

# **Characterization of the Farming and Livestock Production Systems and Potential of Feed-based Interventions in Adama and Arsi Negelle Districts, Ethiopia**

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## **Background**

The Feed Assessment Tool (FEAST) was used to characterize the farming and livestock production systems with a particular focus on the feed-related aspects in selected villages of the Adama and Arsi Negelle Districts in Ethiopia. FEAST is a tool that utilizes a combination of informal group discussions and structured interviews with key farmer informants to rapidly assess on-farm feed availability in a smallholder context. The study was conducted by staff members from the Ethiopian Institute of Agricultural Research (EIAR) with backstopping from consultants and staff of International Livestock Research Institute (ILRI) and International Center for Agriculture in the Dry Areas (ICARDA). The aims of the study were to: 1) gain an understanding of the overall production system with a particular focus on the livestock feeding practices of farmers; and 2) identify key areas of intervention that could improve livestock productivity in the districts.

## **Methodology**

### **Study site**

Adama District is located in East Shoa Zone and Arsi Negelle District is located in West Arsi Zone, Ethiopia. The two districts were selected by the staff of EIAR.

### **Sampling method**

#### *Selection of villages*

The selection of villages or *Kebeles* was conducted by the staff of EIAR and Agricultural Officers in Adama and Arsi Negelle Districts. The *Kebeles* were selected based on the criteria that the households raise livestock in addition to cropping activities and that the villages have a good percentage of farmers with small scale beef fattening activities. Kechemba and Kuriftu were selected from Adama District and Ali Wayo and Kersa Ilala were selected from Arsi Negelle District.

#### *Selection of participants for the group discussion*

The participants selected were farmers who represent the range of wealth statuses in the villages and have experience in beef fattening and crop production. Gender was given due attention in the selection of participants. Women farmers were encouraged to participate in the discussion as they are more inclined to livestock production activities. Kechemba had 20 participants (15 male and 5 female), Wonji Kuriftu had 20 participants (11 males and 9 females), Ali Wayo had 22 participants (15 males and 7 females) and Kersa Ilala had 20 participants (15 males and 5 females).

### *Selection of key informant farmers*

Three farmers were selected from participants of the group discussions of each village to carry out interviews. These key informant farmers were selected to represent the 3 main categories of wealth in their respective areas. Landholding was used to determine wealth. The three categories of wealth were; below average landholding, average landholding, and above average landholding. The cut-off point between the various wealth categories were determined by the farmers during the group discussions.

### **Survey structure and format**

The FEAST tool was developed by ILRI staff. The study was conducted in Adama District on the 5<sup>th</sup> and 6<sup>th</sup> April, 2012. In Arsi Negelle, the study was conducted on 11<sup>th</sup> and 12<sup>th</sup> of April, 2012. The study was conducted in two sessions. The first session which lasted about 2 hours was an informal group discussion consisting of open-ended questions in a semi-structured format. Discussions were facilitated by EIAR staff. Themes discussed included average farm sizes, average household size, rainfall pattern, labour requirements, livestock holdings, crops grown in the area, purchased feeds, livestock health, livestock reproduction, livestock management, marketing of milk products, current problems affecting livestock productivity and what farmers view as potential solutions to these problems. The responses provided an overview of the production system with a particular focus on livestock production especially beef cattle. The second session was a 1-hour long structured interview with 3 informant farmers from each village. Farmers answered the questionnaires individually. Topics included: livestock holdings, livelihood activities, sale of livestock, milk prices, milk yields, crops grown, ration formulation and farmer perceptions on feed quality. This information provided details about on-farm feeding strategies and nutrient availability.

### **Data analysis**

Questionnaire responses were transcribed into Microsoft Excel the FEAST Excel macro program ([www.ilri.org/feast](http://www.ilri.org/feast)). Narrative responses collected from the group discussions were examined and reported.

## **Major Findings**

### **A. Adama District**

#### **Overview of the Production Systems**

The study areas are dominated by smallholder producers who utilize 6 to 8 “*kert*” (1.5 - 2 hectares) farm land per household. Households have an average of 6 members. There are 3 cropping seasons in Kechemba, namely, *kiremt* (rainy season) which usually occurs from July to September, *meher* which occurs from October to December and *Bega* (dry season) which occurs from January to June. Wonji Kuriftu experiences 2 cropping seasons, namely, *kiremt* which occurs from June to October and *Bega* which occurs from November to May. Irrigation is practiced to supplement the rains.

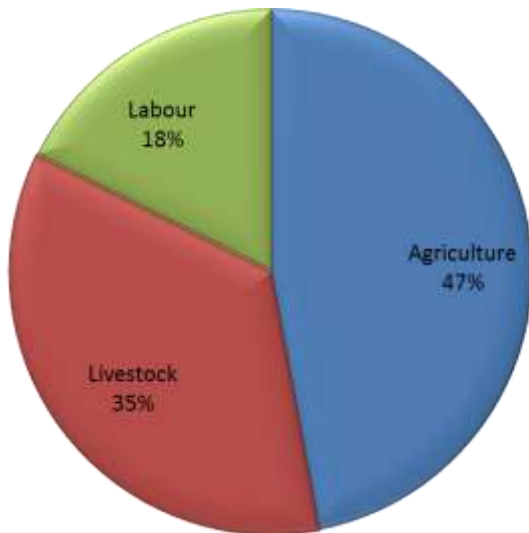
Farm labour is most required from July to August for tillage and weeding, and from October to December for harvesting. The average price of labour is about 48 Ethiopian Birr (ETB) (USD 2.8) per day. Labour shortages are critical during school time (September to June). In some cases, farmers rent out their land and migrate to urban centers for employment.

The main crops grown in Adama district are tef (*Eragrostis tef*), wheat, maize, barley, beans and peas. The cropping system is tef-based. A range of fodder crops such as leucaena (*Leucaena leucocophala*), napier grass (*Pennisetum purpureum*), sesbania (*Sesbania sesban*), fodder beet (*Beta vulgaris*), alfalfa (*Medicago sativa*), are grown as backyard crops by farmers, but natural pasture remains the main source of animal feed. Cattle, sheep, goats, donkey and poultry are kept by the majority of households.

### Major Income Sources

The major household incomes for Kechema are crop production, livestock and off-farm labour. In Wonji Kuriftu there are two major household income sources; crop production and livestock. There is more emphasis on crop production in Wonji Kuriftu compared to Kechema as shown in Fig. 1.

A



B

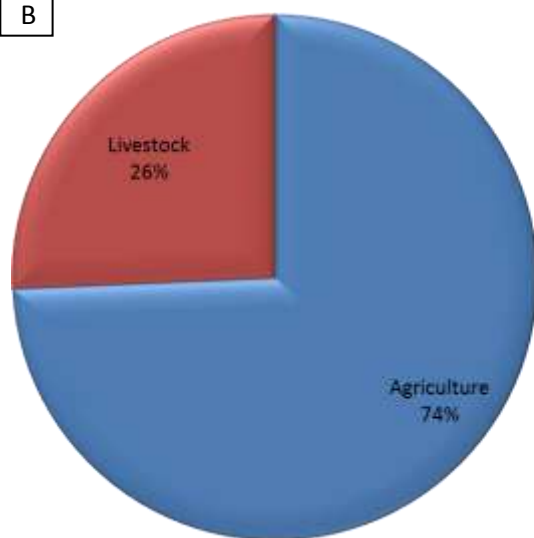
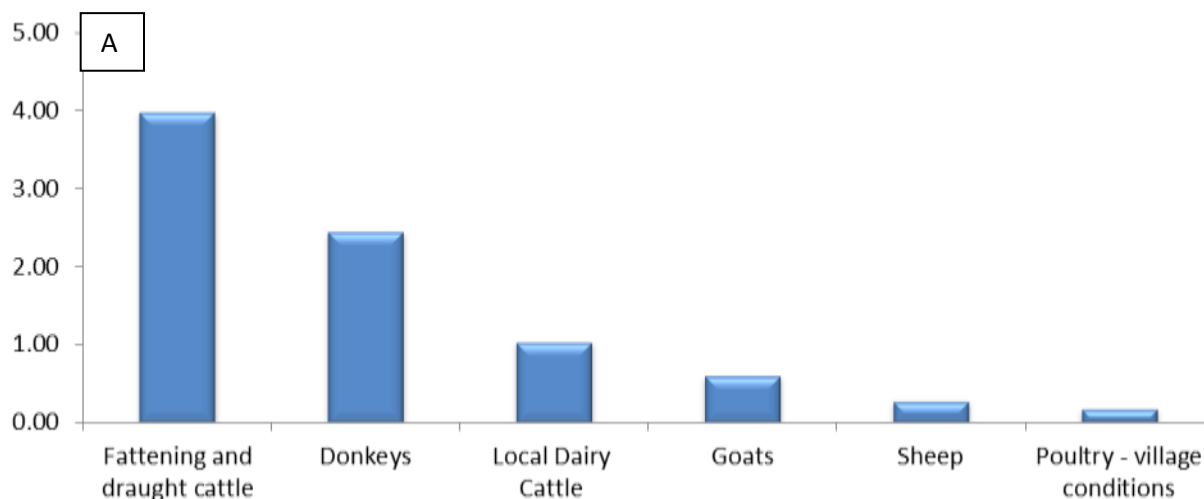


Fig. 1: The average contribution (%) made by the various livelihood activities to total household income in Kechema (A) and Wonji Kuriftu (B).

### The Livestock Production Systems

Livestock are integrated into this system for the purpose of replacing stock, sale, threshing, manure production, tillage, milk production, meat production and cart pulling. Arsi breed is the dominant local/indigenous dairy breed. This local breed is characterized by low milk production, thus, its major contribution is provision of draught power and manure production. On average, 85% of households keep two draught cattle for tillage, threshing and manure production. When the capabilities of the draught oxen begin to decline, they are sold for slaughter after a short period of fattening. Donkeys are kept for transportation, cart pulling, income generate by selling or renting. Sheep, goats and chicken are also kept by households for sale and household consumption. Horses are used in Wonji Kuriftu for cart pulling, and transportation. Fig. 2 shows the average livestock holdings in Kechema and Wonji Kuriftu.



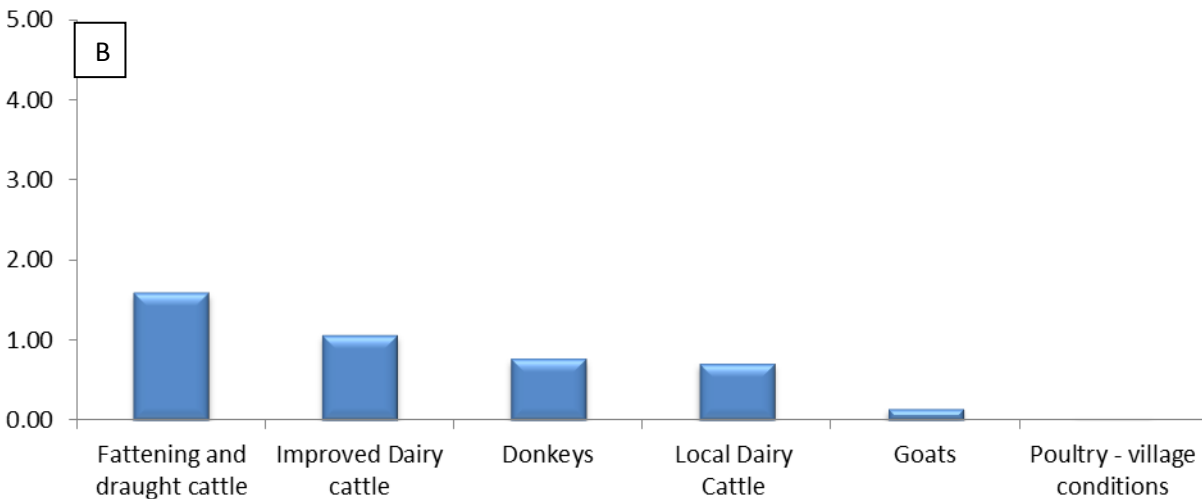


Fig. 2: Average livestock species holdings per household (Tropical Livestock Units) in Kechema (A) and Wonji Kuriftu (B)

Farmers in Kechema give special care to their oxen during tillage and to their milking cows while in Wonji Kuriftu Kebele there is no special treatment for animals because they emphasise more on crop production. Cattle are kept either in loose housing system or in open corrals. Artificial Insemination (AI) is provided by public technicians in both villages. Public and private technicians are available. The cost of each AI service is 4 ETB (USD 0.23). Natural mating is available for 50 ETB (USD 2.9).

### Major Feed Sources through the Year

Crop residues, mainly from tef are the main components in the diet of animals. In Kechema, the straw is usually fed without any form of processing and sometimes mixed with concentrates. In Wonji Kuriftu, the straw is fed by mixing it with purchased concentrate feed. Crop residues constitute a major proportion of dry matter (DM) and metabolisable energy (ME) of the diet (Fig. 3a-b). They are the predominant feed during the year except during the rainy season when animals are grazed and fed green forage (Fig. 4). However, there is minimal grazing but more green forage in Wonji Kuriftu. Feeds such as wheat bran, noug cake, linseed cake and a commercially formulated mixed ration are the main concentrate feeds purchased. These constitute the bulk of protein supply to the livestock diets (Fig. 3c).

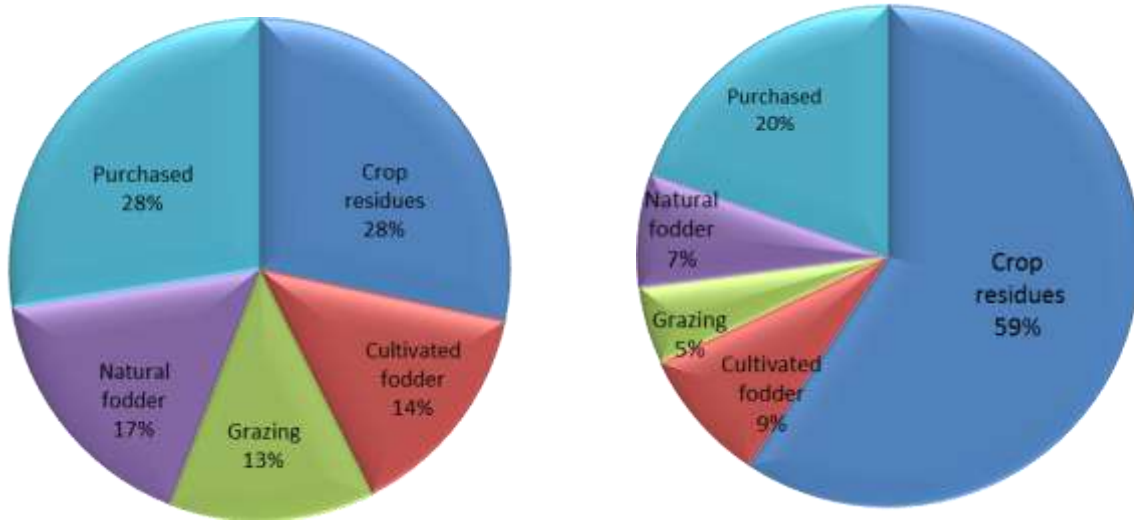


Fig. 3a: The contribution of feeds to total dry matter content of the total diet in Kechem (left) and Wonji Kuriftu (right)

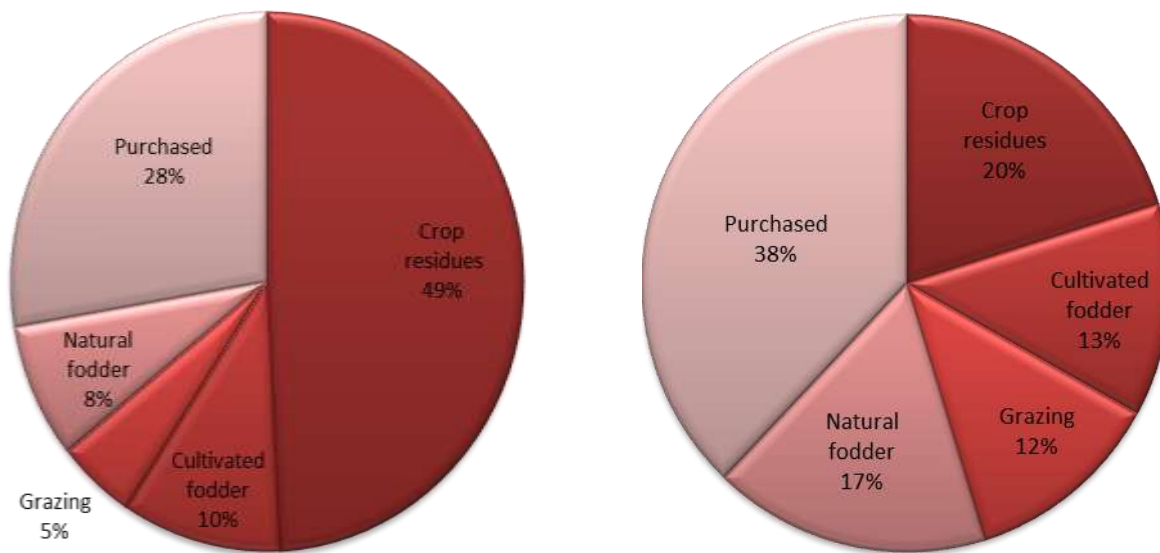


Fig. 3b: The contribution of feeds to metabolisable energy content of the total diet in Kechem (left) and Wonji Kuriftu (right)

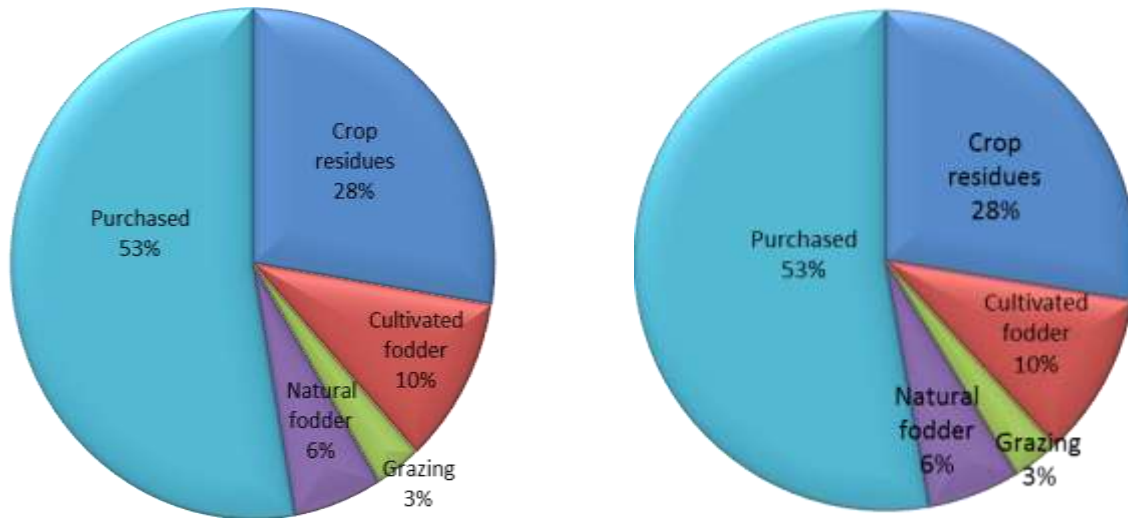
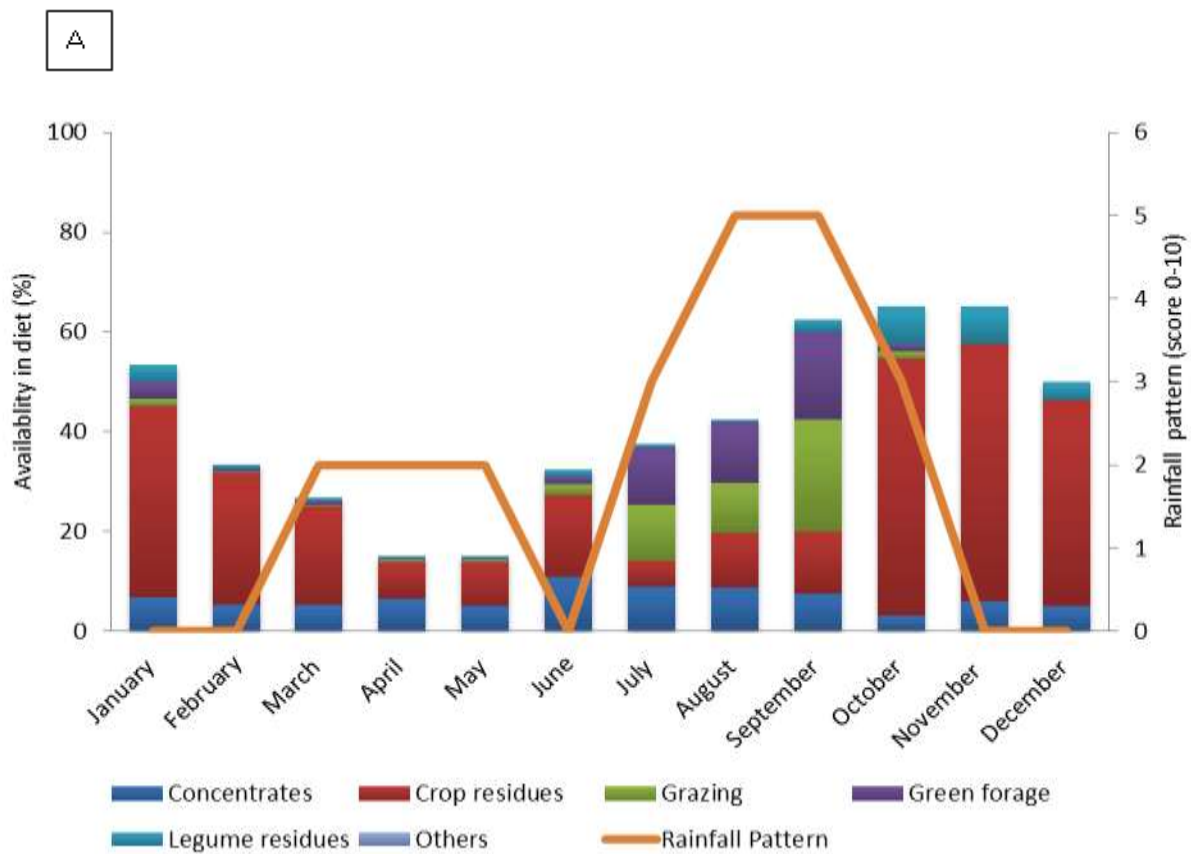


Fig. 3c: The contribution of feeds to crude protein content of the total diet in Kechema (left) and Wonji Kuriftu (right)



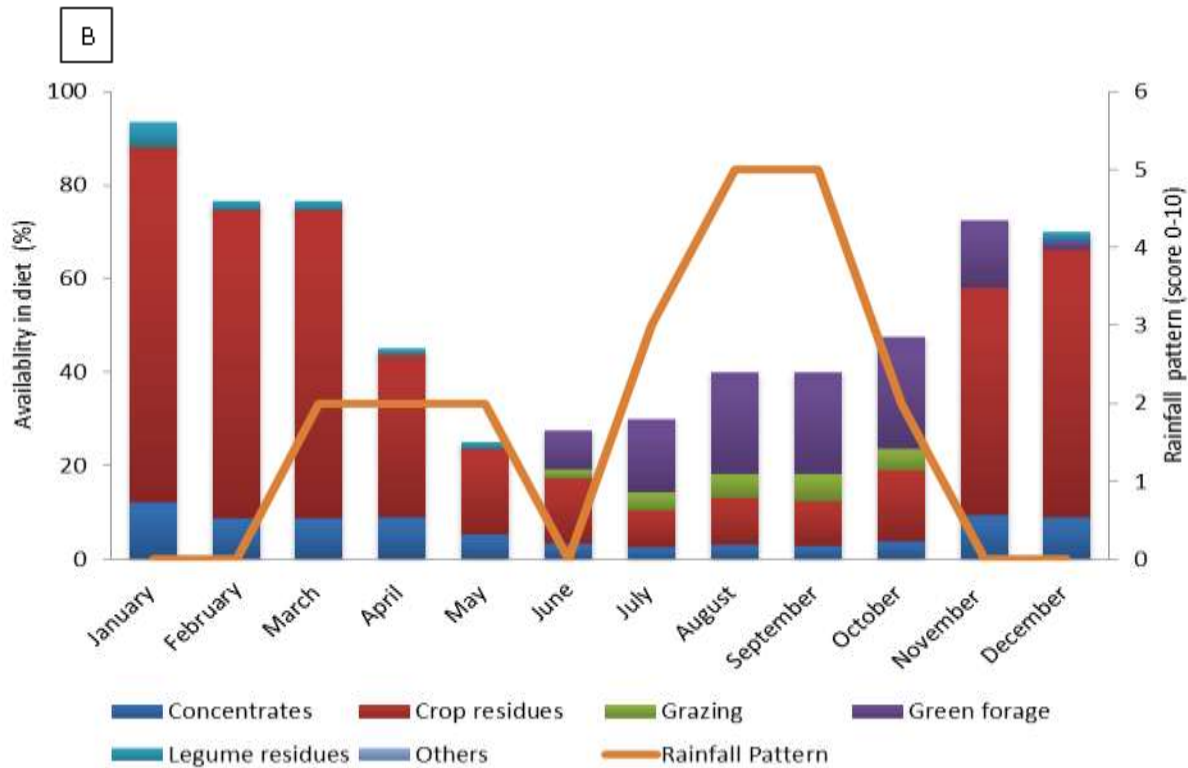


Fig. 4: Seasonality of feed resource availability relative to the rainfall pattern in Kechema (A) and Wonji Kuriftu (B)

## B. Arsi Negelle District

### Overview of the Production System

Ali Wayo and Kersa Ilala are dominated by smallholder producers who utilize 6 to 8 “*kert*” (1.5 – 2 hectares) farm land per household. Households have 7 to 10 members. Ali Wayo experiences 2 cropping seasons; *kiremt* which usually occurs from June to September, *Bega* which occurs from October to May, while Kersa Ilala experiences 3 cropping seasons: *kiremt*, which occurs from June to Mid-September, *Belg*, which occurs from March to June and *Bega*, which occurs from mid-September to February. Irrigation is not available. Farm labour is most required from July to August for tillage and weeding, and from October to December for harvesting. The average cost of labour is 48 ETB (USD 2.8) per day.

The main crops grown in Arsi Negelle district are wheat, tef, maize, barley and potato. The cropping system is wheat-based. Improved pasture production is limited to vetch (*Vicia* spp). Cattle, sheep, goats, donkey and poultry are kept by the majority of households.



## Major Sources of Income

Household incomes in Ali Wayo are derived from crop production, livestock and off-farm business. Similarly, households in Kersa Ilala derive their income from crop production, livestock and labour (Fig. 5).

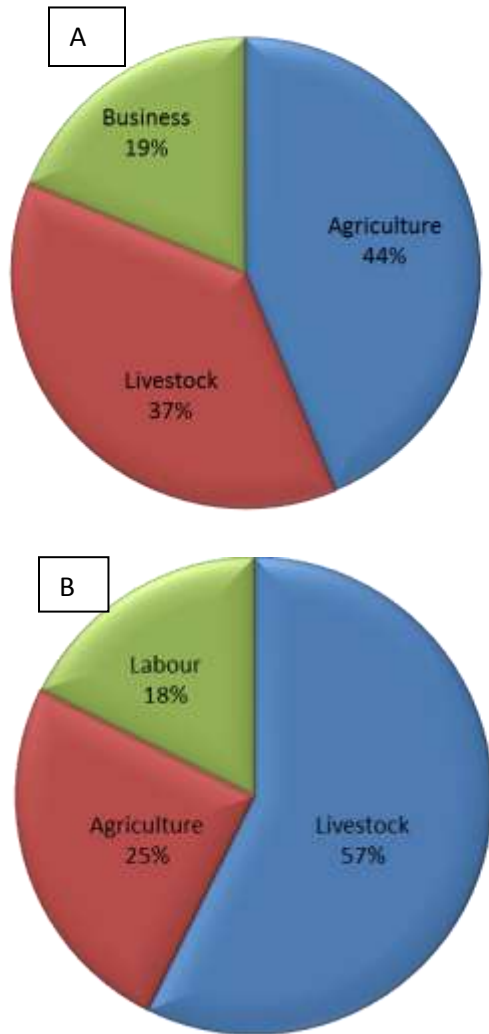


Fig. 5: The average contribution (%) of various livelihood activities to total household incomes in Ali Wayo (A) and Kersa Ilala (B)

## The Livestock Production System

Arsi breed is the dominant local/indigenous dairy breed reared in the district. This local breed is characterized by low milk production. Its major contribution is provision of draught power and manure production. On average, 85% of household keep two draught cattle for tillage, threshing and manure production. About 50% of households in Ali Wayo keep two cattle for fattening. Donkeys are important for transportation, cart pulling and for tillage. Sheep, goats and chicken are also kept by households for sale and household consumption. Goats are used for milk production. Horses are utilized for transportation. Fig.

6 shows the average livestock holdings in in Ali Wayo and Kersa Ilala. Kersa Ilala has more cattle than Ali Wayo, though they are local breeds.

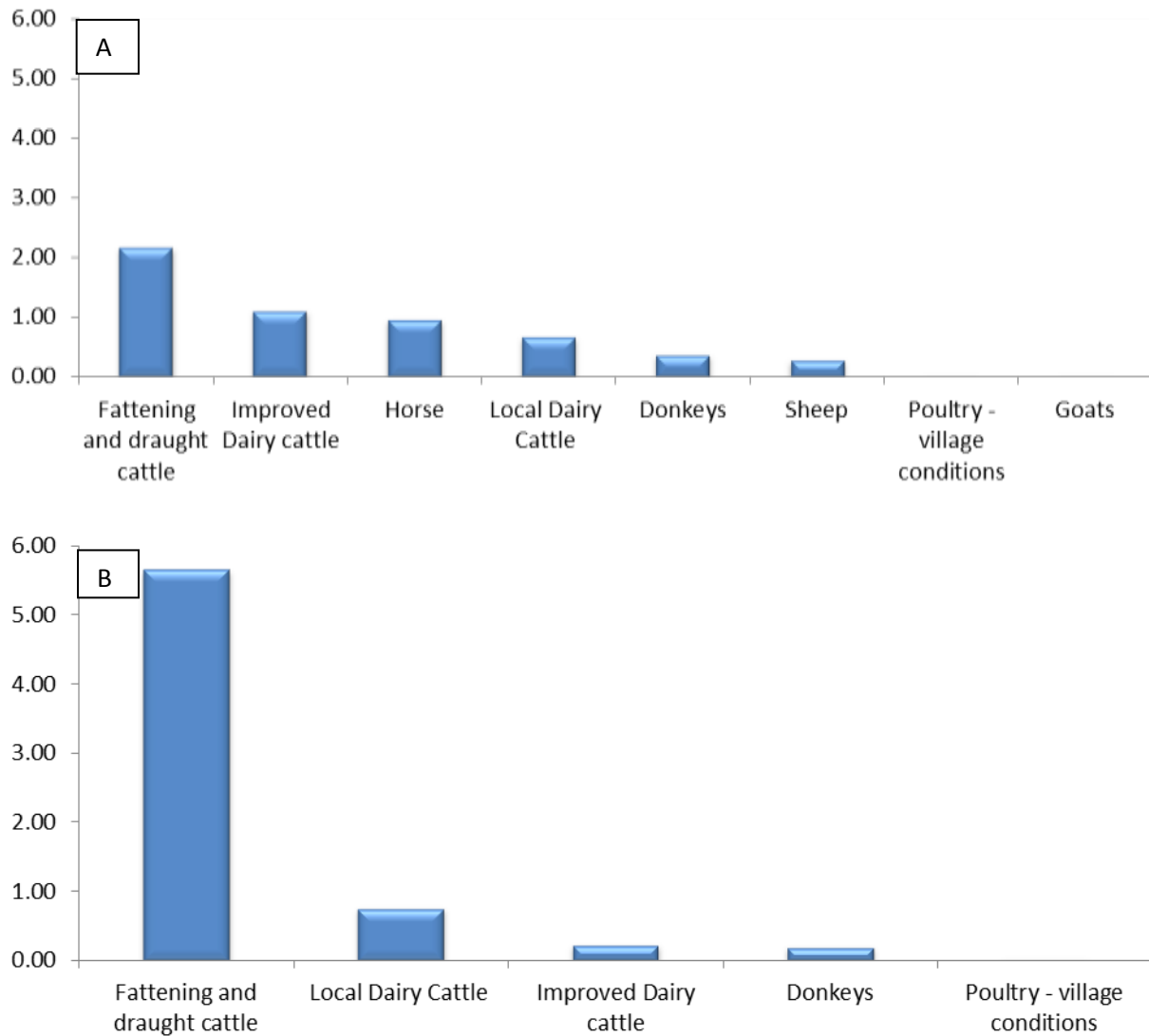


Fig. 6: Average livestock species holdings per household in Tropical Livestock Units (TLU) in Ali Wayo (A) and Kersa Ilala (B)

Farmers feed their animals by open grazing on stubble during the dry seasons and stall feeding during the rainy season. Cattle are kept in loose housing system or in open corrals. Artificial Insemination (AI) is provided by public technicians in Kersa Ilala. Both public and private technicians are available at Ali Wayo. The cost of public AI service in Ali Wayo is 2 ETB (USD 0.1) and 40 ETB (2.3) for private service. Natural mating is available for 40 ETB (USD 2.3)

## Major Feed Sources through the Year

Wheat straw is the main component in the diet of animals in Arsi Negelle. Farmers fatten animals using *atela* (*liquore distillation by-product*). They mix chopped maize stalks, tef and wheat straw with *atela*. The mixture is stirred by hand until it becomes wet and soft enough for animal consumption. Crop residues, naturally occurring pasture and purchased feeds contribute a major proportion to DM intake, ME and protein of livestock diets. Feeds such as wheat bran, noug cake, linseed cake and commercially formulated mixed rations are the main concentrate feeds that are purchased. Fig. 7 shows the contribution of various feeds to the DM, ME and CP content of total diets of animals. Purchased feed is a predominant source of feed in Ali Way, possibly because they have improved cattle. They also do not graze their animals even during the rainy season (Fig. 8).

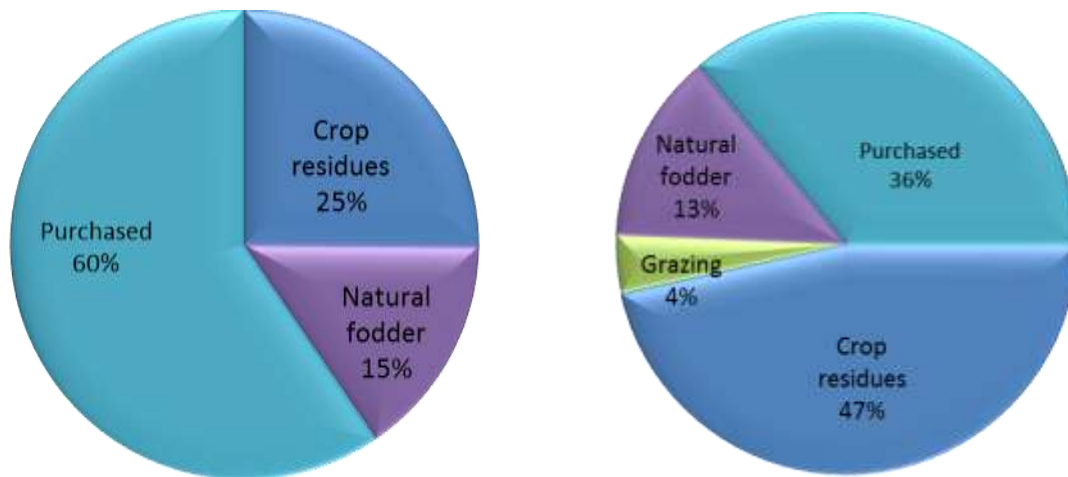


Fig. 7a: The contribution of feeds to dry matter content of animal diets in Ali Way (A) and Kersa Ilala (B)

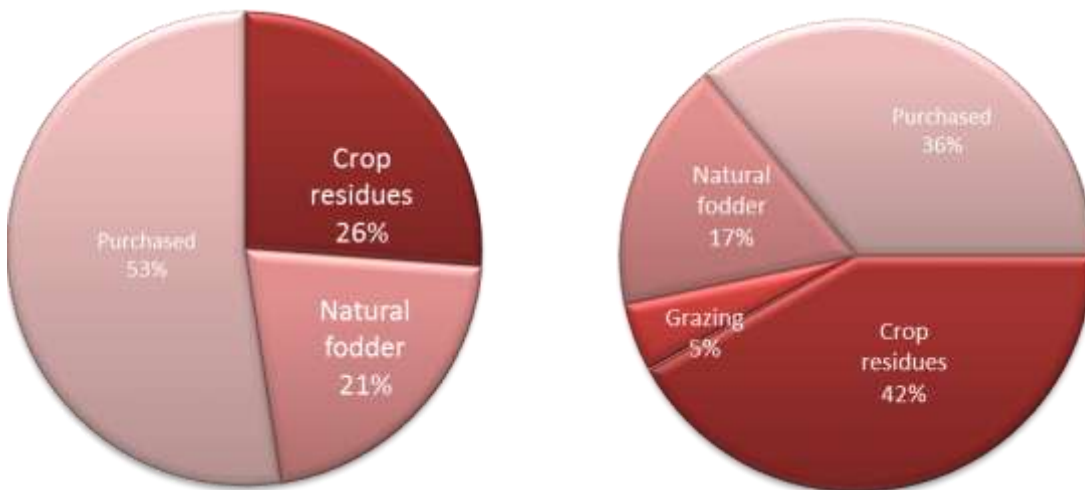


Fig. 7b: The contribution of feed resources to metabolisable energy content of animal diets in Ali Way (A) and Kersa Ilala (B)

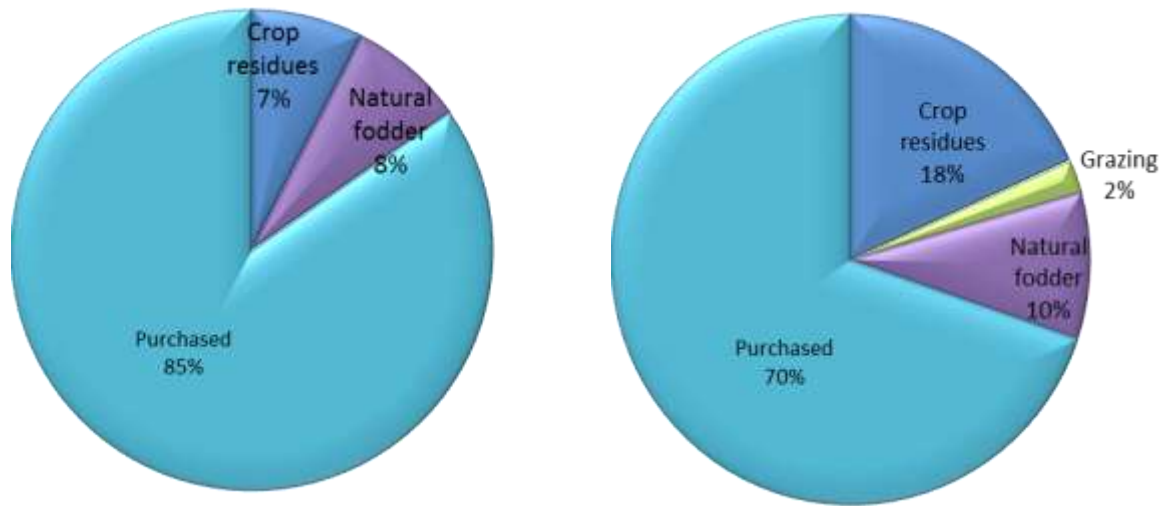
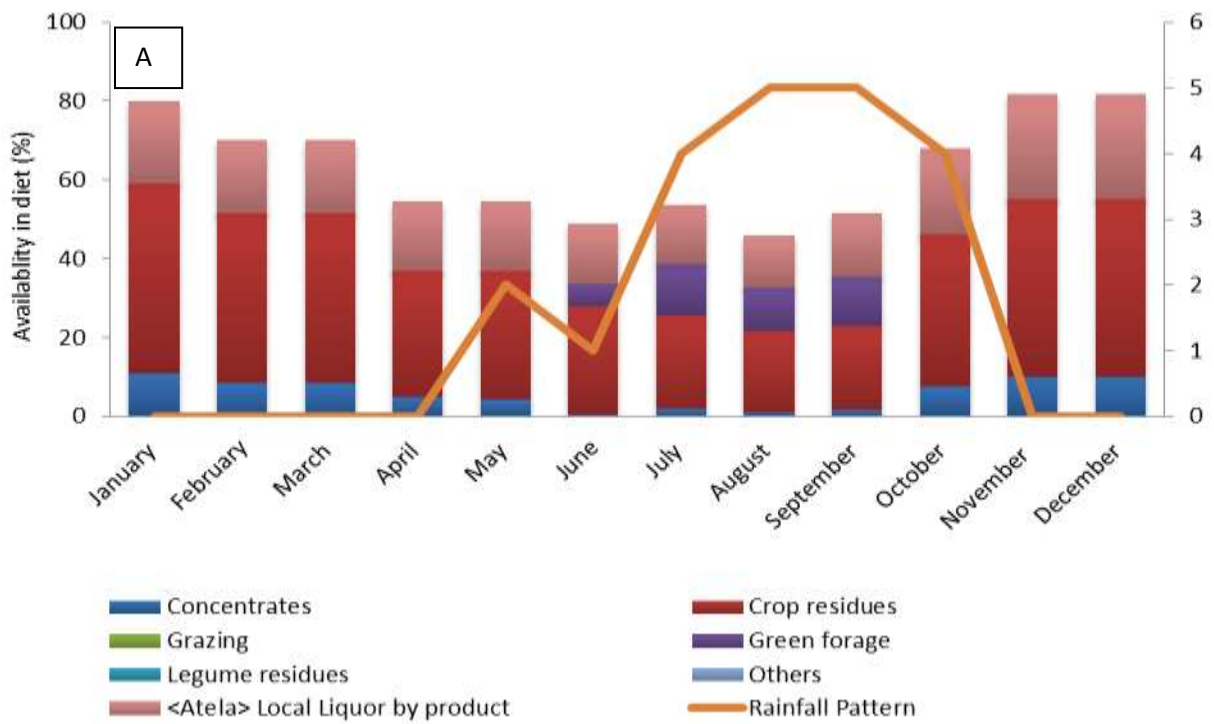


Fig. 7c: The contribution of feed resources to crude protein content of animal diets in Ali Wayo (A) and Kersa Ilala (B)



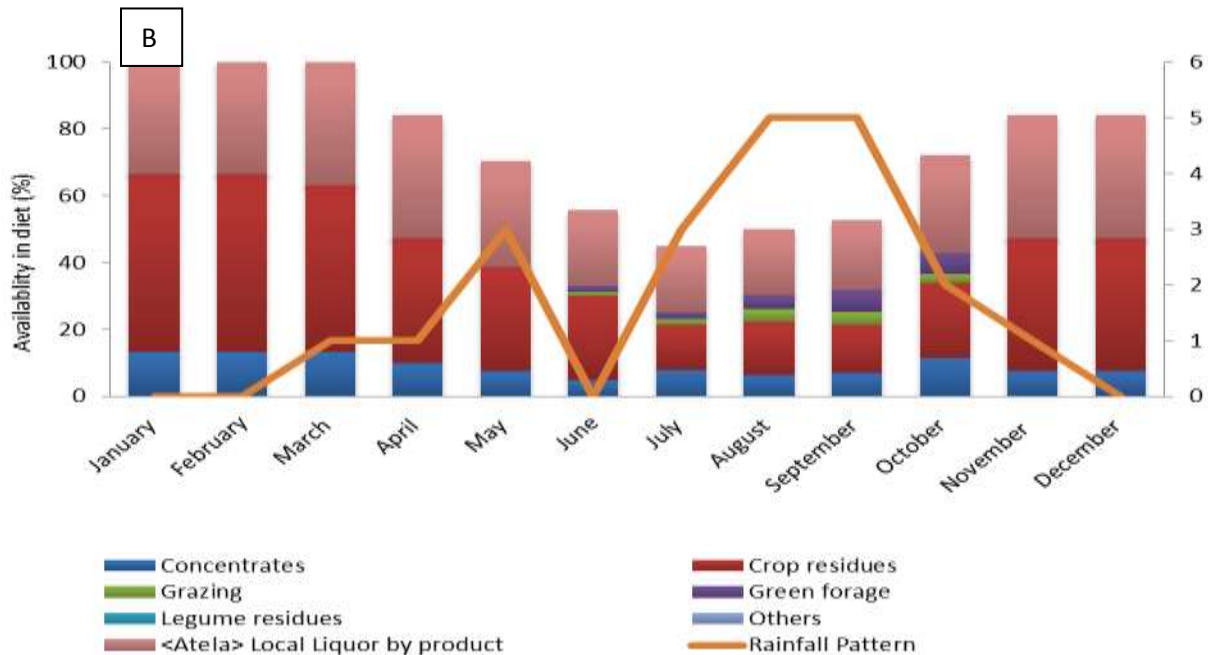


Fig. 8: Seasonality of feed resource availability and their seasonal contribution to the total diet in Ali Wayo (A) and Kersa Ilala (B)

### Problems, Issues and Opportunities

Various problems were identified by farmers as limiting to livestock productivity (Table 1). Feed scarcity (quantity and quality) and access to credit were prioritized as a problem in all villages. Farmers proposed solutions to their problems as shown in Table 2. Farmers in the villages are very favorable to the formation of cooperatives. Formation of cooperatives was proposed as a way to improve the provision of veterinary services, accessibility to agricultural inputs and livestock inputs, training and increased awareness as well as market information and broker fraudulence.

Table 1: Problems identified by farmers as limiting to livestock productivity

Problem (in order of importance)	Adama		Arsi Negele	
	Kechema	Kuriftu	Ali-Weyo	Kersa-Ilala
1	Livestock feed	Livestock feed	Livestock feed due to land shortage	Livestock feed
2	Veterinary service	Cash/credit service	Cash/credit service	Cash/credit service
3	Cash/credit service	Veterinary service	Agricultural and livestock inputs	Agricultural and livestock inputs
4	AI service	Lack of training	Lack of knowledge	Veterinary service
5	Poor quality livestock inputs	Poor quality livestock inputs	Market information and broker fraudulence	Market information and broker fraudulence

Table 2: Solutions to problems as proposed by farmers

Problem	Adama		Arsi Negele	
	Kechema	Kuriftu	Ali-Weyo	Kersa-Ilala
1	Forage cultivation, training, minimizing herd size	Mixing different feed ingredients, training	Government intervention, selling based on weight	Provision of improved forage seed,
2	Establishment of an animal health center; hygienic practice, training	Formation of cooperatives, credit provision by government	Provision of credit by government	Formation of cooperatives, government support to facilitate
3	Saving and credit coops, credit service from government	Establishment of an animal health center	Formation of cooperatives	Formation of cooperatives
4	Assignment of AI technician & training	Regular training	Training	Establishing an animal health center and enhanced awareness
5	Farmers participation when inputs are bought	Awareness, provision of inputs by government	Establishment of farmers group	Solidarity among farmers

## **Summary**

### *Key issues*

- Lack of feed quality and quantity
- Lack of veterinary service
- Lack of cash and credit
- Poor AI service for the crossbred dairy cows
- Poor quality livestock inputs
- Lack of market information
- Land scarcity

## **Limitations of the study**

- The selection of three key informants for individual interviews may be fair if it is purposive rather than random. Besides, the sample size of only three respondents looks too small to represent the real situation.
- The reliance on farmer estimates for calculating animal intake from grazing and intake from collected green fodder is a source of inaccuracy. Farmer estimates are generally imprecise as farmers do not weigh collected forages prior to feeding. Estimating intake from grazing is particularly difficult due to the number of factors that affect the intake. Better techniques of estimation need to be developed to avoid biases.

## **Lessons Learnt**

- Women who had been isolated from community discussions because of cultural restrictions participated actively during the PRA exercise. They were observed to have equal or even better knowledge and zeal as well as willingness to learn. This was especially useful as the women are more inclined to livestock management from which they derive a bigger share of the household income.
- Participation of the farmers in group discussions regarding their own problems increased their awareness on various issues, such as, what to expect from input supplies, credit services and market information. The forum served as an efficient experience-sharing platform.

## **Way forward**

The low beef production levels are attributed to several factors; the major one being shortage of animal feed both in quantity and quality. The fattening of beef cattle in the study areas is mainly dependent upon crop residues and local liquor by-products. Farmers need to be made aware of and assisted in mixing feed ingredients into low cost fattening rations. Farmers are still operating on traditional systems; they feed their cattle with what is available in the markets without considering the biological impacts or economic returns. There is also need to intensify efforts on extension in aspects of improved livestock management and veterinary service.