Characterization of the farming and livestock production systems and the potential to enhance livestock productivity through improved feeding in Alloshe, Goba District, Bale Highlands, Ethiopia

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Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three regional projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads the program’s monitoring, evaluation and impact assessment. [http://africa-rising.net/](http://africa-rising.net/)

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Introduction

Feed problem both in yield and quality is the most prevailing bottleneck for livestock production in Ethiopia and in Bale zone in particular. The main cause of feed shortage is the shrinking of grazing lands due to the expansion of arable land to satisfy the food demand of the increasing human population. Currently, most of the areas in the highlands of Bale are under cultivation of food crops. This has resulted in keeping large numbers of livestock on limited grazing area leading to overgrazing and poor productivity of livestock. However, expansion of the cultivation of cereal crops has increased the supply of crop residues for animal feeding. The crop residues are nevertheless of low nutritive value and cannot support reasonable animal productivity. Hence, shortage of nutrients for livestock is increasingly becoming serious.

The Feed Assessment Tool (FEAST) was used to characterize the livestock production system with a particular focus on the feed-related aspects smallholder farmers of Alloshe kebele, Goba district of Bale high lands, Ethiopia.

The Feed Assessment Tool (FEAST) is a systematic and rapid method to assess local feed resource availability and use at site-level. It helps in the design of intervention strategies aiming to optimize feed supply and utilization through technical and organizational interventions. The objectives of the study were to provide an overview of the farming system and to identify the major livestock production problems, opportunities and potential interventions with particular emphasis on livestock feed aspects for improving the production and productivity of livestock.
Methodology

Study site
The study was conducted in Alloshe kebele of Goba district. Goba is located in Bale highlands in the South eastern part of Ethiopia. The altitude of Alloshe is 2566 meters above sea level (m.a.s.l). It lies 8 km from Robe, the administrative center of Goba district. The GPS coordinates of Alloshe are 07 00 22.2N and 040 01 26.1E.

Sampling method
Prior to farmer selection, the SARC team made visits to the focal experts from the District Agricultural Offices to discuss the general objective of the study. The kebele was purposively selected for the study as it has good potential for livestock production, accessibility to road and other important infrastructure. The selected kebele visited and discussions made with the kebele Development Agent on the criteria for farmer selection and mobilization. The respective development agents were given guidance to select 18-20 household farmers of different age groups including men and women based on the size of land holding (small, medium and large land size).

Survey structure and format
The total of 16 farmers (12 male and 4 females) participated in the study. The participatory rural appraisal (PRA) approach was used for general discussions to provide an overview of the farming system and to identify constraints and opportunities for improving livestock production in the area. Individual farmer interviews using 9 key informant farmers, 3 from each category of land holding, were selected for in depth interviews.

Data analysis
The information gathered during the group discussions was examined and reported. The quantitative data collected from individual key informant farmers was entered into excel FEAST excel template and (www.ilri.org/feast) analyzed.
Major findings

Overview of the farming system

The farming system of the study area is a mixed cereal-livestock production system. The size of land holdings per household is varies among the farmers. About 35% of farmers are considered as small holder households (Figure 1). The proportions of the households categorized in the medium size land holding are about 35% of the total households in the kebele. While, equal percentage (10%) is considered for households with no land and for those under large size landholding category. The major portion of the land is used for crop production and very small area is allocated for grazing. As compared to the past, farmers have low land holding size due to the increasing family size.

Figure 1: Households (%) in the various categories of landholding in Alloshe

There are two cropping seasons locally called ‘genna’ and bona in the area. Genna extends from April to July while Bona starts in August and extends up to the December. Bona is the main cropping season in which farmers cover most part of their cultivated land with crop. Heavy rainfall is usually from the months of August to mid-October. More crop types are cultivated during the Bona season. During the genna season, planting starts in April and harvesting is done towards end of July to the beginning of August. During Bona, planting is done in August and harvesting is completed in January.

Table 1: Cropping seasons of Alloshe

<table>
<thead>
<tr>
<th>Season</th>
<th>Jan</th>
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<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
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<td>Genna</td>
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<td>Bona</td>
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</table>
The common crops grown in the study area are cereals (wheat, barley, emmer wheat), highland pulses (faba bean, fieldpea), highland oil crops (linseed) and horticultural crops (onion). Cereals crops are mainly produced during bona while more pulse crops are produced during genna. Crop residues found are used mainly as livestock feed resources. Only small proportions are used for other purposes such as raw material for mixing with mud for house making. Pulse residues, mainly fieldpea straws, are left on the farm for soil improvement.

Crop production is mainly rainfed. Only 0.5% of the total households of the kebele produce horticultural crops using water pumps. Like most other study kebeles of Bale highlands, hired labour is not easily available throughout the year. The requirement is very high during planting and crop harvesting. There are two types of hired labour, daily labourers and labourers hired on contractual basis. Apart from family labour available within the household, labour exchanges among relatives that involve other households are also practiced. In most cases such labour exchange is used for farm tasks that required a lot of labour at a given time, such as planting and harvesting different crops. Crop production is the main contributor to household income, contributing approximately 76% of all household income. Off-farm business, labour, small ruminant fattening and dairying are other important activities contributing for the household income as shown in Figure 3.
Livestock production system

Livestock holdings in Alloshe comprise cattle, small ruminants, equines and poultry with varying proportions among the households. Livestock husbandry is almost entirely the traditional way of production, predominantly with local cattle breed types. Local fattening and draft cattle, donkeys, dairy cows and horses are the most important and commonly kept livestock species (Figure 4). The herd structure and composition of livestock varies per household. The average number of local dairy cows and draft cattle are 3 and 2 respectively. About 95% of the households in the kebele own dairy cows and draft cattle. Only 10% of the total households keep improved dairy cows mainly, crosses of local and Holstein breeds. The majority of households also keep on average 2 horses and donkeys. About 20 % of the total households own sheep while goat production is not practiced much except by very few household (5%) in the kebele.

Cattle are mainly used for draft power, milk and meat production, as a source of income, manure for fuel and soil fertility. In addition, draft cattle are used for threshing. Cattle fattening is not widely practiced. Few farmers (10% of the total households) fatten their oxen after they are no longer used for draft purposes. On average, local dairy cow produces 2 liters of milk per day. Milk produced is usually used for home consumption since it is not adequate for selling. Large animals are usually kept overnight in open coral or fences made from locally available materials while small ruminants and calves are housed mainly in small barns attached to the living room of the household. There is no animal health clinic in Alloshe, thus, it is difficult for the farmers to get veterinary services as required. Moreover, the price of treatment and drugs is very high at the private clinic located in the neighboring kebele.
Very few households in the area use Artificial Insemination (AI). However, the efficiency of the service is not satisfactory as indicated by many farmers because of the number of repeat services required before animals conceive.

![Figure 4: Average livestock species holdings per household in Tropical Livestock Units (TLU)](image)

**Feeds and feed resources**

The main feed resources in Alloshe are crop residues, crop stubbles, grazing on fallow lands, pasture land, agro-industrial by-products and cultivated fodder crops. Among the feed resources, crop residues contribute the largest source of feed to livestock in the study area. Crop residues contribute about 47% of dry matter (DM), 32% crude protein (CP) and 39% of metabolizable energy (ME) (Figure 5) of the total dietary sources from the available feed stuffs. The main crop residues available for livestock feeding are from cereals (wheat, barley and emmer wheat), pulses (field pea and faba bean) and linseed.

The quantity and quality of crop residues varies. Wheat straw is dominantly available, however, the straw from barley crop is the most preferable crop residue for livestock feeding due to its palatability and softness of the stem as compared to either straws of pulses or other cereals. Wheat and emmer wheat residues were equally preferred next to barley straw. The practice of feeding livestock with straw in the morning and evening around homesteads is a common practice. The practice of feeding livestock with crop residues is increasing recently due to the reduction of the herbage obtained from natural pasture because of overgrazing of communal grazing areas.

Crop residues are primarily used for the feeding of draft animals to maintain body condition of the animals especially during the dry period from early January to April (Figure 6). Supplementation of the draft animal is very important particularly during peak times of cultivation and when the oxen are used for cultivation and have less access to grazing on natural pasture. Cereal straws are usually collected and
stacked under shade immediately after threshing, however, farmers usually feed pulse straws directly on the field due to the small quantity of pulses production.

Livestock in Alloshe also depend on grazing of natural pasture during the wet and dry seasons. The area of land allocated to grazing is progressively declining over time due to expansion of cultivation. Livestock are allowed to graze crop stubbles and reserved grazing land for most of the months in the year. Farmers only allow their own livestock to graze on the crop stubbles on their farms for the first few days, thereafter, livestock owned by community members in the locality are allowed in. Some farmers leave some plots of land as fallow to improve soil fertility and utilized the available forage as a source of feed. Grazing contributes about 29, 28, and 31% to DM, CP and ME respectively (Figure 5) to the total diet. Draft animals, weak animals, lactating cows and calves get the priority for grazing grasses from reserved plot of lands. Stubble grazing of cereal crops is practiced after harvest from mid-July to late August after the short rainy season.

Naturally occurring and collected feeds are available during wet periods of the year, while during the dry period mainly the dry crop residue are available. By-products of oilseeds are mixed with straw and other available supplements at household level such as residues of local brewing practice (atela) to feed livestock. Such types of feeds are given in priority for cross-bred dairy cows, fattening animals, and calves. Production of cultivated forage species are not widely practiced by most farmers in the study area. Attempts have been made to introduce improved forage species of oats and vetch through district agricultural offices and research centers. Some households produce fodder oats to feed crossbred cows and draft cattle in the form of cut and carry. Shortage of forage seeds and awareness about the importance of the improved forage species are the major constraints.
Figure 5: The contribution made by the various feedstuffs to DM (a), CP (b) and ME(c) of the diet
Figure 6: Composition of the diet in Alloshe kebele throughout the year in relation to rainfall pattern
Problems, issues and opportunities

The main important livestock development problems and the appropriate improvement options suggested by the farmers are summarized in Table 2 below. Caution should be taken when intervening in feeding issues because farmers do not consider feed issues as a main priority. It would be recommended that interventions concerning feed issues be integrated with issues that farmers consider important such as availability of credit services, animal health and improved breeding programs or AI services.

Table 2: Livestock-related problems identified by farmers in Alloshe and the corresponding solutions that were suggested by farmers

<table>
<thead>
<tr>
<th>Problem (in order of importance)</th>
<th>Problems identified</th>
<th>Proposed solution by the farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cash shortage</td>
<td>• Strengthening cash credit and agricultural input providers such as cooperatives</td>
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</table>
| 2 Incidence of disease and parasites | • Establishment of animal health clinic with adequate manpower and facilities.  
  • Improving management of animals so that to minimize the risks of disease |
| 3 Shortage of improved cattle breeds | • Selection of better productive animals for breeding  
  • Strengthening AI service |
| 4 Shortage of feed in quantity and quality | • Conservation and appropriate utilization of crop residues  
  • Production of improved forage  
  • Rehabilitation of grazing lands  
  • Use of agro-industrial by products  
  • Minimize the herd size to productive ones |
| 5 Poor management due to inadequate awareness | • Improve awareness of the farmers of livestock production and management through training |
Summary

**Key issues**
- Cash shortage
- Incidence of disease and parasites
- Shortage of improved cattle breeds
- Shortage of feed in quantity and quality
- Poor management

**Metrics**
- Milk yield: 360 liters per cow per year
- Meat off take: not applicable