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Improving the Livelihoods of Poor Livestock-keepers through Community-Based Management of Indigenous Farm Animal Genetic Resources in Africa

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Introduction

It is public fact that millions of the world's poor depends on livestock to sustain their lives. Milk, meat and eggs are the vital sources of protein which they obtain from livestock. Moreover, subsistent farmers and pastoralists in Africa, Asia and Latin America derive much of their income from this sector (Scherf, 2000). For instance, in Africa, more than 70% of rural farmers under abject poverty and pastoralists depend on livestock for their livelihood. Further more, at national level the contribution of livestock to agricultural GDP reaches 80% in some Sub-Saharan African countries. In line with that the demand for livestock products in Africa is expected to rapidly increase over the coming decades, and poor livestock-keepers and their indigenous breeds have the potential to play a prominent role in meeting such demand.

The existing livestock biodiversity, in the form of numerous indigenous breeds, is the outcome of rural communities managing livestock in many different habitats and ecological niches, thereby shaping the genetic composition of livestock according to their breeding goals, production system requirements and environmental constraints. But the basis of these livelihoods is under treat. Many of the animal breeds farmers and herders have developed over thousands of years are becoming extinct. Since the dawn of agriculture, humanity has domesticated about 40 species of animals, from chicken to camels, and from alpaca to yaks. Livestock keepers have developed over 7000 breeds. Each one is specialized for a particular area or production system (Scherf 2000). But many traditional breeds are endangered. Among the 5330 breeds of livestock mammals, over 900 breeds, or 17%, are already extinct. Another 1500 breeds, or 29%, are endangered (Greelings et al. 2002).

The loss of genetic diversity reduces opportunities and potentials and makes the future gloomy to achieve food security, poverty reduction and shift towards sustainable agricultural development goals at local, regional and national level. Despite an accelerating rate of livestock diversity extinction, little has been done in terms of systematic and systemic genetic improvement and conservation. It is believed that the community-based management (CBM) of existing animal genetic diversity in developing countries can support not only the improvement of the livelihoods of poor livestock keepers but ensures the conservation of the genetic resources.

The project entitled "Improving the livelihood of poor livestock keepers in Africa through community based management of farm animal genetic resources, AnGR" is being implemented in Ethiopia, Kenya and Benin. The project is implemented at Danno district of Ethiopia in a sedentary highland crop-livestock production system. PRA survey was conducted to identify intervention point for improvement of cattle production and

marketing system of the area. This paper presents results of PRA survey about cattle production, marketing and constraints of the area.

Materials and Methods

Background of the study area

Danno district is located in the southwestern part of west shewa zone of Oromia. It has an area of 659.2 KM² and a human population of 82,573. It is found at a distance of 250 km from Addis Ababa and 125 km from Ambo town (zonal capital). Danno is located at a distance of 33 km from Ijaji town and is bordered by Chaliya from North, Jima administrative zone from West and Nono Woreda from South and East. Sayyo town is its capital. It is situated stretching between 1400 and 2500 masl. The district receives on average 900 - 1400 mm annual rainfall and 15-30 °c annual temperature. Danno district is characterized by its mixed crop-livestock farming system. Maize, sorghum, teff, noug, faba bean and hot pepper are the major crops grown in the area. The area is known for its high livestock population. According to the estimate available at district level it carries 74,842 cattle, 4,480 goats, 2900 sheep and 3462 equines. Agro ecologically 80%, 15% and 5% of the district is midland, lowland highland, respectively. Topographically the district is characterized by dissected plateaus, mountains, hills plains and valleys. Danno is a site in Ethiopia where ILRI-BMZ project is being implemented. The area is less influenced by modern technologies and only indigenous animas are kept. This is one of the criteria for selection of the site for the project.

Sampling procedure and method of data collection

Three-stage sampling procedure was used to select the target farmers. In the first place, a multi disciplinary team visit different districts of east Wellega and west shewa zone bordering Gibe valley to select appropriate site for the implementation of ILRI-BMZ project entitled "Improving the livelihood of poor livestock keepers in Africa through community based management of indigenous farm animal genetic resources" as per the criteria set for the project. Accordingly, Danno district was selected as a project site because of its large livestock population, absence of exotic or cross breed, prevalence of major livestock diseases and its accessibility for frequent field visits. In the second stage a workshop was held at Sayyo with stockholders drawn from different government offices and farmers' representatives (leaders and vice administrators of peasant associations) with the objective of briefing them about the objective of the project. After brief presentation, the participants were divided in to two groups (civil servants and farmers' representative group) in order to select the priority species and target peasant associations. Accordingly cattle were the priority species selected by workshop participants due to their abundance and multiple uses in the livelihood of the community. On the other hand, three peasant associations namely Gida and Abu (representing midland & high land), Ifa tokkuma (low land and recently established peasant association by settlers) and Sayyo Gambala (representing low land) were selected as site for implementation of the project. Then the team visited the selected peasant associations to select target farmers based on their wealth status (mainly based on land and cattle ownership). However farmers of Ifa Tokkuma were found to have small number of cattle

(on average 1.34 cattle) per household and have many basic problems to be solved prior to doing long term projects like Gibe valley. Hence the team decides to include Danno Shanan that was selected as a forth-potential peasant association during stakeholder consultation workshop. Different PRA techniques were used to collect the data needed for this study. This was achieved by grouping knowledgeable individuals who knows more about the past and present situation of their respective peasant association.

Data source and analytical method

This study largely used primary data collected from a group of knowledgeable individuals (key informants) residing in the target peasant associations. The secondary data were also collected from district agricultural bureau and offices of the selected peasant associations. Data collected using participatory rural appraisal techniques were analyzed by qualitative assessment tools namely tabulation, conceptualization and use of available literatures. On the other hand, percentages and graphs were used for the analysis of quantitative data.

Results

Household composition

On average the family size of the surveyed area was about 9 ranging from households having 4 to 16 family members. This large family size was probably attributed to lack of awareness about family planning or due to polygamy and bearing of children to maintain family labor requirements. More over children are considered to be an asset for most of the rural communities. As a result youngsters dominate the family structure of the area as compared to older family members.

Household Typologies

Identifying target groups and considering household typology is very crucial to assist improvement of research work in delineating recommendations and in developing client oriented technologies, which can easily taken up by users. Ranking of households in to different wealth groups was made with the help of PA administrators and development team leaders (locally called *Garee misoomaa*) who are responsible for 20-30 households and knows the status of each household in the community. Hence mainly based on cattle ownership farmers of the target PAs broadly categorized in to three to four groups; namely poor, medium, rich and very rich. The following table illustrates the typologies developed according to the criteria set.

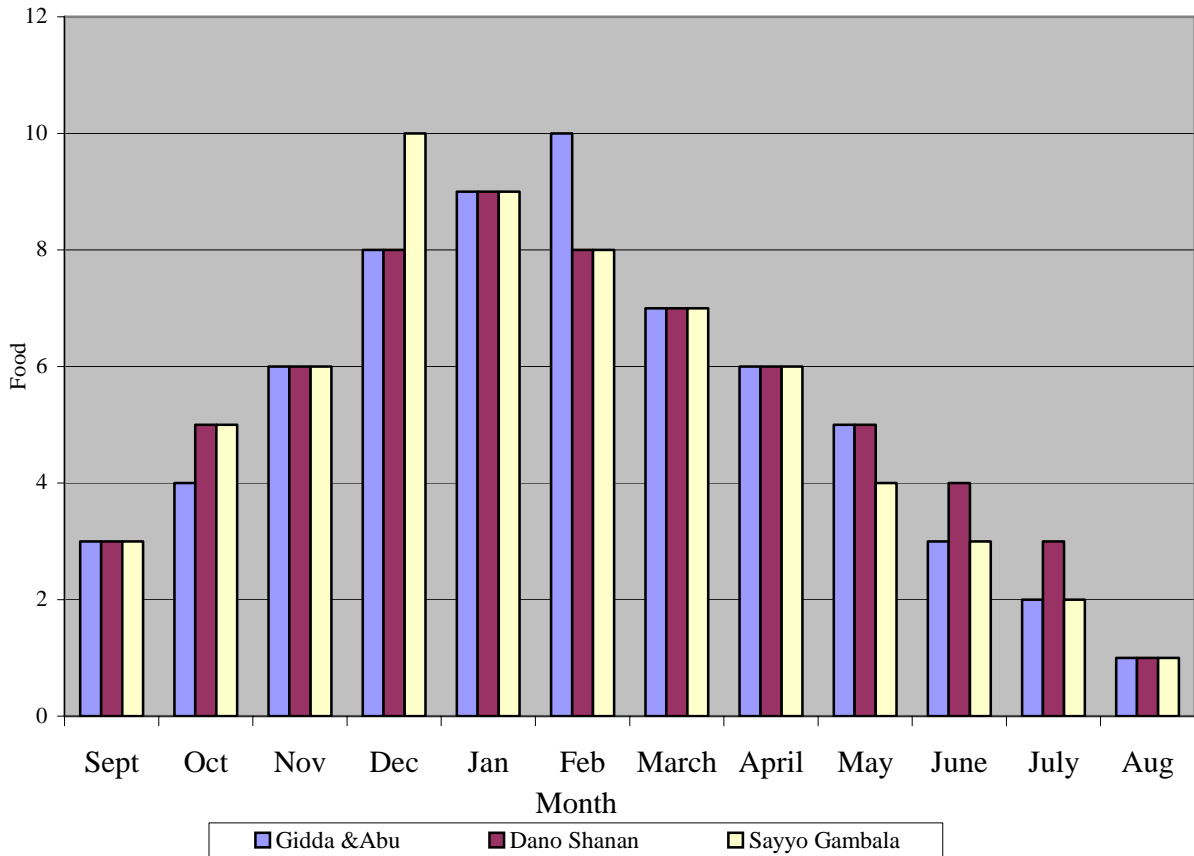
Table 1. House holds typologies of target peasant associations

<i>Peasant association</i>				
	<i>Very rich</i> (Excess producer)	<i>Rich</i> (Food self-sufficient)	<i>Medium</i> (Better food availability)	<i>Poor</i> (Food insufficient)
<i>Gida and Abu</i>	<i>>20 heads of cattle</i>	<i>10-19 heads of cattle</i>	<i>4-9 heads of cattle</i>	<i>≤3 heads of cattle</i>
<i>Danno Shanan</i>	<i>>20 heads of cattle</i>	<i>10-19 heads of cattle</i>	<i>4-9 heads of cattle</i>	<i>≤3 heads of cattle</i>
<i>Sayyo Gambala</i>	-	<i>>10 heads of cattle</i>	<i>4-9 heads of cattle</i>	<i>≤3 heads of cattle</i>

Household food availability

Sufficient food production for the family is the primary objective of farmers in the surveyed area. This is however hardly possible due to man made and/or natural calamities. As a result there is a year or a period in a year where food is surplus and deficit. Though there is slight differences across the target peasant associations, harvesting season (December to February) was reported to be months of excess food availability. But trends of food availability starts to decline gradually starting from March owing to home consumption and continuous marketing of the produces to cover various household expenses and reaches its climax in the Ganna season (June to August), where critical food shortage was reported in all the surveyed area. Farmers of the area exercise some coping strategies to pass through hunger months. These coping strategies include *inter alia* planting early maturing crop varieties (maize and haricot bean -'Adongaree') and vegetables (like *cabbage*), using credit service (in cash or in kind) obtained from relatives or local lenders. More over they reported sale of livestock for procurement of food grain during food shortage. They also use their livestock for collateral. Again in September the condition become better, family food availability gradually starts to increase till it reaches its climax during harvest season.

Figure 1. Household food availability in the surveyed area



Household income sources

Figure 2, 3 and 4. showed the sources of house hold income. Most of the households of the surveyed area generate income from the crop they grown and livestock species they rear. Oxen, cows, bull, heifer, sheep, goat and chicken were livestock species providing income for the household. On the other side, noug, leen seed, faba bean, teff, maize and sorghum were crop species used as household income sources. Livestock products like butter, egg and honey had also their contribution to household income. But the income source from crop and livestock or livestock products can not be compared using this data.

Household expenditure

Households of the study area expend their income for different purposes which include *inter alia* settlement of government input debt especially for fertilizer, taxation, contribution for various development works (school, health post, farmers training center, etc), purchase of consumable household items (salt, oil, fuel, coffee, spices, soap, etc), health and school fee. The largest share of the household income was being goes to cover family clothing, settlement of government input debt, purchase of consumable items, hospital bill, tax, schooling, contribution for development work and other social costs in that order. The proportion of household expenses is indicated in table below (Table 2).

Table 2. proportion of Household expenditures

Peasant Association	Household expenditures (%)							
	Input debt	Tax	Schooling	Health	Consumption	Development	Clothing	Others
Gida & Abu	22	12	10	6	15	7	28	-
Sayyo Gambala	23	6	9	16	20	4	16	6
Danno Shanan	15	10	7	24	12	6	19	7
	60	28	26	46	47	17	63	13

Credit sources

Credit is an important input in any enterprise of agricultural production. However cash shortage was reported to be one of the major problems in the study area. There was no formal credit providing institution established in the area. Hence, farmers experienced cash problem especially during hungry months (June, July and August) when the grain is depleted from the store for various reasons. During this period Idir, relatives, neighbors and informal lenders (*Arata*) were the major sources of credit in the area. Farmers were asked to put their preferences of credit sources. Accordingly relatives, neighbors, Idir and informal lenders were selected respectively based on the duration of credit, absence of interest and accessibility (Table 3).

Table 3. Preference ranking of farmer's credit sources

Source of credit	Relative	Neighbor	Idir	Arata	Score	Rank
Relative(R)	X	R	R	R	3	1
Neighbor (N)		X	N	N	2	2
Idir (ID)			X	ID	1	3
Arata (A)				X	0	4

Figure 2. Average household income from livestock

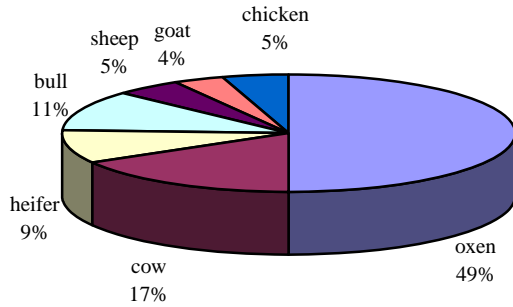


Figure 3. Average household income from livestock products

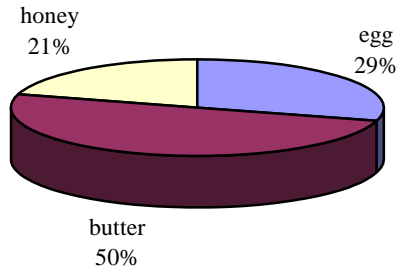
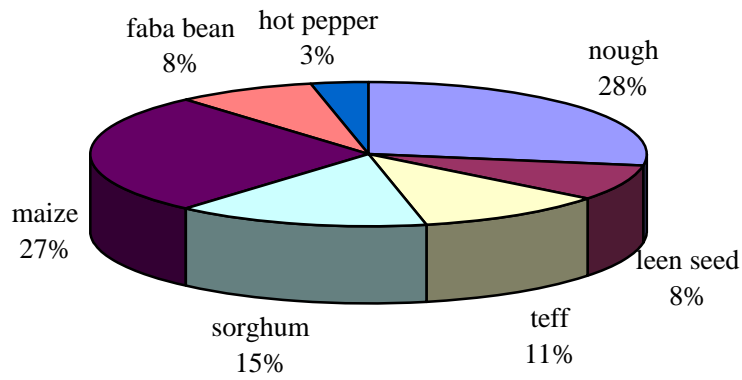


Figure 4. Average household income from crops



Land use pattern

The study area is characterized by crop-livestock mixed farming system, where livestock form the integral component of crop production. Land shortage and fragmentation is the major problem owing to the ever increasing human and livestock population. This problem affects both food and feed security in the area. Of the total land owned by household, the largest proportion is allocated for crop production followed by grazing, forest and wasteland respectively. Land use pattern of the target peasant association is indicated in Table 4 below.

Table 4. Land use pattern of the study area

Peasant Association	Percentage of land use				
	Grazing	Crop	Forest	Waste	Total
Gida and Abu	26	61	4	9	100
Danno Shanan	22	65	9	4	100
Sayyo Gambala	22	67	7	4	100
Total	23.3	64.3	6.7	5.67	100

Rainfall Pattern

The area is characterized by unimodal pattern of rainfall. As a result the farm families depend only on the main rainy season (ganna) for crop production. However, the erratic nature of rainfall in the area affects the production and productivity of both crops and livestock. Late start and early cessation of rainfall was reported to be a critical problem affecting the livelihoods of farming community in the area. According to the respondents, this situation has become serious for the last three years. Fortunately, the last cropping season (1996/97) was reported as a good year owing to good rainfall condition in both intensity and distribution. In the surveyed area, December, January, February and March were known as a dry months of the year though there is little amount of rain in December and March.

Figure 5. Rain fall pattern of the target PAs

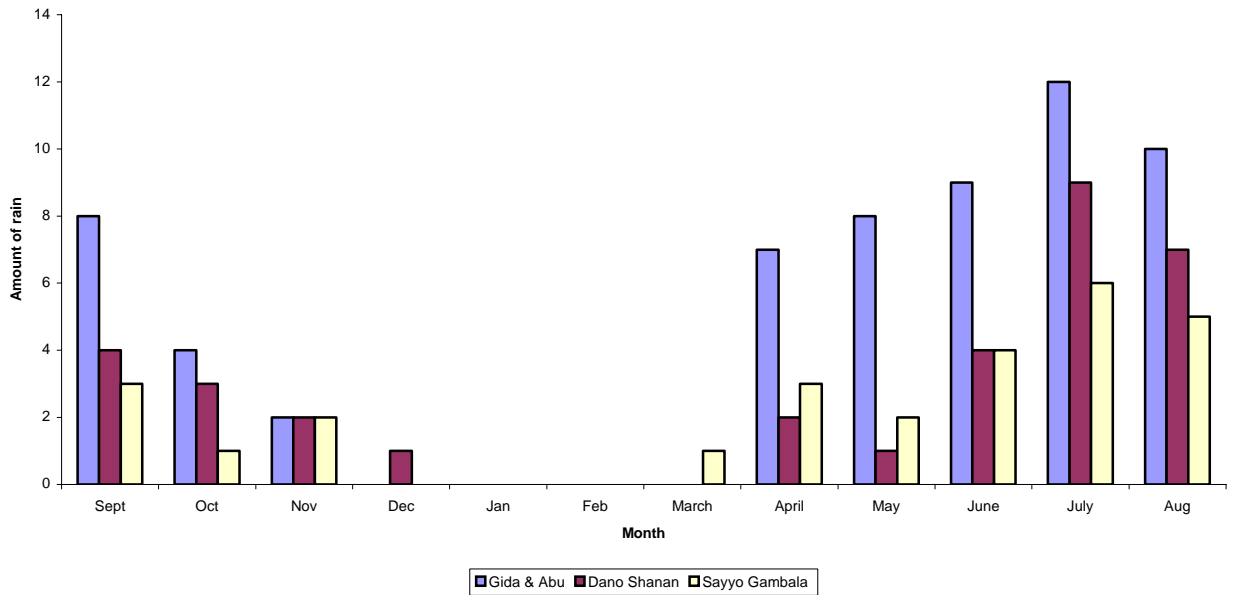
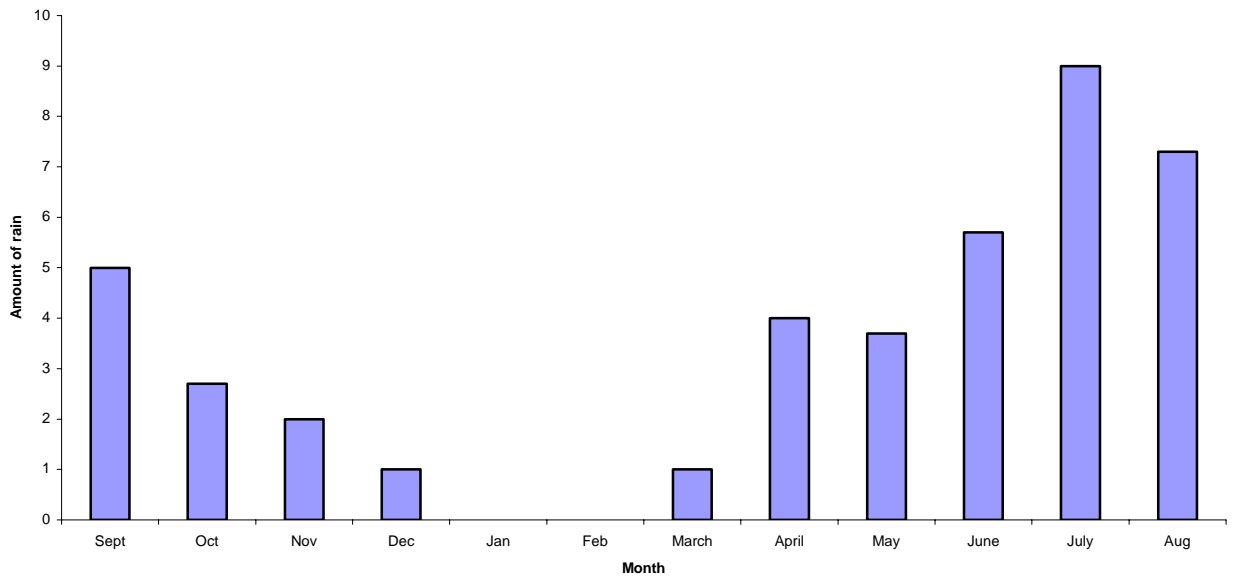


Figure 6. Average rain fall pattern of the study area

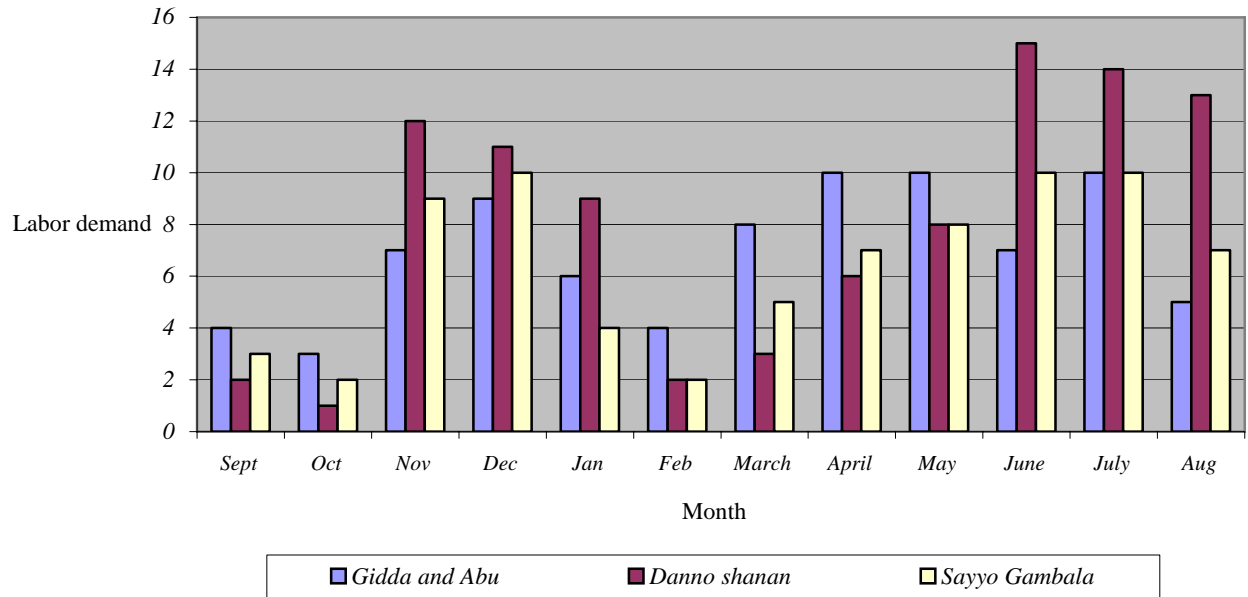


Labor calendar

Labor calendar of the surveyed area was shown in figure x. Though labour shortage was not reported as critical agricultural inputs in the area, its availability and requirement varies depending on the load of the work with in certain period of the year. Accordingly, the months before harvesting (September and October) and after harvesting (February) were identified as slack periods while November and December (harvesting period) and

June to August (planting and weeding period) were peak periods of the **cropping season**. Hence farmers were in need of additional labor during these peak periods. In the surveyed area, however, farmers were using different strategies like intensive use of family labor, hired labor and community labor (*Daboo and Dugdee*) to overcome labor shortage during peak periods of the year. Contrary to this, farmers were looking for off-farm activities during slack periods to generate additional income for their livelihoods.

Figure 7. Labor calendar of the surveyed area



Purpose of keeping livestock

Farmers keep livestock for multi-purposes functions. Cattle goats, sheep and chicken produce milk, meat and egg which are a vital source of protein and income for the farmers. Especially cattle are kept for traction and other farm activities like threshing during harvest and manure for fertilization, as the system is mixed crop-livestock farming system. In such system livestock forms an integral component of crop production. They are also an asset for the community and used as risk aversion during crop failures. The respondents reported livestock specially cattle in connecting with their life, they are guarantee for their life and use for indication of wealth status. So they are used for prestige. There are also additional benefits including *inter alia* locally made household furniture and utensils like sleeping matrices, pillows, "wancha" and spoon. The first two items are made of hides and skins and the later two from horn.

Selection criteria

Farmers do select and have their own criteria for ranking their animals. They practice selection especially at market depending whether they require for breeding stock or for other cultural ceremonies. So they have their own trait preferences and trait expression for different type of livestock. Some of the most important traits in cattle are: color, body

condition, body size (body frame, long legs, long back etc.), large umbilical cord, tail length and type of horn. According to the key informants, animals with large body size are late maturing type and they are less prolific. Black colored animals are not preferred because, flies known as tse tse (locally called qarxasa or warana), which is known for its trypanosoma transmission, are attracted to black colored animals. Very white colored animals known in Afan Oromo "Aadii Qadoo" are also susceptible to diseases and they are also not responsive to feed. Animals with inward growth of horns are not preferred for reproduction and are locally called "Karra cuftuu". The most preferred ones are animals with brown red or light red, light grey, dark whitish and pied color, long tail, long umbilical cord and outward growth of horns.

Feed Resources and Production

Inadequate supply of feed in both quantity and quality was reported to be the most single problems responsible for low productivity of the livestock in the area. The most important feed source of the study area is natural pasture both in wet and dry seasons. Crop residues, crop aftermath and supplementary feeds (mostly salt) are also reported as feed sources. According to the respondents feed shortage is highly aggravated during dry season months (March to May) when the natural pasture dried out and crop residues and aftermath are totally consumed. Though not widely practiced tef straw is the only conserved crop by products for use during feed shortage. According to the key informants, even this practice was started recently and mainly used for working oxen. Some farmers also reported to use tree branches to supplement for their animals in the dry season when there is severe feed shortage.

The most critical months of feed shortage in the area are March, April, May and August. Though August is among the months that receive good amount of rainfall (Figure 5 & 6), shortage of feed is reported either animals do not enter to the grazing field due to marshy condition of the area or when entered they are destroyed by trampling and soiling the existing forage. From September through December or January the feed situation is getting better due to two major reasons. Due to the fact that the intensity of rainfall is decreasing in September animals could have access to enter in to most of the grazing areas and graze. The other important reason is that most of the crop fields could be free from different crops. Thus, from September to December or January there are abundant feeds for animals both from crop residues and crop aftermath. Furthermore, grasses protected for at least three to four months are also available in the fields (mostly from faba bean and field pea fields) when crops are harvested. Therefore, it can be generalized that "Birra" (September to December) is best in terms of livestock feed availability.

Oromo community has a proverb to indicate the suitability of the Birra season for livestock production. The proverb is:

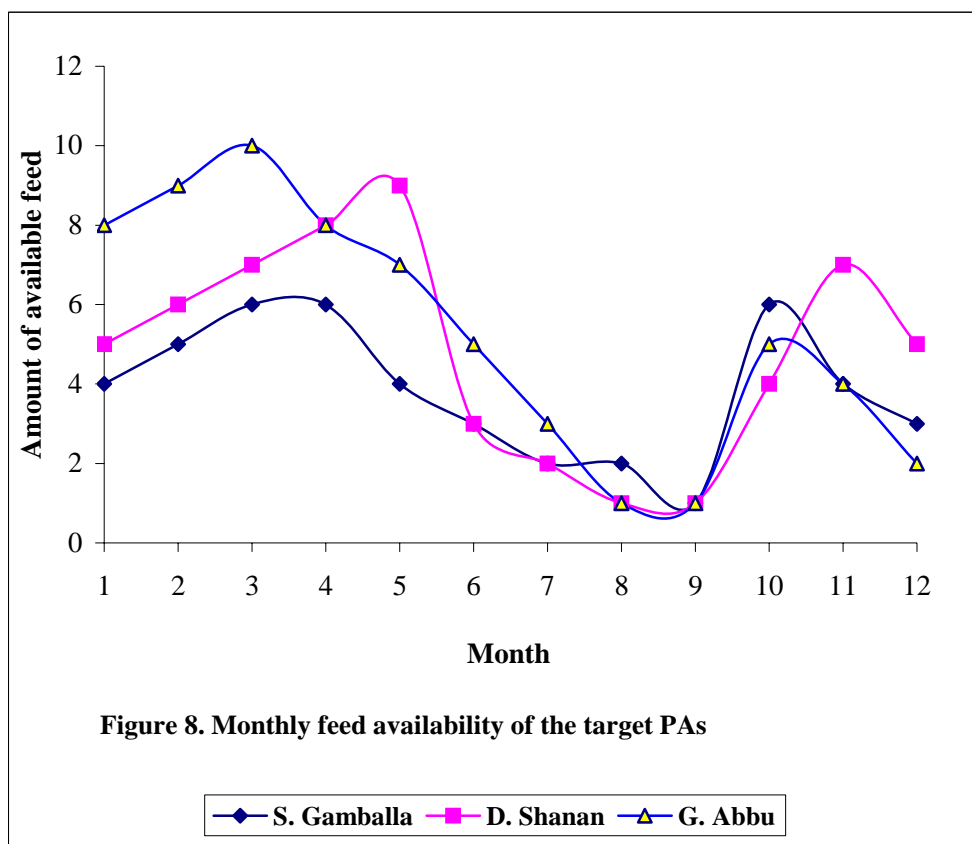
"Bona aduun majajaa

Ganna dhoqqeetu majajaa

Arfaasaa roobe wayyaa

Biirraa dheerate wayyaa" It is to mean that during dry and wet

season livestock suffer from hot and cold stress and it is better if "Birra" is longer.



As one can understand from the proverb above these seasons (Bona, Arfasa, Ganna and Birra), were used to indicate seasons of excess and shortage of feeds. But according to the respondents this proverb is hardly true currently because of climatic changes in the area. For example March was previously known to be start of the rain but in recent years rain starts in June and terminates also very early.

Generally the most important causes for feed shortage reported were encroachment of crop production to grazing land, increased population of both human and livestock number and fluctuation of climatic conditions. Most of the previously known grazing lands are now turned in to crop due to population growth.

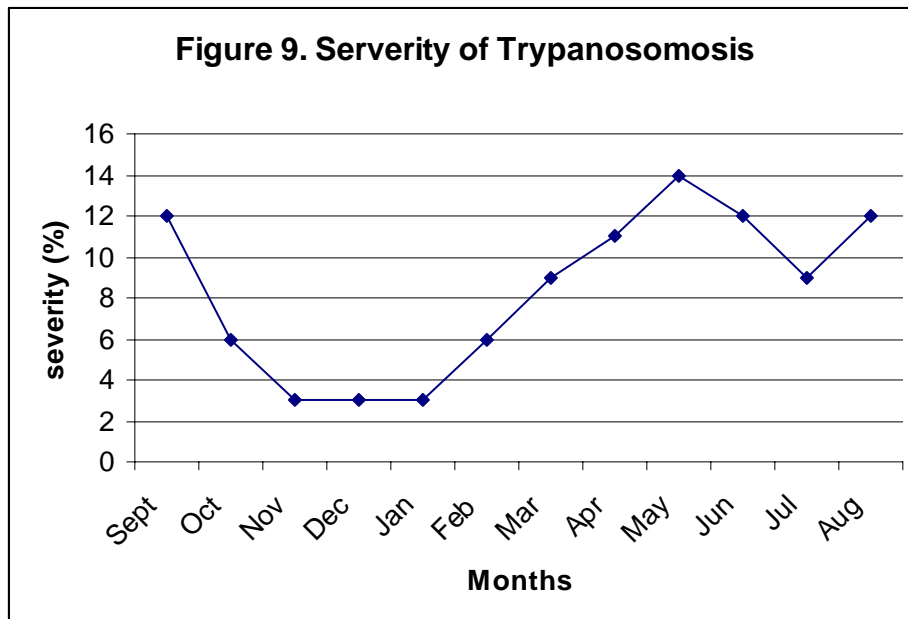
Possible suggestions

- ✓ Proper conservation and utilization of crop residues and natural pasture
- ✓ Herd reduction and hence keeping minimum possible number of livestock
- ✓ Avoiding communal grazing which actually causes much of livestock diseases
- ✓ Allocating enough land for grazing and paddock and rotational grazing
- ✓ Feeding leaves of available trees and shrubs
- ✓ Assistance from the government in providing some feed technologies

Major health problems

Next to feed, disease is one of the most serious problems responsible for low production and productivity and death of livestock in the area. Trypanosomosis (*gandi*), Mastitis, Anthrax (*abba sanga* or *cita*), black leg (*abba gorba*), pasturolosis (*gororsa*), *guba*, bloating (*bokoksaa*), toxicity of wilted sorghum were the most common diseases reported. Some of these diseases are accidental while others are prevailing through out the year. Some of the diseases are feed induced and aggravated during period of feed shortage. As can be seen from Figure 9. trypanosomosis (*gandii*) is the disease affects cattle through out the year but reaches its peak in May and this coincides with the peak of feed shortage in the area. Oxen are reported to be the most affected classes of cattle by *gandii* because of two main reasons; work stress and less time for grazing. Disease like Anthrax, black leg, and *guba* occur mostly in Birra season starting at the end of ganna (August to December).

Bloating is caused by feeding on leguminous plants like clover (*siddisaa*) just before flowering (end of August to start of October) and toxicity of wilted sorghum was reported to be in years of rain shortage. The key informants speculate that due to rain shortage when the sorghum become wilted, a worm is produced in the shoot of sorghum and on feeding this plant the worm is also ingested and become poison to the animal. These problems are seasonal and can be minimized by appropriate management.



Different cultural practices are used to treat animals for the different diseases mentioned. Some farmers use tree leaves, roots of trees and other cultural practices like the use of hot iron to treat sick animals. They also reported use of drugs purchased from local drug vender or from any other open markets. Local *areke* and rapeseed and practice of piercing of the ribs were reported to treat bloating. Also some farmers use the newly

emerging false banana shoot to treat bloating. They withdraw the shoot and then send it to the stomach through throat so that gas may come out.

Mastitis is also raised as a critical problem in the area. According to the key informants currently it is very difficult to find cows having four normal teats. They identify mastitis when the teat become swollen and reddish, produce pus and totally closed.

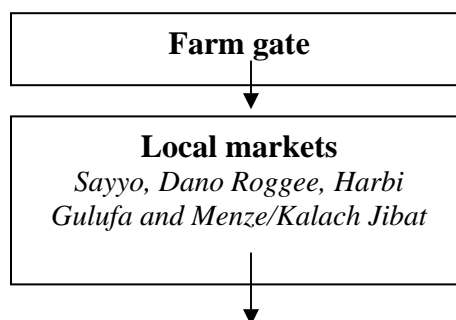
Livestock marketing

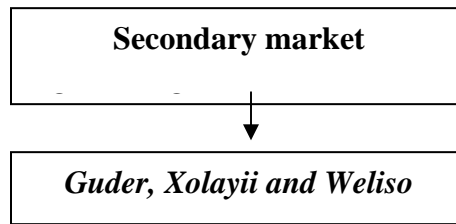
Farmers sale livestock to generate cash for their livelihoods. However, the type of livestock species to be sold depends on the extent of the problem the household is facing. For instance, according to farmers, the less favored species (chicken and small ruminants) are sold frequently to cover relatively small household expenses. On the other hand cattle, the most preferred species in the area are used as asset and guarantee and they are sold as a last resort depending on the seriousness of money demanded. Generally livestock are sold to cover the expenses which include *inter alia* settlement of input debt, health, schooling, and social issues eg. weeding.

Market Channel

In any marketing, there is a chain of steps through which a given product passes starting from its original unit of production until it reaches the final consumers. Livestock as a product passes from producers through traders, fatteners, butchers and processors to reach the final consumers. In the surveyed area livestock marketing starts from farm gate where small petty traders collect livestock and bring them to primary or local markets (Sayyo, Danno Roggee, Harbi Gulufa and Menze/Kalach Jibat). Moreover, local farmers also bring their livestock to the primary market. Traders purchase relatively large number of animals from primary markets for selling to secondary markets (Shenen, Silkamba and Benja). Again big traders purchase and supply livestock from secondary market to the next marketing stage (Guder, Xolayii, Weliso). There is also a report where very insignificant farmers or traders could directly take their livestock from farm gate or primary market to terminal market. In the study area consumers get meat either through kircha system by direct purchase of live animal or from butchers. In the process of livestock marketing, farmers reported the distance of the local market and unforeseen cash demand as a factor for selling their animal with relatively lower price at farm gate. Market structure of the study area is depicted in Figure 10. below.

Figure 10. Livestock market structure of the study area





Market information

Farmers in Ethiopia in general and in the study area in particular have weak bargaining power due, in part, to lack of information about markets. As a result they are exposed to the exploitation of middlemen because the majority of them have no up to date information on the prevailing market prices, supply and demand situations and other information, which can be used in decision making. The only source of information used by farmers of the surveyed area is the informal communications among themselves in the market or elsewhere. The majority of the farmers become aware of the prices only upon arrival in the market place. Others get information about previous market days by asking their neighbors who had been there. On the other hand, few farmers visit the local market before they trek their animals. According to farmers, poor infrastructure development (road and telecommunication services) of the area has contributed much to the lack of market information.

Price formation

In an open market price formation mainly depends on demand and supply. However prices are also influenced by information and other social and cultural factors. According to farmers, during season of poor crop performance the price of livestock is very low as compared to that good cropping season. On the other hand, during holidays the price increases. For example, the price of small ruminant and chicken rises during Easter, Christmas and on the commencement of New Year while the price of cattle is high during Meskel and Epiphany. It was also reported that the price for oxen is high starting from January to March due to their high demand for traction. Selection criteria used during purchasing also affects the price given for the particular animal. According to respondents for instance animal having red color are more preferred on the market than black colored animals because cattle of black color are highly attacked by flies (tryps) locally known as *qarxasa* or *warana* and hence their market price varies accordingly. Some times prices are also formed through negotiation between farmers and traders with the help of brokers. In this case brokers have paid from both sellers and buyers side for their facilitation role. This is done mostly in kind (local drinks) locally called '*finxir*' than in cash. Generally farmers of the study area are price takers due to lack of market information.

Transportation

In the study area transportation facilities are poorly developed. As a result trekking is the dominant means of taking animals to local markets. Small traders who purchase animals

from remote markets and local market also use similar method to supply animals for the secondary market.

Marketing constraints

Lack of market information, poor infrastructure, cash shortage, low market competitiveness were some of marketing problems identified by the farmers.

Problem Ranking

After thorough discussion with the key informants the major constraints identified (feed shortage, livestock disease, marketing, breeding bulls, water and credit) were ranked using pair wise ranking techniques. As can be seen below all problems were not necessarily uniform across the target PAs.

Table 5. Pair-wise ranking of constraints in Gidda Abbu PA

Constraints	Disease	Feed	Market	Breeding bulls	Score	Rank
Disease	-	Disease	Disease	Disease	3	1
Feed		-	Feed	Feed	2	2
Market			-	Market	1	3
Breeding bulls				-	0	4

Table 6. Pair-wise ranking of constraints in Sayyo Gamballa PA

Constraints	Feed	Disease	Market	Credit	Water	Score	Rank
Feed	-	Feed	Feed	Feed	Feed	4	1
Disease		-	Disease	Disease	Disease	3	2
Market			-	Market	Market	2	3
Credit				-	Credit	1	4
Water					-	0	5

Table 7. Pair wise ranking of constraints in Danno Shanan PA

Constraints	Feed	Market	Disease	Credit	Water	Score	Rank
Feed	-	Feed	Feed	Feed	Feed	4	1
Market		-	Market	Market	Market	3	2
Disease			-	Disease	Disease	2	3
Water				-	water	1	4
Water shortage					-	0	5

Conclusion

It can be concluded that although livestock play a momentous role in the livelihood of the farming community, livestock keepers are facing incredible predicaments mainly caused by severe feed and health problem. In line with that, the production and productivity of the livestock is declining through time due to inadequate animal feeds both in quantity and quality, poor management practices and poor health facilities in the area. Moreover, poor resource endowment and lack of awareness of the farmers reflects their inability to acquire knowledge and new technologies to boost the contribution of livestock in their livelihood.

According to the respondents, the major livestock production constraints were feed shortage, disease, market, breeding bull, credit and water probably in that order of importance. Therefore, empowerment of the farming community through training about the general husbandry practices and improved livestock technologies will be the first step in order to change the current scenario. In addition to that, there is no awareness about the importance of indigenous animal genetic resources though they practice some selection based on their utility and socio-cultural value. Thus, identification of the preferred group of cattle and designing some conservation strategies and technique is highly demanding in the area as it could be well revealed on this report.

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