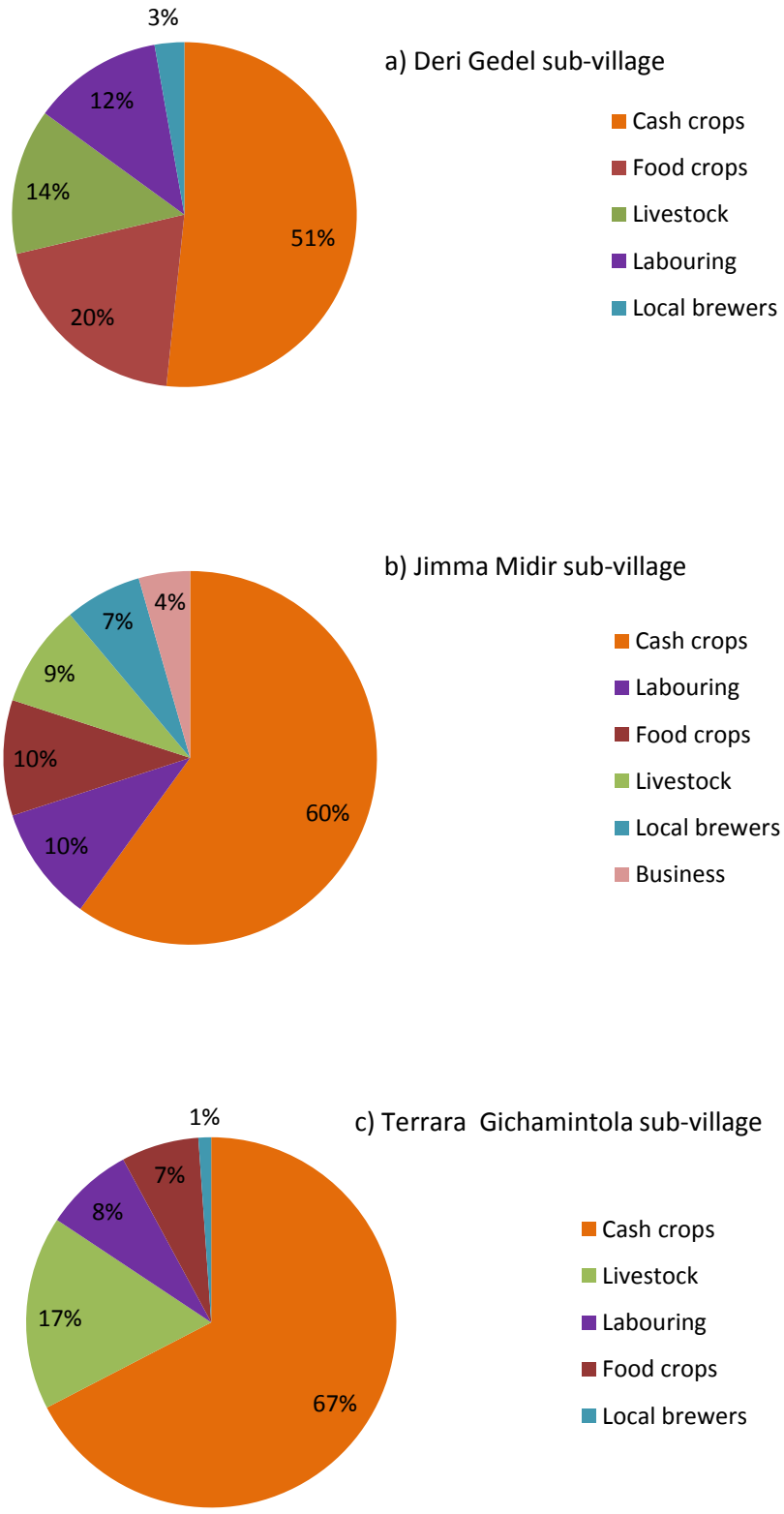


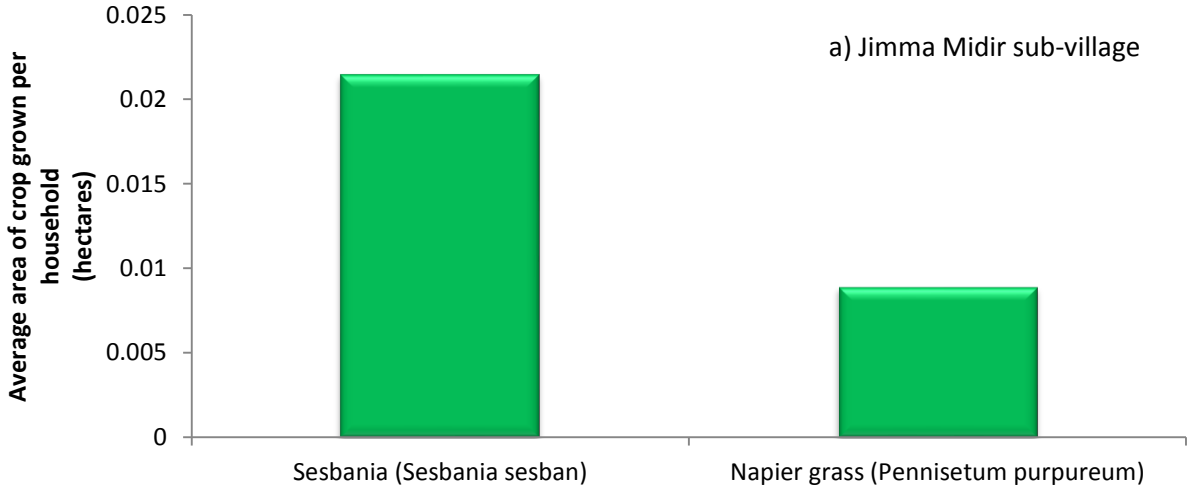
Figure 4. Contribution of livelihood activities to household income in the study sub-villages

Major feed resources

Major feed resources in the three study sub-villages are crop residues, naturally occurring and collected feeds and grazing in order of importance. Even though, crop residues represent the largest share of livestock feed, none of the farmers apply either chemical or mechanical treatment methods so as to improve the palatability and quality of crop residues. The farmers in the group discussion indicated that there is no extension service to provide advice on improving the utilization of existing crop residues. Farmers have not received training so far and do not have the know-how on how to treat and improve palatability of available straw. Straw is always provided to animals alone, even without mixing it with other feeds like salt, molasses and water.

The practice of growing improved forage crops for livestock feed is not common in the kebele. However, some farmers in Jimma Midir planted sesbania (*Sesbania sesban*) and napier grass (*Pennisetum purpureum*) in backyards (Figure 5). On the other hand, farmers in Terara Gichamitola have grown only sesbania at their backyard for shade purpose. During the group discussion farmers showed deep interest to allocate land and establish improved forage crops, if training and initial seed materials are provided to them.

In addition to the existing feed resources, most of the farmers purchase supplementary concentrate feeds. Frequency of purchasing concentrate feeds varies from farmer to farmer depending on wealth status and amount of stored feed. Supplementary feeds are purchased from the local market as well as well as Bahir Dar market. Supplementary concentrate diets are provided primarily to milking cows and draught oxen. Among the concentrate feeds, wheat bran, nougseed cake and chick pea haulm are purchased by farmers in varying proportions in the three villages (Figure 6 a-c). Moreover farmers in the kebele also purchase crop residues such as finger millet and lentil straw. Chick pea haulm is the largest proportion of supplementary feed purchased in Jimma Midir sub-village while wheat bran is prominent in both Deri Gedel and Terara Gichamintola sub-villages.



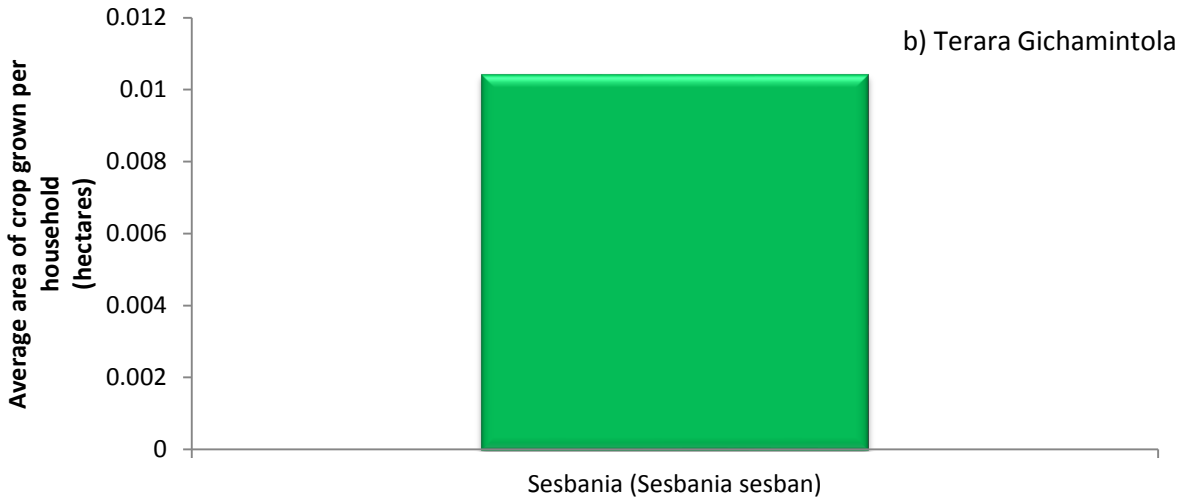


Figure 5. Improved fodder crops grown in the study sub-villages

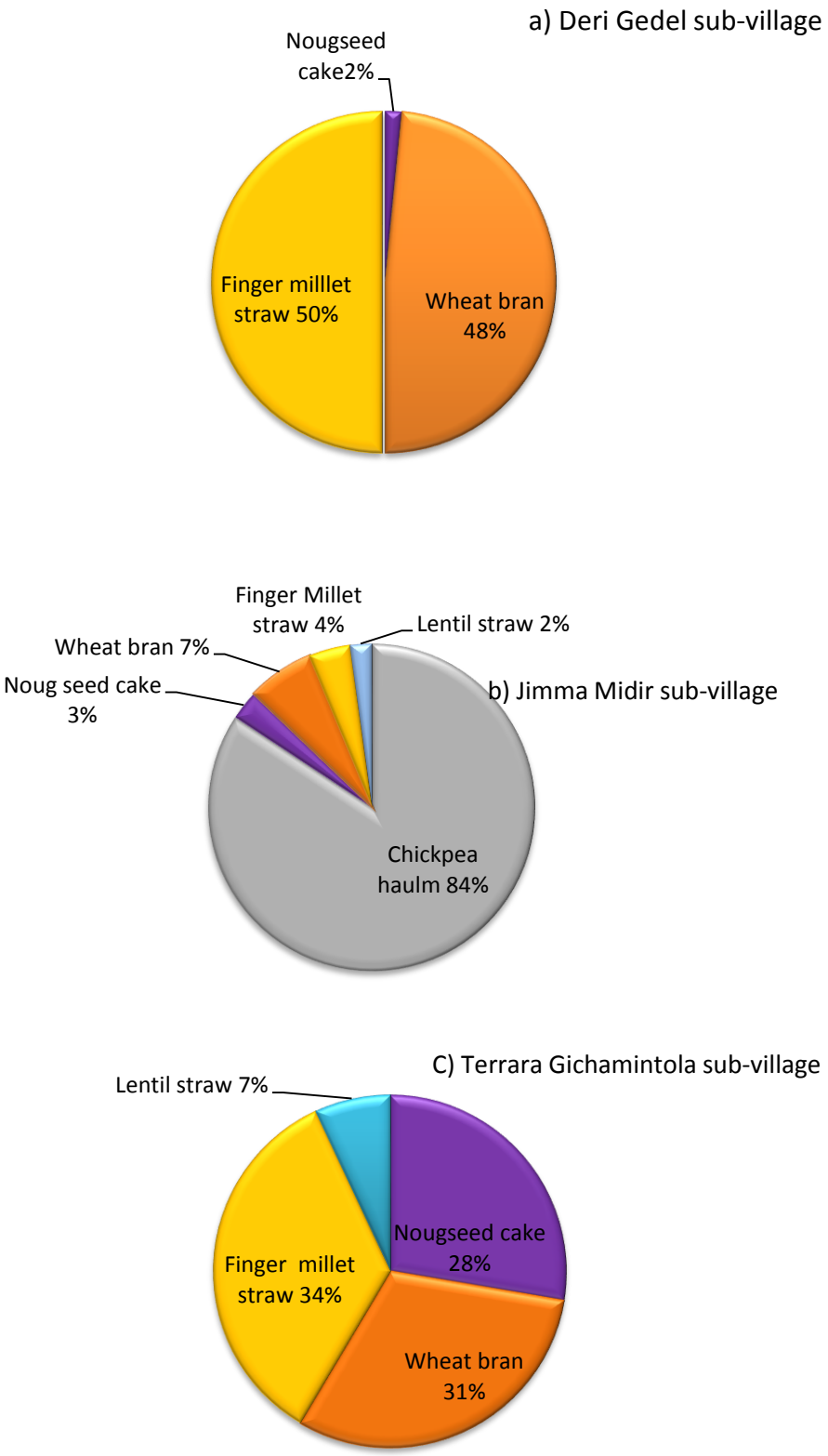


Figure 6. Dry matter quantity of feed purchased over a 12mth period in the study sub-villages

Dietary composition and seasonality of feeds availability

Crop residues contribute the largest proportion to the livestock diets in terms of dry matter (DM) in all study sub-villages followed by naturally occurring and collected green fodders (Figure 7 a-c). Similar to the dry matter content, crop residues in both Deri Gedel and Terara Gichamintola contributed the largest amount of metabolizable energy (ME) and crude protein (CP) content of the diet (Figures, 8 and 9). In Jimma Midir, crop residues contribute a higher proportion to DM content of the diet, although the highest contributor to the ME and CP content of the diet remains naturally occurring and collected fodder.

Seasonality of feeds and rainfall pattern for Deri Gedel, Jimma Midir and Terara Gichamintola sub-villages, respectively is shown in Figure 10 (a-c). Crop residues are the major feed resources in the study areas and serve almost for the entire dry period (December to June). Green fodders assume the highest importance in the wet season from July to November in the sub-villages surveyed. Natural pasture grazing and crop aftermath grazing are also other feed resources in some wet and dry seasons of the year.

Rain fall pattern has similar trends across the study sub-villages. The months from July to September are characterized by heavy rain fall. However, there are light showers of rain from March to May as well as from September to November. Green feed availability is strongly related with rainfall availability.

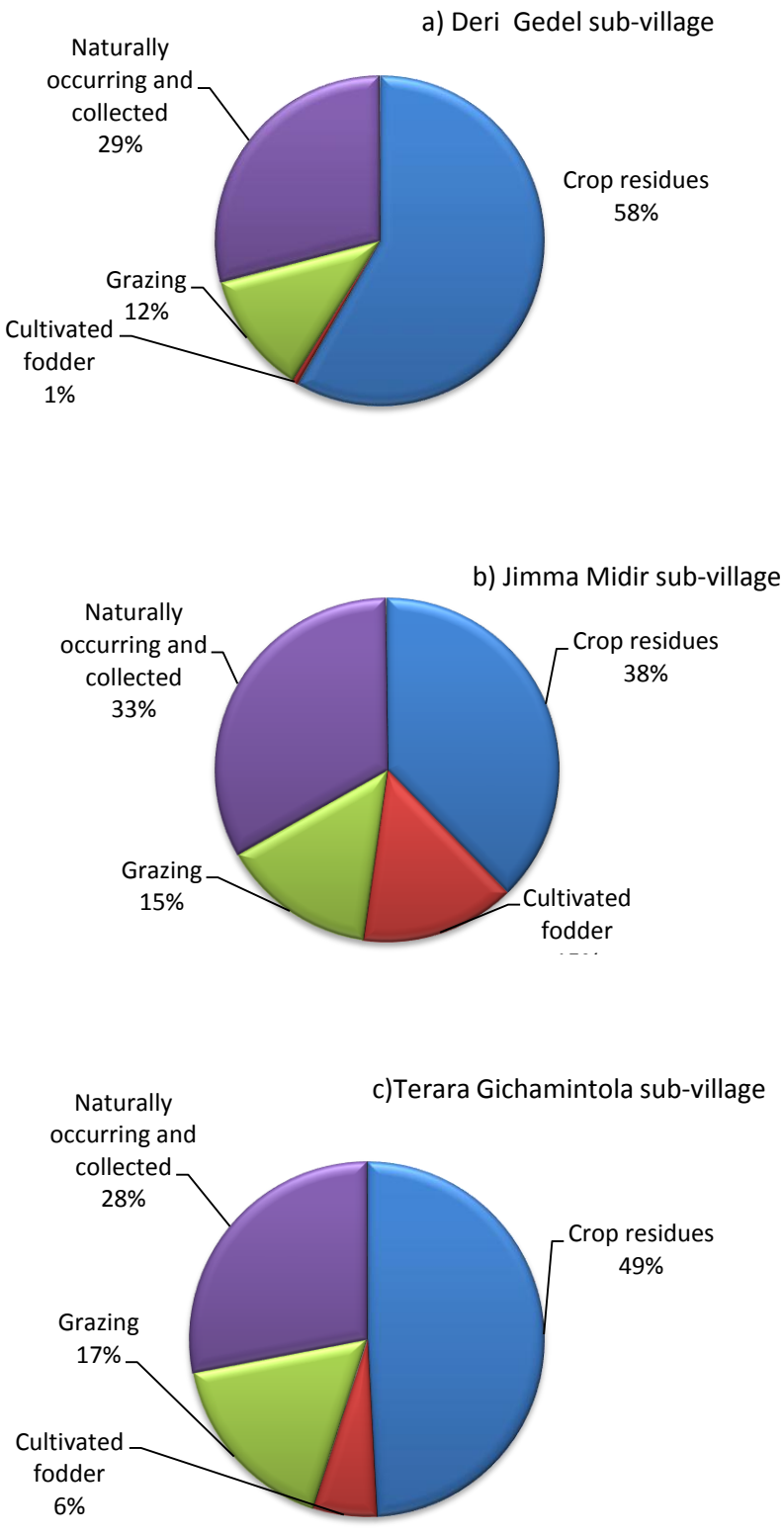


Figure 7. Dry matter content of total diet in the study sub-villages

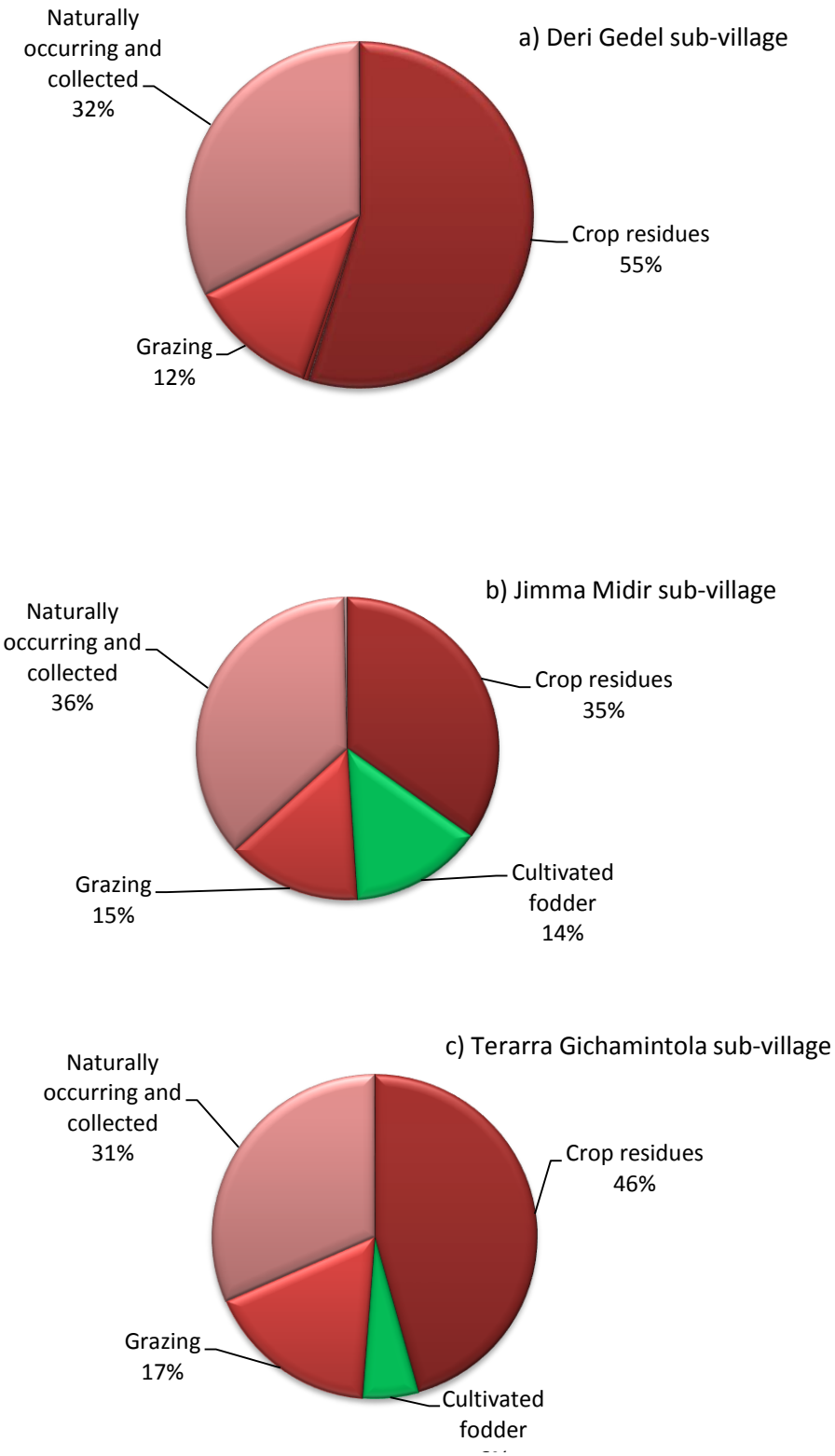


Figure 8. Metabolizable energy content of the total diet in the study sub-villages

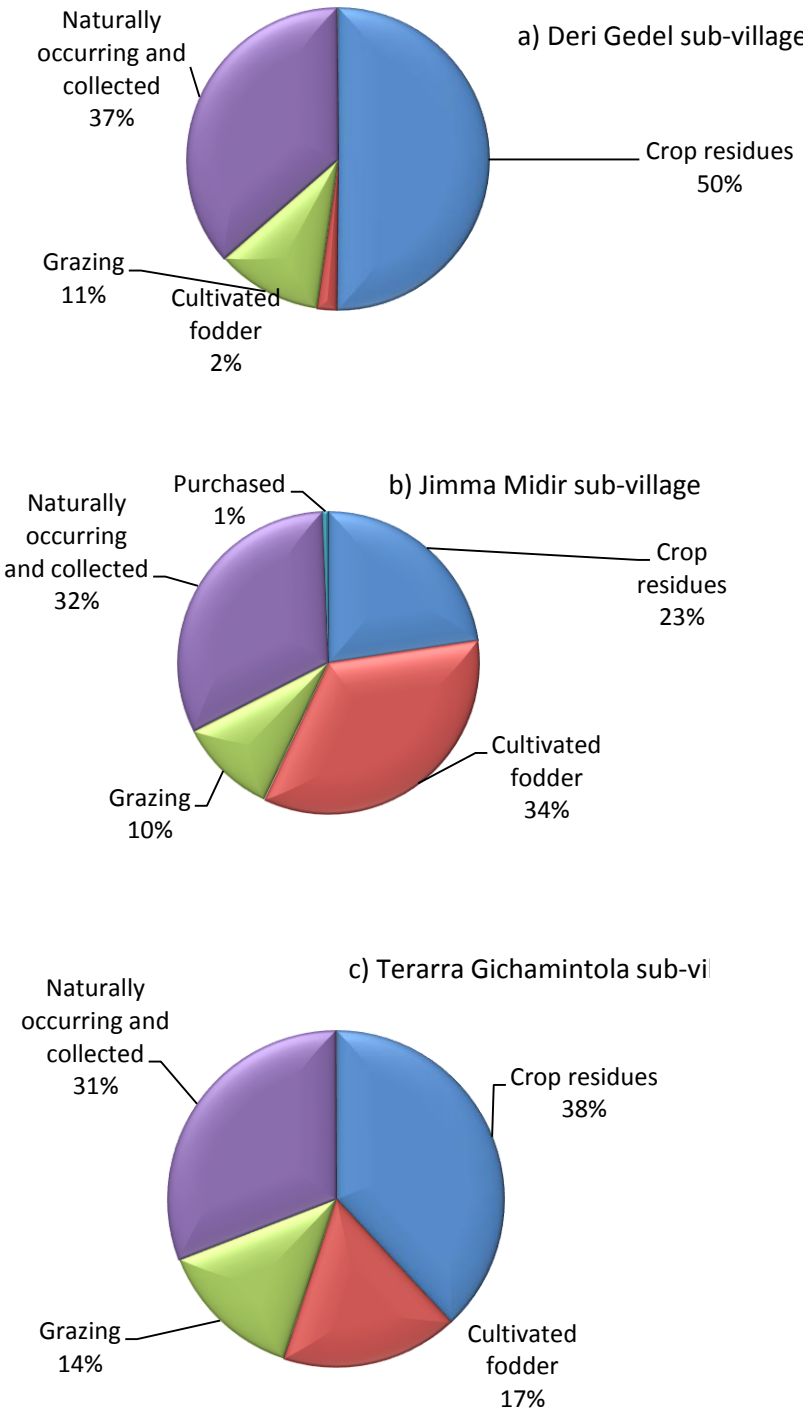


Figure 9. Crude protein content of the total diet in the study sub-villages

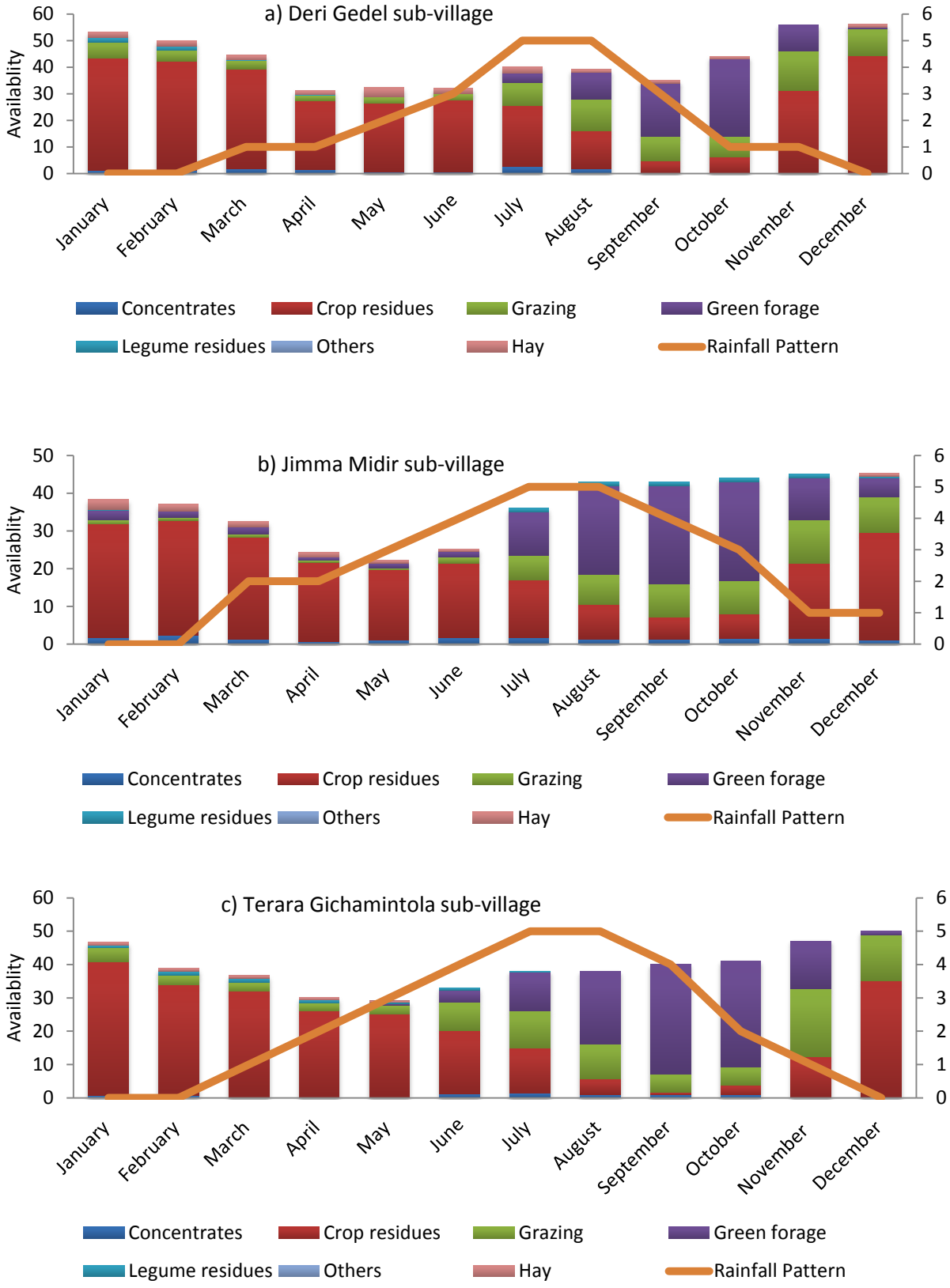


Figure 10. Feed resources availability in relation with rainfall

Major livestock production constraints

Pair wise ranking was carried out during PRA discussions to prioritize problems in order of importance in the study sub-villages. The major problem identified in Deri Gedel sub-village was livestock feed shortage (Table 1). Limited know-how on livestock management and husbandry was raised as the main problem in Jimma Midir sub-village (Table 2). In Terara Gichamintola sub-village farmers identified lack of genetically improved animals as a major problem (Table 3).

Lack of improved breeds, knowledge gaps on livestock management and animal disease were other problems identified by participants in Deri Gedel sub-village (Table 1). Participants in Jimma Midir sub-village, identified livestock feed shortage, lack of a public animal health service and lack of improved cattle breeds as other problems in order of importance (Table 2). Knowledge gaps on improved livestock management and husbandry, lack of public animal health services and livestock feed shortage were other issues described by participants in Terara Gichamintola sub-village (Table 3). The participants in the respective sub-villages also suggested possible solutions for the problems listed (Tables 1, 2 and 3).

Table 1. Major livestock production problems identified and solutions suggested by PRA participants in Deri Gedel sub-village

Problems	Problems listed	Suggested solutions
1	Livestock feed shortage	• Allocate land for improved forages at backyards and multiply it • Reduce herd size • Training on how to utilize locally available feed resources
2	Lack of improved cattle breeds	• Artificial Insemination services provision • Improved bull services • Link with research centers for improve dairy cattle
3	Knowledge gap on livestock management	• Training on livestock health, housing and feeding

Table 2. Major livestock production problems identified and solutions suggested by PRA participants in Jimma Midir sub-village.

Problems	Problems listed	Suggested solutions
1	Limited know-how on animal management and husbandry	• Training on improved animal management and husbandry system • Experience sharing with model farmers
2	Livestock feed shortage	• Establish improved forages at backyard level • Training on how to mix simple ration, feed treatment and processing
3	Lack of public animal health services	• Make animal health clinic and services available at *kebele* level
4	Lack of improved cattle breeds	• Assign AI technician at *kebele* level • Provide improved bull service • Train AI technician from the community themselves

Table 3. Major livestock production problems identified and solutions suggested by PRA participants in Terara Gichamintola sub-village.

Problems	Problems listed	Solutions suggested by farmers
1	Poor genetic makeup of indigenous cattle breeds/lack of genetically improved animals	• Promote AI services and improve availability • Offer improved bull services • Cross selected local cattle with improved breeds
2	Knowledge gap on improved livestock husbandry and management	• Experience sharing from best model farmers • Training on improved livestock and husbandry practices
3	Lack of public animal health services	• Assign public animal health workers and services at the *kebele* level • Awareness on disease prevention
4	Livestock feed shortage	• Allocate land and establish improved forages at the backyard level • Reduce herd size • Improve feed storage

Conclusions

Livestock are one of the pillars for the livelihood of the community in the study sub-villages. Livestock production is mainly based on indigenous livestock species with the exception of a small number of crossbred animals.

As reported by the participants, the productivity of livestock in the study sub-villages is generally low due to feed shortage, poor genetic potential of indigenous animals, in adequate animal health services and limited knowledge on management and husbandry. Although crop residues represent the largest portion of livestock feed, intervention to improve the quality and utilization of these feed resources is nonexistent in the surveyed villages. Naturally occurring and collected fodder are also important feed resources particularly in the wet season.

To improve livestock production and productivity in the sub-villages the following points need to be taken into consideration.

- Provide farmers with training on appropriate utilization of available feed resources and development and use of improved forages.
- Link improved forage development with the existing irrigation practice
- Improve utilization of available feed resources through application of appropriate processing and supplementation methods
- Strengthening the existing livestock extension system particularly management, husbandry, feeding, breeding and animal health in the village
- Improve the existing indigenous cattle genetic potential through selection and crossbreeding

Reference

Duncan, A.J., York, L., Lukuyu, B., Samaddar, A. and Stűr, W. 2012. Feed Assessment Tool (FEAST). www.ilri.org/feast.